AIR QUALITY MODELING REPORT
SNOWMOBILE AND SNOWCOACH EMISSIONS

WINTER USE PLAN
Post Supplemental Environmental Impact Statement Analysis

YELLOWSTONE NATIONAL PARK

Prepared for

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August 2013*

*This is the final air quality modeling report prepared in support of the Record of Decision for the Yellowstone Winter Use Plan/Supplemental EIS; it supersedes the February 2013 report issued in support of the Supplemental EIS.

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1.0 Introduction and Background

In support of the Winter Use Plan Final Supplemental Environmental Impact Statement (FSEIS) for Yellowstone National Park (Yellowstone), Air Resource Specialists, Inc. (ARS) completed an analysis of potential air quality impacts from snowmobile and snowcoach operations. This report analyzes potential air quality impacts for several alternatives utilizing air dispersion modeling and other accepted methods and models. Motorized over-snow vehicle (OSV) vehicle entry limits and other details for each of the alternatives were provided by NPS to ARS and are discussed in Section 3.0 and Appendix A. This air quality study is part of the National Park Service's (NPS) efforts to complete a long-term analysis of the environmental impacts of winter use in the parks.

Within Yellowstone, all snowmobiles must also meet Best Available Technology (BAT) requirements. The assessment of alternatives analyzed in this study is based on implementation of the associated entry limits and BAT requirements under consideration in the FSEIS.

For this air quality study of OSV emissions in Yellowstone, maximum predicted ambient concentrations of carbon monoxide (CO), nitrogen dioxide (NO_2), and particulate matter (PM_{10} and $PM_{2.5}$) were calculated using U.S. Environmental Protection Agency (EPA) approved air quality models. Impacts for each alternative were assessed with respect to the National Ambient Air Quality Standards (NAAQS). Modeling results were also compared to Prevention of Significant Deterioration (PSD) increments for particulate matter, and potential visibility impacts for each alternative were assessed. Winter-season emission estimates for criteria pollutants (CO, PM, and nitrogen oxides (NO_x)), hydrocarbons (HC), and hazardous air pollutants (HAPs) (benzene, 1,3 butadiene, formaldehyde, and acetaldehyde) were calculated. The methodology employed for this study is discussed in the following sections.

2.0 Regulatory Overview

Yellowstone is classified as a Class I area under the Federal Clean Air Act. This air quality classification is to provide protection against air quality degradation in national parks and wilderness areas. The Clean Air Act defines mandatory Class I areas as national parks over 6,000 acres, wilderness areas over 5,000 acres, and national memorial parks over 5,000 acres designated as of the date of the Act.

For this study, dispersion modeling was utilized to predict concentrations of CO, nitrogen dioxide (NO_2), and particulates (PM_{10} and $PM_{2.5}$) for a short-term localized basis at specific locations in the parks. These predicted concentrations were assessed with respect to the NAAQS, which are discussed below, to determine the potential for air

quality impacts. In addition, an emission inventory was completed for the four (4) pollutants discussed below to assess regional OSV emissions during the winter season. Also, as a Class I area, an analysis of potential visibility impacts resulting from OSV emissions was conducted for four (4) areas. The methodology and results of this visibility analysis are presented in Section 8.0.

In 2002, EPA adopted new standards for new non-road engines, including snowmobiles, which were previously unregulated. As a significant source of air pollution, newly manufactured non-road engines will need to meet exhaust emission standards. For snowmobiles, the new HC and CO standards began to take effect for the 2006 model year, with a 50 percent phase-in requirement. Further details on these standards are provided below in Section 4.0.

2.1 Pollutants

Carbon monoxide (CO), a colorless, odorless, and poisonous gas, is produced in locations with motor vehicles, primarily by the incomplete combustion of gasoline and other fossil fuels. Health effects include impairment of the central nervous system, particularly on people with heart disease. CO also interferes with the transport of oxygen in the blood. In the vicinity of roadways, the majority, if not all, CO emissions are from motor vehicles. CO concentrations can vary greatly over relatively short distances. Elevated concentrations are usually limited to locations near crowded intersections, typically along heavily traveled and congested roadways.

Consequently, CO concentrations must be predicted on a localized or microscale basis. Elevated traffic volumes of snowmobiles and snowcoaches on certain park roadways could result in localized increases in CO levels. Therefore, the mobile source analysis evaluated CO concentrations from snowmobiles and snowcoaches at several modeling locations within the park.

Particulate matter (PM_{10} and $PM_{2.5}$) is emitted into the atmosphere from a variety of sources: industrial facilities, power plants, construction activity, etc. Gasoline powered vehicles typically do not produce any significant quantities of particulate emissions. Although less relevant to this study, diesel-powered vehicles, especially heavy trucks and buses, also emit particulates, and particulate concentrations may be locally elevated near roadways with high volumes of heavy diesel-powered vehicles. The mobile source analysis evaluated particulate (PM_{10} and $PM_{2.5}$) concentrations from snowmobiles and snowcoaches at several modeling locations within the park.

Hydrocarbon (HC) emissions from motor vehicles can result from partially-burned fuel emitted through the tailpipe and from fuel evaporations from the crankcase, carburetor and gas tank. Hydrocarbons are also released from gasoline fuel vapor when vehicles are re-fueled at gas stations and when bulk storage tanks are refilled. When exposed to sunlight, hydrocarbons or volatile organic compounds (VOCs) contribute to formation of harmful ground level ozone, also known as smog. For the purposes of this study, hydrocarbons may also be expressed as VOCs, which include air toxins or hazardous air pollutants (HAPs). Within the park, these pollutants are of primary concern due to their potential serious health effects on NPS workers and visitors.

Air toxins or HAPs associated with motor vehicles also result from fuel evaporation and the fuel-burning process. These pollutants include a variety of chemicals known to cause cancer, poisoning and other ailments. The emission inventory completed for this study included hydrocarbon emissions as well as the following HAPs: benzene; 1,3 butadiene; formaldehyde; and acetaldehyde.

Nitrogen oxides (NO_x), are typically of principal concern because of their role as precursors in the formation of photochemical oxidants, such as ozone. Ozone is formed through a series of reactions that take place in the atmosphere in the presence of sunlight. However, ozone is not an issue in the park in the winter, although NO_x also contributes to atmospheric particles, and can cause respiratory problems and visibility impairment. NO_x emissions from mobile sources and the pollutants formed from NO_x can be transported over long distances, so they are generally examined on a regional basis and are assessed in the emission inventory component of this study. However, on a localized basis, the mobile source analysis evaluated NO_2 concentrations from snowmobiles and snowcoaches at several modeling locations within the park, for comparison to the 1-hour NAAQS.

2.2 Air Quality Standards

As required by the Clean Air Act and its amendments, the Environmental Protection Agency has established primary and secondary National Ambient Air Quality Standards (NAAQS) for six major air pollutants: CO, NO_2, ozone, particulate matter (PM_{10} and $PM_{2.5}$), SO_2, and lead. The NAAQS of primary concern for this analysis (CO, NO_2, PM_{10} and $PM_{2.5}$) are shown in Table 2-1.

The primary standards protect public health, and represent levels at which there are no known significant effects on human health. The secondary standards are intended to protect the nation's welfare, and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the environment. For CO, NO_2, PM_{10} and $PM_{2.5}$, the primary and secondary standards are the same.

Impacts for each alternative were assessed with respect to the NAAQS and relative to current and historical conditions. For Wyoming, Montana, and Idaho, the applicable state standards for CO, NO_2, and particulates are the same as the federal standards, with the exception of the 1-hour CO standard in Montana, which is 23 ppm.

Since Yellowstone is classified as Federal Class I area, PM_{10} increment comparison under PSD was also assessed. PSD increments are the maximum permitted increases in pollutant concentrations over baseline levels. For Class I areas, the PM_{10} PSD increments are 4 and 8 micrograms per cubic meter, for the annual and 24-hour averaging periods, respectively. Winter OSV emissions were considered increment consuming or contributing sources for this analysis. This study only assessed PSD increments for the 24-hour averaging period, since the sources of concern are only present during the winter season and an applicable annual average cannot be prepared. This assessment is a screening level approach and may indicate that a detailed analysis is required if concentrations are near the PM_{10} PSD increments. Furthermore, as the

methodology employed in this study is a screening-level analysis, it is not intended for regulatory purposes and does not constitute a regulatory PSD increment consumption analysis.

Table 2-1
National Ambient Air Quality Standards

Pollutant	Primary		Secondary	
	PPM	Micrograms Per Cubic Meter	PPM	Micrograms Per Cubic Meter
Carbon Monoxide (CO)				
Maximum 8-Hour Concentration[1]	9		None	
Maximum 1-Hour Concentration[1]	35			
Nitrogen Dioxide (NO_2)				
Annual Arithmetic Mean	0.053		Same as Primary	
Maximum 1-Hour Concentration[2]	0.100			
Respirable Particulates (PM_{10})				
Maximum 24-Hour Concentration[3]		150	Same as Primary	
Respirable Particulates ($PM_{2.5}$)				
Annual Arithmetic Mean[4]		15	Same as Primary	
Maximum 24-Hour Concentration[5]		35		

Notes:
[1] Not to be exceeded more than once per year.
[2] To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb (effective January 22, 2010).
[3] Not to be exceeded more than once per year on average over 3 years.
[4] To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 ug/m^3.
[5] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 ug/m^3.
PPM = parts per million

Source: 40 CFR Part 50—National Primary and Secondary Ambient Air Quality Standards

2.3 Air Quality Monitoring

In recent years, ARS has been contracted by NPS to conduct winter air quality monitoring in Yellowstone near the Old Faithful geyser. Meteorological, gaseous, and particulate variables were monitored continuously.

The most recent monitored CO and $PM_{2.5}$ concentrations at these locations can be found in the *Data Transmittal Report for the Yellowstone National Park Winter Use Air Quality Study December 15, 2009 - March 15, 2010*, Air Resource Specialists, July 2010. The highest CO 1- and 8-hour averages were 2.5 and 0.8 ppm, respectively, at the Old Faithful monitor for 2009-2010. These were well below the respective 1- and 8-hour CO NAAQS (35 and 9 ppm), Montana and Wyoming air quality standards. Similarly, the highest $PM_{2.5}$ 24-hour average in 2009-2010 was 5.1 micrograms per cubic meter at the

Old Faithful monitor, which was well below the $PM_{2.5}$ NAAQS of 35 micrograms per cubic meter for the 24-hour averaging period.

Since monitoring began in 1998 for CO and in 2002 for $PM_{2.5}$ at Yellowstone, measured pollutant concentrations have steadily decreased, consistent with the decrease in number of snowmobile visits and the recent snowmobile technology emission requirements under the temporary plans. As documented in the *Winter Air Quality Study 2004-2005*, John D. Ray, Ph.D., NPS Air Resources Division, December 2005, at the West Entrance, the highest measured 8-hour average CO concentrations have gone from a near NAAQS exceedance of 8.9 ppm in the 1998-1999 winter season to 1.0 ppm in 2004-2005. At Old Faithful, the highest measured 8-hour average CO concentrations have declined from 1.2 ppm in the 2002-2003 winter season to 0.8 ppm in 2009-2010.

Similarly, the highest measured 24-hour average $PM_{2.5}$ concentrations at Old Faithful have declined from 32.1 micrograms per cubic meter in the 2002-2003 winter season to 5.1 micrograms per cubic meter in 2009-2010. These monitored maximum values demonstrate a distinct trend of improvement in winter pollutant concentrations in Yellowstone.

3.0 Alternatives

OSV entry limits and other details of the alternatives required as inputs for the air quality modeling and emission inventory were provided by the National Park Service (NPS). Descriptions of the alternatives are provided in the FSEIS. In addition, distribution factors spreadsheets are included as Appendix A of this report. A summary of the development of modeling scenarios analyzed in this study follows.

The development of a model to distribute use within the park, based on the entrance limits specified under each alternative, is necessary in order to understand the impacts of the alternatives on park resources and values. These models, called travel factors, were developed in the past for the Temporary Winter Use EA and the 2007 Plan/EIS. The scenarios attempt to predict the total amount of daily winter recreational (motorized) traffic on each road segment within Yellowstone, by vehicle type.

The scenarios provide both a sense of how much snowmobile or snowcoach traffic one can expect in a day on each road segment within the parks and a comparison of the relative differences among the alternatives. This approach facilitates an understanding of the magnitude of differences of the environmental consequences of each alternative. The alternatives also provide fundamental air quality inputs to the modeling analyses.

4.0 Mobile Source Modeling

Estimates of maximum concentrations for pollutant averaging periods were prepared to compare with the national ambient air quality standards (which are based on 1- and 8-hour averages for CO concentrations, 1-hour averages for NO_2 concentrations, and 24-hour averages for particulate concentrations). The prediction of CO, NO_2, PM_{10} and $PM_{2.5}$ concentrations generated by over-snow vehicles takes into account emissions data, meteorological phenomena, vehicle traffic/travel conditions, and physical configurations (of roadways and staging areas). The mathematical formulations that comprise the dispersion and emission models attempt to simulate the extremely complex physical phenomenon as closely as possible. Although most dispersion models are typically conservative, especially under adverse meteorological conditions, the results of the modeling below compared with monitored concentrations show predicted concentrations within the reasonable in range of possibility, considering that all models must employ approximations of actual conditions.

The analysis employs a modeling approach widely used for evaluating air quality impacts throughout the country. This approach was coupled with a series of conservative assumptions for meteorology, traffic conditions, background concentration levels, etc. This combination results in conservative, yet realistic, estimates of expected pollutant concentrations and resulting potential impacts to air quality from the winter use vehicle emissions.

4.1 Dispersion Modeling

Air dispersion modeling analyses were conducted for emissions of CO, NO_2, PM_{10}, and $PM_{2.5}$ employing EPA's CAL3QHCR and AERMOD models. The models and modeling inputs, parameters, and assumptions, along with emission factors are discussed in detail below.

4.1.1 CAL3QHCR

At the entrance stations and roadways selected for study, analysis was performed using EPA's CAL3QHCR model (*Addendum to the User's Guide to CAL3QHC, A Modeling Methodology for Predicting Pollutant Concentrations Near Roadway Intersections*, Office of Air Quality, Planning Standards, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina). The CAL3QHCR model is an enhanced, but separate, version of CAL3QHC, which is based on the CALINE-3 line source dispersion model, with an additional algorithm for estimating vehicle queue lengths at signalized intersections. It is a Gaussian model utilized for predicting CO and PM concentrations along roadway segments and assumes the dispersion of pollutants downwind of a pollution source along a Gaussian (or normal) distribution. The pollution source is the emissions from motorized vehicles operating under free flow conditions. CAL3QHCR processes up to a year of meteorological data, vehicle emissions and traffic data using algorithms from CAL3QHC.

For this analysis, CAL3QHCR was run using the Tier II approach, with detailed data reflecting traffic conditions for each hour of the day and week. In addition to maximum hourly averages, CAL3QHCR is able to calculate running 8-hour averaged CO or 24-hour averaged PM concentrations. Similar to CAL3QHC, CAL3QHCR also provides the refinement of including the contribution of emissions from idling vehicles in the overall concentration. The model's queuing algorithm requires additional input for local traffic parameters, such as signal timing, and performs delay calculations to estimate the number of idling vehicles. In this study, locations with snowmobiles and snowcoaches stopping and idling were simulated with the characteristics of a signalized intersection for CAL3QHCR modeling.

4.1.2 AERMOD

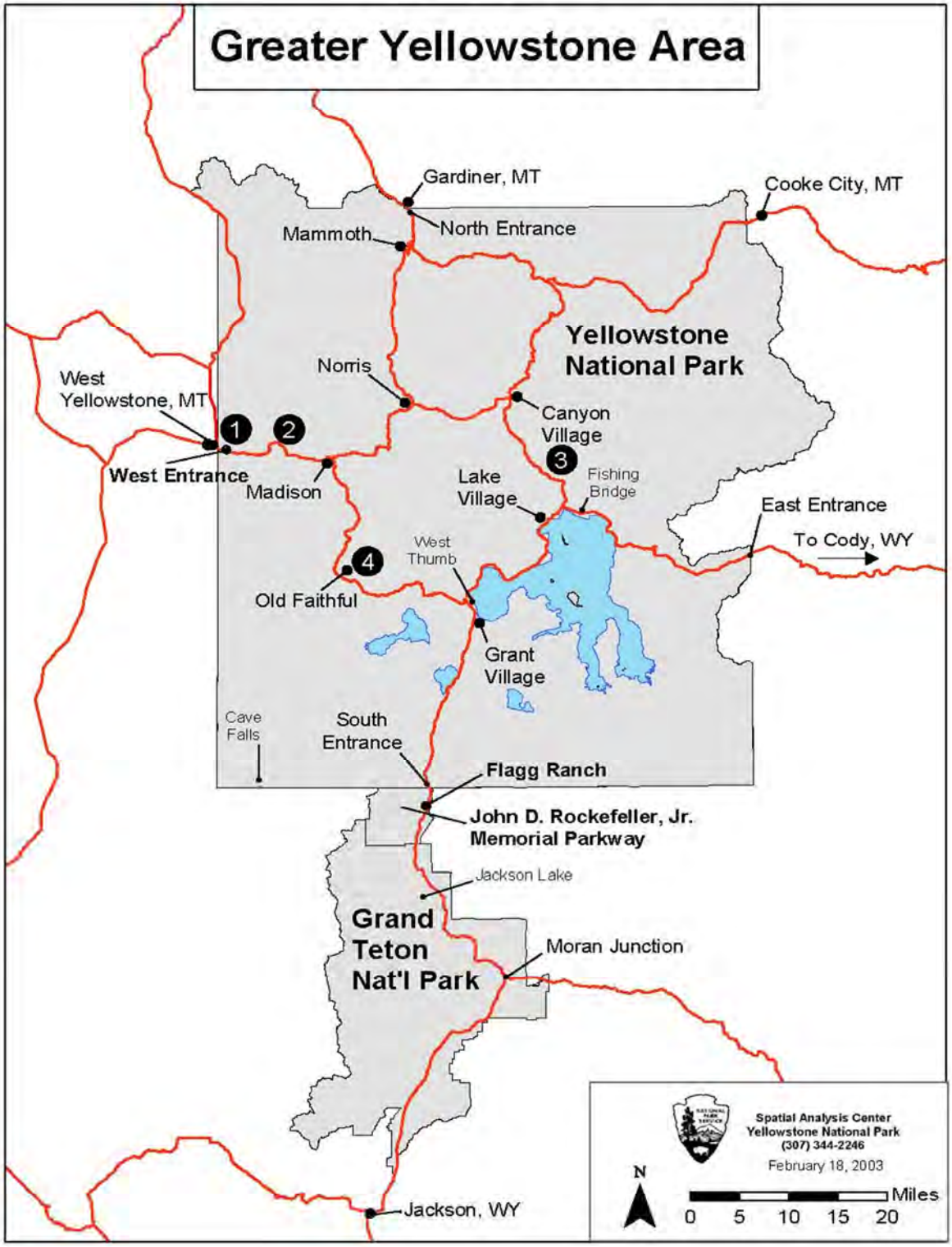
Air pollutant concentrations from emissions at the snowmobile staging areas were evaluated with the AERMOD, developed by EPA. All modeling was performed using BEE-Line Software's BEEST suite, which integrates AERMOD (Version 12060), ISC, and related programs (AERMET, AERMAP, BPIP, etc.) into a graphical user interface. Since vehicles in the staging area are clustered (in the parking lots), the AERMOD model was selected, utilizing its area source dispersion modeling capabilities. All AERMOD technical options selected followed the *regulatory default option*.

Model inputs also specified rural conditions for dispersion coefficients and other variables. Terrain data for the park was obtained from United States Geological Survey (USGS) using The National Map Seamless Server website. Coordinates for the modeled area were input into a coordinate search in the National Map, in order to zoom into the site and 1-Arc Second National Elevation Dataset (NED) terrain files were downloaded as a Tagged Image File Format (TIFF) file for an area big enough to encompass the area to be modeled area.

4.2 Modeling Locations

Four (4) locations in the park were selected for air quality modeling because they were expected to generate the most elevated ambient air quality impacts associated with snowmobile and snowcoach operations, due to expected vehicle traffic levels. These locations (shown on Figure 4-1) are: Site 1, The West Entrance; Site 2, West Entrance to Madison Junction; Site 3, Canyon to Fishing Bridge; and Site 4, Old Faithful Staging Area. At the roadway modeling locations, multiple ground-level receptors (computer simulations of roadside locations) were modeled for CAL3QHCR along the approach and departure links at spaced intervals, outside of the mixing zone, the area of uniform emissions and turbulence. The receptor with the highest predicted concentration was used to represent each modeling site for each alternative.

Figure 4-1


Greater Yellowstone Area
Gardiner, MT
Cooke City, MT
Mammoth
North Entrance
Yellowstone National Park
Norris
West Yellowstone, MT
Canyon Village
1
2
3
West Entrance
Madison
Lake Village
Fishing Bridge
East Entrance
To Cody, WY
West Thumb
4
Old Faithful
Grant Village
Cave Falls
South Entrance
Flagg Ranch
John D. Rockefeller, Jr. Memorial Parkway
Jackson Lake
Grand Teton Nat'l Park
Moran Junction
Jackson, WY
Spatial Analysis Center
Yellowstone National Park
(307) 344-2246
February 18, 2003
N
Miles
0 5 10 15 20

Site 1: West Entrance

The West Entrance is a unique location for modeling as snowmobiles and snowcoaches approach the entrance station and then stop for a short time while entrance permits are checked. Vehicles experience delay and queuing traffic conditions. In addition, this location is in close proximity to West Yellowstone, MT. Modeling was performed based on an average "low speed" approach and departure and an average engine idle time of 30 seconds at each kiosk. The approach and departure paths of the vehicles were simulated by line sources or "links", up to 1,000 feet in each direction from the West Entrance. CAL3QHCR modeling was performed for this intersection-type location.

At the West Entrance modeling location, receptors were spaced oppositely in each direction out from a central receptor placed at the origin of the queuing links, with receptors placed in pairs on each side of the links. Receptors were placed 3 feet both east and west (lengthwise) of the central receptor; the next pair of receptors were placed 25 feet from the central receptor. The remaining receptors were placed at intervals of 25 feet out to a distance of 500 feet along the link.

Site 2: West Entrance to Madison

For many of the alternatives, this modeling location is expected to have the highest traffic volumes compared to other roadway segments in Yellowstone. This is expected to result in elevated emissions and associated impacts from snowmobile and snowcoach traffic. CAL3QHCR modeling was performed for the free-flow roadway segments of this location, employing emissions data for OSVs traveling at "cruise" speeds (see discussion of modes below). As discussed above, vehicle traffic levels were based on the proposed entry limits in the winter use plan for each alternative.

For the West Entrance to Madison location, receptors were spaced along 2000 feet of the straight portions of the links. For the middle section of this modeling location, a gradual curve in the roadway geometry could result in potential overlapping emission contributions from roadway link segments at some modeling wind directions. Therefore, along these links, receptors were placed in pairs at intervals of 5, 25, 25, 50, 200, 200, 1500, and 1500 feet in both directions from the central receptors at the apex of the curve. As at the West Entrance, receptors were placed in pairs on each side of the links.

Site 3: Canyon to Fishing Bridge

This modeling location is expected to have moderate traffic volumes compared to other roadway segments in Yellowstone and is expected to result in lower emissions and associated impacts. CAL3QHCR modeling was performed for the free-flow roadway segments of this location, employing emissions data for snowmobiles and snowcoaches traveling at "cruise" speeds. As discussed above, vehicle traffic levels were based on the proposed entry limits for each alternative. For this location, receptors were placed in pairs on each side of the modeling roadway at intervals of 100 feet in both directions.

Site 4: Old Faithful Staging Area

The Old Faithful staging area was selected for modeling because of the concentration of emissions from snowmobiles and snowcoaches bringing visitors to the Old Faithful Geyser Basin and parking area. The primary contributor of emissions is the idling of engines after visitors enter and also prior to leaving these staging areas.

At the staging areas, emissions are clustered in distinct areas (the parking lots). Therefore, the AERMOD model was selected for area source modeling. Emissions at the staging area were calculated only for engine idling, which is assumed to be a total of three minutes on average for each vehicle, including during arrival and before departure. Engine emission calculations for the staging area did not explicitly include ingress and egress emissions from the vehicles, as these were included in the roadway segment emissions. It was conservatively assumed that all vehicles traveling from Madison and West Thumb to Old Faithful would enter the Old Faithful staging area, to maximize the number of vehicles included in the modeling for this site.

The Old Faithful staging area, including the three (3) main parking areas, was modeled as a 630 meter by 1037 meter rectangular area source for AERMOD modeling, aligned north-south. These dimensions were confirmed by Yellowstone staff.

At the staging areas, a grid network of receptors was modeled for AERMOD along the perimeters of the area sources representing idling vehicles. Receptors were arranged in rectangular grids surrounding the Old Faithful staging area. At Old Faithful, receptors were placed at 100 meter intervals around the perimeter of the staging area out to approximately 1.5 kilometers in both the east and west directions, and out to approximately 2.0 kilometers in both the north and south directions.

4.3 Vehicle Emissions Data

To predict ambient concentrations of pollutants generated by vehicular traffic, emissions from vehicle exhaust systems must be estimated accurately. This analysis focuses primarily on emissions associated with visitor use of OSVs within the park, however, administrative vehicles are also included in the modeling.

Emissions data and vehicle usage data (discussed below) were used for atmospheric dispersion modeling analyses to calculate the ambient levels of CO, NO_2, PM_{10} and $PM_{2.5}$ at four (4) locations within the park, for the alternatives. Emissions data was also utilized to predict the total winter-season emissions of CO, PM, NO_x, HC, and HAPs from the operation of OSVs in the park. The employed for this analysis were obtained from past air quality and emissions testing and research studies. Snowmobile laboratory test data utilized may not reflect actual operating conditions in Yellowstone, as high altitude and low winter temperatures in the parks are likely to decrease overall snowmobile engine performance and increase relative emissions. However, this data may be the best available.

For all alternatives, the analysis assumed that all snowmobiles are 4-stroke engines meeting either the current NPS Best Available Technology (BAT) requirements,

or the proposed New BAT or E-BAT requirements. Current BAT for snowmobiles operating in Yellowstone has been established for CO and HC emissions, at less than 120 and 15 grams per kilowatt hour, respectively. BAT, New BAT, and E-BAT requirements are shown in Table 4-1.

In addition, EPA adopted new standards for new non-road engines in 2002. For snowmobiles, the new standards took effect for the 2006 model year, with a 50 percent phase-in requirement. These standards and the corresponding implementation years are also provided in Table 4-1.

Table 4-1
Snowmobile BAT Requirements and EPA Standards

	Emission Requirement or Standard		**Phase-in***
	Hydrocarbons (HC) (g/KW-hr)	**Carbon Monoxide (CO) (g/KW-hr)**	
NPS BAT	15	120	-
NPS New BAT	15	90	-
NPS E-BAT	15	60	-
EPA Emission Standards			
Model Year			
2006	100	275	50%
2007-2009	100	275	100%
2010	75	275	100%
2012	75	200	100%
Note: * Percent of newly manufactured sleds for the model year that must meet the applicable requirement.			

Composite emission factors for each alternative were calculated by weighting the snowmobile and snowcoach emission factors appropriate for each particular alternative according to usage levels of each vehicle type. These composite emission factors (weighted averages) were inputted to the CAL3QHCR modeling.

4.3.1 4-Stroke Snowmobile Emission Factors

4-stroke snowmobile emission factors for CO, NO_x and HC used this analysis were calculated based on testing performed in the NPS's *Yellowstone Over-snow Vehicle Emission Tests – 2012*, John D. Ray, Gary A. Bishop, Brent Schuchmann, Chris Frey, Gurdas Sandu, Brandon Graver, 2012 (FINAL). This study collected in-use measurements of emissions from two snowmobiles (2011 Arctic Cat TZ1 and a 2012 Ski Doo Bombardier) operating in Yellowstone during March 2012.

Particulate emission factors for 4-stroke snowmobiles were not measured in the above study, and were determined from manufacturers' EPA certification modal emission testing and engine performance results, following standard EPA test procedures, for the BAT-approved snowmobile engines of two different manufacturers (Arctic Cat T660

Touring and Polaris Frontier), in SwRI's *Laboratory Testing of Snowmobile Emissions*, Lela and White, July 2002. Based on these data, the average 4-stroke snowmobile emission factors representative of the current snowmobile fleet are shown in Table 4-2.

Table 4-2
4- Stroke Snowmobile Emission Factors

	PM			CO			HC			NO_X		
	Idle (g/hr)	**Low Speed mph (g/mi)**	**Cruise Speed mph (g/mi)**	**Idle (g/hr)**	**Low Speed mph (g/mi)**	**Cruise Speed mph (g/mi)**	**Idle (g/hr)**	**Low Speed mph (g/mi)**	**Cruise Speed mph (g/mi)**	**Idle (g/hr)**	**Low Speed mph (g/mi)**	**Cruise Speed mph (g/mi)**
BAT snowmobiles	0.49	0.065	0.031	409.7	161.1	18.56	15.83	6.55	1.05	1.41	2.79	9.61
New BAT snowmobiles	0.49	0.065	0.031	216.0	25.0	4.0	13.32	1.3	0.1	0.61	5.2	11.0
E-BAT snowmobiles	0.49	0.065	0.031	144.0	16.67	2.67	8.88	0.87	0.07	0.41	3.47	7.33

4.3.2 Snowcoach Emission Factors

Snowcoach emission factors for this analysis were also obtained from the NPS's *Yellowstone Over-snow Vehicle Emission Tests – 2012*, referenced in the section above. This study measured emissions from five (5) snowcoaches operating in Yellowstone during March 2012. The study, along with others, show that the vehicle operating conditions (altitude, temperature, terrain, vehicle operator, etc.) can greatly affect snowcoach emission factors.

A summary of the idle and traveling (low speeds of less than 15 mph and cruise speeds of 15 to 35 mph) emissions is shown in Table 4-3, representing "current fleet" (non-BAT), administrative snowcoach, and BAT snowcoach emissions, for modeling purposes. BAT snowcoach emissions vary by future alternative, due to differences in fleet mix for each alternative.

The future snowcoach BAT requirements are likely to be based on a technical definition of BAT, rather than meeting actual emission standards, as snowcoaches operate in conditions very different from on-road counterparts.

4.4 Traffic Activity Data

Traffic data for the air quality analysis were derived from snowmobile and snowcoach entry limits and other information for each alternative provided to ARS by NPS (Appendices A and H). Refined microscale, or localized, dispersion modeling analysis was conducted for the each hour of the day, at each of the four modeling locations, to most accurately assess the potential for significant air quality impacts.

Table 4-3
Snowcoach Emission Factors for Modeling

	PM			CO			HC			NO_X		
	Idle (g/hr)	**Low Speed mph (g/mi)**	**Cruise Speed mph (g/mi)**	**Idle (g/hr)**	**Low Speed mph (g/mi)**	**Cruise Speed mph (g/mi)**	**Idle (g/hr)**	**Low Speed mph (g/mi)**	**Cruise Speed mph (g/mi)**	**Idle (g/hr)**	**Low Speed mph (g/mi)**	**Cruise Speed mph (g/mi)**
Current Fleet Snowcoaches	0.048	0.033	0.012	201.9	77.9	138.4	11.3	2.3	4.8	6.53	10.42	9.93
Administrative Snowcoaches	0.04	0.03	0.01	6.66	1.00	0.71	0.33	0.10	2.85	13.32	14.70	10.05
Alternative 2B BAT Snowcoaches	0.058	0.032	0.003	10.7	12.1	103.6	0.8	0.3	0.3	4.05	5.12	4.89
Alternative 3B BAT Snowcoaches	0.059	0.033	0.003	10.7	13.3	123.9	0.6	0.3	0.3	4.09	5.06	4.88
Alternative 4A BAT Snowcoaches	0.059	0.033	0.003	10.6	10.9	84.0	1.0	0.4	0.3	4.14	5.30	4.98
Alternative 4B BAT Snowcoaches	0.060	0.033	0.003	10.7	13.0	118.2	0.7	0.3	0.3	4.12	5.12	4.91
Alternative 4C BAT Snowcoaches	0.059	0.033	0.003	10.7	13.3	123.9	0.6	0.3	0.3	4.09	5.06	4.88
Alternative 4D BAT Snowcoaches	0.060	0.033	0.003	10.8	14.3	140.8	0.5	0.2	0.3	4.09	4.98	4.85

Source: *Yellowstone Over-snow Vehicle Emission Tests – 2012:*, Ray, Bishop, Schuchmann, Frey, Sandu, Graver .

To determine hourly vehicle inputs for the modeling locations, hourly distribution data of OSVs collected by the park was used together with the travel factor spreadsheets previously discussed in Section 3.0 to determine hourly traffic activity and emission factors for each alternative. The modeling for the West Entrance assumed two lanes open in the morning, with about two thirds of daily entries going to the southernmost booth and third going to the middle (north) booth; the northernmost booth is currently unused in winter.

4.5 Meteorological Conditions

Following EPA methodology and guidance from NPS, on-site meteorological data from Yellowstone's Water Tank site IMPROVE monitoring site, along with concurrent upper air data from Riverton, Wyoming Airport, were processed with AERMET for use in the AERMOD modeling. In addition, the same data were processed with the Meteorological Processor for Regulatory Models (MPRM) for use in CAL3QHCR modeling. The meteorological data sets employed for the modeling include five (5) individual full years of data for 2003 to 2007. However, both AERMOD and CAL3QHCR modeling were completed selecting only the January 1st thru March 31st and December 15th thru December 31st periods of each modeling year, as meteorological conditions for these periods would most closely represent the park's winter use season.

4.6 Background Concentrations

Background concentrations are those pollutant concentrations not directly accounted for by the modeling analysis. Background concentrations must be added to modeling results to obtain total pollutant concentrations at prediction sites. Background concentrations can typically be attributed to local sources, long-range transport and natural sources. For this analysis, background levels include smoke (from wood-burning stoves and fireplaces) and other emissions from West Yellowstone. Background concentrations for this analysis were estimated considering the guidelines provided in *Guideline on Air Quality Models, Appendix W to 40 CFR part 51,* Federal Register, November 9, 2005.

Recent data collected at West Yellowstone and Old Faithful monitors provided background concentration estimates of a 1-hour average CO background of 0.17 ppm, and an 8-hour average CO background of 0.15 ppm, based on overnight monitoring data (John D. Ray, Atmospheric Chemist, NPS Air Resources Division, Denver, Colorado, July 2006 personal communication), so that emissions from the daytime OSVs modeled in this analysis would not be "double-counted".

The 24-hour average PM_{10} background concentration was determined from the IMPROVE network aerosol data (gravimetric mass average of 2002-04 annual mean values) and is 4.2 micrograms per cubic meter. The 24-hour average $PM_{2.5}$ background concentration was determined from *$PM_{2.5}$ Winter Air Quality in Yellowstone National Park*, John D. Ray, Ph.D., National Park Service, and is 1.4 micrograms per cubic meter. Consistent with EPA guidance, IMPROVE data provide representative background particulate levels that are not directly affected by winter OSVs emissions, as the

monitoring station is located near Lake Village. All background concentrations used in this analysis are shown in Table 4-4.

Table 4-4
Background Concentrations

CO (ppm)	
1-hour	**8-hour**
0.17	0.15
24-hour Particulates (ug/m^3)	
PM_{10}	**$PM_{2.5}$**
4.2	1.4

Note:
CO backgrounds estimated from average overnight values from John D. Ray (Atmospheric Chemist, NPS Air Resources Division, Denver Colorado), July 2006, personal communication.
Particulate backgrounds based on IMPROVE network aerosol data.

4.7 Modeling Scenarios

Modeling was conducted for all alternatives at the maximum allowable use level using the emission factors provided in Tables 4-2 and 4-3. For example, for Alternative 2, maximum allowable use was modeled as 318 snowmobiles and 78 snowcoaches. For Alternative 3B, maximum allowable use was modeled as 120 BAT snowcoaches. For Alternative 4A, maximum allowable use was modeled as 480 snowmobiles and 60 snowcoaches (46 commercially guided snowmobile transportation events of 10 snowmobiles each, 4 non-commercially guided snowmobile transportation events of 5 snowmobiles each, and 60 snowcoach transportation events comprised of one snowcoach each). All of the modeling scenarios for each alternative are included in Appendix A.

Modeling was also conducted for maximum average use scenarios for Alternatives 4A, 4C, and 4D because seasonal average transportation event size limits apply to oversnow vehicles under these scenarios. Seasonal average transportation event size limits do not apply to modeling scenarios under Alternatives 2, 3 or 4B. The results for these average use scenarios are also included in the tables in Section 5 and are noted with an "AVG" label.

For Alternative 4A-AVG, modeling was conducted for 46 commercial snowmobile transportation events of 7 New BAT snowmobiles each (the maximum allowed average daily use level for snowmobile transportation events) plus 4 non-commercially guided transportation events of 5 New BAT snowmobiles each for a total of 342 snowmobiles and 60 snowcoach transportation events made up of 1 snowcoach.

For Alternative 4C-AVG, modeling was conducted for 46 commercial snowmobile transportation events of 8 E-BAT snowmobiles each (the maximum allowed average daily use level for snowmobile transportation events) plus 4 non-commercially guided transportation events of 5 E-BAT snowmobiles each for a total of 388 snowmobiles and 60 snowcoach transportation events made up of 1.5 snowcoaches each

(the required average daily use level for snowcoach transportation events) for a total of 90 snowcoaches.

For Alternative 4D-AVG, modeling was conducted for 4 non-commercially guided transportation events of 5 New BAT snowmobiles each and 106 snowcoach transportation events made up of 1.5 snowcoaches each (the required average daily use level for snowcoach transportation events) for a total of 159 snowcoaches.

5.0 Dispersion Modeling Results

As noted previously, receptors were placed at multiple locations at each of four modeling locations. The receptor with the highest predicted concentration was used to represent each modeling site for each of the alternatives. CO, NO_2, and PM concentrations were calculated for each location, for each alternative.

For all modeling results, the values shown are the highest predicted concentrations for each receptor location and include background levels. CO concentrations under each alternative were determined using the methodology previously described.

Tables 5-1 and 5-2 show the maximum predicted 1- and 8-hour average CO concentrations for each of the alternatives and fleet assumptions at the analysis sites. The modeling results indicate that winter use vehicle emissions would not result in any exceedances of the CO NAAQS, or the Montana or Wyoming ambient air quality standards, under any of the alternatives.

Table 5-3 shows the maximum predicted 1-hour average NO_2 concentrations for each of the alternatives and fleet assumptions at the analysis sites. Based on guidance in the *Guideline on Air Quality Models, Appendix W to 40 CFR part 51*, and discussion with NPS, a ratio of 0.78 was used to determine the NO_2 fraction of NO_x. The modeling results indicate that winter use vehicle emissions would not result in any exceedances of the NO_2 NAAQS, or the Montana or Wyoming ambient air quality standards, under any of the alternatives.

Table 5-4 shows the maximum predicted 24-hour $PM_{2.5}$ concentrations for each of the alternatives and fleet assumptions at the analysis sites. The modeling results indicate that no winter use vehicle emissions from any of the alternatives would result in exceedances of the 24-hour $PM_{2.5}$ NAAQS, or the Montana or Wyoming ambient air quality standards. In addition, it should be noted that all predicted $PM_{2.5}$ concentrations for this analysis are conservative, as most available emission factors utilized for vehicles assumed total particulates, or PM_{10} as all $PM_{2.5}$. However, the modeling results indicate there would not be any exceedances of the 24-hour PM_{10} NAAQS, or the Montana or Wyoming ambient air quality standards, under any of the alternatives.

Table 5-1
Maximum Predicted 1-hour CO Concentrations
(parts per million)

Scenario	Description	Fleet Assumption	Site 1: West Entrance 1-hour (ppm)	Site 2: West Entrance to Madison 1-hour (ppm)	Site 3: Canyon to Fishing Bridge 1-hour (ppm)	Site 4: Old Faithful Staging Area 1-hour (ppm)
Alternative 1	No Action	Admin SC, BAT SM	0.5	0.5	0.2	0.2
Alternative 2A-M	Interim Regulation	Current SC, BAT SM	10.6	0.9	0.3	0.3
Alternative 2B-M	Interim Regulation, with BAT SC	BAT SC, BAT SM	9.8	0.8	0.3	0.3
Alternative 3B-M	Phase II of SM phase-out (phase-out of comm. SM)	BAT SC	0.7	0.9	0.3	0.2
	Transportation Event Management - MAX					
Alternative 4A-M	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	8.9	0.5	0.2	0.3
Alternative 4B-M	106 SC events, 4 Non-commercial SM events	BAT SC, New BAT SM	0.6	0.8	0.3	0.2
Alternative 4C-M	60 SC events (120 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	6.2	0.8	0.3	0.2
Alternative 4D-M	106 SC events (212 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	0.7	1.5	0.4	0.2
	Transportation Event Management - AVG					
Alternative 4A-AVG	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	4.9	0.4	0.2	0.3
Alternative 4C-AVG	60 SC events (90 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	4.6	0.7	0.3	0.2
Alternative 4D-AVG	106 SC events (159 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	0.6	1.2	0.3	0.2

Note:
NAAQS for CO are 35 and 9 parts per million (ppm), for the 1-hour and 8-hour averaging periods, respectively.

Table 5-2
Maximum Predicted 8-hour CO Concentrations
(parts per million)

Scenario	Description	Fleet Assumption	Site 1: West Entrance 8-hour (ppm)	Site 2: West Entrance to Madison 8-hour (ppm)	Site 3: Canyon to Fishing Bridge 8-hour (ppm)	Site 4: Old Faithful Staging Area 8-hour (ppm)
Alternative 1	No Action	Admin SC, BAT SM	0.2	0.2	0.2	0.2
Alternative 2A-M	Interim Regulation	Current SC, BAT SM	1.6	0.3	0.2	0.2
Alternative 2B-M	Interim Regulation, with BAT SC	BAT SC, BAT SM	1.4	0.3	0.2	0.2
Alternative 3B-M	Phase II of SM phase-out (phase-out of comm. SM)	BAT SC	0.2	0.3	0.2	0.2
	Transportation Event Management - MAX					
Alternative 4A-M	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	1.3	0.2	0.2	0.2
Alternative 4B-M	106 SC events, 4 Non-commercial SM events	BAT SC, New BAT SM	0.2	0.2	0.2	0.2
Alternative 4C-M	60 SC events (120 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	1.0	0.3	0.2	0.2
Alternative 4D-M	106 SC events (212 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	0.2	0.4	0.2	0.2
	Transportation Event Management - AVG					
Alternative 4A-AVG	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	0.7	0.2	0.2	0.2
Alternative 4C-AVG	60 SC events (90 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	0.7	0.2	0.2	0.2
Alternative 4D-AVG	106 SC events (159 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	0.2	0.3	0.2	0.2

Note:
NAAQS for CO are 35 and 9 parts per million (ppm), for the 1-hour and 8-hour averaging periods, respectively.

Table 5-3
Maximum Predicted 1-hour NO_2 Concentrations
(parts per billion)

Scenario	Description	Fleet Assumption	Site 1: West Entrance 1-hour (ppb)	Site 2: West Entrance to Madison 1-hour (ppb)	Site 3: Canyon to Fishing Bridge 1-hour (ppb)	Site 4: Old Faithful Staging Area 1-hour (ppb)
Alternative 1	No Action	Admin SC, BAT SM	9	11	4	0
Alternative 2A-M	Interim Regulation	Current SC, BAT SM	28	49	16	1
Alternative 2B-M	Interim Regulation, with BAT SC	BAT SC, BAT SM	23	45	15	1
Alternative 3B-M	Phase II of SM phase-out (phase-out of comm. SM)	BAT SC	19	17	6	0
	Transportation Event Management - MAX					
Alternative 4A-M	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	33	70	22	0
Alternative 4B-M	106 SC events, 4 Non-commercial SM events	BAT SC, New BAT SM	10	19	7	0
Alternative 4C-M	60 SC events (120 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	30	50	16	0
Alternative 4D-M	106 SC events (212 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	19	28	7	1
	Transportation Event Management - AVG					
Alternative 4A-AVG	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	23	52	17	0
Alternative 4C-AVG	60 SC events (90 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	24	40	13	0
Alternative 4D-AVG	106 SC events (159 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	15	25	7	0

Note:
NAAQS for NO_2 is 100 parts per billion (ppb), for the 1-hour averaging period.

Table 5-4
Maximum Predicted 24-hour $PM_{2.5}$ Concentrations
(micrograms per cubic meter)

Scenario	Description	Fleet Assumption	Site 1: West Entrance 24-hour (ug/m^3)	Site 2: West Entrance to Madison 24-hour (ug/m^3)	Site 3: Canyon to Fishing Bridge 24-hour (ug/m^3)	Site 4: Old Faithful Staging Area 24-hour (ug/m^3)
Alternative 1	No Action	Admin SC, BAT SM	1.4	1.4	1.4	1.4
Alternative 2A-M	Interim Regulation	Current SC, BAT SM	2.0	1.4	1.4	1.4
Alternative 2B-M	Interim Regulation, with BAT SC	BAT SC, BAT SM	1.7	1.4	1.4	1.4
Alternative 3B-M	Phase II of SM phase-out (phase-out of comm. SM)	BAT SC	1.4	1.4	1.4	1.4
	Transportation Event Management - MAX					
Alternative 4A-M	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	2.5	1.4	1.4	1.5
Alternative 4B-M	106 SC events, 4 Non-commercial SM events	BAT SC, New BAT SM	1.5	1.4	1.4	1.4
Alternative 4C-M	60 SC events (120 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	2.7	1.4	1.4	1.5
Alternative 4D-M	106 SC events (212 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	1.5	1.4	1.4	1.4
	Transportation Event Management - AVG					
Alternative 4A-AVG	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	2.0	1.4	1.4	1.4
Alternative 4C-AVG	60 SC events (90 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	2.2	1.4	1.4	1.4
Alternative 4D-AVG	106 SC events (159 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	1.5	1.4	1.4	1.4

Note:
NAAQS for PM_{10} is 150 $\mu g/m^3$ and for $PM_{2.5}$ is 35 $\mu g/m3$, for the 24-hour averaging period.

