UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

User ID: RMV

RAW DATA QUALIFIER REPORT

Report Request ID: 1516432 Report Code: AMP360 Jan. 26, 2017

GEOGRAPHIC SELECTIONS

Tribal Code	State	County	Site	Parameter	POC	City	AQCR	UAR	CBSA	CSA	EPA Region
											09

PROTOCOL SELECTIONS

Parameter Classification	Parameter	Method	Duration
CRITERIA	44201		

SELECTED OPTIONS

Option Type	Option Value
QUALIFIER COUNTS BY MONITOR	YES
MERGE PDF FILES	YES
QUALIFIER CODE	RO - Stratospheric Ozone Intrusion (REQEXC)
CONCURRENCE STATUS	All Data (Concurred and Non-concurred)
QUALIFIER TYPES	ALL QUALFIER TYPES
AGENCY ROLE	PQAO

DATE CRITERIA

Start Date	End Date
2005 01 01	2017 01 25

ED_001361_00017811

ED_001361_00017811

United States Environmental Protection Agency
Air Quality System
Raw Data Qualifier Report (v 1.1)

Report Date: Jan. 26, 2017

Parameter: Ozone (44201)
Standard Units: Parts per million (007)

Monitor Key / Site Address	Sample Date-Time	Sample Value	Qualifier Code	Qualifier Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-01 11:00	.075	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-01 12:00	.077	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-01 13:00	.078	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-01 14:00	.078	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-01 15:00	.078	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-01 16:00	.077	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-01 17:00	.079	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-01 18:00	.078	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-05 11:00	.08	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-05 12:00	.082	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-05 13:00	.079	RO	Stratospheric Ozone Intrusion	2014-11-04			

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Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-05 14:00	.078	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-05 15:00	.081	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-05 16:00	.08	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-05 17:00	.082	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-05 18:00	.082	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-06 10:00	.073	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-06 11:00	.076	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-06 12:00	.078	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-06 13:00	.079	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-06 14:00	.077	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-06 15:00	.081	RO	Stratospheric Ozone Intrusion	2014-11-04			

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32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-06 16:00	.08	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-06 17:00	.077	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-07 11:00	.072	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-07 12:00	.078	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-07 13:00	.081	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-07 14:00	.079	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-07 15:00	.076	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-07 16:00	.077	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-07 17:00	.077	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0022-44201-1 12101 Hwy 91, Nevada Las Vegas, NV 89165	2014-06-07 18:00	.075	RO	Stratospheric Ozone Intrusion	2014-11-04			

Monitor Qualifier Counts: RO Stratospheric Ozone Intrusion **Count: 32**

Monitor Key / Site Address	Sample Date-Time	Sample Value	Qualifier Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date

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Parameter: Ozone (44201)
Standard Units: Parts per million (007)

Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-01 10:00	.075	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-01 11:00	.076	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-01 12:00	.077	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-01 13:00	.078	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-01 14:00	.082	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-01 15:00	.081	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-01 16:00	.079	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-01 17:00	.075	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-05 10:00	.078	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-05 11:00	.08	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-05 12:00	.081	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-05 13:00	.084	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-05 14:00	.082	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-05 15:00	.084	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-05 16:00	.082	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-05 17:00	.078	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1	2014-06-06 10:00	.076	RO	Stratospheric Ozone	2014-11-04			

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Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-06 10:00	.076	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-06 11:00	.077	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-06 12:00	.081	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-06 13:00	.08	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-06 14:00	.081	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-06 15:00	.086	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-06 16:00	.083	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-06 17:00	.077	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-07 10:00	.075	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-07 11:00	.083	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-07 12:00	.087	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-07 13:00	.089	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-07 14:00	.085	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-07 15:00	.083	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-07 16:00	.083	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0043-44201-1 4525 NEW FOREST DRIVE	2014-06-07 17:00	.082	RO	Stratospheric Ozone Intrusion	2014-11-04			

Monitor Qualifier Counts: RO Stratospheric Ozone Intrusion **Count: 32**

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Parameter: Ozone (44201)
Standard Units: Parts per million (007)

Monitor Key / Site Address	Sample Date-Time	Sample Value	Qualifier Code	Qualifier Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-003-0071-44201-1 7701 DUCHARME AVE	2014-06-05 10:00	.073	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0071-44201-1 7701 DUCHARME AVE	2014-06-05 11:00	.078	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0071-44201-1 7701 DUCHARME AVE	2014-06-05 12:00	.082	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0071-44201-1 7701 DUCHARME AVE	2014-06-05 13:00	.08	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0071-44201-1 7701 DUCHARME AVE	2014-06-05 14:00	.079	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0071-44201-1 7701 DUCHARME AVE	2014-06-05 15:00	.082	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0071-44201-1 7701 DUCHARME AVE	2014-06-05 16:00	.081	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0071-44201-1 7701 DUCHARME AVE	2014-06-05 17:00	.076	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0071-44201-1 7701 DUCHARME AVE	2014-06-06 10:00	.075	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0071-44201-1 7701 DUCHARME AVE	2014-06-06 11:00	.079	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0071-44201-1 7701 DUCHARME AVE	2014-06-06 12:00	.077	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0071-44201-1 7701 DUCHARME AVE	2014-06-06 13:00	.075	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0071-44201-1 7701 DUCHARME AVE	2014-06-06 14:00	.074	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0071-44201-1 7701 DUCHARME AVE	2014-06-06 15:00	.079	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0071-44201-1 7701 DUCHARME AVE	2014-06-06 16:00	.079	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0071-44201-1 7701 DUCHARME AVE	2014-06-06 17:00	.074	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0071-44201-1	2014-06-07 11:00	.079	RO	Stratospheric Ozone	2014-11-04			

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Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-003-0071-44201-1 7701 DUCHARME AVE	2014-06-07 11:00	.079	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0071-44201-1 7701 DUCHARME AVE	2014-06-07 12:00	.083	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0071-44201-1 7701 DUCHARME AVE	2014-06-07 13:00	.085	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0071-44201-1 7701 DUCHARME AVE	2014-06-07 14:00	.083	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0071-44201-1 7701 DUCHARME AVE	2014-06-07 15:00	.079	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0071-44201-1 7701 DUCHARME AVE	2014-06-07 16:00	.079	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0071-44201-1 7701 DUCHARME AVE	2014-06-07 17:00	.078	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0071-44201-1 7701 DUCHARME AVE	2014-06-07 18:00	.072	RO	Stratospheric Ozone Intrusion	2014-11-04			

Monitor Qualifier Counts: RO Stratospheric Ozone Intrusion **Count: 24**

Monitor Key / Site Address	Sample Date-Time	Sample Qualifier Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-01 11:00	.074	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-01 12:00	.076	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-01 13:00	.077	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-01 14:00	.078	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER	2014-06-01 15:00	.083	RO	Stratospheric Ozone Intrusion	2014-11-04			

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Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-01 16:00	.082	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-01 17:00	.076	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-01 18:00	.071	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-05 10:00	.073	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-05 11:00	.085	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-05 12:00	.086	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-05 13:00	.084	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-05 14:00	.081	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-05 15:00	.086	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-05 16:00	.084	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-05 17:00	.08	RO	Stratospheric Ozone Intrusion	2014-11-04			

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Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-06 10:00	.074	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-06 11:00	.082	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-06 12:00	.083	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-06 13:00	.079	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-06 14:00	.078	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-06 15:00	.079	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-06 16:00	.079	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-06 17:00	.077	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-07 11:00	.081	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-07 12:00	.087	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-07 13:00	.087	RO	Stratospheric Ozone Intrusion	2014-11-04			

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32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-07 14:00	.083	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-07 15:00	.084	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-07 16:00	.083	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-07 17:00	.083	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-07 18:00	.081	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-11 10:00	.077	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-11 11:00	.077	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-11 12:00	.076	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-11 13:00	.076	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-11 14:00	.076	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-11 15:00	.077	RO	Stratospheric Ozone Intrusion	2014-11-04			

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Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-11 16:00	.077	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0073-44201-1 333 PAVILION CENTER DRIVE	2014-06-11 17:00	.076	RO	Stratospheric Ozone Intrusion	2014-11-04			

Monitor Qualifier Counts: RO Stratospheric Ozone Intrusion **Count: 40**

Monitor Key / Site Address	Sample Date-Time	Sample Qualifier Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-01 11:00	.075	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-01 12:00	.077	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-01 13:00	.079	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-01 14:00	.081	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-01 15:00	.082	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-01 16:00	.086	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-01 17:00	.081	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-01 18:00	.073	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-05 10:00	.081	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-05 11:00	.089	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-05 12:00	.089	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-05 13:00	.086	RO	Stratospheric Ozone Intrusion	2014-11-04			

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Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-05 14:00	.086	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-05 15:00	.088	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-05 16:00	.09	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-05 17:00	.088	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-06 10:00	.077	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-06 11:00	.084	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-06 12:00	.084	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-06 13:00	.082	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-06 14:00	.085	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-06 15:00	.088	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-06 16:00	.086	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-06 17:00	.081	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-07 11:00	.08	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-07 12:00	.087	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-07 13:00	.091	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-07 14:00	.089	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1	2014-06-07 15:00	.086	RO	Stratospheric Ozone	2014-11-04			

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Parameter: Ozone (44201)
Standard Units: Parts per million (007)

Monitor Key / Site Address	Sample Date-Time	Sample Value	Qualifier Code	Qualifier Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-07 15:00	.086	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-07 16:00	.087	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-07 17:00	.086	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-07 18:00	.077	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-11 10:00	.078	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-11 11:00	.087	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-11 12:00	.083	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-11 13:00	.079	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-11 14:00	.078	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-11 15:00	.077	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-11 16:00	.077	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0075-44201-1 6651 W. AZURE AVE	2014-06-11 17:00	.077	RO	Stratospheric Ozone Intrusion	2014-11-04			

Monitor Qualifier Counts: RO Stratospheric Ozone Intrusion **Count: 40**

Monitor Key / Site Address	Sample Date-Time	Sample Value	Qualifier Code	Qualifier Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-003-0540-44201-1 4250 Karen Ave	2014-06-05 10:00	.072	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0540-44201-1 4250 Karen Ave	2014-06-05 11:00	.076	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0540-44201-1 4250 Karen Ave	2014-06-05 12:00	.078	RO	Stratospheric Ozone Intrusion	2014-11-04			

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Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-003-0540-44201-1 4250 Karen Ave	2014-06-05 13:00	.077	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0540-44201-1 4250 Karen Ave	2014-06-05 14:00	.076	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0540-44201-1 4250 Karen Ave	2014-06-05 15:00	.078	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0540-44201-1 4250 Karen Ave	2014-06-05 16:00	.081	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0540-44201-1 4250 Karen Ave	2014-06-05 17:00	.082	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0540-44201-1 4250 Karen Ave	2014-06-06 10:00	.072	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0540-44201-1 4250 Karen Ave	2014-06-06 11:00	.08	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0540-44201-1 4250 Karen Ave	2014-06-06 12:00	.086	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0540-44201-1 4250 Karen Ave	2014-06-06 13:00	.082	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0540-44201-1 4250 Karen Ave	2014-06-06 14:00	.079	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0540-44201-1 4250 Karen Ave	2014-06-06 15:00	.074	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0540-44201-1 4250 Karen Ave	2014-06-06 16:00	.073	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0540-44201-1 4250 Karen Ave	2014-06-06 17:00	.073	RO	Stratospheric Ozone Intrusion	2014-11-04			

Monitor Qualifier Counts: RO Stratospheric Ozone Intrusion **Count: 16**

Monitor Key / Site Address	Sample Date-Time	Sample Value	Qualifier Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-003-0601-44201-1 1005 INDUSTRIAL ROAD	2014-06-01 10:00	.07	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0601-44201-1 1005 INDUSTRIAL ROAD	2014-06-01 11:00	.07	RO	Stratospheric Ozone Intrusion	2014-11-04			

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Parameter: Ozone (44201)
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Monitor Key / Site Address	Sample Date-Time	Sample Value	Qualifier Code	Qualifier Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-003-0601-44201-1 1005 INDUSTRIAL ROAD	2014-06-01 12:00	.074	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0601-44201-1 1005 INDUSTRIAL ROAD	2014-06-01 13:00	.077	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0601-44201-1 1005 INDUSTRIAL ROAD	2014-06-01 14:00	.081	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0601-44201-1 1005 INDUSTRIAL ROAD	2014-06-01 15:00	.085	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0601-44201-1 1005 INDUSTRIAL ROAD	2014-06-01 16:00	.081	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0601-44201-1 1005 INDUSTRIAL ROAD	2014-06-01 17:00	.075	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0601-44201-1 1005 INDUSTRIAL ROAD	2014-06-07 10:00	.076	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0601-44201-1 1005 INDUSTRIAL ROAD	2014-06-07 11:00	.078	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0601-44201-1 1005 INDUSTRIAL ROAD	2014-06-07 12:00	.079	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0601-44201-1 1005 INDUSTRIAL ROAD	2014-06-07 13:00	.078	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0601-44201-1 1005 INDUSTRIAL ROAD	2014-06-07 14:00	.078	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0601-44201-1 1005 INDUSTRIAL ROAD	2014-06-07 15:00	.078	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0601-44201-1 1005 INDUSTRIAL ROAD	2014-06-07 16:00	.077	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-0601-44201-1 1005 INDUSTRIAL ROAD	2014-06-07 17:00	.075	RO	Stratospheric Ozone Intrusion	2014-11-04			

Monitor Qualifier Counts: RO Stratospheric Ozone Intrusion **Count: 16**

Monitor Key / Site Address	Sample Date-Time	Sample Value	Qualifier Code	Qualifier Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-003-1019-44201-1 1965 State Hwy 161,	2014-06-06 08:00	.079	RO	Stratospheric Ozone Intrusion	2014-11-04			

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Parameter: Ozone (44201)
Standard Units: Parts per million (007)

Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-003-1019-44201-1 1965 State Hwy 161, Jean, NV	2014-06-06 09:00	.08	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-1019-44201-1 1965 State Hwy 161, Jean, NV	2014-06-06 10:00	.079	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-1019-44201-1 1965 State Hwy 161, Jean, NV	2014-06-06 11:00	.078	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-1019-44201-1 1965 State Hwy 161, Jean, NV	2014-06-06 12:00	.078	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-1019-44201-1 1965 State Hwy 161, Jean, NV	2014-06-06 13:00	.08	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-1019-44201-1 1965 State Hwy 161, Jean, NV	2014-06-06 14:00	.08	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-1019-44201-1 1965 State Hwy 161, Jean, NV	2014-06-06 15:00	.079	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-1019-44201-1 1965 State Hwy 161, Jean, NV	2014-06-07 10:00	.075	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-1019-44201-1 1965 State Hwy 161, Jean, NV	2014-06-07 11:00	.08	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-1019-44201-1 1965 State Hwy 161, Jean, NV	2014-06-07 12:00	.081	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-1019-44201-1 1965 State Hwy 161, Jean, NV	2014-06-07 13:00	.079	RO	Stratospheric Ozone Intrusion	2014-11-04			

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Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-003-1019-44201-1 1965 State Hwy 161, Jean, NV	2014-06-07 14:00	.079	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-1019-44201-1 1965 State Hwy 161, Jean, NV	2014-06-07 15:00	.078	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-1019-44201-1 1965 State Hwy 161, Jean, NV	2014-06-07 16:00	.076	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-1019-44201-1 1965 State Hwy 161, Jean, NV	2014-06-07 17:00	.077	RO	Stratospheric Ozone Intrusion	2014-11-04			

Monitor Qualifier Counts: RO Stratospheric Ozone Intrusion **Count: 16**

Monitor Key / Site Address	Sample Date-Time	Sample Qualifier Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-003-2002-44201-1 1301B EAST TONOPAH	2014-06-06 10:00	.07	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-2002-44201-1 1301B EAST TONOPAH	2014-06-06 11:00	.083	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-2002-44201-1 1301B EAST TONOPAH	2014-06-06 12:00	.086	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-2002-44201-1 1301B EAST TONOPAH	2014-06-06 13:00	.084	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-2002-44201-1 1301B EAST TONOPAH	2014-06-06 14:00	.084	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-2002-44201-1 1301B EAST TONOPAH	2014-06-06 15:00	.078	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-2002-44201-1 1301B EAST TONOPAH	2014-06-06 16:00	.076	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-2002-44201-1 1301B EAST TONOPAH	2014-06-06 17:00	.072	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-2002-44201-1 1301B EAST TONOPAH	2014-06-07 10:00	.073	RO	Stratospheric Ozone Intrusion	2014-11-04			

