Table 1. 2019 Site Specification	IS.																		
						Latitude	Longitude												
Mating at Dauly Hait	Cha Nama	Chata	NPS Abbr.	CASTNET Abbr.	AQS	(degrees	(degrees	Elev.	O₃ Yearsª		CO	NO _x /	DM	WS/ WD	TMP	RH	RNF	SOL	Filter Pack ^b
National Park Unit Sites operated by the National	Site Name Park Service (Gaseous Pollutant	State			ID Number	north)	west)	(m)	Tears	SO ₂	СО	NO _Y	PM	WD	TIVIP	КП	KINE	JUL	Pack
Big Bend	K-Bar Ranch Road	TX	BIBE-KB	BBE401	48-043-0101	29.3028	103.1778	1057	30					Х	Х	Х	Х	Х	Х
Canyonlands	Island in the Sky	UT	CANY-IS	CAN407	49-037-0101	38.4583	109.8214	1794	28					X	X	X	X	Х	Х
Carlsbad Caverns	Biology Building	NM	CAVE-BB		35-015-0010	32.1783	104.4406	1357	1					X	X	Х	X	X	
Chaco Culture	Radio Repeater	NM	CHCU-RR	CHC432	35-045-0020	36.0350	107.9042	1965	3			Х		X	X	X	X	X	
Chiricahua	Entrance Station	AZ	CHIR-ES	CHA467	04-003-8001	32.0094	109.3892	1569	29					X	X	X	X	X	Х
Craters of the Moon	Visitor Center	ID	CRMO-VC		16-023-0101	43.4606	113.5622	1815	28					X	X			X	
Death Valley	Park Village	CA	DEVA-PV	DEV412	06-027-0101	36.5092	116.8481	125	27					X	X				
Denali	Headquarters	AK	DENA-HQ	DEN417	02-068-0003	63.7233	148.9675	663	33					X	X	Х	Х	Х	Х
Dinosaur	West Entrance Housing	UT	DINO-WE	DIN431	49-047-1002	40.4372	109.3047	1463	19					X	X		X	Х	X
Everglades	Beard Center	FL	EVER-BC	EVE419	12-086-0030	25.3911	80.6808	1						X	X	Х	X	Х	X
Glacier	West Glacier Horse Stables	MT	GLAC-WG	GLR468	30-029-8001	48.5103	113.9969	964	28					X	Х			X	X
Grand Canyon	The Abyss	AZ	GRCA-AS	GRC474	04-005-8001	36.0586	112.1836	2073	27					Х	X	Х	Х	Х	X
Grand Teton	Science School	WY	GRTE-SS	GRT434	56-039-0008	43.6708	110.5994	2105	9					X	X	Х	X	X	
Great Basin	Maintenance Yard	NV	GRBA-MY	GRB411	32-033-0101	39.0050	114.2158	2058	27					Х	X	X	Х	X	Х
Great Smoky Mountains	Cade's Cove	TN	GRSM-CC		47-009-0102	35.6042	83.7831	564	27					Х	X	Х	X	X	
Great Smoky Mountains	Clingmans Dome	TN	GRSM-CD		47-155-0102	35.5619	83.4981	2021	27					X		Х	Х	Х	
Great Smoky Mountains	Cove Mountain	TN	GRSM-CM		47-155-0101	35.6967	83.6086	1243	32					X	Х	X	Х		
Great Smoky Mountains	Look Rock NCore	TN	GRSM-LN	GRS420	47-009-0101	35.6336	83.9417	801		Х	Х	Х							
Great Smoky Mountains	Look Rock	TN	GRSM-LR	GRS420	47-009-0101	35.6336	83.9417	801	32				Х	Х	Х	Х	Х	Х	Х
Guadalupe Mountains	Maintenance Area	TX	GUMO-MA		48-109-0002	31.8914	-104.8097	1701	1					Х	Х	Х	Х	Х	
Hawaii Volcanoes	Visitor Center	НІ	HAVO-VC		15-001-0005	19.4308	155.2578	1215		Х			Х	Х	Х	Х	Х	Х	
Joshua Tree	Black Rock	CA	JOTR-BR	JOT403	06-071-9002	34.0694	116.3889	1243	27					Х	Х	Χ	Х	Х	Х
Joshua Tree	Cottonwood Visitor Center	CA	JOTR-CV		06-065-0010	33.7472	115.8201	943	2				Х	Х	Х	Х	Х	Х	
Joshua Tree	Pinto Wells	CA	JOTR-PW		06-065-1004	33.9397	115.4108	326	14					Х	Х	Х		Х	
Lassen Volcanic	Manzanita Lake Fire Station	CA	LAVO-ML	LAV410	06-089-3003	40.5400	121.5764	1755	33					Х	Х	Х	Х	Х	Х
Mammoth Cave	Houchin Meadow	KY	MACA-HM	MAC426	21-061-0501	37.1317	86.1431	230	23	Х	Χ	Х		Х	Х	Χ	Х	Х	Х
Mesa Verde	Resource Management Area	СО	MEVE-RM	MEV405	08-083-0101	37.1983	108.4906	2170	27					Х	Х	Х	Х	Х	Х
Minidoka	Maintenance Building	ID	MIIN-MB		16-053-0003	42.6800	114.2525	1223					Х	Х	Х	Χ			
Mojave	Kelso Mountains	CA	MOJA-KM		06-071-1001	35.1019	115.7767	1212	13					Х	Х	Х		Х	
Petrified Forest	South Entrance	AZ	PEFO-SE	PET427	04-017-0119	34.8225	109.8950	1712	18					Х	Х			Х	Х

Table 1. 2019 Site Specification	ons (continued).																		
National Park Unit	Site Name	State	NPS Abbr.	CASTNET Abbr.	AQS ID Number	Latitude (degrees north)	Longitude (degrees west)	Elev. (m)	O ₃ Years ^a	SO ₂	со	NO _x /	PM	WS/ WD	TMP	RH	RNF	SOL	Filter Pack ^b
Sites operated by the Nationa	al Park Service (Gaseous Pollutan	Monitor	ing Program)																
Pinnacles	SW of East Entrance Station	CA	PINN-ES	PIN414	06-069-0003	36.4833	121.1569	317	33					Х	Х	Х	Х	Х	Х
Rocky Mountain	Long's Peak	СО	ROMO-LP	ROM406	08-069-0007	40.2710	105.5456	2742	36					Х	Х	Х	Х	Х	Х
Sequoia and Kings Canyon	Ash Mountain	CA	SEKI-AS	SEK430	06-107-0009	36.4894	118.8292	510	21				Х	Х	Х	Х	Х	Х	Х
Sequoia and Kings Canyon	Lower Kaweah	CA	SEKI-LK		06-107-0006	36.5658	118.7772	1890	36					Х	Х	Х	Х	Х	
Shenandoah	Big Meadows	VA	SHEN-BM	SHN418	51-113-0003	38.5231	78.4347	1068	37					Х	Х	Х	Х	Х	Х
Voyageurs	Sullivan Bay	MN	VOYA-SB	VOY413	27-137-0034	48.4128	92.8292	427	24					Х	Х	Х	Х	Х	Х
Yellowstone	Old Faithful Snow Lodge	WY	YELL-OS		56-039-1013	44.4582	110.8253	2230			Х	Х	Х	Х	Х	Х			
Yellowstone	West Entrance	MT	YELL-WS		30-031-0017	44.6569	111.0894	2030			Х	Х	Х	Х	Х	Х			
Yellowstone	Water Tank	WY	YELL-WT	YEL408	56-039-1011	44.5653	110.4003	2430	24					Х	Х	Х	Х	Х	Х
Yosemite	Turtleback Dome	CA	YOSE-TD	YOS404	06-043-0003	37.7133	119.7061	1599	27					Х	Х	Χ	Х	Х	Х
Zion	Dalton's Wash	UT	ZION-DW	ZIO433	49-053-0130	37.1983	113.1506	1213	16					Х	Х			Х	
Sites operated by the NPS for	the Bureau of Land Managemen	t																	
Meeker	Plant Science	СО	MEEK-PS		08-103-0005	40.0039	107.8475	1994	10			Х	Х	Х	Х	Х	Х	Х	Х
Rangely	Golf Course	СО	RANG-GC		08-103-0006	40.0869	108.7614	1655	10			Х	Х	Х		Χ	Х	Х	
Sites operated by cooperating	g state agencies																		
Acadia	Cadillac Mountain	ME	ACAD-CM		23-009-0102	44.3517	68.2269	466	25					Х	Х	Х			
Acadia	McFarland Hill	ME	ACAD-MH	ACA416	23-009-0103	44.3772	68.2608	153	22	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х
Badlands	Visitor Center	SD	BADL-VC		46-071-1001	43.7436	101.9414	739	15	Х			Х						
Cape Cod	Cape Cod	MA	CACO-XX		25-001-0002	41.9758	70.0247	41	33					Х	Х	Х		Х	
Chamizal	Chamizal	TX	CHAM-XX		48-141-0044	31.7656	106.4550	1128	28					Х	Х	Х		Х	
Congaree	Congaree Bluff	SC	COSW-BL		45-079-0021	33.8147	80.7811	34	20	Х									
Everglades	Cutler Road	FL	EVER-CR		12-086-0029	25.5861	80.3269	4	35										
Great Smoky Mountains	Purchase Knob	NC	GRSM-PK		37-087-0036	35.5900	83.0775	1550	25										
Indiana Dunes	Ammunition Bunker	IN	INDU-AB		18-089-0022	41.6067	87.3047	183	27	Х			Х	Х	Х	Х		Х	

Table 1. 2019 Site Specificati	ions (continued).																		
			NPS	CASTNET	AQS	Latitude (degrees	Longitude (degrees	Elev.	O ₃			NO _x /		WS/					Filter
National Park Unit	Site Name	State	Abbr.	Abbr.	ID Number	north)	west)	(m)	Years ^a	SO ₂	СО	NO_{Y}	PM	WD	TMP	RH	RNF	SOL	Pack ^b
Sites operated by cooperating	ng state agencies																		
Mount Rainier	Jackson Visitor's Center	WA	MORA-JV		53-053-0012	46.7853	121.7378	1615	22										
Saguaro	East	AZ	SAGU-EA		04-019-0021	32.1744	110.7364	938	28					Х	Χ	Х		Х	
Theodore Roosevelt	Painted Canyon, VC	ND	THRO-VC	THR422	38-007-0002	46.8947	103.3778	840	22	Χ			Χ	Χ	Х	Х	Χ	Χ	Χ
Wind Cave	Visitor Center	SD	WICA-VC	WNC429	46-033-0132	43.5575	103.4839	1288	16				Х	Х	Χ	Х	Х	Х	Х
Yosemite	Village	CA	YOSE-VI		06-043-1001	37.7458	119.6028	1216					Χ						

^a The values in this column represent the number of years an ozone analyzer has been operational at the site.

italics = site operated by a state agency

underline = site operated by the National Park Service, but consisting of non-EPA certified portable instrumentation

Parameter key: $O_3 = ozone (ppb)$

 SO_2 = sulfur dioxide (ppb)

CO = carbon monoxide (ppm)

 NO_X = oxides of nitrogen (ppb)

PM = particulate matter $(\mu g/m^3)$

WS = wind speed (m/s)

WD = wind direction (degrees)

TMP = air temperature (degrees C)

RH = relative humity (%)

RNF = precipitation (mm/hr)

SOL = solar radiation (watts/m²)

Note: Dashed lines indicate parameter not measured at that site.

^b A filter pack is a part of the CASTNET network and is used to measure dry deposition using the "inferential method." This method combines air quality concentration data with meteorological measurements and land use functions to compute deposition velocities. Ambient air is drawn across the filter at either 3.0 or 1.5 liters per minute. The filter is then analyzed in a lab to yield weekly average concentrations of particulate sulfate (SO₄²⁻), particulate nitrate (NO₃⁻), particulate ammonium (NH₄⁺), sulfur dioxide (SO₂), and nitric acid (HNO₃). In some cases, the positive ions Na⁺, K⁺, Ca²⁺, and Mg²⁺ are also measured from the filter samples.

		Valid Number	1st	2nd	3rd	4th	# Days with 8-Hou Average O ₃ Values
National Park Unit	Site Name	of Days	Highest	Highest	Highest	Highest	≥70 ppb ^a
	l Park Service (Gaseous Pollutant						
Big Bend	K-Bar Ranch Road	333	68	66	65	64	0
Canyonlands	Island in the Sky	359	68	65	64	64	0
Carlsbad Caverns	Biology Building	167	82	80	78	74	6
Chaco Culture	Radio Repeater	347	65	65	65	65	0
Chiricahua	Entrance Station	359	69	68	66	66	0
Craters of the Moon	Visitor Center	360	61	60	59	58	0
Death Valley	Park Village	344	72	71	71	69	3
Denali	Headquarters	353	56	54	53	53	0
Dinosaur	West Entrance Housing	355	80	73	72	70	3
Glacier	West Glacier Horse Stables	363	56	55	55	53	0
Grand Canyon	The Abyss	352	64	64	62	61	0
Grand Teton	Science School	362	63	62	61	58	0
Great Basin	Maintenance Yard	361	71	68	67	66	1
Great Smoky Mountains	Cade's Cove	255	63	61	59	57	0
Great Smoky Mountains	Clingmans Dome	178	67	66	61	61	0
Great Smoky Mountains	Cove Mountain	362	66	65	63	62	0
Great Smoky Mountains	Look Rock	353	71	67	64	64	1
Ioshua Tree	Black Rock	362	88	83	82	82	39
Joshua Tree	Cottonwood Visitor Center	270	75	70	70	65	1
Lassen Volcanic	Manzanita Lake Fire Station	322	61	60	59	59	0
Mammoth Cave	Houchin Meadow	357	61	60	60	60	0
Mesa Verde	Resource Management Area	353	69	66	66	65	0
Petrified Forest	South Entrance	357	74	69	68	66	1
Pinnacles	SW of East Entrance Station	357	64	64	63	62	0
Rocky Mountain	Long's Peak	359	67	66	65	65	0
Sequoia and Kings Canyon	Ash Mountain	359	85	85	85	83	59
Sequoia and Kings Canyon	Lower Kaweah	210	80	77	75	75	28
Shenandoah	Big Meadows	357	60	60	59	58	0
Voyageurs	Sullivan Bay	351	65	62	57	56	0
Yellowstone	Water Tank	331	66	61	61	61	0
Yosemite	Turtleback Dome	361	73	70	69	68	1
Zion	Dalton's Wash	357	66	65	64	63	0
Sites operated by the NPS for	the Bureau of Land Management	:					
Meeker	Plant Science	118	60	58	57	56	0
Rangely	Golf Course	355	70	66	65	64	0
Sites operated by cooperating							
Acadia	Cadillac Mountain	156	72	67	64	64	1
Acadia	McFarland Hill	350	67	66	65	62	0
Badlands	Visitor Center	360	58	58	58	58	0
Cape Cod	Cape Cod	356	68	66	62	60	0
Chamizal	Chamizal	325	79	75	75	73	7
Congaree	Congaree Bluff	279	57	56	56	56	0
Everglades	Cutler Road	353	70	64	61	60	0

Table 2. 2019 Summary of 8-	hour average ozone concentration	ons (ppb) (continu	ed).				
National Park Unit	Site Name	Valid Number of Days	1st Highest	2nd Highest	3rd Highest	4th Highest	# Days with 8-Hour Average O ₃ Values ≥70 ppb ^a
Sites operated by cooperating	g state agencies						
Great Smoky Mountains	Purchase Knob	240	69	64	62	62	0
Indiana Dunes	Ammunition Bunker	316	71	67	67	65	1
Mount Rainier	Jackson Visitor's Center	299	62	57	56	56	0
Saguaro	East	364	71	66	66	65	1
Theodore Roosevelt	Painted Canyon, VC	341	65	62	58	58	0
Wind Cave	Visitor Center	360	65	61	60	57	0
Portable ozone monitoring s	ystems (POMS) ^b						
Guadalupe Mountains	Maintenance Area	104	73	72	70	68	2
Joshua Tree	Pinto Wells	320	68	68	67	67	0
<u>Mojave</u>	Kelso Mountains	190	77	75	74	74	19

^a The primary and secondary National Ambient Air Quality Standard for ozone is 0.070 ppm over an 8-hour period. (An exceedance of the standard occurs when an 8-hour average ozone concentration is greater than or equal to 70 ppb. A violation of the standard occurs when the 3-year average of the fourth highest daily maximum 8-hour average ozone concentration equals or exceeds 70 ppb.) Exceedances of the standard are in red.

italics = site operated by a state agency

underline = site operated by the National Park Service, but consisting of non-EPA certified portable instrumentation

Color shading key: Red = 4th highest 8-hour average ozone concentration >70 ppb, >3 days with 8-hour average >70 ppb

Bold = Ozone summary statistics for POMS are highlighted bold where exceedances occurred. These sites should be compared to EPA standards for reference purposes only.

^b The gaseous Pollutant Monitoring Program Portable Ozone Monitoring Systems (POMS) do not meet EPA standards for regulatory monitoring. However, ozone summary statistics from portable systems can be compared to EPA standards for reference purposes.

National Park Unit	Site Name	2017-2019	2016-2018	2015-2017	2014-2016	2013-2015	2012-2014	2011-2013
Sites operated by the Nationa	l Park Service (Gaseous Pollutan	t Monitoring F	Program)					
Big Bend	K-Bar Ranch Road	64	63	62	62	64	65	71
Canyonlands	Island in the Sky	65	65	64	64	65	67	69
Carlsbad Caverns	Biology Building	(74)						
Chaco Culture	Radio Repeater	(65)	(66)	(64)				
Chiricahua	Entrance Station	66	66	65	65	68	71	73
Craters of the Moon	Visitor Center	63	63	60	60	61	62	63
Death Valley	Park Village	72	(73)	(70)	70	70	70	72
Denali	Headquarters	52	50	50	53	54	54	52
Dinosaur	West Entrance Housing	70	72	72	68	81	(84)	
Glacier	West Glacier Horse Stables	53	52	53	53	(54)	54	55
Grand Canyon	The Abyss	64	65	66	67	69	70	72
Grand Teton	Science School	59	60	59	59	59	62	(60)
Great Basin	Maintenance Yard	67	66	64	64	68	71	74
Great Smoky Mountains	Cade's Cove	60	62	61	60	59	60	63
Great Smoky Mountains	Clingmans Dome	(62)	(63)	(63)	(65)	(65)	(67)	(71)
Great Smoky Mountains	Cove Mountain	64	67	67	68	67	68	72
Great Smoky Mountains	Look Rock	65	67	67	67	65	67	74
Joshua Tree	Black Rock	88	89	87	86	86	90	90
Joshua Tree	Cottonwood Visitor Center	(73)	(82)					
Lassen Volcanic	Manzanita Lake Fire Station	66	68	64	65	66	68	68
Mammoth Cave	Houchin Meadow	61	63	64	64	63	69	71
Mesa Verde	Resource Management Area	67	68	66	65	66	67	69
Petrified Forest	South Entrance	66	65	63	64	66	70	70
Pinnacles	SW of East Entrance Station	64	68	68	69	68	70	70
Rocky Mountain	Long's Peak	68	70	68	69	70	74	76
Sequoia and Kings Canyon	Ash Mountain	86	89	89	89	89	91	93
Sequoia and Kings Canyon	Lower Kaweah	82	86	84	(84)	(84)	(86)	85
Shenandoah	Big Meadows	60	63	63	63	62	65	69
Voyageurs	Sullivan Bay	56	55	54	55	57	59	59
Yellowstone	Water Tank	62	62	61	60	62	63	65
Yosemite	Turtleback Dome	77	79	75	74	74	77	77
Zion	Dalton's Wash	66	66	65	(65)	(67)	70	72
Sites operated by the NPS for	the Bureau of Land Managemen	t						
Meeker	Plant Science	(59)	60	60	61	63	63	63
Rangely	Golf Course	65	64	63	63	73	74	77

Table 3. 2019 Ozone violation	summary - primary standard ^{a,}	(continued).						
National Park Unit	Site Name	2017-2019	2016-2018	2015-2017	2014-2016	2013-2015	2012-2014	2011-2013
Sites operated by cooperating	state agencies							
Acadia	Cadillac Mountain	69	70	71	66	67	66	69
Acadia	McFarland Hill	64	63	64	62	65	63	65
Badlands	Visitor Center	62	63	61	58	58	61	59
Cape Cod	Cape Cod	67	69	(69)	(65)	(67)	69	72
Chamizal	Chamizal	74	71	69	67	68	68	69
Congaree	Congaree Bluff	55	55	55	55	55	55	57
Everglades	Cutler Road	61	62	(61)	61	63	63	64
Great Smoky Mountains	Purchase Knob	63	64	64	65	65	66	67
Indiana Dunes	Ammunition Bunker	68	70	68	67	65	69	69
Mount Rainier	Jackson Visitor's Center	64	64	63	(59)	(60)	60	58
Saguaro	East	69	71	69	68	69	71	73
Theodore Roosevelt	Painted Canyon, VC	60	59	60	58	58	56	57
Wind Cave	Visitor Center	61	62	61	58	59	62	63

^a The 2015 primary and secondary National Ambient air Qulaity Standard for ozone is 0.070 ppm over an 8-hour period. This standard was used for the 2017-2019 period through 2014-2016. (An exceedance of the standard occurs when an 8-hour average ozone concentration is greater than or equal to 71 ppb. A violation of the standard occurs when the 3-year average of the fourth highest daily maximum 8-hour average ozone concentration equals or exceeds 71 ppb.)

Operating agency key: plain text = site operated by the National Park Service *italics* = site operated by a state agency

Color shading key: Red = ozone violation based on the standard in place at that time

Note: A number in parenthesis () indicates that data completeness was not met. The primary standard required 90 percent data completeness, on average, during the 3-year period, with no single year within the period having less than 75 percent data completeness. This data completeness requirement would have to be satisfied in order to determine that the standard has been met at a monitoring site. However, calendar years with less than 75 percent data completeness are included in the computation if the annual fourth-highest daily maximum 8-hour concentration is greater than the level of the standard. A site could be found not to have met the standard with less than complete data.

^b The 2008 primary and secondary National Ambient Air Quality Standard for ozone is 0.075 ppm over an 8-hour period. This standard was used for the 2013-2015 period through 2008-2010. (An exceedance of the standard occurs when an 8-hour average ozone concentration is greater than or equal to 76 ppb. A violation of the standard occurs when the 3-year average of the fourth highest daily maximum 8-hour average ozone concentration equals or exceeds 76 ppb.)

		O ₃ %	SUM06 ^a	SUM06	W126 ^b	W126	NPS W126 ^c	NPS W126
National Park Unit	Site Name	Valid	(ppm-hr)	Period	(ppm-hr)	Period	(ppm-hr)	Period
	Park Service (Gaseous Pollutant I	_	· ·	May litte	7.4	السمر	0.2	منا المم
Big Bend	K-Bar Ranch Road	93.8	7.2	May-July	7.4	April-June	8.3	April-June
Canyonlands	Island in the Sky	98.8	5.5	April-June	8.5	April-June	9.5	April-June
Carlsbad Caverns	Biology Building	95.6	12.1	August-October	9.0	August-October		
Chaco Culture	Radio Repeater	95.0	6.9	June-August	8.6	June-August	10.5	April-June
Chiricahua	Entrance Station	98.7	14.4	April-June	12.2	April-June	13.3	April-June
Craters of the Moon	Visitor Center	98.9	0.7	March-May	3.9	March-May	4.8	March-May
Death Valley	Park Village	95.5	23.9	June-August	16.5	June-August	17.8	June-August
Denali	Headquarters	97.4	0.1	February-April	2.7	March-May	3.5	March-May
Dinosaur	West Entrance Housing	98.1	9.4	February-April	9.2	February-April	8.4	June-August
Glacier	West Glacier Horse Stables	99.2	0.0	January-March	2.5	March-May	3.2	March-May
Grand Canyon	The Abyss	97.3	5.8	April-June	8.5	April-June	9.5	April-June
Grand Teton	Science School	99.0	1.6	March-May	4.8	March-May	5.7	March-May
Great Basin	Maintenance Yard	98.8	9.6	May-July	9.5	May-July	10.6	May-July
Great Smoky Mountains	Cade's Cove	97.3	0.5	March-May	3.3	March-May	4.0	March-May
Great Smoky Mountains	Clingmans Dome	97.9	1.4	August-October	2.5	May-July	3.2	May-July
Great Smoky Mountains	Cove Mountain	99.5	1.7	February-April	5.1	March-May	6.0	March-May
Great Smoky Mountains	Look Rock	98.5	3.0	July-September	4.0	March-May	4.8	March-May
loshua Tree	Black Rock	99.2	40.8	June-August	28.3	June-August	29.7	June-Augus
loshua Tree	Cottonwood Visitor Center	84.2	12.2	June-August	10.7	May-July	11.8	May-July
Lassen Volcanic	Manzanita Lake Fire Station	91.3	1.9	June-August	4.1	June-August	5.0	June-August
Mammoth Cave	Houchin Meadow	96.1	3.0	August-October	4.5	March-May	5.3	March-May
Mesa Verde	Resource Management Area	97.0	7.9	April-June	10.2	April-June	11.3	April-June
Petrified Forest	South Entrance	97.8	10.4	May-July	10.5	April-June	11.6	April-June
Pinnacles	SW of East Entrance Station	98.2	4.3	Sept-November	4.8	August-October	4.2	July-Septemb
Rocky Mountain	Long's Peak	98.4	7.9	March-May	9.1	March-May	10.1	March-May
Sequoia and Kings Canyon	Ash Mountain	98.1	54.9	July-September	39.1	July-September	40.7	July-Septemb
Sequoia and Kings Canyon	Lower Kaweah	98.8	42.3	June-August	27.9	June-August	29.3	June-August
Shenandoah	Big Meadows	98.6	0.8	February-April	4.7	March-May	5.6	March-May
Voyageurs	Sullivan Bay	96.5	1.2	April-June	2.2	March-May	2.8	March-May
Yellowstone	Water Tank	91.3	1.8	February-April	3.9	February-April	5.6	March-May
Yosemite	Turtleback Dome	98.5	14.5	June-August	12.0	June-August	13.2	June-Augus
Zion	Dalton's Wash	97.9	6.3	April-June	8.1	May-July	9.1	May-July
Sites operated by the NPS for t	the Bureau of Land Management							
Meeker	Plant Science	95.5	0.7	February-April	4.0	February-April		
Rangely	Golf Course	96.9	3.7	June-August	7.1	May-July	8.0	May-July
Sites operated by cooperating	state agencies							
Acadia	Cadillac Mountain	96.3	2.8	July-September	2.2	May-July	2.8	May-July
Acadia	McFarland Hill	94.8	1.7	July-September	3.5	February-April	4.1	March-May
Badlands	Visitor Center	98.3	0.5	March-May	3.9	March-May	4.3	March-May
Cape Cod	Cape Cod	98.2	1.6	July-September	2.8	March-May	3.3	March-May
Chamizal	Chamizal	91.3	17.9	June-August	13.7	June-August	14.7	June-August
Congaree	Congaree Bluff	98.2	0.4	April-June	1.5	April-June	1.8	March-May
Everglades	Cutler Road	97.9	2.4	February-April	3.2	March-May	3.6	March-May
		-		, r · · ·		- /		,

Table 4. 2019 Summary of in	dices for resource injury (SUM06	and W126) (c	ontinued).					
National Park Unit	Site Name	O ₃ % Valid	SUM06 ^a (ppm-hr)	SUM06 Period	W126 ^b (ppm-hr)	W126 Period	NPS W126 ^c (ppm-hr)	NPS W126 Period
Indiana Dunes	Ammunition Bunker	87.3	3.9	June-August	4.0	April-June	6.4	June-August
Mount Rainier	Jackson Visitor's Center	88.1	0.4	March-May	2.1	March-May	3.6	March-May
Saguaro	East	99.4	12.1	June-August	10.1	June-August	10.6	June-August
Theodore Roosevelt	Painted Canyon, VC	94.6	1.6	April-June	3.3	March-May	3.8	March-May
Wind Cave	Visitor Center	98.7	1.4	April-June	3.5	May-July	4.0	May-July
Portable ozone monitoring s	systems (POMS)							
Guadalupe Mountains	Maintenance Area	99.3	2.6	August-October	3.8	August-October		
Joshua Tree	Pinto Wells	88.5	11.0	June-August	9.7	June-August	10.7	June-August
Mojave	Kelso Mountains	89.5	20.2	July-September	15.3	July-September	22.4	May-July

^a SUM06 exposure index represents the 0800-2000 hourly ozone concentrations equaling or exceeding 0.06 ppm. The value reported here represents a three-month maximum value during the ozone season. Units are ppm-hr.

italics = site operated by a state agency

underline = site operated by the National Park Service, but consisting of non-EPA certified portable instrumentation

^b W126 exposure index represents 0800-2000 hourly ozone concentrations where each concentration is weighted by a function that gives greater emphasis to the higher hourly concentrations while still including the lower ones. The value reported here represents a three-month maximum value during the ozone season. Units are ppm-hr. For more information on the W126 exposure index go to https://www.nps.gov/subjects/air/glossary.htm

^c NPS W126 represents a three-month maximum value during the growing season (March to September) with a monthly completeness criteria of 50%, a three-month completeness criteria of 75%, and a seasonal completeness criteria of 60%.

Table 5. 2019 Summary of	f sulfur dioxide data.											
				Highest D	aily Maximu	ım 1-Hour			High	est Daily Ma	aximum 3-H	our
				Average	Concentrati	on ^a (ppb)			Ave	rage Concer	ntration ^b (p _l	ob)
National Park Unit	Site Name	1 st Highest	2 nd Highest	3 rd Highest	4 th Highest	99th Percentile Value	No. of Days with 1-Hr Average >75 ppb	1 st Highest	2 nd Highest	3 rd Highest	4 th Highest	No. of Days with 3-Hr Maximum >549 ppb
Sites operated by the Nat	ional Park Service (Gase						''					
Great Smoky Mountains	Look Rock NCore	1.7	1.5	1.5	1.4	1	0	1.1	1.0	0.9	0.9	0
Hawaii Volcanoes *	Visitor Center	54.2	43.4	40.6	37.4	37	0	32.1	31.7	28.0	21.1	0
Mammoth Cave	Houchin Meadow	2.7	2.5	2.4	2.1	2	0	1.9	1.6	1.6	1.5	0
Sites operated by coopera	ating state agencies											
Acadia	McFarland Hill	0.7	0.6	0.6	0.6	1	0	0.5	0.4	0.4	0.4	0
Badlands	Visitor Center	5.7	5.3	5.0	4.6	5	0	5.1	4.7	4.4	4.2	0
Congaree	Congaree Bluff	4.0	3.8	3.6	3.1	3	0	3.3	2.4	2.1	2.0	0
Indiana Dunes	Ammunition Bunker	51.4	45.5	37.9	35.1	35	0	30.4	27.4	18.1	16.9	0
Theodore Roosevelt	Painted Canyon, VC	5.7	5.5	4.6	4.3	4	0	4.7	3.7	3.7	3.7	0

^a The primary hourly National Ambient Air Quality Standard for sulfur dioxide is a daily maximum 1-hour average of 75 ppb. (An exceedance of the standard occurs when a daily maximum 1-hour average exceeds 75 ppb. A violation of the standards occurs when the 3-year average of the 99 th percentile of the daily maximum 1-hour average exceeds 75 ppb.)

Operating agency key: plain text = site operated by the National Park Service italics = site operated by a state agency

Color shading key: Red >75 ppb 99th percentile value, or >549 ppb 3-hour average

^b 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.)

^{*} This site collected sulfur dioxide data using a range that is not EPA approved.

Table 6. 2019 Summary o	f carbon monoxide data.										
			High	est Daily Ma	aximum 1-Ho	our		High	est Daily Ma	ximum 8-Ho	our
			Ave	erage Concer	ntration ^a (pp	b)		Ave	rage Concer	ntration ^b (pp	b)
		1 st	2 nd	3 rd	4 th	No. of Days with 1-Hr Average	1 st	2 nd	3 rd	4 th	No. of Days with 8-Hr Average
National Park Unit	Site Name	Highest	Highest	Highest	Highest	>35 ppm	Highest	Highest	Highest	Highest	>9 ppm
Sites operated by the Na	tional Park Service (Gaseou	s Pollutant I	Monitoring I	Program)							
Great Smoky Mountains	Look Rock NCore	1.383	0.555	0.275	0.263	0	0.915	0.246	0.242	0.232	0
Mammoth Cave	Houchin Meadow	1.546	1.136	0.281	0.269	0	0.571	0.250	0.245	0.242	0
Yellowstone	Old Faithful Snow Lodge	0.270	0.267	0.240	0.239	0	0.223	0.207	0.204	0.189	0
Yellowstone	West Yellowstone	1.067	0.924	0.733	0.696	0	0.590	0.447	0.380	0.350	0
Sites operated by cooper	ating state agencies										
Acadia	McFarland Hill	0.272	0.239	0.239	0.237	0	0.259	0.229	0.227	0.221	0

^a The primary hourly National Ambient Air Quality Standard for carbon monoxide is a daily maximum 1-hour average of 35 ppm. (An exceedance of the standard occurs when a daily maximum 1-hour average exceeds 35 ppm. A violation of the standard occurs when a daily maximum 1-hour average exceeds 35 ppm more than once in a calendar year.)

italics = site operated by a state agency

Color shading key: Red >35 ppm 1-hour average or >9 ppm 8-hour average

^b The primary National Ambient Air Quality Standard for carbon monoxide is 9 ppm over an 8-hour period. (An exceedance of the standard occurs when an 8-hour average exceeds 9 ppm. A violation of the standard occurs when a daily maximum 8-hour average exceeds 9 ppm more than once in a calendar year.)

(40CFR 50.8.)

Table 7. 2019 Summary of ni	trogen dioxide data.							
			Highe	est Daily Maxi	imum 1-Hou	r Average Con	centrations (ppb)	
National Park Unit	Site Name	1st Highest	2nd Highest	3rd Highest	4th Highest	98 th Percentile Value	No. of Days with 1-Hour Average >100 ppb	Annual Arithmetic Mean
Sites operated by the Nation	nal Park Service (Gaseous Polluta	nt Monitorin	g Program)					
Chaco Culture	Radio Repeater	7.7	7.3	7.2	6.4	4	0	1
Great Smoky Mountains	Look Rock NCore	6.6	6.1	6.0	5.8	5	0	1
Mammoth Cave	Houchin Meadow	16.9	15.6	15.3	11.6	11	0	2
Yellowstone	Old Faithful Snow Lodge	14.7	13.6	13.2	10.2	13	0	1
Yellowstone	West Yellowstone	40.9	39.1	37.5	36.9	32	0	2
Sites operated by the NPS fo	or the Bureau of Land Manageme	nt						
Meeker	Plant Science	5.5	4.1	3.5	3.4	4	0	1
Rangely	Golf Course	47.3	33.6	33.5	30.7	25	0	3

		High	Highest Daily Maximum 1-Hour Average Concentrations (ppb)							
National Park Unit	Site Name	1st Highest	2nd Highest	3rd Highest	4th Highest	No. of Days with 1-Hour Average >100 ppb				
Sites operated by the Nation	al Park Service (Gaseous Polluta	nt Monitoring Pr	ogram)							
Chaco Culture	Radio Repeater	7.5	7.3	7.0	6.3	0				
Great Smoky Mountains	Look Rock NCore	6.5	6.5	6.0	5.8	0				
Mammoth Cave	Houchin Meadow	16.9	15.6	15.3	14.9	0				
Yellowstone	Old Faithful Snow Lodge	45.9	38.1	26.3	23.8	0				
Yellowstone	West Yellowstone	299.4	285.8	249.7	169.6	11				
Sites operated by the NPS fo	r the Bureau of Land Manageme	nt								
Meeker	Plant Science	6.3	5.2	5.1	4.6	0				
Rangely	Golf Course	86.2	46.9	45.0	38.5	0				
Sites operated by cooperating state agencies										
Acadia	McFarland Hill (NO _Y)	21.4	18.8	17.0	11.0	0				

Table 9. 2019 Summary of P	M _{2.5} data from reference and	equivalency	/ method	ls.						
					Highest Daily Maximum 24-Hour Average Concentrations (μg/					
				Annual Arithmetic					98 th	No. of Days with 24-Hour
National Barb Hait	Cita Nama	Sampler	% Valid	Mean ^a	1st	2nd	3rd	4th	Percentile	Average
National Park Unit	Site Name nal Park Service (Gaseous Poll	Type*	Valid	(μg/m³)	Highest	Highest	Highest	Highest	Value	>35 μg/m³
. ,	•		•	· ,						
Great Smoky Mountains	Look Rock NCore	TEOM	98.8	7.5	41.6	20.8	18.2	17.4	15.1	1
Hawaii Volcanoes	Visitor Center	BAM	37.6	0.0	1.4	1.2	0.8	0.5	0.8	0
Joshua Tree	Cottonwood Visitor Center	BAM	77.3	4.5	21.6	16.9	13.2	11.9	11.5	0
Minidoka	Maintenance Building	BAM	97.6	3.5	11.5	11.2	10.2	10.1	9.1	0
Sequoia and Kings Canyon	Ash Mountain	BAM	28.7	7.0	35.7	26.7	23.2	22.7	26.7	1
Yellowstone	Old Faithful Snow Lodge	BAM	85.9	1.2	5.3	5.2	5.2	5.0	4.7	0
Yellowstone	West Yellowstone	BAM	98.2	0.5	18.3	11.1	8.1	5.8	5.0	0
Sites operated by the NPS fo	or the Bureau of Land Manage	ment								
Meeker	Plant Science	TEOM	75.7	4.0	7.6	7.4	7.2	6.7	7.4	0
Rangely	Golf Course	BAM	97.8	7.2	14.0	14.0	13.0	12.5	11.9	0
Sites operated by cooperation	ng state agencies									
Acadia	McFarland Hill	BAM	93.0	2.5	16.8	16.2	15.9	14.3	12.0	0
Badlands	Visitor Center	BAM	98.9	3.2	15.5	15.1	11.7	11.4	9.4	0
Indiana Dunes	Ammunition Bunker	BAM	88.0	7.5	24.8	24.5	19.4	19.3	18.0	0
Theodore Roosevelt	Painted Canyon Visitor Ctr	TEOM	98.3	3.0	13.0	12.9	11.4	11.0	9.1	0
Wind Cave	Visitor Center	BAM	98.5	2.0	21.5	11.1	10.0	9.3	8.2	0

^a The primary annual National Ambient Air Quality Standard for PM_{2.5} is an annual arithmetic mean of 15.0 μ g/m³. (An exceedance of the standard occurs when an annual arithmetic mean of PM_{2.5} concentrations is greater than 15.0 μ g/m³. A violation of the standard occurs when the 3-year average of the weighted annual mean PM_{2.5} concentrations is greater than 15.0 μ g/m³.) (40 CFR 50.7.)

Operating agency key: plain text = site operated by the National Park Service italics = site operated by a state agency

Color shading key: Annual arithmetic mean $\,$ Red $>15 \,\mu g/m^3 \,$ 98^{th} percentile value $\,$ Red $>35 \,\mu g/m^3 \,$

^b The primary daily National Ambient Air Quality Standard for PM_{2.5} is a 24-hour average concentration of 35 μ g/m³. (An exceedance of the standard occurs when a 24-hour average PM_{2.5} concentration is greater than 35 μ g/m³. A violation of the standard occurs when the 3-year average of the annual 98 th percentile of 24-hour PM_{2.5} concentrations is greater than 35 μ g/m³.) (40 CFR 50.7.)

^{*} TEOM = tapered element oscillating microbalance BAM = beta attenuation monitor

Table 10. 2019 Summary of PM ₁₀ data from reference and equivalency methods.											
					Highest Daily Maximum 24-Hour Average Concentrations ^b (μg/						
National Park Unit	Site Name	Sampler Type*	% Valid	Annual Arithmetic Mean ^a (µg/m ³)	1st Highest	2nd Highest	3rd Highest	4th Highest	No. of Days with 24-Hour Average >150 µg/m ³		
	Sites operated by cooperating state agencies										
Badlands	Visitor Center	BAM	98.5	8	30	30	30	30	0		
Wind Cave	Visitor Center	BAM	96.2	7	30	20	20	20	0		
Yosemite	Village	BAM	91.5	21	130	130	110	100	0		

^a The primary and annual National Ambient Air Quality Standard for PM₁₀ is an annual arithmetic mean of 50 μ g/m³. (An exceedance of the standard occurs when an annual arithmetic mean of PM₁₀ concentrations is greater than 50 μ g/m³. A violation of the standard occurs when the 3-year average of the weighted annual mean PM₁₀ concentrations is greater than 50 μ g/m³.) (40 CFR 50.6.)

Color shading key: Red >50 μ g/m³ annual arithmetic mean, > 150 μ g/m³ 24-hour average

italics = site operated by a state agency

^b The primary daily National Ambient Air Quality Standard for PM₁₀ is a 24-hour average concentration of 150 μ g/m³. (An exceedance of the standard occurs when a 24-hour average PM₁₀ concentration is greater than 150 μ g/m³ occurs more than once in a calendar year.) (40 CFR 50.6.)

^{*} TEOM = tapered element oscillating microbalance BAM = beta attenuation monitor

Table 11. 2019 PM_{10} summary - maximum daily 24-hour average concentration in 2015-2019 ($\mu g/m^3$) a .

		Sampler						
National Park Unit	Site Name	Type*	2019	2018	2017			
Sites operated by cooperating state agencies								
Badlands	Visitor Center	BAM	30	60	80			
Wind Cave	Visitor Center	BAM	30	40	100			
Yosemite	Village	BAM	130	(310)	140			

^a The primary daily National Ambient Air Quality Standard for PM₁₀ is a 24-hour average concentration of 150 μ g/m³. (An exceedance of the standard occurs when a 24-hour average PM₁₀ concentration is greather than 150 μ g/m³. A violation of the standard occurs when a 24-hour average concentration greater than 150 μ g/m³ occurs more than once in a calendar year.) (40 CFR 50.6.)

Color shading key: Red = more than one 24-hour average concentration > $150 \,\mu\text{g/m}^3$

italics = site operated by a state agency

^{*} TEOM = tapered element oscillating microbalance BAM = beta attenuation monitor

		Wind Speed	Am	bient Tempera	ture	R	Precipitation		
		(m/s)	(degrees C)			Relative Humidity (%)			(mm)
									Annual
National Park Unit	Site Name	Average	Average	Maximum	Minimum	Average	Maximum	Minimum	Accumulation
Sites operated by the Nationa	l Park Service (Gaseous Pollutan	t Monitoring Pr	ogram)						
Big Bend	K-Bar Ranch Road	3.6	22.2	40.9	-5.0	43	100	4	233.9
Canyonlands	Island in the Sky	2.8	11.9	34.9	-14.1	41	95	3	276.2
Carlsbad Caverns	Biology Building	3.9	19.1	39.6	-4.9	43	99	8	98.8
Chaco Culture	Radio Repeater	4.1	11.1	34.4	-22.0	46	99	7	159.8
Chiricahua	Entrance Station	2.9	15.7	35.8	-8.9	45	100	7	467.5
Craters of the Moon	Visitor Center	3.1	3.5	34.4	-19.2				
Death Valley	Park Village	3.9	25.6	47.8	5.8				
Denali	Headquarters	1.3	0.5	28.5	-35.0	72	99	16	534.9
Dinosaur	West Entrance Housing	1.4	8.4	36.1	-23.7				262.3
Everglades	Beard Center	3.0	24.3	34.7	6.7	80	100	25	1124.2
Glacier	West Glacier Horse Stables	0.8	5.2	32.0	-31.1				
Grand Canyon	The Abyss	2.9	10.4	31.1	-12.8	44	100	3	395.4
Grand Teton	Science School	2.4	1.6	29.5	-28.0	68	98	11	348.6
Great Basin	Maintenance Yard	2.6	8.3	33.7	-19.0	46	95	5	378.2
Great Smoky Mountains	Cade's Cove	1.2	14.6	33.6	-12.3	79	100	12	1640.1
Great Smoky Mountains	Clingmans Dome	2.4	12.5	21.8	-6.5	87	100	4	1226.0
Great Smoky Mountains	Cove Mountain	4.4	12.1	28.1	-17.4	73	100	6	1254.2
Great Smoky Mountains	Look Rock	2.2	14.0	29.9	-14.4	72	100	8	1627.6
Hawaii Volcanoes	Visitor Center	3.2	16.3	27.2	7.5	90	100	36	1676.7
Joshua Tree	Black Rock	3.9	15.0	36.7	-5.7	40	97	5	354.9
Joshua Tree	Cottonwood Visitor Center	2.7	17.3	38.9	-2.7	35	100	4	187.2
Lassen Volcanic	Manzanita Lake Fire Station	1.2	6.9	33.4	-17.4	65	96	10	1061.6
Mammoth Cave	Houchin Meadow	1.7	14.5	35.3	-13.0	74	100	21	1585.0
Mesa Verde	Resource Management Area	3.0	9.4	32.6	-15.7	45	95	5	414.1
Minidoka	Maintenance Building	2.1	7.4	37.6	-18.3	65	98	7	
Petrified Forest	South Entrance	4.1	13.5	36.6	-18.5				
Pinnacles	SW of East Entrance Station	2.2	14.5	41.3	-4.9	62	99	6	538.3
Rocky Mountain	Long's Peak	2.4	3.8	26.8	-25.4	52	95	4	451.3
Sequoia and Kings Canyon	Ash Mountain	2.5	17.2	39.2	-1.8	52	97	7	787.7
Sequoia and Kings Canyon	Lower Kaweah	1.6	13.2	26.6	-2.4	59	95	9	240.9
Shenandoah	Big Meadows	1.8	9.2	27.6	-22.8	74	100	13	1318.1
Voyageurs	Sullivan Bay	2.2	2.7	32.4	-38.6	76	100	16	769.5
Yellowstone	Old Faithful Snow Lodge	1.6	1.1	28.5	-34.9	69	98	12	
Yellowstone	Water Tank	1.5	0.6	26.0	-30.5	69	96	11	540.2
Yellowstone	West Entrance	1.0	1.4	30.5	-36.4	70	99	10	
Yosemite	Turtleback Dome	4.1	11.6	28.9	-11.0	52	100	7	812.9
Zion	Dalton's Wash	4.0	16.0	41.0	-8.4				358.7
	the Bureau of Land Managemen								
Meeker	Plant Science	3.2	-1.2	21.9	-27.0	71	100	12	165.2
Rangely	Golf Course	2.9	8.3	36.1	-24.1	55	100	7	255.0
Haribert	Con course	2.3	0.5	50.1	24.1	33	100	,	233.0

Table 12. 2019 Annual sum	mary of selected meteorologica	l data (continued).							
		Wind Speed	Wind Speed Ambient Temperature				Relative Humidity		
		(m/s)		(degrees C)			(%)		(mm)
									Annual
National Park Unit	Site Name	Average	Average	Maximum	Minimum	Average	Maximum	Minimum	Accumulation
Sites operated by cooperat	ing state agencies								
Acadia	Cadillac Mountain	4.1	10.5	24.8	-4.0	80	100	22	
Acadia	McFarland Hill	2.6	6.8	31.9	-18.7	74	99	19	1533.2
Cape Cod	Cape Cod	2.2	10.3	33.9	-15.2	70	92	23	
Chamizal	Chamizal	3.3	18.5	38.5	-2.4	34	100	4	
Indiana Dunes	Ammunition Bunker	2.7	12.8	37.6	-14.1	74	100	18	
Saguaro	East		20.5	40.7	-3.0	36	99	3	
Theodore Roosevelt	Painted Canyon, VC	4.8	7.0	33.5	-29.4	69	99	17	501.6
Wind Cave	Visitor Center	2.8	7.4	34.1	-25.3	61	96	10	589.0
Portable ozone monitoring	systems (POMS) ^b								
Guadalupe Mountains	Maintenance Area	3.9	22.4	35.3	-5.2	44	98	7	126.8
Joshua Tree	Pinto Wells	3.2	22.1	44.8	-2.9	31	100	3	101.4
Mojave	Kelso Mountains	3.5	22.6	37.2	1.1	26	97	6	39.5

Note: Dashed lines reporesent no data available for that particular parameter at that site.

Operating agency key: plain text = site operated by the National Park Service or Bureau of Land Management

italics = site operated by a state agency

<u>underline</u> = site oprated by the National Park Service, but consisting of non-EPA certified portable instrumentation