For Alternative 1, the no action scenario, CO, NO_2, and $PM_{2.5}$ concentrations were estimated, rather than modeled, based on the modeling results of other alternatives, along with considering the relative contributions of snowmobiles and snowcoaches in this scenario, compared to the other alternatives.

Since Yellowstone is a Class I area, PM_{10} increment consumption under PSD was also assessed. For Class I areas, the PM_{10} PSD increment is 8 micrograms per cubic meter, for the 24-hour averaging period, which EPA has determined is the small "allowable" incremental increase for PM_{10} in these areas. This increment is evaluated in reference to the previously established (by Montana and Wyoming) baseline date of 1979 for Yellowstone (*Air Quality Concerns Related to Snowmobile Usage in National Parks*, National Park Service Air Resources Division, February 2000), which was used to determine baseline concentrations.

Although snowmobile (and snowcoach) traffic in the parks has increased since 1979, it was expected that the 4-stroke BAT snowmobiles required by the alternatives would generally result in a net decrease in 24-hour PM_{10} levels compared to the established baseline date. The 1979 baseline levels were estimated from adjusting 1999 Historical Conditions Scenario modeled PM_{10} levels (from the 2007 Plan/EIS) based on the maximum daily snowmobile levels (from Yellowstone entry records) of the two years. As the methodology employed in this study is a screening-level analysis, comparing predicted PM_{10} increments with estimated 1979 baseline concentrations, it does not constitute a regulatory PSD increment consumption analysis. Typically, detailed analysis would be required if concentrations are near or "consume" allowable Class I PM_{10} PSD increment.

The predicted 24-hour PM_{10} increment consumption values based on the previously described particulate modeling are shown in Table 5-5 for each of the alternatives and fleet assumptions. There is no 24-hour PM_{10} increment consumption for any of the modeling locations compared to the baseline date.

Table 5-5
24-hour PM_{10} PSD Increment Consumption

Scenario	Description	Fleet Assumption	Site 1: West Entrance 24-hour (ug/m^3)	Site 2: West Entrance to Madison 24-hour (ug/m^3)	Site 3: Canyon to Fishing Bridge 24-hour (ug/m^3)	Site 4: Old Faithful Staging Area 24-hour (ug/m^3)
Alternative 1	No Action	Admin SC, BAT SM	0.0	0.0	0.0	0.0
Alternative 2A-M	Interim Regulation	Current SC, BAT SM	0.6	0.0	0.0	0.0
Alternative 2B-M	Interim Regulation, with BAT SC	BAT SC, BAT SM	0.3	0.0	0.0	0.0
Alternative 3B-M	Phase II of SM phase-out (phase-out of comm. SM)	BAT SC	0.0	0.0	0.0	0.0
	Transportation Event Management - MAX					
Alternative 4A-M	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	1.1	0.0	0.0	0.1
Alternative 4B-M	106 SC events, 4 Non-commercial SM events	BAT SC, New BAT SM	0.1	0.0	0.0	0.0
Alternative 4C-M	60 SC events (120 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	1.3	0.0	0.0	0.1
Alternative 4D-M	106 SC events (212 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	0.1	0.0	0.0	0.0
	Transportation Event Management - AVG					
Alternative 4A-AVG	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	0.6	0.0	0.0	0.0
Alternative 4C-AVG	60 SC events (90 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	0.8	0.0	0.0	0.0
Alternative 4D-AVG	106 SC events (159 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	0.1	0.0	0.0	0.0
1999 Historical	Historical Unregulated Scenario		191.5	40.2	5.9	3.8
PSD Baseline Year	1979 Historical Conditions		42.5	8.9	1.1	0.7

Note:
Baseline Year concentrations are based on the ratio of 1979 to 1999 snowmobile levels at the modeling locations.
Class I PSD Increment for 24-hour average PM_{10} is 8 $\mu g/m^3$
As the methodology employed in this study is a screening-level analysis, it is not intended for regulatory purposes and does not constitute a regulatory PSD increment consumption analysis.

6.0 Emissions Inventory

In addition to the dispersion modeling analysis for determining potential short-term CO, NO_2, and particulate concentrations, an emissions inventory of snowmobiles and snowcoaches operating in Yellowstone in tons per winter season was completed for each alternative and fleet assumption, based on vehicle entry limits and other information provided (Appendix A).

Emissions were calculated using travel estimates of OSV used on Yellowstone roadways, the roadway lengths, and modes of operation of the vehicles. Emission factor data previously discussed in Section 4.3 were combined with daily vehicle traffic levels for each roadway segment, for each alternative, to determine total park-wide emissions for each pollutant. The winter season was defined as a 90-day period that typically runs from December 15 to March 15.

Estimates were prepared for criteria pollutants (CO, PM, and NO_x) and HC. The total maximum potential winter season emissions due to operations of snowmobiles and snowcoaches in the parks in tons per winter season are shown for each of the alternatives and fleet assumptions in Table 6-1. Detailed emission inventory calculations are included as Appendix H. An emissions inventory for HAPs was also completed for each alternative and is discussed in the next section. Table 6-2 shows the contribution by vehicle type by percentage of the total season emissions for the alternatives and fleet assumptions. Tables 6-3 to 6-6 show the emissions for each pollutant, including subtotals by vehicle type, for each of the alternatives.

7.0 Hazardous Air Pollutant (HAP) Emissions

Emissions of HAPs (benzene, 1,3 butadiene, formaldehyde, and acetaldehyde) occur in OSVs emissions and are associated with incomplete fuel combustion. An emission inventory for these HAPs was completed based on HC speciation estimates and the total winter season HC emissions previously determined. For snowmobiles, HAPs emissions were estimated as a fraction of measured HC emissions from 4-stroke snowmobiles based on data reported in SwRI's *Laboratory Testing of Snowmobile Emissions*, Lela and White, July 2002. HAPs classified as air toxics are presented in Table 7-1 as a percentage of the total HC mass, for snowmobiles.

HAPs emissions from snowcoaches were calculated using the percentages of the total HC mass derived from MOBILE6, based on the on-road vehicle types that are converted to snowcoaches. The snowcoach vehicle mix was approximated by the following MOBILE6 vehicle mix fractions: 50 percent light-duty trucks (LDT4), 17 percent CLASS 2b heavy-duty vehicles (HDV), 17 percent CLASS 3 HDV, and 16 percent CLASS 4 HDV. HAP emissions as a percentage of total HC mass, for snowcoaches are presented in Table 7-2. Using the methodology described, total winter season mobile source emissions of HAPs were estimated and are summarized in Table 7-3.

Table 6-1
Park-wide Total Winter Season Mobile Source Emissions (Pounds per Day / Tons per Year)

Scenario	Description	Fleet Assumption	CO		HC		NOx		PM	
			lb/day	tpy	lb/day	tpy	lb/day	tpy	lb/day	tpy
Alternative 2A-M	Interim Regulation	Current SC, BAT SM	3,343	150	152	6.8	874	39	2.5	0.11
Alternative 2B-M	Interim Regulation, with BAT SC	BAT SC, BAT SM	2,859	129	89	4.0	804	36	2.4	0.11
Alternative 3B-M	Phase II of SM phase-out (phase-out of comm. SM)	BAT SC	2,852	128	28	1.3	272	12	0.6	0.03
	Transportation Event Management									
Alternative 4A-M	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	1,332	55	20	0.8	1,227	43	3.3	0.11
Alternative 4B-M	106 SC events, 4 Non-commercial SM events	BAT SC, New BAT SM	2,339	105	13	0.6	329	15	0.7	0.03
Alternative 4C-M	60 SC events (120 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	2,930	100	20	0.8	892	33	3.4	0.13
Alternative 4D-M	106 SC events (212 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	5,457	185	19	0.7	421	17	0.8	0.03
	Transportation Event Management									
Alternative 4A-AVG	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	1,225	55	17	0.8	945	43	2.5	0.11
Alternative 4C-AVG	60 SC events (90 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	2,224	100	17	0.8	741	33	2.8	0.13
Alternative 4D-AVG	106 SC events (159 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	4,114	185	16	0.7	375	17	0.7	0.03

Table 6-2
Percent Contribution by Vehicle Type to Total Scenario Emissions

Scenario	Description	Fleet Assumption	CO		HC		NOx		PM	
			Snowmobile	Snowcoach	Snowmobile	Snowcoach	Snowmobile	Snowcoach	Snowmobile	Snowcoach
Alternative 2A-M	Interim Regulation	Current SC, BAT SM	43%	57%	53%	47%	82%	18%	93%	7%
Alternative 2B-M	Interim Regulation, with BAT SC	BAT SC, BAT SM	50%	50%	89%	11%	89%	11%	97%	3%
Alternative 3B-M	Phase II of SM phase-out (phase-out of comm. SM)	BAT SC	11%	89%	59%	41%	56%	44%	86%	14%
	Transportation Event Management									
Alternative 4A-M	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	27%	73%	50%	50%	92%	8%	98%	2%
Alternative 4B-M	106 SC events, 4 Non-commercial SM events	BAT SC, New BAT SM	3%	97%	16%	84%	66%	34%	89%	11%
Alternative 4C-M	60 SC events (120 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	11%	89%	40%	60%	87%	13%	98%	2%
Alternative 4D-M	106 SC events (212 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	2%	98%	13%	87%	58%	42%	85%	15%
	Transportation Event Management									
Alternative 4A-AVG	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	27%	73%	50%	50%	92%	8%	98%	2%
Alternative 4C-AVG	60 SC events (90 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	11%	89%	40%	60%	87%	13%	98%	2%
Alternative 4D-AVG	106 SC events (159 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	2%	98%	13%	87%	58%	42%	85%	15%

Table 6-3
Park-wide Total Winter Season Mobile Source Emissions – CO by Vehicle Type
(Pounds per Day / Tons per Year)

Scenario	Description	Fleet Assumption	CO							
			Administrative Use		Commercial/Non-commercial Snowmobiles		Commercial Snowcoaches		TOTAL	
			lb/day	tpy	lb/day	tpy	lb/day	tpy	lb/day	tpy
Alternative 2A-M	Interim Regulation	Current SC, BAT SM	301	14	1,126	51	1,917	86	3,343	150
Alternative 2B-M	Interim Regulation, with BAT SC	BAT SC, BAT SM	301	14	1,126	51	1,432	64	2,859	129
Alternative 3B-M	Phase II of SM phase-out (phase-out of comm. SM)	BAT SC	301	14	0	0	2,551	115	2,852	128
	Transportation Event Management									
Alternative 4A-M	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	67	3	371	12	894	40	1,332	55
Alternative 4B-M	106 SC events, 4 Non-commercial SM events	BAT SC, New BAT SM	67	3	16	1	2,256	102	2,339	105
Alternative 4C-M	60 SC events (120 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	45	2	248	9	2,638	89	2,930	100
Alternative 4D-M	106 SC events (212 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	67	3	16	1	5,375	181	5,457	185
	Transportation Event Management									
Alternative 4A-AVG	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	67	3	265	12	894	40	1,225	55
Alternative 4C-AVG	60 SC events (90 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	45	2	200	9	1,978	89	2,224	100
Alternative 4D-AVG	106 SC events (159 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	67	3	16	1	4,031	181	4,114	185

Table 6-4
Park-wide Total Winter Season Mobile Source Emissions – HC by Vehicle Type
(Pounds per Day / Tons per Year)

Scenario	Description	Fleet Assumption	HC							
			Administrative Use		Commercial/Non-commercial Snowmobiles		Commercial Snowcoaches		TOTAL	
			lb/day	tpy	lb/day	tpy	lb/day	tpy	lb/day	tpy
Alternative 2A-M	Interim Regulation	Current SC, BAT SM	22	1.0	63	2.8	66	3.0	152	6.8
Alternative 2B-M	Interim Regulation, with BAT SC	BAT SC, BAT SM	22	1.0	63	2.8	4	0.2	89	4.0
Alternative 3B-M	Phase II of SM phase-out (phase-out of comm. SM)	BAT SC	22	1	0	0	6	0	28	1
	Transportation Event Management									
Alternative 4A-M	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	7	0.3	10	0.3	3	0.1	20	0.8
Alternative 4B-M	106 SC events, 4 Non-commercial SM events	BAT SC, New BAT SM	7	0.3	0	0.0	6	0.3	13	0.6
Alternative 4C-M	60 SC events (120 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	7	0.3	7	0.2	6	0.2	20	0.8
Alternative 4D-M	106 SC events (212 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	7	0.3	0	0.0	11	0.4	19	0.7
	Transportation Event Management									
Alternative 4A-AVG	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	7	0.3	7	0.3	3	0.1	17	0.8
Alternative 4C-AVG	60 SC events (90 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	7	0.3	6	0.2	5	0.2	17	0.8
Alternative 4D-AVG	106 SC events (159 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	7	0.3	0	0.0	9	0.4	16	0.7

Table 6-5
Park-wide Total Winter Season Mobile Source Emissions – NO_x by Vehicle Type
(Pounds per Day / Tons per Year)

Scenario	Description	Fleet Assumption	NOx							
			Administrative Use		Commercial/Non-commercial Snowmobiles		Commercial Snowcoaches		TOTAL	
			lb/day	tpy	lb/day	tpy	lb/day	tpy	lb/day	tpy
Alternative 2A-M	Interim Regulation	Current SC, BAT SM	171	8	565	25	138	6	874	39
Alternative 2B-M	Interim Regulation, with BAT SC	BAT SC, BAT SM	171	8	565	25	68	3	804	36
Alternative 3B-M	Phase II of SM phase-out (phase-out of comm. SM)	BAT SC	171	8	0	0	101	5	272	12
	Transportation Event Management									
Alternative 4A-M	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	193	9	980	31	53	2	1,227	43
Alternative 4B-M	106 SC events, 4 Non-commercial SM events	BAT SC, New BAT SM	193	9	42	2	94	4	329	15
Alternative 4C-M	60 SC events (120 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	135	6	653	24	104	4	892	33
Alternative 4D-M	106 SC events (212 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	193	9	42	2	186	6	421	17
	Transportation Event Management									
Alternative 4A-AVG	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	193	9	699	31	53	2	945	43
Alternative 4C-AVG	60 SC events (90 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	135	6	528	24	78	4	741	33
Alternative 4D-AVG	106 SC events (159 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	193	9	42	2	139	6	375	17

Table 6-6
Park-wide Total Winter Season Mobile Source Emissions – PM by Vehicle Type
(Pounds per Day / Tons per Year)

Scenario	Description	Fleet Assumption	PM							
			Administrative Use		Commercial/Non-commercial Snowmobiles		Commercial Snowcoaches		TOTAL	
			lb/day	tpy	lb/day	tpy	lb/day	tpy	lb/day	tpy
Alternative 2A-M	Interim Regulation	Current SC, BAT SM	0.51	0.02	1.85	0.08	0.17	0.01	2.53	0.11
Alternative 2B-M	Interim Regulation, with BAT SC	BAT SC, BAT SM	0.51	0.02	1.85	0.08	0.04	0.00	2.40	0.11
Alternative 3B-M	Phase II of SM phase-out (phase-out of comm. SM)	BAT SC	0.51	0.02	0.00	0.00	0.06	0.00	1.71	0.08
	Transportation Event Management									
Alternative 4A-M	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	0.51	0.02	2.80	0.09	0.03	0.00	3.34	0.11
Alternative 4B-M	106 SC events, 4 Non-commercial SM events	BAT SC, New BAT SM	0.51	0.02	0.12	0.01	0.06	0.00	0.69	0.03
Alternative 4C-M	60 SC events (120 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	0.51	0.02	2.80	0.10	0.07	0.00	3.38	0.13
Alternative 4D-M	106 SC events (212 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	0.51	0.02	0.12	0.01	0.12	0.00	0.75	0.03
	Transportation Event Management									
Alternative 4A-AVG	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	0.51	0.02	1.99	0.09	0.03	0.00	2.54	0.11
Alternative 4C-AVG	60 SC events (90 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	0.51	0.02	2.26	0.10	0.05	0.00	2.82	0.13
Alternative 4D-AVG	106 SC events (159 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	0.51	0.02	0.12	0.01	0.09	0.00	0.72	0.03

Table 7-1
Snowmobile HC Speciation Data

	4-stroke Snowmobiles (percent of HC)
Benzene	2.60 %
1-3 Butadiene	0.00 %
Formaldehyde	2.81 %
Acetaldehyde	1.08 %

Table 7-2
Snowcoach HC Speciation

	Current Fleet (percent of HC)	BAT Snowcoach (percent of HC)
Benzene	3.74 %	3.69 %
1-3 Butadiene	0.54 %	0.56 %
Formaldehyde	1.60 %	1.83 %
Acetaldehyde	0.55 %	0.65 %

Table 7-3
Park-wide Total Winter Season Mobile Sources HAPs Emissions
(Tons per Year)

Scenario	Description	Fleet Assumption	Benzene (tpy)	1-3 Butadiene (tpy)	Formaldehyde (tpy)	Acetaldehyde (tpy)
Alternative 2A-M	Interim Regulation	Current SC, BAT SM	0.21	0.02	0.15	0.06
Alternative 2B-M	Interim Regulation, with BAT SC	BAT SC, BAT SM	0.11	0.00	0.11	0.04
Alternative 3B-M	Phase II of SM phase-out (phase-out of comm. SM)	BAT SC	0.04	0.00	0.03	0.01
	Transportation Event Management					
Alternative 4A-M	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	0.02	0.00	0.02	0.01
Alternative 4B-M	106 SC events, 4 Non-commercial SM events	BAT SC, New BAT SM	0.02	0.00	0.01	0.00
Alternative 4C-M	60 SC events (120 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	0.02	0.00	0.02	0.01
Alternative 4D-M	106 SC events (212 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	0.03	0.00	0.01	0.01
	Transportation Event Management					
Alternative 4A-AVG	54 SC events, 46 SM events (4 Non-comm)	BAT SC, New BAT SM	0.02	0.00	0.02	0.01
Alternative 4C-AVG	60 SC events (90 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	0.02	0.00	0.02	0.01
Alternative 4D-AVG	106 SC events (159 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	0.03	0.00	0.01	0.01

Note:
4-stroke snowmobile HAPs estimated as a fraction of measured HC emissions based on data reported in SwRI's *Laboratory Testing of Snowmobile Emissions*, Lela and White, July 2002.

Snowcoach HAPs estimated as a fraction of HC emissions based on MOBILE6 modeling of HC and air toxics emission factors for light- and heavy-duty vehicles.

8.0 Visibility

Yellowstone and Grand Teton are classified as Class I areas under the Federal Clean Air Act. As required by the visibility protection provision of the Clean Air Act, additional procedural requirements apply when a proposed source has the potential to impair visibility in a Class I area (40 CFR 52.27 (d)). Therefore, an analysis of anticipated visibility impacts resulting from on-snow vehicle emissions was conducted following procedures in the *Workbook for Plume Visual Impact Screening and Analysis*, EPA-450/4-88-015, 1992. The EPA model VISCREEN incorporates the methodology

and was used to conduct a Level 1 screening analysis of potential visibility impacts. Virtual point source methods were applied to adapt procedures originally designed for assessing plume impacts resulting from industrial stacks to the line and area sources modeled at the four locations in this study.

For the visibility analysis, a winter Yellowstone value of 240 kilometers was assumed for the background visual range. This was converted from the reference level light-extinction coefficient for Yellowstone (winter) provided in Appendix 2.B of the *Federal Land Managers' Air Quality Related Values Workgroup (FLAG), Phase I Report*, U.S Forest Service, NPS, and U.S. Fish and Wildlife Service (December 2000) using conversion equation 1 in Appendix 2.A of the report.

The results of the VISCREEN modeling are shown in Table 8-1. There were no potential localized, perceptible, visibility impairments predicted for any of the alternatives at the screening locations. Visibility modeling parameters and modeling input and output files are included as Appendix I.

Table 8-1
Visibility Impairment

Scenario	Description	Fleet Assumption	Screening Criteria Exceedance			
			Site 1: West Entrance	Site 2: West Entrance to Madison	Site 3: Canyon to Fishing Bridge	Site 4: Old Faithful Staging Area
Alternative 1	No Action	Admin SC, BAT SM	No	No	No	No
Alternative 2A-M	Interim Regulation	Current SC, BAT SM	No	No	No	No
Alternative 2B-M	Interim Regulation, with BAT SC	BAT SC, BAT SM	No	No	No	No
Alternative 3B-M	Phase II of SM phase-out (phase-out of comm. SM)	BAT SC	No	No	No	No
	Transportation Event Management					
Alternative 4A-M	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	No	No	No	No
Alternative 4B-M	106 SC events, 4 Non-commercial SM events	BAT SC, New BAT SM	No	No	No	No
Alternative 4C-M	60 SC events (120 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	No	No	No	No
Alternative 4D-M	106 SC events (212 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	No	No	No	No
	Transportation Event Management					
Alternative 4A-AVG	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	No	No	No	No
Alternative 4C-AVG	60 SC events (90 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	No	No	No	No
Alternative 4D-AVG	106 SC events (159 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	No	No	No	No

9.0 Summary and Conclusions

In support of the Winter Use Plan FSEIS for Yellowstone, this report analyzed potential air quality impacts from snowmobile and snowcoach operations for several alternatives and fleet assumptions, utilizing air dispersion modeling and other accepted methods and models. For all alternatives, snowmobiles entering Yellowstone must be BAT machines. In addition, all alternatives consider the implementation of a snowcoach BAT.

For each alternative and fleet assumption, maximum predicted ambient concentrations of CO, NO_2 and $PM_{2.5}$ were calculated using dispersion modeling and impacts were assessed with respect to the NAAQS. Modeling results were also compared to PSD increments for particulate matter. Winter-season emission estimates in tons per year were calculated for CO, PM, NO_x, HC, and HAPs, and potential visibility impacts for each alternative were also assessed.

The results of the air quality modeling revealed that none of the alternatives would be likely to exceed the CO, NO_2, and $PM_{2.5}$ NAAQS, or the Montana or Wyoming ambient air quality standards.

In addition, the results of the Class I PSD assessment shows that 24-hour PM_{10} increment consumption for each of the alternatives and fleet assumptions at all modeling locations would be lower than the PSD increment of 8 micrograms per cubic meter. However, as the methodology employed in this study is a screening-level analysis, it is not intended for regulatory purposes and does not constitute a regulatory PSD increment consumption analysis.

AIR QUALITY MODELING REPORT
SNOWMOBILE AND SNOWCOACH EMISSIONS

APPENDICES

YELLOWSTONE NATIONAL PARK

Prepared for

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August 2013*

*This is the final air quality modeling report prepared in support of the Record of Decision for the Yellowstone Winter Use Plan/Supplemental EIS; it supersedes the February 2013 report issued in support of the Supplemental EIS.

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APPENDIX A
MOTORIZED OVERSNOW VEHICLE ALTERNATIVES

2012 SEIS Administrative Travel - Estimated Average Administrative Travel Each Day

	West Entrance		South Entrance		East Entrance		North Entrance		Old Faithful		Total	
Snowmobiles	**20**		**20**		**20**		**20**		**30**		**110**	
	(Madison-5)		(Grant-5)		(Canyon5 Lake10)							
YELL Road Segment	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**		
Mammoth to Norris	0.1	2	0.1	2	0.1	2	2	40	0.2	6	52	0.473
West Entrance to Madison	1.5	30	0.1	2	0.1	2	0.4	8	0.3	9	51	0.464
Madison to Norris	0.2	4	0.1	2	0.1	2	1.4	28	0.2	6	42	0.382
Norris to Canyon Village	0.1	2	0.1	2	0.2	4	0.6	12	0.1	3	23	0.209
Canyon Village to Fishing Bridge	0.1	2	0.1	2	1.4	28	0.2	4	0.1	3	39	0.355
Fishing Bridge to East Entrance	0.1	2	0.1	2	1.6	32	0.1	2	0.1	3	41	0.373
Fishing Bridge to West Thumb	0.1	2	0.5	10	0.3	6	0.1	2	0.1	3	23	0.209
Madison to Old Faithful	0.3	6	0.1	2	0.1	2	1	20	1	30	60	0.545
Old Faithful to West Thumb	0.1	2	0.5	10	0.2	4	0.1	2	1	30	48	0.436
West Thumb to Flagg Ranch	0.1	2	1	20	0.1	2	0.1	2	0.1	3	29	0.264

	West Entrance		South Entrance		East Entrance		North Entrance		Old Faithful		Total	
Snowcoaches	**2**		**2**		**3**		**2**		**4**		**13**	
	(Madison-1)		(Grant-1)		(Canyon-1 Lake-1)							
YELL Road Segment	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**		
Mammoth to Norris	0.1	0.2	0.1	0.2	0.1	0.3	2	4	0.2	0.8	5.5	0.423
West Entrance to Madison	1.5	3	0.1	0.2	0.1	0.3	0.4	0.8	0.3	1.2	5.5	0.423
Madison to Norris	0.2	0.4	0.1	0.2	0.1	0.3	1.4	2.8	0.2	0.8	4.5	0.346
Norris to Canyon Village	0.1	0.2	0.1	0.2	0.2	0.6	0.6	1.2	0.1	0.4	2.6	0.2
Canyon Village to Fishing Bridge	0.1	0.2	0.1	0.2	1.4	4.2	0.2	0.4	0.1	0.4	5.4	0.415
Fishing Bridge to East Entrance	0.1	0.2	0.1	0.2	1.6	4.8	0.1	0.2	0.1	0.4	5.8	0.446
Fishing Bridge to West Thumb	0.1	0.2	0.5	1	0.3	0.9	0.1	0.2	0.1	0.4	2.7	0.208
Madison to Old Faithful	0.3	0.6	0.1	0.2	0.1	0.3	1	2	1	4	7.1	0.546
Old Faithful to West Thumb	0.1	0.2	0.5	1	0.2	0.6	0.1	0.2	1	4	6	0.462
West Thumb to Flagg Ranch	0.1	0.2	1	2	0.1	0.3	0.1	0.2	0.1	0.4	3.1	0.238

Note:

In the Old Faithful developed area, all 30 snowmobiles and 4 snowcoaches originating would operate in the developed area.
In addition, 24 snowmobiles and 3 snowcoaches originating elsewhere would operate in the Old Faithful developed area (half of those orginating elsewhere).

2012 SEIS Alternative 2A (Interim Use 318 BAT Snowmobiles (groups of 10) & 78 Snowcoaches)

Snowmobile group size: 10

Snowcoach group size: 1

	West Entrance		South Entrance		East Entrance		North Entrance		Old Faithful		Total	
Snowmobiles	**160**		**114**		**20**		**12**		**12**		**318**	
YELL Road Segment	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**		
Mammoth to Norris	0.05	8	0.03	3.42	0.1	2	1.8	21.6	0.3	3.6	38.62	0.121
West Entrance to Madison	1.8	288	0.05	5.7	0.1	2	0.15	1.8	0.15	1.8	299.3	0.941
Madison to Norris	0.59	94.4	0.08	9.12	0.1	2	1.2	14.4	1	12	131.92	0.415
Norris to Canyon Village	0.44	70.4	0.05	5.7	0.2	4	0.56	6.72	0.7	8.4	95.22	0.299
Canyon Village to Fishing Bridge	0.34	54.4	0.45	51.3	1.4	28	0.36	4.32	0.7	8.4	146.42	0.46
Fishing Bridge to East Entrance	0.02	3.2	0.05	5.7	1.6	32	0.02	0.24	0.02	0.24	41.38	0.13
Fishing Bridge to West Thumb	0.08	12.8	0.46	52.44	0.3	6	0.02	0.24	0.7	8.4	79.88	0.251
Madison to Old Faithful	1.41	225.6	0.47	53.58	0.1	2	1.15	13.8	1.05	12.6	307.58	0.967
Old Faithful to West Thumb	0.27	43.2	1.35	153.9	0.2	4	0.05	0.6	0.75	9	210.7	0.663
West Thumb to Flagg Ranch	0.05	8	1.75	199.5	0.1	2	0.05	0.6	0.05	0.6	210.7	0.663

	West Entrance		South Entrance		East Entrance		North Entrance		Old Faithful		Total	
Snowcoaches	**34**		**13**		**2**		**13**		**16**		**78**	
Fractions to each entrance	**0.4359**		**0.16667**		**0.02564**		**0.16667**		**0.20513**			
YELL Road Segment	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**		
Mammoth to Norris	0.05	1.7	0.03	0.39	0.1	0.2	1.8	23.4	0	0	25.69	0.329
West Entrance to Madison	1.8	61.2	0.05	0.65	0.1	0.2	0.15	1.95	0.48	7.68	71.68	0.919
Madison to Norris	0.59	20.06	0.08	1.04	0.1	0.2	1.2	15.6	0.06	0.96	37.86	0.485
Norris to Canyon Village	0.44	14.96	0.05	0.65	0.2	0.4	0.56	7.28	0.06	0.96	24.25	0.311
Canyon Village to Fishing Bridge	0.34	11.56	0.45	5.85	1.4	2.8	0.36	4.68	0.06	0.96	25.85	0.331
Fishing Bridge to East Entrance	0.02	0.68	0.05	0.65	1.6	3.2	0.02	0.26	0	0	4.79	0.061
Fishing Bridge to West Thumb	0.08	2.72	0.46	5.98	0.3	0.6	0.02	0.26	0.06	0.96	10.52	0.135
Madison to Old Faithful	1.41	47.94	0.47	6.11	0.1	0.2	1.15	14.95	0.6	9.6	78.8	1.01
Old Faithful to West Thumb	0.27	9.18	1.35	17.55	0.2	0.4	0.05	0.65	1.3	20.8	48.58	0.623
West Thumb to Flagg Ranch	0.05	1.7	1.75	22.75	0.1	0.2	0.05	0.65	1.18	18.88	44.18	0.566

Note:

This alternative models the average numbers of snowmobile and snowcoach daily entries over the following winter seasons:

2009-2010	188	35
2010-2011	197	39
Average	193	37

2012 SEIS Alternative 2A (Interim Use 318 BAT Snowmobiles (groups of 7) & 78 Snowcoaches)

Snowmobile group size: 7

Snowcoach group size: 1

	West Entrance		South Entrance		East Entrance		North Entrance		Old Faithful		Total	
Snowmobiles	**160**		**114**		**20**		**12**		**12**		**318**	
YELL Road Segment	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**		
Mammoth to Norris	0.05	8	0.03	3.42	0.1	2	1.8	21.6	0.3	3.6	38.62	0.121
West Entrance to Madison	1.8	288	0.05	5.7	0.1	2	0.15	1.8	0.15	1.8	299.3	0.941
Madison to Norris	0.59	94.4	0.08	9.12	0.1	2	1.2	14.4	1	12	131.92	0.415
Norris to Canyon Village	0.44	70.4	0.05	5.7	0.2	4	0.56	6.72	0.7	8.4	95.22	0.299
Canyon Village to Fishing Bridge	0.34	54.4	0.45	51.3	1.4	28	0.36	4.32	0.7	8.4	146.42	0.46
Fishing Bridge to East Entrance	0.02	3.2	0.05	5.7	1.6	32	0.02	0.24	0.02	0.24	41.38	0.13
Fishing Bridge to West Thumb	0.08	12.8	0.46	52.44	0.3	6	0.02	0.24	0.7	8.4	79.88	0.251
Madison to Old Faithful	1.41	225.6	0.47	53.58	0.1	2	1.15	13.8	1.05	12.6	307.58	0.967
Old Faithful to West Thumb	0.27	43.2	1.35	153.9	0.2	4	0.05	0.6	0.75	9	210.7	0.663
West Thumb to Flagg Ranch	0.05	8	1.75	199.5	0.1	2	0.05	0.6	0.05	0.6	210.7	0.663

	West Entrance		South Entrance		East Entrance		North Entrance		Old Faithful		Total	
Snowcoaches	**34**		**13**		**2**		**13**		**16**		**78**	
Fractions to each entrance	**0.4359**		**0.16667**		**0.02564**		**0.16667**		**0.20513**			
YELL Road Segment	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**		
Mammoth to Norris	0.05	1.7	0.03	0.39	0.1	0.2	1.8	23.4	0	0	25.69	0.329
West Entrance to Madison	1.8	61.2	0.05	0.65	0.1	0.2	0.15	1.95	0.48	7.68	71.68	0.919
Madison to Norris	0.59	20.06	0.08	1.04	0.1	0.2	1.2	15.6	0.06	0.96	37.86	0.485
Norris to Canyon Village	0.44	14.96	0.05	0.65	0.2	0.4	0.56	7.28	0.06	0.96	24.25	0.311
Canyon Village to Fishing Bridge	0.34	11.56	0.45	5.85	1.4	2.8	0.36	4.68	0.06	0.96	25.85	0.331
Fishing Bridge to East Entrance	0.02	0.68	0.05	0.65	1.6	3.2	0.02	0.26	0	0	4.79	0.061
Fishing Bridge to West Thumb	0.08	2.72	0.46	5.98	0.3	0.6	0.02	0.26	0.06	0.96	10.52	0.135
Madison to Old Faithful	1.41	47.94	0.47	6.11	0.1	0.2	1.15	14.95	0.6	9.6	78.8	1.01
Old Faithful to West Thumb	0.27	9.18	1.35	17.55	0.2	0.4	0.05	0.65	1.3	20.8	48.58	0.623
West Thumb to Flagg Ranch	0.05	1.7	1.75	22.75	0.1	0.2	0.05	0.65	1.18	18.88	44.18	0.566

Note:

This alternative models the average numbers of snowmobile and snowcoach daily entries over the following winter seasons:

2009-2010	188	35
2010-2011	197	39
Average	193	37

2012 SEIS Alternative 2B (Interim Use 318 BAT Snowmobiles (groups of 10) & 78 BAT Snowcoaches)

Snowmobile group size: 10

Snowcoach group size: 1

	West Entrance		South Entrance		East Entrance		North Entrance		Old Faithful		Total	
Snowmobiles	**160**		**114**		**20**		**12**		**12**		**318**	
YELL Road Segment	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**		
Mammoth to Norris	0.05	8	0.03	3.42	0.1	2	1.8	21.6	0.3	3.6	38.62	0.121
West Entrance to Madison	1.8	288	0.05	5.7	0.1	2	0.15	1.8	0.15	1.8	299.3	0.941
Madison to Norris	0.59	94.4	0.08	9.12	0.1	2	1.2	14.4	1	12	131.92	0.415
Norris to Canyon Village	0.44	70.4	0.05	5.7	0.2	4	0.56	6.72	0.7	8.4	95.22	0.299
Canyon Village to Fishing Bridge	0.34	54.4	0.45	51.3	1.4	28	0.36	4.32	0.7	8.4	146.42	0.46
Fishing Bridge to East Entrance	0.02	3.2	0.05	5.7	1.6	32	0.02	0.24	0.02	0.24	41.38	0.13
Fishing Bridge to West Thumb	0.08	12.8	0.46	52.44	0.3	6	0.02	0.24	0.7	8.4	79.88	0.251
Madison to Old Faithful	1.41	225.6	0.47	53.58	0.1	2	1.15	13.8	1.05	12.6	307.58	0.967
Old Faithful to West Thumb	0.27	43.2	1.35	153.9	0.2	4	0.05	0.6	0.75	9	210.7	0.663
West Thumb to Flagg Ranch	0.05	8	1.75	199.5	0.1	2	0.05	0.6	0.05	0.6	210.7	0.663

	West Entrance		South Entrance		East Entrance		North Entrance		Old Faithful		Total	
Snowcoaches	**34**		**13**		**2**		**13**		**16**		**78**	
Fractions to each entrance	**0.4359**		**0.16667**		**0.02564**		**0.16667**		**0.20513**			
YELL Road Segment	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**		
Mammoth to Norris	0.05	1.7	0.03	0.39	0.1	0.2	1.8	23.4	0	0	25.69	0.329
West Entrance to Madison	1.8	61.2	0.05	0.65	0.1	0.2	0.15	1.95	0.48	7.68	71.68	0.919
Madison to Norris	0.59	20.06	0.08	1.04	0.1	0.2	1.2	15.6	0.06	0.96	37.86	0.485
Norris to Canyon Village	0.44	14.96	0.05	0.65	0.2	0.4	0.56	7.28	0.06	0.96	24.25	0.311
Canyon Village to Fishing Bridge	0.34	11.56	0.45	5.85	1.4	2.8	0.36	4.68	0.06	0.96	25.85	0.331
Fishing Bridge to East Entrance	0.02	0.68	0.05	0.65	1.6	3.2	0.02	0.26	0	0	4.79	0.061
Fishing Bridge to West Thumb	0.08	2.72	0.46	5.98	0.3	0.6	0.02	0.26	0.06	0.96	10.52	0.135
Madison to Old Faithful	1.41	47.94	0.47	6.11	0.1	0.2	1.15	14.95	0.6	9.6	78.8	1.01
Old Faithful to West Thumb	0.27	9.18	1.35	17.55	0.2	0.4	0.05	0.65	1.3	20.8	48.58	0.623
West Thumb to Flagg Ranch	0.05	1.7	1.75	22.75	0.1	0.2	0.05	0.65	1.18	18.88	44.18	0.566

Note:

This alternative models the average numbers of snowmobile and snowcoach daily entries over the following winter seasons:

2009-2010	188	35
2010-2011	197	39
Average	193	37

2012 SEIS Alternative 2B (Interim Use 318 BAT Snowmobiles (groups of 7) & 78 BAT Snowcoaches)

Snowmobile group size: 7

Snowcoach group size: 1

	West Entrance		South Entrance		East Entrance		North Entrance		Old Faithful		Total	
Snowmobiles	**160**		**114**		**20**		**12**		**12**		**318**	
YELL Road Segment	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**		
Mammoth to Norris	0.05	8	0.03	3.42	0.1	2	1.8	21.6	0.3	3.6	38.62	0.121
West Entrance to Madison	1.8	288	0.05	5.7	0.1	2	0.15	1.8	0.15	1.8	299.3	0.941
Madison to Norris	0.59	94.4	0.08	9.12	0.1	2	1.2	14.4	1	12	131.92	0.415
Norris to Canyon Village	0.44	70.4	0.05	5.7	0.2	4	0.56	6.72	0.7	8.4	95.22	0.299
Canyon Village to Fishing Bridge	0.34	54.4	0.45	51.3	1.4	28	0.36	4.32	0.7	8.4	146.42	0.46
Fishing Bridge to East Entrance	0.02	3.2	0.05	5.7	1.6	32	0.02	0.24	0.02	0.24	41.38	0.13
Fishing Bridge to West Thumb	0.08	12.8	0.46	52.44	0.3	6	0.02	0.24	0.7	8.4	79.88	0.251
Madison to Old Faithful	1.41	225.6	0.47	53.58	0.1	2	1.15	13.8	1.05	12.6	307.58	0.967
Old Faithful to West Thumb	0.27	43.2	1.35	153.9	0.2	4	0.05	0.6	0.75	9	210.7	0.663
West Thumb to Flagg Ranch	0.05	8	1.75	199.5	0.1	2	0.05	0.6	0.05	0.6	210.7	0.663

	West Entrance		South Entrance		East Entrance		North Entrance		Old Faithful		Total	
Snowcoaches	**34**		**13**		**2**		**13**		**16**		**78**	
Fractions to each entrance	**0.4359**		**0.16667**		**0.02564**		**0.16667**		**0.20513**			
YELL Road Segment	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**		
Mammoth to Norris	0.05	1.7	0.03	0.39	0.1	0.2	1.8	23.4	0	0	25.69	0.329
West Entrance to Madison	1.8	61.2	0.05	0.65	0.1	0.2	0.15	1.95	0.48	7.68	71.68	0.919
Madison to Norris	0.59	20.06	0.08	1.04	0.1	0.2	1.2	15.6	0.06	0.96	37.86	0.485
Norris to Canyon Village	0.44	14.96	0.05	0.65	0.2	0.4	0.56	7.28	0.06	0.96	24.25	0.311
Canyon Village to Fishing Bridge	0.34	11.56	0.45	5.85	1.4	2.8	0.36	4.68	0.06	0.96	25.85	0.331
Fishing Bridge to East Entrance	0.02	0.68	0.05	0.65	1.6	3.2	0.02	0.26	0	0	4.79	0.061
Fishing Bridge to West Thumb	0.08	2.72	0.46	5.98	0.3	0.6	0.02	0.26	0.06	0.96	10.52	0.135
Madison to Old Faithful	1.41	47.94	0.47	6.11	0.1	0.2	1.15	14.95	0.6	9.6	78.8	1.01
Old Faithful to West Thumb	0.27	9.18	1.35	17.55	0.2	0.4	0.05	0.65	1.3	20.8	48.58	0.623
West Thumb to Flagg Ranch	0.05	1.7	1.75	22.75	0.1	0.2	0.05	0.65	1.18	18.88	44.18	0.566

Note:

This alternative models the average numbers of snowmobile and snowcoach daily entries over the following winter seasons:

2009-2010	188	35
2010-2011	197	39
Average	193	37

2012 SEIS Alternative 3B (0 Commercial Snowmobiles, 120 BAT Snowcoaches)

Snowmobile group size: 0

Snowcoach group size: 2

	West Entrance		South Entrance		East Entrance		North Entrance		Old Faithful		Total	
Snowmobiles	**0**		**0**		**0**		**0**		**0**		**0**	
YELL Road Segment	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**		
Mammoth to Norris	0.05	0	0.03	0	0.1	0	1.8	0	0.3	0	0	0
West Entrance to Madison	1.8	0	0.05	0	0.1	0	0.15	0	0.15	0	0	0
Madison to Norris	0.59	0	0.08	0	0.1	0	1.2	0	1	0	0	0
Norris to Canyon Village	0.44	0	0.05	0	0.2	0	0.56	0	0.7	0	0	0
Canyon Village to Fishing Bridge	0.34	0	0.45	0	1.4	0	0.36	0	0.7	0	0	0
Fishing Bridge to East Entrance	0.02	0	0.05	0	1.6	0	0.02	0	0.02	0	0	0
Fishing Bridge to West Thumb	0.08	0	0.46	0	0.3	0	0.02	0	0.7	0	0	0
Madison to Old Faithful	1.41	0	0.47	0	0.1	0	1.15	0	1.05	0	0	0
Old Faithful to West Thumb	0.27	0	1.35	0	0.2	0	0.05	0	0.75	0	0	0
West Thumb to Flagg Ranch	0.05	0	1.75	0	0.1	0	0.05	0	0.05	0	0	0

	West Entrance		South Entrance		East Entrance		North Entrance		Old Faithful		Total	
Snowcoaches	**62**		**10**		**0**		**19**		**29**		**120**	
YELL Road Segment	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**		
Mammoth to Norris	0.05	3.1	0.03	0.3	0.1	0	1.8	34.2	0	0	37.6	0.313
West Entrance to Madison	1.8	111.6	0.05	0.5	0.1	0	0.15	2.85	0.48	13.92	128.87	1.074
Madison to Norris	0.59	36.58	0.08	0.8	0.1	0	1.2	22.8	0.06	1.74	61.92	0.516
Norris to Canyon Village	0.44	27.28	0.05	0.5	0.2	0	0.56	10.64	0.06	1.74	40.16	0.335
Canyon Village to Fishing Bridge	0.34	21.08	0.45	4.5	1.4	0	0.36	6.84	0.06	1.74	34.16	0.285
Fishing Bridge to East Entrance	0	0	0	0	0	0	0	0	0	0	0	0
Fishing Bridge to West Thumb	0.08	4.96	0.46	4.6	0.3	0	0.02	0.38	0.06	1.74	11.68	0.097
Madison to Old Faithful	1.41	87.42	0.47	4.7	0.1	0	1.15	21.85	0.6	17.4	131.37	1.095
Old Faithful to West Thumb	0.27	16.74	1.35	13.5	0.2	0	0.05	0.95	1.3	37.7	68.89	0.574
West Thumb to Flagg Ranch	0.05	3.1	1.75	17.5	0.1	0	0.05	0.95	1.18	34.22	55.77	0.465

2012 SEIS Alternative 4A MAX (460 New BAT Commercial Snowmobiles (groups of 10), 20 New BAT Non-commercial Snowmobiles (groups of 5), 60 BAT Snowcoaches (groups of 1))

Snowmobile group size: 10
Snowcoach group size: 1

	West Entrance		South Entrance		East Entrance		North Entrance		Old Faithful		Total	
Snowmobiles	**230**		**170**		**20**		**20**		**20**		**460**	
NC Snowmobiles	**5**		**5**		**5**		**5**				**20**	
YELL Road Segment	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**		
Mammoth to Norris	0.05	11.75	0.03	5.25	0.1	2.5	1.8	45	0.3	6	70.5	0.147
West Entrance to Madison	1.8	423	0.05	8.75	0.1	2.5	0.15	3.75	0.15	3	441	0.919
Madison to Norris	0.59	138.65	0.08	14	0.1	2.5	1.2	30	1	20	205.15	0.427
Norris to Canyon Village	0.44	103.4	0.05	8.75	0.2	5	0.56	14	0.7	14	145.15	0.302
Canyon Village to Fishing Bridge	0.34	79.9	0.45	78.75	1.4	35	0.36	9	0.7	14	216.65	0.451
Fishing Bridge to East Entrance	0.02	4.7	0.05	8.75	1.6	40	0.02	0.5	0.02	0.4	54.35	0.113
Fishing Bridge to West Thumb	0.08	18.8	0.46	80.5	0.3	7.5	0.02	0.5	0.7	14	121.3	0.253
Madison to Old Faithful	1.41	331.35	0.47	82.25	0.1	2.5	1.15	28.75	1.05	21	465.85	0.971
Old Faithful to West Thumb	0.27	63.45	1.35	236.25	0.2	5	0.05	1.25	0.75	15	320.95	0.669
West Thumb to Flagg Ranch	0.05	11.75	1.75	306.25	0.1	2.5	0.05	1.25	0.05	1	322.75	0.672

	West Entrance		South Entrance		East Entrance		North Entrance		Old Faithful		Total	
Snowcoaches	**26**		**8**		**1**		**13**		**12**		**60**	
YELL Road Segment	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**		
Mammoth to Norris	0.05	1.3	0.03	0.24	0.1	0.1	1.8	23.4	0	0	25.04	0.417
West Entrance to Madison	1.8	46.8	0.05	0.4	0.1	0.1	0.15	1.95	0.48	5.76	55.01	0.917
Madison to Norris	0.59	15.34	0.08	0.64	0.1	0.1	1.2	15.6	0.06	0.72	32.4	0.54
Norris to Canyon Village	0.44	11.44	0.05	0.4	0.2	0.2	0.56	7.28	0.06	0.72	20.04	0.334
Canyon Village to Fishing Bridge	0.34	8.84	0.45	3.6	1.4	1.4	0.36	4.68	0.06	0.72	19.24	0.321
Fishing Bridge to East Entrance	0.02	0.52	0.05	0.4	1.6	1.6	0.02	0.26	0	0	2.78	0.046
Fishing Bridge to West Thumb	0.08	2.08	0.46	3.68	0.3	0.3	0.02	0.26	0.06	0.72	7.04	0.117
Madison to Old Faithful	1.41	36.66	0.47	3.76	0.1	0.1	1.15	14.95	0.6	7.2	62.67	1.045
Old Faithful to West Thumb	0.27	7.02	1.35	10.8	0.2	0.2	0.05	0.65	1.3	15.6	34.27	0.571
West Thumb to Flagg Ranch	0.05	1.3	1.75	14	0.1	0.1	0.05	0.65	1.18	14.16	30.21	0.504

2012 SEIS Alternative 4A AVG (322 New BAT Commercial Snowmobiles (groups of 7), 20 New BAT Non-commercial Snowmobiles (groups of 5), 60 BAT Snowcoaches (groups of 1))

Snowmobile group size: 7

Snowcoach group size: 1

	West Entrance		South Entrance		East Entrance		North Entrance		Old Faithful		Total	
Snowmobiles	**161**		**119**		**14**		**14**		**14**		**322**	
NC Snowmobiles	**5**		**5**		**5**		**5**				**20**	
YELL Road Segment	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**		
Mammoth to Norris	0.05	8.3	0.03	3.72	0.1	1.9	1.8	34.2	0.3	4.2	52.32	0.153
West Entrance to Madison	1.8	298.8	0.05	6.2	0.1	1.9	0.15	2.85	0.15	2.1	311.85	0.912
Madison to Norris	0.59	97.94	0.08	9.92	0.1	1.9	1.2	22.8	1	14	146.56	0.429
Norris to Canyon Village	0.44	73.04	0.05	6.2	0.2	3.8	0.56	10.64	0.7	9.8	103.48	0.303
Canyon Village to Fishing Bridge	0.34	56.44	0.45	55.8	1.4	26.6	0.36	6.84	0.7	9.8	155.48	0.455
Fishing Bridge to East Entrance	0.02	3.32	0.05	6.2	1.6	30.4	0.02	0.38	0.02	0.28	40.58	0.119
Fishing Bridge to West Thumb	0.08	13.28	0.46	57.04	0.3	5.7	0.02	0.38	0.7	9.8	86.2	0.252
Madison to Old Faithful	1.41	234.06	0.47	58.28	0.1	1.9	1.15	21.85	1.05	14.7	330.79	0.967
Old Faithful to West Thumb	0.27	44.82	1.35	167.4	0.2	3.8	0.05	0.95	0.75	10.5	227.47	0.665
West Thumb to Flagg Ranch	0.05	8.3	1.75	217	0.1	1.9	0.05	0.95	0.05	0.7	228.85	0.669

	West Entrance		South Entrance		East Entrance		North Entrance		Old Faithful		Total	
Snowcoaches	**26**		**8**		**1**		**13**		**12**		**60**	
YELL Road Segment	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**		
Mammoth to Norris	0.05	1.3	0.03	0.24	0.1	0.1	1.8	23.4	0	0	25.04	0.417
West Entrance to Madison	1.8	46.8	0.05	0.4	0.1	0.1	0.15	1.95	0.48	5.76	55.01	0.917
Madison to Norris	0.59	15.34	0.08	0.64	0.1	0.1	1.2	15.6	0.06	0.72	32.4	0.54
Norris to Canyon Village	0.44	11.44	0.05	0.4	0.2	0.2	0.56	7.28	0.06	0.72	20.04	0.334
Canyon Village to Fishing Bridge	0.34	8.84	0.45	3.6	1.4	1.4	0.36	4.68	0.06	0.72	19.24	0.321
Fishing Bridge to East Entrance	0.02	0.52	0.05	0.4	1.6	1.6	0.02	0.26	0	0	2.78	0.046
Fishing Bridge to West Thumb	0.08	2.08	0.46	3.68	0.3	0.3	0.02	0.26	0.06	0.72	7.04	0.117
Madison to Old Faithful	1.41	36.66	0.47	3.76	0.1	0.1	1.15	14.95	0.6	7.2	62.67	1.045
Old Faithful to West Thumb	0.27	7.02	1.35	10.8	0.2	0.2	0.05	0.65	1.3	15.6	34.27	0.571
West Thumb to Flagg Ranch	0.05	1.3	1.75	14	0.1	0.1	0.05	0.65	1.18	14.16	30.21	0.504

2012 SEIS Alternative 4B MAX (0 New BAT Commercial Snowmobiles, 20 New BAT Non-commercial Snowmobiles (groups of 5), 106 BAT Snowcoaches(groups of 1))

Snowmobile group size: 0

Snowcoach group size: 1

	West Entrance		South Entrance		East Entrance		North Entrance		Old Faithful		Total	
Snowmobiles	**0**		**0**		**0**		**0**		**0**		**0**	
NC Snowmobiles	**5**		**5**		**5**		**5**				**20**	
YELL Road Segment	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**		
Mammoth to Norris	0.05	0.25	0.03	0.15	0.1	0.5	1.8	9	0.3	0	9.9	0.495
West Entrance to Madison	1.8	9	0.05	0.25	0.1	0.5	0.15	0.75	0.15	0	10.5	0.525
Madison to Norris	0.59	2.95	0.08	0.4	0.1	0.5	1.2	6	1	0	9.85	0.493
Norris to Canyon Village	0.44	2.2	0.05	0.25	0.2	1	0.56	2.8	0.7	0	6.25	0.313
Canyon Village to Fishing Bridge	0.34	1.7	0.45	2.25	1.4	7	0.36	1.8	0.7	0	12.75	0.638
Fishing Bridge to East Entrance	0.02	0.1	0.05	0.25	1.6	8	0.02	0.1	0.02	0	8.45	0.423
Fishing Bridge to West Thumb	0.08	0.4	0.46	2.3	0.3	1.5	0.02	0.1	0.7	0	4.3	0.215
Madison to Old Faithful	1.41	7.05	0.47	2.35	0.1	0.5	1.15	5.75	1.05	0	15.65	0.783
Old Faithful to West Thumb	0.27	1.35	1.35	6.75	0.2	1	0.05	0.25	0.75	0	9.35	0.468
West Thumb to Flagg Ranch	0.05	0.25	1.75	8.75	0.1	0.5	0.05	0.25	0.05	0	9.75	0.488

	West Entrance		South Entrance		East Entrance		North Entrance		Old Faithful		Total	
Snowcoaches	**49**		**25**		**3**		**15**		**14**		**106**	
YELL Road Segment	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**		
Mammoth to Norris	0.05	2.45	0.03	0.75	0.1	0.3	1.8	27	0	0	30.5	0.288
West Entrance to Madison	1.8	88.2	0.05	1.25	0.1	0.3	0.15	2.25	0.48	6.72	98.72	0.931
Madison to Norris	0.59	28.91	0.08	2	0.1	0.3	1.2	18	0.06	0.84	50.05	0.472
Norris to Canyon Village	0.44	21.56	0.05	1.25	0.2	0.6	0.56	8.4	0.06	0.84	32.65	0.308
Canyon Village to Fishing Bridge	0.34	16.66	0.45	11.25	1.4	4.2	0.36	5.4	0.06	0.84	38.35	0.362
Fishing Bridge to East Entrance	0.02	0.98	0.05	1.25	1.6	4.8	0.02	0.3	0	0	7.33	0.069
Fishing Bridge to West Thumb	0.08	3.92	0.46	11.5	0.3	0.9	0.02	0.3	0.06	0.84	17.46	0.165
Madison to Old Faithful	1.41	69.09	0.47	11.75	0.1	0.3	1.15	17.25	0.6	8.4	106.79	1.007
Old Faithful to West Thumb	0.27	13.23	1.35	33.75	0.2	0.6	0.05	0.75	1.3	18.2	66.53	0.628
West Thumb to Flagg Ranch	0.05	2.45	1.75	43.75	0.1	0.3	0.05	0.75	1.18	16.52	63.77	0.602

2012 SEIS Alternative 4C MAX (460 E-BAT Commercial Snowmobiles (groups of 10), 20 E-BAT Non-commercial Snowmobiles (groups of 5), 120 E-BAT Snowcoaches (groups of 2))

Snowmobile group size: 10

Snowcoach group size: 2

	West Entrance		South Entrance		East Entrance		North Entrance		Old Faithful		Total	
Snowmobiles	**230**		**170**		**20**		**20**		**20**		**460**	
NC Snowmobiles	**5**		**5**		**5**		**5**				**20**	
YELL Road Segment	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**		
Mammoth to Norris	0.05	11.75	0.03	5.25	0.1	2.5	1.8	45	0.3	6	70.5	0.147
West Entrance to Madison	1.8	423	0.05	8.75	0.1	2.5	0.15	3.75	0.15	3	441	0.919
Madison to Norris	0.59	138.65	0.08	14	0.1	2.5	1.2	30	1	20	205.15	0.427
Norris to Canyon Village	0.44	103.4	0.05	8.75	0.2	5	0.56	14	0.7	14	145.15	0.302
Canyon Village to Fishing Bridge	0.34	79.9	0.45	78.75	1.4	35	0.36	9	0.7	14	216.65	0.451
Fishing Bridge to East Entrance	0.02	4.7	0.05	8.75	1.6	40	0.02	0.5	0.02	0.4	54.35	0.113
Fishing Bridge to West Thumb	0.08	18.8	0.46	80.5	0.3	7.5	0.02	0.5	0.7	14	121.3	0.253
Madison to Old Faithful	1.41	331.35	0.47	82.25	0.1	2.5	1.15	28.75	1.05	21	465.85	0.971
Old Faithful to West Thumb	0.27	63.45	1.35	236.25	0.2	5	0.05	1.25	0.75	15	320.95	0.669
West Thumb to Flagg Ranch	0.05	11.75	1.75	306.25	0.1	2.5	0.05	1.25	0.05	1	322.75	0.672

	West Entrance		South Entrance		East Entrance		North Entrance		Old Faithful		Total	
Snowcoaches	**52**		**16**		**2**		**26**		**24**		**120**	
YELL Road Segment	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**		
Mammoth to Norris	0.05	2.6	0.03	0.48	0.1	0.2	1.8	46.8	0	0	50.08	0.417
West Entrance to Madison	1.8	93.6	0.05	0.8	0.1	0.2	0.15	3.9	0.48	11.52	110.02	0.917
Madison to Norris	0.59	30.68	0.08	1.28	0.1	0.2	1.2	31.2	0.06	1.44	64.8	0.54
Norris to Canyon Village	0.44	22.88	0.05	0.8	0.2	0.4	0.56	14.56	0.06	1.44	40.08	0.334
Canyon Village to Fishing Bridge	0.34	17.68	0.45	7.2	1.4	2.8	0.36	9.36	0.06	1.44	38.48	0.321
Fishing Bridge to East Entrance	0.02	1.04	0.05	0.8	1.6	3.2	0.02	0.52	0	0	5.56	0.046
Fishing Bridge to West Thumb	0.08	4.16	0.46	7.36	0.3	0.6	0.02	0.52	0.06	1.44	14.08	0.117
Madison to Old Faithful	1.41	73.32	0.47	7.52	0.1	0.2	1.15	29.9	0.6	14.4	125.34	1.045
Old Faithful to West Thumb	0.27	14.04	1.35	21.6	0.2	0.4	0.05	1.3	1.3	31.2	68.54	0.571
West Thumb to Flagg Ranch	0.05	2.6	1.75	28	0.1	0.2	0.05	1.3	1.18	28.32	60.42	0.504

2012 SEIS Alternative 4C AVG (368 E-BAT Commercial Snowmobiles (groups of 7), 20 E-BAT Non-commercial Snowmobiles (groups of 5), 120 E-BAT Snowcoaches (groups of 2))

Snowmobile group size: 8

Snowcoach group size: 2

	West Entrance		South Entrance		East Entrance		North Entrance		Old Faithful		Total	
Snowmobiles	**184**		**136**		**16**		**16**		**16**		**368**	
NC Snowmobiles	**5**		**5**		**5**		**5**				**20**	
YELL Road Segment	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**		
Mammoth to Norris	0.05	9.45	0.03	4.23	0.1	2.1	1.8	37.8	0.3	4.8	58.38	0.15
West Entrance to Madison	1.8	340.2	0.05	7.05	0.1	2.1	0.15	3.15	0.15	2.4	354.9	0.915
Madison to Norris	0.59	111.51	0.08	11.28	0.1	2.1	1.2	25.2	1	16	166.09	0.428
Norris to Canyon Village	0.44	83.16	0.05	7.05	0.2	4.2	0.56	11.76	0.7	11.2	117.37	0.303
Canyon Village to Fishing Bridge	0.34	64.26	0.45	63.45	1.4	29.4	0.36	7.56	0.7	11.2	175.87	0.453
Fishing Bridge to East Entrance	0.02	3.78	0.05	7.05	1.6	33.6	0.02	0.42	0.02	0.32	45.17	0.116
Fishing Bridge to West Thumb	0.08	15.12	0.46	64.86	0.3	6.3	0.02	0.42	0.7	11.2	97.9	0.252
Madison to Old Faithful	1.41	266.49	0.47	66.27	0.1	2.1	1.15	24.15	1.05	16.8	375.81	0.969
Old Faithful to West Thumb	0.27	51.03	1.35	190.35	0.2	4.2	0.05	1.05	0.75	12	258.63	0.667
West Thumb to Flagg Ranch	0.05	9.45	1.75	246.75	0.1	2.1	0.05	1.05	0.05	0.8	260.15	0.67

	West Entrance		South Entrance		East Entrance		North Entrance		Old Faithful		Total	
Snowcoaches	**39**		**12**		**2**		**20**		**18**		**90**	
YELL Road Segment	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**		
Mammoth to Norris	0.05	1.95	0.03	0.36	0.1	0.15	1.8	35.1	0	0	37.56	0.417
West Entrance to Madison	1.8	70.2	0.05	0.6	0.1	0.15	0.15	2.925	0.48	8.64	82.515	0.917
Madison to Norris	0.59	23.01	0.08	0.96	0.1	0.15	1.2	23.4	0.06	1.08	48.6	0.54
Norris to Canyon Village	0.44	17.16	0.05	0.6	0.2	0.3	0.56	10.92	0.06	1.08	30.06	0.334
Canyon Village to Fishing Bridge	0.34	13.26	0.45	5.4	1.4	2.1	0.36	7.02	0.06	1.08	28.86	0.321
Fishing Bridge to East Entrance	0.02	0.78	0.05	0.6	1.6	2.4	0.02	0.39	0	0	4.17	0.046
Fishing Bridge to West Thumb	0.08	3.12	0.46	5.52	0.3	0.45	0.02	0.39	0.06	1.08	10.56	0.117
Madison to Old Faithful	1.41	54.99	0.47	5.64	0.1	0.15	1.15	22.425	0.6	10.8	94.005	1.045
Old Faithful to West Thumb	0.27	10.53	1.35	16.2	0.2	0.3	0.05	0.975	1.3	23.4	51.405	0.571
West Thumb to Flagg Ranch	0.05	1.95	1.75	21	0.1	0.15	0.05	0.975	1.18	21.24	45.315	0.504

2012 SEIS Alternative 4D MAX (0 E-BAT Commercial Snowmobiles, 20 E-BAT Non-commercial Snowmobiles (groups of 5), 212 E-BAT Snowcoaches (groups of 2))

Snowmobile group size: 0

Snowcoach group size: 2

	West Entrance		South Entrance		East Entrance		North Entrance		Old Faithful		Total	
Snowmobiles	**0**		**0**		**0**		**0**		**0**		**0**	
NC Snowmobiles	**5**		**5**		**5**		**5**				**20**	
YELL Road Segment	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**		
Mammoth to Norris	0.05	0.25	0.03	0.15	0.1	0.5	1.8	9	0.3	0	9.9	0.495
West Entrance to Madison	1.8	9	0.05	0.25	0.1	0.5	0.15	0.75	0.15	0	10.5	0.525
Madison to Norris	0.59	2.95	0.08	0.4	0.1	0.5	1.2	6	1	0	9.85	0.493
Norris to Canyon Village	0.44	2.2	0.05	0.25	0.2	1	0.56	2.8	0.7	0	6.25	0.313
Canyon Village to Fishing Bridge	0.34	1.7	0.45	2.25	1.4	7	0.36	1.8	0.7	0	12.75	0.638
Fishing Bridge to East Entrance	0.02	0.1	0.05	0.25	1.6	8	0.02	0.1	0.02	0	8.45	0.423
Fishing Bridge to West Thumb	0.08	0.4	0.46	2.3	0.3	1.5	0.02	0.1	0.7	0	4.3	0.215
Madison to Old Faithful	1.41	7.05	0.47	2.35	0.1	0.5	1.15	5.75	1.05	0	15.65	0.783
Old Faithful to West Thumb	0.27	1.35	1.35	6.75	0.2	1	0.05	0.25	0.75	0	9.35	0.468
West Thumb to Flagg Ranch	0.05	0.25	1.75	8.75	0.1	0.5	0.05	0.25	0.05	0	9.75	0.488

	West Entrance		South Entrance		East Entrance		North Entrance		Old Faithful		Total	
Snowcoaches	**98**		**50**		**6**		**30**		**28**		**212**	
YELL Road Segment	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**		
Mammoth to Norris	0.05	4.9	0.03	1.5	0.1	0.6	1.8	54	0	0	61	0.288
West Entrance to Madison	1.8	176.4	0.05	2.5	0.1	0.6	0.15	4.5	0.48	13.44	197.44	0.931
Madison to Norris	0.59	57.82	0.08	4	0.1	0.6	1.2	36	0.06	1.68	100.1	0.472
Norris to Canyon Village	0.44	43.12	0.05	2.5	0.2	1.2	0.56	16.8	0.06	1.68	65.3	0.308
Canyon Village to Fishing Bridge	0.34	33.32	0.45	22.5	1.4	8.4	0.36	10.8	0.06	1.68	76.7	0.362
Fishing Bridge to East Entrance	0.02	1.96	0.05	2.5	1.6	9.6	0.02	0.6	0	0	14.66	0.069
Fishing Bridge to West Thumb	0.08	7.84	0.46	23	0.3	1.8	0.02	0.6	0.06	1.68	34.92	0.165
Madison to Old Faithful	1.41	138.18	0.47	23.5	0.1	0.6	1.15	34.5	0.6	16.8	213.58	1.007
Old Faithful to West Thumb	0.27	26.46	1.35	67.5	0.2	1.2	0.05	1.5	1.3	36.4	133.06	0.628
West Thumb to Flagg Ranch	0.05	4.9	1.75	87.5	0.1	0.6	0.05	1.5	1.18	33.04	127.54	0.602

2012 SEIS Alternative 4D AVG (0 E-BAT Commercial Snowmobiles, 20 E-BAT Non-commercial Snowmobiles (groups of 5), 212 E-BAT Snowcoaches (groups of 1.5)

Snowmobile group size: 0

Snowcoach group size: 2

	West Entrance		South Entrance		East Entrance		North Entrance		Old Faithful		Total	
Snowmobiles	**0**		**0**		**0**		**0**		**0**		**0**	
NC Snowmobiles	**5**		**5**		**5**		**5**				**20**	
YELL Road Segment	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**		
Mammoth to Norris	0.05	0.25	0.03	0.15	0.1	0.5	1.8	9	0.3	0	9.9	0.495
West Entrance to Madison	1.8	9	0.05	0.25	0.1	0.5	0.15	0.75	0.15	0	10.5	0.525
Madison to Norris	0.59	2.95	0.08	0.4	0.1	0.5	1.2	6	1	0	9.85	0.493
Norris to Canyon Village	0.44	2.2	0.05	0.25	0.2	1	0.56	2.8	0.7	0	6.25	0.313
Canyon Village to Fishing Bridge	0.34	1.7	0.45	2.25	1.4	7	0.36	1.8	0.7	0	12.75	0.638
Fishing Bridge to East Entrance	0.02	0.1	0.05	0.25	1.6	8	0.02	0.1	0.02	0	8.45	0.423
Fishing Bridge to West Thumb	0.08	0.4	0.46	2.3	0.3	1.5	0.02	0.1	0.7	0	4.3	0.215
Madison to Old Faithful	1.41	7.05	0.47	2.35	0.1	0.5	1.15	5.75	1.05	0	15.65	0.783
Old Faithful to West Thumb	0.27	1.35	1.35	6.75	0.2	1	0.05	0.25	0.75	0	9.35	0.468
West Thumb to Flagg Ranch	0.05	0.25	1.75	8.75	0.1	0.5	0.05	0.25	0.05	0	9.75	0.488

	West Entrance		South Entrance		East Entrance		North Entrance		Old Faithful		Total	
Snowcoaches	**74**		**38**		**5**		**23**		**21**		**159**	
YELL Road Segment	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**	**Factor**	**Results**		
Mammoth to Norris	0.05	3.675	0.03	1.125	0.1	0.45	1.8	40.5	0	0	45.75	0.288
West Entrance to Madison	1.8	132.3	0.05	1.875	0.1	0.45	0.15	3.375	0.48	10.08	148.08	0.931
Madison to Norris	0.59	43.365	0.08	3	0.1	0.45	1.2	27	0.06	1.26	75.075	0.472
Norris to Canyon Village	0.44	32.34	0.05	1.875	0.2	0.9	0.56	12.6	0.06	1.26	48.975	0.308
Canyon Village to Fishing Bridge	0.34	24.99	0.45	16.875	1.4	6.3	0.36	8.1	0.06	1.26	57.525	0.362
Fishing Bridge to East Entrance	0.02	1.47	0.05	1.875	1.6	7.2	0.02	0.45	0	0	10.995	0.069
Fishing Bridge to West Thumb	0.08	5.88	0.46	17.25	0.3	1.35	0.02	0.45	0.06	1.26	26.19	0.165
Madison to Old Faithful	1.41	103.635	0.47	17.625	0.1	0.45	1.15	25.875	0.6	12.6	160.185	1.007
Old Faithful to West Thumb	0.27	19.845	1.35	50.625	0.2	0.9	0.05	1.125	1.3	27.3	99.795	0.628
West Thumb to Flagg Ranch	0.05	3.675	1.75	65.625	0.1	0.45	0.05	1.125	1.18	24.78	95.655	0.602

APPENDIX B
MOBILE6 EMISSIONS FILES

(Electronic files, please download:
Appendix B MOBILE6 Modeling Files.zip)

Summary of MOBILE6.2 Emission Factors for Modeling

Yellowstone National Park Winter Use Plan SEIS

Revised for HAPs
11/9/2012

HAPs (for all Alternatives)

Snowcoach HAPs Emission Factors Based on MOBILE6.2 for Light- and Heavy-Duty Trucks

80/20 gas/diesel snowcoaches mix (Current Fleet)

	Benzene			1-3 Butadiene			Formaldehyde			Acetaldehyde		
	Idle (g/hr)	Low (g/mi)	Cruise (g/mi)	Idle (g/hr)	Low (g/mi)	Cruise (g/mi)	Idle (g/hr)	Low (g/mi)	Cruise (g/mi)	Idle (g/hr)	Low (g/mi)	Cruise (g/mi)
2012 Composite Emissions	434.3	87.1	45.3	52.2	11.9	6.7	153.8	37.4	18.0	52.7	12.8	6.5

Snowcoach HAPs Emissions as Percent of HC

	Benzene			1-3 Butadiene			Formaldehyde			Acetaldehyde		
	Idle	Low	Cruise	Idle	Low	Cruise	Idle	Low	Cruise	Idle	Low	Cruise
Percent of HC	3.05%	3.74%	3.68%	0.37%	0.51%	0.54%	1.08%	1.60%	1.46%	0.37%	0.55%	0.53%

70/30 gas/diesel snowcoaches mix (BAT Snowcoaches)

	Benzene			1-3 Butadiene			Formaldehyde			Acetaldehyde		
	Idle (g/hr)	Low (g/mi)	Cruise (g/mi)	Idle (g/hr)	Low (g/mi)	Cruise (g/mi)	Idle (g/hr)	Low (g/mi)	Cruise (g/mi)	Idle (g/hr)	Low (g/mi)	Cruise (g/mi)
2017 Composite Emissions	272.2	55.3	29.5	34.1	7.9	4.6	108.2	27.4	13.9	38.7	9.8	5.1

Snowcoach HAPs Emissions as Percent of HC

	Benzene			1-3 Butadiene			Formaldehyde			Acetaldehyde		
	Idle	Low	Cruise	Idle	Low	Cruise	Idle	Low	Cruise	Idle	Low	Cruise
Percent of HC	3.06%	3.69%	3.60%	0.38%	0.53%	0.56%	1.22%	1.83%	1.70%	0.43%	0.65%	0.63%

Note:
Low speed for M6 is 8.3 mph, cruise speed is 24.3 mph (average of 2005, 2005, & 2012 testing)
Shaded values selected for determining HAPs emission inventories.

Snowcoach HC Emissions Estimated by MOBILE6.2
80/20 gas/diesel (Current Fleet)

	HC		
	Idle (g/hr)	Low (g/mi)	Cruise (g/mi)
2012 Composite	14.3	2.33	1.23

Snowcoach HC Emissions Estimated by MOBILE6.2
70/30 gas/diesel (BAT Snowcoach)

	HC		
	Idle (g/hr)	Low (g/mi)	Cruise (g/mi)
2017 Composit	8.9	1.50	0.82

APPENDIX C
CAL3QHCR MODELING FILES

(Electronic files, please download:
Appendix C CAL3QHCR Modeling Files.zip)

APPENDIX D
AERMOD MODELING FILES

**(Electronic files, please download:
Appendix D AERMOD Modeling Files.zip)**

APPENDIX E
PSD CALCULATIONS

APPENDIX E PSD Analysis

Maximum Predicted 24- hour PM_{10} ($\mu g/m^3$) without Background / Increment Consumption

CAL3QHCR and AERMOD Modeling - Post-SEIS

Yellowstone National Park

Scenario	Description	Fleet Assumption	Site 1: West Entrance 24-hour (ug/m^3)	Site 2: West Entrance to Madison 24-hour (ug/m^3)	Site 3: Canyon to Fishing Bridge 24-hour (ug/m^3)	Site 4: Old Faithful Staging Area 24-hour (ug/m^3)
Alternative 1	No Action	Admin SC, BAT SM	0.0	0.0	0.0	0.0
Alternative 2A-M	Interim Regulation	Current SC, BAT SM	0.6	0.0	0.0	0.0
Alternative 2B-M	Interim Regulation, with BAT SC	BAT SC, BAT SM	0.3	0.0	0.0	0.0
Alternative 3B-M	Phase II of SM phase-out (phase-out of comm. SM)	BAT SC	0.0	0.0	0.0	0.0
	Transportation Event Management - MAX					
Alternative 4A-M	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	1.1	0.0	0.0	0.1
Alternative 4B-M	106 SC events, 4 Non-commercial SM events	BAT SC, New BAT SM	0.1	0.0	0.0	0.0
Alternative 4C-M	60 SC events (120 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	1.3	0.0	0.0	0.1
Alternative 4D-M	106 SC events (212 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	0.1	0.0	0.0	0.0
	Transportation Event Management - AVG					
Alternative 4A-AVG	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	0.6	0.0	0.0	0.0
Alternative 4C-AVG	60 SC events (90 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	0.8	0.0	0.0	0.0
Alternative 4D-AVG	106 SC events (159 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	0.1	0.0	0.0	0.0
1999 Historical	Historical Unregulated Scenario		191.5	40.2	5.9	3.8
PSD Baseline Year	1979 Historical Conditions		42.5	8.9	1.1	0.7

Note:

Baseline Year concentrations are based on the ratio of 1979 to 1999 snowmobile levels at the modeling locations.

Class I PSD Increment for 24-hour average PM_{10} is 8 $\mu g/m^3$

As the methodology employed in this study is a screening-level analysis, it is not intended for regulatory purposes and does not constitute a regulatory PSD increment consumption analysis.

Peak Hour Snowmobile Volume Comparison
Dispersion Modeling Input Volumes

Modeling Year	Site 1: West Entrance	Site 2: West Entrance to Madison	Site 3: Canyon to Fishing Bridge	Site 4: Old Faithful Staging Area
1979	74	74	46	121
1999	331	331	238	633
1979 to 1999 Ratio	22%	22%	19%	19%

	West Entrance Daily Entry Limit	West Entrance to Madison Trips	Canyon to Fishing Bridge Trips	Daily One-way Trips on Road Segments to Old Faithful
1979	210	Same as WE	115	220
1999	947	Same as WE	595	1,152
Peak Hour (% of Daily Trips)	35.0%		40.0%	55.0%

1979 Baseline Year - Historical Unregulated Conditions

Snowmobiles	West Entrance		South Entrance		East Entrance		North Entrance		Old Faithful		Total
	210		37		16		13		0		276
YELL Road Segment	Factor	Results	Factor	Results	Factor	Results	Factor	Results	Factor	Results	
Mammoth to Norris	0.05	10.5	0.03	1.11	0.1	1.6	1.8	23.4	0.3	0	37
West Entrance to Madison	1.8	378	0.05	1.85	0.1	1.6	0.15	1.95	0.15	0	383
Madison to Norris	0.59	123.9	0.08	2.96	0.1	1.6	1.2	15.6	1	0	144
Norris to Canyon Village	0.44	92.4	0.05	1.85	0.2	3.2	0.56	7.28	0.7	0	105
Canyon Village to Fishing Bridge	0.34	71.4	0.45	16.65	1.4	22.4	0.36	4.68	0.7	0	115
Fishing Bridge to East Entrance	0.02	4.2	0.05	1.85	1.6	25.6	0.02	0.26	0.02	0	32
Fishing Bridge to West Thumb	0.08	16.8	0.46	17.02	0.3	4.8	0.02	0.26	0.7	0	39
Madison to Old Faithful*	1.41	296.1	0.47	17.39	0.1	1.6	1.15	14.95	1.05	0	330
Old Faithful to West Thumb*	0.27	56.7	1.35	49.95	0.2	3.2	0.05	0.65	0.75	0	111
West Thumb to Flagg Ranch	0.05	10.5	1.75	64.75	0.1	1.6	0.05	0.65	0.05	0	78

* Used to determine Old Faithful visits

Snowcoaches	West Entrance		South Entrance		East Entrance		North Entrance		Old Faithful		Total
	7		5		0		0		0		12
YELL Road Segment	Factor	Results	Factor	Results	Factor	Results	Factor	Results	Factor	Results	
Mammoth to Norris	0.05	0.365556	0.03	0.143	0.1	0	1.8	0	0	0	1
West Entrance to Madison	1.8	13.16	0.05	0.238333	0.1	0	0.15	0	0.48	0	13
Madison to Norris	0.59	4.313556	0.08	0.381333	0.1	0	1.2	0	0.06	0	5
Norris to Canyon Village	0.44	3.216889	0.05	0.238333	0.2	0	0.56	0	0.06	0	3
Canyon Village to Fishing Bridge	0.34	2.485778	0.45	2.145	1.4	0	0.36	0	0.06	0	5
Fishing Bridge to East Entrance	0.02	0.146222	0.05	0.238333	1.6	0	0.02	0	0	0	0
Fishing Bridge to West Thumb	0.08	0.584889	0.46	2.192667	0.3	0	0.02	0	0.06	0	3
Madison to Old Faithful	1.41	10.30867	0.47	2.240333	0.1	0	1.15	0	0.6	0	13
Old Faithful to West Thumb	0.27	1.974	1.35	6.435	0.2	0	0.05	0	1.3	0	8
West Thumb to Flagg Ranch	0.05	0.365556	1.75	8.341667	0.1	0	0.05	0	1.18	0	9

APPENDIX F
EMISSIONS INVENTORY FILES

Post-SEIS Maximum Predicted 1- and 8-hour CO Concentrations (parts per million) - CAL3QHCR and AERMOD Modeling
Yellowstone National Park

Scenario	Description	Fleet Assumption	Site 1: West Entrance		Site 2: West Entrance to Madison		Site 3: Canyon to Fishing Bridge		Site 4: Old Faithful Staging Area	
			1-hour (ppm)	8-hour (ppm)	1-hour (ppm)	8-hour (ppm)	1-hour (ppm)	8-hour (ppm)	1-hour (ppm)	8-hour (ppm)
Alternative 1	No Action	Admin SC, BAT SM	0.5	0.2	0.5	0.2	0.2	0.2	0.2	0.2
Alternative 2A-M	Interim Regulation	Current SC, BAT SM	10.6	1.6	0.9	0.3	0.3	0.2	0.3	0.2
Alternative 2B-M	Interim Regulation, with BAT SC	BAT SC, BAT SM	9.8	1.4	0.8	0.3	0.3	0.2	0.3	0.2
Alternative 3B	Phase II of SM phase-out (phase-out of comm. SM)	BAT SC	0.7	0.2	0.9	0.3	0.3	0.2	0.2	0.2
	Transportation Event Management - MAX									
Alternative 4A-M	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	8.9	1.3	0.5	0.2	0.2	0.2	0.3	0.2
Alternative 4B-M	106 SC events, 4 Non-commercial SM events	BAT SC, New BAT SM	0.6	0.2	0.8	0.2	0.3	0.2	0.2	0.2
Alternative 4C-M	60 SC events (120 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	6.2	1.0	0.8	0.3	0.3	0.2	0.2	0.2
Alternative 4D-M	106 SC events (212 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	0.7	0.2	1.5	0.4	0.4	0.2	0.2	0.2
	Transportation Event Management - AVG									
Alternative 4A-AVG	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	4.9	0.7	0.4	0.2	0.2	0.2	0.3	0.2
Alternative 4C-AVG	60 SC events (90 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	4.6	0.7	0.7	0.2	0.3	0.2	0.2	0.2
Alternative 4D-AVG	106 SC events (159 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	0.6	0.2	1.2	0.3	0.3	0.2	0.2	0.2

Note:
NAAQS for CO are 35 and 9 parts per million (ppm), for the 1-hour and 8-hour averaging periods, respectively.

Location	CO Backgrounds (ppm)	
	1-hr	8-hr
West Entrance	0.17	0.15
Old Faithful	0.17	0.15

Post-SEIS Maximum Predicted 1-hour NO_2 Concentrations (parts per billion) - CAL3QHCR and AERMOD Modeling
Yellowstone National Park

Scenario	Description	Fleet Assumption	Site 1: West Entrance 1-hour (ppb)	Site 2: West Entrance to Madison 1-hour (ppb)	Site 3: Canyon to Fishing Bridge 1-hour (ppb)	Site 4: Old Faithful Staging Area 1-hour (ppb)
Alternative 1	No Action	Admin SC, BAT SM	9	11	4	0
Alternative 2A-M	Interim Regulation	Current SC, BAT SM	28	49	16	1
Alternative 2B-M	Interim Regulation, with BAT SC	BAT SC, BAT SM	23	45	15	1
Alternative 3B-M	Phase II of SM phase-out (phase-out of comm. SM)	BAT SC	19	17	6	0
	Transportation Event Management - MAX					
Alternative 4A-M	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	33	70	22	0
Alternative 4B-M	106 SC events, 4 Non-commercial SM events	BAT SC, New BAT SM	10	19	7	0
Alternative 4C-M	60 SC events (120 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	30	50	16	0
Alternative 4D-M	106 SC events (212 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	19	28	7	1
	Transportation Event Management - AVG					
Alternative 4A-AVG	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	23	52	17	0
Alternative 4C-AVG	60 SC events (90 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	24	40	13	0
Alternative 4D-AVG	106 SC events (159 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	15	25	7	0

Note:
NAAQS for NO_2 is 100 parts per billion (ppb), for the 1-hour averaging period.

NO_2 Background (ppb)
1-hr
0.3000

Post-SEIS Maximum Predicted 24- hour $PM_{2.5}$ Concentrations ($\mu g/m^3$) - CAL3QHCR and AERMOD Modeling
Yellowstone National Park

Scenario	Description	Fleet Assumption	Site 1: West Entrance 24-hour (ug/m^3)	Site 2: West Entrance to Madison 24-hour (ug/m^3)	Site 3: Canyon to Fishing Bridge 24-hour (ug/m^3)	Site 4: Old Faithful Staging Area 24-hour (ug/m^3)
Alternative 1	No Action	Admin SC, BAT SM	1.4	1.4	1.4	1.4
Alternative 2A-M	Interim Regulation	Current SC, BAT SM	2.0	1.4	1.4	1.4
Alternative 2B-M	Interim Regulation, with BAT SC	BAT SC, BAT SM	1.7	1.4	1.4	1.4
Alternative 3B-M	Phase II of SM phase-out (phase-out of comm. SM)	BAT SC	1.4	1.4	1.4	1.4
	Transportation Event Management - MAX					
Alternative 4A-M	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	2.5	1.4	1.4	1.5
Alternative 4B-M	106 SC events, 4 Non-commercial SM events	BAT SC, New BAT SM	1.5	1.4	1.4	1.4
Alternative 4C-M	60 SC events (120 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	2.7	1.4	1.4	1.5
Alternative 4D-M	106 SC events (212 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	1.5	1.4	1.4	1.4
	Transportation Event Management - AVG					
Alternative 4A-AVG	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	2.0	1.4	1.4	1.4
Alternative 4C-AVG	60 SC events (90 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	2.2	1.4	1.4	1.4
Alternative 4D-AVG	106 SC events (159 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	1.5	1.4	1.4	1.4

Note:

NAAQS for PM_{10} is 150 $\mu g/m^3$ and for $PM_{2.5}$ is 35 $\mu g/m3$, for the 24-hour averaging period.

Location		$PM_{2.5}$ Backgrounds (ug/m^3) 24-hr
WEST ENTRANCE		1.4
OLD FAITHFUL		1.4

YELLOWSTONE NATIONAL PARK POST-SEIS VISCREEN Visibility Analysis Results

Scenario	Description	Fleet Assumption	Screening Criteria Exceedance			
			Site 1: West Entrance	Site 2: West Entrance to Madison	Site 3: Canyon to Fishing Bridge	Site 4: Old Faithful Staging Area
Alternative 1	No Action	Admin SC, BAT SM	No	No	No	No
Alternative 2A-M	Interim Regulation	Current SC, BAT SM	No	No	No	No
Alternative 2B-M	Interim Regulation, with BAT SC	BAT SC, BAT SM	No	No	No	No
Alternative 3B-M	Phase II of SM phase-out (phase-out of comm. SM)	BAT SC	No	No	No	No
	Transportation Event Management					
Alternative 4A-M	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	No	No	No	No
Alternative 4B-M	106 SC events, 4 Non-commercial SM events	BAT SC, New BAT SM	No	No	No	No
Alternative 4C-M	60 SC events (120 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	No	No	No	No
Alternative 4D-M	106 SC events (212 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	No	No	No	No
	Transportation Event Management					
Alternative 4A-AVG	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	No	No	No	No
Alternative 4C-AVG	60 SC events (90 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	No	No	No	No
Alternative 4D-AVG	106 SC events (159 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	No	No	No	No

Table 6-1: Summary of Parkwide Total Winter Season Mobile Source Emissions
Yellowstone National Park

Scenario	Description	Fleet Assumption	CO		HC		NOx		PM	
			lb/day	tpy	lb/day	tpy	lb/day	tpy	lb/day	tpy
Alternative 2A-M	Interim Regulation	Current SC, BAT SM	3,343	150	152	6.8	874	39	2.5	0.11
Alternative 2B-M	Interim Regulation, with BAT SC	BAT SC, BAT SM	2,859	129	89	4.0	804	36	2.4	0.11
Alternative 3B-M	Phase II of SM phase-out (phase-out of comm. SM)	BAT SC	2,852	128	28	1.3	272	12	0.6	0.03
	Transportation Event Management									
Alternative 4A-M	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	1,332	55	20	0.8	1,227	43	3.3	0.11
Alternative 4B-M	106 SC events, 4 Non-commercial SM events	BAT SC, New BAT SM	2,339	105	13	0.6	329	15	0.7	0.03
Alternative 4C-M	60 SC events (120 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	2,930	100	20	0.8	892	33	3.4	0.13
Alternative 4D-M	106 SC events (212 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	5,457	185	19	0.7	421	17	0.8	0.03
	Transportation Event Management									
Alternative 4A-AVG	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	1,225	55	17	0.8	945	43	2.5	0.11
Alternative 4C-AVG	60 SC events (90 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	2,224	100	17	0.8	741	33	2.8	0.13
Alternative 4D-AVG	106 SC events (159 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	4,114	185	16	0.7	375	17	0.7	0.03

Table _: Summary of Parkwide Total Winter Season Mobile Source CO Emissions by Contribution
Yellowstone National Park

Scenario	Description	Fleet Assumption	CO							
			Administrative Use		Commercial/Non-commercial Snowmobiles		Commercial Snowcoaches		TOTAL	
			lb/day	tpy	lb/day	tpy	lb/day	tpy	lb/day	tpy
Alternative 2A-M	Interim Regulation	Current SC, BAT SM	301	14	1,126	51	1,917	86	3,343	150
Alternative 2B-M	Interim Regulation, with BAT SC	BAT SC, BAT SM	301	14	1,126	51	1,432	64	2,859	129
Alternative 3B-M	Phase II of SM phase-out (phase-out of comm. SM)	BAT SC	301	14	0	0	2,551	115	2,852	128
	Transportation Event Management									
Alternative 4A-M	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	67	3	371	12	894	40	1,332	55
Alternative 4B-M	106 SC events, 4 Non-commercial SM events	BAT SC, New BAT SM	67	3	16	1	2,256	102	2,339	105
Alternative 4C-M	60 SC events (120 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	45	2	248	9	2,638	89	2,930	100
Alternative 4D-M	106 SC events (212 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	67	3	16	1	5,375	181	5,457	185
	Transportation Event Management									
Alternative 4A-AVG	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	67	3	265	12	894	40	1,225	55
Alternative 4C-AVG	60 SC events (90 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	45	2	200	9	1,978	89	2,224	100
Alternative 4D-AVG	106 SC events (159 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	67	3	16	1	4,031	181	4,114	185

Table _: Summary of Parkwide Total Winter Season Mobile Source HC Emissions by Contribution
Yellowstone National Park

Scenario	Description	Fleet Assumption	HC							
			Administrative Use		Commercial/Non-commercial Snowmobiles		Commercial Snowcoaches		TOTAL	
			lb/day	tpy	lb/day	tpy	lb/day	tpy	lb/day	tpy
Alternative 2A-M	Interim Regulation	Current SC, BAT SM	22	1.0	63	2.8	66	3.0	152	6.8
Alternative 2B-M	Interim Regulation, with BAT SC	BAT SC, BAT SM	22	1.0	63	2.8	4	0.2	89	4.0
Alternative 3B-M	Phase II of SM phase-out (phase-out of comm. SM)	BAT SC	22	1	0	0	6	0	28	1
	Transportation Event Management									
Alternative 4A-M	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	7	0.3	10	0.3	3	0.1	20	0.8
Alternative 4B-M	106 SC events, 4 Non-commercial SM events	BAT SC, New BAT SM	7	0.3	0	0.0	6	0.3	13	0.6
Alternative 4C-M	60 SC events (120 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	7	0.3	7	0.2	6	0.2	20	0.8
Alternative 4D-M	106 SC events (212 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	7	0.3	0	0.0	11	0.4	19	0.7
	Transportation Event Management									
Alternative 4A-AVG	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	7	0.3	7	0.3	3	0.1	17	0.8
Alternative 4C-AVG	60 SC events (90 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	7	0.3	6	0.2	5	0.2	17	0.8
Alternative 4D-AVG	106 SC events (159 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	7	0.3	0	0.0	9	0.4	16	0.7

Table _: Summary of Parkwide Total Winter Season Mobile Source NOx Emissions by Contribution
Yellowstone National Park

Scenario	Description	Fleet Assumption	NOx							
			Administrative Use		Commercial/Non-commercial Snowmobiles		Commercial Snowcoaches		TOTAL	
			lb/day	tpy	lb/day	tpy	lb/day	tpy	lb/day	tpy
Alternative 2A-M	Interim Regulation	Current SC, BAT SM	171	8	565	25	138	6	874	39
Alternative 2B-M	Interim Regulation, with BAT SC	BAT SC, BAT SM	171	8	565	25	68	3	804	36
Alternative 3B-M	Phase II of SM phase-out (phase-out of comm. SM)	BAT SC	171	8	0	0	101	5	272	12
	Transportation Event Management									
Alternative 4A-M	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	193	9	980	31	53	2	1,227	43
Alternative 4B-M	106 SC events, 4 Non-commercial SM events	BAT SC, New BAT SM	193	9	42	2	94	4	329	15
Alternative 4C-M	60 SC events (120 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	135	6	653	24	104	4	892	33
Alternative 4D-M	106 SC events (212 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	193	9	42	2	186	6	421	17
	Transportation Event Management									
Alternative 4A-AVG	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	193	9	699	31	53	2	945	43
Alternative 4C-AVG	60 SC events (90 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	135	6	528	24	78	4	741	33
Alternative 4D-AVG	106 SC events (159 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	193	9	42	2	139	6	375	17

Table _: Summary of Parkwide Total Winter Season Mobile Source PM Emissions by Contribution
Yellowstone National Park

Scenario	Description	Fleet Assumption	PM							
			Administrative Use		Commercial/Non-commercial Snowmobiles		Commercial Snowcoaches		TOTAL	
			lb/day	tpy	lb/day	tpy	lb/day	tpy	lb/day	tpy
Alternative 2A-M	Interim Regulation	Current SC, BAT SM	0.51	0.02	1.85	0.08	0.17	0.01	2.53	0.11
Alternative 2B-M	Interim Regulation, with BAT SC	BAT SC, BAT SM	0.51	0.02	1.85	0.08	0.04	0.00	2.40	0.11
Alternative 3B-M	Phase II of SM phase-out (phase-out of comm. SM)	BAT SC	0.51	0.02	0.00	0.00	0.06	0.00	1.71	0.08
	Transportation Event Management									
Alternative 4A-M	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	0.51	0.02	2.80	0.09	0.03	0.00	3.34	0.11
Alternative 4B-M	106 SC events, 4 Non-commercial SM events	BAT SC, New BAT SM	0.51	0.02	0.12	0.01	0.06	0.00	0.69	0.03
Alternative 4C-M	60 SC events (120 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	0.51	0.02	2.80	0.10	0.07	0.00	3.38	0.13
Alternative 4D-M	106 SC events (212 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	0.51	0.02	0.12	0.01	0.12	0.00	0.75	0.03
	Transportation Event Management									
Alternative 4A-AVG	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	0.51	0.02	1.99	0.09	0.03	0.00	2.54	0.11
Alternative 4C-AVG	60 SC events (90 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	0.51	0.02	2.26	0.10	0.05	0.00	2.82	0.13
Alternative 4D-AVG	106 SC events (159 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	0.51	0.02	0.12	0.01	0.09	0.00	0.72	0.03

Summary of Emissions

Summary of Emissions By Scenario and Link (lb/day)

CO	MAX							*CO*		
Link	**Alternative 2 Current (lb/day)**	**Alternative 2 BAT SC (lb/day)**	**Alternative 3b SC Only (lb/day)**	**Alternative 4a BAT SC (lb/day)**	**Alternative 4b BAT SC (lb/day)**	**Alternative 4c BAT SC (lb/day)**	**Alternative 4d BAT SC (lb/day)**	**Alternative 4A-AVG New BAT SM (lb/day)**	**Alternative 4C-AVG E-BAT SM (lb/day)**	**Alternative 4D-AVG New BAT SM (lb/day)**
West	27.96	25.97	3.55	6.59	1.17	4.82	1.82	4.87	3.91	1.52
Mammoth to Norris	242.44	201.09	260.31	120.14	178.39	302.32	408.91	116.77	229.07	309.59
West Entrance to Madison	506.53	429.61	521.68	203.30	367.53	460.98	864.96	187.37	348.81	650.65
Madison to Norris	261.22	220.59	260.71	114.51	188.92	268.03	441.11	107.28	202.92	332.46
Norris to Canyon Village	146.75	124.45	142.85	62.32	105.15	143.17	246.16	57.92	108.40	185.41
Canyon Village to Fishing Bridge	247.50	215.80	174.81	93.13	167.18	192.21	388.02	84.51	146.37	292.88
Fishing Bridge to East Entrance	101.74	91.82	16.64	30.47	57.18	52.06	128.42	27.19	40.36	97.73
Fishing Bridge to West Thumb	178.21	161.27	109.22	59.08	105.54	101.94	237.50	52.59	78.88	180.65
Madison to Old Faithful	624.96	528.32	613.05	259.83	455.69	596.96	1070.65	240.79	451.66	805.70
Old Faithful to West Thumb	431.71	368.41	353.13	163.21	303.21	355.03	710.27	149.21	269.31	534.89
West Thumb to Flagg Ranch	558.53	477.26	393.85	208.64	406.77	445.50	957.61	188.79	337.73	720.29
Old Faithful Staging Area	15.66	14.32	2.67	10.82	1.80	7.33	1.91	8.10	6.09	1.85
Total	**3343.22**	**2858.90**	**2852.48**	**1332.04**	**2338.54**	**2930.36**	**5457.35**	**1225.39**	**2223.50**	**4113.61**

HC	MAX							*HC*		
Link	**Alternative 2 Current (lb/day)**	**Alternative 2 BAT SC (lb/day)**	**Alternative 3b SC Only (lb/day)**	**Alternative 4a BAT SC (lb/day)**	**Alternative 4b BAT SC (lb/day)**	**Alternative 4c BAT SC (lb/day)**	**Alternative 4d BAT SC (lb/day)**	**Alternative 4A-AVG New BAT SM (lb/day)**	**Alternative 4C-AVG E-BAT SM (lb/day)**	**Alternative 4D-AVG New BAT SM (lb/day)**
West	1.11	1.05	0.13	0.35	0.05	0.24	0.05	0.26	0.20	0.05
Mammoth to Norris	10.83	5.48	3.77	1.64	1.43	1.82	1.86	1.56	1.60	1.65
West Entrance to Madison	22.44	12.49	3.33	2.51	1.59	2.56	2.50	2.11	2.12	2.04
Madison to Norris	11.63	6.38	2.33	1.46	1.02	1.53	1.48	1.28	1.29	1.25
Norris to Canyon Village	6.55	3.67	1.15	0.80	0.53	0.82	0.79	0.69	0.69	0.66
Canyon Village to Fishing Bridge	11.78	7.68	2.35	1.65	1.13	1.58	1.54	1.43	1.38	1.33
Fishing Bridge to East Entrance	5.21	3.93	1.26	0.78	0.59	0.71	0.72	0.70	0.65	0.66
Fishing Bridge to West Thumb	9.47	7.28	3.41	1.76	1.36	1.62	1.60	1.59	1.49	1.48
Madison to Old Faithful	27.65	15.15	4.32	3.23	2.11	3.34	3.24	2.75	2.78	2.67
Old Faithful to West Thumb	19.54	11.36	3.30	2.41	1.60	2.38	2.35	2.06	2.02	1.98
West Thumb to Flagg Ranch	24.98	14.47	2.96	2.81	1.68	2.73	2.69	2.31	2.26	2.19
Old Faithful Staging Area	0.63	0.55	0.10	0.66	0.10	0.44	0.11	0.49	0.37	0.10
Total	**151.81**	**89.48**	**28.42**	**20.04**	**13.20**	**19.76**	**18.93**	**17.23**	**16.86**	**16.06**

Summary of Emissions

NOx	MAX							*NOx*		
Link	Alternative 2 Current (lb/day)	Alternative 2 BAT SC (lb/day)	Alternative 3b SC Only (lb/day)	Alternative 4a BAT SC (lb/day)	Alternative 4b BAT SC (lb/day)	Alternative 4c BAT SC (lb/day)	Alternative 4d BAT SC (lb/day)	Alternative 4A-AVG New BAT SM (lb/day)	Alternative 4C-AVG E-BAT SM (lb/day)	Alternative 4D-AVG New BAT SM (lb/day)
West	0.75	0.60	0.34	1.26	0.35	0.99	0.55	0.95	0.80	0.45
Mammoth to Norris	54.64	48.65	34.16	70.65	40.98	55.40	47.74	61.40	48.46	44.32
West Entrance to Madison	127.46	116.32	36.21	177.04	37.51	129.47	52.09	133.23	105.87	44.71
Madison to Norris	64.53	58.64	23.16	90.21	26.56	67.01	33.95	70.33	55.74	30.21
Norris to Canyon Village	37.08	33.85	11.71	52.22	13.43	38.44	17.57	40.10	31.76	15.47
Canyon Village to Fishing Bridge	73.76	69.17	21.00	104.40	28.61	74.57	35.08	80.68	62.38	31.81
Fishing Bridge to East Entrance	36.19	34.75	9.71	47.33	18.62	32.98	20.70	38.32	28.58	19.65
Fishing Bridge to West Thumb	65.19	62.74	27.49	91.34	34.15	63.99	38.02	73.48	55.26	36.06
Madison to Old Faithful	154.58	140.59	45.43	217.37	50.32	159.91	68.35	165.01	131.26	59.22
Old Faithful to West Thumb	113.41	104.25	32.12	160.62	38.11	116.05	50.04	122.11	95.81	44.00
West Thumb to Flagg Ranch	146.61	134.84	30.77	214.14	40.73	153.53	56.88	159.54	125.38	48.70
Old Faithful Staging Area	0.10	0.09	0.06	0.06	0.05	0.07	0.09	0.05	0.06	0.07
Total	**874.31**	**804.48**	**272.15**	**1226.63**	**329.43**	**892.41**	**421.08**	**945.22**	**741.37**	**374.68**

PM-10	MAX							*PM-10*		
Link	Alternative 2 Current (lb/day)	Alternative 2 BAT SC (lb/day)	Alternative 3b SC Only (lb/day)	Alternative 4a BAT SC (lb/day)	Alternative 4b BAT SC (lb/day)	Alternative 4c BAT SC (lb/day)	Alternative 4d BAT SC (lb/day)	Alternative 4A-AVG New BAT SM (lb/day)	Alternative 4C-AVG E-BAT SM (lb/day)	Alternative 4D-AVG New BAT SM (lb/day)
West	0.01	0.01	0.00	0.02	0.00	0.02	0.00	0.01	0.01	0.00
Mammoth to Norris	0.15	0.14	0.08	0.18	0.10	0.19	0.10	0.16	0.17	0.10
West Entrance to Madison	0.36	0.34	0.06	0.48	0.07	0.48	0.08	0.35	0.40	0.07
Madison to Norris	0.18	0.17	0.05	0.24	0.06	0.24	0.06	0.18	0.20	0.06
Norris to Canyon Village	0.11	0.10	0.02	0.14	0.03	0.14	0.03	0.11	0.12	0.03
Canyon Village to Fishing Bridge	0.22	0.21	0.05	0.28	0.06	0.29	0.07	0.22	0.24	0.06
Fishing Bridge to East Entrance	0.11	0.11	0.03	0.13	0.05	0.13	0.05	0.10	0.11	0.05
Fishing Bridge to West Thumb	0.19	0.19	0.07	0.25	0.08	0.25	0.08	0.20	0.22	0.08
Madison to Old Faithful	0.44	0.41	0.08	0.58	0.10	0.59	0.11	0.44	0.49	0.10
Old Faithful to West Thumb	0.32	0.31	0.07	0.43	0.08	0.44	0.08	0.33	0.36	0.08
West Thumb to Flagg Ranch	0.42	0.40	0.06	0.58	0.08	0.59	0.09	0.43	0.48	0.08
Old Faithful Staging Area	0.02	0.02	0.00	0.02	0.00	0.02	0.00	0.02	0.02	0.00
Total	**2.53**	**2.40**	**0.58**	**3.34**	**0.69**	**3.38**	**0.75**	**2.54**	**2.82**	**0.72**

Percent Contribution by Vehicle Type to Total Scenario Emissions

Scenario	Description	Fleet Assumption	CO		HC		NOx		PM	
			Snowmobile	Snowcoach	Snowmobile	Snowcoach	Snowmobile	Snowcoach	Snowmobile	Snowcoach
Alternative 2A-M	Interim Regulation	Current SC, BAT SM	43%	57%	53%	47%	82%	18%	93%	7%
Alternative 2B-M	Interim Regulation, with BAT SC	BAT SC, BAT SM	50%	50%	89%	11%	89%	11%	97%	3%
Alternative 3B-M	Phase II of SM phase-out (phase-out of comm. SM)	BAT SC	11%	89%	59%	41%	56%	44%	86%	14%
	Transportation Event Management									
Alternative 4A-M	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	27%	73%	50%	50%	92%	8%	98%	2%
Alternative 4B-M	106 SC events, 4 Non-commercial SM events	BAT SC, New BAT SM	3%	97%	16%	84%	66%	34%	89%	11%
Alternative 4C-M	60 SC events (120 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	11%	89%	40%	60%	87%	13%	98%	2%
Alternative 4D-M	106 SC events (212 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	2%	98%	13%	87%	58%	42%	85%	15%
	Transportation Event Management									
Alternative 4A-AVG	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	27%	73%	50%	50%	92%	8%	98%	2%
Alternative 4C-AVG	60 SC events (90 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	11%	89%	40%	60%	87%	13%	98%	2%
Alternative 4D-AVG	106 SC events (159 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	2%	98%	13%	87%	58%	42%	85%	15%

Summary of Parkwide Total Winter Season HAPs Mobile Source Emissions (Tons per Year)
Yellowstone National Park Post-SEIS

Scenario	Description	Fleet Assumption	Benzene (tpy)	1-3 Butadiene (tpy)	Formaldehyde (tpy)	Acetaldehyde (tpy)
Alternative 2A-M	Interim Regulation	Current SC, BAT SM	0.21	0.02	0.15	0.06
Alternative 2B-M	Interim Regulation, with BAT SC	BAT SC, BAT SM	0.11	0.00	0.11	0.04
Alternative 3B-M	Phase II of SM phase-out (phase-out of comm. SM)	BAT SC	0.04	0.00	0.03	0.01
	Transportation Event Management					
Alternative 4A-M	60 SC events, 50 SM events (4 Non-comm)	BAT SC, New BAT SM	0.02	0.00	0.02	0.01
Alternative 4B-M	106 SC events, 4 Non-commercial SM events	BAT SC, New BAT SM	0.02	0.00	0.01	0.00
Alternative 4C-M	60 SC events (120 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	0.02	0.00	0.02	0.01
Alternative 4D-M	106 SC events (212 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	0.03	0.00	0.01	0.01
	Transportation Event Management					
Alternative 4A-AVG	54 SC events, 46 SM events (4 Non-comm)	BAT SC, New BAT SM	0.02	0.00	0.02	0.01
Alternative 4C-AVG	60 SC events (90 SC), 50 SM events (4 Non-comm)	BAT SC, E-BAT SM	0.02	0.00	0.02	0.01
Alternative 4D-AVG	106 SC events (159 SC), 4 Non-commercial SM events	BAT SC, New BAT SM	0.03	0.00	0.01	0.01

Note:
4-stroke snowmobile HAPs estimated as a fraction of measured HC emissions based on data reported in SwRI's *Laboratory Testing of Snowmobile Emissions* , Lela and White, July 2002.

Snowcoach HAPs estimated as a fraction of HC emissions based on MOBILE6 modeling of HC and air toxics emission factors for light- and heavy-duty vehicles.

HAP Emission Factors

HAP	Snowmobile (4-stroke)	Snowcoach Current 80/20	Snowcoach BAT 70/30
Benzene	2.60%	3.74%	3.69%
1-3 Butadiene	0.00%	0.54%	0.56%
Formaldehyde	2.81%	1.60%	1.83%
Acetaldehyde	1.08%	0.55%	0.65%

Summary of Daily Snowmobile and Snowcoach Use Numbers from Yellowstone Post-SEIS 2013 Travel Factors Spreadsheet

TravelFactorsV7_DJ (wv).xlsx

Travel Factors datec 6/25/2013

Snowmobiles

Link	Alt 2A Max Current	Alt 2B Max BAT SC	Alt 3B Max SC Only	Alt 4a Max New BAT SM	Alt 4b Max New BAT NC SM	Alt 4c Max E-BAT SM	Alt 4d Max New BAT NC SM	Alt 4a AVG New BAT SM	Alt 4c AVG E-BAT SM	Alt 4d AVG New BAT NC SM	Administrative Travel
West Entrance	160	160	0	235	5	235	5	166	189	5	20
Mammoth to Norris	38.62	38.62	0	70.5	9.9	70.5	9.9	52.32	58.38	9.9	52
West Entrance to Madison	299.3	299.3	0	441	10.5	441	10.5	311.85	354.9	10.5	51
Madison to Norris	131.92	131.92	0	205.15	9.85	205.15	9.85	146.56	166.09	9.85	42
Norris to Canyon Village	95.22	95.22	0	145.15	6.25	145.15	6.25	103.48	117.37	6.25	23
Canyon Village to Fishing Bridge	146.42	146.42	0	216.65	12.75	216.65	12.75	155.48	175.87	12.75	39
Fishing Bridge to East Entrance	41.38	41.38	0	54.35	8.45	54.35	8.45	40.58	45.17	8.45	15
Fishing Bridge to West Thumb	79.88	79.88	0	121.3	4.3	121.3	4.3	86.2	97.9	4.3	49
Madison to Old Faithful	307.58	307.58	0	465.85	15.65	465.85	15.65	330.79	375.81	15.65	60
Old Faithful to West Thumb	210.7	210.7	0	320.95	9.35	320.95	9.35	227.47	258.63	9.35	48
West Thumb to Flagg Ranch	210.7	210.7	0	322.75	9.75	322.75	9.75	228.85	260.15	9.75	29
Old Faithful	259.14	259.14	0	393.4	12.5	393.4	12.5	279.13	317.22	12.5	54

Snowcoaches

Link	Alt 2A Max Current	Alt 2B Max BAT SC	Alt 3B Max SC Only	Alt 4a Max New BAT SM	Alt 4b Max New BAT NC SM	Alt 4c Max E-BAT SM	Alt 4d Max New BAT NC SM	Alt 4a AVG New BAT SM	Alt 4c AVG E-BAT SM	Alt 4d AVG New BAT NC SM	Administrative Travel
West Entrance	34	34	62	26	49	52	98	26	39	74	2
Mammoth to Norris	25.69	25.69	37.6	25.04	30.5	50.08	61	25.04	37.56	45.75	5.5
West Entrance to Madison	71.68	71.68	128.87	55.01	98.72	110.02	197.44	55.01	82.515	148.08	5.5
Madison to Norris	37.86	37.86	61.92	32.4	50.05	64.8	100.1	32.4	48.6	75.075	4.5
Norris to Canyon Village	24.25	24.25	40.16	20.04	32.65	40.08	65.3	20.04	30.06	48.975	2.6
Canyon Village to Fishing Bridge	25.85	25.85	34.16	19.24	38.35	38.48	76.7	19.24	28.86	57.525	5.4
Fishing Bridge to East Entrance	4.79	4.79	0	2.78	7.33	5.56	14.66	2.78	4.17	10.995	1.9
Fishing Bridge to West Thumb	10.52	10.52	11.68	7.04	17.46	14.08	34.92	7.04	10.56	26.19	6.6
Madison to Old Faithful	78.8	78.8	131.37	62.67	106.79	125.34	213.58	62.67	94.005	160.185	7.1
Old Faithful to West Thumb	48.58	48.58	68.89	34.27	66.53	68.54	133.06	34.27	51.405	99.795	6
West Thumb to Flagg Ranch	44.18	44.18	55.77	30.21	63.77	60.42	127.54	30.21	45.315	95.655	3.1
Old Faithful	63.69	63.69	100.13	48.47	86.66	96.94	173.32	48.47	72.705	129.99	6.55

Note: West Entrance numbers are based on total daily admission--no factors applied.

Alternative 2A-M - MAX Interim Regulation, Current Fleet

CO Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	Current BAT	161.1	18.6	409.7	0.0083	West Entrance
Snowcoach	Current	77.9	138.4	201.9	0.05	Old Faithful
Snowcoach	Admin	1.0	0.7	6.7		

Revised Oct 15 2012 Emission Factors from [*Air Quality Model Runs for FEIS with emission numbers V2 (labels cor*

Link	Distance (mi)	Snowmobile Unit Emissions (g/veh-link)	Snowcoach Unit Emissions (g/veh-link)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	64.6	31.3	0.4	22.77	2.85	2.34	0.00	27.96
Mammoth to Norris	21	389.8	2906.4	14.9	33.16	44.64	164.46	0.18	242.44
West Entrance to Madison	14	259.8	1937.6	9.9	171.30	29.19	305.92	0.12	506.53
Madison to Norris	14	259.8	1937.6	9.9	75.50	24.04	161.58	0.10	261.22
Norris to Canyon Village	12	222.7	1660.8	8.5	46.71	11.28	88.71	0.05	146.75
Canyon Village to Fishing Bridge	16	297.0	2214.4	11.4	95.77	25.51	126.08	0.14	247.50
Fishing Bridge to East Entrance	27	501.1	3736.8	19.2	45.67	16.56	39.43	0.08	101.74
Fishing Bridge to West Thumb	21	389.8	2906.4	14.9	68.58	42.07	67.35	0.22	178.21
Madison to Old Faithful	16	297.0	2214.4	11.4	201.19	39.25	384.35	0.18	624.96
Old Faithful to West Thumb	17	315.5	2352.8	12.1	146.43	33.36	251.76	0.16	431.71
West Thumb to Flagg Ranch	24	445.4	3321.6	17.0	206.73	28.45	323.23	0.12	558.53
Old Faithful Staging Area	NA	20.5	10.1	0.3	11.69	2.44	1.42	0.12	15.66
Total					1125.51	299.63	1916.63	1.45	**3343.22**

HC Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	Current BAT	6.6	1.1	15.8	0.0083	West Entrance
Snowcoach	Current	2.3	4.8	11.3	0.05	Old Faithful
Snowcoach	Admin	0.1	2.9	0.3		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	2.6	1.0	0.0	0.92	0.12	0.07	0.00	1.11
Mammoth to Norris	21	22.1	100.8	59.9	1.88	2.53	5.70	0.73	10.83
West Entrance to Madison	14	14.7	67.2	39.9	9.69	1.65	10.61	0.48	22.44
Madison to Norris	14	14.7	67.2	39.9	4.27	1.36	5.60	0.40	11.63
Norris to Canyon Village	12	12.6	57.6	34.2	2.64	0.64	3.08	0.20	6.55
Canyon Village to Fishing Bridge	16	16.8	76.8	45.6	5.42	1.44	4.37	0.54	11.78
Fishing Bridge to East Entrance	27	28.4	129.6	77.0	2.58	0.94	1.37	0.32	5.21
Fishing Bridge to West Thumb	21	22.1	100.8	59.9	3.88	2.38	2.34	0.87	9.47
Madison to Old Faithful	16	16.8	76.8	45.6	11.38	2.22	13.33	0.71	27.65
Old Faithful to West Thumb	17	17.9	81.6	48.5	8.28	1.89	8.73	0.64	19.54
West Thumb to Flagg Ranch	24	25.2	115.2	68.4	11.70	1.61	11.21	0.47	24.98
Old Faithful Staging Area	NA	0.8	0.6	0.0	0.45	0.09	0.08	0.00	0.63
Total					63.10	16.86	66.49	5.36	**151.81**

Alternative 2A-M - MAX Interim Regulation, Current Fleet (cont)

NOx Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	Current BAT	2.8	9.6	1.4	0.0083	West Entrance
Snowcoach	Current	10.4	9.9	6.5	0.05	Old Faithful
Snowcoach	Admin	14.7	10.1	13.3		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	1.1	4.0	5.7	0.38	0.05	0.30	0.03	0.75
Mammoth to Norris	21	201.8	208.5	211.1	17.17	23.11	11.80	2.56	54.64
West Entrance to Madison	14	134.5	139.0	140.7	88.70	15.11	21.95	1.70	127.46
Madison to Norris	14	134.5	139.0	140.7	39.09	12.45	11.59	1.39	64.53
Norris to Canyon Village	12	115.3	119.2	120.6	24.19	5.84	6.36	0.69	37.08
Canyon Village to Fishing Bridge	16	153.8	158.9	160.8	49.59	13.21	9.05	1.91	73.76
Fishing Bridge to East Entrance	27	259.5	268.1	271.4	23.65	8.57	2.83	1.14	36.19
Fishing Bridge to West Thumb	21	201.8	208.5	211.1	35.51	21.78	4.83	3.07	65.19
Madison to Old Faithful	16	153.8	158.9	160.8	104.17	20.32	27.58	2.51	154.58
Old Faithful to West Thumb	17	163.4	168.8	170.9	75.82	17.27	18.06	2.26	113.41
West Thumb to Flagg Ranch	24	230.6	238.3	241.2	107.04	14.73	23.19	1.65	146.61
Old Faithful Staging Area	NA	0.1	0.3	0.7	0.04	0.01	0.05	0.01	0.10
Total					565.34	152.46	137.59	18.92	**874.31**

PM Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	Current BAT	0.065	0.031	0.490	0.0083	West Entrance
Snowcoach	Current	0.033	0.012	0.048	0.05	Old Faithful
Snowcoach	Admin	0.030	0.010	0.040		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Gas Snowcoach Unit Emissions (g)	Diesel Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Gas Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	0.029	0.013	0.012	0.01	0.00	0.00	0.00	0.01
Mammoth to Norris	21	0.651	0.252	0.210	0.06	0.07	0.01	0.00	0.15
West Entrance to Madison	14	0.434	0.168	0.140	0.29	0.05	0.03	0.00	0.36
Madison to Norris	14	0.434	0.168	0.140	0.13	0.04	0.01	0.00	0.18
Norris to Canyon Village	12	0.372	0.144	0.120	0.08	0.02	0.01	0.00	0.11
Canyon Village to Fishing Bridge	16	0.496	0.192	0.160	0.16	0.04	0.01	0.00	0.22
Fishing Bridge to East Entrance	27	0.837	0.324	0.270	0.08	0.03	0.00	0.00	0.11
Fishing Bridge to West Thumb	21	0.651	0.252	0.210	0.11	0.07	0.01	0.00	0.19
Madison to Old Faithful	16	0.496	0.192	0.160	0.34	0.07	0.03	0.00	0.44
Old Faithful to West Thumb	17	0.527	0.204	0.170	0.24	0.06	0.02	0.00	0.32
West Thumb to Flagg Ranch	24	0.744	0.288	0.240	0.35	0.05	0.03	0.00	0.42
Old Faithful Staging Area	NA	0.025	0.002	0.002	0.01	0.00	0.00	0.00	0.017
Total					1.85	0.50	0.17	0.02	**2.53**

Alternative 2B-M - MAX Interim Regulation, BAT Snowcoaches

CO Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	Current BAT	161.1	18.6	409.7	0.0083	West Entrance
Snowcoach	BAT	12.1	103.6	10.7	0.05	Old Faithful
Snowcoach	Admin	1.0	0.7	6.7		

Revised Oct 24 2012 Emission Factors from [*Air Quality Model Runs for FEIS with emission numbers V2 (labels cor*

Link	Distance (mi)	Snowmobile Unit Emissions (g/veh-link)	Snowcoach Unit Emissions (g/veh-link)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	64.6	4.7	0.4	22.77	2.85	0.35	0.00	25.97
Mammoth to Norris	21	389.8	2175.6	14.9	33.16	44.64	123.11	0.18	201.09
West Entrance to Madison	14	259.8	1450.4	9.9	171.30	29.19	229.00	0.12	429.61
Madison to Norris	14	259.8	1450.4	9.9	75.50	24.04	120.95	0.10	220.59
Norris to Canyon Village	12	222.7	1243.2	8.5	46.71	11.28	66.40	0.05	124.45
Canyon Village to Fishing Bridge	16	297.0	1657.6	11.4	95.77	25.51	94.38	0.14	215.80
Fishing Bridge to East Entrance	27	501.1	2797.2	19.2	45.67	16.56	29.51	0.08	91.82
Fishing Bridge to West Thumb	21	389.8	2175.6	14.9	68.58	42.07	50.41	0.22	161.27
Madison to Old Faithful	16	297.0	1657.6	11.4	201.19	39.25	287.71	0.18	528.32
Old Faithful to West Thumb	17	315.5	1761.2	12.1	146.43	33.36	188.46	0.16	368.41
West Thumb to Flagg Ranch	24	445.4	2486.4	17.0	206.73	28.45	241.96	0.12	477.26
Old Faithful Staging Area	NA	20.5	0.5	0.3	11.69	2.44	0.08	0.12	14.32
Total					1125.51	299.63	1432.31	1.45	**2858.90**

HC Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	Current BAT	6.6	1.1	15.8	0.0083	West Entrance
Snowcoach	BAT	0.3	0.3	0.8	0.05	Old Faithful
	Admin	0.1	2.9	0.3		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	2.6	0.1	0.0	0.92	0.12	0.01	0.00	1.05
Mammoth to Norris	21	22.1	6.3	59.9	1.88	2.53	0.36	0.73	5.48
West Entrance to Madison	14	14.7	4.2	39.9	9.69	1.65	0.66	0.48	12.49
Madison to Norris	14	14.7	4.2	39.9	4.27	1.36	0.35	0.40	6.38
Norris to Canyon Village	12	12.6	3.6	34.2	2.64	0.64	0.19	0.20	3.67
Canyon Village to Fishing Bridge	16	16.8	4.8	45.6	5.42	1.44	0.27	0.54	7.68
Fishing Bridge to East Entrance	27	28.4	8.1	77.0	2.58	0.94	0.09	0.32	3.93
Fishing Bridge to West Thumb	21	22.1	6.3	59.9	3.88	2.38	0.15	0.87	7.28
Madison to Old Faithful	16	16.8	4.8	45.6	11.38	2.22	0.83	0.71	15.15
Old Faithful to West Thumb	17	17.9	5.1	48.5	8.28	1.89	0.55	0.64	11.36
West Thumb to Flagg Ranch	24	25.2	7.2	68.4	11.70	1.61	0.70	0.47	14.47
Old Faithful Staging Area	NA	0.8	0.0	0.0	0.45	0.09	0.01	0.00	0.55
Total					63.10	16.86	4.16	5.36	**89.48**

Alternative 2B-M - MAX Interim Regulation, BAT Snowcoaches (cont)

NOx Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	Current BAT	2.8	9.6	1.4	0.0083	West Entrance
Snowcoach	BAT	5.1	4.9	4.1	0.05	Old Faithful
	Admin	14.7	10.1	13.3		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	1.1	2.0	5.7	0.38	0.05	0.15	0.03	0.60
Mammoth to Norris	21	201.8	102.7	211.1	17.17	23.11	5.81	2.56	48.65
West Entrance to Madison	14	134.5	68.5	140.7	88.70	15.11	10.81	1.70	116.32
Madison to Norris	14	134.5	68.5	140.7	39.09	12.45	5.71	1.39	58.64
Norris to Canyon Village	12	115.3	58.7	120.6	24.19	5.84	3.13	0.69	33.85
Canyon Village to Fishing Bridge	16	153.8	78.2	160.8	49.59	13.21	4.45	1.91	69.17
Fishing Bridge to East Entrance	27	259.5	132.0	271.4	23.65	8.57	1.39	1.14	34.75
Fishing Bridge to West Thumb	21	201.8	102.7	211.1	35.51	21.78	2.38	3.07	62.74
Madison to Old Faithful	16	153.8	78.2	160.8	104.17	20.32	13.58	2.51	140.59
Old Faithful to West Thumb	17	163.4	83.1	170.9	75.82	17.27	8.90	2.26	104.25
West Thumb to Flagg Ranch	24	230.6	117.4	241.2	107.04	14.73	11.42	1.65	134.84
Old Faithful Staging Area	NA	0.1	0.2	0.7	0.04	0.01	0.03	0.01	0.09
Total					565.34	152.46	67.76	18.92	**804.48**

PM Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	Current BAT	0.065	0.031	0.490	0.0083	West Entrance
Snowcoach	BAT	0.032	0.003	0.058	0.05	Old Faithful
	Admin	0.030	0.010	0.040		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	0.029	0.013	0.012	0.01	0.00	0.00	0.00	0.01
Mammoth to Norris	21	0.651	0.063	0.210	0.06	0.07	0.00	0.00	0.14
West Entrance to Madison	14	0.434	0.042	0.140	0.29	0.05	0.01	0.00	0.34
Madison to Norris	14	0.434	0.042	0.140	0.13	0.04	0.00	0.00	0.17
Norris to Canyon Village	12	0.372	0.036	0.120	0.08	0.02	0.00	0.00	0.10
Canyon Village to Fishing Bridge	16	0.496	0.048	0.160	0.16	0.04	0.00	0.00	0.21
Fishing Bridge to East Entrance	27	0.837	0.081	0.270	0.08	0.03	0.00	0.00	0.11
Fishing Bridge to West Thumb	21	0.651	0.063	0.210	0.11	0.07	0.00	0.00	0.19
Madison to Old Faithful	16	0.496	0.048	0.160	0.34	0.07	0.01	0.00	0.41
Old Faithful to West Thumb	17	0.527	0.051	0.170	0.24	0.06	0.01	0.00	0.31
West Thumb to Flagg Ranch	24	0.744	0.072	0.240	0.35	0.05	0.01	0.00	0.40
Old Faithful Staging Area	NA	0.025	0.003	0.002	0.01	0.00	0.00	0.00	0.017
Total					1.85	0.50	0.04	0.02	**2.40**

Alternative 3B - Phase II of SM phase-out (complete phase-out of commercial SM), BAT SC

CO Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	Current BAT	161.1	18.6	409.7	0.0083	West Entrance
Snowcoach	BAT	13.3	123.9	10.7	0.05	Old Faithful
Snowcoach	Admin	1.0	0.7	6.7		

Revised Oct 24 2012 Emission Factors from [*Air Quality Model Runs for FEIS with emission numbers V2 (labels cor*

Link	Distance (mi)	Snowmobile Unit Emissions (g/veh-link)	Snowcoach Unit Emissions (g/veh-link)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	64.6	5.1	0.4	0.00	2.85	0.70	0.00	3.55
Mammoth to Norris	21	389.8	2601.9	14.9	0.00	44.64	215.49	0.18	260.31
West Entrance to Madison	14	259.8	1734.6	9.9	0.00	29.19	492.37	0.12	521.68
Madison to Norris	14	259.8	1734.6	9.9	0.00	24.04	236.58	0.10	260.71
Norris to Canyon Village	12	222.7	1486.8	8.5	0.00	11.28	131.52	0.05	142.85
Canyon Village to Fishing Bridge	16	297.0	1982.4	11.4	0.00	25.51	149.16	0.14	174.81
Fishing Bridge to East Entrance	27	501.1	3345.3	19.2	0.00	16.56	0.00	0.08	16.64
Fishing Bridge to West Thumb	21	389.8	2601.9	14.9	0.00	42.07	66.94	0.22	109.22
Madison to Old Faithful	16	297.0	1982.4	11.4	0.00	39.25	573.63	0.18	613.05
Old Faithful to West Thumb	17	315.5	2106.3	12.1	0.00	33.36	319.61	0.16	353.13
West Thumb to Flagg Ranch	24	445.4	2973.6	17.0	0.00	28.45	365.28	0.12	393.85
Old Faithful Staging Area	NA	20.5	0.5	0.3	0.00	2.44	0.12	0.12	2.67
Total					0.00	299.63	2551.40	1.45	**2852.48**

HC Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	Current BAT	6.6	1.1	15.8	0.0083	West Entrance
Snowcoach	BAT	0.3	0.3	0.6	0.05	Old Faithful
Snowcoach	Admin	0.1	2.9	0.3		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	2.6	0.1	0.0	0.00	0.12	0.02	0.00	0.13
Mammoth to Norris	21	22.1	6.3	59.9	0.00	2.53	0.52	0.73	3.77
West Entrance to Madison	14	14.7	4.2	39.9	0.00	1.65	1.19	0.48	3.33
Madison to Norris	14	14.7	4.2	39.9	0.00	1.36	0.57	0.40	2.33
Norris to Canyon Village	12	12.6	3.6	34.2	0.00	0.64	0.32	0.20	1.15
Canyon Village to Fishing Bridge	16	16.8	4.8	45.6	0.00	1.44	0.36	0.54	2.35
Fishing Bridge to East Entrance	27	28.4	8.1	77.0	0.00	0.94	0.00	0.32	1.26
Fishing Bridge to West Thumb	21	22.1	6.3	59.9	0.00	2.38	0.16	0.87	3.41
Madison to Old Faithful	16	16.8	4.8	45.6	0.00	2.22	1.39	0.71	4.32
Old Faithful to West Thumb	17	17.9	5.1	48.5	0.00	1.89	0.77	0.64	3.30
West Thumb to Flagg Ranch	24	25.2	7.2	68.4	0.00	1.61	0.88	0.47	2.96
Old Faithful Staging Area	NA	0.8	0.0	0.0	0.00	0.09	0.01	0.00	0.10
Total					0.00	16.86	6.20	5.36	**28.42**

Alternative 3B - Phase II of SM phase-out (complete phase-out of commercial SM), BAT SC (cont)

NOx Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	Current BAT	2.8	9.6	1.4	0.0083	West Entrance
Snowcoach	BAT	5.1	4.9	4.1	0.05	Old Faithful
Snowcoach	Admin	14.7	10.1	13.3		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	1.1	2.0	5.7	0.00	0.05	0.27	0.03	0.34
Mammoth to Norris	21	201.8	102.5	211.1	0.00	23.11	8.49	2.56	34.16
West Entrance to Madison	14	134.5	68.3	140.7	0.00	15.11	19.39	1.70	36.21
Madison to Norris	14	134.5	68.3	140.7	0.00	12.45	9.32	1.39	23.16
Norris to Canyon Village	12	115.3	58.6	120.6	0.00	5.84	5.18	0.69	11.71
Canyon Village to Fishing Bridge	16	153.8	78.1	160.8	0.00	13.21	5.87	1.91	21.00
Fishing Bridge to East Entrance	27	259.5	131.8	271.4	0.00	8.57	0.00	1.14	9.71
Fishing Bridge to West Thumb	21	201.8	102.5	211.1	0.00	21.78	2.64	3.07	27.49
Madison to Old Faithful	16	153.8	78.1	160.8	0.00	20.32	22.59	2.51	45.43
Old Faithful to West Thumb	17	163.4	83.0	170.9	0.00	17.27	12.59	2.26	32.12
West Thumb to Flagg Ranch	24	230.6	117.1	241.2	0.00	14.73	14.39	1.65	30.77
Old Faithful Staging Area	NA	0.1	0.2	0.7	0.00	0.01	0.05	0.01	0.06
Total					0.00	152.46	100.77	18.92	**272.15**

PM Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	Current BAT	0.065	0.031	0.490	0.0083	West Entrance
Snowcoach	BAT	0.033	0.003	0.059	0.05	Old Faithful
Snowcoach	Admin	0.030	0.010	0.040		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	0.029	0.013	0.012	0.00	0.00	0.00	0.00	0.00
Mammoth to Norris	21	0.651	0.063	0.210	0.00	0.07	0.01	0.00	0.08
West Entrance to Madison	14	0.434	0.042	0.140	0.00	0.05	0.01	0.00	0.06
Madison to Norris	14	0.434	0.042	0.140	0.00	0.04	0.01	0.00	0.05
Norris to Canyon Village	12	0.372	0.036	0.120	0.00	0.02	0.00	0.00	0.02
Canyon Village to Fishing Bridge	16	0.496	0.048	0.160	0.00	0.04	0.00	0.00	0.05
Fishing Bridge to East Entrance	27	0.837	0.081	0.270	0.00	0.03	0.00	0.00	0.03
Fishing Bridge to West Thumb	21	0.651	0.063	0.210	0.00	0.07	0.00	0.00	0.07
Madison to Old Faithful	16	0.496	0.048	0.160	0.00	0.07	0.01	0.00	0.08
Old Faithful to West Thumb	17	0.527	0.051	0.170	0.00	0.06	0.01	0.00	0.07
West Thumb to Flagg Ranch	24	0.744	0.072	0.240	0.00	0.05	0.01	0.00	0.06
Old Faithful Staging Area	NA	0.025	0.003	0.002	0.00	0.00	0.00	0.00	0.004
Total					0.00	0.50	0.06	0.02	**0.58**

Alternative 4A-M - MAX Transportation Event Management 60 SC events, 50 SM events (4 Non-comm) / BAT Snowcoaches & New BAT SM

CO Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	New BAT	25.0	4.0	216.0	0.0083	West Entrance
Snowcoach	BAT	10.9	84.0	10.6	0.05	Old Faithful
Snowcoach	Admin	1.0	0.7	6.7		

Revised Oct 24 2012 Emission Factors from [*Air Quality Model Runs for FEIS with emission numbers V2 (labels cor*

Link	Distance (mi)	Snowmobile Unit Emissions (g/veh-link)	Snowcoach Unit Emissions (g/veh-link)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	11.3	4.2	0.4	5.85	0.50	0.24	0.00	6.59
Mammoth to Norris	21	84.0	1764.0	14.9	13.04	9.62	97.29	0.18	120.14
West Entrance to Madison	14	56.0	1176.0	9.9	54.40	6.29	142.49	0.12	203.30
Madison to Norris	14	56.0	1176.0	9.9	25.30	5.18	83.93	0.10	114.51
Norris to Canyon Village	12	48.0	1008.0	8.5	15.35	2.43	44.49	0.05	62.32
Canyon Village to Fishing Bridge	16	64.0	1344.0	11.4	30.54	5.50	56.96	0.14	93.13
Fishing Bridge to East Entrance	27	108.0	2268.0	19.2	12.93	3.57	13.89	0.08	30.47
Fishing Bridge to West Thumb	21	84.0	1764.0	14.9	22.44	9.07	27.35	0.22	59.08
Madison to Old Faithful	16	64.0	1344.0	11.4	65.67	8.46	185.53	0.18	259.83
Old Faithful to West Thumb	17	68.0	1428.0	12.1	48.07	7.19	107.79	0.16	163.21
West Thumb to Flagg Ranch	24	96.0	2016.0	17.0	68.25	6.13	134.15	0.12	208.64
Old Faithful Staging Area	NA	10.8	0.5	0.3	9.36	1.28	0.06	0.12	10.82
Total					371.20	65.22	894.17	1.45	**1332.04**

HC Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	New BAT	1.3	0.1	13.3	0.0083	West Entrance
Snowcoach	BAT	0.4	0.3	1.0	0.05	Old Faithful
Snowcoach	Admin	0.1	2.9	0.3		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	0.6	0.2	0.0	0.31	0.03	0.01	0.00	0.35
Mammoth to Norris	21	2.1	6.3	59.9	0.33	0.24	0.35	0.73	1.64
West Entrance to Madison	14	1.4	4.2	39.9	1.36	0.16	0.51	0.48	2.51
Madison to Norris	14	1.4	4.2	39.9	0.63	0.13	0.30	0.40	1.46
Norris to Canyon Village	12	1.2	3.6	34.2	0.38	0.06	0.16	0.20	0.80
Canyon Village to Fishing Bridge	16	1.6	4.8	45.6	0.76	0.14	0.20	0.54	1.65
Fishing Bridge to East Entrance	27	2.7	8.1	77.0	0.32	0.09	0.05	0.32	0.78
Fishing Bridge to West Thumb	21	2.1	6.3	59.9	0.56	0.23	0.10	0.87	1.76
Madison to Old Faithful	16	1.6	4.8	45.6	1.64	0.21	0.66	0.71	3.23
Old Faithful to West Thumb	17	1.7	5.1	48.5	1.20	0.18	0.38	0.64	2.41
West Thumb to Flagg Ranch	24	2.4	7.2	68.4	1.71	0.15	0.48	0.47	2.81
Old Faithful Staging Area	NA	0.7	0.1	0.0	0.58	0.08	0.01	0.00	0.66
Total					9.79	1.69	3.21	5.36	**20.04**

Alternative 4A-M - MAX Transportation Event Management 60 SC events, 50 SM events (4 Non-comm) / BAT Snowcoaches & New BAT SM (cont)

NOx Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	New BAT	5.2	11.0	0.6	0.0083	West Entrance
Snowcoach	BAT	5.3	5.0	4.1	0.05	Old Faithful
Snowcoach	Admin	14.7	10.1	13.3		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	2.0	2.1	5.7	1.03	0.09	0.12	0.03	1.26
Mammoth to Norris	21	231.0	104.6	211.1	35.87	26.46	5.77	2.56	70.65
West Entrance to Madison	14	154.0	69.7	140.7	149.59	17.30	8.45	1.70	177.04
Madison to Norris	14	154.0	69.7	140.7	69.59	14.25	4.98	1.39	90.21
Norris to Canyon Village	12	132.0	59.8	120.6	42.20	6.69	2.64	0.69	52.22
Canyon Village to Fishing Bridge	16	176.0	79.7	160.8	83.99	15.12	3.38	1.91	104.40
Fishing Bridge to East Entrance	27	297.0	134.5	271.4	35.55	9.81	0.82	1.14	47.33
Fishing Bridge to West Thumb	21	231.0	104.6	211.1	61.72	24.93	1.62	3.07	91.34
Madison to Old Faithful	16	176.0	79.7	160.8	180.59	23.26	11.00	2.51	217.37
Old Faithful to West Thumb	17	187.0	84.7	170.9	132.20	19.77	6.39	2.26	160.62
West Thumb to Flagg Ranch	24	264.0	119.5	241.2	187.68	16.86	7.95	1.65	214.14
Old Faithful Staging Area	NA	0.0	0.2	0.7	0.03	0.00	0.02	0.01	0.06
Total					980.03	174.54	53.13	18.92	**1226.63**

PM Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	New BAT	0.065	0.031	0.490	0.0083	West Entrance
Snowcoach	BAT	0.033	0.003	0.059	0.05	Old Faithful
Snowcoach	Admin	0.030	0.010	0.040		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	0.029	0.013	0.012	0.01	0.00	0.00	0.00	0.02
Mammoth to Norris	21	0.651	0.063	0.210	0.10	0.07	0.00	0.00	0.18
West Entrance to Madison	14	0.434	0.042	0.140	0.42	0.05	0.01	0.00	0.48
Madison to Norris	14	0.434	0.042	0.140	0.20	0.04	0.00	0.00	0.24
Norris to Canyon Village	12	0.372	0.036	0.120	0.12	0.02	0.00	0.00	0.14
Canyon Village to Fishing Bridge	16	0.496	0.048	0.160	0.24	0.04	0.00	0.00	0.28
Fishing Bridge to East Entrance	27	0.837	0.081	0.270	0.10	0.03	0.00	0.00	0.13
Fishing Bridge to West Thumb	21	0.651	0.063	0.210	0.17	0.07	0.00	0.00	0.25
Madison to Old Faithful	16	0.496	0.048	0.160	0.51	0.07	0.01	0.00	0.58
Old Faithful to West Thumb	17	0.527	0.051	0.170	0.37	0.06	0.00	0.00	0.43
West Thumb to Flagg Ranch	24	0.744	0.072	0.240	0.53	0.05	0.00	0.00	0.58
Old Faithful Staging Area	NA	0.025	0.003	0.002	0.02	0.00	0.00	0.00	0.024
Total					2.80	0.50	0.03	0.02	**3.34**

Alternative 4B-M - MAX Transportation Event Management 106 SC events, 4 Non-commercial SM events / BAT Snowcoaches & New BAT SM

CO Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	New BAT	25.0	4.0	216.0	0.0083	West Entrance
Snowcoach	BAT	13.0	118.2	10.7	0.05	Old Faithful
Snowcoach	Admin	1.0	0.7	6.7		

Revised Oct 24 2012 Emission Factors from [*Air Quality Model Runs for FEIS with emission numbers V2 (labels corrected).xlsx*]

Link	Distance (mi)	Snowmobile Unit Emissions (g/veh-link)	Snowcoach Unit Emissions (g/veh-link)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	11.3	5.0	0.4	0.12	0.50	0.54	0.00	1.17
Mammoth to Norris	21	84.0	2482.2	14.9	1.83	9.62	166.76	0.18	178.39
West Entrance to Madison	14	56.0	1654.8	9.9	1.30	6.29	359.83	0.12	367.53
Madison to Norris	14	56.0	1654.8	9.9	1.21	5.18	182.43	0.10	188.92
Norris to Canyon Village	12	48.0	1418.4	8.5	0.66	2.43	102.01	0.05	105.15
Canyon Village to Fishing Bridge	16	64.0	1891.2	11.4	1.80	5.50	159.75	0.14	167.18
Fishing Bridge to East Entrance	27	108.0	3191.4	19.2	2.01	3.57	51.53	0.08	57.18
Fishing Bridge to West Thumb	21	84.0	2482.2	14.9	0.80	9.07	95.46	0.22	105.54
Madison to Old Faithful	16	64.0	1891.2	11.4	2.21	8.46	444.85	0.18	455.69
Old Faithful to West Thumb	17	68.0	2009.4	12.1	1.40	7.19	294.46	0.16	303.21
West Thumb to Flagg Ranch	24	96.0	2836.8	17.0	2.06	6.13	398.46	0.12	406.77
Old Faithful Staging Area	NA	10.8	0.5	0.3	0.30	1.28	0.10	0.12	1.80
Total					15.70	65.22	2256.18	1.45	**2338.54**

HC Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	New BAT	1.3	0.1	13.3	0.0083	West Entrance
Snowcoach	BAT	0.3	0.3	0.7	0.05	Old Faithful
Snowcoach	Admin	0.1	2.9	0.3		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	0.6	0.1	0.0	0.01	0.03	0.01	0.00	0.05
Mammoth to Norris	21	2.1	6.3	59.9	0.05	0.24	0.42	0.73	1.43
West Entrance to Madison	14	1.4	4.2	39.9	0.03	0.16	0.91	0.48	1.59
Madison to Norris	14	1.4	4.2	39.9	0.03	0.13	0.46	0.40	1.02
Norris to Canyon Village	12	1.2	3.6	34.2	0.02	0.06	0.26	0.20	0.53
Canyon Village to Fishing Bridge	16	1.6	4.8	45.6	0.04	0.14	0.41	0.54	1.13
Fishing Bridge to East Entrance	27	2.7	8.1	77.0	0.05	0.09	0.13	0.32	0.59
Fishing Bridge to West Thumb	21	2.1	6.3	59.9	0.02	0.23	0.24	0.87	1.36
Madison to Old Faithful	16	1.6	4.8	45.6	0.06	0.21	1.13	0.71	2.11
Old Faithful to West Thumb	17	1.7	5.1	48.5	0.04	0.18	0.75	0.64	1.60
West Thumb to Flagg Ranch	24	2.4	7.2	68.4	0.05	0.15	1.01	0.47	1.68
Old Faithful Staging Area	NA	0.7	0.0	0.0	0.02	0.08	0.01	0.00	0.10
Total					0.41	1.69	5.74	5.36	**13.20**

Alternative 4B-M - MAX Transportation Event Management 106 SC events, 4 Non-commercial SM events / BAT Snowcoaches & New BAT SM (cont)

NOx Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	New BAT	5.2	11.0	0.6	0.0083	West Entrance
Snowcoach	BAT	5.1	4.9	4.1	0.05	Old Faithful
Snowcoach	Admin	14.7	10.1	13.3		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	2.0	2.0	5.7	0.02	0.09	0.21	0.03	0.35
Mammoth to Norris	21	231.0	103.1	211.1	5.04	26.46	6.93	2.56	40.98
West Entrance to Madison	14	154.0	68.7	140.7	3.56	17.30	14.95	1.70	37.51
Madison to Norris	14	154.0	68.7	140.7	3.34	14.25	7.58	1.39	26.56
Norris to Canyon Village	12	132.0	58.9	120.6	1.82	6.69	4.24	0.69	13.43
Canyon Village to Fishing Bridge	16	176.0	78.6	160.8	4.94	15.12	6.64	1.91	28.61
Fishing Bridge to East Entrance	27	297.0	132.6	271.4	5.53	9.81	2.14	1.14	18.62
Fishing Bridge to West Thumb	21	231.0	103.1	211.1	2.19	24.93	3.97	3.07	34.15
Madison to Old Faithful	16	176.0	78.6	160.8	6.07	23.26	18.48	2.51	50.32
Old Faithful to West Thumb	17	187.0	83.5	170.9	3.85	19.77	12.23	2.26	38.11
West Thumb to Flagg Ranch	24	264.0	117.8	241.2	5.67	16.86	16.55	1.65	40.73
Old Faithful Staging Area	NA	0.0	0.2	0.7	0.00	0.00	0.04	0.01	0.05
Total					42.03	174.54	93.95	18.92	**329.43**

PM Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	New BAT	0.065	0.031	0.490	0.0083	West Entrance
Snowcoach	BAT	0.033	0.003	0.060	0.05	Old Faithful
Snowcoach	Admin	0.030	0.010	0.040		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	0.029	0.013	0.012	0.00	0.00	0.00	0.00	0.00
Mammoth to Norris	21	0.651	0.063	0.210	0.01	0.07	0.00	0.00	0.10
West Entrance to Madison	14	0.434	0.042	0.140	0.01	0.05	0.01	0.00	0.07
Madison to Norris	14	0.434	0.042	0.140	0.01	0.04	0.00	0.00	0.06
Norris to Canyon Village	12	0.372	0.036	0.120	0.01	0.02	0.00	0.00	0.03
Canyon Village to Fishing Bridge	16	0.496	0.048	0.160	0.01	0.04	0.00	0.00	0.06
Fishing Bridge to East Entrance	27	0.837	0.081	0.270	0.02	0.03	0.00	0.00	0.05
Fishing Bridge to West Thumb	21	0.651	0.063	0.210	0.01	0.07	0.00	0.00	0.08
Madison to Old Faithful	16	0.496	0.048	0.160	0.02	0.07	0.01	0.00	0.10
Old Faithful to West Thumb	17	0.527	0.051	0.170	0.01	0.06	0.01	0.00	0.08
West Thumb to Flagg Ranch	24	0.744	0.072	0.240	0.02	0.05	0.01	0.00	0.08
Old Faithful Staging Area	NA	0.025	0.003	0.002	0.00	0.00	0.00	0.00	0.004
Total					0.12	0.50	0.06	0.02	**0.69**

Alternative 4C-M - MAX Transportation Event Management 60 SC events (120 SC), 50 SM events (4 Non-comm) / BAT Snowcoaches & E-BAT SM

CO Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	E-BAT	16.7	2.7	144.0	0.0083	West Entrance
Snowcoach	BAT	13.3	123.9	10.7	0.05	Old Faithful
Snowcoach	Admin	1.0	0.7	6.7		

Revised Oct 24 2012 Emission Factors from [*Air Quality Model Runs for FEIS with emission numbers V2 (labels cor*

Link	Distance (mi)	Snowmobile Unit Emissions (g/veh-link)	Snowcoach Unit Emissions (g/veh-link)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	7.5	5.1	0.4	3.90	0.33	0.59	0.00	4.82
Mammoth to Norris	21	56.1	2601.9	14.9	8.71	6.42	287.01	0.18	302.32
West Entrance to Madison	14	37.4	1734.6	9.9	36.31	4.20	420.35	0.12	460.98
Madison to Norris	14	37.4	1734.6	9.9	16.89	3.46	247.58	0.10	268.03
Norris to Canyon Village	12	32.0	1486.8	8.5	10.24	1.62	131.26	0.05	143.17
Canyon Village to Fishing Bridge	16	42.7	1982.4	11.4	20.39	3.67	168.02	0.14	192.21
Fishing Bridge to East Entrance	27	72.1	3345.3	19.2	8.63	2.38	40.97	0.08	52.06
Fishing Bridge to West Thumb	21	56.1	2601.9	14.9	14.98	6.05	80.69	0.22	101.94
Madison to Old Faithful	16	42.7	1982.4	11.4	43.84	5.65	547.30	0.18	596.96
Old Faithful to West Thumb	17	45.4	2106.3	12.1	32.09	4.80	317.99	0.16	355.03
West Thumb to Flagg Ranch	24	64.1	2973.6	17.0	45.55	4.09	395.74	0.12	445.50
Old Faithful Staging Area	NA	7.2	0.5	0.3	6.24	0.86	0.11	0.12	7.33
Total					247.76	43.53	2637.62	1.45	**2930.36**

HC Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	E-BAT	0.9	0.1	8.9	0.0083	West Entrance
Snowcoach	BAT	0.3	0.3	0.6	0.05	Old Faithful
Snowcoach	Admin	0.1	2.9	0.3		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	0.4	0.1	0.0	0.21	0.02	0.01	0.00	0.24
Mammoth to Norris	21	1.5	6.3	59.9	0.23	0.17	0.69	0.73	1.82
West Entrance to Madison	14	1.0	4.2	39.9	0.95	0.11	1.02	0.48	2.56
Madison to Norris	14	1.0	4.2	39.9	0.44	0.09	0.60	0.40	1.53
Norris to Canyon Village	12	0.8	3.6	34.2	0.27	0.04	0.32	0.20	0.82
Canyon Village to Fishing Bridge	16	1.1	4.8	45.6	0.53	0.10	0.41	0.54	1.58
Fishing Bridge to East Entrance	27	1.9	8.1	77.0	0.23	0.06	0.10	0.32	0.71
Fishing Bridge to West Thumb	21	1.5	6.3	59.9	0.39	0.16	0.20	0.87	1.62
Madison to Old Faithful	16	1.1	4.8	45.6	1.15	0.15	1.33	0.71	3.34
Old Faithful to West Thumb	17	1.2	5.1	48.5	0.84	0.13	0.77	0.64	2.38
West Thumb to Flagg Ranch	24	1.7	7.2	68.4	1.19	0.11	0.96	0.47	2.73
Old Faithful Staging Area	NA	0.4	0.0	0.0	0.38	0.05	0.01	0.00	0.44
Total					6.82	1.18	6.40	5.36	**19.76**

Alternative 4C-M - MAX Transportation Event Management 60 SC events (120 SC), 50 SM events (4 Non-comm) / BAT Snowcoaches & E-BAT SM

Adaptive

NOx Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	E-BAT	3.5	7.3	0.4	0.0083	West Entrance
Snowcoach	BAT	5.1	4.9	4.1	0.05	Old Faithful
Snowcoach	Admin	14.7	10.1	13.3		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	1.3	2.0	5.7	0.68	0.06	0.22	0.03	0.99
Mammoth to Norris	21	153.9	102.5	211.1	23.90	17.63	11.30	2.56	55.40
West Entrance to Madison	14	102.6	68.3	140.7	99.68	11.53	16.56	1.70	129.47
Madison to Norris	14	102.6	68.3	140.7	46.37	9.49	9.75	1.39	67.01
Norris to Canyon Village	12	88.0	58.6	120.6	28.12	4.46	5.17	0.69	38.44
Canyon Village to Fishing Bridge	16	117.3	78.1	160.8	55.97	10.07	6.62	1.91	74.57
Fishing Bridge to East Entrance	27	197.9	131.8	271.4	23.69	6.54	1.61	1.14	32.98
Fishing Bridge to West Thumb	21	153.9	102.5	211.1	41.13	16.61	3.18	3.07	63.99
Madison to Old Faithful	16	117.3	78.1	160.8	120.34	15.50	21.56	2.51	159.91
Old Faithful to West Thumb	17	124.6	83.0	170.9	88.09	13.17	12.52	2.26	116.05
West Thumb to Flagg Ranch	24	175.9	117.1	241.2	125.06	11.24	15.59	1.65	153.53
Old Faithful Staging Area	NA	0.0	0.2	0.7	0.02	0.00	0.04	0.01	0.07
Total					653.06	116.31	104.13	18.92	**892.41**

PM Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	E-BAT	0.065	0.031	0.490	0.0083	West Entrance
Snowcoach	BAT	0.033	0.003	0.059	0.05	Old Faithful
Snowcoach	Admin	0.030	0.010	0.040		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	0.029	0.013	0.012	0.01	0.00	0.00	0.00	0.02
Mammoth to Norris	21	0.651	0.063	0.210	0.10	0.07	0.01	0.00	0.19
West Entrance to Madison	14	0.434	0.042	0.140	0.42	0.05	0.01	0.00	0.48
Madison to Norris	14	0.434	0.042	0.140	0.20	0.04	0.01	0.00	0.24
Norris to Canyon Village	12	0.372	0.036	0.120	0.12	0.02	0.00	0.00	0.14
Canyon Village to Fishing Bridge	16	0.496	0.048	0.160	0.24	0.04	0.00	0.00	0.29
Fishing Bridge to East Entrance	27	0.837	0.081	0.270	0.10	0.03	0.00	0.00	0.13
Fishing Bridge to West Thumb	21	0.651	0.063	0.210	0.17	0.07	0.00	0.00	0.25
Madison to Old Faithful	16	0.496	0.048	0.160	0.51	0.07	0.01	0.00	0.59
Old Faithful to West Thumb	17	0.527	0.051	0.170	0.37	0.06	0.01	0.00	0.44
West Thumb to Flagg Ranch	24	0.744	0.072	0.240	0.53	0.05	0.01	0.00	0.59
Old Faithful Staging Area	NA	0.025	0.003	0.002	0.02	0.00	0.00	0.00	0.025
Total					2.80	0.50	0.07	0.02	**3.38**

Alternative 4D-M - MAX Transportation Event Management 106 SC events (212 SC), 4 Non-commercial SM events / BAT Snowcoaches & New BA

CO Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	New BAT	25.0	4.0	216.0	0.0083	West Entrance
Snowcoach	BAT	14.3	140.8	10.8	0.05	Old Faithful
Snowcoach	Admin	1.0	0.7	6.7		

Revised Oct 24 2012 Emission Factors from [*Air Quality Model Runs for FEIS with emission numbers V2 (labels cor*

Link	Distance (mi)	Snowmobile Unit Emissions (g/veh-link)	Snowcoach Unit Emissions (g/veh-link)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	11.3	5.5	0.4	0.12	0.50	1.19	0.00	1.82
Mammoth to Norris	21	84.0	2956.8	14.9	1.83	9.62	397.28	0.18	408.91
West Entrance to Madison	14	56.0	1971.2	9.9	1.30	6.29	857.25	0.12	864.96
Madison to Norris	14	56.0	1971.2	9.9	1.21	5.18	434.62	0.10	441.11
Norris to Canyon Village	12	48.0	1689.6	8.5	0.66	2.43	243.02	0.05	246.16
Canyon Village to Fishing Bridge	16	64.0	2252.8	11.4	1.80	5.50	380.59	0.14	388.02
Fishing Bridge to East Entrance	27	108.0	3801.6	19.2	2.01	3.57	122.76	0.08	128.42
Fishing Bridge to West Thumb	21	84.0	2956.8	14.9	0.80	9.07	227.43	0.22	237.50
Madison to Old Faithful	16	64.0	2252.8	11.4	2.21	8.46	1059.81	0.18	1070.65
Old Faithful to West Thumb	17	68.0	2393.6	12.1	1.40	7.19	701.53	0.16	710.27
West Thumb to Flagg Ranch	24	96.0	3379.2	17.0	2.06	6.13	949.30	0.12	957.61
Old Faithful Staging Area	NA	10.8	0.5	0.3	0.30	1.28	0.21	0.12	1.91
Total					15.70	65.22	5374.98	1.45	**5457.35**

HC Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	New BAT	1.3	0.1	13.3	0.0083	West Entrance
Snowcoach	BAT	0.2	0.3	0.5	0.05	Old Faithful
Snowcoach	Admin	0.1	2.9	0.3		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	0.6	0.1	0.0	0.01	0.03	0.02	0.00	0.05
Mammoth to Norris	21	2.1	6.3	59.9	0.05	0.24	0.85	0.73	1.86
West Entrance to Madison	14	1.4	4.2	39.9	0.03	0.16	1.83	0.48	2.50
Madison to Norris	14	1.4	4.2	39.9	0.03	0.13	0.93	0.40	1.48
Norris to Canyon Village	12	1.2	3.6	34.2	0.02	0.06	0.52	0.20	0.79
Canyon Village to Fishing Bridge	16	1.6	4.8	45.6	0.04	0.14	0.81	0.54	1.54
Fishing Bridge to East Entrance	27	2.7	8.1	77.0	0.05	0.09	0.26	0.32	0.72
Fishing Bridge to West Thumb	21	2.1	6.3	59.9	0.02	0.23	0.48	0.87	1.60
Madison to Old Faithful	16	1.6	4.8	45.6	0.06	0.21	2.26	0.71	3.24
Old Faithful to West Thumb	17	1.7	5.1	48.5	0.04	0.18	1.49	0.64	2.35
West Thumb to Flagg Ranch	24	2.4	7.2	68.4	0.05	0.15	2.02	0.47	2.69
Old Faithful Staging Area	NA	0.7	0.0	0.0	0.02	0.08	0.01	0.00	0.11
Total					0.41	1.69	11.48	5.36	**18.93**

Alternative 4D-M - MAX Transportation Event Management 106 SC events (212 SC), 4 Non-commercial SM events / BAT Snowcoaches & New BA

NOx Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	New BAT	5.2	11.0	0.6	0.0083	West Entrance
Snowcoach	BAT	5.0	4.9	4.1	0.05	Old Faithful
Snowcoach	Admin	14.7	10.1	13.3		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	2.0	1.9	5.7	0.02	0.09	0.42	0.03	0.55
Mammoth to Norris	21	231.0	101.9	211.1	5.04	26.46	13.68	2.56	47.74
West Entrance to Madison	14	154.0	67.9	140.7	3.56	17.30	29.53	1.70	52.09
Madison to Norris	14	154.0	67.9	140.7	3.34	14.25	14.97	1.39	33.95
Norris to Canyon Village	12	132.0	58.2	120.6	1.82	6.69	8.37	0.69	17.57
Canyon Village to Fishing Bridge	16	176.0	77.6	160.8	4.94	15.12	13.11	1.91	35.08
Fishing Bridge to East Entrance	27	297.0	131.0	271.4	5.53	9.81	4.23	1.14	20.70
Fishing Bridge to West Thumb	21	231.0	101.9	211.1	2.19	24.93	7.83	3.07	38.02
Madison to Old Faithful	16	176.0	77.6	160.8	6.07	23.26	36.51	2.51	68.35
Old Faithful to West Thumb	17	187.0	82.5	170.9	3.85	19.77	24.16	2.26	50.04
West Thumb to Flagg Ranch	24	264.0	116.4	241.2	5.67	16.86	32.70	1.65	56.88
Old Faithful Staging Area	NA	0.0	0.2	0.7	0.00	0.00	0.08	0.01	0.09
Total					42.03	174.54	185.59	18.92	**421.08**

PM Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	New BAT	0.065	0.031	0.490	0.0083	West Entrance
Snowcoach	BAT	0.033	0.003	0.060	0.05	Old Faithful
Snowcoach	Admin	0.030	0.010	0.040		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	0.029	0.013	0.012	0.00	0.00	0.00	0.00	0.00
Mammoth to Norris	21	0.651	0.063	0.210	0.01	0.07	0.01	0.00	0.10
West Entrance to Madison	14	0.434	0.042	0.140	0.01	0.05	0.02	0.00	0.08
Madison to Norris	14	0.434	0.042	0.140	0.01	0.04	0.01	0.00	0.06
Norris to Canyon Village	12	0.372	0.036	0.120	0.01	0.02	0.01	0.00	0.03
Canyon Village to Fishing Bridge	16	0.496	0.048	0.160	0.01	0.04	0.01	0.00	0.07
Fishing Bridge to East Entrance	27	0.837	0.081	0.270	0.02	0.03	0.00	0.00	0.05
Fishing Bridge to West Thumb	21	0.651	0.063	0.210	0.01	0.07	0.00	0.00	0.08
Madison to Old Faithful	16	0.496	0.048	0.160	0.02	0.07	0.02	0.00	0.11
Old Faithful to West Thumb	17	0.527	0.051	0.170	0.01	0.06	0.01	0.00	0.08
West Thumb to Flagg Ranch	24	0.744	0.072	0.240	0.02	0.05	0.02	0.00	0.09
Old Faithful Staging Area	NA	0.025	0.003	0.002	0.00	0.00	0.00	0.00	0.005
Total					0.12	0.50	0.12	0.02	**0.75**

Alternative 4A-AVG - AVERAGE (group size 7) Transportation Event Management 60 SC events, 50 SM events (4 Non-comm) / BAT Snowcoaches

CO Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	New BAT	25.0	4.0	216.0	0.0083	West Entrance
Snowcoach	BAT	10.9	84.0	10.6	0.05	Old Faithful
Snowcoach	Admin	1.0	0.7	6.7		

Link	Distance (mi)	Snowmobile Unit Emissions (g/veh-link)	Snowcoach Unit Emissions (g/veh-link)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	11.3	4.2	0.4	4.13	0.50	0.24	0.00	4.87
Mammoth to Norris	21	84.0	1764.0	14.9	9.68	9.62	97.29	0.18	116.77
West Entrance to Madison	14	56.0	1176.0	9.9	38.47	6.29	142.49	0.12	187.37
Madison to Norris	14	56.0	1176.0	9.9	18.08	5.18	83.93	0.10	107.28
Norris to Canyon Village	12	48.0	1008.0	8.5	10.94	2.43	44.49	0.05	57.92
Canyon Village to Fishing Bridge	16	64.0	1344.0	11.4	21.92	5.50	56.96	0.14	84.51
Fishing Bridge to East Entrance	27	108.0	2268.0	19.2	9.65	3.57	13.89	0.08	27.19
Fishing Bridge to West Thumb	21	84.0	1764.0	14.9	15.95	9.07	27.35	0.22	52.59
Madison to Old Faithful	16	64.0	1344.0	11.4	46.63	8.46	185.53	0.18	240.79
Old Faithful to West Thumb	17	68.0	1428.0	12.1	34.07	7.19	107.79	0.16	149.21
West Thumb to Flagg Ranch	24	96.0	2016.0	17.0	48.39	6.13	134.15	0.12	188.79
Old Faithful Staging Area	NA	10.8	0.5	0.3	6.64	1.28	0.06	0.12	8.10
Total					264.55	65.22	894.17	1.45	**1225.39**

HC Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	New BAT	1.3	0.1	13.3	0.0083	West Entrance
Snowcoach	BAT	0.4	0.3	1.0	0.05	Old Faithful
Snowcoach	Admin	0.1	2.9	0.3		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	0.6	0.2	0.0	0.22	0.03	0.01	0.00	0.26
Mammoth to Norris	21	2.1	6.3	59.9	0.24	0.24	0.35	0.73	1.56
West Entrance to Madison	14	1.4	4.2	39.9	0.96	0.16	0.51	0.48	2.11
Madison to Norris	14	1.4	4.2	39.9	0.45	0.13	0.30	0.40	1.28
Norris to Canyon Village	12	1.2	3.6	34.2	0.27	0.06	0.16	0.20	0.69
Canyon Village to Fishing Bridge	16	1.6	4.8	45.6	0.55	0.14	0.20	0.54	1.43
Fishing Bridge to East Entrance	27	2.7	8.1	77.0	0.24	0.09	0.05	0.32	0.70
Fishing Bridge to West Thumb	21	2.1	6.3	59.9	0.40	0.23	0.10	0.87	1.59
Madison to Old Faithful	16	1.6	4.8	45.6	1.17	0.21	0.66	0.71	2.75
Old Faithful to West Thumb	17	1.7	5.1	48.5	0.85	0.18	0.38	0.64	2.06
West Thumb to Flagg Ranch	24	2.4	7.2	68.4	1.21	0.15	0.48	0.47	2.31
Old Faithful Staging Area	NA	0.7	0.1	0.0	0.41	0.08	0.01	0.00	0.49
Total					6.97	1.69	3.21	5.36	**17.23**

Alternative 4A-AVG - AVERAGE (group size 7) Transportation Event Management 60 SC events, 50 SM events (4 Non-comm) / BAT Snowcoaches

NOx Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	New BAT	5.2	11.0	0.6	0.0083	West Entrance
Snowcoach	BAT	5.3	5.0	4.1	0.05	Old Faithful
Snowcoach	Admin	14.7	10.1	13.3		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	2.0	2.1	5.7	0.72	0.09	0.12	0.03	0.95
Mammoth to Norris	21	231.0	104.6	211.1	26.62	26.46	5.77	2.56	61.40
West Entrance to Madison	14	154.0	69.7	140.7	105.78	17.30	8.45	1.70	133.23
Madison to Norris	14	154.0	69.7	140.7	49.71	14.25	4.98	1.39	70.33
Norris to Canyon Village	12	132.0	59.8	120.6	30.09	6.69	2.64	0.69	40.10
Canyon Village to Fishing Bridge	16	176.0	79.7	160.8	60.27	15.12	3.38	1.91	80.68
Fishing Bridge to East Entrance	27	297.0	134.5	271.4	26.55	9.81	0.82	1.14	38.32
Fishing Bridge to West Thumb	21	231.0	104.6	211.1	43.86	24.93	1.62	3.07	73.48
Madison to Old Faithful	16	176.0	79.7	160.8	128.24	23.26	11.00	2.51	165.01
Old Faithful to West Thumb	17	187.0	84.7	170.9	93.69	19.77	6.39	2.26	122.11
West Thumb to Flagg Ranch	24	264.0	119.5	241.2	133.08	16.86	7.95	1.65	159.54
Old Faithful Staging Area	NA	0.0	0.2	0.7	0.02	0.00	0.02	0.01	0.05
Total					698.63	174.54	53.13	18.92	**945.22**

PM Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	New BAT	0.065	0.031	0.490	0.0083	West Entrance
Snowcoach	BAT	0.033	0.003	0.059	0.05	Old Faithful
Snowcoach	Admin	0.030	0.010	0.040		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	0.029	0.013	0.012	0.01	0.00	0.00	0.00	0.01
Mammoth to Norris	21	0.651	0.063	0.210	0.08	0.07	0.00	0.00	0.16
West Entrance to Madison	14	0.434	0.042	0.140	0.30	0.05	0.01	0.00	0.35
Madison to Norris	14	0.434	0.042	0.140	0.14	0.04	0.00	0.00	0.18
Norris to Canyon Village	12	0.372	0.036	0.120	0.08	0.02	0.00	0.00	0.11
Canyon Village to Fishing Bridge	16	0.496	0.048	0.160	0.17	0.04	0.00	0.00	0.22
Fishing Bridge to East Entrance	27	0.837	0.081	0.270	0.07	0.03	0.00	0.00	0.10
Fishing Bridge to West Thumb	21	0.651	0.063	0.210	0.12	0.07	0.00	0.00	0.20
Madison to Old Faithful	16	0.496	0.048	0.160	0.36	0.07	0.01	0.00	0.44
Old Faithful to West Thumb	17	0.527	0.051	0.170	0.26	0.06	0.00	0.00	0.33
West Thumb to Flagg Ranch	24	0.744	0.072	0.240	0.38	0.05	0.00	0.00	0.43
Old Faithful Staging Area	NA	0.025	0.003	0.002	0.02	0.00	0.00	0.00	0.018
Total					1.99	0.50	0.03	0.02	**2.54**

Alternative 4C-AVG - AVERAGE (group size 8) Transportation Event Management 60 SC events (90 SC), 46 SM events (4 Non-comm) / BAT Snow

CO Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	E-BAT	16.7	2.7	144.0	0.0083	West Entrance
Snowcoach	BAT	13.3	123.9	10.7	0.05	Old Faithful
Snowcoach	Admin	1.0	0.7	6.7		

Link	Distance (mi)	Snowmobile Unit Emissions (g/veh-link)	Snowcoach Unit Emissions (g/veh-link)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	7.5	5.1	0.4	3.13	0.33	0.44	0.00	3.91
Mammoth to Norris	21	56.1	2601.9	14.9	7.21	6.42	215.26	0.18	229.07
West Entrance to Madison	14	37.4	1734.6	9.9	29.22	4.20	315.27	0.12	348.81
Madison to Norris	14	37.4	1734.6	9.9	13.67	3.46	185.69	0.10	202.92
Norris to Canyon Village	12	32.0	1486.8	8.5	8.28	1.62	98.44	0.05	108.40
Canyon Village to Fishing Bridge	16	42.7	1982.4	11.4	16.55	3.67	126.02	0.14	146.37
Fishing Bridge to East Entrance	27	72.1	3345.3	19.2	7.17	2.38	30.73	0.08	40.36
Fishing Bridge to West Thumb	21	56.1	2601.9	14.9	12.09	6.05	60.52	0.22	78.88
Madison to Old Faithful	16	42.7	1982.4	11.4	35.36	5.65	410.47	0.18	451.66
Old Faithful to West Thumb	17	45.4	2106.3	12.1	25.86	4.80	238.49	0.16	269.31
West Thumb to Flagg Ranch	24	64.1	2973.6	17.0	36.72	4.09	296.80	0.12	337.73
Old Faithful Staging Area	NA	7.2	0.5	0.3	5.03	0.86	0.09	0.12	6.09
Total					200.31	43.53	1978.21	1.45	**2223.50**

HC Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	E-BAT	0.9	0.1	8.9	0.0083	West Entrance
Snowcoach	BAT	0.3	0.3	0.6	0.05	Old Faithful
Snowcoach	Admin	0.1	2.9	0.3		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	0.4	0.1	0.0	0.17	0.02	0.01	0.00	0.20
Mammoth to Norris	21	1.5	6.3	59.9	0.19	0.17	0.52	0.73	1.60
West Entrance to Madison	14	1.0	4.2	39.9	0.77	0.11	0.76	0.48	2.12
Madison to Norris	14	1.0	4.2	39.9	0.36	0.09	0.45	0.40	1.29
Norris to Canyon Village	12	0.8	3.6	34.2	0.22	0.04	0.24	0.20	0.69
Canyon Village to Fishing Bridge	16	1.1	4.8	45.6	0.43	0.10	0.31	0.54	1.38
Fishing Bridge to East Entrance	27	1.9	8.1	77.0	0.19	0.06	0.07	0.32	0.65
Fishing Bridge to West Thumb	21	1.5	6.3	59.9	0.32	0.16	0.15	0.87	1.49
Madison to Old Faithful	16	1.1	4.8	45.6	0.93	0.15	0.99	0.71	2.78
Old Faithful to West Thumb	17	1.2	5.1	48.5	0.68	0.13	0.58	0.64	2.02
West Thumb to Flagg Ranch	24	1.7	7.2	68.4	0.96	0.11	0.72	0.47	2.26
Old Faithful Staging Area	NA	0.4	0.0	0.0	0.31	0.05	0.00	0.00	0.37
Total					5.52	1.18	4.80	5.36	**16.86**

Alternative 4C-AVG - AVERAGE (group size 8) Transportation Event Management 60 SC events (90 SC), 46 SM events (4 Non-comm) / BAT Snow

NOx Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	E-BAT	3.5	7.3	0.4	0.0083	West Entrance
Snowcoach	BAT	5.1	4.9	4.1	0.05	Old Faithful
Snowcoach	Admin	14.7	10.1	13.3		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	1.3	2.0	5.7	0.55	0.06	0.17	0.03	0.80
Mammoth to Norris	21	153.9	102.5	211.1	19.79	17.63	8.48	2.56	48.46
West Entrance to Madison	14	102.6	68.3	140.7	80.22	11.53	12.42	1.70	105.87
Madison to Norris	14	102.6	68.3	140.7	37.54	9.49	7.31	1.39	55.74
Norris to Canyon Village	12	88.0	58.6	120.6	22.74	4.46	3.88	0.69	31.76
Canyon Village to Fishing Bridge	16	117.3	78.1	160.8	45.43	10.07	4.96	1.91	62.38
Fishing Bridge to East Entrance	27	197.9	131.8	271.4	19.69	6.54	1.21	1.14	28.58
Fishing Bridge to West Thumb	21	153.9	102.5	211.1	33.19	16.61	2.38	3.07	55.26
Madison to Old Faithful	16	117.3	78.1	160.8	97.08	15.50	16.17	2.51	131.26
Old Faithful to West Thumb	17	124.6	83.0	170.9	70.99	13.17	9.39	2.26	95.81
West Thumb to Flagg Ranch	24	175.9	117.1	241.2	100.81	11.24	11.69	1.65	125.38
Old Faithful Staging Area	NA	0.0	0.2	0.7	0.01	0.00	0.03	0.01	0.06
Total					528.05	116.31	78.10	18.92	**741.37**

PM Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	E-BAT	0.065	0.031	0.490	0.0083	West Entrance
Snowcoach	BAT	0.033	0.003	0.059	0.05	Old Faithful
Snowcoach	Admin	0.030	0.010	0.040		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	0.029	0.013	0.012	0.01	0.00	0.00	0.00	0.01
Mammoth to Norris	21	0.651	0.063	0.210	0.08	0.07	0.01	0.00	0.17
West Entrance to Madison	14	0.434	0.042	0.140	0.34	0.05	0.01	0.00	0.40
Madison to Norris	14	0.434	0.042	0.140	0.16	0.04	0.00	0.00	0.20
Norris to Canyon Village	12	0.372	0.036	0.120	0.10	0.02	0.00	0.00	0.12
Canyon Village to Fishing Bridge	16	0.496	0.048	0.160	0.19	0.04	0.00	0.00	0.24
Fishing Bridge to East Entrance	27	0.837	0.081	0.270	0.08	0.03	0.00	0.00	0.11
Fishing Bridge to West Thumb	21	0.651	0.063	0.210	0.14	0.07	0.00	0.00	0.22
Madison to Old Faithful	16	0.496	0.048	0.160	0.41	0.07	0.01	0.00	0.49
Old Faithful to West Thumb	17	0.527	0.051	0.170	0.30	0.06	0.01	0.00	0.36
West Thumb to Flagg Ranch	24	0.744	0.072	0.240	0.43	0.05	0.01	0.00	0.48
Old Faithful Staging Area	NA	0.025	0.003	0.002	0.02	0.00	0.00	0.00	0.021
Total					2.26	0.50	0.05	0.02	**2.82**

Alternative 4D-AVG - AVERAGE Transportation Event Management 106 SC events (159 SC), 4 Non-commercial SM events / BAT Snowcoaches &

CO Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	New BAT	25.0	4.0	216.0	0.0083	West Entrance
Snowcoach	BAT	14.3	140.8	10.8	0.05	Old Faithful
Snowcoach	Admin	1.0	0.7	6.7		

Link	Distance (mi)	Snowmobile Unit Emissions (g/veh-link)	Snowcoach Unit Emissions (g/veh-link)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	11.3	5.5	0.4	0.12	0.50	0.90	0.00	1.52
Mammoth to Norris	21	84.0	2956.8	14.9	1.83	9.62	297.96	0.18	309.59
West Entrance to Madison	14	56.0	1971.2	9.9	1.30	6.29	642.94	0.12	650.65
Madison to Norris	14	56.0	1971.2	9.9	1.21	5.18	325.96	0.10	332.46
Norris to Canyon Village	12	48.0	1689.6	8.5	0.66	2.43	182.26	0.05	185.41
Canyon Village to Fishing Bridge	16	64.0	2252.8	11.4	1.80	5.50	285.45	0.14	292.88
Fishing Bridge to East Entrance	27	108.0	3801.6	19.2	2.01	3.57	92.07	0.08	97.73
Fishing Bridge to West Thumb	21	84.0	2956.8	14.9	0.80	9.07	170.57	0.22	180.65
Madison to Old Faithful	16	64.0	2252.8	11.4	2.21	8.46	794.86	0.18	805.70
Old Faithful to West Thumb	17	68.0	2393.6	12.1	1.40	7.19	526.14	0.16	534.89
West Thumb to Flagg Ranch	24	96.0	3379.2	17.0	2.06	6.13	711.98	0.12	720.29
Old Faithful Staging Area	NA	10.8	0.5	0.3	0.30	1.28	0.15	0.12	1.85
Total					15.70	65.22	4031.24	1.45	**4113.61**

HC Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	New BAT	1.3	0.1	13.3	0.0083	West Entrance
Snowcoach	BAT	0.2	0.3	0.5	0.05	Old Faithful
Snowcoach	Admin	0.1	2.9	0.3		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	0.6	0.1	0.0	0.01	0.03	0.01	0.00	0.05
Mammoth to Norris	21	2.1	6.3	59.9	0.05	0.24	0.63	0.73	1.65
West Entrance to Madison	14	1.4	4.2	39.9	0.03	0.16	1.37	0.48	2.04
Madison to Norris	14	1.4	4.2	39.9	0.03	0.13	0.69	0.40	1.25
Norris to Canyon Village	12	1.2	3.6	34.2	0.02	0.06	0.39	0.20	0.66
Canyon Village to Fishing Bridge	16	1.6	4.8	45.6	0.04	0.14	0.61	0.54	1.33
Fishing Bridge to East Entrance	27	2.7	8.1	77.0	0.05	0.09	0.20	0.32	0.66
Fishing Bridge to West Thumb	21	2.1	6.3	59.9	0.02	0.23	0.36	0.87	1.48
Madison to Old Faithful	16	1.6	4.8	45.6	0.06	0.21	1.69	0.71	2.67
Old Faithful to West Thumb	17	1.7	5.1	48.5	0.04	0.18	1.12	0.64	1.98
West Thumb to Flagg Ranch	24	2.4	7.2	68.4	0.05	0.15	1.52	0.47	2.19
Old Faithful Staging Area	NA	0.7	0.0	0.0	0.02	0.08	0.01	0.00	0.10
Total					0.41	1.69	8.61	5.36	**16.06**

Alternative 4D-AVG - AVERAGE Transportation Event Management 106 SC events (159 SC), 4 Non-commercial SM events / BAT Snowcoaches &

NOx Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	New BAT	5.2	11.0	0.6	0.0083	West Entrance
Snowcoach	BAT	5.0	4.9	4.1	0.05	Old Faithful
Snowcoach	Admin	14.7	10.1	13.3		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	2.0	1.9	5.7	0.02	0.09	0.31	0.03	0.45
Mammoth to Norris	21	231.0	101.9	211.1	5.04	26.46	10.26	2.56	44.32
West Entrance to Madison	14	154.0	67.9	140.7	3.56	17.30	22.15	1.70	44.71
Madison to Norris	14	154.0	67.9	140.7	3.34	14.25	11.23	1.39	30.21
Norris to Canyon Village	12	132.0	58.2	120.6	1.82	6.69	6.28	0.69	15.47
Canyon Village to Fishing Bridge	16	176.0	77.6	160.8	4.94	15.12	9.83	1.91	31.81
Fishing Bridge to East Entrance	27	297.0	131.0	271.4	5.53	9.81	3.17	1.14	19.65
Fishing Bridge to West Thumb	21	231.0	101.9	211.1	2.19	24.93	5.88	3.07	36.06
Madison to Old Faithful	16	176.0	77.6	160.8	6.07	23.26	27.38	2.51	59.22
Old Faithful to West Thumb	17	187.0	82.5	170.9	3.85	19.77	18.12	2.26	44.00
West Thumb to Flagg Ranch	24	264.0	116.4	241.2	5.67	16.86	24.52	1.65	48.70
Old Faithful Staging Area	NA	0.0	0.2	0.7	0.00	0.00	0.06	0.01	0.07
Total					42.03	174.54	139.20	18.92	**374.68**

PM Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/mi)	Cruise Speed (g/mi)	Idle (g/hr)	Idle Time (hr): Idle Time	
Snowmobile	New BAT	0.065	0.031	0.490	0.0083	West Entrance
Snowcoach	BAT	0.033	0.003	0.060	0.05	Old Faithful
Snowcoach	Admin	0.030	0.010	0.040		

Link	Distance (mi)	Snowmobile Unit Emissions (g)	Snowcoach Unit Emissions (g)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile Emissions (lb/day)	Administrative Snowmobile Emissions (lb/day)	Snowcoach Emissions (lb/day)	Administrative Snowcoach Emissions (lb/day)	**Total Emissions (lb/day)**
West Entrance	0.38	0.029	0.013	0.012	0.00	0.00	0.00	0.00	0.00
Mammoth to Norris	21	0.651	0.063	0.210	0.01	0.07	0.01	0.00	0.10
West Entrance to Madison	14	0.434	0.042	0.140	0.01	0.05	0.01	0.00	0.07
Madison to Norris	14	0.434	0.042	0.140	0.01	0.04	0.01	0.00	0.06
Norris to Canyon Village	12	0.372	0.036	0.120	0.01	0.02	0.00	0.00	0.03
Canyon Village to Fishing Bridge	16	0.496	0.048	0.160	0.01	0.04	0.01	0.00	0.06
Fishing Bridge to East Entrance	27	0.837	0.081	0.270	0.02	0.03	0.00	0.00	0.05
Fishing Bridge to West Thumb	21	0.651	0.063	0.210	0.01	0.07	0.00	0.00	0.08
Madison to Old Faithful	16	0.496	0.048	0.160	0.02	0.07	0.02	0.00	0.10
Old Faithful to West Thumb	17	0.527	0.051	0.170	0.01	0.06	0.01	0.00	0.08
West Thumb to Flagg Ranch	24	0.744	0.072	0.240	0.02	0.05	0.02	0.00	0.08
Old Faithful Staging Area	NA	0.025	0.003	0.002	0.00	0.00	0.00	0.00	0.004
Total					0.12	0.50	0.09	0.02	**0.72**

APPENDIX G
VISCREEN INPUTS & MODELING FILES

**(Electronic files, please download:
Appendix G VISCREEN Modeling Files.zip)**

VISCREEN ANALYSIS
Determination of Virtual Point Source

Source/Observer Separation Distances:

Canyon to Fishing
Distance of link = 25.7 km
σy_o = 25.7 ÷ 4.3 = 5.98 km

Old Faithful
Staging area = 630 m x 1037m = 653,310 m^2
v9,600 m = 808 m (equal length of sides)
σy_o = v9,600 ÷ 4.3 = 188 m

WE to Madison
Distance of link = 22.5 km
σy_o = 22.5 ÷ 4.3 = 5.25 km

West Entrance
Distance of link = 0.61
σy_o = 0.61 ÷ 4.3 = 0.142 km

Source/Observer Distance (find midpoint):

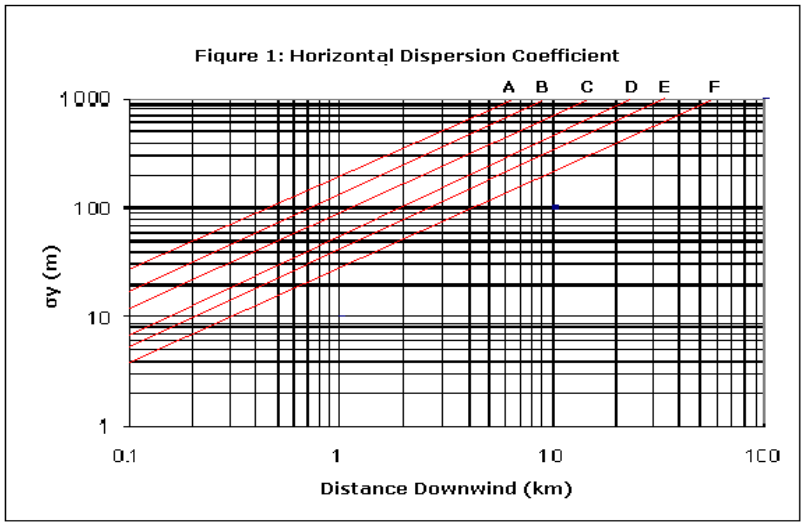
Canyon to Fishing	25.7 km ÷ 2 = 12.85 km
Old Faithful:	0.808 km ÷ 2 = 0.404 km
WE to Madison	22.5 km ÷ 2 = 11.25 km
West Entrance	0.61km ÷ 2 = 0.305

Determine Downwind Distance:

From chart using stability Class D:

Canyon to Fishing	At σy_o = 5,980 m, x = 170 km (extrapolate)
Old Faithful:	At σy_o = 188 m, x = 3.5 km
WE to Madison	At σy_o = 5,230 m, x = 120 km (extrapolate)
West Entrance	At σy_o = 142 m, x = 2.5 km

Note: Use dispersion coefficient table with larger σy scale.



VISCREEN INPUT

Site	Source/Observer Distance (km)	Closest Distance Between S/O (km)	Furthest Distance Between S/O (km)
Canyon to Fishing	12.85	157.15	182.85
Old Faithful:	0.404	3.096	3.904
WE to Madison	11.25	108.75	131.25
West Entrance	0.305	2.195	2.805

Additional Input:

Background Visual Range = 240 km
Change stability class to D
Change wind speed to 1.0 m/s

Yellowstone Post-SEIS Aug 2013
VISCREEN Modeling Inputs

NO2	Site 1: West entrance lb/hour	Site 2: West to Madison lb/hour	Site 3: Canyon to Fish lb/hour	Site 4: Old Faithful lb/hour
Alternative 2A-M	0.26	38.24	29.50	0.049
Alternative 2B-M	0.21	34.90	27.67	0.040
Alternative 3B-M	0.12	10.86	8.40	0.027
Alternative 4A-M	0.44	53.11	41.76	0.028
Alternative 4B-M	0.12	11.25	11.44	0.023
Alternative 4C-M	0.35	38.84	29.83	0.035
Alternative 4D-M	0.19	15.63	14.03	0.045
Alternative 4A-AVG	0.33	39.97	32.27	0.024
Alternative 4C-AVG	0.28	31.76	24.95	0.027
Alternative 4D-AVG	0.16	13.41	12.72	0.034
PM	**lb/hour**	**lb/hour**	**lb/hour**	**lb/hour**
Alternative 2A-M	0.004	0.109	0.086	0.008
Alternative 2B-M	0.004	0.103	0.083	0.008
Alternative 3B-M	0.001	0.019	0.019	0.001
Alternative 4A-M	0.006	0.143	0.113	0.012
Alternative 4B-M	0.001	0.021	0.025	0.001
Alternative 4C-M	0.006	0.145	0.114	0.012
Alternative 4D-M	0.002	0.024	0.027	0.001
Alternative 4A-AVG	0.004	0.106	0.087	0.009
Alternative 4C-AVG	0.005	0.119	0.096	0.010
Alternative 4D-AVG	0.001	0.022	0.026	0.001

NO2	Site 1: West entrance lb/day	Site 2: West to Madison lb/day	Site 3: Canyon to Fish lb/day
Alternative 2A-M	0.75	127.46	73.76
Alternative 2B-M	0.60	116.32	69.17
Alternative 3B-M	0.34	36.21	21.00
Alternative 4A-M	1.26	177.04	104.40
Alternative 4B-M	0.35	37.51	28.61
Alternative 4C-M	0.99	129.47	74.57
Alternative 4D-M	0.55	52.09	35.08
Alternative 4A-AVG	0.95	133.23	80.68
Alternative 4C-AVG	0.80	105.87	62.38
Alternative 4D-AVG	0.45	44.71	31.81

PM	lb/day	lb/day	lb/day
Alternative 2A-M	0.01	0.36	0.22
Alternative 2B-M	0.01	0.34	0.21
Alternative 3B-M	0.00	0.06	0.05
Alternative 4A-M	0.02	0.48	0.28
Alternative 4B-M	0.00	0.07	0.06
Alternative 4C-M	0.02	0.48	0.29
Alternative 4D-M	0.00	0.08	0.07
Alternative 4A-AVG	0.01	0.35	0.22
Alternative 4C-AVG	0.01	0.40	0.24
Alternative 4D-AVG	0.00	0.07	0.06

APPENDIX H
REFINED INPUTS & HOURLY DISTRIBUTIONS OF OSV

Post-SEIS Site 1: West Entrance & Site 2: West Entrance to Madison

CO Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	Current BAT	161.1	18.6	409.7
Snowcoach	Current	77.9	138.4	201.9
Snowcoach	Admin	1.0	0.7	6.7

OSV trips Revised Jul 10 2013, Emissions Revised Oct 2012

CURRENT FLEET SNOWCOACHES

Alternative 2A

Visitor Snowmobiles	Visitor Snowcoaches	Administrative Travel Snowmobiles	Administrative Travel Snowcoaches	Hour	# vehs / pk hr Snowmobiles	# vehs / pk hr Snowcoaches	Admin Snowcoaches	Tot Veh.	Alternative 2A Site 1 E- Factor (g/mi) Low Speed	E- Factor (g/hr) Idle	West Entrance Traffic South Lane	West Entrance Traffic North Lane	Site 2 E- Factor (g/mi) Cruise Speed	West to Madison
				12 to 1					0	0	0	0	0	0
				1 to 2					0	0	0	0	0	0
				2 to 3					0	0	0	0	0	0
				3 to 4					0	0	0	0	0	0
				4 to 5					0	0	0	0	0	0
				5 to 6					0	0	0	0	0	0
				6 to 7					0	0	0	0	0	0
160	**34**	**20**	**2**	7 to 8	34	7	0	41	146.90	374.22	27	14	39.02	22
				8 to 9	37	7	1	45	144.60	368.42	30	15	36.81	25
				9 to 10	52	10	0	62	147.68	376.18	41	21	37.89	43
				10 to 11	35	7	0	42	147.23	375.07	28	14	38.53	62
				11 to 12	10	2	0	12	147.23	375.07	8	4	38.53	51
				12 to 1	18	3	0	21	149.21	380.01	14	7	35.68	22
				1 to 2	18	3	0	21	149.21	380.01	14	7	35.68	51
				2 to 3	34	7	0	41	146.90	374.22	27	14	39.02	51
				3 to 4	36	7	0	43	147.56	375.87	29	14	38.07	63
				4 to 5	61	12	1	74	145.44	370.56	49	25	37.75	35
				5 to 6	19	3	0	22	149.75	381.36	15	7	34.90	3
				6 to 7	2	0	0	2	161.10	409.70	1	1	18.56	2
				7 to 8	2	0	0	2	161.10	409.70	1	1	18.56	2
				8 to 9	2	0	0	2	161.10	409.70	1	1	18.56	2
				9 to 10					0	0	0	0	0	0
				10 to 11					0	0	0	0	0	0
				11 to 12					0	0	0	0	0	0

BAT SNOWCOACHES

Alternative 2B

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	Current BAT	161.1	18.6	409.7
Snowcoach	BAT	12.1	103.6	10.7
Snowcoach	Admin	1.0	0.7	6.7

Visitor Snowmobiles	Visitor Snowcoaches	Administrative Travel Snowmobiles	Administrative Travel Snowcoaches	Hour	# vehs / pk hr Snowmobiles	# vehs / pk hr Snowcoaches	Admin Snowcoaches	Tot Veh.	Alternative 2B Site 1 E- Factor (g/mi) Low Speed	E- Factor (g/hr) Idle	West Entrance Traffic South Lane	West Entrance Traffic North Lane	Site 2 E- Factor (g/mi) Cruise Speed	West to Madison
				12 to 1					0	0	0	0	0	0
				1 to 2					0	0	0	0	0	0
				2 to 3					0	0	0	0	0	0
				3 to 4					0	0	0	0	0	0
				4 to 5					0	0	0	0	0	0
				5 to 6					0	0	0	0	0	0
				6 to 7					0	0	0	0	0	0
160	**34**	**20**	**2**	7 to 8	34	7	0	41	135.66	341.58	27	14	33.08	22
				8 to 9	37	7	1	45	134.36	338.68	30	15	31.39	25
				9 to 10	52	10	0	62	137.07	345.35	41	21	32.28	43
				10 to 11	35	7	0	42	136.27	343.20	28	14	32.73	62
				11 to 12	10	2	0	12	136.27	343.20	8	4	32.73	51
				12 to 1	18	3	0	21	139.81	352.70	14	7	30.71	22
				1 to 2	18	3	0	21	139.81	352.70	14	7	30.71	51
				2 to 3	34	7	0	41	135.66	341.58	27	14	33.08	51
				3 to 4	36	7	0	43	136.84	344.75	29	14	32.40	63
				4 to 5	61	12	1	74	134.77	339.55	49	25	32.11	35
				5 to 6	19	3	0	22	140.78	355.29	15	7	30.16	3
				6 to 7	2	0	0	2	161.10	409.70	1	1	18.56	2
				7 to 8	2	0	0	2	161.10	409.70	1	1	18.56	2
				8 to 9	2	0	0	2	161.10	409.70	1	1	18.56	2
				9 to 10					0	0	0	0	0	0
				10 to 11					0	0	0	0	0	0
				11 to 12					0	0	0	0	0	0

SEIS Site 1: West Entrance & Site 2: West Entrance to Madison

CO Emissions

Revised Oct 2012

BAT SNOWCOACHES

Alternative 3B

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	Current BAT	161.1	18.6	409.7
Snowcoach	BAT	13.3	123.9	10.7
Snowcoach	Admin	1.0	0.7	6.7

Visitor		Administrative Travel			# vehs / pk hr		Admin		Alternative 3B Site 1				Site 2	
									E- Factor (g/mi)	E- Factor (g/hr)	West Entrance Traffic		E- Factor (g/mi)	
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Snowcoaches	Tot Veh.	Low Speed	Idle	South Lane	North Lane	Cruise Speed	West to Madison
				12 to 1					0	0	0	0	0	0
				1 to 2					0	0	0	0	0	0
				2 to 3					0	0	0	0	0	0
				3 to 4					0	0	0	0	0	0
				4 to 5					0	0	0	0	0	0
				5 to 6					0	0	0	0	0	0
				6 to 7					0	0	0	0	0	0
0	62	20	2	7 to 8	2	12	0	14	34.41	67.70	9	5	108.85	8
				8 to 9	5	12	1	18	53.67	121.31	12	6	87.80	12
				9 to 10	4	19	0	23	39.00	80.09	15	8	105.58	17
				10 to 11	3	12	0	15	42.86	90.50	10	5	102.83	22
				11 to 12	2	3	0	5	72.42	170.30	3	2	81.76	18
				12 to 1	2	6	0	8	50.25	110.45	5	3	97.57	8
				1 to 2	2	6	0	8	50.25	110.45	5	3	97.57	18
				2 to 3	2	12	0	14	34.41	67.70	9	5	108.85	18
				3 to 4	4	12	0	16	50.25	110.45	11	5	97.57	23
				4 to 5	5	22	1	28	39.25	81.81	19	9	100.69	15
				5 to 6	3	6	0	9	62.57	143.70	6	3	88.79	3
				6 to 7	2	0	0	2	161.10	409.70	1	1	18.56	2
				7 to 8	2	0	0	2	161.10	409.70	1	1	18.56	2
				8 to 9	2	0	0	2	161.10	409.70	1	1	18.56	2
				9 to 10					0	0	0	0	0	0
				10 to 11					0	0	0	0	0	0
				11 to 12					0	0	0	0	0	0

Alternative 4a

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	25.0	4.0	216.0
Snowcoach	BAT	10.9	84.0	10.6
Snowcoach	Admin	1.0	0.7	6.7

Visitor		Administrative Travel			# vehs / pk hr		Admin		Alternative 4a E- Factor (g/mi)	Alternative 4a E- Factor (g/hr)	Site 1 West Entrance Traffic		Site 2 E- Factor (g/mi)	
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Snowcoaches	Tot Veh.	Low Speed	Idle	South Lane	North Lane	Cruise Speed	West to Madison
				12 to 1					0	0	0	0	0	0
				1 to 2					0	0	0	0	0	0
				2 to 3					0	0	0	0	0	0
				3 to 4					0	0	0	0	0	0
				4 to 5					0	0	0	0	0	0
				5 to 6					0	0	0	0	0	0
				6 to 7					0	0	0	0	0	0
235	26	20	2	7 to 8	49	5	0	54	23.69	196.98	36	18	11.41	29
				8 to 9	52	5	1	58	23.37	194.68	39	19	10.84	32
				9 to 10	75	8	0	83	23.64	196.20	55	28	11.71	57
				10 to 11	50	5	0	55	23.72	197.33	37	18	11.27	82
				11 to 12	14	1	0	15	24.06	202.31	10	5	9.33	68
				12 to 1	26	3	0	29	23.54	194.75	19	10	12.28	29
				1 to 2	26	3	0	29	23.54	194.75	19	10	12.28	68
				2 to 3	49	5	0	54	23.69	196.98	36	18	11.41	68
				3 to 4	51	5	0	56	23.74	197.66	37	19	11.14	83
				4 to 5	87	9	1	97	23.44	194.78	65	32	11.39	44
				5 to 6	27	3	0	30	23.59	195.46	20	10	12.00	3
				6 to 7	2	0	0	2	25.00	216.00	1	1	4.00	2
				7 to 8	2	0	0	2	25.00	216.00	1	1	4.00	2
				8 to 9	2	0	0	2	25.00	216.00	1	1	4.00	2
				9 to 10					0	0	0	0	0	0
				10 to 11					0	0	0	0	0	0
				11 to 12					0	0	0	0	0	0

Alternative 4b

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	25.0	4.0	216.0
Snowcoach	BAT	13.0	118.2	10.7
Snowcoach	Admin	1.0	0.7	6.7

Visitor		Administrative Travel			# vehs / pk hr		Admin		Alternative 4b E- Factor (g/mi)	Alternative 4b E- Factor (g/hr)	Site 1 West Entrance Traffic		Site 2 E- Factor (g/mi)	
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Snowcoaches	Tot Veh.	Low Speed	Idle	South Lane	North Lane	Cruise Speed	West to Madison
				12 to 1					0	0	0	0	0	0
				1 to 2					0	0	0	0	0	0
				2 to 3					0	0	0	0	0	0
				3 to 4					0	0	0	0	0	0
				4 to 5					0	0	0	0	0	0
				5 to 6					0	0	0	0	0	0
				6 to 7					0	0	0	0	0	0
5	49	20	2	7 to 8	3	10	0	13	15.77	58.08	9	4	91.85	8
				8 to 9	6	10	1	17	16.53	82.92	11	6	70.98	11
				9 to 10	6	15	0	21	16.43	69.36	14	7	85.57	15
				10 to 11	4	10	0	14	16.43	69.36	9	5	85.57	20
				11 to 12	2	2	0	4	19.00	113.35	3	1	61.10	15
				12 to 1	3	5	0	8	17.50	87.69	5	3	75.38	8
				1 to 2	3	5	0	8	17.50	87.69	5	3	75.38	15
				2 to 3	3	10	0	13	15.77	58.08	9	4	91.85	15
				3 to 4	5	10	0	15	17.00	79.13	10	5	80.13	21
				4 to 5	7	17	1	25	15.88	68.02	17	8	81.52	14
				5 to 6	4	5	0	9	18.33	101.94	6	3	67.44	3
				6 to 7	2	0	0	2	25.00	216.00	1	1	4.00	2
				7 to 8	2	0	0	2	25.00	216.00	1	1	4.00	2
				8 to 9	2	0	0	2	25.00	216.00	1	1	4.00	2
				9 to 10					0	0	0	0	0	0
				10 to 11					0	0	0	0	0	0
				11 to 12					0	0	0	0	0	0

Alternative 4c

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	E-BAT	16.7	2.7	144.0
Snowcoach	BAT	13.3	123.9	10.7
Snowcoach	Admin	1.0	0.7	6.7

Visitor		Administrative Travel			# vehs / pk hr		Admin		Alternative 4c E- Factor (g/mi)	Alternative 4c E- Factor (g/hr)	Site 1 West Entrance Traffic		Site 2 E- Factor (g/mi)	
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Snowcoaches	Tot Veh.	Low Speed	Idle	South Lane	North Lane	Cruise Speed	West to Madison
				12 to 1					0	0	0	0	0	0
				1 to 2					0	0	0	0	0	0
				2 to 3					0	0	0	0	0	0
				3 to 4					0	0	0	0	0	0
				4 to 5					0	0	0	0	0	0
				5 to 6					0	0	0	0	0	0
				6 to 7					0	0	0	0	0	0
235	52	20	2	7 to 8	49	10	0	59	16.10	121.41	39	20	23.22	31
				8 to 9	52	10	1	63	15.89	120.66	42	21	21.88	35
				9 to 10	75	16	0	91	16.08	120.56	61	30	23.99	62
				10 to 11	50	10	0	60	16.11	121.78	40	20	22.88	90
				11 to 12	14	3	0	17	16.08	120.48	11	6	24.06	74
				12 to 1	26	5	0	31	16.13	122.50	21	10	22.22	31
				1 to 2	26	5	0	31	16.13	122.50	21	10	22.22	74
				2 to 3	49	10	0	59	16.10	121.41	39	20	23.22	74
				3 to 4	51	10	0	61	16.12	122.15	41	20	22.54	91
				4 to 5	87	18	1	106	15.95	120.07	71	35	23.24	48
				5 to 6	27	5	0	32	16.14	123.17	21	11	21.61	3
				6 to 7	2	0	0	2	16.67	144.00	1	1	2.67	2
				7 to 8	2	0	0	2	16.67	144.00	1	1	2.67	2
				8 to 9	2	0	0	2	16.67	144.00	1	1	2.67	2
				9 to 10					0	0	0	0	0	0
				10 to 11					0	0	0	0	0	0
				11 to 12					0	0	0	0	0	0

Alternative 4d

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	25.0	4.0	216.0
Snowcoach	BAT	14.3	140.8	10.8
Snowcoach	Admin	1.0	0.7	6.7

Visitor		Administrative Travel			# vehs / pk hr		Admin		Alternative 4d E- Factor (g/mi)	Alternative 4d E- Factor (g/hr)	Site 1 West Entrance Traffic		Site 2 E- Factor (g/mi)	
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Snowcoaches	Tot Veh.	Low Speed	Idle	South Lane	North Lane	Cruise Speed	West to Madison
				12 to 1					0	0	0	0	0	0
				1 to 2					0	0	0	0	0	0
				2 to 3					0	0	0	0	0	0
				3 to 4					0	0	0	0	0	0
				4 to 5					0	0	0	0	0	0
				5 to 6					0	0	0	0	0	0
				6 to 7					0	0	0	0	0	0
5	98	20	2	7 to 8	3	20	0	23	15.70	37.57	15	8	122.96	13
				8 to 9	6	20	1	27	16.19	56.25	18	9	105.21	16
				9 to 10	6	29	0	35	16.13	45.98	23	12	117.35	25
				10 to 11	4	20	0	24	16.08	45.00	16	8	118.00	35
				11 to 12	2	5	0	7	17.36	69.43	5	2	101.71	28
				12 to 1	3	10	0	13	16.77	58.15	9	4	109.23	13
				1 to 2	3	10	0	13	16.77	58.15	9	4	109.23	28
				2 to 3	3	20	0	23	15.70	37.57	15	8	122.96	28
				3 to 4	5	20	0	25	16.44	51.84	17	8	113.44	36
				4 to 5	7	34	1	42	15.77	44.90	28	14	114.66	21
				5 to 6	4	10	0	14	17.36	69.43	9	5	101.71	3
				6 to 7	2	0	0	2	25.00	216.00	1	1	4.00	2
				7 to 8	2	0	0	2	25.00	216.00	1	1	4.00	2
				8 to 9	2	0	0	2	25.00	216.00	1	1	4.00	2
				9 to 10					0	0	0	0	0	0
				10 to 11					0	0	0	0	0	0
				11 to 12					0	0	0	0	0	0

Post-SEIS Site 1: West Entrance & Site 2: West Entrance to Madison

NOx Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	Current BAT	279.0	961.0	141.0
Snowcoach	Current	1042.0	993.0	653.0
Snowcoach	Admin	1470.0	1005.0	1332.0

OSV trips Revised Jul 10 2013, Emissions Revised Oct 2012

NOTE: * All emissions factors are x100 (NOx only)

CURRENT FLEET SNOWCOACHES

Alternative 2A — **Alternative 2** — **Site 1** — **Site 2**

Visitor Snowmobiles	Visitor Snowcoaches	Administrative Travel Snowmobiles	Administrative Travel Snowcoaches	Hour	# vehs / pk hr Snowmobiles	# vehs / pk hr Snowcoaches	Admin Snowcoaches	Tot Veh.	E- Factor (g/mi) Low Speed	E- Factor (g/hr) Idle	West Entrance Traffic South Lane	West Entrance Traffic North Lane	E- Factor (g/mi) Cruise Speed	West to Madison
				12 to 1					0	0	0	0	0	0
				1 to 2					0	0	0	0	0	0
				2 to 3					0	0	0	0	0	0
				3 to 4					0	0	0	0	0	0
				4 to 5					0	0	0	0	0	0
				5 to 6					0	0	0	0	0	0
				6 to 7					0	0	0	0	0	0
160	**34**	**20**	**2**	7 to 8	34	7	0	41	409.27	228.41	27	14	966.46	22
				8 to 9	37	7	1	45	424.16	247.11	30	15	966.96	25
				9 to 10	52	10	0	62	402.06	223.58	41	21	966.16	43
				10 to 11	35	7	0	42	406.17	226.33	28	14	966.33	62
				11 to 12	10	2	0	12	406.17	226.33	8	4	966.33	51
				12 to 1	18	3	0	21	388.00	214.14	14	7	965.57	22
				1 to 2	18	3	0	21	388.00	214.14	14	7	965.57	51
				2 to 3	34	7	0	41	409.27	228.41	27	14	966.46	51
				3 to 4	36	7	0	43	403.21	224.35	29	14	966.21	63
				4 to 5	61	12	1	74	418.82	240.12	49	25	966.78	35
				5 to 6	19	3	0	22	383.05	210.82	15	7	965.36	3
				6 to 7	2	0	0	2	279.00	141.00	1	1	961.00	2
				7 to 8	2	0	0	2	279.00	141.00	1	1	961.00	2
				8 to 9	2	0	0	2	279.00	141.00	1	1	961.00	2
				9 to 10					0	0	0	0	0	0
				10 to 11					0	0	0	0	0	0
				11 to 12					0	0	0	0	0	0

BAT SNOWCOACHES

Alternative 2B

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	Current BAT	279.0	961.0	141.0
Snowcoach	BAT	512.0	489.0	405.0
Snowcoach	Admin	1470.0	1005.0	1332.0

NOTE: * All emissions factors are x100 (NOx only)

Alternative 2B — **Site 1** — **Site 2**

Visitor Snowmobiles	Visitor Snowcoaches	Administrative Travel Snowmobiles	Administrative Travel Snowcoaches	Hour	# vehs / pk hr Snowmobiles	# vehs / pk hr Snowcoaches	Admin Snowcoaches	Tot Veh.	E- Factor (g/mi) Low Speed	E- Factor (g/hr) Idle	West Entrance Traffic South Lane	West Entrance Traffic North Lane	E- Factor (g/mi) Cruise Speed	West to Madison
				12 to 1					0	0	0	0	0	0
				1 to 2					0	0	0	0	0	0
				2 to 3					0	0	0	0	0	0
				3 to 4					0	0	0	0	0	0
				4 to 5					0	0	0	0	0	0
				5 to 6					0	0	0	0	0	0
				6 to 7					0	0	0	0	0	0
160	**34**	**20**	**2**	7 to 8	34	7	0	41	318.78	186.07	27	14	880.41	22
				8 to 9	37	7	1	45	341.71	208.53	30	15	888.56	25
				9 to 10	52	10	0	62	316.58	183.58	41	21	884.87	43
				10 to 11	35	7	0	42	317.83	185.00	28	14	882.33	62
				11 to 12	10	2	0	12	317.83	185.00	8	4	882.33	51
				12 to 1	18	3	0	21	312.29	178.71	14	7	893.57	22
				1 to 2	18	3	0	21	312.29	178.71	14	7	893.57	51
				2 to 3	34	7	0	41	318.78	186.07	27	14	880.41	51
				3 to 4	36	7	0	43	316.93	183.98	29	14	884.16	63
				4 to 5	61	12	1	74	332.88	199.91	49	25	885.05	35
				5 to 6	19	3	0	22	310.77	177.00	15	7	896.64	3
				6 to 7	2	0	0	2	279.00	141.00	1	1	961.00	2
				7 to 8	2	0	0	2	279.00	141.00	1	1	961.00	2
				8 to 9	2	0	0	2	279.00	141.00	1	1	961.00	2
				9 to 10					0	0	0	0	0	0
				10 to 11					0	0	0	0	0	0
				11 to 12					0	0	0	0	0	0

SEIS Site 1: West Entrance & Site 2: West Entrance to Madison

NOx Emissions

Revised Oct 22 2012

BAT SNOWCOACHES

Alternative 3B

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	Current BAT	279.0	961.0	141.0
Snowcoach	BAT	506.0	488.0	409.0
Snowcoach	Admin	1470.0	1005.0	1332.0

Visitor		Administrative Travel			# vehs / pk hr		Admin		Alternative 3B Site 1				Site 2	
									E- Factor (g/mi)	E- Factor (g/hr)	West Entrance Traffic		E- Factor (g/mi)	
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Snowcoaches	Tot Veh.	Low Speed	Idle	South Lane	North Lane	Cruise Speed	West to Madison
				12 to 1					0	0	0	0	0	0
				1 to 2					0	0	0	0	0	0
				2 to 3					0	0	0	0	0	0
				3 to 4					0	0	0	0	0	0
				4 to 5					0	0	0	0	0	0
				5 to 6					0	0	0	0	0	0
				6 to 7					0	0	0	0	0	0
0	62	20	2	7 to 8	2	12	0	14	473.57	370.71	9	5	555.57	8
				8 to 9	5	12	1	18	496.50	385.83	12	6	648.11	12
				9 to 10	4	19	0	23	466.52	362.39	15	8	570.26	17
				10 to 11	3	12	0	15	460.60	355.40	10	5	582.60	22
				11 to 12	2	3	0	5	415.20	301.80	3	2	677.20	18
				12 to 1	2	6	0	8	449.25	342.00	5	3	606.25	8
				1 to 2	2	6	0	8	449.25	342.00	5	3	606.25	18
				2 to 3	2	12	0	14	473.57	370.71	9	5	555.57	18
				3 to 4	4	12	0	16	449.25	342.00	11	5	606.25	23
				4 to 5	5	22	1	28	499.89	394.11	19	9	590.93	15
				5 to 6	3	6	0	9	430.33	319.67	6	3	645.67	3
				6 to 7	2	0	0	2	279.00	141.00	1	1	961.00	2
				7 to 8	2	0	0	2	279.00	141.00	1	1	961.00	2
				8 to 9	2	0	0	2	279.00	141.00	1	1	961.00	2
				9 to 10					0	0	0	0	0	0
				10 to 11					0	0	0	0	0	0
				11 to 12					0	0	0	0	0	0

Alternative 4a

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	520.0	1100.0	61.0
Snowcoach	BAT	531.0	498.0	414.0
Snowcoach	Admin	1470.0	1005.0	1332.0

Visitor		Administrative Travel			# vehs / pk hr		Admin		Alternative 4a E- Factor (g/mi)	Alternative 4a E- Factor (g/hr)	Site 1 West Entrance Traffic		Site 2 E- Factor (g/mi)	
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Snowcoaches	Tot Veh.	Low Speed	Idle	South Lane	North Lane	Cruise Speed	West to Madison
				12 to 1					0	0	0	0	0	0
				1 to 2					0	0	0	0	0	0
				2 to 3					0	0	0	0	0	0
				3 to 4					0	0	0	0	0	0
				4 to 5					0	0	0	0	0	0
				5 to 6					0	0	0	0	0	0
				6 to 7					0	0	0	0	0	0
235	**26**	**20**	**2**	7 to 8	49	5	0	54	521.02	93.69	36	18	1044.26	29
				8 to 9	52	5	1	58	537.33	113.34	39	19	1046.47	32
				9 to 10	75	8	0	83	521.06	95.02	55	28	1041.98	57
				10 to 11	50	5	0	55	521.00	93.09	37	18	1045.27	82
				11 to 12	14	1	0	15	520.73	84.53	10	5	1059.87	68
				12 to 1	26	3	0	29	521.14	97.52	19	10	1037.72	29
				1 to 2	26	3	0	29	521.14	97.52	19	10	1037.72	68
				2 to 3	49	5	0	54	521.02	93.69	36	18	1044.26	68
				3 to 4	51	5	0	56	520.98	92.52	37	19	1046.25	83
				4 to 5	87	9	1	97	530.81	106.86	65	32	1043.16	44
				5 to 6	27	3	0	30	521.10	96.30	20	10	1039.80	3
				6 to 7	2	0	0	2	520.00	61.00	1	1	1100.00	2
				7 to 8	2	0	0	2	520.00	61.00	1	1	1100.00	2
				8 to 9	2	0	0	2	520.00	61.00	1	1	1100.00	2
				9 to 10					0	0	0	0	0	0
				10 to 11					0	0	0	0	0	0
				11 to 12					0	0	0	0	0	0

Alternative 4b

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	520.0	1100.0	61.0
Snowcoach	BAT	512.0	491.0	412.0
Snowcoach	Admin	1470.0	1005.0	1332.0

Visitor		Administrative Travel			# vehs / pk hr		Admin		Alternative 4b E- Factor (g/mi)	Alternative 4b E- Factor (g/hr)	Site 1 West Entrance Traffic		Site 2 E- Factor (g/mi)	
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Snowcoaches	Tot Veh.	Low Speed	Idle	South Lane	North Lane	Cruise Speed	West to Madison
				12 to 1					0	0	0	0	0	0
				1 to 2					0	0	0	0	0	0
				2 to 3					0	0	0	0	0	0
				3 to 4					0	0	0	0	0	0
				4 to 5					0	0	0	0	0	0
				5 to 6					0	0	0	0	0	0
				6 to 7					0	0	0	0	0	0
5	**49**	**20**	**2**	7 to 8	3	10	0	13	513.85	331.00	9	4	631.54	8
				8 to 9	6	10	1	17	571.18	342.24	11	6	736.18	11
				9 to 10	6	15	0	21	514.29	311.71	14	7	665.00	15
				10 to 11	4	10	0	14	514.29	311.71	9	5	665.00	20
				11 to 12	2	2	0	4	516.00	236.50	3	1	795.50	15
				12 to 1	3	5	0	8	515.00	280.38	5	3	719.38	8
				1 to 2	3	5	0	8	515.00	280.38	5	3	719.38	15
				2 to 3	3	10	0	13	513.85	331.00	9	4	631.54	15
				3 to 4	5	10	0	15	514.67	295.00	10	5	694.00	21
				4 to 5	7	17	1	25	552.56	350.52	17	8	682.08	14
				5 to 6	4	5	0	9	515.56	256.00	6	3	761.67	3
				6 to 7	2	0	0	2	520.00	61.00	1	1	1100.00	2
				7 to 8	2	0	0	2	520.00	61.00	1	1	1100.00	2
				8 to 9	2	0	0	2	520.00	61.00	1	1	1100.00	2
				9 to 10					0	0	0	0	0	0
				10 to 11					0	0	0	0	0	0
				11 to 12					0	0	0	0	0	0

Alternative 4c

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	E-BAT	347.0	733.0	41.0
Snowcoach	BAT	506.0	488.0	409.0
Snowcoach	Admin	1470.0	1005.0	1332.0

Visitor		Administrative Travel			# vehs / pk hr		Admin		Alternative 4c E- Factor (g/mi)	Alternative 4c E- Factor (g/hr)	Site 1 West Entrance Traffic		Site 2 E- Factor (g/mi)	
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Snowcoaches	Tot Veh.	Low Speed	Idle	South Lane	North Lane	Cruise Speed	West to Madison
				12 to 1					0	0	0	0	0	0
				1 to 2					0	0	0	0	0	0
				2 to 3					0	0	0	0	0	0
				3 to 4					0	0	0	0	0	0
				4 to 5					0	0	0	0	0	0
				5 to 6					0	0	0	0	0	0
				6 to 7					0	0	0	0	0	0
235	52	20	2	7 to 8	49	10	0	59	373.95	103.37	39	20	691.47	31
				8 to 9	52	10	1	63	390.06	119.90	42	21	698.43	35
				9 to 10	75	16	0	91	374.96	105.70	61	30	689.92	62
				10 to 11	50	10	0	60	373.50	102.33	40	20	692.17	90
				11 to 12	14	3	0	17	375.06	105.94	11	6	689.76	74
				12 to 1	26	5	0	31	372.65	100.35	21	10	693.48	31
				1 to 2	26	5	0	31	372.65	100.35	21	10	693.48	74
				2 to 3	49	10	0	59	373.95	103.37	39	20	691.47	74
				3 to 4	51	10	0	61	373.07	101.33	41	20	692.84	91
				4 to 5	87	18	1	106	384.59	115.67	71	35	693.96	48
				5 to 6	27	5	0	32	371.84	98.50	21	11	694.72	3
				6 to 7	2	0	0	2	347.00	41.00	1	1	733.00	2
				7 to 8	2	0	0	2	347.00	41.00	1	1	733.00	2
				8 to 9	2	0	0	2	347.00	41.00	1	1	733.00	2
				9 to 10					0	0	0	0	0	0
				10 to 11					0	0	0	0	0	0
				11 to 12					0	0	0	0	0	0

Alternative 4d

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	520.0	1100.0	61.0
Snowcoach	BAT	498.0	485.0	409.0
Snowcoach	Admin	1470.0	1005.0	1332.0

Visitor		Administrative Travel			# vehs / pk hr		Admin		Alternative 4d E- Factor (g/mi)	Alternative 4d E- Factor (g/hr)	Site 1 West Entrance Traffic		Site 2 E- Factor (g/mi)	
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Snowcoaches	Tot Veh.	Low Speed	Idle	South Lane	North Lane	Cruise Speed	West to Madison
				12 to 1					0	0	0	0	0	0
				1 to 2					0	0	0	0	0	0
				2 to 3					0	0	0	0	0	0
				3 to 4					0	0	0	0	0	0
				4 to 5					0	0	0	0	0	0
				5 to 6					0	0	0	0	0	0
				6 to 7					0	0	0	0	0	0
5	98	20	2	7 to 8	3	20	0	23	500.87	363.61	15	8	565.22	13
				8 to 9	6	20	1	27	538.89	365.85	18	9	640.93	16
				9 to 10	6	29	0	35	501.77	349.34	23	12	590.43	25
				10 to 11	4	20	0	24	501.67	351.00	16	8	587.50	35
				11 to 12	2	5	0	7	504.29	309.57	5	2	660.71	28
				12 to 1	3	10	0	13	503.08	328.69	9	4	626.92	13
				1 to 2	3	10	0	13	503.08	328.69	9	4	626.92	28
				2 to 3	3	20	0	23	500.87	363.61	15	8	565.22	28
				3 to 4	5	20	0	25	502.40	339.40	17	8	608.00	36
				4 to 5	7	34	1	42	524.81	372.98	28	14	599.88	21
				5 to 6	4	10	0	14	504.29	309.57	9	5	660.71	3
				6 to 7	2	0	0	2	520.00	61.00	1	1	1100.00	2
				7 to 8	2	0	0	2	520.00	61.00	1	1	1100.00	2
				8 to 9	2	0	0	2	520.00	61.00	1	1	1100.00	2
				9 to 10					0	0	0	0	0	0
				10 to 11					0	0	0	0	0	0
				11 to 12					0	0	0	0	0	0

Post-SEIS Site 1: West Entrance & Site 2: West Entrance to Madison

PM Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	Current BAT	0.065	0.031	0.490
Snowcoach	Current	0.033	0.012	0.048
Snowcoach	Admin	0.030	0.010	0.040

OSV trips Revised Jul 10 2013, Emissions Revised Oct 2012

CURRENT FLEET SNOWCOACHES

Alternative 2A

Visitor Snowmobiles	Visitor Snowcoaches	Administrative Travel Snowmobiles	Administrative Travel Snowcoaches	Hour	# vehs / pk hr Snowmobiles	# vehs / pk hr Snowcoaches	Admin Snowcoaches	Tot Veh.	Alternative 2 Site 1 E- Factor (g/mi) Low Speed	E- Factor (g/hr) Idle	West Entrance Traffic South Lane	West Entrance Traffic North Lane	Site 2 E- Factor (g/mi) Cruise Speed	West to Madison
				12 to 1					0.000	0	0	0	0.000	0
				1 to 2					0.000	0	0	0	0.000	0
				2 to 3					0.000	0	0	0	0.000	0
				3 to 4					0.000	0	0	0	0.000	0
				4 to 5					0.000	0	0	0	0.000	0
				5 to 6					0.000	0	0	0	0.000	0
				6 to 7					0.000	0	0	0	0.000	0
160	**34**	**20**	**2**	7 to 8	34	7	0	41	0.060	0.41	27	14	0.028	22
				8 to 9	37	7	1	45	0.059	0.41	30	15	0.028	25
				9 to 10	52	10	0	62	0.060	0.42	41	21	0.028	43
				10 to 11	35	7	0	42	0.060	0.42	28	14	0.028	62
				11 to 12	10	2	0	12	0.060	0.42	8	4	0.028	51
				12 to 1	18	3	0	21	0.060	0.43	14	7	0.028	22
				1 to 2	18	3	0	21	0.060	0.43	14	7	0.028	51
				2 to 3	34	7	0	41	0.060	0.41	27	14	0.028	51
				3 to 4	36	7	0	43	0.060	0.42	29	14	0.028	63
				4 to 5	61	12	1	74	0.059	0.41	49	25	0.028	35
				5 to 6	19	3	0	22	0.061	0.43	15	7	0.028	3
				6 to 7	2	0	0	2	0.065	0.49	1	1	0.031	2
				7 to 8	2	0	0	2	0.065	0.49	1	1	0.031	2
				8 to 9	2	0	0	2	0.065	0.49	1	1	0.031	2
				9 to 10					0.000	0	0	0	0.000	0
				10 to 11					0.000	0	0	0	0.000	0
				11 to 12					0.000	0	0	0	0.000	0

BAT SNOWCOACHES

Alternative 2B

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	Current BAT	0.065	0.031	0.490
Snowcoach	BAT	0.032	0.003	0.058
Snowcoach	Admin	0.030	0.010	0.040

Visitor Snowmobiles	Visitor Snowcoaches	Administrative Travel Snowmobiles	Administrative Travel Snowcoaches	Hour	# vehs / pk hr Snowmobiles	# vehs / pk hr Snowcoaches	Admin Snowcoaches	Tot Veh.	Alternative 2B Site 1 E- Factor (g/mi) Low Speed	E- Factor (g/hr) Idle	West Entrance Traffic South Lane	West Entrance Traffic North Lane	Site 2 E- Factor (g/mi) Cruise Speed	West to Madison
				12 to 1					0.000	0	0	0	0.000	0
				1 to 2					0.000	0	0	0	0.000	0
				2 to 3					0.000	0	0	0	0.000	0
				3 to 4					0.000	0	0	0	0.000	0
				4 to 5					0.000	0	0	0	0.000	0
				5 to 6					0.000	0	0	0	0.000	0
				6 to 7					0.000	0	0	0	0.000	0
160	**34**	**20**	**2**	7 to 8	34	7	0	41	0.059	0.42	27	14	0.026	22
				8 to 9	37	7	1	45	0.059	0.41	30	15	0.026	25
				9 to 10	52	10	0	62	0.060	0.42	41	21	0.026	43
				10 to 11	35	7	0	42	0.060	0.42	28	14	0.026	62
				11 to 12	10	2	0	12	0.060	0.42	8	4	0.026	51
				12 to 1	18	3	0	21	0.060	0.43	14	7	0.027	22
				1 to 2	18	3	0	21	0.060	0.43	14	7	0.027	51
				2 to 3	34	7	0	41	0.059	0.42	27	14	0.026	51
				3 to 4	36	7	0	43	0.060	0.42	29	14	0.026	63
				4 to 5	61	12	1	74	0.059	0.41	49	25	0.026	35
				5 to 6	19	3	0	22	0.061	0.43	15	7	0.027	3
				6 to 7	2	0	0	2	0.065	0.49	1	1	0.031	2
				7 to 8	2	0	0	2	0.065	0.49	1	1	0.031	2
				8 to 9	2	0	0	2	0.065	0.49	1	1	0.031	2
				9 to 10					0.000	0	0	0	0.000	0
				10 to 11					0.000	0	0	0	0.000	0
				11 to 12					0.000	0	0	0	0.000	0

SEIS Site 1: West Entrance & Site 2: West Entrance to Madison

PM Emissions

Revised Oct 24 2012

BAT SNOWCOACHES

Alternative 3B

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	Current BAT	0.065	0.031	0.490
Snowcoach	BAT	0.033	0.003	0.059
Snowcoach	Admin	0.030	0.010	0.040

Visitor		Administrative Travel			# vehs / pk hr		Admin		Alternative 3B Site 1 E- Factor (g/mi)	E- Factor (g/hr)	West Entrance Traffic		Site 2 E- Factor (g/mi)	
Snowmobiles	**Snowcoaches**	**Snowmobiles**	**Snowcoaches**	**Hour**	**Snowmobiles**	**Snowcoaches**	**Snowcoaches**	**Tot Veh.**	**Low Speed**	**Idle**	**South Lane**	**North Lane**	**Cruise Speed**	**West to Madison**
				12 to 1					0.000	0	0	0	0.000	0
				1 to 2					0.000	0	0	0	0.000	0
				2 to 3					0.000	0	0	0	0.000	0
				3 to 4					0.000	0	0	0	0.000	0
				4 to 5					0.000	0	0	0	0.000	0
				5 to 6					0.000	0	0	0	0.000	0
				6 to 7					0.000	0	0	0	0.000	0
0	**62**	**20**	**2**	7 to 8	2	12	0	14	0.038	0.12	9	5	0.007	8
				8 to 9	5	12	1	18	0.042	0.18	12	6	0.011	12
				9 to 10	4	19	0	23	0.039	0.13	15	8	0.008	17
				10 to 11	3	12	0	15	0.039	0.15	10	5	0.009	22
				11 to 12	2	3	0	5	0.046	0.23	3	2	0.014	18
				12 to 1	2	6	0	8	0.041	0.17	5	3	0.010	8
				1 to 2	2	6	0	8	0.041	0.17	5	3	0.010	18
				2 to 3	2	12	0	14	0.038	0.12	9	5	0.007	18
				3 to 4	4	12	0	16	0.041	0.17	11	5	0.010	23
				4 to 5	5	22	1	28	0.039	0.14	19	9	0.008	15
				5 to 6	3	6	0	9	0.044	0.20	6	3	0.012	3
				6 to 7	2	0	0	2	0.065	0.49	1	1	0.031	2
				7 to 8	2	0	0	2	0.065	0.49	1	1	0.031	2
				8 to 9	2	0	0	2	0.065	0.49	1	1	0.031	2
				9 to 10					0.000	0	0	0	0.000	0
				10 to 11					0.000	0	0	0	0.000	0
				11 to 12					0.000	0	0	0	0.000	0

Alternative 4a

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	0.065	0.031	0.490
Snowcoach	BAT	0.033	0.003	0.059
Snowcoach	Admin	0.030	0.010	0.040

Visitor		Administrative Travel			# vehs / pk hr		Admin		Alternative 4a E- Factor (g/mi)	Alternative 4a E- Factor (g/hr)	Site 1 West Entrance Traffic		Site 2 E- Factor (g/mi)	
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Snowcoaches	Tot Veh.	Low Speed	Idle	South Lane	North Lane	Cruise Speed	West to Madison
				12 to 1					0.000	0	0	0	0.000	0
				1 to 2					0.000	0	0	0	0.000	0
				2 to 3					0.000	0	0	0	0.000	0
				3 to 4					0.000	0	0	0	0.000	0
				4 to 5					0.000	0	0	0	0.000	0
				5 to 6					0.000	0	0	0	0.000	0
				6 to 7					0.000	0	0	0	0.000	0
235	26	20	2	7 to 8	49	5	0	54	0.062	0.45	36	18	0.028	29
				8 to 9	52	5	1	58	0.062	0.45	39	19	0.028	32
				9 to 10	75	8	0	83	0.062	0.45	55	28	0.028	57
				10 to 11	50	5	0	55	0.062	0.45	37	18	0.028	82
				11 to 12	14	1	0	15	0.063	0.46	10	5	0.029	68
				12 to 1	26	3	0	29	0.062	0.45	19	10	0.028	29
				1 to 2	26	3	0	29	0.062	0.45	19	10	0.028	68
				2 to 3	49	5	0	54	0.062	0.45	36	18	0.028	68
				3 to 4	51	5	0	56	0.062	0.45	37	19	0.029	83
				4 to 5	87	9	1	97	0.062	0.45	65	32	0.028	44
				5 to 6	27	3	0	30	0.062	0.45	20	10	0.028	3
				6 to 7	2	0	0	2	0.065	0.49	1	1	0.031	2
				7 to 8	2	0	0	2	0.065	0.49	1	1	0.031	2
				8 to 9	2	0	0	2	0.065	0.49	1	1	0.031	2
				9 to 10					0.000	0	0	0	0.000	0
				10 to 11					0.000	0	0	0	0.000	0
				11 to 12					0.000	0	0	0	0.000	0

Alternative 4b

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	0.065	0.031	0.490
Snowcoach	BAT	0.033	0.003	0.060
Snowcoach	Admin	0.030	0.010	0.040

Visitor		Administrative Travel			# vehs / pk hr		Admin		Alternative 4b E- Factor (g/mi)	Alternative 4b E- Factor (g/hr)	Site 1 West Entrance Traffic		Site 2 E- Factor (g/mi)	
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Snowcoaches	Tot Veh.	Low Speed	Idle	South Lane	North Lane	Cruise Speed	West to Madison
				12 to 1					0.000	0	0	0	0.000	0
				1 to 2					0.000	0	0	0	0.000	0
				2 to 3					0.000	0	0	0	0.000	0
				3 to 4					0.000	0	0	0	0.000	0
				4 to 5					0.000	0	0	0	0.000	0
				5 to 6					0.000	0	0	0	0.000	0
				6 to 7					0.000	0	0	0	0.000	0
5	49	20	2	7 to 8	3	10	0	13	0.040	0.16	9	4	0.009	8
				8 to 9	6	10	1	17	0.044	0.21	11	6	0.013	11
				9 to 10	6	15	0	21	0.042	0.18	14	7	0.011	15
				10 to 11	4	10	0	14	0.042	0.18	9	5	0.011	20
				11 to 12	2	2	0	4	0.049	0.28	3	1	0.017	15
				12 to 1	3	5	0	8	0.045	0.22	5	3	0.014	8
				1 to 2	3	5	0	8	0.045	0.22	5	3	0.014	15
				2 to 3	3	10	0	13	0.040	0.16	9	4	0.009	15
				3 to 4	5	10	0	15	0.044	0.20	10	5	0.012	21
				4 to 5	7	17	1	25	0.042	0.18	17	8	0.011	14
				5 to 6	4	5	0	9	0.047	0.25	6	3	0.015	3
				6 to 7	2	0	0	2	0.065	0.49	1	1	0.031	2
				7 to 8	2	0	0	2	0.065	0.49	1	1	0.031	2
				8 to 9	2	0	0	2	0.065	0.49	1	1	0.031	2
				9 to 10					0.000	0	0	0	0.000	0
				10 to 11					0.000	0	0	0	0.000	0
				11 to 12					0.000	0	0	0	0.000	0