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Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-003-2002-44201-1 1301B EAST TONOPAH	2014-06-07 11:00	.081	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-2002-44201-1 1301B EAST TONOPAH	2014-06-07 12:00	.082	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-2002-44201-1 1301B EAST TONOPAH	2014-06-07 13:00	.086	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-2002-44201-1 1301B EAST TONOPAH	2014-06-07 14:00	.084	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-2002-44201-1 1301B EAST TONOPAH	2014-06-07 15:00	.077	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-2002-44201-1 1301B EAST TONOPAH	2014-06-07 16:00	.078	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-2002-44201-1 1301B EAST TONOPAH	2014-06-07 17:00	.076	RO	Stratospheric Ozone Intrusion	2014-11-04			

Monitor Qualifier Counts: RO Stratospheric Ozone Intrusion **Count: 16**

Monitor Key / Site Address	Sample Date-Time	Sample Value	Qualifier Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-003-7772-44201-1 668 Gretta Ln, Indian Springs	2014-06-11 11:00	.071	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-7772-44201-1 668 Gretta Ln, Indian Springs	2014-06-11 12:00	.072	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-7772-44201-1 668 Gretta Ln, Indian Springs	2014-06-11 13:00	.074	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-7772-44201-1 668 Gretta Ln, Indian Springs	2014-06-11 14:00	.08	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-7772-44201-1 668 Gretta Ln, Indian Springs	2014-06-11 15:00	.082	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-7772-44201-1	2014-06-11 16:00	.081	RO	Stratospheric Ozone	2014-11-04			

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Parameter: Ozone (44201)
Standard Units: Parts per million (007)

Monitor Key / Site Address	Sample Date-Time	Sample Value	Qualifier Code	Qualifier Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-003-7772-44201-1 668 Gretta Ln, Indian Springs	2014-06-11 16:00	.081	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-7772-44201-1 668 Gretta Ln, Indian Springs	2014-06-11 17:00	.077	RO	Stratospheric Ozone Intrusion	2014-11-04			
32-003-7772-44201-1 668 Gretta Ln, Indian Springs	2014-06-11 18:00	.074	RO	Stratospheric Ozone Intrusion	2014-11-04			

Monitor Qualifier Counts: RO Stratospheric Ozone Intrusion **Count: 8**

Monitor Key / Site Address	Sample Date-Time	Sample Value	Qualifier Code	Qualifier Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-04 00:00	.052	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-04 01:00	.051	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation	2016-07-25			

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Standard Units: Parts per million (007)

Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-04 01:00	.051	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-04 02:00	.051	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1	2015-06-04 03:00	.052	RO	Stratospheric Ozone	2016-07-25			

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Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-04 03:00	.052	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-04 04:00	.051	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1	2015-06-04 05:00	.052	RO	Stratospheric Ozone	2016-07-25			

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Standard Units: Parts per million (007)

Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-04 05:00	.052	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-04 06:00	.054	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1	2015-06-04 07:00	.054	RO	Stratospheric Ozone	2016-07-25			

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Parameter: Ozone (44201)
Standard Units: Parts per million (007)

Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-04 07:00	.054	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-04 08:00	.053	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1	2015-06-04 09:00	.055	RO	Stratospheric Ozone	2016-07-25			

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Parameter: Ozone (44201)
Standard Units: Parts per million (007)

Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-04 09:00	.055	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-04 10:00	.063	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1	2015-06-04 11:00	.066	RO	Stratospheric Ozone	2016-07-25			

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Parameter: Ozone (44201)
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Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-04 11:00	.066	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-04 12:00	.068	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1	2015-06-04 13:00	.07	RO	Stratospheric Ozone	2016-07-25			

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Parameter: Ozone (44201)
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Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-04 13:00	.07	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-04 14:00	.071	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1	2015-06-04 15:00	.073	RO	Stratospheric Ozone	2016-07-25			

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Parameter: Ozone (44201)
Standard Units: Parts per million (007)

Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-04 15:00	.073	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-04 16:00	.077	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1	2015-06-04 17:00	.076	RO	Stratospheric Ozone	2016-07-25			

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Parameter: Ozone (44201)
Standard Units: Parts per million (007)

Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-04 17:00	.076	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-04 18:00	.076	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1	2015-06-04 19:00	.074	RO	Stratospheric Ozone	2016-07-25			

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Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-04 19:00	.074	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-04 20:00	.076	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1	2015-06-04 21:00	.076	RO	Stratospheric Ozone	2016-07-25			

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Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-04 21:00	.076	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-04 22:00	.076	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1	2015-06-04 23:00	.073	RO	Stratospheric Ozone	2016-07-25			

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Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-04 23:00	.073	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-08 00:00	.053	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1	2015-06-08 01:00	.053	RO	Stratospheric Ozone	2016-07-25			

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Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-08 01:00	.053	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-08 02:00	.053	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1	2015-06-08 03:00	.053	RO	Stratospheric Ozone	2016-07-25			

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Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-08 03:00	.053	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-08 04:00	.052	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1	2015-06-08 05:00	.054	RO	Stratospheric Ozone	2016-07-25			

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Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-08 05:00	.054	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-08 06:00	.06	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1	2015-06-08 07:00	.061	RO	Stratospheric Ozone	2016-07-25			

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Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-08 07:00	.061	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-08 08:00	.062	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1	2015-06-08 09:00	.065	RO	Stratospheric Ozone	2016-07-25			

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Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-08 09:00	.065	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-08 10:00	.065	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1	2015-06-08 11:00	.066	RO	Stratospheric Ozone	2016-07-25			

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Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-08 11:00	.066	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-08 12:00	.067	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1	2015-06-08 13:00	.075	RO	Stratospheric Ozone	2016-07-25			

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Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-08 13:00	.075	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-08 14:00	.078	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1	2015-06-08 15:00	.076	RO	Stratospheric Ozone	2016-07-25			

United States Environmental Protection Agency
Air Quality System
Raw Data Qualifier Report (v 1.1)

Report Date: Jan. 26, 2017

Parameter: Ozone (44201)
Standard Units: Parts per million (007)

Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-08 15:00	.076	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-08 16:00	.076	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1	2015-06-08 17:00	.076	RO	Stratospheric Ozone	2016-07-25			

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Raw Data Qualifier Report (v 1.1)

Report Date: Jan. 26, 2017

Parameter: Ozone (44201)
Standard Units: Parts per million (007)

Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-08 17:00	.076	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-08 18:00	.061	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1	2015-06-08 19:00	.059	RO	Stratospheric Ozone	2016-07-25			

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Air Quality System
Raw Data Qualifier Report (v 1.1)

Report Date: Jan. 26, 2017

Parameter: Ozone (44201)
Standard Units: Parts per million (007)

Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-08 19:00	.059	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-08 20:00	.062	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1	2015-06-08 21:00	.064	RO	Stratospheric Ozone	2016-07-25			

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Air Quality System
Raw Data Qualifier Report (v 1.1)

Report Date: Jan. 26, 2017

Parameter: Ozone (44201)
Standard Units: Parts per million (007)

Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-08 21:00	.064	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-08 22:00	.065	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				
32-033-0101-44201-1	2015-06-08 23:00	.062	RO	Stratospheric Ozone	2016-07-25			

ED_001361_00017811

United States Environmental Protection Agency
Air Quality System
Raw Data Qualifier Report (v 1.1)

Report Date: Jan. 26, 2017

Parameter: Ozone (44201)
Standard Units: Parts per million (007)

Monitor Key / Site Address	Sample Date-Time	Sample Value	Code	Description	Action Date	NAAQS Standard	Concurrence Ind	Concurrence Date
32-033-0101-44201-1 GREAT BASIN NATIONAL PARK	2015-06-08 23:00	.062	RO	Stratospheric Ozone Intrusion	2016-07-25			
	Event:			Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation	2016-07-25			
	Comment/URL:			Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.				

Monitor Qualifier Counts: RO Stratospheric Ozone Intrusion **Count: 48**

All Qualifiers Utilized:

Qualifier Code:	Qualifier Description:	Qualifier Count:
RO	Stratospheric Ozone Intrusion	288

ED_001361_00017811

State Code or Tribal Indicator (TT)|County Code or Tribal Code|Site_ID number|Parameter Code|POC|Sampling Begin Date-Time (YYYYMMDD HHMM)|Sample Value|Null Data Code|Null Code Description|Null Code Concurrence|Units Code|Units Description|Event Type Code|Event Type Description|Event-Sample Association Date|Event Description|Event Creation Date|Event coment text or URL|Standard for Concurrence 1|Concurrence Indicator 1|Concurrence Date 1|Concurrence Comment 1|Standard for Concurrence 2|Concurrence Indicator 2|Concurrence Date 2|Concurrence Comment 2|Standard for Concurrence 3|Concurrence Indicator 3|Concurrence Date 3|Concurrence Comment 3|Standard for Concurrence 4|Concurrence Indicator 4|Concurrence Date 4|Concurrence Comment 4|QA Qualifier Code 1|QA Qualifier Description 1|QA Qualifier 1 Comment|QA Qualifier Code 2|QA Qualifier Description 2|QA Qualifier 2 Comment|QA Qualifier Code 3|QA Qualifier Description 3|QA Qualifier 3 Comment|QA Qualifier Code 4|QA Qualifier Description 4|QA Qualifier 4 Comment|QA Qualifier Code 5|QA Qualifier Description 5|QA Qualifier 5 Comment|QA Qualifier Code 6|QA Qualifier Description 6|QA Qualifier 6 Comment|QA Qualifier Code 7|QA Qualifier Description 7|QA Qualifier 7 Comment|QA Qualifier Code 8|QA Qualifier Description 8|QA Qualifier 8 Comment|QA Qualifier Code 9|QA Qualifier Description 9|QA Qualifier 9 Comment|QA Qualifier Code 10|QA Qualifier Description 10|QA Qualifier 10 Comment
32|003|0022|44201|1|20140601 11:00|.075|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140601 12:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140601 13:00|.078|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140601 14:00|.078|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140601 15:00|.078|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140601 16:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140601 17:00|.079|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140601 18:00|.078|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140605 11:00|.08|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140605 12:00|.082|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140605 13:00|.079|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140605 14:00|.078|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140605 15:00|.081|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140605 16:00|.08|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140605 17:00|.082|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140605 18:00|.082|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140606 10:00|.073|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140606 11:00|.076|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140606 12:00|.078|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140606 13:00|.079|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||

32|003|0022|44201|1|20140606 14:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140606 15:00|.081|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140606 16:00|.08|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140606 17:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140607 11:00|.072|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140607 12:00|.078|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140607 13:00|.081|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140607 14:00|.079|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140607 15:00|.076|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140607 16:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140607 17:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0022|44201|1|20140607 18:00|.075|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140601 10:00|.075|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140601 11:00|.076|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140601 12:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140601 13:00|.078|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140601 14:00|.082|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140601 15:00|.081|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140601 16:00|.079|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140601 17:00|.075|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140605 10:00|.078|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140605 11:00|.08|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140605 12:00|.081|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140605 13:00|.084|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140605 14:00|.082|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140605 15:00|.084|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140605 16:00|.082|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140605 17:00|.078|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||

32|003|0043|44201|1|20140606 10:00|.076|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140606 11:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140606 12:00|.081|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140606 13:00|.08|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140606 14:00|.081|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140606 15:00|.086|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140606 16:00|.083|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140606 17:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140607 10:00|.075|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140607 11:00|.083|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140607 12:00|.087|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140607 13:00|.089|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140607 14:00|.085|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140607 15:00|.083|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140607 16:00|.083|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0043|44201|1|20140607 17:00|.082|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0071|44201|1|20140605 10:00|.073|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0071|44201|1|20140605 11:00|.078|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0071|44201|1|20140605 12:00|.082|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0071|44201|1|20140605 13:00|.08|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0071|44201|1|20140605 14:00|.079|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0071|44201|1|20140605 15:00|.082|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0071|44201|1|20140605 16:00|.081|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0071|44201|1|20140605 17:00|.076|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0071|44201|1|20140606 10:00|.075|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0071|44201|1|20140606 11:00|.079|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0071|44201|1|20140606 12:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0071|44201|1|20140606 13:00|.075|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||

32|003|0071|44201|1|20140606 14:00|.074|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0071|44201|1|20140606 15:00|.079|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0071|44201|1|20140606 16:00|.079|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0071|44201|1|20140606 17:00|.074|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0071|44201|1|20140607 11:00|.079|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0071|44201|1|20140607 12:00|.083|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0071|44201|1|20140607 13:00|.085|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0071|44201|1|20140607 14:00|.083|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0071|44201|1|20140607 15:00|.079|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0071|44201|1|20140607 16:00|.079|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0071|44201|1|20140607 17:00|.078|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0071|44201|1|20140607 18:00|.072|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140601 11:00|.074|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140601 12:00|.076|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140601 13:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140601 14:00|.078|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140601 15:00|.083|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140601 16:00|.082|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140601 17:00|.076|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140601 18:00|.071|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140605 10:00|.073|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140605 11:00|.085|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140605 12:00|.086|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140605 13:00|.084|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140605 14:00|.081|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140605 15:00|.086|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140605 16:00|.084|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140605 17:00|.08|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||

32|003|0073|44201|1|20140606 10:00|.074|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140606 11:00|.082|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140606 12:00|.083|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140606 13:00|.079|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140606 14:00|.078|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140606 15:00|.079|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140606 16:00|.079|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140606 17:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140607 11:00|.081|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140607 12:00|.087|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140607 13:00|.087|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140607 14:00|.083|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140607 15:00|.084|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
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32|003|0073|44201|1|20140611 10:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140611 11:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140611 12:00|.076|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140611 13:00|.076|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140611 14:00|.076|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140611 15:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140611 16:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0073|44201|1|20140611 17:00|.076|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140601 11:00|.075|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140601 12:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140601 13:00|.079|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140601 14:00|.081|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||

32|003|0075|44201|1|20140601 15:00|.082|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140601 16:00|.086|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140601 17:00|.081|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140601 18:00|.073|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140605 10:00|.081|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140605 11:00|.089|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140605 12:00|.089|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140605 13:00|.086|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140605 14:00|.086|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140605 15:00|.088|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140605 16:00|.09|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140605 17:00|.088|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140606 10:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140606 11:00|.084|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140606 12:00|.084|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140606 13:00|.082|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140606 14:00|.085|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140606 15:00|.088|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140606 16:00|.086|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140606 17:00|.081|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140607 11:00|.08|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140607 12:00|.087|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140607 13:00|.091|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140607 14:00|.089|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140607 15:00|.086|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140607 16:00|.087|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140607 17:00|.086|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140607 18:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||

32|003|0075|44201|1|20140611 10:00|.078|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140611 11:00|.087|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140611 12:00|.083|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140611 13:00|.079|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140611 14:00|.078|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140611 15:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140611 16:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0075|44201|1|20140611 17:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0540|44201|1|20140605 10:00|.072|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0540|44201|1|20140605 11:00|.076|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0540|44201|1|20140605 12:00|.078|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0540|44201|1|20140605 13:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0540|44201|1|20140605 14:00|.076|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0540|44201|1|20140605 15:00|.078|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0540|44201|1|20140605 16:00|.081|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0540|44201|1|20140605 17:00|.082|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0540|44201|1|20140606 10:00|.072|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0540|44201|1|20140606 11:00|.08|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0540|44201|1|20140606 12:00|.086|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0540|44201|1|20140606 13:00|.082|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0540|44201|1|20140606 14:00|.079|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0540|44201|1|20140606 15:00|.074|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0540|44201|1|20140606 16:00|.073|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0540|44201|1|20140606 17:00|.073|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0601|44201|1|20140601 10:00|.07|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0601|44201|1|20140601 11:00|.07|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0601|44201|1|20140601 12:00|.074|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0601|44201|1|20140601 13:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||

32|003|0601|44201|1|20140601 14:00|.081|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0601|44201|1|20140601 15:00|.085|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0601|44201|1|20140601 16:00|.081|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0601|44201|1|20140601 17:00|.075|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0601|44201|1|20140607 10:00|.076|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0601|44201|1|20140607 11:00|.078|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0601|44201|1|20140607 12:00|.079|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0601|44201|1|20140607 13:00|.078|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0601|44201|1|20140607 14:00|.078|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0601|44201|1|20140607 15:00|.078|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0601|44201|1|20140607 16:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|0601|44201|1|20140607 17:00|.075|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|1019|44201|1|20140606 08:00|.079|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|1019|44201|1|20140606 09:00|.08|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|1019|44201|1|20140606 10:00|.079|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|1019|44201|1|20140606 11:00|.078|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|1019|44201|1|20140606 12:00|.078|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|1019|44201|1|20140606 13:00|.08|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|1019|44201|1|20140606 14:00|.08|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|1019|44201|1|20140606 15:00|.079|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|1019|44201|1|20140607 10:00|.075|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|1019|44201|1|20140607 11:00|.08|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|1019|44201|1|20140607 12:00|.081|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|1019|44201|1|20140607 13:00|.079|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|1019|44201|1|20140607 14:00|.079|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|1019|44201|1|20140607 15:00|.078|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|1019|44201|1|20140607 16:00|.076|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|1019|44201|1|20140607 17:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||

32|003|2002|44201|1|20140606 10:00|.07|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|2002|44201|1|20140606 11:00|.083|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|2002|44201|1|20140606 12:00|.086|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|2002|44201|1|20140606 13:00|.084|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|2002|44201|1|20140606 14:00|.084|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|2002|44201|1|20140606 15:00|.078|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|2002|44201|1|20140606 16:00|.076|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|2002|44201|1|20140606 17:00|.072|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|2002|44201|1|20140607 10:00|.073|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|2002|44201|1|20140607 11:00|.081|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|2002|44201|1|20140607 12:00|.082|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|2002|44201|1|20140607 13:00|.086|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|2002|44201|1|20140607 14:00|.084|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|2002|44201|1|20140607 15:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|2002|44201|1|20140607 16:00|.078|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|2002|44201|1|20140607 17:00|.076|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|7772|44201|1|20140611 11:00|.071|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|7772|44201|1|20140611 12:00|.072|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|7772|44201|1|20140611 13:00|.074|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|7772|44201|1|20140611 14:00|.08|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|7772|44201|1|20140611 15:00|.082|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|7772|44201|1|20140611 16:00|.081|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|7772|44201|1|20140611 17:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|003|7772|44201|1|20140611 18:00|.074|||||007|Parts per million|RO|Stratospheric Ozone Intrusion||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150604 00:00|.052|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:27|Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation|20160725 11:25|Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150604 01:00|.051|||||007|Parts per million|RO|Stratospheric Ozone

Intrusion|20160725 11:27|Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation|20160725 11:25|Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150604 02:00|.051|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:27|Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation|20160725 11:25|Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150604 03:00|.052|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:27|Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation|20160725 11:25|Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150604 04:00|.051|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:27|Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation|20160725 11:25|Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150604 05:00|.052|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:27|Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation|20160725 11:25|Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150604 06:00|.054|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:27|Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation|20160725 11:25|Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150604 07:00|.054|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:27|Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation|20160725 11:25|Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150604 08:00|.053|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:27|Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation|20160725 11:25|Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150604 09:00|.055|||||007|Parts per million|RO|Stratospheric Ozone

Intrusion|20160725 11:27|Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation|20160725 11:25|Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150604 10:00|.063|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:27|Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation|20160725 11:25|Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150604 11:00|.066|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:27|Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation|20160725 11:25|Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150604 12:00|.068|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:27|Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation|20160725 11:25|Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150604 13:00|.07|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:27|Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation|20160725 11:25|Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150604 14:00|.071|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:27|Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation|20160725 11:25|Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150604 15:00|.073|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:27|Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation|20160725 11:25|Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150604 16:00|.077|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:27|Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation|20160725 11:25|Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150604 17:00|.076|||||007|Parts per million|RO|Stratospheric Ozone

Intrusion|20160725 11:27|Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation|20160725 11:25|Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150604 18:00|.076|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:27|Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation|20160725 11:25|Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150604 19:00|.074|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:27|Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation|20160725 11:25|Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150604 20:00|.076|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:27|Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation|20160725 11:25|Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150604 21:00|.076|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:27|Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation|20160725 11:25|Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150604 22:00|.076|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:27|Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation|20160725 11:25|Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150604 23:00|.073|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:27|Stratospheric Ozone Intrustion Event - June 4, 2015 - NDEP Investigation|20160725 11:25|Throughout June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric instrustion moved over the Intermountain West injecting ozone-rich air into the troposphere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150608 00:00|.053|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:41|Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation|20160725 11:41|Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150608 01:00|.053|||||007|Parts per million|RO|Stratospheric Ozone

Intrusion|20160725 11:41|Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation|20160725 11:41|Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150608 02:00|.053|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:41|Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation|20160725 11:41|Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150608 03:00|.053|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:41|Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation|20160725 11:41|Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150608 04:00|.052|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:41|Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation|20160725 11:41|Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150608 05:00|.054|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:41|Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation|20160725 11:41|Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150608 06:00|.06|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:41|Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation|20160725 11:41|Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150608 07:00|.061|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:41|Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation|20160725 11:41|Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150608 08:00|.062|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:41|Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation|20160725 11:41|Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150608 09:00|.065|||||007|Parts per million|RO|Stratospheric Ozone

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32|033|0101|44201|1|20150608 10:00|.065|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:41|Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation|20160725 11:41|Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150608 11:00|.066|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:41|Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation|20160725 11:41|Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150608 12:00|.067|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:41|Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation|20160725 11:41|Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150608 13:00|.075|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:41|Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation|20160725 11:41|Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150608 14:00|.078|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:41|Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation|20160725 11:41|Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150608 15:00|.076|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:41|Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation|20160725 11:41|Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150608 16:00|.076|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:41|Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation|20160725 11:41|Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150608 17:00|.076|||||007|Parts per million|RO|Stratospheric Ozone

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32|033|0101|44201|1|20150608 18:00|.061|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:41|Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation|20160725 11:41|Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150608 19:00|.059|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:41|Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation|20160725 11:41|Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150608 20:00|.062|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:41|Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation|20160725 11:41|Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150608 21:00|.064|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:41|Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation|20160725 11:41|Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150608 22:00|.065|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:41|Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation|20160725 11:41|Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
32|033|0101|44201|1|20150608 23:00|.062|||||007|Parts per million|RO|Stratospheric Ozone Intrusion|20160725 11:41|Stratospheric Ozone Intrustion Event - June 8, 2015 - NDEP Investigation|20160725 11:41|Throught June 4-8, 2015, an upper level atmospheric disturbance associated with a stratospheric intrusion moved over the Intermountain West injecting ozone-rich air into the troposhpere. The ozone-laden air moved over Nevada creating elevated ozone readings which resulted in exceedances of the National Ambient Air Quality Standard (NAAQS) for Ozone (O3) at the Great Basin National Park CASTNET ozone monitor.||||||||||||||||||||||||||||||||||||||||||||||||||||
288 records written.

To: Sather, Mark[sather.mark@epa.gov]
Cc: Coats, Robert[Coats.Robert@epa.gov]; miriam@adeq.state.ar.us[miriam@adeq.state.ar.us]
From: Papp, Michael
Sent: Tue 4/18/2017 2:51:46 PM
Subject: RE: Ozone Data Review

Hey Mark.

I heard from the AQS folks that that the National Computer Center had problems yesterday and was down.

That may be the trouble. The "AS" null code qualifier should be fine. I'm cc'ing Robert Coats just in case he has additional updates on AQS

From: Sather, Mark
Sent: Tuesday, April 18, 2017 10:38 AM
To: Papp, Michael <Papp.Michael@epa.gov>
Subject: FW: Ozone Data Review

Fyi; thanks

From: Talbert, Miriam [mailto:MIRIAM@adeq.state.ar.us]
Sent: Tuesday, April 18, 2017 8:21 AM
To: Sather, Mark <sather.mark@epa.gov>
Subject: RE: Ozone Data Review

Okay, I did enter AS (Poor Quality Assurance) for the Null qualifier codes but they are not showing up in the report.

Should have I entered another code?

From: Sather, Mark [mailto:sather.mark@epa.gov]
Sent: Monday, April 17, 2017 2:34 PM
To: Talbert, Miriam
Cc: Verhalen, Frances
Subject: Ozone Data Review

Good afternoon Miriam. EPA Headquarters (OAQPS) has directed the Regional Offices to work with their respective State/Local/Tribal agencies regarding the invalidation of ozone data in AQS when 1-point QC checks were above +/-7%. In the attached spreadsheet you will see 1 site for your agency to address: the Springdale site (AQS #05-143-0005) for the time period 4/16/14-5/12/14. Please review the information below from Lew Weinstock, and the attached detailed information for this site, and complete the invalidation of this ozone data by May 1, 2017. Let me know of any questions and thanks in advance for your attention to this.

Mark

Mark Sather

Environmental Scientist

U.S. EPA Region 6

Air Monitoring & Grants Section (6MM-AM)

Dallas, Texas

(214) 665-8353

sather.mark@epa.gov

---Original Message-----

From: Weinstock, Lewis

Sent: Thursday, April 13, 2017 7:44 AM

To: Judge, Robert <Judge.Robert@epa.gov>; Khan, Mazeeda <Khan.Mazeeda@epa.gov>; Chow, Alice <chow.alice@epa.gov>; Rinck, Todd <Rinck.Todd@epa.gov>; Compher, Michael <compher.michael@epa.gov>; Verhalen, Frances <verhalen.frances@epa.gov>; Davis, Michael <Davis.Michael@epa.gov>; Fallon, Gail <fallon.gail@epa.gov>; Flagg, MichaelA <Flagg.MichaelA@epa.gov>; Hall, Chris <Hall.Christopher@epa.gov>

Cc: Payton, Richard <Payton.Richard@epa.gov>; Brown, Ethan <Brown.Ethan@epa.gov>; Papp, Michael <Papp.Michael@epa.gov>; Wells, Benjamin <Wells.Benjamin@epa.gov>; Naess, Liz <Naess.Liz@epa.gov>; Rice, Joann <Rice.Joann@epa.gov>

Subject: URGENT ACTION – Invalidation of Ozone data in AQS due to QC issues

Importance: High

Good morning:

As you all are aware by now, we have recently identified ambient ozone data in AQS that was reported during periods of time when 1-point QC checks were outside the critical criteria in the QA Handbook and contained in approved monitoring organization QAPP's. We are currently in the middle of the ozone designations process and it is important that we maintain the integrity of that process. It is critical that we base our designations decisions on defensible data for areas both attaining and not attaining the standard. To this end, we believe that the data identified as outside these critical criteria be null coded in AQS so that the underlying design values supporting the designations process are based on valid data. We understand that there is limited time to complete this work due to the tight timelines for designations. Therefore, this process has been divided into two phases as explained below:

Phase 1:

These are high priority monitors whose 2014-2016 design value would change or become incomplete due to the data invalidations. Attached to this message is an Excel table that explicitly lists the monitors and periods of time for when ozone data should be null coded (coded as Phase 1). We ask that you communicate with the affected monitoring organizations to ensure that these data are invalidated in AQS no later than May 1, 2017 (we will be doing our design value pull from AQS on the morning of May 2). Luckily this first phase only affects about 80 monitors, as some states have already begun invalidating their data.

Phase 2:

The list of the remaining monitors that will have similar data invalidation actions are coded as Phase 2 in the Excel table. These monitors have a less immediate impact on designations so are being included in the Phase 2 action. We recognize that this phase affects a larger number of monitors, therefore we are providing more time to invalidate this data. Please work with your monitoring organizations to complete this exercise by August 1, 2017.

Additional details on the Excel table: The attachment contains three tabs: (1) Data Invalidations – which contains specific information for the data invalidation, (2) 2014-2016 Design Values – design values before and after ("a" added to column heading) data invalidations, and (3) Failed QC Checks – details on the actual QC checks. Please contact Liz Naess (Ben Wells is out of the office until 4/24/17) or Mike Papp with questions on the data retrieval (Liz/Ben) or associated QA issues (Mike).

For additional background information on this quality assurance issue, please refer to the attached memo entitled "Ozone 1-point QC Check Data Quality Evaluation and Next Steps".

We will be checking in periodically during our monthly conference calls to answer any questions and assess progress on this action. Thank you for your prompt attention to this matter.

Lewis Weinstock (Ambient Air Monitoring Group and Liz Naess (Air Quality Analysis Group)

Air Quality Assessment Division - Mail Code C304-06 | Office of Air Quality Planning & Standards | U.S. Environmental Protection Agency | Research Triangle Park, NC 27711 |

To: svance@utah.gov[svance@utah.gov]; Brock LeBaron[blebaron@utah.gov]
Cc: Fallon, Gail[fallon.gail@epa.gov]; Payton, Richard[Payton.Richard@epa.gov]
From: Ostendorf, Jody
Sent: Tue 8/30/2016 6:38:50 PM
Subject: FW: Public Notice for Uinta Basin Exceptional Events package
Uinta Basin EE Public Notice 8 2016.doc

Hi Sheila and Brock,

We just made the deadline for the Salt Lake Tribune and the EE public notice will publish tomorrow. That will start the public comment period, which will close on Sept. 29th.

The public notice will publish in the Vernal Express and the Uinta Basin Standard next Tuesday.

Thanks,

Jody

Jody Ostendorf
State Implementation Plan Program Manager
Uinta Basin Project Coordinator
Air Quality Planning Unit (8P-AR)
U.S. Environmental Protection Agency, Region 8
1595 Wynkoop Street
Denver, CO 80202-1129
303.312.7814

-----Original Message-----
From: Rodriguez, Sallena
Sent: Tuesday, August 30, 2016 12:15 PM
To: (ubslegals@ubmedia.biz) <ubslegals@ubmedia.biz>; (velegals@ubmedia.biz) <velegals@ubmedia.biz>
Cc: Ostendorf, Jody <ostendorf.jody@epa.gov>
Subject: FW: Public Notice for Uinta Basin Exceptional Events package

This public notice has been approved by our budgeting office for a one time publication, when replying to this email with the publication date please include whether you will bill our office or if you will need prepayment.

It is imperative that all parties listed on this email receive the publication date, please “reply to all” when sending the publication date.

Please send the proof of publication to the address listed below.

Thank you in advance for your assistance.

Sallena Rodriguez
U.S. Environmental Protection Agency
Technical and Financial Services
1595 Wynkoop St. 8P-W-TFS
Denver, CO 80202-1129
303-312-6279

-----Original Message-----
From: Ostendorf, Jody
Sent: Tuesday, August 30, 2016 11:22 AM
To: Rodriguez, Sallena <Rodriguez.Sallena@epa.gov>
Subject: Public Notice for Uinta Basin Exceptional Events package

Hi Sallena,

Thank you for your help with this public notice (attached). We are trying to make a noon deadline for the Salt Lake Tribune. The email and other contact information is below.

Cheers,

Jody

Jody Ostendorf
State Implementation Plan Program Manager Uinta Basin Project Coordinator Air Quality Planning Unit (8P-AR) U.S. Environmental Protection Agency, Region 8
1595 Wynkoop Street
Denver, CO 80202-1129
303.312.7814

-----Original Message-----
From: naclegal [mailto:naclegal@mail.UtahMediaGroup.com]
Sent: Thursday, August 25, 2016 4:06 PM
To: Ostendorf, Jody <ostendorf.jody@epa.gov>
Subject: Thank you for your e-mail. Visit our new Legal and Public Notices website at http://legal

Thank you for your e-mail. Visit our new Legal and Public Notices website at http://legalnotices.sltrib.com for details and guidance regarding our legal notice services and contact information. PLEASE NOTE OUR NEW FAX NUMBER - 801.204.6292

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* In the Subject field please include the first day you want your notice to appear. Deadlines are listed below.
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* Any discrepancies regarding billing and charges for legal notices and advertising must be brought to our

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*If you have sent us an attached zip file, please resend in a Microsoft Word doc format if possible *Please be sure to check your ad on the first publication date, if there is a problem please call 801.204.6245.

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Standard Non-Holiday Deadline Schedules. The following deadlines are a guideline only. It is now possible to have notices published with one- or two-day advance notice. Any notice requiring publication outside standard deadlines below requires receipt and approval (if required) by Noon prior to first publication with the exception of Sunday or Monday publications which must be approved by 12:00 Noon Friday.

Monday - 12 Noon for Tuesday Run
Tuesday - 12 Noon for Wednesday Run
Wednesday - 12 Noon for Thursday Run
Thursday - 12 Noon for Friday Run
Friday - 12 Noon for Saturday/Sunday/Monday Run

Unless directed otherwise we will format your notice as sent to the best of our ability. As part of ongoing efforts to improve our service levels, we have created the ability to add emphasis to any part of a Legal Notices by bolding or underlining the text. This does not add to the cost of publication. Simply bold or underline the text you would like affected in your request or attachment. Another new feature is the ability to include your company logo in your Legal or Public Notice to promote your business or organization. Please note: This requires advance notice but can be saved for future use. Legal or Public notices that require publication as a Display Ad require additional time to create. Utah Media Group has many business promotion solutions - including print, digital and broadcast. Please contact Mark Fultz at 801-204-6245 or mfultz@utahmediagroup.com for more details.

Please note that effective January 1, 2010, the new requirement to publish Notice of Trustee's Sales on the internet went into effect (found in 57-1-25(1)(D)(ii), which references 45-1-101, Utah Code Annotated). In compliance, all legal print notices submitted to Utah Media Group are also posted on the internet at www.utahlegals.com.

To: Payton, Richard[Payton.Richard@epa.gov]
Cc: Clarke - CDPHE, Lisa[lisa.devore@state.co.us]
From: Hewitson - CDPHE, Ingrid
Sent: Thur 5/11/2017 4:33:20 PM
Subject: Exceptional Event call
Lamar Not reasonably controllable.docx

Hi Richard,

I am working on updating our exceptional event template and fleshing out the mitigation plan for Lamar and just want to make sure I am understanding the requirements under the revised rule. Would you have some time in the next couple weeks for a call?

My primary question relates to the "Not reasonably controllable or preventable" section, which I have revised and attached (for Lamar). Am I on the right track? It is my understanding that since we have a SIP that has been approved within the past 5 years we can just point to that rather than go through all the potential sources of dust like we have in the past. The mitigation plan will also refer to the SIP measures but will include some updated information that was in the old NEAP as well. The majority of the rest of the EE submittal will look the same.

My second question relates to Alamosa. Since there is not a SIP for the area, the "Large scale, high energy dust events" scenario language (in my attached draft) will stay the same but the "All other dust events" language will have to include all the potential sources of dust like we have in the past. However, per section (b)(5)(iv) we do not have to make case specific justifications we can just do a general assessment of the area. Is this correct?

So in both cases (Lamar and Alamosa) I can develop standard language for this section that will go into any EE submittal regardless of the wind direction. Correct?

My schedule is pretty open for the next two weeks. If you could let me know what would work best I would appreciate it.

Thank you,

Ingrid Hewitson, MPH

Air Quality Planner

State of Colorado, Air Pollution Control Division

P: 303.692.6331 | F: 303.782-0278

4300 Cherry Creek S. Dr., Denver, CO 80246

email:

ingrid.hewitson@state.co.us

To: cara.keslar@wyo.gov[cara.keslar@wyo.gov]; Payton, Richard[Payton.Richard@epa.gov]
From: Carlson, Albion
Sent: Mon 12/5/2016 10:43:00 PM
Subject: RE: Monitoring discussion of Part 58 for industrial monitors and exceptional events

Cara,

We both plan to be here on Thursday and call you from here at 9:00. Thanks,

Albion

From: Cara Keslar [mailto:cara.keslar@wyo.gov]
Sent: Monday, December 05, 2016 12:12 PM
To: Payton, Richard <Payton.Richard@epa.gov>
Cc: Carlson, Albion <Carlson.Albion@epa.gov>
Subject: Re: Monitoring discussion of Part 58 for industrial monitors and exceptional events

How about Thursday morning 9-10:30? DO I need to get a call-in line, or will you two be in the same location?

Thanks,
Cara

Cara Keslar

Monitoring Section Supervisor

Wyoming DEQ - Air Quality Division

(307) 777-8684 (office)

(307) 286-2383 (cell)

cara.keslar@wyo.gov

On Mon, Dec 5, 2016 at 9:43 AM, Payton, Richard <Payton.Richard@epa.gov> wrote:

I have the same availability as Albion.

Richard

From: Carlson, Albion
Sent: Thursday, December 01, 2016 3:19 PM
To: cara.keslar@wyo.gov; Payton, Richard <Payton.Richard@epa.gov>
Subject: RE: Monitoring discussion of Part 58 for industrial monitors and exceptional events

I'm available both mornings excepting from 11:00 to noon on Wednesday.

From: Cara Keslar [mailto:cara.keslar@wyo.gov]
Sent: Thursday, December 01, 2016 3:13 PM
To: Payton, Richard <Payton.Richard@epa.gov>; Carlson, Albion <Carlson.Albion@epa.gov>
Subject: Monitoring discussion of Part 58 for industrial monitors and exceptional events

Hi Richard and Albion,

Nancy Vehr has communicated that Carl was successful in getting approval on a path forward for industrial monitoring Part 58 requirements and responsibilities. For the next step, we would like to have a call between the AQD Monitoring Section and Region 8's monitoring folks to iron out the details. Are you available possibly Wednesday or Thursday morning of next week for about an hour and a half?

In this call, we would also like to open the discussion that Richard and I started at the EE training. We have a facility that has had an exceedance this week. They are interested in pursuing an exceptional event flag for this event. We would like to begin talking about what needs to come to Region 8 for notification process and the information needed to

request review and demonstrate regulatory significance under "F) other actions on a case-by-case basis as determined by the Administrator". I realize you probably won't have any specifics, but we'd like to start the discussion.

Thanks, Cara

Cara Keslar

Monitoring Section Supervisor

Wyoming DEQ - Air Quality Division

(307) 777-8684 (office)

(307) 286-2383 (cell)

cara.keslar@wyo.gov

E-Mail to and from me, in connection with the transaction of public business, is subject to the Wyoming Public Records Act and may be disclosed to third parties.

E-Mail to and from me, in connection with the transaction of public business, is subject to the Wyoming Public Records Act and may be disclosed to third parties.

To: Payton, Richard[Payton.Richard@epa.gov]
Cc: cindy.wike@state.co.us[cindy.wike@state.co.us]; Gordon Pierce[gordon.pierce@state.co.us]
From: Harshfield - CDPHE, Gregory
Sent: Thur 4/20/2017 9:31:41 PM
Subject: Re: FW: URGENT ACTION – Invalidation of Ozone data in AQS due to QC issues

Richard,
We have reviewed all the Phase 1 and Phase 2 failing QC points and have made corrections. Below is a summary of those corrections. Please feel free to contact me if you have any questions.
Regards,
Greg

Phase 1
QC Point: Rifle 08-045-0012 (failing ozone QC on 9/2/15) - CDPHE found that the failing QC point should not have been loaded to AQS. This was an error made by CDPHE in how we select QC records to upload to AQS that are supplied by ARS (contractor). Data surrounding the failing QC point had been appropriately invalided in AQS and the failing QC point was found not to be representative of data in AQS and should be removed.
Actions Taken: 1) The failing QC point has been removed from AQS. 2) Valid QC points (8/26/15 and 9/3/15) book-ending the block of invalid ambient data were uploaded to AQS. 3) New procedures between CDPHE and ARS have been established to ensure invalid QC points are more easily identified and removed from AQS upload consideration.

QC Point: Rifle 08-045-0012 (failing ozone QC on 6/19/16) - CDPHE found that the failing QC point should not have been loaded to AQS. This was an error made by CDPHE in how we select QC records to upload to AQS that are supplied by ARS (contractor). Data surrounding the failing QC point had been appropriately invalided in AQS and the failing QC point was found not to be representative of data in AQS and should be removed.
Actions Taken: 1) The failing QC point has been removed from AQS. 2) Valid QC points (6/15/16 and 6/25/16) book-ending the block of invalid ambient data were uploaded to AQS. 3) New procedures between CDPHE and ARS have been established to ensure invalid QC points are more easily identified and removed from AQS upload consideration.

Phase 2
QC Point: CAMP 08-031-0002 (failing ozone QC on 11/17/16) - CDPHE found that the failing QC point should not have been loaded to AQS. This was an error made by CDPHE. Data surrounding the failing QC point had been appropriately invalided and the failing QC point was found not to be representative of data in AQS and should be removed.
Actions Taken: 1) The failing QC point has been removed from AQS. 2) A valid QC point on 11/23/16 was randomly selected from the two week period and uploaded to AQS to replace the removed 11/17/16 QC point. 3) This error was caused by a flagging oversight in the CDPHE's QC tracking database that occurred during the data validation process. AQS data upload reports will be more closely reviewed prior to uploading data to AQS.

QC Point: Palisade 08-077-0020 (failing ozone QC on 12/8/14) - CDPHE found that the failing QC point should not have been loaded to AQS. This was an error made by both CDPHE and

ARS. ARS internally validates ambient data from QC precision data reported at a 1 decimal point resolution(1/10th ppb), however, they report the data to AQS truncated at the 0 decimal point resolution. In this situation, the data evaluated at the 1 decimal point resolution passed the 7% criteria, but once truncated it failed the 7% criteria. At the time when the QC data was uploaded to AQS, it was standard protocol to upload with 0 decimal point resolution. Because of this, CDPHE determined that the QC point was in fact failing and ambient data surrounding the failing QC point should be invalidated and the failing QC point should be removed from AQS. Actions Taken: 1) The failing QC point has been removed from AQS. 2) Valid QC points (12/7/14 and 12/10/14) book-ending the block of invalid ambient data were uploaded to AQS. 3) Ambient data from 12/7/14 & 01:00 to 12/10/14 00:00 has been invalidated in AQS. 4) New procedures between CDPHE and ARS (contractor) have been developed to ensure all data validation and data reporting to AQS is done at 1 decimal point resolution. ARS will start this new procedure beginning with 2017 data.

QC Point: Rifle 08-045-0012 (failing ozone QC on 10/25/13) - CDPHE found that the failing QC point should not have been loaded to AQS. This was an error made by both CDPHE and ARS. ARS internally validates ambient data from QC precision data reported at a 1 decimal point resolution(1/10th ppb), however, they report the data to AQS truncated at the 0 decimal point resolution. In this situation, the data evaluated at the 1 decimal point resolution passed the 7% criteria, but once truncated it failed the 7% criteria. At the time when the QC data was uploaded to AQS, it was standard protocol to upload with 0 decimal point resolution. Because of this, CDPHE determined that the QC point was in fact failing and ambient data surrounding the failing QC point should be invalidated and the failing QC point should be removed from AQS. Actions Taken: 1) The failing QC point has been removed from AQS. 2) Valid QC points (10/24/13 and 10/27/13) book-ending the block of invalid ambient data were uploaded to AQS. 3) Ambient data from 10/24/13 & 01:00 to 10/27/13 00:00 has been invalidated in AQS. 4) New procedures between CDPHE and ARS (contractor) have been developed to ensure all data validation and data reporting to AQS is done at 1 decimal point resolution. ARS will start this new procedure beginning with 2017 data.

QC Point: Rifle 08-045-0012 (failing ozone QC on 5/25/13) - CDPHE found that the failing QC point should not have been loaded to AQS. This was an error made by both CDPHE and ARS. ARS internally validates ambient data from QC precision data reported at a 1 decimal point resolution(1/10th ppb), however, they report the data to AQS truncated at the 0 decimal point resolution. In this situation, the data evaluated at the 1 decimal point resolution passed the 7% criteria, but once truncated it failed the 7% criteria. At the time when the QC data was uploaded to AQS, it was standard protocol to upload with 0 decimal point resolution. Because of this, CDPHE determined that the QC point was in fact failing and ambient data surrounding the failing QC point should be invalidated and the failing QC point should be removed from AQS. Actions Taken: 1) The failing QC point has been removed from AQS. 2) Valid QC points (5/24/13 and 5/26/13) book-ending the block of invalid ambient data were uploaded to AQS. 3) Ambient data from 5/24/13 & 01:00 to 5/26/13 00:00 has been invalidated in AQS. 4) New procedures between CDPHE and ARS (contractor) have been developed to ensure all data validation and data reporting to AQS is done at 1 decimal point resolution. ARS will start this new procedure beginning with 2017 data.

QC Point: Rifle 08-045-0012 (failing ozone QC on 4/13/13) - CDPHE found that the failing QC point should not have been loaded to AQS. This was an error made by both CDPHE and ARS. ARS internally validates ambient data from QC precision data reported at a 1 decimal point resolution(1/10th ppb), however, they report the data to AQS truncated at the 0 decimal point resolution. In this situation, the data evaluated at the 1 decimal point resolution passed the 7% criteria, but once truncated it failed the 7% criteria. At the time when the QC data was uploaded to AQS, it was standard protocol to upload with 0 decimal point resolution. Because of this, CDPHE determined that the QC point was in fact failing and ambient data surrounding the failing QC point should be invalidated and the failing QC point should be removed from AQS. Actions Taken: 1) The failing QC point has been removed from AQS. 2) Valid QC points (4/10/13 and 4/14/13) book-ending the block of invalid ambient data were uploaded to AQS. 3) Ambient data from 4/10/13 & 01:00 to 4/14/13 00:00 has been invalidated in AQS. 4) New procedures between CDPHE and ARS (contractor) have been developed to ensure all data validation and data reporting to AQS is done at 1 decimal point resolution. ARS will start this new procedure beginning with 2017 data.

QC Point: Rifle 08-045-0012 (failing ozone QC on 1/25/13) - CDPHE found that the failing QC point should not have been loaded to AQS. This was an error made by both CDPHE and ARS. ARS internally validates ambient data from QC precision data reported at a 1 decimal point resolution(1/10th ppb), however, they report the data to AQS truncated at the 0 decimal point resolution. In this situation, the data evaluated at the 1 decimal point resolution passed the 7% criteria, but once truncated it failed the 7% criteria. At the time when the QC data was uploaded to AQS, it was standard protocol to upload with 0 decimal point resolution. Because of this, CDPHE determined that the QC point was in fact failing and ambient data surrounding the failing QC point should be invalidated and the failing QC point should be removed from AQS. Actions Taken: 1) The failing QC point has been removed from AQS. 2) Valid QC points (1/23/13 and 1/27/13) book-ending the block of invalid ambient data were uploaded to AQS. 3) Ambient data from 1/23/13 & 01:00 to 1/27/13 00:00 has been invalidated in AQS. 4) New procedures between CDPHE and ARS (contractor) have been developed to ensure all data validation and data reporting to AQS is done at 1 decimal point resolution. ARS will start this new procedure beginning with 2017 data.

On Wed, Apr 19, 2017 at 1:26 PM, Payton, Richard <Payton.Richard@epa.gov> wrote:

> Hi folks. This is a follow-up message to the one I sent last week about ozone monitors with some "failing" QC check data (QC check errors greater than 7%) with associated raw data in AQS (rather than null codes). Your situation is different from that assumed in this e-mail from OAQPS and the attached memo: in general, OAQPS assumed the raw data is invalid and needs to be nulled in AQS; in your case, you have nightly span or other checks you used to validate some of the data between bi-weekly manual QC checks. Your solution is to at least delete the failing QC check for which raw data has already been nulled, and optionally, enter "bookend" QC data around the nulled data to show that the remaining data are all valid.

I have edited the OAQPS provided spreadsheet (originally a 50 state assessment) to show only the Colorado data. The spreadsheet shows both your data, as well as S. Ute, NPS, CASTNET, and USFS data; I have separated the data so yours is first, followed by a blank line, and then the other agencies' data. We don't expect you to do anything about the other agency data, but I thought you should know about the QC check status of those other networks in Colorado.

I think this will be a topic on tomorrow's NACAA Monitoring Call.

Please let me know if you have questions.

Richard

-----Original Message-----
From: Weinstock, Lewis
Sent: Thursday, April 13, 2017 6:44 AM
To: Judge, Robert <Judge.Robert@epa.gov>; Khan, Mazeeda <Khan.Mazeeda@epa.gov>; Chow, Alice <chow.alice@epa.gov>; Rinck, Todd <Rinck.Todd@epa.gov>; Compher, Michael <compher.michael@epa.gov>; Verhalen, Frances <verhalen.frances@epa.gov>; Davis, Michael <Davis.Michael@epa.gov>; Fallon, Gail <fallon.gail@epa.gov>; Flagg, MichaelA <Flagg.MichaelA@epa.gov>; Hall, Chris <Hall.Christopher@epa.gov>
Cc: Payton, Richard <Payton.Richard@epa.gov>; Brown, Ethan <Brown.Ethan@epa.gov>; Papp, Michael <Papp.Michael@epa.gov>; Wells, Benjamin <Wells.Benjamin@epa.gov>; Naess, Liz <Naess.Liz@epa.gov>; Rice, Joann <Rice.Joann@epa.gov>
Subject: URGENT ACTION – Invalidation of Ozone data in AQS due to QC issues
Importance: High

Good morning:

As you all are aware by now, we have recently identified ambient ozone data in AQS that was reported during periods of time when 1-point QC checks were outside the critical criteria in the QA Handbook and contained in approved monitoring organization QAPP's. We are currently in the middle of the ozone designations process and it is important that we maintain the integrity of that process. It is critical that we base our designations decisions on defensible data for areas both attaining and not attaining the standard. To this end, we believe that the data identified as outside these critical criteria be null coded in AQS so that the underlying design values supporting the designations process are based on valid data. We understand that there is limited time to complete this work due to the tight timelines for designations. Therefore, this process has been divided into two phases as explained below:

Phase 1:
These are high priority monitors whose 2014-2016 design value would change or become incomplete due to the data invalidations. Attached to this message is an Excel table that explicitly lists the monitors and periods of time for when ozone data should be null coded (coded as Phase 1). We ask that you communicate with the affected monitoring

organizations to ensure that these data are invalidated in AQS no later than May 1, 2017 (we will be doing our design value pull from AQS on the morning of May 2). Luckily this first phase only affects about 80 monitors, as some states have already begun invalidating their data.

Phase 2:
The list of the remaining monitors that will have similar data invalidation actions are coded as Phase 2 in the Excel table. These monitors have a less immediate impact on designations so are being included in the Phase 2 action. We recognize that this phase affects a larger number of monitors, therefore we are providing more time to invalidate this data. Please work with your monitoring organizations to complete this exercise by August 1, 2017.

Additional details on the Excel table: The attachment contains three tabs: (1) Data Invalidations – which contains specific information for the data invalidation, (2) 2014-2016 Design Values – design values before and after ("a" added to column heading) data invalidations, and (3) Failed QC Checks – details on the actual QC checks.

For additional background information on this quality assurance issue, please refer to the attached memo entitled "Ozone 1-point QC Check Data Quality Evaluation and Next Steps".

We will be checking in periodically during our monthly conference calls to answer any questions and assess progress on this action. Thank you for your prompt attention to this matter.

Lewis Weinstock (Ambient Air Monitoring Group and Liz Naess (Air Quality Analysis Group)

Air Quality Assessment Division - Mail Code C304-06 | Office of Air Quality Planning & Standards | U.S. Environmental Protection Agency | Research Triangle Park, NC 27711 |

--

Gregory Harshfield
Gaseous and Meteorological Monitoring Group Supervisor
Technical Services Program

P 303.692.3232 | F 303.782.5493
4300 Cherry Creek Drive South, APCD_TS_B1, Denver, CO 80246-1530
gregory.harshfield@state.co.us | www.colorado.gov/cdphe/apcd

To: minnieg@utetribe.com[minnieg@utetribe.com]
Cc: Payton, Richard[Payton.Richard@epa.gov]
From: Ostendorf, Jody
Sent: Tue 8/23/2016 4:49:42 PM
Subject: RE: Letter from the Tribe

Hi Minnie,

Monica Morales is the Acting Air Director, so she would be the appropriate addressee. If you could scan and email it to her and cc: me and Richard Payton, that would be best. That way we can start the public comment process asap.

A hard copy can be mailed to:

Monica Morales, 8P-AR

U.S. EPA Region 8

1595 Wynkoop St.

Denver, CO 80202

Thanks,

Jody

Jody Ostendorf

State Implementation Plan Program Manager

Uinta Basin Project Coordinator

Air Quality Planning Unit (8P-AR)

U.S. Environmental Protection Agency, Region 8

1595 Wynkoop Street

Denver, CO 80202-1129

303.312.7814

From: Minnie Grant [mailto:minnieg@utetribe.com]
Sent: Tuesday, August 23, 2016 10:45 AM
To: Ostendorf, Jody <ostendorf.jody@epa.gov>
Subject: RE: Letter from the Tribe

Jody,

One more item who and where do we send the letter? Region 8? Thank-you. minnie

From: Ostendorf, Jody [mailto:ostendorf.jody@epa.gov]
Sent: Tuesday, August 23, 2016 10:43 AM
To: Minnie Grant
Cc: Payton, Richard
Subject: RE: Letter from the Tribe

Hi Minnie,

That's great news about the letter! Richard Payton is breaking the EE package into three parts to send to you, so you should be receiving the complete package in a few minutes. I guess the document was too large to go through your server.

Please let me know if there's anything else you need.

Jody

Jody Ostendorf

State Implementation Plan Program Manager

Uinta Basin Project Coordinator

Air Quality Planning Unit (8P-AR)

U.S. Environmental Protection Agency, Region 8

1595 Wynkoop Street

Denver, CO 80202-1129

303.312.7814

From: Minnie Grant [mailto:minnieg@utetribe.com]
Sent: Tuesday, August 23, 2016 10:40 AM
To: Ostendorf, Jody <ostendorf.jody@epa.gov>
Subject: RE: Letter from the Tribe

Jody,

The letter has been completed just waiting to go before the counsel. Do you have a complete final draft of the SI EE it seems my final draft is missing pages 30-49. Could you send those to me? minnie

From: Ostendorf, Jody [mailto:ostendorf.jody@epa.gov]
Sent: Tuesday, August 23, 2016 10:35 AM
To: Brock LeBaron; svance@utah.gov; Minnie Grant
Subject: Letter from the Tribe

Hi All,

At our staff meeting this morning, I discussed the letter of support we are seeking from the Tribe

for the Exceptional Events package. Our attorneys confirmed that the letter can come either from the Business Committee or the Tribe's attorneys. Our regional counsel attorney also offered to contact the Tribe's attorneys if that would be helpful to move the process along. Please let me know, thanks!

Jody

Jody Ostendorf

State Implementation Plan Program Manager

Uinta Basin Project Coordinator

Air Quality Planning Unit (8P-AR)

U.S. Environmental Protection Agency, Region 8

1595 Wynkoop Street

Denver, CO 80202-1129

303.312.7814

To: Patrick Reddy[preddyresearch@gmail.com]; k.e.knowland@nasa.gov[k.e.knowland@nasa.gov]; Payton, Richard[Payton.Richard@epa.gov]
Cc: Landes - CDPHE, Scott[scott.landes@state.co.us]; Welsh - CDPHE, Dan[dan.welsh@state.co.us]; Amber Ortega - CDPHE[amber.ortega@state.co.us]; Gordon Pierce[gordon.pierce@state.co.us]; gregory.harshfield@state.co.us[gregory.harshfield@state.co.us]; Duncan, Bryan N. (GSFC-6140)[bryan.n.duncan@nasa.gov]; Tonnesen, Gail[Tonnesen.Gail@epa.gov]
From: Katherine Emma Knowland
Sent: Tue 1/24/2017 8:48:50 PM
Subject: Re: Stratospheric intrusion research at NASA Goddard

Hi Richard,

To elaborate a bit more on the details I gave Pat, I am looking for a list of the dates and locations of ozone observations which received 'full event flag' or 'information flag only' labels associated with stratospheric intrusion events for the spring of 2012 and I'd be interested in flag information going back to 2005 if available. Do you have this level of detail on stratospheric intrusion events that you can share with me? I have tried to find this information in the public domain as I was hoping to reference a link in the paper I am working on.

Kind regards,

Emma

--
K. Emma Knowland, PhD
Global Modeling and Assimilation Office/USRA
NASA Goddard Space Flight Center Bldg 33
Code 610.1, Greenbelt, MD, 20771
Phone: +1-301-614-6342

On 01/24/2017 11:32 AM, Patrick Reddy wrote:

> Hi Emma,
> I am looking forward to seeing your paper. Probably the best person to contact about this information is Richard Payton at EPA Region 8. I think he has some spreadsheets with this information. Otherwise, the EPA might be able to generate reports of the data you need. Hopefull the recently announced freeze on the EPA will not hamper their ability to provide you this information.
>
> Regards,
>
> Patrick Reddy
>
> On Tue, Jan 17, 2017 at 1:16 PM, Katherine Emma Knowland <katherine.e.knowland@nasa.gov> wrote:
>
>> Hi Pat,
>>
>> For the last few months I have focused on stratospheric intrusions over western USA

during spring of 2012 with case studies over Colorado. In my analysis of the case studies, I have used similar indicators for tropopause folding events as you listed, specifically meteorological and constituent (O3, CO) data from observations, the MERRA-2 reanalysis, and GEOS-5 simulated tracers. I am working on a possible GRL paper on the representation of the case study folds in the high-resolution MERRA-2 reanalysis as a prequel to a greater study building a climatology of stratospheric intrusion events over the western and eastern USA using a tracking algorithm. In an effort to validate the long-term study with information on other years and other sites, I am wondering if there is a publicly available list of the dates and locations which receive 'full event flag' and 'information flag only' labels or is that information internal only? I've found some of your work online such, as http://www.westar.org/12%20Tech%20Conf/Presentations/Reddy.pdf which shows a table with exceedences with dates in green for stratospheric intrusions, but I have struggled to find this information on the CDPHE website or EPA website. I found possibly an outdated list on http://webapps.datafed.net/exceedance.aspx?parameter=ozone which has a few events in the 2010-2012 period marked with a stratospheric intrusion data quality flag from AQS.

Kind regards,

Emma

On 11/02/2016 03:24 PM, Patrick Reddy wrote:

> Hi Emma,
> Sorry for the delay in getting back to you. Yes, I am still a good contact for this topic. I am working part time for CDPHE until December 15, and I am a visiting scientist at NCAR ACOM, and I might continue to contribute to interagency workgroups on intrusions next year. Scott Landes (meteorologist), Dan Welsh (meteorologist), and Amber Ortega (atmospheric chemist and meteorologist) are now responsible for this topic at CDPHE and for identifying and analyzing events for flagging. In the past we have used meteorological data (isentropic potential vorticity, relative humidity, storm structure data) and whatever satellite (total column ozone, AIRS 600 mb CO) and modeled data (the IDEA stratospheric intrusion tool and RAQMS and NCAR MOZART stratospheric O3 or 500 mb O3 and various large source groups for CO) we could find. CO is an inverse indicator for stratospheric air and a positive indicator for possible Asian or west coast US ozone.
>
> In general an event received an informational flag if the contribution of stratospheric ozone seemed relatively small and/or the data that would normally support a full event flag was sparse or inconclusive. Many of the ambiguous intrusion events occur in late May or June when there is significant anthropogenic ozone, a continuing influx of material from Asia, and when greater mixing dilutes some of the meteorological indicators for intrusions. Model data is always a

welcome addition.

The folks I just mentioned are busy working on smoke and intrusion exceptional events for 2016. Because of the new O3 standard, these reports have to be finished by next spring. I think they would love to work with you on these exceptional events in general, and it might make sense for all of you to consider how you can help each other with your respective projects.

Regards,

Pat Reddy

On Tue, Oct 25, 2016 at 11:58 AM, Katherine Emma Knowland <katherine.e.knowland@nasa.gov> wrote:

> Dear Pat,
>
> My name is Emma Knowland and I am a new research scientist at NASA Goddard working with Lesley Ott and Bryan Duncan. I'm interested in regional and seasonal differences in stratospheric intrusions over the US, and how well our GEOS-5 products can represent these intrusions. Lesley provided me with your list of stratospheric intrusions over Colorado during spring of 2012, some of which have 'full event flag' and others with 'information flag only'. I'm interested in knowing more about your work at CDPHE, in particular, the tools you used to identify the impact of stratospheric air on surface observations and the differences in the classifications of 'full event' and 'information flag only'. Did an event only get an 'information flag' because the models were not able to confirm the intrusion? Was there a lack of other observational data to support the surface observations? Bryan tells me you are now retired (congratulations!) and I was wondering if you are still the right person to direct my questions to regarding stratospheric intrusion candidates, or if there is someone else at CDPHE I should contact.
>
> Thank you.
>
> Kind regards,
>
> Emma Knowland
>
> --
> K. Emma Knowland, PhD
> Global Modeling and Assimilation Office/USRA
> NASA Goddard Space Flight Center Bldg 33
> Code 610.1, Greenbelt, MD, 20771
> Phone: +1-301-614-6342

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K. Emma Knowland, PhD
Global Modeling and Assimilation Office/USRA
NASA Goddard Space Flight Center Bldg 33
Code 610.1, Greenbelt, MD, 20771
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--
K. Emma Knowland, PhD
Global Modeling and Assimilation Office/USRA
NASA Goddard Space Flight Center Bldg 33
Code 610.1, Greenbelt, MD, 20771
Phone: +1-301-614-6342

To: Payton, Richard[Payton.Richard@epa.gov]
Cc: Ostendorf, Jody[ostendorf.jody@epa.gov]
From: Sheila Vance
Sent: Thur 11/3/2016 5:34:41 PM
Subject: Re: Exceptional Event

Thanks Richard! Appreciate the quick response!
Sheila

Sheila Vance | Environmental Scientist

Phone: 801.536.4001

195 North 1950 West, Salt Lake City, UT 84116
Website | Blog | Twitter | Facebook

On Thu, Nov 3, 2016 at 10:30 AM, Payton, Richard <Payton.Richard@epa.gov> wrote:

Yours was the only public comment received.

We will now need to review and concur or non-concur on the request. Since I was the principal author, I will be getting peer review of the demonstration from OAQPS and (probably) one other regional office (normally, we handle the review in-house for Region 8 EE requests, with the option of OAQPS support for unusual circumstances). We will be making the determination on the request in time to inform our response to your and the tribes NAA recommendations. That response is due to you no later than June 2, 2017.

Richard Payton

EPA Region 8 Air Quality Monitoring

(303) 312-6439

From: Sheila Vance [mailto:svance@utah.gov]
Sent: Thursday, November 03, 2016 10:25 AM
To: Ostendorf, Jody <ostendorf.jody@epa.gov>; Payton, Richard <Payton.Richard@epa.gov>
Subject: Exceptional Event

Jody or Richard - as I am a bit new still to this, just wondering what happens now with the

exceptional event submitted by the Tribe for the June 8-9, 2015 event? Is there a formal approval or denial process? I assume there were no public comments? Just curious what happens next! Thanks!

Sheila

Sheila Vance | Environmental Scientist

Phone: 801.536.4001

195 North 1950 West, Salt Lake City, UT 84116

Website | Blog | Twitter | Facebook

To: Payton, Richard[Payton.Richard@epa.gov]
Cc: Ostendorf, Jody[ostendorf.jody@epa.gov]
From: Sheila Vance
Sent: Thur 11/3/2016 5:34:41 PM
Subject: Re: Exceptional Event

Thanks Richard! Appreciate the quick response!
Sheila

Sheila Vance | Environmental Scientist

Phone: 801.536.4001

195 North 1950 West, Salt Lake City, UT 84116
Website | Blog | Twitter | Facebook

On Thu, Nov 3, 2016 at 10:30 AM, Payton, Richard <Payton.Richard@epa.gov> wrote:

Yours was the only public comment received.

We will now need to review and concur or non-concur on the request. Since I was the principal author, I will be getting peer review of the demonstration from OAQPS and (probably) one other regional office (normally, we handle the review in-house for Region 8 EE requests, with the option of OAQPS support for unusual circumstances). We will be making the determination on the request in time to inform our response to your and the tribes NAA recommendations. That response is due to you no later than June 2, 2017.

Richard Payton

EPA Region 8 Air Quality Monitoring

(303) 312-6439

From: Sheila Vance [mailto:svance@utah.gov]
Sent: Thursday, November 03, 2016 10:25 AM
To: Ostendorf, Jody <ostendorf.jody@epa.gov>; Payton, Richard <Payton.Richard@epa.gov>
Subject: Exceptional Event

Jody or Richard - as I am a bit new still to this, just wondering what happens now with the

exceptional event submitted by the Tribe for the June 8-9, 2015 event? Is there a formal approval or denial process? I assume there were no public comments? Just curious what happens next! Thanks!

Sheila

Sheila Vance | Environmental Scientist

Phone: 801.536.4001

195 North 1950 West, Salt Lake City, UT 84116

Website | Blog | Twitter | Facebook

To: Payton, Richard[Payton.Richard@epa.gov]
From: Pierce - CDPHE, Gordon
Sent: Fri 6/23/2017 2:02:35 PM
Subject: Fwd: Fw: PAMS Funding for CO and UT...how do you wish to proceed

Richard,
Looks like inserting a line in the existing 2016/17 PPA is going to happen!

Gordon

---------- Forwarded message ----------
From: **Chase - CDPHE, John** <john.chase@state.co.us>
Date: Fri, Jun 23, 2017 at 7:50 AM
Subject: Fwd: Fw: PAMS Funding for CO and UT...how do you wish to proceed
To: "Bulanowski, Gerard" <Bulanowski.Gerard@epa.gov>, Gordon Pierce - CDPHE <gordon.pierce@state.co.us>, Lena Peschanskaia <lena.peschanskaia@state.co.us>, "Fabisiak, Greg" <greg.fabisiak@state.co.us>, "Hulstein, Sarah" <hulstein.sarah@epa.gov>

All, it looks like we are all getting on the same page. Thanks for everyone's assistance and patience - :)

Fyi, after today I will be out of the office until July 17th.

In the meantime and to keep this moving along, I would like to recommend the following:

1) Gordon (along with Richard Payton, EPA), Greg and Gerard work through the amendment to the 2016-17 PPA.

2) I am assuming there is enough room within the current PPG application to award these funds. The reason I say assume is pretty much based upon us not yet knowing our final allocations for FY2017. If there is enough room, I'll assume that EPA will place the funds into either this next award (final 2017 allocation amts.) that is being prepared or will do so right afterwards. If we find that there is not enough room to award, then I will work on a PPG amendment when I return (right after submitting our upcoming FY2018-19 PPG application).

Does this sound ok with everyone and is there anything that I am missing?

Thx to all for your help with this.

John D. Chase

Environmental Programs, Deputy for Operations and Financial Services
Colorado Department of Public Health and Environment
303-692-2023

---------- Forwarded message ----------
From: **Bulanowski, Gerard** <Bulanowski.Gerard@epa.gov>
Date: Thu, Jun 22, 2017 at 12:00 PM
Subject: Fw: PAMS Funding for CO and UT...how do you wish to proceed
To: "csilotti@utah.gov" <csilotti@utah.gov>, "renetteanderson@utah.gov" <renetteanderson@utah.gov>, "john.chase@state.co.us" <john.chase@state.co.us>, "greg.fabisiak@state.co.us" <greg.fabisiak@state.co.us>

Hi All -

I need your assistance in replying to Marisa. Please let me know how you want to proceed and advise of issues triggered by this.

Thanks!

Gerard

Gerard A.Bółąnówski, State Program Manager

Office of Partnerships and Regulatory Assistance

US EPA Region 8

1195 Wynkoop Street

Denver, Colorado 80202-1129

P 303.312.6141

F 303.312.6341

From: McPhilliamy, Marisa
Sent: Thursday, June 22, 2017 10:23
To: Bulanowski, Gerard; Hulstein, Sarah; Kloberdanz, Ryan

Cc: Payton, Richard; Rickard, Joshua; Brown, Ethan
Subject: PAMS Funding for CO and UT...guidance needed

All-

We have received notification from OAPQS that the Region will be receiving CAA 105 funding, both cash (241,500) and funding held in OAPQS (200,000) for CO and UT to begin implementing Photochemical Assessment Monitoring Stations (PAMS).

This is new to both states for FY17. The PPAs have been reviewed and it has been determined that there is no language to cover either state to receive these funds. Both PPAs will need to be amended to accommodate the award of this funding. We thought something broad, in addition to a grant term and condition as suggested by OAQPS. We want to accomplish this in the easiest way possible, so if there is a better way to get there, we're open to suggestions.

PPA language:

Initiate PAMS early implementation activities: PAMS siting, preliminary PAMS plan for 2017 Annual Monitoring Network Plan, acquisition and installation of ceilometer for mixing height measurements.

Grant Condition (would be amended depending on the pieces of equipment each state was purchasing):

As a result of the Ozone NAAQS promulgated in 2015, revisions to the PAMS network established 43 required PAMS stations leveraging the existing NCore network and a flexible enhanced monitoring program (EMP) network that could include currently operating PAMS stations. The 43 required stations should begin operating no later than June 1, 2019. Associated Program Support funding is included for the purchase of an Auto-GC, a ceilometer and a True NO2 monitor.

Utah should be awarded $200,000 for the purchase of an AutoGC ($140,000), a True NO2 ($25,000) and a ceilometer ($35,000). Colorado should be awarded $41,500 for the purchase of a ceilometer.

In addition to the above funds coming to the Region, there is an additional $200k of Associated Program Support costs that will be held in OAQPS for PAMS data analysis. Our recommendation is to attribute most of this support ($160k) to UT, as they are receiving most of the funding and attribute a smaller amount to Colorado ($40k).

As you can see from the email trail below, all of this funding is considered Associated Program Support (not In-Kind), so we have been told that there is no matching required. I am more familiar with the concept of In-Kind and know that In-Kind funding has to be applied for by the grantee and shown on the grant award. Gerard, Sarah, Ryan, how do we deal with Associated Program support when part of it is being awarded as net allocation to the state and part is being held in OAPQS?

Thanks for your help.

Marisa McPhilliamy

Air Program

US EPA Region 8

1595 Wynkoop St. (8P-AR)

Denver, CO 80202

p: 303.312.6965

f: 303.312.6064

From: Trinca, Laurie
Sent: Thursday, June 22, 2017 8:27 AM
To: McPhilliamy, Marisa <McPhilliamy.Marisa@epa.gov>
Subject: RE: PAMS Funding

All of the funding that we hold back yes – in the spreadsheet it's that 2nd block – that's all APS

From: McPhilliamy, Marisa
Sent: Thursday, June 22, 2017 10:26 AM
To: Trinca, Laurie <Trinca.Laurie@epa.gov>
Cc: Payton, Richard <Payton.Richard@epa.gov>; Rickard, Joshua <Rickard.Joshua@epa.gov>; Brown, Ethan <Brown.Ethan@epa.gov>
Subject: RE: PAMS Funding

Just to confirm, all of the funding is considered APS?

Thanks!
m.

Marisa McPhilliamy

Air Program

US EPA Region 8

1595 Wynkoop St. (8P-AR)

Denver, CO 80202

p: 303.312.6965

f: 303.312.6064

From: Trinca, Laurie
Sent: Thursday, June 22, 2017 8:25 AM
To: McPhilliamy, Marisa <McPhilliamy.Marisa@epa.gov>
Subject: RE: PAMS Funding

One more clarification – since they do not go to the states first, that's why they don't have to match – it's APS not in-kind

From: McPhilliamy, Marisa
Sent: Thursday, June 22, 2017 10:23 AM

To: Trinca, Laurie <Trinca.Laurie@epa.gov>
Subject: RE: PAMS Funding

Okay, thanks.

I'm working with the monitoring guys on this, in addition to the PO's on the grants, so we will certainly defer to the PO's advice, but the states are asking about match. My assumption as they are 105 funds, they have to be matched?

Thanks, Laurie!

m.

Marisa McPhilliamy

Air Program

US EPA Region 8

1595 Wynkoop St. (8P-AR)

Denver, CO 80202

p: 303.312.6965

f: 303.312.6064

From: Trinca, Laurie
Sent: Thursday, June 22, 2017 7:54 AM
To: McPhilliamy, Marisa <McPhilliamy.Marisa@epa.gov>
Subject: RE: PAMS Funding

Marissa

So, we're withholding $200k from R8, but we're also giving $241.5k back for Utah and CO for

purchase equipment, so it's your call on how you want to spread it. I would probably split it equally for the APS since they are both benefitting and getting resources back or charge it all to UT, since they are getting all $200k back. CO will likely get more funding next year for equipment.

Those are my thoughts, but it's really up to you.

From: McPhilliamy, Marisa
Sent: Thursday, June 22, 2017 9:43 AM
To: Trinca, Laurie <Trinca.Laurie@epa.gov>
Subject: RE: PAMS Funding

Hi Laurie-

Thanks for this information. We need both CO and UT to amend their PPA/PPG's to account for this. The language that you have as a term and condition to the grant, I'm wondering if we can have them insert into their PPA (workplan). We were trying to craft some language to tell them to amend their document with.

Also, what is the amount of associated program support for each state?

Thanks!
m.

Marisa McPhilliamy

Air Program

US EPA Region 8

1595 Wynkoop St. (8P-AR)

Denver, CO 80202

p: 303.312.6965

f: 303.312.6064

From: Trinca, Laurie
Sent: Thursday, June 22, 2017 7:37 AM
To: McPhilliamy, Marisa <McPhilliamy.Marisa@epa.gov>
Subject: PAMS Funding

I have initiated a reprogramming to move $241,500 to your Region to be provided to Colorado and Utah for the purchase of new PAMS equipment.

Utah should be awarded $200,000 for the purchase of an AutoGC ($140,000), a True NO2 ($25,000) and a ceilometer ($35,000).

Colorado should be awarded $41,500 for the purchase of a ceilometer.

These states have volunteered to be an early adopter and will be purchasing the equipment on their own. Below is some suggested language to include in the grant. Feel free to edit as necessary.

PAMS Term and Condition

As a result of the Ozone NAAQS promulgated in 2015, revisions to the PAMS network established 43 required PAMS stations leveraging the existing NCore network and a flexible enhanced monitoring program (EMP) network that could include currently operating PAMS stations. The 43 required stations should begin operating no later than June 1, 2019. Associated Program Support funding is included for the purchase of an Auto-GC, a ceilometer and a True NO2 monitor.

If you have any questions, please don't hesitate to contact me.

Laurie

--

Gordon Pierce
Program Manager
Technical Services Program

4300 Cherry Creek Drive South, Denver, CO 80246-1530
P 303.692.3238 | F 303.782.5493
gordon.pierce@state.co.us | www.colorado.gov/cdphe/apcd

Are you curious about ground-level ozone in Colorado? Visit our ozone webpage to learn more.

To: Tonnesen, Gail[Tonnesen.Gail@epa.gov]; Brad Pierce - NOAA Federal[brad.pierce@noaa.gov]; Payton, Richard[Payton.Richard@epa.gov]
Cc: Bohnenkamp, Carol[Bohnenkamp.Carol@epa.gov]; Kay, Rynda[Kay.Rynda@epa.gov]
From: Sheryl Fontaine
Sent: Tue 10/25/2016 5:09:14 PM
Subject: RE: November Stratospheric Intrusion Work Group call for Oct 18th [WARNING: SPF validation failed]

HI Gail,

November 22 works for us, thank you.

Sheryl

From: Tonnesen, Gail [mailto:Tonnesen.Gail@epa.gov]
Sent: Tuesday, October 25, 2016 9:53 AM
To: Brad Pierce - NOAA Federal; Payton, Richard
Cc: Sheryl Fontaine; Bohnenkamp, Carol; Kay, Rynda
Subject: RE: November Stratospheric Intrusion Work Group call for Oct 18th

Brad, Sheryl,

Does Nov 22 works for both of you? If yes, I'll send a email to the group changing the date.

Brad - I appreciate your volunteering to present this.

thanks,

Gail

303-312-6113

From: Brad Pierce - NOAA Federal [mailto:brad.pierce@noaa.gov]

Sent: Tuesday, October 18, 2016 12:48 PM
To: Payton, Richard <Payton.Richard@epa.gov>
Cc: Tonnesen, Gail <Tonnesen.Gail@epa.gov>; Sheryl Fontaine <sfontaine@ndep.nv.gov>; Bohnenkamp, Carol <Bohnenkamp.Carol@epa.gov>; Kay, Rynda <Kay.Rynda@epa.gov>
Subject: Re: November Stratospheric Intrusion Work Group call for Oct 18th

November 1 or possibly November 22 work for me.

On Tue, Oct 18, 2016 at 1:23 PM, Payton, Richard <Payton.Richard@epa.gov> wrote:

November 8, election day, is an all-day workshop for exceptional events in Denver; Nov. 29 is a similar workshop in Dallas. Those might be conflicts for many EPA, State and local monitoring folks interested in exceptional events.

Richard

From: Tonnesen, Gail
Sent: Tuesday, October 18, 2016 12:21 PM
To: Brad Pierce - NOAA Federal <brad.pierce@noaa.gov>
Cc: Sheryl Fontaine <sfontaine@ndep.nv.gov>; Bohnenkamp, Carol <Bohnenkamp.Carol@epa.gov>; Kay, Rynda <Kay.Rynda@epa.gov>; Payton, Richard <Payton.Richard@epa.gov>
Subject: RE: November Stratospheric Intrusion Work Group call for Oct 18th

Hi Brad - we can do a different Tuesday in November, or delay this meeting until the 3rd Tuesday in December. Do you want to suggest a Tuesday 10 am MT date that works for you and Sheryl?

thanks,

Gail

From: Brad Pierce - NOAA Federal [mailto:brad.pierce@noaa.gov]
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Subject: Re: November Stratospheric Intrusion Work Group call for Oct 18th

Gail,

Unfortunately, I will be on travel on Nov 15, and not able to dial in. Maybe we can discuss this case at a later date.

Sorry,

Brad

On Tue, Oct 18, 2016 at 11:46 AM, Tonnesen, Gail <Tonnesen.Gail@epa.gov> wrote:

Hi Brad,

Thanks for offering to do this presentation, and I'll put it on the Agenda for the Nov 15 call. Also, I wanted to note that EPA encourages the states to submit EE demonstrations only for events that affect the regulatory status, and if this event does not affect the attainment status it might not be necessary to submit a demonstration (EPA Region 9 staff are cc'd and can provide advice on this). However, even if NV does not submit an EE demonstration, this will still be an interesting case to share with the SI group for illustrating technical analysis methods, so I like to go ahead with the presentation for the November call.

Thanks,
Gail
303-312-6113

-----Original Message-----
From: Sheryl Fontaine [mailto:sfontaine@ndep.nv.gov]
Sent: Tuesday, October 18, 2016 10:38 AM
To: Brad Pierce - NOAA Federal <brad.pierce@noaa.gov>; Tonnesen, Gail <Tonnesen.Gail@epa.gov>
Subject: RE: cancelling Stratospheric Intrusion Work Group call for Oct 18th

Hi Brad and Gail,

Thank you for the email and for thinking of us. I apologize for the delay in my

response, we're traveling this week (to Great Basin, actually), and have limited email access.

We would be more than happy to participate in the call, and we would really appreciate input from the group, but please understand that we are very new to this. We're definitely learning (slowly!) as we go, and would definitely benefit from some help.

Thanks again and we look forward to hearing from you.

Sheryl

_____
From: Brad Pierce - NOAA Federal [brad.pierce@noaa.gov]
Sent: Tuesday, October 18, 2016 6:18 AM
To: Tonnesen, Gail
Cc: Sheryl Fontaine
Subject: Re: cancelling Stratospheric Intrusion Work Group call for Oct 18th

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Hate to see this working group lose momentum.

Brad

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<Tonnesen.Gail@epa.gov<mailto:Tonnesen.Gail@epa.gov>> wrote:
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Gail

==========
Gail Tonnesen, Ph.D.
EPA Region 8 - Air Program
1595 Wynkoop St.
Denver, CO 80202
303-312-6113<tel:303-312-6113>

--

R. Bradley Pierce

NOAA/NESDIS
Center for SaTellite Applications and Research (STAR) Advanced Satellite Products Branch (ASPB)
1225 West Dayton Street
Madison, WI 53706

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Sheryl

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Gail Tonnesen, Ph.D.
EPA Region 8 - Air Program
1595 Wynkoop St.
Denver, CO 80202
303-312-6113<tel:303-312-6113>

--

R. Bradley Pierce

NOAA/NESDIS
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--

R. Bradley Pierce

NOAA/NESDIS
Center for SaTellite Applications and Research (STAR)
Advanced Satellite Products Branch (ASPB)
1225 West Dayton Street
Madison, WI 53706

To: Monique Douville[MDouville@ndnlaw.com]
Cc: Payton, Richard[Payton.Richard@epa.gov]; minnieg@utetribe.com[minnieg@utetribe.com]
From: Ostendorf, Jody
Sent: Mon 10/24/2016 5:23:39 PM
Subject: Follow up: Ute Indian Tribe designation recommendation for the recently revised NAAQS for Ozone attached

Hi Monique,

Thank you for sending the Ute Tribe's designation recommendation for the 2015 ozone NAAQS. We did not see an attached legal description for the specific area surrounding the Ouray monitoring station as referenced in footnote 6 on page two of the recommendation. Please send that to us at your earliest convenience.

[6] The specific area surrounding the Ouray monitoring station t
nonattainment will be further detailed in an attached legal des

Also, we received no comments on the Ute Tribe's Exceptional Events package for which the public comment period ended September 29th. We would like to request that the Tribe's attorneys send us an email request for EPA to proceed with considering the Exceptional Events package as it was submitted for public comment (i.e. with no changes).

Please call if you have any further questions.

Thank you,

Jody

Jody Ostendorf

State Implementation Plan Program Manager

Uinta Basin Project Coordinator

Air Quality Planning Unit (8P-AR)

U.S. Environmental Protection Agency, Region 8

1595 Wynkoop Street

Denver, CO 80202-1129

303.312.7814

From: Monique Douville [mailto:MDouville@ndnlaw.com]
Sent: Friday, September 30, 2016 1:07 PM
To: Ostendorf, Jody <ostendorf.jody@epa.gov>
Cc: Jeremy Patterson <JPatterson@ndnlaw.com>; Fallon, Gail <fallon.gail@epa.gov>; Payton, Richard <Payton.Richard@epa.gov>; minnieg@utetribe.com
Subject: Ute Indian Tribe designation recommendation for the recently revised NAAQS for Ozone attached
Importance: High

Ms. Ostendorf,

Attached please find the Ute Indian Tribe's designation recommendation for the recently revised National Ambient Air Quality Standards for Ozone. We are also filing this electronically as well as sending a hard copy, certified return receipt.

Thank you.

Respectfully,

Monique Douville

Assistant to Tom Fredericks and Jeremy Patterson

Fredericks Peebles & Morgan LLP

1900 Plaza Drive

Louisville, Colorado 80027

(303)673-9600

FAX (303)673-9155

mdouville@ndnlaw.com

www.ndnlaw.com

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To: Payton, Richard[Payton.Richard@epa.gov]
From: Sheila Vance
Sent: Thur 10/6/2016 10:17:47 PM
Subject: Fwd: Ozone Area Recommendation Letter
McGrath, Shaun_Ozone Area Recommendation Letter.pdf
State_Area_Ozone_Designation_Recommendation.pdf

Richard - Here is the recommendation letter and backup - let me know if you need anything else! Thanks!
Sheila

Sheila Vance | Environmental Scientist

Phone: 801.536.4001

195 North 1950 West, Salt Lake City, UT 84116
Website | Blog | Twitter | Facebook

---------- Forwarded message ----------
From: **Edgar Navarro** <enavarro@utah.gov>
Date: Fri, Sep 30, 2016 at 9:07 AM
Subject: Ozone Area Recommendation Letter
To: Bryce Bird <bbird@utah.gov>, Brock LeBaron <blebaron@utah.gov>, Dave McNeill <dmcneill@utah.gov>, Mark Berger <mberger@utah.gov>, Sheila Vance <svance@utah.gov>, Jay Baker <jbaker@utah.gov>, ostendorf.jody@epa.gov, morales.monica@epa.gov, Melissa Yazhe <myazhe@utah.gov>

Good morning,

Included in this email is the Governor's letter and attachment that were mailed out yesterday, regarding the State Area Ozone Designation Recommendation.

Thank you,

Edgar Navarro
Office Specialist I
Utah Division of Air Quality
Office: (801) 536-4213

Public Notice of Exceptional Event:
Ozone NAAQS Exceedances Occurring June 8 and 9, 2015
Uinta Basin of Utah
Prepared by: Ute Indian Tribe of the Uinta and Ouray Reservation
U. S. EPA Region 8
Utah State University Bingham Energy Center
Utah Division of Air Quality

Event Details

The Ute Indian Tribe of the Uintah and Ouray Reservation operates ozone monitors at four locations, Myton, Whiterocks, Ouray and Redwash. These four monitors recorded their highest and second highest 8-hour ozone in 2015 on June 8 and 9. Data presented in the Technical Support Document (TSD) show that the high ozone recorded on those days was unseasonably high, not consistent with historical readings and patterns, and that they coincided with the intrusion of stratospheric air into the troposphere contributing ozone to the surface measurements. With this demonstration, the Ute Indian Tribe is requesting that the EPA concur on stratospheric ozone exceptional event flags the tribe has applied to the impacted data in the Air Quality System database, and that the EPA exclude the exceedances caused on June 8 and 9, 2015 by stratospheric intrusion from calculations of ozone exceedances and violations for 2015.

Definition of Exceptional Event

The U. S. Environmental Protection Agency promulgated the Exceptional Events Rule (EER) in 2007, pursuant to the 2005 amendment of Clean Air Act (CAA) Section 319. The EER includes definitions, criteria for the EPA approval, procedural requirements, and requirements for air agency demonstrations, all of which must be met before the EPA can concur on the exclusion of air quality data from regulatory decisions. Specifically, the air agency must provide evidence that:

- The event affects air quality; the event is not reasonably controllable or preventable; and the event is caused by human activity that is unlikely to recur at a particular location or is a natural event;
- There is a clear causal relationship between the measurement under consideration and the event that is claimed to have affected the air quality in the area;
- The event is associated with a measured concentration in excess of normal historical fluctuations, including background; and
- There would have been no exceedance or violation but for the event.

Technical Support Document for Public Review

Members of the public may review copies of the draft TSD at the Ute Indian Tribe's Energy and Minerals Department's Air Quality Office at 988 S. 7500 E., Annex Building, Ft. Duchesne, Utah; at the Utah Division of Air Quality, 195 N 1950 W, Salt Lake City, Utah; and at the U.S. EPA Region 8 office, 1595 Wynkoop Street, Denver, Colorado. All documents will be available for review at the U.S. EPA Region 8 office Monday through Friday from 8:00 a.m. to 4:00 p.m. (excluding Federal holidays). Electronic copies of the draft TSD may also be viewed at: https://www.epa.gov/air-quality-analysis/treatment-data-influenced-exceptional-events

Please submit your comments by September 29, 2016. All comments should be addressed to Richard Payton, U.S. EPA, Region 8, Air Program (8P-AR), 1595 Wynkoop Street, Denver, CO 80202 or at payton.richard@epa.gov.

State of Utah

GARY R. HERBERT
Governor

SPENCER J. COX
Lieutenant Governor

Office of the Governor

September 29, 2016

Shaun McGrath
Regional Administrator
USEPA Region 8
Mail Code: 8P-AR
1595 Wynkoop Street
Denver, Colorado 80202-1 129

RE: Utah 2015 8-Hour Ozone Designation Recommendation

Dear Mr. McGrath,

This letter transmits my recommendation, as allowed under Section 107(d)(l) of the Clean Air Act, for Utah area designations and nonattainment area boundaries for the 2015 8-hour Ozone National Ambient Air Quality Standards. This recommendation is based on a Utah Department of Environmental Quality (UDEQ) staff analysis that relied on the best available scientific data and research. The recommendation also follows the EPA's guidance dated February 25, 2016, "Area Designations for the 2015 Ozone National Ambient Air Quality Standards."

At this time, I recommend that Box Elder, Cache, Carbon, Garfield, San Juan, and Washington counties be designated attainment. I recommend that Salt Lake and Davis counties, and portions of Weber, Tooele, Utah, Uintah, and Duchesne counties be designated nonattainment. I also recommend that all other areas of the State of Utah be designated attainment/unclassifiable. Enclosed is a figure showing the boundary of the recommended nonattainment areas, along with a table listing all specific areas of the State with their corresponding recommended designations.[1] The technical support document, which includes a 5-Factor Analysis, is also attached.

Sincerely,

Gary R. Herbert
Governor

[1] This recommendation does not include areas under EPA or tribal jurisdiction for air quality purposes as specified under 42 U.S.C. §7601(d)(2).

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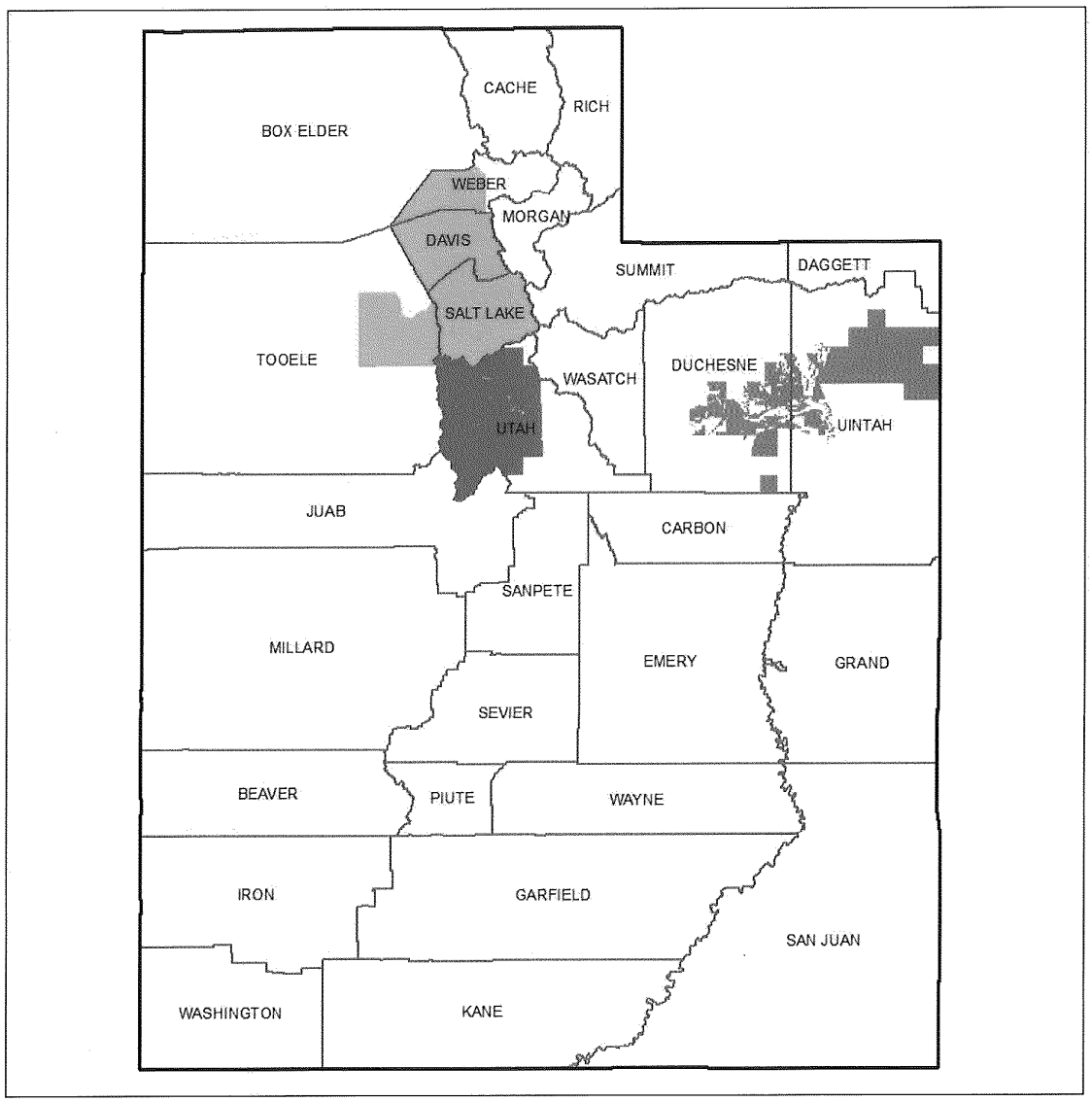
Map of recommended Nonattainment Areas in Utah



State Boundaries

County Boundaries

0 20 40 80 120 mi

0 30 60 120 180 km

N W E S

Proposed Ozone Nonattainment Areas

Salt Lake-Davis-Weber

Utah County

Uinta Basin

Utah Department of Environmental Quality

Table of all areas of Utah and their recommended ozone designation

County	Attainment	Unclassifiable	Nonattainment	Nonattainment Area
Beaver	X	X		
Box Elder	X			
Cache	X			
Carbon	X			
Daggett	X	X		
Davis			X	Salt Lake-Davis-Weber
Duchesne		All portions of Duchesne County not otherwise designated nonattainment	The following Townships or portions thereof within Duchesne County that are not under EPA or tribal jurisdiction for air quality purposes under 42 U.S.C §7601(d)(2)[2]: Within the Salt Lake Meridian T10S R17E, T11S R16E, T11S R17E, T8S R15E, T8S R16E, T9S R15E, and T9S R16E. Within the Uintah Meridian T4S R1W, T1N R1W, T1S R1W, T1S R2W, T2S R1W, T2S R2W, T2S R3W, T2S R5W, T3S R1W, T3S R2W, T3S R3W, T3S R4W, T3S R5W, T3S R6W, T4S R2W, T4S R3W, T4S R4W, T4S R5W, T4S R6W, and T5S R3W	Uinta Basin
Emery	X	X		
Garfield	X			
Grand	X	X		
Iron	X	X		
Juab	X	X		
Kane	X	X		
Millard	X	X		
Morgan	X	X		
Piute	X	X		
Rich	X	X		
Salt Lake			X	Salt Lake-Davis-Weber
San Juan	X			

[2] The map used to define portions of Duchesne and Uintah counties under EPA or tribal jurisdiction originated with EPA Region VIII.

County	Attainment	Unclassifiable	Nonattainment	Nonattainment Area
Sanpete	X	X		
Sevier	X	X		
Summit	X	X		
Tooele		All portions of Tooele County not otherwise designated nonattainment	The following Townships or portions thereof within Tooele County: T1S R3W, T2S R3W, T3S R3W, T3S R4W, T2S R4W, T2S R5W, T3S R5W, T3S R6W, T2S R6W, T1S R6W, T1S R5W, T1S R4W, T1S R7W, T2S R7W, T3S R7W, T4S R7W, T4S R6W, T4S R5W, T4S R4W, and T4S R3W	Salt Lake-Davis-Weber
Uintah		All portions of Uintah County not otherwise designated nonattainment	The following Townships or portions thereof within Uintah County that are not under EPA or tribal jurisdiction for air quality purposes under 42 U.S.C §7601(d)(2)[2]: Within the Salt Lake Meridian T10S R25E, T11S R25E, T12S R25E, T2S R22E, T3S R21E, T3S R22E, T3S R23E, T3S R24E, T3S R25E, T4S R19E, T4S R20E, T4S R21E, T4S R22E, T4S R23E, T4S R24E, T5S R19E, T5S R20E, T5S R21E, T5S R22E, T5S R23E, T5S R24E, T5S R25E, T6S R19E, T6S R20E, T6S R21E, T6S R22E, T6S R23E, T6S R24E, T6S R25E, T7S R19E, T7S R20E, T7S R23E, T7S R24E, T7S R25E, T8S R17E, T8S R18E, T8S R25E, T9S R19E, and T9S R25E. Within the Uintah Meridian T1N R1E, T1N R1W, T1N R2E, T1S R1E, T1S R1W, T1S R2E, T2S R1E, T2S R1W, T2S R2E, T3S R1E, T3S R1W, T3S R2E, T4S R1E, T4S R1W, T4S R2E, T4S R3E, T5S R2E, and T5S R3E.	Uinta Basin

County	Attainment	Unclassifiable	Nonattainment	Nonattainment Area
Utah		All portions of Utah County not otherwise designated nonattainment	All portions of Utah County west of and including any portion of the following townships located within Utah County: T3S R1E, T4S R2E, T5S R3E, T6S R3E, T7S R3E, T8S R3E, T9S R3E, and T10S R2E	Utah County
Wasatch	X	X		
Washington	X			
Wayne	X	X		
Weber		All portions of Weber County not otherwise designated nonattainment	All portions of Weber County west of and including T5N R1W & T6N R1W and all portions of T7N R1W that are in Weber County and west of the ridgeline that traces the Wasatch Mountains from the southeast corner of the township to the easternmost extension of the county boundary	Salt Lake-Davis-Weber

UTAH AREA DESIGNATION RECOMMENDATIONS FOR THE 2015 8-HOUR OZONE NATIONAL AMBIENT AIR QUALITY STANDARD

State of Utah
Department of Environmental Quality
Division of Air Quality
195 North 1950 West
P.O. Box 144820
Salt Lake City, Utah 84114-4820
(801) 536-4000

September 2016

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Purpose

The purpose of this document is to provide Utah's recommendation regarding area designations for the revised National Ambient Air Quality Standard (NAAQS) for ozone promulgated on October 1, 2015, under Section 109 of the Clean Air Act (Act).

Overview of Ozone in Utah

The occurrence of ozone in the State of Utah should be considered on a regional basis. In general, higher concentrations of ozone are monitored in certain core areas where the majority of Utah's population resides and where most major industry is located. These core areas are also where high local and interstate vehicular traffic predominate. In Utah, these core areas are part of a larger geographical region, better known as the Wasatch Front, extending from Weber County on the north to Utah County on the south, a distance of approximately 90 miles. This area is bounded on the east by the Wasatch Range and on the west by smaller north-south mountain ranges and the Great Basin. The Wasatch Range is actually an extension of the Northern Rocky Mountains which extends southward to Mount Nebo, in southern Utah County.

The yearly trend of NAAQS exceedances for ozone during the last twenty years shows a steady decline in ambient ozone concentrations (see Figure 1). This trend has occurred at the same time that the federal standard has twice been lowered. During this same timeframe, counties along the Wasatch Front maintained the applicable standard, if only by the slightest of margins. Ambient ozone data collected in recent years show violations of the 2015 8-hr standard at monitors located within the state's Wasatch Front area monitoring network, while permanent monitors located in areas outside the Wasatch Front typically do not. This is the basis for the State's position that ozone generated in the major core area of the Wasatch Front actually moves throughout the area and is the probable cause for increased ozone concentrations being recorded in some peripheral locations along the Wasatch Front. A further discussion of this phenomenon can be found later in this document. Elevated ozone levels are also observed in northeastern Utah in a geographic area known as the Uinta Basin (Basin). Figure 2 shows monitoring locations around the State and highlights the Wasatch Front and Uinta Basin for reference.

Data collected along the Wasatch Front and in the Basin also indicate that ozone is a seasonal problem. On the Wasatch Front we observe episodic elevated concentrations during the summer months, usually June through August, when daylight hours are longer. In the Basin, high ozone levels typically occur when there is snow cover and a persistent temperature inversion that acts to inhibit any substantial vertical movement of the air. A broader discussion of the unique nature of the Basin's winter ozone is found later in this document.

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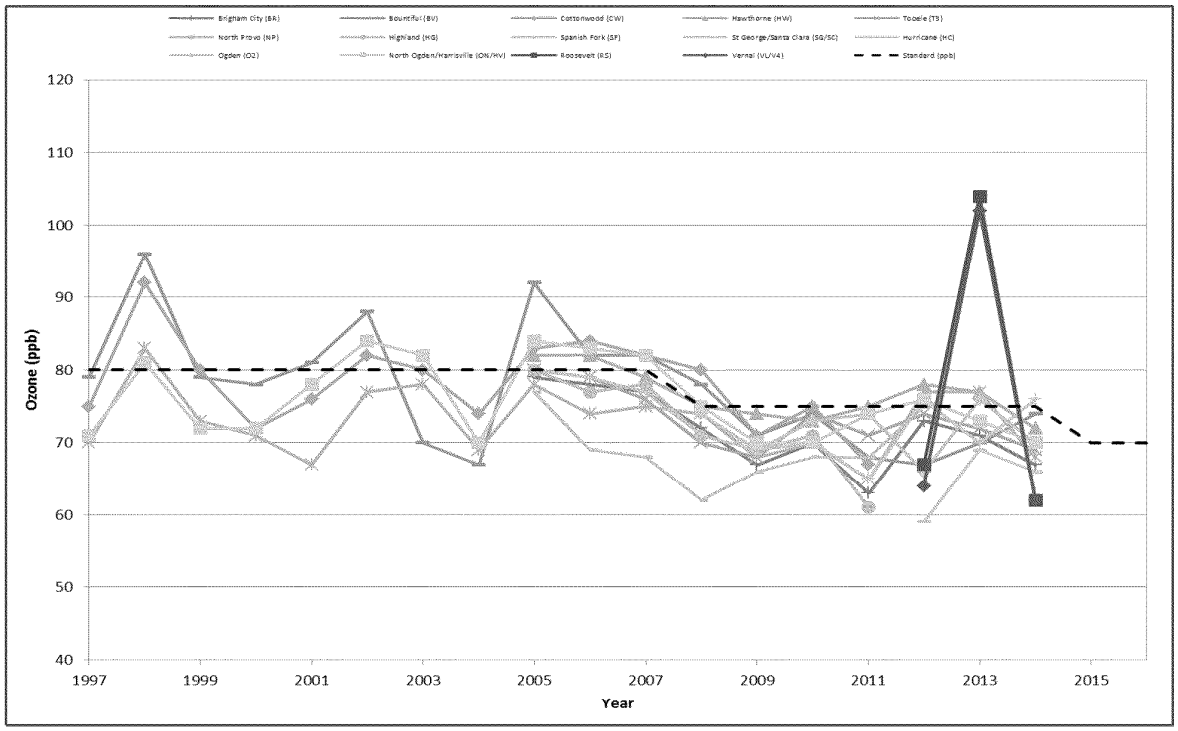

Figure 1. Yearly ambient ozone trends in Utah.

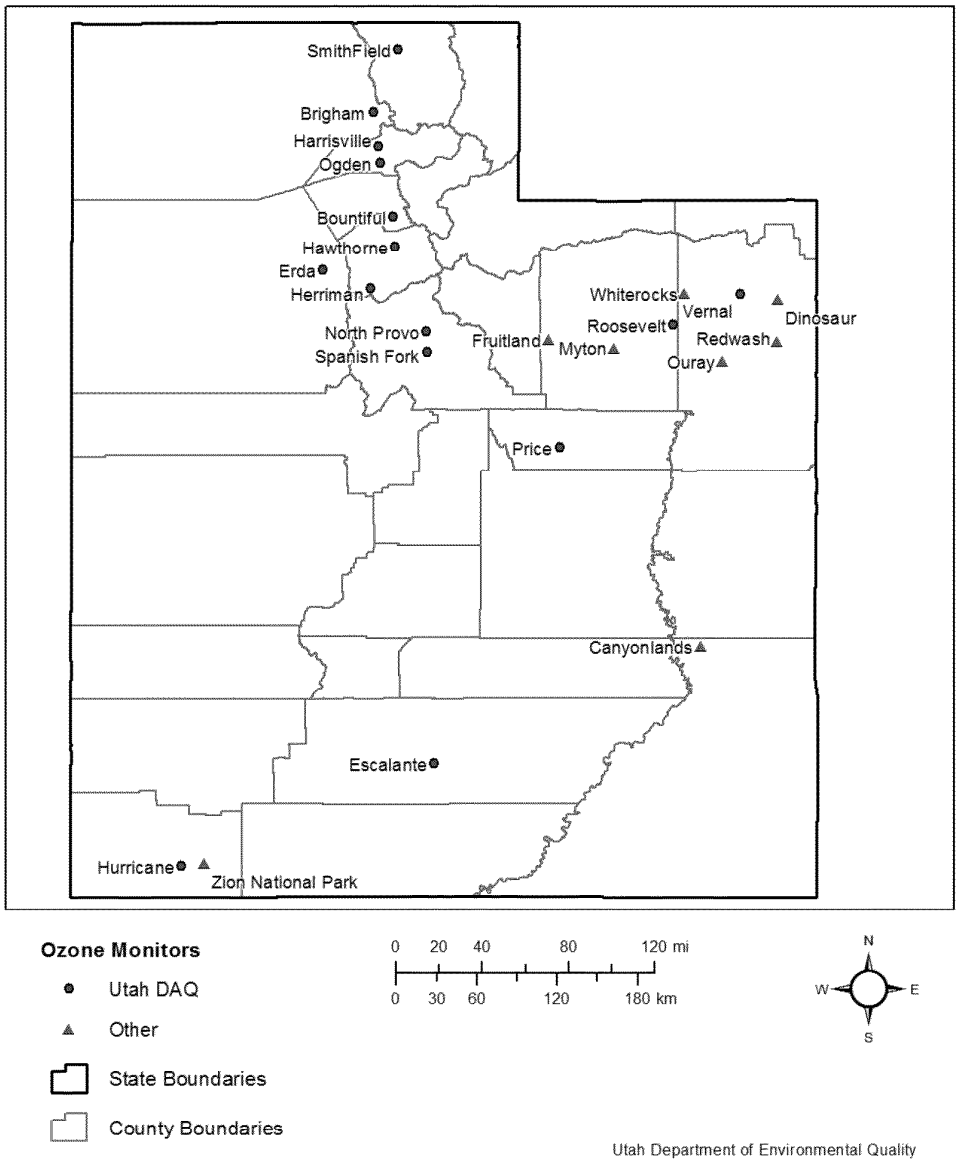

Figure 2. Utah ozone monitoring network.

Ozone concentrations along the Wasatch Front generally increase from mid-to-late morning until late afternoon when ultraviolet radiation reaches its maximum. As the solar radiation subsides and evening rush hour traffic increases, data suggests that some of the ozone is scavenged by NO_x and concentrations begin to decrease. Ozone concentrations generally remain at relatively low levels throughout the night and begin to increase the following morning after the rush hour traffic subsides. If clear skies and light winds persist over a period of two to three days, ozone can continue to form and accumulate along the Wasatch Front core area where it is contained vertically by nighttime subsidence and horizontally by the local topography as shown in Figure 3 below.

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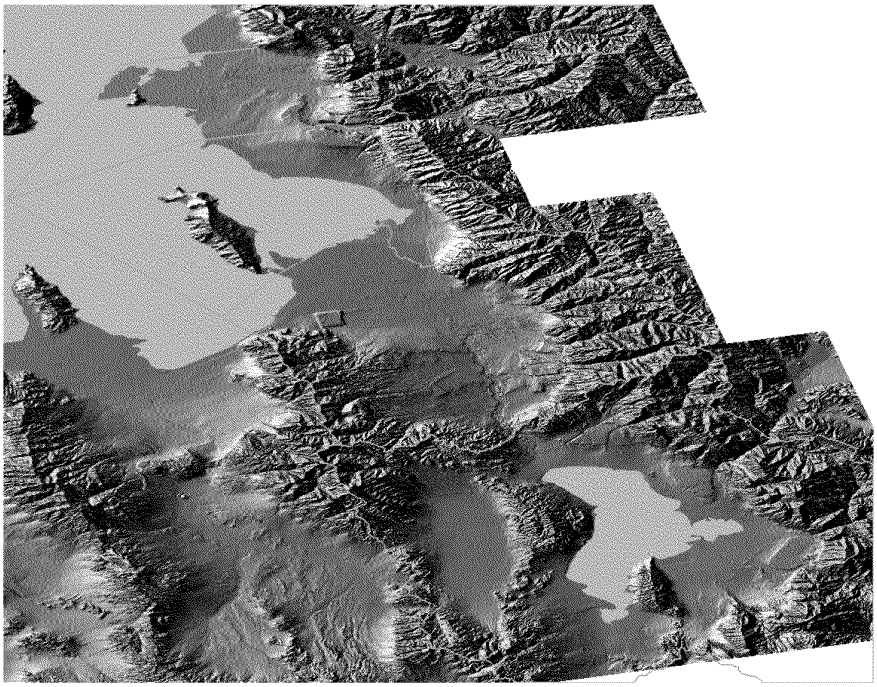

Figure 3. Utah's Wasatch Front extending from Utah County (Lower right) to Box Elder County (Upper left).

Data from both Utah Division of Air Quality (DAQ) and National Park Service (NPS) monitors located in more rural and remote areas of the state show lower concentrations of ozone than those recorded along the Wasatch Front. In many cases, these remote concentrations are substantially lower, and may reflect a normal regional background-level of ozone. At times, however, the regional background level of ozone may increase due to ozone transport or as a result of exceptional events, such as wildfires or stratospheric intrusions. A reasonable conclusion from available remote monitoring data is that, with the exception of wintertime ozone formation in the Basin, the NAAQS is generally not exceeded outside of the urbanized or semi-urbanized counties that make up the Wasatch Front.

Ozone is formed by a chemical interaction of VOCs and NO_x in the presence of solar radiation. Winds that occur during stagnant periods are generally of the diurnal mountain-valley variety, or very light breezes that flow generally north-south along the Wasatch Front. On many occasions under these conditions, areas of higher ozone concentration have been transported by these local breezes. By tracking daily ozone concentrations at various locations along the Wasatch Front, it has been noted that these concentrations increase and decrease in patterns that are consistent with local wind flows. For example, with a light southerly flow, concentrations that were originally higher in Utah or Salt Lake counties tended to decrease while concentrations that were originally lower in Weber and Box Elder counties tended to increase. Refer to Figure 4 for reference to the location of counties in northern Utah. With a light northerly flow, the opposite effect was noted (i.e., concentrations at northern monitors tended to decrease while concentrations at southern monitors tended to increase). The same phenomenon is true for light diurnal southeast-northwest flows.

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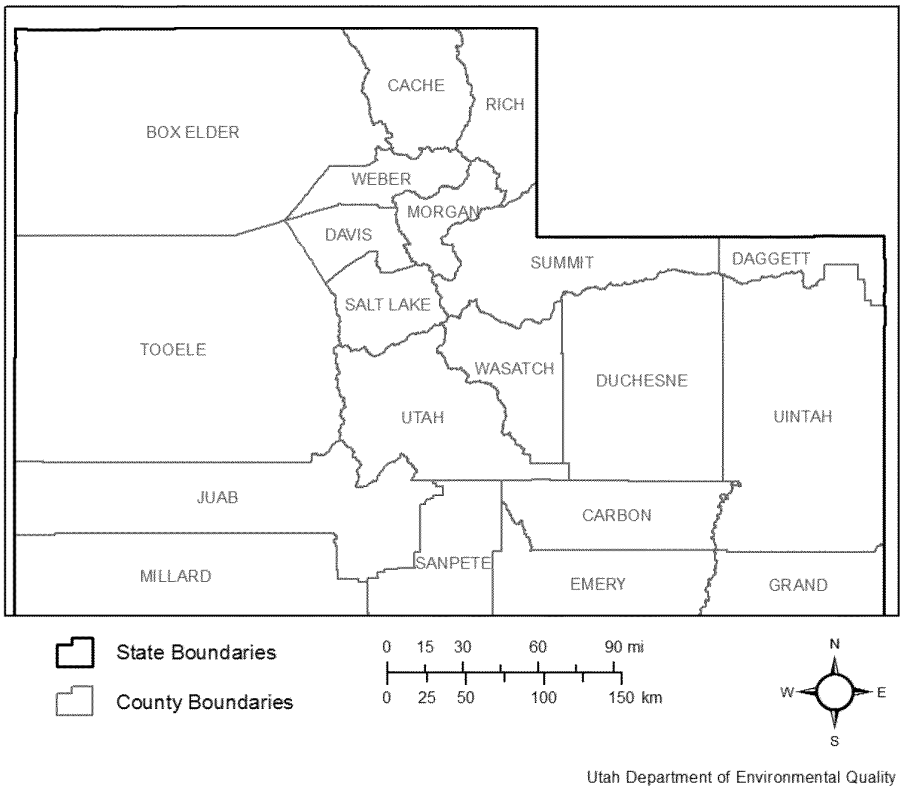

Figure 4. Counties of Northern Utah.

Ozone is generally considered an urban pollutant since the precursors needed for its formation are present in most urban environments and are generally not present in rural environments. This serves to highlight the distinction between urban areas that generally cause pollution and rural areas that may or may not contribute to an ozone problem. Much of this phenomenon is also due to the fact that the bulk of Utah's population (over 75%) is generally located within lowland valley areas along the Wasatch Front in which air is easily trapped by meteorological conditions and local topography. In other words, in Utah it is not simply the case of an urban area with an urban mix of emissions; there is also a barrier to dispersion which allows ozone concentrations to build up over a period of time and reach concentrations that can eventually exceed the NAAQS.

The foregoing characterization of Utah's ozone problem has shaped the State's approach to making these area designations. The vast majority of Utah is sparsely populated (see Figure 12). According to the 2010 U.S. Census, Utah's population was 2,763,885. Over 75% of that population lived in the four Wasatch Front counties (Weber, Davis, Salt Lake, and Utah). Most of the monitoring data has been collected in the heavily populated urbanized areas of the State. This suggests that most of the areas recommended for designation as either "attainment/unclassifiable" will be either in the rural areas of the State or in areas where precursors of ozone are not generated. Those areas recommended for the "nonattainment" designation will be urban areas where most of the sources of ozone precursors are found.

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Regulatory Background

On October 1, 2015, the EPA promulgated revisions to the NAAQS for ground-level ozone. It revised the 8-hour primary (health-based) ozone standard to a level of 0.070 parts per million (ppm). The previous standard, set in 2008, was 0.075 ppm. Additionally, the EPA specified the level of the primary standard to three decimal places. The EPA also revised the 8-hour secondary (welfare-based) ozone standard to be identical to the revised primary standard.

Section 107(d) of the Act establishes that it is incumbent on each state to recommend initial designations for all areas within its respective geographic boundary following promulgation of a new or revised NAAQS. States are required to submit these recommendations to EPA, based on the most current three year data set, not later than one year after the promulgation of the new or revised standard.

Areas should be designated as attainment, nonattainment, or unclassifiable. The Act allows that areas may be designated as:

a) attainment for any area other than an area identified in clause (b) that meets the national primary or secondary ambient air quality standard for the pollutant; or
b) nonattainment for any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant; or
c) unclassifiable, for any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant.

EPA must finalize the area designations as expeditiously as practicable, but not later than two years following the effective date of the revised NAAQS. In the event that EPA intends to promulgate a designation that deviates from the State's recommendation, it must notify the State at least 120 days prior to promulgating the modified designation to provide the State an opportunity to comment. The EPA's designation of areas for the 8-hour ozone NAAQS will be based on the most current three consecutive years of air quality data at the time of the final designation.[1]

Applicable Guidance

On February 25, 2016, EPA issued a guidance memorandum to assist States and Tribes in making their recommendations with respect to ozone.2 The memorandum indicated that the Combined Statistical Areas (CSA) or, where appropriate, Core Based Statistical Areas (CBSA) be

[1] For the 8-hour ozone NAAQS, it is the three consecutive years of data obtained in accordance with 40 CFR part 50, Appendix I; data used will be quality-assured and meet 40 CFR part 58 requirements (e.g., for monitor siting). Recommended designations should generally be made based on 2013-2015 monitored air quality data and final designations on 2014-2016 data.

[2] "Area Designations for the 2015 Ozone National Ambient Air Quality Standards," Memorandum from Janet G. McCabe dated February 25, 2016.

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used for analyzing whether nearby areas contribute to the violation in the violating area. The EPA also emphasized that these statistical area boundaries are not presumed to be the nonattainment area.[3]

Current CSAs and Metropolitan Statistical Areas (MSAs) in the State of Utah and the counties that are included in these areas are as follows (Figure 5):

- *Logan MSA:*
  - Cache County, