



Prepared for:
Air Resources Division
Research & Monitoring Branch
303-969-2820

May 2007 Monthly Report

Final Data

Gaseous Pollutants & Meteorology
NPS Gaseous Pollutant Monitoring Program

Monthly Data Summary May 2007

National Park Service Gaseous Pollutant Monitoring Program

ATTACHED DATA PRODUCTS

The data collected by the NPS Gaseous Pollutant Monitoring Program (GPMP) during the month of May 2007 have been fully validated and are considered final. The attached PDF file provides a brief summary of the data collected during the month. This summary contains the following data products:

1. Monthly Summary of Ozone Data by Site
2. Monthly Summary of Sulfur Dioxide Data by Site
3. Monthly Summary of Selected Meteorological Data by Site
4. Monthly Data Collection Statistics

Viewing the PDF file requires Adobe Acrobat Reader. If you do not have this software, you can obtain a free download at the following Web link: <http://www.adobe.com/products/acrobat/readstep2.html>

WEB ACCESS OF DATA PRODUCTS

If opening email attachments is prohibited on your network, you can find a copy of this and previous months' summaries on the GPMP Project Web Site at: <http://ard-aq-request.air-resource.com/project>. You will be prompted for a user name (type your name) and a password, which is 'npsair'. You may also visit this web site for more information about the GPMP.

*****Note: The GPMP Project Web Site is currently unavailable. Changes are in progress to improve access to the site. The site is expected to be fully operational again within a few weeks.**

WEB ACCESS OF HOURLY DATA AND DATA PLOTS

From the GPMP Data Request Web Site (<http://ard-aq-request.air-resource.com>) you may directly access hourly average data files or stacked data plots. Click on "Get Data Files" or "Get Plots" and follow the directions on the page.

CONTACT INFORMATION

If you have any specific questions or comments about this month's data, or would like additional information, please contact the GPMP contractor at:

Air Resource Specialists, Inc.
Information Management Center
Phone: 800-344-5423
Air-Imc@air-resource.com

Or contact the National Park Service Air Resources Division (NPS ARD):

John D. Ray, Ph.D.
Program Manager
Phone: 303-969-2820
John_d_ray@nps.gov

David Maxwell
Air Quality Monitoring Specialist
Phone: 303-969-2810
David_maxwell@nps.gov

Summary of Ozone Data by Site
05/01/2007 - 05/31/2007
National Park Service Gaseous Pollutant Monitoring Program

National Park Unit	Site Name	4 Highest Daily Maximum 8-Hour Average Concentrations ¹ (ppb)				# Days with 8-Hour Average O3 Values >=85 ppb ³	Highest Daily Maximum 1-Hour Average Concentrations ² (ppb)	
		1st Highest	2nd Highest	3rd Highest	4th Highest		1st Highest	# Days with 1-Hour Average O3 Values >=125 ppb
Abraham Lincoln Birthplace	Knob Creek High	72	71	69	67	0	77	0
Assateague Island	Maintenance Area	65	59	59	58	0	82	0
Badlands	Visitor Center	64	61	61	58	0	67	0
Big Bend	K-Bar Ranch Road	65	64	64	63	0	68	0
Canyonlands	Island in the Sky	71	68	67	64	0	74	0
Carlsbad Caverns	Maintenace Area	63	61	61	61	0	68	0
Chiricahua	Entrance Station	68	66	66	66	0	70	0
Colorado	Maintenance Yard	61	57	56	54	0	68	0
Craters of the Moon	Visitor Center	59	56	56	55	0	64	0
Cumberland Gap	Hensley Settlement	82	77	77	76	0	88	0
Death Valley	Park Village	85	83	83	81	1	92	0
Denali	Headquarters	51	51	49	48	0	53	0
Dinosaur	West Entrance Housing	64	63	63	62	0	72	0
Glacier	West Glacier Horse Stables	59	54	53	53	0	63	0
Grand Canyon	The Abyss	70	70	69	68	0	75	0
Great Basin	Maintenance Yard	75	73	73	72	0	79	0
Great Smoky Mountains	Clingmans Dome	83	79	78	75	0	88	0
Great Smoky Mountains	Cove Mountain	81	81	80	76	0	87	0
Great Smoky Mountains	Look Rock	87	85	81	80	2	93	0
Joshua Tree	Black Rock	95	89	89	88	5	105	0
Joshua Tree	Cottonwood Canyon	76	74	74	72	0	86	0
Joshua Tree	Pinto Wells	82	77	76	75	0	84	0
Lassen Volcanic	Manzanita Lake Fire Str.	73	73	72	71	0	77	0
Mammoth Cave	Houchin Meadow	81	79	78	73	0	87	0
Mesa Verde	Resource Mngmt Area	72	71	68	68	0	77	0
Mojave	Kelso Mountains	81	80	79	79	0	89	0
Mount Rainier	Tahoma Woods	65	62	53	47	0	71	0
Natchez Trace Parkway	Dancy Ranger Station	70	68	64	61	0	79	0
North Cascades	Marblemount Ranger Str.	57	50	48	48	0	64	0
Padre Island	Malaquite Visitor Center	77	75	75	72	0	81	0

Summary of Ozone Data by Site
05/01/2007 - 05/31/2007
National Park Service Gaseous Pollutant Monitoring Program

National Park Unit	Site Name	4 Highest Daily Maximum 8-Hour Average Concentrations ¹ (ppb)					Highest Daily Maximum 1-Hour Average Concentrations ² (ppb)	
		1st Highest	2nd Highest	3rd Highest	4th Highest	# Days with 8-Hour Average O3 Values \geq 85 ppb ³	1st Highest	# Days with 1-Hour Average O3 Values \geq 125 ppb
Petrified Forest	South Entrance	71	69	68	68	0	74	0
Pinnacles	SW of East Entrance Stn.	77	73	70	67	0	82	0
Rocky Mountain	Long's Peak	69	68	66	65	0	72	0
Sequoia and Kings Canyon	Ash Mountain	94	94	90	86	4	104	0
Sequoia and Kings Canyon	Lower Kaweah	79	76	75	69	0	85	0
Shenandoah	Big Meadows	74	72	72	70	0	78	0
Voyageurs	Sullivan Bay	63	63	59	58	0	66	0
Yellowstone	Water Tank	66	64	62	62	0	72	0
Yosemite	Mobile	71	70	68	68	0	93	0
Yosemite	School Yard	66	61	61	60	0	72	0
Yosemite	Turtleback Dome	92	82	79	79	1	96	0
Zion	Dalton's Wash	71	71	69	68	0	74	0

1. The primary and secondary National Ambient Air Quality Standard for ozone is 0.08 ppm over an 8-hour period. (Attainment of the primary standard is reached if the annual fourth highest daily maximum 8-hour ozone concentration, averaged over three years, does not exceed 0.08 ppm, 84 ppb, or 157 $\mu\text{g}/\text{m}^3$.) (40 CFR 50.10 with reference to Appendix D and I.)

2. The primary and secondary National Ambient Air Quality Standard for ozone is 0.12 ppm over a 1-hour period not to be exceeded more than once per year. (A value greater than 0.12 ppm, 124 ppb, or 235 $\mu\text{g}/\text{m}^3$.) (40 CFR 50.9 with reference to Appendix D and H.)

3. An exceedance of the National Ambient Air Quality Standard for ozone occurs when an 8-hour average ozone concentration exceeds 0.08 ppm, 84 ppb, or 157 $\mu\text{g}/\text{m}^3$. (40 CFR 50.10 with reference to Appendix D and I.)

Summary of Sulfur Dioxide Data by Site
05/01/2007 - 05/31/2007
National Park Service Gaseous Pollutant Monitoring Program

National Park Unit	Site Name	Highest Hourly Average Concentration (ppb)	Highest Daily Maximum 3-Hour Average Concentrations ¹ (ppb)		Highest Daily Maximum 24-Hour Average Concentrations ² (ppb)	
			1st Highest	# Days with 3-Hour Average SO ₂ Values >=550 ppb	1st Highest	# Days with 24-Hour Average SO ₂ Values >=145 ppb
Great Smoky Mountains	Cove Mountain	8	5.3	0	2.6	0
Hawaii Volcanoes	Observatory - Additional	565	329.3	0	166.9	1
Hawaii Volcanoes	Visitor Center - Additional	550	434.3	0	187.5	1
Shenandoah	Big Meadows	Insufficient Data				

1. The secondary National Ambient Air Quality Standard for sulfur dioxide is 0.5 ppm over a 3-hour period not to be exceeded more than once per year. (A value greater than 0.5 ppm, 549 ppb, or 1300 µg/m³ exceeds the standard.) (40 CFR 50.5.)

2. The primary National Ambient Air Quality Standard for sulfur dioxide is 0.14 ppm over a 24-hour period not to be exceeded more than once per year. (A value greater than 0.14 ppm, 144 ppb, or 365 µg/m³ exceeds the standard.) (40 CFR 50.4.)

Summary of Selected Meteorological Data by Site
05/01/2007 - 05/31/2007
National Park Service Gaseous Pollutant Monitoring Program

National Park Unit	Site Name	Wind Speed (Scalar) (m/s)	Ambient Temperature (degrees C)			Relative Humidity (%)			Precipitation (mm)
		Average	Average	Maximum	Minimum	Average	Maximum	Minimum	Accumulated during period
Abraham Lincoln Birthplace	Knob Creek High	0.5	20.7	31.3	4.9	65	98	25	84.0
Assateague Island	Maintenance Area	1.6	17.1	30.4	7.2	74	100	32	21.4
Badlands	Visitor Center	4.3	16.8	33.7	6.1	58	99	18	41.1
Big Bend	K-Bar Ranch Road	3.7	22.9	35.4	13.0	50	96	3	2.5
Canyonlands	Island in the Sky	3.2	16.0	27.6	2.4	30	96	3	21.2
Carlsbad Caverns	Maintenance Area	4.6	19.2	31.3	10.3	54	98	10	83.1
Chiricahua	Entrance Station	3.2	20.0	29.7	8.1	27	81	7	15.3
Colorado	Maintenance Yard	1.8	17.3	29.4	3.5	33	98	4	4.3
Craters of the Moon	Visitor Center	3.7	12.7	25.7	-3.8	35	95	9	—
Cumberland Gap	Hensley Settlement	2.0	16.9	25.2	4.2	63	100	16	64.1
Death Valley	Park Village	4.5	31.7	40.6	17.6	9	24	3	0.0
Denali	Headquarters	1.5	7.1	22.0	-1.4	60	99	17	15.2
Dinosaur	West Entrance Housing	1.4	16.6	31.1	2.3	43	95	9	29.3
Everglades	Beard Center	2.8	23.6	30.9	13.2	81	100	40	178.7
Glacier	West Glacier Horse Stables	0.9	10.7	27.4	-1.9	66	99	12	70.1
Grand Canyon	The Abyss	3.0	15.1	26.2	-1.1	28	100	5	26.8
Great Basin	Maintenance Yard	3.2	14.1	25.2	-1.3	25	96	7	9.1
Great Smoky Mountains	Cades Cove	1.0	18.5	29.1	1.4	66	100	17	79.0
Great Smoky Mountains	Clingmans Dome	3.6	11.0	18.8	-0.2	69	100	1	63.9
Great Smoky Mountains	Cove Mountain	3.5	16.3	23.3	3.1	62	100	21	16.6
Great Smoky Mountains	Look Rock	2.3	18.9	26.1	6.5	57	99	18	51.0
Hawaii Volcanoes	Observatory	5.3	16.2	23.0	12.4	86	100	55	13.2
Hawaii Volcanoes	Visitor Center	4.0	14.0	19.7	10.3	89	100	60	44.2
Joshua Tree	Black Rock	4.2	20.1	28.2	6.1	19	69	3	0.0
Joshua Tree	Cottonwood Canyon	3.4	23.1	31.0	10.4	19	65	3	0.0
Joshua Tree	Pinto Wells	3.4	27.9	37.6	15.1	14	50	3	0.0
Lassen Volcanic	Manzanita Lake Fire Strn.	2.0	10.0	23.4	-5.2	53	100	8	29.4
Mammoth Cave	Houchin Meadow	1.4	21.0	30.4	6.2	62	100	27	67.7

Summary of Selected Meteorological Data by Site
05/01/2007 - 05/31/2007
National Park Service Gaseous Pollutant Monitoring Program

National Park Unit	Site Name	Wind Speed (Scalar) (m/s)	Ambient Temperature (degrees C)			Relative Humidity (%)			Precipitation (mm)
		Average	Average	Maximum	Minimum	Average	Maximum	Minimum	Accumulated during period
Mesa Verde	Resource Mngment Area	3.1	13.5	23.8	0.7	45	96	11	61.0
Mojave	Kelso Mountains	3.4	23.4	30.4	13.7	16	48	7	0.0
Mount Rainier	Tahoma Woods	1.1	10.9	29.0	0.1	75	99	20	51.7
Natchez Trace Parkway	Dancy Ranger Station	0.3	21.2	32.6	5.5	75	98	25	49.8
North Cascades	Marblemount Ranger Stn.	1.6	12.2	30.0	2.4	69	96	11	49.5
Padre Island	Malaquite Visitor Center	6.1	25.2	28.4	19.8	81	96	52	109.6
Petrified Forest	South Entrance	4.5	17.1	28.3	0.6	36	99	6	10.0
Pinnacles	SW of East Entrance Stn.	2.6	16.3	33.7	1.9	50	95	5	0.0
Rocky Mountain	Long's Peak	2.2	6.3	17.9	-5.6	58	96	20	33.5
Sequoia and Kings Canyon	Ash Mountain	2.7	20.2	31.3	5.3	40	91	10	1.2
Sequoia and Kings Canyon	Lower Kaweah	1.9	11.2	19.7	-1.3	59	100	23	4.5
Shenandoah	Big Meadows	2.2	13.2	23.1	0.6	69	98	19	105.0
Theodore Roosevelt	Painted Cany. VC	5.7	12.9	27.5	2.7	69	100	23	80.5
Voyageurs	Sullivan Bay	2.9	13.4	29.3	-0.7	64	98	17	77.7
Wind Cave	Visitor Center	3.4	13.0	29.1	0.8	55	97	13	61.3
Yellowstone	Old Faithful	2.0	7.5	21.7	-4.1	55	97	11	—
Yellowstone	Water Tank	1.9	5.5	19.0	-5.3	56	94	16	21.5
Yosemite	Mobile	—	14.9	28.8	0	62	100	19	—
Yosemite	School Yard	0.8	14.2	28.1	-0.4	57	95	15	18.1
Yosemite	Turtleback Dome	4.4	13.7	21.8	-0.5	44	99	16	0.0
Zion	Dalton's Wash	3.3	22.2	33.9	6.3	18	75	4	0.0

Data Collections Statistics by Site
05/01/2007 - 05/31/2007
National Park Service Gaseous Pollutant Monitoring Program

National Park Unit	Site Name	Parameter Code											
		O3 % valid ¹	SO2 % valid ¹	SO2Add % valid ¹	VWD % valid ¹	SWS % valid ¹	TMP % valid ¹	RH % valid ¹	RNF % valid ¹	WET % valid ¹	DTP % valid ¹	SOL % valid ¹	FLOW % valid ¹
Abraham Lincoln Birthplace	Knob Creek High	96.8	—	—	100.0	100.0	100.0	100.0	100.0	—	—	100.0	—
Assateague Island	Maintenance Area	100.0	—	—	100.0	100.0	100.0	100.0	100.0	—	—	100.0	—
Badlands	Visitor Center	98.5	—	—	99.5	99.5	99.5	99.5	80.0	—	—	99.5	—
Big Bend	K-Bar Ranch Road	98.7	—	—	99.2	99.2	98.5	99.2	99.2	99.2	73.9	99.2	99.6
Canyonlands	Island in the Sky	99.5	—	—	100.0	100.0	52.3	100.0	99.3	99.3	52.3	98.7	100.0
Carlsbad Caverns	Maintenance Area	95.4	—	—	100.0	100.0	100.0	100.0	100.0	—	—	100.0	100.0
Chiricahua	Entrance Station	98.9	—	—	100.0	100.0	100.0	100.0	99.3	99.3	100.0	100.0	100.0
Colorado	Maintenance Yard	58.3	—	—	100.0	100.0	100.0	100.0	100.0	—	—	100.0	—
Craters of the Moon	Visitor Center	23.9	—	—	99.5	99.5	99.5	99.5	—	—	—	100.0	—
Cumberland Gap	Hensley Settlement	99.9	—	—	100.0	100.0	100.0	100.0	100.0	—	—	100.0	—
Death Valley	Park Village	99.3	—	—	100.0	100.0	100.0	100.0	99.3	99.3	100.0	100.0	100.0
Denali	Headquarters	78.9	—	—	99.3	99.3	99.3	100.0	99.3	99.6	99.3	100.0	99.6
Dinosaur	West Entrance Housing	95.6	—	—	100.0	100.0	100.0	100.0	100.0	—	—	100.0	100.0
Everglades	Beard Center	—	—	—	100.0	100.0	100.0	97.0	99.2	99.2	100.0	100.0	100.0
Glacier	West Glacier Horse Stables	97.6	—	—	99.7	99.7	99.7	100.0	99.1	99.1	99.7	99.3	100.0
Grand Canyon	The Abyss	99.9	—	—	100.0	100.0	100.0	100.0	99.3	99.3	100.0	100.0	100.0
Great Basin	Maintenance Yard	99.1	—	—	99.1	99.1	99.1	99.1	98.9	98.9	99.1	99.1	99.9
Great Smoky Mountains	Cades Cove	—	—	—	100.0	100.0	100.0	100.0	99.5	—	—	100.0	—
Great Smoky Mountains	Clingmans Dome	98.7	—	—	100.0	100.0	100.0	100.0	99.3	—	—	100.0	—
Great Smoky Mountains	Cove Mountain	99.5	99.6	—	99.9	99.9	99.9	99.9	89.2	—	—	—	—
Great Smoky Mountains	Look Rock	99.6	—	—	100.0	100.0	100.0	100.0	99.3	99.2	100.0	100.0	99.9
Hawaii Volcanoes	Observatory	—	94.2	94.2	100.0	100.0	100.0	100.0	99.6	—	—	—	—
Hawaii Volcanoes	Visitor Center	—	95.6	95.6	100.0	100.0	34.1	34.1	99.6	—	—	100.0	—
Joshua Tree	Black Rock	98.9	—	—	99.6	99.6	99.5	99.5	98.7	98.7	99.5	99.5	99.7
Joshua Tree	Cottonwood Canyon	95.4	—	—	99.5	99.5	99.5	99.6	91.8	—	—	99.6	—
Joshua Tree	Pinto Wells	90.8	—	—	97.5	97.5	97.5	97.5	97.5	—	—	97.5	97.5
Lassen Volcanic	Manzanita Lake Fire Stn.	99.5	—	—	100.0	100.0	100.0	100.0	99.3	99.5	100.0	100.0	100.0
Mammoth Cave	Houchin Meadow	94.9	—	—	100.0	100.0	100.0	100.0	99.3	99.3	100.0	100.0	100.0
Mesa Verde	Resource Mngment Area	99.5	—	—	99.7	99.7	99.7	100.0	99.3	99.3	99.7	99.7	100.0
Mojave	Kelso Mountains	99.3	—	—	100.0	100.0	100.0	100.0	99.3	—	—	100.0	—
Mount Rainier	Tahoma Woods	99.5	—	—	100.0	100.0	100.0	100.0	99.9	99.9	100.0	100.0	100.0
Natchez Trace Parkway	Dancy Ranger Station	100.0	—	—	100.0	100.0	100.0	100.0	100.0	—	—	96.8	—
North Cascades	Marblemount Ranger Stn.	97.0	—	—	97.6	97.6	97.6	97.6	96.9	96.9	95.4	97.4	98.1

Data Collections Statistics by Site
05/01/2007 - 05/31/2007
National Park Service Gaseous Pollutant Monitoring Program

National Park Unit	Site Name	Parameter Code											
		O3 % valid ¹	SO2 % valid ¹	SO2Add % valid ¹	VWD % valid ¹	SWS % valid ¹	TMP % valid ¹	RH % valid ¹	RNF % valid ¹	WET % valid ¹	DTP % valid ¹	SOL % valid ¹	FLOW % valid ¹
Padre Island	Malaquite Visitor Center	92.5	—	—	100.0	100.0	100.0	100.0	100.0	—	—	100.0	—
Petrified Forest	South Entrance	99.7	—	—	100.0	100.0	100.0	100.0	98.9	98.9	100.0	100.0	100.0
Pinnacles	SW of East Entrance Stn.	98.1	—	—	98.7	98.7	98.7	98.8	98.0	98.0	98.7	98.7	98.9
Rocky Mountain	Long's Peak	95.0	—	—	100.0	100.0	100.0	100.0	99.3	99.3	100.0	99.9	99.9
Sequoia and Kings Canyon	Ash Mountain	99.6	—	—	100.0	100.0	100.0	100.0	99.7	99.7	100.0	100.0	100.0
Sequoia and Kings Canyon	Lower Kaweah	99.5	—	—	99.5	99.5	99.5	100.0	99.2	—	—	99.5	—
Shenandoah	Big Meadows	96.9	0.0	—	100.0	100.0	100.0	100.0	99.3	99.6	100.0	96.8	100.0
Theodore Roosevelt	Painted Cany. VC	—	—	—	95.3	82.4	80.8	95.4	95.2	94.9	80.8	40.3	95.8
Voyageurs	Sullivan Bay	98.8	—	—	0.0	99.9	99.9	99.9	99.3	99.5	99.9	99.9	99.9
Wind Cave	Visitor Center	—	—	—	99.2	99.2	99.2	99.2	98.7	98.7	99.2	98.7	84.1
Yellowstone	Old Faithful	—	—	—	99.7	99.7	99.7	99.7	—	—	—	—	—
Yellowstone	Water Tank	82.9	—	—	85.5	78.6	85.5	85.5	84.9	85.1	85.5	85.5	85.9
Yosemite	Mobile	100.0	—	—	—	—	100.0	100.0	—	—	—	—	—
Yosemite	School Yard	99.7	—	—	100.0	100.0	100.0	100.0	100.0	—	—	99.9	—
Yosemite	Turtleback Dome	96.6	—	—	100.0	100.0	100.0	100.0	99.2	99.3	100.0	100.0	100.0
Zion	Dalton's Wash	99.7	—	—	100.0	100.0	100.0	100.0	99.3	—	—	100.0	—
Average Network Data Collection		94.6	72.4	94.9	97.3	98.9	96.7	98.0	98.1	98.4	95.5	97.9	98.6

Key:

O3 = Ozone Analyzer
SO2 = Sulfur Dioxide Analyzer
SO2Add = Sulfur Dioxide Analyzer
VWD = Vector Wind Direction
SWS = Scalar Wind Speed
TMP = Ambient Temperature
RH = Relative Humidity
RNF = Precipitation
WET = Wetness Sensor
DTP = Delta Temperature
SOL = Solar Radiation
FLOW = Filter Pack Flow Rate

Performance Goals:

Monthly Criteria:
100% of sites, >= 60% valid data capture
90% of sites, >= 75% valid data capture
80% of sites, >= 85% valid data capture
Quarterly Criteria:
100% of sites, >= 85% valid data capture
90% of sites, >= 90% valid data capture
80% of sites, >= 95% valid data capture

1. Percent valid can be less than 100% due to calibrations, routine maintenance, power failures, audits or other circumstances where the instrument was not available to collect data. For example, automatic zeros and spans are performed daily on most ambient gas analyzers; therefore, no ambient gas data can be collected during this time. As a result, the maximum percent valid for ambient gas data typically cannot be greater than 95.8. Percent valid can also be less than 100% due to influencing factors such as instrument error, operator error, timing problems, flow issues, and other factors that affect instrument operation.

Color shading key:

- Acceptable: indicates data recovery of 85% - 100%
- Marginal: indicates data recovery of 75% - 84.9%
- Low: indicates data recovery of 60% - 74.9%
- Unacceptable: indicates data recovery of 0% - 59.9%