Alternative 4c

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	E-BAT	0.065	0.031	0.490
Snowcoach	BAT	0.033	0.003	0.059
Snowcoach	Admin	0.030	0.010	0.040

Visitor		Administrative Travel							Alternative 4c		Site 1		Site 2	
					# vehs / pk hr		Admin		E- Factor (g/mi)	E- Factor (g/hr)	West Entrance Traffic		E- Factor (g/mi)	
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Snowcoaches	Tot Veh.	Low Speed	Idle	South Lane	North Lane	Cruise Speed	West to Madison
				12 to 1					0.000	0	0	0	0.000	0
				1 to 2					0.000	0	0	0	0.000	0
				2 to 3					0.000	0	0	0	0.000	0
				3 to 4					0.000	0	0	0	0.000	0
				4 to 5					0.000	0	0	0	0.000	0
				5 to 6					0.000	0	0	0	0.000	0
				6 to 7					0.000	0	0	0	0.000	0
235	**52**	**20**	**2**	7 to 8	49	10	0	59	0.060	0.42	39	20	0.026	31
				8 to 9	52	10	1	63	0.059	0.41	42	21	0.026	35
				9 to 10	75	16	0	91	0.059	0.41	61	30	0.026	62
				10 to 11	50	10	0	60	0.060	0.42	40	20	0.026	90
				11 to 12	14	3	0	17	0.059	0.41	11	6	0.026	74
				12 to 1	26	5	0	31	0.060	0.42	21	10	0.026	31
				1 to 2	26	5	0	31	0.060	0.42	21	10	0.026	74
				2 to 3	49	10	0	59	0.060	0.42	39	20	0.026	74
				3 to 4	51	10	0	61	0.060	0.42	41	20	0.026	91
				4 to 5	87	18	1	106	0.059	0.41	71	35	0.026	48
				5 to 6	27	5	0	32	0.060	0.42	21	11	0.027	3
				6 to 7	2	0	0	2	0.065	0.49	1	1	0.031	2
				7 to 8	2	0	0	2	0.065	0.49	1	1	0.031	2
				8 to 9	2	0	0	2	0.065	0.49	1	1	0.031	2
				9 to 10					0.000	0	0	0	0.000	0
				10 to 11					0.000	0	0	0	0.000	0
				11 to 12					0.000	0	0	0	0.000	0

Alternative 4d

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	0.065	0.031	0.490
Snowcoach	BAT	0.033	0.003	0.060
Snowcoach	Admin	0.030	0.010	0.040

Visitor		Administrative Travel							Alternative 4d		Site 1		Site 2	
					# vehs / pk hr		Admin		E- Factor (g/mi)	E- Factor (g/hr)	West Entrance Traffic		E- Factor (g/mi)	
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Snowcoaches	Tot Veh.	Low Speed	Idle	South Lane	North Lane	Cruise Speed	West to Madison
				12 to 1					0.000	0	0	0	0.000	0
				1 to 2					0.000	0	0	0	0.000	0
				2 to 3					0.000	0	0	0	0.000	0
				3 to 4					0.000	0	0	0	0.000	0
				4 to 5					0.000	0	0	0	0.000	0
				5 to 6					0.000	0	0	0	0.000	0
				6 to 7					0.000	0	0	0	0.000	0
5	**98**	**20**	**2**	7 to 8	3	20	0	23	0.037	0.12	15	8	0.007	13
				8 to 9	6	20	1	27	0.040	0.15	18	9	0.009	16
				9 to 10	6	29	0	35	0.038	0.13	23	12	0.008	25
				10 to 11	4	20	0	24	0.038	0.13	16	8	0.008	35
				11 to 12	2	5	0	7	0.042	0.18	5	2	0.011	28
				12 to 1	3	10	0	13	0.040	0.16	9	4	0.009	13
				1 to 2	3	10	0	13	0.040	0.16	9	4	0.009	28
				2 to 3	3	20	0	23	0.037	0.12	15	8	0.007	28
				3 to 4	5	20	0	25	0.039	0.15	17	8	0.009	36
				4 to 5	7	34	1	42	0.038	0.13	28	14	0.008	21
				5 to 6	4	10	0	14	0.042	0.18	9	5	0.011	3
				6 to 7	2	0	0	2	0.065	0.49	1	1	0.031	2
				7 to 8	2	0	0	2	0.065	0.49	1	1	0.031	2
				8 to 9	2	0	0	2	0.065	0.49	1	1	0.031	2
				9 to 10					0.000	0	0	0	0.000	0
				10 to 11					0.000	0	0	0	0.000	0
				11 to 12					0.000	0	0	0	0.000	0

EMISSIONS INPUT FOR AERMOD REFINED MODELING
Post-SEIS Site 4: Old Faithful Staging Area
Old Faithful - CO

Revised Jul 16 2013

Link	Distance (mi)	Snowmobile Unit Emissions (g/veh-link)	Snowcoach Unit Emissions (g/veh-link)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile	Administrative	Snowcoach	Administrativ	**Total Emissions (lb/day)**
Alternative 2A-M	NA	20.49	10.10	0.33	11.69	2.44	1.42	0.12	15.66
Alternative 2B-M	NA	20.49	0.54	0.33	11.69	2.44	0.08	0.12	14.32
Alternative 4A-M	NA	10.80	0.53	0.33	9.36	1.28	0.06	0.12	10.82
Alternative 4B-M	NA	10.80	0.54	0.33	0.30	1.28	0.10	0.12	1.80
Alternative 4C-M	NA	7.20	0.54	0.33	6.24	0.86	0.11	0.12	7.33
Alternative 4D-M	NA	10.80	0.54	0.33	0.30	1.28	0.21	0.12	1.91
Alternative 4A-AVG	NA	10.80	0.53	0.33	6.64	1.28	0.06	0.12	8.10
Alternative 4C-AVG	NA	7.20	0.54	0.33	5.03	0.86	0.09	0.12	6.09
Alternative 4D-AVG	NA	10.80	0.54	0.33	0.30	1.28	0.15	0.12	1.85

	CO Emissions (lb/day) Visitor (All)	Administrative
Alternative 2A-M	**13.11**	**2.55**
Alternative 2B-M	**11.77**	**2.55**
Alternative 4A-M	**9.41**	**1.40**
Alternative 4B-M	**0.40**	**1.40**
Alternative 4C-M	**6.35**	**0.97**
Alternative 4D-M	**0.50**	**1.40**
Alternative 4A-AVG	**6.70**	**1.40**
Alternative 4C-AVG	**5.12**	**0.97**
Alternative 4D-AVG	**0.45**	**1.40**

	CO Emissions (lb/hr)								
Hour	**Alt.2A-M**	**Alt.2B-M**	**Alt.4A-M**	**Alt.4B-M**	**Alt.4C-M**	**Alt.4D-M**	**Alt.4A-AVG**	**Alt.4C-AVG**	**Alt.4D-AVG**
7 to 8	1.57	1.43	1.08	0.18	0.73	0.19	0.81	0.61	0.19
8 to 9	0.51	0.51	0.28	0.28	0.19	0.28	0.28	0.19	0.28
9 to 10	1.95	1.82	1.29	0.39	0.88	0.40	1.02	0.76	0.40
10 to 11	4.70	4.30	3.25	0.54	2.20	0.57	2.43	1.83	0.56
11 to 12	6.15	5.55	4.38	0.32	2.96	0.37	3.15	2.40	0.34
12 to 1	1.57	1.43	1.08	0.18	0.73	0.19	0.81	0.61	0.19
1 to 2	3.53	3.20	2.49	0.24	1.69	0.27	1.81	1.38	0.25
2 to 3	7.47	6.73	5.32	0.36	3.59	0.42	3.82	2.91	0.39
3 to 4	1.82	1.69	1.22	0.32	0.83	0.33	0.95	0.71	0.33
4 to 5	0.38	0.38	0.21	0.21	0.15	0.21	0.21	0.15	0.21
5 to 6	0.91	0.84	0.61	0.16	0.42	0.17	0.48	0.35	0.16
6 to 7	0.26	0.26	0.14	0.14	0.10	0.14	0.14	0.10	0.14
7 to 8	0.26	0.26	0.14	0.14	0.10	0.14	0.14	0.10	0.14
8 to 9	0.26	0.26	0.14	0.14	0.10	0.14	0.14	0.10	0.14

Post-SEIS Site 4: Old Faithful Staging Area
Old Faithful - NOx

Link	Distance (mi)	Snowmobile Unit Emissions (g/veh-link)	Snowcoach Unit Emissions (g/veh-link)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile	Administrative	Snowcoach	Administrativ	**Total Emissions (lb/day)**
Alternative 2A-M	NA	0.07	0.33	0.67	0.0402	0.0084	0.0458	0.0096	0.1040
Alternative 2B-M	NA	0.07	0.20	0.67	0.0402	0.0084	0.0284	0.0096	0.0866
Alternative 4A-M	NA	0.03	0.21	0.67	0.0264	0.0036	0.0221	0.0096	0.0618
Alternative 4B-M	NA	0.03	0.21	0.67	0.0008	0.0036	0.0393	0.0096	0.0534
Alternative 4C-M	NA	0.02	0.20	0.67	0.0178	0.0024	0.0437	0.0096	0.0735
Alternative 4D-M	NA	0.03	0.20	0.67	0.0008	0.0036	0.0781	0.0096	0.0921
Alternative 4A-AVG	NA	0.03	0.21	0.67	0.0188	0.0036	0.0221	0.0096	0.0541
Alternative 4C-AVG	NA	0.02	0.20	0.67	0.0143	0.0024	0.0327	0.0096	0.0591
Alternative 4D-AVG	NA	0.03	0.21	0.67	0.0008	0.0036	0.0586	0.0096	0.0726

	NOx Emissions (lb/day) Visitor (All)	Administrative
Alternative 2A-M	**0.0860**	**0.0180**
Alternative 2B-M	**0.0686**	**0.0180**
Alternative 4A-M	**0.0485**	**0.0132**
Alternative 4B-M	**0.0402**	**0.0132**
Alternative 4C-M	**0.0614**	**0.0120**
Alternative 4D-M	**0.0789**	**0.0132**
Alternative 4A-AVG	**0.0409**	**0.0132**
Alternative 4C-AVG	**0.0471**	**0.0120**
Alternative 4D-AVG	**0.0594**	**0.0132**

	NOx Emissions (lb/hr)								
Hour	**Alt.2A-M**	**Alt.2B-M**	**Alt.4A-M**	**Alt.4B-M**	**Alt.4C-M**	**Alt.4D-M**	**Alt.4A-AVG**	**Alt.4C-AVG**	**Alt.4D-AVG**
7 to 8	0.0104	0.0087	0.0062	0.0053	0.0073	0.0092	0.0054	0.0059	0.0073
8 to 9	0.0036	0.0036	0.0026	0.0026	0.0024	0.0026	0.0026	0.0024	0.0026
9 to 10	0.0131	0.0114	0.0082	0.0073	0.0092	0.0112	0.0074	0.0077	0.0092
10 to 11	0.0312	0.0260	0.0185	0.0160	0.0220	0.0276	0.0162	0.0177	0.0218
11 to 12	0.0405	0.0327	0.0232	0.0194	0.0288	0.0368	0.0197	0.0224	0.0281
12 to 1	0.0104	0.0087	0.0062	0.0053	0.0073	0.0092	0.0054	0.0059	0.0073
1 to 2	0.0233	0.0190	0.0135	0.0114	0.0166	0.0211	0.0115	0.0130	0.0162
2 to 3	0.0491	0.0396	0.0280	0.0234	0.0350	0.0447	0.0238	0.0271	0.0340
3 to 4	0.0122	0.0105	0.0075	0.0067	0.0086	0.0105	0.0067	0.0071	0.0086
4 to 5	0.0027	0.0027	0.0020	0.0020	0.0018	0.0020	0.0020	0.0018	0.0020
5 to 6	0.0061	0.0052	0.0038	0.0033	0.0043	0.0053	0.0034	0.0036	0.0043
6 to 7	0.0018	0.0018	0.0013	0.0013	0.0012	0.0013	0.0013	0.0012	0.0013
7 to 8	0.0018	0.0018	0.0013	0.0013	0.0012	0.0013	0.0013	0.0012	0.0013
8 to 9	0.0018	0.0018	0.0013	0.0013	0.0012	0.0013	0.0013	0.0012	0.0013

Post-SEIS Site 4: Old Faithful Staging Area
Old Faithful - PM

Link	Distance (mi)	Snowmobile Unit Emissions (g/veh-link)	Snowcoach Unit Emissions (g/veh-link)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile	Administrative	Snowcoach	Administrativ	**Total Emissions (lb/day)**
Alternative 2A-M	NA	0.0245	0.0024	0.0020	0.0140	0.0029	0.0003	0.0000	0.0173
Alternative 2B-M	NA	0.0245	0.0029	0.0020	0.0140	0.0029	0.0004	0.0000	0.0173
Alternative 4A-M	NA	0.0245	0.0030	0.0020	0.0212	0.0029	0.0003	0.0000	0.0245
Alternative 4B-M	NA	0.0245	0.0030	0.0020	0.0007	0.0029	0.0006	0.0000	0.0042
Alternative 4C-M	NA	0.0245	0.0030	0.0020	0.0212	0.0029	0.0006	0.0000	0.0248
Alternative 4D-M	NA	0.0245	0.0030	0.0020	0.0007	0.0029	0.0011	0.0000	0.0048
Alternative 4A-AVG	NA	0.0245	0.0030	0.0020	0.0151	0.0029	0.0003	0.0000	0.0183
Alternative 4C-AVG	NA	0.0245	0.0030	0.0020	0.0171	0.0029	0.0005	0.0000	0.0205
Alternative 4D-AVG	NA	0.0245	0.0030	0.0020	0.0007	0.0029	0.0009	0.0000	0.0045

	PM Emissions (lb/day) Visitor (All)	Administrative
Alternative 2A-M	**0.0143**	**0.0029**
Alternative 2B-M	**0.0144**	**0.0029**
Alternative 4A-M	**0.0215**	**0.0029**
Alternative 4B-M	**0.0012**	**0.0029**
Alternative 4C-M	**0.0219**	**0.0029**
Alternative 4D-M	**0.0018**	**0.0029**
Alternative 4A-AVG	**0.0154**	**0.0029**
Alternative 4C-AVG	**0.0176**	**0.0029**
Alternative 4D-AVG	**0.0015**	**0.0029**

	PM Emissions (lb/hr)								
Hour	**Alt.2A-M**	**Alt.2B-M**	**Alt.4A-M**	**Alt.4B-M**	**Alt.4C-M**	**Alt.4D-M**	**Alt.4A-AVG**	**Alt.4C-AVG**	**Alt.4D-AVG**
7 to 8	0.0017	0.0017	0.0024	0.0004	0.0025	0.0005	0.0018	0.0021	0.0004
8 to 9	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006
9 to 10	0.0022	0.0022	0.0029	0.0009	0.0029	0.0009	0.0023	0.0025	0.0009
10 to 11	0.0052	0.0052	0.0073	0.0013	0.0074	0.0014	0.0055	0.0062	0.0013
11 to 12	0.0067	0.0068	0.0100	0.0009	0.0101	0.0011	0.0072	0.0082	0.0010
12 to 1	0.0017	0.0017	0.0024	0.0004	0.0025	0.0005	0.0018	0.0021	0.0004
1 to 2	0.0039	0.0039	0.0057	0.0006	0.0058	0.0007	0.0041	0.0047	0.0007
2 to 3	0.0082	0.0082	0.0121	0.0010	0.0123	0.0013	0.0088	0.0100	0.0011
3 to 4	0.0020	0.0020	0.0027	0.0007	0.0028	0.0008	0.0021	0.0023	0.0007
4 to 5	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004
5 to 6	0.0010	0.0010	0.0014	0.0004	0.0014	0.0004	0.0011	0.0012	0.0004
6 to 7	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
7 to 8	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003
8 to 9	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003

EMISSIONS INPUT FOR AERMOD REFINED MODELING
FSEIS Site 4: Old Faithful Staging Area
Old Faithful - CO

Link	Distance (mi)	Snowmobile Unit Emissions (g/veh-link)	Snowcoach Unit Emissions (g/veh-link)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile	Administrative	Snowcoach	Administrativ	**Total Emissions (lb/day)**
Alternative 3B	NA	20.49	0.54	0.33	0.00	2.44	0.12	0.12	2.67

	CO Emissions (lb/day)	
	Visitor (All)	**Administrative**
Alternative 3B	**0.12**	**2.55**

CO Emissions (lb/hr)	
Hour	**Alt.3B**
7 to 8	0.27
8 to 9	0.51
9 to 10	0.65
10 to 11	0.80
11 to 12	0.31
12 to 1	0.27
1 to 2	0.28
2 to 3	0.32
3 to 4	0.52
4 to 5	0.38
5 to 6	0.26
6 to 7	0.26
7 to 8	0.26
8 to 9	0.26

Old Faithful - NOx

Link	Distance (mi)	Snowmobile Unit Emissions (g/veh-link)	Snowcoach Unit Emissions (g/veh-link)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile	Administrative	Snowcoach	Administrativ	**Total Emissions (lb/day)**
Alternative 3B	NA	0.07	0.20	0.67	0.0000	0.0084	0.0451	0.0096	0.0631

	NOx Emissions (lb/day)	
	Visitor (All)	**Administrative**
Alternative 3B	**0.0451**	**0.0180**

NOx Emissions (lb/hr)	
Hour	**Alt.3B**
7 to 8	0.0063
8 to 9	0.0036
9 to 10	0.0090
10 to 11	0.0189
11 to 12	0.0221
12 to 1	0.0063
1 to 2	0.0131
2 to 3	0.0266
3 to 4	0.0081
4 to 5	0.0027
5 to 6	0.0041
6 to 7	0.0018
7 to 8	0.0018
8 to 9	0.0018

Old Faithful - PM

Link	Distance (mi)	Snowmobile Unit Emissions (g/veh-link)	Snowcoach Unit Emissions (g/veh-link)	Admin Snowcoach Unit Emissions (g/veh-link)	Snowmobile	Administrative	Snowcoach	Administrativ	**Total Emissions (lb/day)**
Alternative 3B	NA	0.0245	0.0030	0.0020	0.0000	0.0029	0.0007	0.0000	0.0036

	PM Emissions (lb/day)	
	Visitor (All)	**Administrative**
Alternative 3B	**0.0007**	**0.0029**

	PM Emissions (lb/hr)
Hour	**Alt.3B**
7 to 8	0.0004
8 to 9	0.0006
9 to 10	0.0008
10 to 11	0.0011
11 to 12	0.0006
12 to 1	0.0004
1 to 2	0.0005
2 to 3	0.0007
3 to 4	0.0007
4 to 5	0.0004
5 to 6	0.0003
6 to 7	0.0003
7 to 8	0.0003
8 to 9	0.0003

Summary of Daily Snowmobile and Snowcoach Use Numbers from Yellowstone Post-SEIS 2013 Travel Factors Spreadsheet

TravelFactorsV7_DJ (wv).xlsx Travel Factors dated 6/25/2013

Snowmobiles

Link	Alt 2A Max Current	Alt 2B Max BAT SC	Alt 4a Max New BAT SM	Alt 4b Max New BAT NC SM	Alt 4c Max E-BAT SM	Alt 4d Max New BAT NC SM	Administrative Travel
West Entrance	160	160	235	5	235	5	20
Mammoth to Norris	38.62	38.62	70.5	9.9	70.5	9.9	52
West Entrance to Madison	299.3	299.3	441	10.5	441	10.5	51
Madison to Norris	131.92	131.92	205.15	9.85	205.15	9.85	42
Norris to Canyon Village	95.22	95.22	145.15	6.25	145.15	6.25	23
Canyon Village to Fishing Bridge	146.42	146.42	216.65	12.75	216.65	12.75	39
Fishing Bridge to East Entrance	41.38	41.38	54.35	8.45	54.35	8.45	15
Fishing Bridge to West Thumb	79.88	79.88	121.3	4.3	121.3	4.3	49
Madison to Old Faithful	307.58	307.58	465.85	15.65	465.85	15.65	60
Old Faithful to West Thumb	210.7	210.7	320.95	9.35	320.95	9.35	48
West Thumb to Flagg Ranch	210.7	210.7	322.75	9.75	322.75	9.75	29
Old Faithful	259.14	259.14	393.4	12.5	393.4	12.5	54

Snowcoaches

Link	Alt 2A Max Current	Alt 2B Max BAT SC	Alt 4a Max New BAT SM	Alt 4b Max New BAT NC SM	Alt 4c Max E-BAT SM	Alt 4d Max New BAT NC SM	Administrative Travel
West Entrance	34	34	26	49	52	98	2
Mammoth to Norris	25.69	25.69	25.04	30.5	50.08	61	5.5
West Entrance to Madison	71.68	71.68	55.01	98.72	110.02	197.44	5.5
Madison to Norris	37.86	37.86	32.4	50.05	64.8	100.1	4.5
Norris to Canyon Village	24.25	24.25	20.04	32.65	40.08	65.3	2.6
Canyon Village to Fishing Bridge	25.85	25.85	19.24	38.35	38.48	76.7	5.4
Fishing Bridge to East Entrance	4.79	4.79	2.78	7.33	5.56	14.66	1.9
Fishing Bridge to West Thumb	10.52	10.52	7.04	17.46	14.08	34.92	6.6
Madison to Old Faithful	78.8	78.8	62.67	106.79	125.34	213.58	7.1
Old Faithful to West Thumb	48.58	48.58	34.27	66.53	68.54	133.06	6
West Thumb to Flagg Ranch	44.18	44.18	30.21	63.77	60.42	127.54	3.1
Old Faithful	63.69	63.69	48.47	86.66	96.94	173.32	6.55

Note: West Entrance numbers are based on total daily admission--no factors applied.

Hourly distributions of Visitor OSVs for AQ Modeling

	West Entrance		West to Madison		Canyon to Fishing Bridge		Old Faithful	
Hour	Entries %	Exits %	East Bound %	West Bound %	South Bound %	North Bound %	Arrive %	Depart %
7 to 8	10%	10%	0%	10%	0%	0%	0%	10%
8 to 9	20%	0%	10%	0%	0%	0%	0%	0%
9 to 10	30%	0%	20%	0%	10%	10%	10%	0%
10 to 11	20%	0%	30%	0%	20%	20%	30%	0%
11 to 12	5%	0%	20%	5%	20%	20%	40%	5%
12 to 1	5%	5%	5%	5%	20%	20%	5%	5%
1 to 2	5%	5%	5%	20%	10%	10%	5%	20%
2 to 3	0%	20%	5%	20%	10%	10%	5%	50%
3 to 4	0%	20%	0%	30%	10%	10%	0%	10%
4 to 5	5%	30%	5%	10%	0%	0%	0%	0%
5 to 6	0%	10%	0%	0%	0%	0%	5%	0%
6 to 7	0%	0%	0%	0%	0%	0%	0%	0%
7 to 8	0%	0%	0%	0%	0%	0%	0%	0%
8 to 9	0%	0%	0%	0%	0%	0%	0%	0%
Totals	100%	100%	100%	100%	100%	100%	100%	100%

Hourly distributions of Administrative Travel OSVs for AQ Modeling

	West Entrance		West to Madison		Canyon to Fishing Bridge		Old Faithful	
Hour	Entries %	Exits %	East Bound %	West Bound %	South Bound %	North Bound %	Arrive %	Depart %
7 to 8	5%	5%	5%	5%	5%	5%	5%	5%
8 to 9	20%	5%	20%	5%	5%	5%	10%	10%
9 to 10	15%	5%	15%	5%	10%	10%	10%	15%
10 to 11	10%	5%	10%	5%	10%	10%	20%	10%
11 to 12	5%	5%	5%	5%	10%	10%	5%	5%
12 to 1	5%	5%	5%	5%	10%	10%	5%	5%
1 to 2	5%	5%	5%	5%	10%	10%	5%	5%
2 to 3	5%	5%	5%	5%	10%	10%	5%	5%
3 to 4	5%	15%	5%	15%	5%	5%	10%	10%
4 to 5	5%	20%	5%	20%	5%	5%	5%	10%
5 to 6	5%	10%	5%	10%	5%	5%	5%	5%
6 to 7	5%	5%	5%	5%	5%	5%	5%	5%
7 to 8	5%	5%	5%	5%	5%	5%	5%	5%
8 to 9	5%	5%	5%	5%	5%	5%	5%	5%
Totals	100%	100%	100%	100%	100%	100%	100%	100%

Post-SEIS Site 1: West Entrance & Site 2: West Entrance to Madison

CO Emissions

Alternative 4a-AVG

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	25.0	4.0	216.0
Snowcoach	BAT	10.9	84.0	10.6
Snowcoach	Admin	1.0	0.7	6.7

OSV trips Revised Jul 10 2013, Emissions Revised Oct 2012

Visitor		Administrative Travel			# vehs / pk hr		Admin		AVG Alternative 4a E- Factor (g/mi)	AVG Alternative 4a E- Factor (g/hr)	Site 1 West Entrance Traffic		Site 2 E- Factor (g/mi)	
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Snowcoaches	Tot Veh.	Low Speed	Idle	South Lane	North Lane	Cruise Speed	West to Madison
				12 to 1					0	0	0	0	0	0
				1 to 2					0	0	0	0	0	0
				2 to 3					0	0	0	0	0	0
				3 to 4					0	0	0	0	0	0
				4 to 5					0	0	0	0	0	0
				5 to 6					0	0	0	0	0	0
				6 to 7					0	0	0	0	0	0
166	**26**	**20**	**2**	7 to 8	35	5	0	40	23.24	190.33	27	13	14.00	22
				8 to 9	38	5	1	44	22.85	187.90	29	15	13.02	25
				9 to 10	54	8	0	62	23.18	189.50	41	21	14.32	43
				10 to 11	36	5	0	41	23.28	190.95	27	14	13.76	61
				11 to 12	10	1	0	11	23.72	197.33	7	4	11.27	51
				12 to 1	19	3	0	22	23.08	187.99	15	7	14.91	22
				1 to 2	19	3	0	22	23.08	187.99	15	7	14.91	51
				2 to 3	35	5	0	40	23.24	190.33	27	13	14.00	51
				3 to 4	37	5	0	42	23.32	191.55	28	14	13.52	62
				4 to 5	63	9	1	73	22.93	187.81	49	24	13.82	34
				5 to 6	20	3	0	23	23.16	189.21	15	8	14.43	3
				6 to 7	2	0	0	2	25.00	216.00	1	1	4.00	2
				7 to 8	2	0	0	2	25.00	216.00	1	1	4.00	2
				8 to 9	2	0	0	2	25.00	216.00	1	1	4.00	2
				9 to 10					0	0	0	0	0	0
				10 to 11					0	0	0	0	0	0
				11 to 12					0	0	0	0	0	0

Alternative 4c-AVG

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	E-BAT	16.7	2.7	144.0
Snowcoach	BAT	13.3	123.9	10.7
Snowcoach	Admin	1.0	0.7	6.7

AVG Alternative 4c

Visitor Snowmobiles	Visitor Snowcoaches	Administrative Travel Snowmobiles	Administrative Travel Snowcoaches	Hour	# vehs / pk hr Snowmobiles	# vehs / pk hr Snowcoaches	Admin Snowcoaches	Tot Veh.	Site 1 E- Factor (g/mi) Low Speed	Site 1 E- Factor (g/hr) Idle	West Entrance Traffic South Lane	West Entrance Traffic North Lane	Site 2 E- Factor (g/mi) Cruise Speed	West to Madison
				12 to 1					0	0	0	0	0	0
				1 to 2					0	0	0	0	0	0
				2 to 3					0	0	0	0	0	0
				3 to 4					0	0	0	0	0	0
				4 to 5					0	0	0	0	0	0
				5 to 6					0	0	0	0	0	0
				6 to 7					0	0	0	0	0	0
189	39	20	2	7 to 8	40	8	0	48	16.11	121.78	32	16	22.88	25
				8 to 9	43	8	1	52	15.85	120.85	35	17	21.28	28
				9 to 10	61	12	0	73	16.12	122.09	49	24	22.60	50
				10 to 11	41	8	0	49	16.12	122.24	33	16	22.46	72
				11 to 12	11	2	0	13	16.15	123.49	9	4	21.32	59
				12 to 1	21	4	0	25	16.13	122.67	17	8	22.07	25
				1 to 2	21	4	0	25	16.13	122.67	17	8	22.07	59
				2 to 3	40	8	0	48	16.11	121.78	32	16	22.88	59
				3 to 4	42	8	0	50	16.13	122.67	33	17	22.07	73
				4 to 5	71	14	1	86	15.94	120.70	57	29	22.38	39
				5 to 6	22	4	0	26	16.15	123.49	17	9	21.32	3
				6 to 7	2	0	0	2	16.67	144.00	1	1	2.67	2
				7 to 8	2	0	0	2	16.67	144.00	1	1	2.67	2
				8 to 9	2	0	0	2	16.67	144.00	1	1	2.67	2
				9 to 10					0	0	0	0	0	0
				10 to 11					0	0	0	0	0	0
				11 to 12					0	0	0	0	0	0

Alternative 4d-AVG

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	25.0	4.0	216.0
Snowcoach	BAT	14.3	140.8	10.8
Snowcoach	Admin	1.0	0.7	6.7

AVG Alternative 4d

Visitor Snowmobiles	Visitor Snowcoaches	Administrative Travel Snowmobiles	Administrative Travel Snowcoaches	Hour	# vehs / pk hr Snowmobiles	# vehs / pk hr Snowcoaches	Admin Snowcoaches	Tot Veh.	Site 1 E- Factor (g/mi) Low Speed	Site 1 E- Factor (g/hr) Idle	West Entrance Traffic South Lane	West Entrance Traffic North Lane	Site 2 E- Factor (g/mi) Cruise Speed	West to Madison
				12 to 1					0	0	0	0	0	0
				1 to 2					0	0	0	0	0	0
				2 to 3					0	0	0	0	0	0
				3 to 4					0	0	0	0	0	0
				4 to 5					0	0	0	0	0	0
				5 to 6					0	0	0	0	0	0
				6 to 7					0	0	0	0	0	0
5	74	20	2	7 to 8	3	15	0	18	16.08	45.00	12	6	118.00	11
				8 to 9	6	15	1	22	16.61	66.58	15	7	97.12	14
				9 to 10	6	22	0	28	16.59	54.77	19	9	111.49	20
				10 to 11	4	15	0	19	16.55	54.00	13	6	112.00	28
				11 to 12	2	4	0	6	17.87	79.20	4	2	95.20	22
				12 to 1	3	7	0	10	17.51	72.36	7	3	99.76	11
				1 to 2	3	7	0	10	17.51	72.36	7	3	99.76	22
				2 to 3	3	15	0	18	16.08	45.00	12	6	118.00	22
				3 to 4	5	15	0	20	16.98	62.10	13	7	106.60	29
				4 to 5	7	26	1	34	16.11	52.93	23	11	108.52	18
				5 to 6	4	7	0	11	18.19	85.42	7	4	91.05	3
				6 to 7	2	0	0	2	25.00	216.00	1	1	4.00	2
				7 to 8	2	0	0	2	25.00	216.00	1	1	4.00	2
				8 to 9	2	0	0	2	25.00	216.00	1	1	4.00	2
				9 to 10					0	0	0	0	0	0
				10 to 11					0	0	0	0	0	0
				11 to 12					0	0	0	0	0	0

Post-SEIS Site 1: West Entrance & Site 2: West Entrance to Madison

NOx Emissions

Alternative 4a-AVG

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	520.0	1100.0	61.0
Snowcoach	BAT	531.0	498.0	414.0
Snowcoach	Admin	1470.0	1005.0	1332.0

OSV trips Revised Jul 10 2013, Emissions Revised Oct 2012

Visitor		Administrative Travel			# vehs / pk hr		Admin		AVG Alternative 4a E- Factor (g/mi)	AVG Alternative 4a E- Factor (g/hr)	Site 1 West Entrance Traffic		Site 2 E- Factor (g/mi)	
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Snowcoaches	Tot Veh.	Low Speed	Idle	South Lane	North Lane	Cruise Speed	West to Madison
				12 to 1					0	0	0	0	0	0
				1 to 2					0	0	0	0	0	0
				2 to 3					0	0	0	0	0	0
				3 to 4					0	0	0	0	0	0
				4 to 5					0	0	0	0	0	0
				5 to 6					0	0	0	0	0	0
				6 to 7					0	0	0	0	0	0
166	**26**	**20**	**2**	7 to 8	35	5	0	40	521.38	105.13	27	13	1024.75	22
				8 to 9	38	5	1	44	542.84	130.00	29	15	1029.43	25
				9 to 10	54	8	0	62	521.42	106.55	41	21	1022.32	43
				10 to 11	36	5	0	41	521.34	104.05	27	14	1026.59	61
				11 to 12	10	1	0	11	521.00	93.09	7	4	1045.27	51
				12 to 1	19	3	0	22	521.50	109.14	15	7	1017.91	22
				1 to 2	19	3	0	22	521.50	109.14	15	7	1017.91	51
				2 to 3	35	5	0	40	521.38	105.13	27	13	1024.75	51
				3 to 4	37	5	0	42	521.31	103.02	28	14	1028.33	62
				4 to 5	63	9	1	73	534.37	121.93	49	24	1024.48	34
				5 to 6	20	3	0	23	521.43	107.04	15	8	1021.48	3
				6 to 7	2	0	0	2	520.00	61.00	1	1	1100.00	2
				7 to 8	2	0	0	2	520.00	61.00	1	1	1100.00	2
				8 to 9	2	0	0	2	520.00	61.00	1	1	1100.00	2
				9 to 10					0	0	0	0	0	0
				10 to 11					0	0	0	0	0	0
				11 to 12					0	0	0	0	0	0

Alternative 4c-AVG

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	E-BAT	347.0	733.0	41.0
Snowcoach	BAT	506.0	488.0	409.0
Snowcoach	Admin	1470.0	1005.0	1332.0

AVG Alternative 4c

Visitor		Administrative Travel			# vehs / pk hr		Admin		E- Factor (g/mi)	E- Factor (g/hr)	Site 1 West Entrance Traffic		Site 2 E- Factor (g/mi)	
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Snowcoaches	Tot Veh.	Low Speed	Idle	South Lane	North Lane	Cruise Speed	West to Madison
				12 to 1					0	0	0	0	0	0
				1 to 2					0	0	0	0	0	0
				2 to 3					0	0	0	0	0	0
				3 to 4					0	0	0	0	0	0
				4 to 5					0	0	0	0	0	0
				5 to 6					0	0	0	0	0	0
				6 to 7					0	0	0	0	0	0
189	39	20	2	7 to 8	40	8	0	48	373.50	102.33	32	16	692.17	25
				8 to 9	43	8	1	52	393.06	122.44	35	17	700.54	28
				9 to 10	61	12	0	73	373.14	101.49	49	24	692.73	50
				10 to 11	41	8	0	49	372.96	101.08	33	16	693.00	72
				11 to 12	11	2	0	13	371.46	97.62	9	4	695.31	59
				12 to 1	21	4	0	25	372.44	99.88	17	8	693.80	25
				1 to 2	21	4	0	25	372.44	99.88	17	8	693.80	59
				2 to 3	40	8	0	48	373.50	102.33	32	16	692.17	59
				3 to 4	42	8	0	50	372.44	99.88	33	17	693.80	73
				4 to 5	71	14	1	86	385.94	115.92	57	29	696.28	39
				5 to 6	22	4	0	26	371.46	97.62	17	9	695.31	3
				6 to 7	2	0	0	2	347.00	41.00	1	1	733.00	2
				7 to 8	2	0	0	2	347.00	41.00	1	1	733.00	2
				8 to 9	2	0	0	2	347.00	41.00	1	1	733.00	2
				9 to 10					0	0	0	0	0	0
				10 to 11					0	0	0	0	0	0
				11 to 12					0	0	0	0	0	0

Alternative 4d-AVG

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	520.0	1100.0	61.0
Snowcoach	BAT	498.0	485.0	409.0
Snowcoach	Admin	1470.0	1005.0	1332.0

AVG Alternative 4d

Visitor		Administrative Travel			# vehs / pk hr		Admin		E- Factor (g/mi)	E- Factor (g/hr)	Site 1 West Entrance Traffic		Site 2 E- Factor (g/mi)	
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Snowcoaches	Tot Veh.	Low Speed	Idle	South Lane	North Lane	Cruise Speed	West to Madison
				12 to 1					0	0	0	0	0	0
				1 to 2					0	0	0	0	0	0
				2 to 3					0	0	0	0	0	0
				3 to 4					0	0	0	0	0	0
				4 to 5					0	0	0	0	0	0
				5 to 6					0	0	0	0	0	0
				6 to 7					0	0	0	0	0	0
5	74	20	2	7 to 8	3	15	0	18	501.67	351.00	12	6	587.50	11
				8 to 9	6	15	1	22	548.18	356.05	15	7	676.36	14
				9 to 10	6	22	0	28	502.71	334.43	19	9	616.79	20
				10 to 11	4	15	0	19	502.63	335.74	13	6	614.47	28
				11 to 12	2	4	0	6	505.33	293.00	4	2	690.00	22
				12 to 1	3	7	0	10	504.60	304.60	7	3	669.50	11
				1 to 2	3	7	0	10	504.60	304.60	7	3	669.50	22
				2 to 3	3	15	0	18	501.67	351.00	12	6	587.50	22
				3 to 4	5	15	0	20	503.50	322.00	13	7	638.75	29
				4 to 5	7	26	1	34	531.12	364.50	23	11	626.91	18
				5 to 6	4	7	0	11	506.00	282.45	7	4	708.64	3
				6 to 7	2	0	0	2	520.00	61.00	1	1	1100.00	2
				7 to 8	2	0	0	2	520.00	61.00	1	1	1100.00	2
				8 to 9	2	0	0	2	520.00	61.00	1	1	1100.00	2
				9 to 10					0	0	0	0	0	0
				10 to 11					0	0	0	0	0	0
				11 to 12					0	0	0	0	0	0

Post-SEIS Site 1: West Entrance & Site 2: West Entrance to Madison

PM Emissions

Alternative 4a-AVG

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	0.065	0.031	0.490
Snowcoach	BAT	0.033	0.003	0.059
Snowcoach	Admin	0.030	0.010	0.040

OSV trips Revised Jul 10 2013, Emissions Revised Oct 2012

										AVG				
										Alternative 4a	Site 1		Site 2	
Visitor		Administrative Travel			# vehs / pk hr		Admin		E- Factor (g/mi)	E- Factor (g/hr)	West Entrance Traffic		E- Factor (g/mi)	
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Snowcoaches	Tot Veh.	Low Speed	Idle	South Lane	North Lane	Cruise Speed	West to Madison
				12 to 1					0.000	0	0	0	0.000	0
				1 to 2					0.000	0	0	0	0.000	0
				2 to 3					0.000	0	0	0	0.000	0
				3 to 4					0.000	0	0	0	0.000	0
				4 to 5					0.000	0	0	0	0.000	0
				5 to 6					0.000	0	0	0	0.000	0
				6 to 7					0.000	0	0	0	0.000	0
166	26	20	2	7 to 8	35	5	0	40	0.061	0.44	27	13	0.028	22
				8 to 9	38	5	1	44	0.061	0.43	29	15	0.027	25
				9 to 10	54	8	0	62	0.061	0.43	41	21	0.027	43
				10 to 11	36	5	0	41	0.061	0.44	27	14	0.028	61
				11 to 12	10	1	0	11	0.062	0.45	7	4	0.028	51
				12 to 1	19	3	0	22	0.061	0.43	15	7	0.027	22
				1 to 2	19	3	0	22	0.061	0.43	15	7	0.027	51
				2 to 3	35	5	0	40	0.061	0.44	27	13	0.028	51
				3 to 4	37	5	0	42	0.061	0.44	28	14	0.028	62
				4 to 5	63	9	1	73	0.061	0.43	49	24	0.027	34
				5 to 6	20	3	0	23	0.061	0.43	15	8	0.027	3
				6 to 7	2	0	0	2	0.065	0.49	1	1	0.031	2
				7 to 8	2	0	0	2	0.065	0.49	1	1	0.031	2
				8 to 9	2	0	0	2	0.065	0.49	1	1	0.031	2
				9 to 10					0.000	0	0	0	0.000	0
				10 to 11					0.000	0	0	0	0.000	0
				11 to 12					0.000	0	0	0	0.000	0

Alternative 4c-AVG

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	E-BAT	0.065	0.031	0.490
Snowcoach	BAT	0.033	0.003	0.059
Snowcoach	Admin	0.030	0.010	0.040

AVG Alternative 4c

Visitor		Administrative Travel			# vehs / pk hr		Admin		E- Factor (g/mi)	E- Factor (g/hr)	Site 1 West Entrance Traffic		Site 2 E- Factor (g/mi)	
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Snowcoaches	Tot Veh.	Low Speed	Idle	South Lane	North Lane	Cruise Speed	West to Madison
				12 to 1					0.000	0	0	0	0.000	0
				1 to 2					0.000	0	0	0	0.000	0
				2 to 3					0.000	0	0	0	0.000	0
				3 to 4					0.000	0	0	0	0.000	0
				4 to 5					0.000	0	0	0	0.000	0
				5 to 6					0.000	0	0	0	0.000	0
				6 to 7					0.000	0	0	0	0.000	0
189	39	20	2	7 to 8	40	8	0	48	0.060	0.42	32	16	0.026	25
				8 to 9	43	8	1	52	0.059	0.42	35	17	0.026	28
				9 to 10	61	12	0	73	0.060	0.42	49	24	0.026	50
				10 to 11	41	8	0	49	0.060	0.42	33	16	0.026	72
				11 to 12	11	2	0	13	0.060	0.42	9	4	0.027	59
				12 to 1	21	4	0	25	0.060	0.42	17	8	0.027	25
				1 to 2	21	4	0	25	0.060	0.42	17	8	0.027	59
				2 to 3	40	8	0	48	0.060	0.42	32	16	0.026	59
				3 to 4	42	8	0	50	0.060	0.42	33	17	0.027	73
				4 to 5	71	14	1	86	0.059	0.41	57	29	0.026	39
				5 to 6	22	4	0	26	0.060	0.42	17	9	0.027	3
				6 to 7	2	0	0	2	0.065	0.49	1	1	0.031	2
				7 to 8	2	0	0	2	0.065	0.49	1	1	0.031	2
				8 to 9	2	0	0	2	0.065	0.49	1	1	0.031	2
				9 to 10					0.000	0	0	0	0.000	0
				10 to 11					0.000	0	0	0	0.000	0
				11 to 12					0.000	0	0	0	0.000	0

Alternative 4d-AVG

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	0.065	0.031	0.490
Snowcoach	BAT	0.033	0.003	0.060
Snowcoach	Admin	0.030	0.010	0.040

AVG Alternative 4d

Visitor		Administrative Travel			# vehs / pk hr		Admin		E- Factor (g/mi)	E- Factor (g/hr)	Site 1 West Entrance Traffic		Site 2 E- Factor (g/mi)	
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Snowcoaches	Tot Veh.	Low Speed	Idle	South Lane	North Lane	Cruise Speed	West to Madison
				12 to 1					0.000	0	0	0	0.000	0
				1 to 2					0.000	0	0	0	0.000	0
				2 to 3					0.000	0	0	0	0.000	0
				3 to 4					0.000	0	0	0	0.000	0
				4 to 5					0.000	0	0	0	0.000	0
				5 to 6					0.000	0	0	0	0.000	0
				6 to 7					0.000	0	0	0	0.000	0
5	74	20	2	7 to 8	3	15	0	18	0.038	0.13	12	6	0.008	11
				8 to 9	6	15	1	22	0.042	0.18	15	7	0.011	14
				9 to 10	6	22	0	28	0.040	0.15	19	9	0.009	20
				10 to 11	4	15	0	19	0.040	0.15	13	6	0.009	28
				11 to 12	2	4	0	6	0.044	0.20	4	2	0.012	22
				12 to 1	3	7	0	10	0.043	0.19	7	3	0.011	11
				1 to 2	3	7	0	10	0.043	0.19	7	3	0.011	22
				2 to 3	3	15	0	18	0.038	0.13	12	6	0.008	22
				3 to 4	5	15	0	20	0.041	0.17	13	7	0.010	29
				4 to 5	7	26	1	34	0.040	0.15	23	11	0.009	18
				5 to 6	4	7	0	11	0.045	0.22	7	4	0.013	3
				6 to 7	2	0	0	2	0.065	0.49	1	1	0.031	2
				7 to 8	2	0	0	2	0.065	0.49	1	1	0.031	2
				8 to 9	2	0	0	2	0.065	0.49	1	1	0.031	2
				9 to 10					0.000	0	0	0	0.000	0
				10 to 11					0.000	0	0	0	0.000	0
				11 to 12					0.000	0	0	0	0.000	0

Summary of Daily Snowmobile and Snowcoach Use Numbers from Yellowstone Post-SEIS 2013 Travel Factors Spreadsheet

TravelFactorsV7_DJ (wv).xlsx Travel Factors dated 6/25/2013

Snowmobiles

Link	Alt 4a AVG New BAT SM	Alt 4c AVG E-BAT SM	Alt 4d AVG New BAT NC SM	Administrative Travel
West Entrance	166	189	5	20
Mammoth to Norris	52.32	58.38	9.9	52
West Entrance to Madison	311.85	354.9	10.5	51
Madison to Norris	146.56	166.09	9.85	42
Norris to Canyon Village	103.48	117.37	6.25	23
Canyon Village to Fishing Bridge	155.48	175.87	12.75	39
Fishing Bridge to East Entrance	40.58	45.17	8.45	15
Fishing Bridge to West Thumb	86.2	97.9	4.3	49
Madison to Old Faithful	330.79	375.81	15.65	60
Old Faithful to West Thumb	227.47	258.63	9.35	48
West Thumb to Flagg Ranch	228.85	260.15	9.75	29
Old Faithful	279.13	317.22	12.5	54

Snowcoaches

Link	Alt 4a AVG New BAT SM	Alt 4c AVG E-BAT SM	Alt 4d AVG New BAT NC SM	Administrative Travel
West Entrance	26	39	74	2
Mammoth to Norris	25.04	37.56	45.75	5.5
West Entrance to Madison	55.01	82.515	148.08	5.5
Madison to Norris	32.4	48.6	75.075	4.5
Norris to Canyon Village	20.04	30.06	48.975	2.6
Canyon Village to Fishing Bridge	19.24	28.86	57.525	5.4
Fishing Bridge to East Entrance	2.78	4.17	10.995	1.9
Fishing Bridge to West Thumb	7.04	10.56	26.19	6.6
Madison to Old Faithful	62.67	94.005	160.185	7.1
Old Faithful to West Thumb	34.27	51.405	99.795	6
West Thumb to Flagg Ranch	30.21	45.315	95.655	3.1
Old Faithful	48.47	72.705	129.99	6.55

Note: West Entrance numbers are based on total daily admission--no factors applied.

Site 3: Canyon to Fishing Bridge

CO Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	Current BAT	161.1	18.6	409.7
Snowcoach	Current	77.9	138.4	201.9
Snowcoach	Admin	1.0	0.7	6.7

OSV trips Revised Jul 12 2013, Emissions Revised Nov 2012

CURRENT FLEET SNOWCOACHES

Alternative 2A

Visitor Snowmobiles	Visitor Snowcoaches	Administrative Travel Snowmobiles	Administrative Travel Snowcoaches	Hour	# vehs / pk hr Snowmobiles	# vehs / pk hr Snowcoaches	# vehs / pk hr Admin Snowcoaches	Tot Veh.	Site 3 E- Factor (g/mi) Cruise Speed
				12 to 1				0	0
				1 to 2				0	0
				2 to 3				0	0
				3 to 4				0	0
				4 to 5				0	0
				5 to 6				0	0
				6 to 7				0	0
146	**26**	**39**	**5**	7 to 8	4	0	1	5	14.99
				8 to 9	4	0	1	5	14.99
				9 to 10	37	5	1	43	32.08
				10 to 11	66	10	1	77	33.89
				11 to 12	66	10	1	77	33.89
				12 to 1	66	10	1	77	33.89
				1 to 2	37	5	1	43	32.08
				2 to 3	37	5	1	43	32.08
				3 to 4	33	5	1	39	33.47
				4 to 5	4	0	1	5	14.99
				5 to 6	4	0	1	5	14.99
				6 to 7	4	0	1	5	14.99
				7 to 8	4	0	1	5	14.99
				8 to 9	4	0	1	5	14.99
				9 to 10				0	0
				10 to 11				0	0
				11 to 12				0	0

BAT SNOWCOACHES

Alternative 2B

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	Current BAT	161.1	18.6	409.7
Snowcoach	BAT	12.1	103.6	10.7
Snowcoach	Admin	1.0	0.7	6.7

Visitor Snowmobiles	Visitor Snowcoaches	Administrative Travel Snowmobiles	Administrative Travel Snowcoaches	Hour	# vehs / pk hr Snowmobiles	# vehs / pk hr Snowcoaches	# vehs / pk hr Admin Snowcoaches	Tot Veh.	Site 3 E- Factor (g/mi) Cruise Speed
				12 to 1				0	0
				1 to 2				0	0
				2 to 3				0	0
				3 to 4				0	0
				4 to 5				0	0
				5 to 6				0	0
				6 to 7				0	0
146	**26**	**39**	**5**	7 to 8	4	0	1	5	14.99
				8 to 9	4	0	1	5	14.99
				9 to 10	37	5	1	43	28.03
				10 to 11	66	10	1	77	29.37
				11 to 12	66	10	1	77	29.37
				12 to 1	66	10	1	77	29.37
				1 to 2	37	5	1	43	28.03
				2 to 3	37	5	1	43	28.03
				3 to 4	33	5	1	39	29.00
				4 to 5	4	0	1	5	14.99
				5 to 6	4	0	1	5	14.99
				6 to 7	4	0	1	5	14.99
				7 to 8	4	0	1	5	14.99
				8 to 9	4	0	1	5	14.99
				9 to 10				0	0
				10 to 11				0	0
				11 to 12				0	0

Site 3: Canyon to Fishing Bridge

CO Emissions

Revised Nov 1 2012

BAT SNOWCOACHES

Alternative 3B

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	Current BAT	161.1	18.6	409.7
Snowcoach	BAT	13.3	123.9	10.7
Snowcoach	Admin	1.0	0.7	6.7

Visitor		Administrative Travel			# vehs / pk hr		Admin		Site 3 E- Factor (g/mi)
Snowmobiles	**Snowcoaches**	**Snowmobiles**	**Snowcoaches**	**Hour**	**Snowmobiles**	**Snowcoaches**	**Snowcoaches**	**Tot Veh.**	**Cruise Speed**
				12 to 1				0	0
				1 to 2				0	0
				2 to 3				0	0
				3 to 4				0	0
				4 to 5				0	0
				5 to 6				0	0
				6 to 7				0	0
0	**34**	**39**	**5**	7 to 8	4	0	1	5	14.99
				8 to 9	4	0	1	5	14.99
				9 to 10	8	7	1	16	63.53
				10 to 11	8	14	1	23	81.90
				11 to 12	8	14	1	23	81.90
				12 to 1	8	14	1	23	81.90
				1 to 2	8	7	1	16	63.53
				2 to 3	8	7	1	16	63.53
				3 to 4	4	7	1	12	78.52
				4 to 5	4	0	1	5	14.99
				5 to 6	4	0	1	5	14.99
				6 to 7	4	0	1	5	14.99
				7 to 8	4	0	1	5	14.99
				8 to 9	4	0	1	5	14.99
				9 to 10				0	0
				10 to 11				0	0
				11 to 12				0	0

Alternative 4a

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	25.0	4.0	216.0
Snowcoach	BAT	10.9	84.0	10.6
Snowcoach	Admin	1.0	0.7	6.7

Visitor Snowmobiles	Visitor Snowcoaches	Administrative Travel Snowmobiles	Administrative Travel Snowcoaches	Hour	# vehs / pk hr Snowmobiles	# vehs / pk hr Snowcoaches	Admin Snowcoaches	Tot Veh.	Site 3 E- Factor (g/mi) Cruise Speed
				12 to 1				0	0
				1 to 2				0	0
				2 to 3				0	0
				3 to 4				0	0
				4 to 5				0	0
				5 to 6				0	0
				6 to 7				0	0
217	**19**	**39**	**5**	7 to 8	4	0	1	5	3.34
				8 to 9	4	0	1	5	3.34
				9 to 10	51	4	1	56	9.66
				10 to 11	94	8	1	103	10.18
				11 to 12	94	8	1	103	10.18
				12 to 1	94	8	1	103	10.18
				1 to 2	51	4	1	56	9.66
				2 to 3	51	4	1	56	9.66
				3 to 4	47	4	1	52	10.09
				4 to 5	4	0	1	5	3.34
				5 to 6	4	0	1	5	3.34
				6 to 7	4	0	1	5	3.34
				7 to 8	4	0	1	5	3.34
				8 to 9	4	0	1	5	3.34
				9 to 10				0	0
				10 to 11				0	0
				11 to 12				0	0

Alternative 4b

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	25.0	4.0	216.0
Snowcoach	BAT	13.0	118.2	10.7
Snowcoach	Admin	1.0	0.7	6.7

Visitor Snowmobiles	Visitor Snowcoaches	Administrative Travel Snowmobiles	Administrative Travel Snowcoaches	Hour	# vehs / pk hr Snowmobiles	# vehs / pk hr Snowcoaches	Admin Snowcoaches	Tot Veh.	Site 3 E- Factor (g/mi) Cruise Speed
				12 to 1				0	0
				1 to 2				0	0
				2 to 3				0	0
				3 to 4				0	0
				4 to 5				0	0
				5 to 6				0	0
				6 to 7				0	0
13	**38**	**39**	**5**	7 to 8	4	0	1	5	3.34
				8 to 9	4	0	1	5	3.34
				9 to 10	10	8	1	19	51.91
				10 to 11	13	15	1	29	62.96
				11 to 12	13	15	1	29	62.96
				12 to 1	13	15	1	29	62.96
				1 to 2	10	8	1	19	51.91
				2 to 3	10	8	1	19	51.91
				3 to 4	6	8	1	15	64.69
				4 to 5	4	0	1	5	3.34
				5 to 6	4	0	1	5	3.34
				6 to 7	4	0	1	5	3.34
				7 to 8	4	0	1	5	3.34
				8 to 9	4	0	1	5	3.34
				9 to 10				0	0
				10 to 11				0	0
				11 to 12				0	0

Alternative 4c

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	E-BAT	16.7	2.7	144.0
Snowcoach	BAT	13.3	123.9	10.7
Snowcoach	Admin	1.0	0.7	6.7

Visitor Snowmobiles	Visitor Snowcoaches	Administrative Travel Snowmobiles	Administrative Travel Snowcoaches	Hour	# vehs / pk hr Snowmobiles	# vehs / pk hr Snowcoaches	Admin Snowcoaches	Tot Veh.	Site 3 E- Factor (g/mi) Cruise Speed
				12 to 1				0	0
				1 to 2				0	0
				2 to 3				0	0
				3 to 4				0	0
				4 to 5				0	0
				5 to 6				0	0
				6 to 7				0	0
217	**38**	**39**	**5**	7 to 8	4	0	1	5	2.28
				8 to 9	4	0	1	5	2.28
				9 to 10	51	8	1	60	18.80
				10 to 11	94	15	1	110	19.18
				11 to 12	94	15	1	110	19.18
				12 to 1	94	15	1	110	19.18
				1 to 2	51	8	1	60	18.80
				2 to 3	51	8	1	60	18.80
				3 to 4	47	8	1	56	19.95
				4 to 5	4	0	1	5	2.28
				5 to 6	4	0	1	5	2.28
				6 to 7	4	0	1	5	2.28
				7 to 8	4	0	1	5	2.28
				8 to 9	4	0	1	5	2.28
				9 to 10				0	0
				10 to 11				0	0
				11 to 12				0	0

Alternative 4d

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	25.0	4.0	216.0
Snowcoach	BAT	14.3	140.8	10.8
Snowcoach	Admin	1.0	0.7	6.7

Visitor Snowmobiles	Visitor Snowcoaches	Administrative Travel Snowmobiles	Administrative Travel Snowcoaches	Hour	# vehs / pk hr Snowmobiles	# vehs / pk hr Snowcoaches	Admin Snowcoaches	Tot Veh.	Site 3 E- Factor (g/mi) Cruise Speed
				12 to 1				0	0
				1 to 2				0	0
				2 to 3				0	0
				3 to 4				0	0
				4 to 5				0	0
				5 to 6				0	0
				6 to 7				0	0
13	**77**	**39**	**5**	7 to 8	4	0	1	5	3.34
				8 to 9	4	0	1	5	3.34
				9 to 10	10	15	1	26	82.80
				10 to 11	13	31	1	45	98.17
				11 to 12	13	31	1	45	98.17
				12 to 1	13	31	1	45	98.17
				1 to 2	10	15	1	26	82.80
				2 to 3	10	15	1	26	82.80
				3 to 4	6	15	1	22	97.12
				4 to 5	4	0	1	5	3.34
				5 to 6	4	0	1	5	3.34
				6 to 7	4	0	1	5	3.34
				7 to 8	4	0	1	5	3.34
				8 to 9	4	0	1	5	3.34
				9 to 10				0	0
				10 to 11				0	0
				11 to 12				0	0

Site 3: Canyon to Fishing Bridge

NOx Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	Current BAT	279.0	961.0	141.0
Snowcoach	Current	1042.0	993.0	653.0
Snowcoach	Admin	1470.0	1005.0	1332.0

OSV trips Revised Jul 12 2013, Emissions Revised Nov 2012

NOTE: * All emissions factors are x100 (NOx only)

CURRENT FLEET SNOWCOACHES

Alternative 2A

Visitor Snowmobiles	Visitor Snowcoaches	Administrative Travel Snowmobiles	Administrative Travel Snowcoaches	Hour	# vehs / pk hr Snowmobiles	# vehs / pk hr Snowcoaches	# vehs / pk hr Admin Snowcoaches	Tot Veh.	Site 3 E- Factor (g/mi) Cruise Speed
				12 to 1				0	0
				1 to 2				0	0
				2 to 3				0	0
				3 to 4				0	0
				4 to 5				0	0
				5 to 6				0	0
				6 to 7				0	0
146	26	39	5	7 to 8	4	0	1	5	969.80
				8 to 9	4	0	1	5	969.80
				9 to 10	37	5	1	43	965.74
				10 to 11	66	10	1	77	965.73
				11 to 12	66	10	1	77	965.73
				12 to 1	66	10	1	77	965.73
				1 to 2	37	5	1	43	965.74
				2 to 3	37	5	1	43	965.74
				3 to 4	33	5	1	39	966.23
				4 to 5	4	0	1	5	969.80
				5 to 6	4	0	1	5	969.80
				6 to 7	4	0	1	5	969.80
				7 to 8	4	0	1	5	969.80
				8 to 9	4	0	1	5	969.80
				9 to 10				0	0
				10 to 11				0	0
				11 to 12				0	0

BAT SNOWCOACHES

Alternative 2B

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	Current BAT	279.0	961.0	141.0
Snowcoach	BAT	512.0	489.0	405.0
Snowcoach	Admin	1470.0	1005.0	1332.0

NOTE: * All emissions factors are x100 (NOx only)

Visitor Snowmobiles	Visitor Snowcoaches	Administrative Travel Snowmobiles	Administrative Travel Snowcoaches	Hour	# vehs / pk hr Snowmobiles	# vehs / pk hr Snowcoaches	# vehs / pk hr Admin Snowcoaches	Tot Veh.	Site 3 E- Factor (g/mi) Cruise Speed
				12 to 1				0	0
				1 to 2				0	0
				2 to 3				0	0
				3 to 4				0	0
				4 to 5				0	0
				5 to 6				0	0
				6 to 7				0	0
146	26	39	5	7 to 8	4	0	1	5	969.80
				8 to 9	4	0	1	5	969.80
				9 to 10	37	5	1	43	907.14
				10 to 11	66	10	1	77	900.27
				11 to 12	66	10	1	77	900.27
				12 to 1	66	10	1	77	900.27
				1 to 2	37	5	1	43	907.14
				2 to 3	37	5	1	43	907.14
				3 to 4	33	5	1	39	901.62
				4 to 5	4	0	1	5	969.80
				5 to 6	4	0	1	5	969.80
				6 to 7	4	0	1	5	969.80
				7 to 8	4	0	1	5	969.80
				8 to 9	4	0	1	5	969.80
				9 to 10				0	0
				10 to 11				0	0
				11 to 12				0	0

Site 3: Canyon to Fishing Bridge

NOx Emissions

Revised Nov 1 2012

BAT SNOWCOACHES

Alternative 3B

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	Current BAT	279.0	961.0	141.0
Snowcoach	BAT	506.0	488.0	409.0
Snowcoach	Admin	1470.0	1005.0	1332.0

Visitor		Administrative Travel			# vehs / pk hr		Admin		Site 3 E- Factor (g/mi)
Snowmobiles	**Snowcoaches**	**Snowmobiles**	**Snowcoaches**	**Hour**	**Snowmobiles**	**Snowcoaches**	**Snowcoaches**	**Tot Veh.**	**Cruise Speed**
				12 to 1				0	0
				1 to 2				0	0
				2 to 3				0	0
				3 to 4				0	0
				4 to 5				0	0
				5 to 6				0	0
				6 to 7				0	0
0	**34**	**39**	**5**	7 to 8	4	0	1	5	969.80
				8 to 9	4	0	1	5	969.80
				9 to 10	8	7	1	16	756.81
				10 to 11	8	14	1	23	675.00
				11 to 12	8	14	1	23	675.00
				12 to 1	8	14	1	23	675.00
				1 to 2	8	7	1	16	756.81
				2 to 3	8	7	1	16	756.81
				3 to 4	4	7	1	12	688.75
				4 to 5	4	0	1	5	969.80
				5 to 6	4	0	1	5	969.80
				6 to 7	4	0	1	5	969.80
				7 to 8	4	0	1	5	969.80
				8 to 9	4	0	1	5	969.80
				9 to 10				0	0
				10 to 11				0	0
				11 to 12				0	0

Alternative 4a

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	520.0	1100.0	61.0
Snowcoach	BAT	531.0	498.0	414.0
Snowcoach	Admin	1470.0	1005.0	1332.0

Visitor Snowmobiles	Visitor Snowcoaches	Administrative Travel Snowmobiles	Administrative Travel Snowcoaches	Hour	# vehs / pk hr Snowmobiles	# vehs / pk hr Snowcoaches	Admin Snowcoaches	Tot Veh.	Site 3 E- Factor (g/mi) Cruise Speed
				12 to 1				0	0
				1 to 2				0	0
				2 to 3				0	0
				3 to 4				0	0
				4 to 5				0	0
				5 to 6				0	0
				6 to 7				0	0
217	**19**	**39**	**5**	7 to 8	4	0	1	5	1081.00
				8 to 9	4	0	1	5	1081.00
				9 to 10	51	4	1	56	1055.30
				10 to 11	94	8	1	103	1052.32
				11 to 12	94	8	1	103	1052.32
				12 to 1	94	8	1	103	1052.32
				1 to 2	51	4	1	56	1055.30
				2 to 3	51	4	1	56	1055.30
				3 to 4	47	4	1	52	1051.87
				4 to 5	4	0	1	5	1081.00
				5 to 6	4	0	1	5	1081.00
				6 to 7	4	0	1	5	1081.00
				7 to 8	4	0	1	5	1081.00
				8 to 9	4	0	1	5	1081.00
				9 to 10				0	0
				10 to 11				0	0
				11 to 12				0	0

Alternative 4b

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	520.0	1100.0	61.0
Snowcoach	BAT	512.0	491.0	412.0
Snowcoach	Admin	1470.0	1005.0	1332.0

Visitor Snowmobiles	Visitor Snowcoaches	Administrative Travel Snowmobiles	Administrative Travel Snowcoaches	Hour	# vehs / pk hr Snowmobiles	# vehs / pk hr Snowcoaches	Admin Snowcoaches	Tot Veh.	Site 3 E- Factor (g/mi) Cruise Speed
				12 to 1				0	0
				1 to 2				0	0
				2 to 3				0	0
				3 to 4				0	0
				4 to 5				0	0
				5 to 6				0	0
				6 to 7				0	0
13	**38**	**39**	**5**	7 to 8	4	0	1	5	1081.00
				8 to 9	4	0	1	5	1081.00
				9 to 10	10	8	1	19	838.58
				10 to 11	13	15	1	29	781.72
				11 to 12	13	15	1	29	781.72
				12 to 1	13	15	1	29	781.72
				1 to 2	10	8	1	19	838.58
				2 to 3	10	8	1	19	838.58
				3 to 4	6	8	1	15	768.87
				4 to 5	4	0	1	5	1081.00
				5 to 6	4	0	1	5	1081.00
				6 to 7	4	0	1	5	1081.00
				7 to 8	4	0	1	5	1081.00
				8 to 9	4	0	1	5	1081.00
				9 to 10				0	0
				10 to 11				0	0
				11 to 12				0	0

Alternative 4c

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	E-BAT	347.0	733.0	41.0
Snowcoach	BAT	506.0	488.0	409.0
Snowcoach	Admin	1470.0	1005.0	1332.0

Visitor		Administrative Travel			# vehs / pk hr		Admin		Site 3 E- Factor (g/mi)
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Snowcoaches	Tot Veh.	Cruise Speed
				12 to 1				0	0
				1 to 2				0	0
				2 to 3				0	0
				3 to 4				0	0
				4 to 5				0	0
				5 to 6				0	0
				6 to 7				0	0
217	**38**	**39**	**5**	7 to 8	4	0	1	5	787.40
				8 to 9	4	0	1	5	787.40
				9 to 10	51	8	1	60	704.87
				10 to 11	94	15	1	110	702.06
				11 to 12	94	15	1	110	702.06
				12 to 1	94	15	1	110	702.06
				1 to 2	51	8	1	60	704.87
				2 to 3	51	8	1	60	704.87
				3 to 4	47	8	1	56	702.86
				4 to 5	4	0	1	5	787.40
				5 to 6	4	0	1	5	787.40
				6 to 7	4	0	1	5	787.40
				7 to 8	4	0	1	5	787.40
				8 to 9	4	0	1	5	787.40
				9 to 10				0	0
				10 to 11				0	0
				11 to 12				0	0

Alternative 4d

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	520.0	1100.0	61.0
Snowcoach	BAT	498.0	485.0	409.0
Snowcoach	Admin	1470.0	1005.0	1332.0

Visitor		Administrative Travel			# vehs / pk hr		Admin		Site 3 E- Factor (g/mi)
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Snowcoaches	Tot Veh.	Cruise Speed
				12 to 1				0	0
				1 to 2				0	0
				2 to 3				0	0
				3 to 4				0	0
				4 to 5				0	0
				5 to 6				0	0
				6 to 7				0	0
13	**77**	**39**	**5**	7 to 8	4	0	1	5	1081.00
				8 to 9	4	0	1	5	1081.00
				9 to 10	10	15	1	26	741.54
				10 to 11	13	31	1	45	674.22
				11 to 12	13	31	1	45	674.22
				12 to 1	13	31	1	45	674.22
				1 to 2	10	15	1	26	741.54
				2 to 3	10	15	1	26	741.54
				3 to 4	6	15	1	22	676.36
				4 to 5	4	0	1	5	1081.00
				5 to 6	4	0	1	5	1081.00
				6 to 7	4	0	1	5	1081.00
				7 to 8	4	0	1	5	1081.00
				8 to 9	4	0	1	5	1081.00
				9 to 10				0	0
				10 to 11				0	0
				11 to 12				0	0

Site 3: Canyon to Fishing Bridge

PM Emissions

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	Current BAT	0.065	0.031	0.490
Snowcoach	Current	0.033	0.012	0.048
Snowcoach	Admin	0.030	0.010	0.040

OSV trips Revised Jul 12 2013, Emissions Revised Nov 2012

CURRENT FLEET SNOWCOACHES

Alternative 2A

Visitor Snowmobiles	Visitor Snowcoaches	Administrative Travel Snowmobiles	Administrative Travel Snowcoaches	Hour	# vehs / pk hr Snowmobiles	# vehs / pk hr Snowcoaches	# vehs / pk hr Admin Snowcoaches	Tot Veh.	Site 3 E- Factor (g/mi) Cruise Speed
				12 to 1				0	0.000
				1 to 2				0	0.000
				2 to 3				0	0.000
				3 to 4				0	0.000
				4 to 5				0	0.000
				5 to 6				0	0.000
				6 to 7				0	0.000
146	**26**	**39**	**5**	7 to 8	4	0	1	5	0.027
				8 to 9	4	0	1	5	0.027
				9 to 10	37	5	1	43	0.028
				10 to 11	66	10	1	77	0.028
				11 to 12	66	10	1	77	0.028
				12 to 1	66	10	1	77	0.028
				1 to 2	37	5	1	43	0.028
				2 to 3	37	5	1	43	0.028
				3 to 4	33	5	1	39	0.028
				4 to 5	4	0	1	5	0.027
				5 to 6	4	0	1	5	0.027
				6 to 7	4	0	1	5	0.027
				7 to 8	4	0	1	5	0.027
				8 to 9	4	0	1	5	0.027
				9 to 10				0	0.000
				10 to 11				0	0.000
				11 to 12				0	0.000

BAT SNOWCOACHES

Alternative 2B

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	Current BAT	0.065	0.031	0.490
Snowcoach	BAT	0.032	0.003	0.058
Snowcoach	Admin	0.030	0.010	0.040

Visitor Snowmobiles	Visitor Snowcoaches	Administrative Travel Snowmobiles	Administrative Travel Snowcoaches	Hour	# vehs / pk hr Snowmobiles	# vehs / pk hr Snowcoaches	# vehs / pk hr Admin Snowcoaches	Tot Veh.	Site 3 E- Factor (g/mi) Cruise Speed
				12 to 1				0	0.000
				1 to 2				0	0.000
				2 to 3				0	0.000
				3 to 4				0	0.000
				4 to 5				0	0.000
				5 to 6				0	0.000
				6 to 7				0	0.000
146	**26**	**39**	**5**	7 to 8	4	0	1	5	0.027
				8 to 9	4	0	1	5	0.027
				9 to 10	37	5	1	43	0.027
				10 to 11	66	10	1	77	0.027
				11 to 12	66	10	1	77	0.027
				12 to 1	66	10	1	77	0.027
				1 to 2	37	5	1	43	0.027
				2 to 3	37	5	1	43	0.027
				3 to 4	33	5	1	39	0.027
				4 to 5	4	0	1	5	0.027
				5 to 6	4	0	1	5	0.027
				6 to 7	4	0	1	5	0.027
				7 to 8	4	0	1	5	0.027
				8 to 9	4	0	1	5	0.027
				9 to 10				0	0.000
				10 to 11				0	0.000
				11 to 12				0	0.000

Site 3: Canyon to Fishing Bridge

PM Emissions

Revised Nov 1 2012

BAT SNOWCOACHES

Alternative 3B

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	Current BAT	0.065	0.031	0.490
Snowcoach	BAT	0.033	0.003	0.059
Snowcoach	Admin	0.030	0.010	0.040

Visitor		Administrative Travel			# vehs / pk hr				Site 3 E- Factor (g/mi)
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Admin Snowcoaches	Tot Veh.	Cruise Speed
				12 to 1				0	0.000
				1 to 2				0	0.000
				2 to 3				0	0.000
				3 to 4				0	0.000
				4 to 5				0	0.000
				5 to 6				0	0.000
				6 to 7				0	0.000
0	**34**	**39**	**5**	7 to 8	4	0	1	5	0.027
				8 to 9	4	0	1	5	0.027
				9 to 10	8	7	1	16	0.017
				10 to 11	8	14	1	23	0.013
				11 to 12	8	14	1	23	0.013
				12 to 1	8	14	1	23	0.013
				1 to 2	8	7	1	16	0.017
				2 to 3	8	7	1	16	0.017
				3 to 4	4	7	1	12	0.013
				4 to 5	4	0	1	5	0.027
				5 to 6	4	0	1	5	0.027
				6 to 7	4	0	1	5	0.027
				7 to 8	4	0	1	5	0.027
				8 to 9	4	0	1	5	0.027
				9 to 10				0	0.000
				10 to 11				0	0.000
				11 to 12				0	0.000

Alternative 4a

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	0.065	0.031	0.490
Snowcoach	BAT	0.033	0.003	0.059
Snowcoach	Admin	0.030	0.010	0.040

Visitor Snowmobiles	Visitor Snowcoaches	Administrative Travel Snowmobiles	Administrative Travel Snowcoaches	Hour	# vehs / pk hr Snowmobiles	# vehs / pk hr Snowcoaches	Admin Snowcoaches	Tot Veh.	Site 3 E- Factor (g/mi) Cruise Speed
				12 to 1				0	0.000
				1 to 2				0	0.000
				2 to 3				0	0.000
				3 to 4				0	0.000
				4 to 5				0	0.000
				5 to 6				0	0.000
				6 to 7				0	0.000
217	**19**	**39**	**5**	7 to 8	4	0	1	5	0.027
				8 to 9	4	0	1	5	0.027
				9 to 10	51	4	1	56	0.029
				10 to 11	94	8	1	103	0.029
				11 to 12	94	8	1	103	0.029
				12 to 1	94	8	1	103	0.029
				1 to 2	51	4	1	56	0.029
				2 to 3	51	4	1	56	0.029
				3 to 4	47	4	1	52	0.028
				4 to 5	4	0	1	5	0.027
				5 to 6	4	0	1	5	0.027
				6 to 7	4	0	1	5	0.027
				7 to 8	4	0	1	5	0.027
				8 to 9	4	0	1	5	0.027
				9 to 10				0	0.000
				10 to 11				0	0.000
				11 to 12				0	0.000

Alternative 4b

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	0.065	0.031	0.490
Snowcoach	BAT	0.033	0.003	0.060
Snowcoach	Admin	0.030	0.010	0.040

Visitor Snowmobiles	Visitor Snowcoaches	Administrative Travel Snowmobiles	Administrative Travel Snowcoaches	Hour	# vehs / pk hr Snowmobiles	# vehs / pk hr Snowcoaches	Admin Snowcoaches	Tot Veh.	Site 3 E- Factor (g/mi) Cruise Speed
				12 to 1				0	0.000
				1 to 2				0	0.000
				2 to 3				0	0.000
				3 to 4				0	0.000
				4 to 5				0	0.000
				5 to 6				0	0.000
				6 to 7				0	0.000
13	**38**	**39**	**5**	7 to 8	4	0	1	5	0.027
				8 to 9	4	0	1	5	0.027
				9 to 10	10	8	1	19	0.018
				10 to 11	13	15	1	29	0.016
				11 to 12	13	15	1	29	0.016
				12 to 1	13	15	1	29	0.016
				1 to 2	10	8	1	19	0.018
				2 to 3	10	8	1	19	0.018
				3 to 4	6	8	1	15	0.015
				4 to 5	4	0	1	5	0.027
				5 to 6	4	0	1	5	0.027
				6 to 7	4	0	1	5	0.027
				7 to 8	4	0	1	5	0.027
				8 to 9	4	0	1	5	0.027
				9 to 10				0	0.000
				10 to 11				0	0.000
				11 to 12				0	0.000

Alternative 4c

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	E-BAT	0.065	0.031	0.490
Snowcoach	BAT	0.033	0.003	0.059
Snowcoach	Admin	0.030	0.010	0.040

Visitor		Administrative Travel			# vehs / pk hr		Admin		Site 3 E- Factor (g/mi)
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Snowcoaches	Tot Veh.	Cruise Speed
				12 to 1				0	0.000
				1 to 2				0	0.000
				2 to 3				0	0.000
				3 to 4				0	0.000
				4 to 5				0	0.000
				5 to 6				0	0.000
				6 to 7				0	0.000
217	38	39	5	7 to 8	4	0	1	5	0.027
				8 to 9	4	0	1	5	0.027
				9 to 10	51	8	1	60	0.027
				10 to 11	94	15	1	110	0.027
				11 to 12	94	15	1	110	0.027
				12 to 1	94	15	1	110	0.027
				1 to 2	51	8	1	60	0.027
				2 to 3	51	8	1	60	0.027
				3 to 4	47	8	1	56	0.027
				4 to 5	4	0	1	5	0.027
				5 to 6	4	0	1	5	0.027
				6 to 7	4	0	1	5	0.027
				7 to 8	4	0	1	5	0.027
				8 to 9	4	0	1	5	0.027
				9 to 10				0	0.000
				10 to 11				0	0.000
				11 to 12				0	0.000

Alternative 4d

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	0.065	0.031	0.490
Snowcoach	BAT	0.033	0.003	0.060
Snowcoach	Admin	0.030	0.010	0.040

Visitor		Administrative Travel			# vehs / pk hr		Admin		Site 3 E- Factor (g/mi)
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Snowcoaches	Tot Veh.	Cruise Speed
				12 to 1				0	0.000
				1 to 2				0	0.000
				2 to 3				0	0.000
				3 to 4				0	0.000
				4 to 5				0	0.000
				5 to 6				0	0.000
				6 to 7				0	0.000
13	77	39	5	7 to 8	4	0	1	5	0.027
				8 to 9	4	0	1	5	0.027
				9 to 10	10	15	1	26	0.014
				10 to 11	13	31	1	45	0.011
				11 to 12	13	31	1	45	0.011
				12 to 1	13	31	1	45	0.011
				1 to 2	10	15	1	26	0.014
				2 to 3	10	15	1	26	0.014
				3 to 4	6	15	1	22	0.011
				4 to 5	4	0	1	5	0.027
				5 to 6	4	0	1	5	0.027
				6 to 7	4	0	1	5	0.027
				7 to 8	4	0	1	5	0.027
				8 to 9	4	0	1	5	0.027
				9 to 10				0	0.000
				10 to 11				0	0.000
				11 to 12				0	0.000

Site 3: Canyon to Fishing Bridge

CO Emissions

Alternative 4a-AVG

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	25.0	4.0	216.0
Snowcoach	BAT	10.9	84.0	10.6
Snowcoach	Admin	1.0	0.7	6.7

Visitor		Administrative Travel			# vehs / pk hr		Admin		AVG Site 3
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Snowcoaches	Tot Veh.	E- Factor (g/mi) Cruise Speed
				12 to 1				0	0
				1 to 2				0	0
				2 to 3				0	0
				3 to 4				0	0
				4 to 5				0	0
				5 to 6				0	0
				6 to 7				0	0
155	**19**	**39**	**5**	7 to 8	4	0	1	5	3.34
				8 to 9	4	0	1	5	3.34
				9 to 10	39	4	1	44	11.20
				10 to 11	70	8	1	79	12.06
				11 to 12	70	8	1	79	12.06
				12 to 1	70	8	1	79	12.06
				1 to 2	39	4	1	44	11.20
				2 to 3	39	4	1	44	11.20
				3 to 4	35	4	1	40	11.92
				4 to 5	4	0	1	5	3.34
				5 to 6	4	0	1	5	3.34
				6 to 7	4	0	1	5	3.34
				7 to 8	4	0	1	5	3.34
				8 to 9	4	0	1	5	3.34
				9 to 10				0	0
				10 to 11				0	0
				11 to 12				0	0

Alternative 4c-AVG

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	E-BAT	16.7	2.7	144.0
Snowcoach	BAT	13.3	123.9	10.7
Snowcoach	Admin	1.0	0.7	6.7

Visitor Snowmobiles	Visitor Snowcoaches	Administrative Travel Snowmobiles	Administrative Travel Snowcoaches	Hour	# vehs / pk hr Snowmobiles	# vehs / pk hr Snowcoaches	Admin Snowcoaches	Tot Veh.	AVG Site 3 E- Factor (g/mi) Cruise Speed
				12 to 1				0	0
				1 to 2				0	0
				2 to 3				0	0
				3 to 4				0	0
				4 to 5				0	0
				5 to 6				0	0
				6 to 7				0	0
176	**29**	**39**	**5**	7 to 8	4	0	1	5	2.28
				8 to 9	4	0	1	5	2.28
				9 to 10	43	6	1	50	17.18
				10 to 11	78	12	1	91	18.63
				11 to 12	78	12	1	91	18.63
				12 to 1	78	12	1	91	18.63
				1 to 2	43	6	1	50	17.18
				2 to 3	43	6	1	50	17.18
				3 to 4	39	6	1	46	18.44
				4 to 5	4	0	1	5	2.28
				5 to 6	4	0	1	5	2.28
				6 to 7	4	0	1	5	2.28
				7 to 8	4	0	1	5	2.28
				8 to 9	4	0	1	5	2.28
				9 to 10				0	0
				10 to 11				0	0
				11 to 12				0	0

Alternative 4d-AVG

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	25.0	4.0	216.0
Snowcoach	BAT	14.3	140.8	10.8
Snowcoach	Admin	1.0	0.7	6.7

Visitor Snowmobiles	Visitor Snowcoaches	Administrative Travel Snowmobiles	Administrative Travel Snowcoaches	Hour	# vehs / pk hr Snowmobiles	# vehs / pk hr Snowcoaches	Admin Snowcoaches	Tot Veh.	AVG Site 3 E- Factor (g/mi) Cruise Speed
				12 to 1				0	0
				1 to 2				0	0
				2 to 3				0	0
				3 to 4				0	0
				4 to 5				0	0
				5 to 6				0	0
				6 to 7				0	0
13	**58**	**39**	**5**	7 to 8	4	0	1	5	3.34
				8 to 9	4	0	1	5	3.34
				9 to 10	10	12	1	23	75.23
				10 to 11	13	23	1	37	88.95
				11 to 12	13	23	1	37	88.95
				12 to 1	13	23	1	37	88.95
				1 to 2	10	12	1	23	75.23
				2 to 3	10	12	1	23	75.23
				3 to 4	6	12	1	19	90.23
				4 to 5	4	0	1	5	3.34
				5 to 6	4	0	1	5	3.34
				6 to 7	4	0	1	5	3.34
				7 to 8	4	0	1	5	3.34
				8 to 9	4	0	1	5	3.34
				9 to 10				0	0
				10 to 11				0	0
				11 to 12				0	0

Site 3: Canyon to Fishing Bridge

NOx Emissions

Alternative 4a-AVG

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	520.0	1100.0	61.0
Snowcoach	BAT	531.0	498.0	414.0
Snowcoach	Admin	1470.0	1005.0	1332.0

Visitor		Administrative Travel			# vehs / pk hr		Admin		AVG Site 3 E- Factor (g/mi)
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Snowcoaches	Tot Veh.	Cruise Speed
				12 to 1				0	0
				1 to 2				0	0
				2 to 3				0	0
				3 to 4				0	0
				4 to 5				0	0
				5 to 6				0	0
				6 to 7				0	0
155	19	39	5	7 to 8	4	0	1	5	1081.00
				8 to 9	4	0	1	5	1081.00
				9 to 10	39	4	1	44	1043.11
				10 to 11	70	8	1	79	1037.84
				11 to 12	70	8	1	79	1037.84
				12 to 1	70	8	1	79	1037.84
				1 to 2	39	4	1	44	1043.11
				2 to 3	39	4	1	44	1043.11
				3 to 4	35	4	1	40	1037.43
				4 to 5	4	0	1	5	1081.00
				5 to 6	4	0	1	5	1081.00
				6 to 7	4	0	1	5	1081.00
				7 to 8	4	0	1	5	1081.00
				8 to 9	4	0	1	5	1081.00
				9 to 10				0	0
				10 to 11				0	0
				11 to 12				0	0

Alternative 4c-AVG

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	E-BAT	347.0	733.0	41.0
Snowcoach	BAT	506.0	488.0	409.0
Snowcoach	Admin	1470.0	1005.0	1332.0

Visitor Snowmobiles	Visitor Snowcoaches	Administrative Travel Snowmobiles	Administrative Travel Snowcoaches	Hour	# vehs / pk hr Snowmobiles	# vehs / pk hr Snowcoaches	Admin Snowcoaches	Tot Veh.	AVG Site 3 E- Factor (g/mi) Cruise Speed
				12 to 1				0	0
				1 to 2				0	0
				2 to 3				0	0
				3 to 4				0	0
				4 to 5				0	0
				5 to 6				0	0
				6 to 7				0	0
176	**29**	**39**	**5**	7 to 8	4	0	1	5	787.40
				8 to 9	4	0	1	5	787.40
				9 to 10	43	6	1	50	709.04
				10 to 11	78	12	1	91	703.68
				11 to 12	78	12	1	91	703.68
				12 to 1	78	12	1	91	703.68
				1 to 2	43	6	1	50	709.04
				2 to 3	43	6	1	50	709.04
				3 to 4	39	6	1	46	706.96
				4 to 5	4	0	1	5	787.40
				5 to 6	4	0	1	5	787.40
				6 to 7	4	0	1	5	787.40
				7 to 8	4	0	1	5	787.40
				8 to 9	4	0	1	5	787.40
				9 to 10				0	0
				10 to 11				0	0
				11 to 12				0	0

Alternative 4d-AVG

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	520.0	1100.0	61.0
Snowcoach	BAT	498.0	485.0	409.0
Snowcoach	Admin	1470.0	1005.0	1332.0

Visitor Snowmobiles	Visitor Snowcoaches	Administrative Travel Snowmobiles	Administrative Travel Snowcoaches	Hour	# vehs / pk hr Snowmobiles	# vehs / pk hr Snowcoaches	Admin Snowcoaches	Tot Veh.	AVG Site 3 E- Factor (g/mi) Cruise Speed
				12 to 1				0	0
				1 to 2				0	0
				2 to 3				0	0
				3 to 4				0	0
				4 to 5				0	0
				5 to 6				0	0
				6 to 7				0	0
13	**58**	**39**	**5**	7 to 8	4	0	1	5	1081.00
				8 to 9	4	0	1	5	1081.00
				9 to 10	10	12	1	23	775.00
				10 to 11	13	23	1	37	715.14
				11 to 12	13	23	1	37	715.14
				12 to 1	13	23	1	37	715.14
				1 to 2	10	12	1	23	775.00
				2 to 3	10	12	1	23	775.00
				3 to 4	6	12	1	19	706.58
				4 to 5	4	0	1	5	1081.00
				5 to 6	4	0	1	5	1081.00
				6 to 7	4	0	1	5	1081.00
				7 to 8	4	0	1	5	1081.00
				8 to 9	4	0	1	5	1081.00
				9 to 10				0	0
				10 to 11				0	0
				11 to 12				0	0

Site 3: Canyon to Fishing Bridge

PM Emissions

Alternative 4a-AVG

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	0.065	0.031	0.490
Snowcoach	BAT	0.033	0.003	0.059
Snowcoach	Admin	0.030	0.010	0.040

Visitor		Administrative Travel			# vehs / pk hr		Admin		AVG Site 3 E- Factor (g/mi)
Snowmobiles	Snowcoaches	Snowmobiles	Snowcoaches	Hour	Snowmobiles	Snowcoaches	Snowcoaches	Tot Veh.	Cruise Speed
				12 to 1				0	0.000
				1 to 2				0	0.000
				2 to 3				0	0.000
				3 to 4				0	0.000
				4 to 5				0	0.000
				5 to 6				0	0.000
				6 to 7				0	0.000
155	19	39	5	7 to 8	4	0	1	5	0.027
				8 to 9	4	0	1	5	0.027
				9 to 10	39	4	1	44	0.028
				10 to 11	70	8	1	79	0.028
				11 to 12	70	8	1	79	0.028
				12 to 1	70	8	1	79	0.028
				1 to 2	39	4	1	44	0.028
				2 to 3	39	4	1	44	0.028
				3 to 4	35	4	1	40	0.028
				4 to 5	4	0	1	5	0.027
				5 to 6	4	0	1	5	0.027
				6 to 7	4	0	1	5	0.027
				7 to 8	4	0	1	5	0.027
				8 to 9	4	0	1	5	0.027
				9 to 10				0	0.000
				10 to 11				0	0.000
				11 to 12				0	0.000

Alternative 4c-AVG

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	E-BAT	0.065	0.031	0.490
Snowcoach	BAT	0.033	0.003	0.059
Snowcoach	Admin	0.030	0.010	0.040

Visitor Snowmobiles	Visitor Snowcoaches	Administrative Travel Snowmobiles	Administrative Travel Snowcoaches	Hour	# vehs / pk hr Snowmobiles	# vehs / pk hr Snowcoaches	Admin Snowcoaches	Tot Veh.	AVG Site 3 E- Factor (g/mi) Cruise Speed
				12 to 1				0	0.000
				1 to 2				0	0.000
				2 to 3				0	0.000
				3 to 4				0	0.000
				4 to 5				0	0.000
				5 to 6				0	0.000
				6 to 7				0	0.000
176	**29**	**39**	**5**	7 to 8	4	0	1	5	0.027
				8 to 9	4	0	1	5	0.027
				9 to 10	43	6	1	50	0.027
				10 to 11	78	12	1	91	0.027
				11 to 12	78	12	1	91	0.027
				12 to 1	78	12	1	91	0.027
				1 to 2	43	6	1	50	0.027
				2 to 3	43	6	1	50	0.027
				3 to 4	39	6	1	46	0.027
				4 to 5	4	0	1	5	0.027
				5 to 6	4	0	1	5	0.027
				6 to 7	4	0	1	5	0.027
				7 to 8	4	0	1	5	0.027
				8 to 9	4	0	1	5	0.027
				9 to 10				0	0.000
				10 to 11				0	0.000
				11 to 12				0	0.000

Alternative 4d-AVG

Snow Equipment	BAT Requirements	Emission Factors and Traveling Speeds: Low Speed (g/veh-mi)	Cruise Speed (g/veh-mi)	Idle (g/hr)
Snowmobile	New BAT	0.065	0.031	0.490
Snowcoach	BAT	0.033	0.003	0.060
Snowcoach	Admin	0.030	0.010	0.040

Visitor Snowmobiles	Visitor Snowcoaches	Administrative Travel Snowmobiles	Administrative Travel Snowcoaches	Hour	# vehs / pk hr Snowmobiles	# vehs / pk hr Snowcoaches	Admin Snowcoaches	Tot Veh.	AVG Site 3 E- Factor (g/mi) Cruise Speed
				12 to 1				0	0.000
				1 to 2				0	0.000
				2 to 3				0	0.000
				3 to 4				0	0.000
				4 to 5				0	0.000
				5 to 6				0	0.000
				6 to 7				0	0.000
13	**58**	**39**	**5**	7 to 8	4	0	1	5	0.027
				8 to 9	4	0	1	5	0.027
				9 to 10	10	12	1	23	0.015
				10 to 11	13	23	1	37	0.013
				11 to 12	13	23	1	37	0.013
				12 to 1	13	23	1	37	0.013
				1 to 2	10	12	1	23	0.015
				2 to 3	10	12	1	23	0.015
				3 to 4	6	12	1	19	0.012
				4 to 5	4	0	1	5	0.027
				5 to 6	4	0	1	5	0.027
				6 to 7	4	0	1	5	0.027
				7 to 8	4	0	1	5	0.027
				8 to 9	4	0	1	5	0.027
				9 to 10				0	0.000
				10 to 11				0	0.000
				11 to 12				0	0.000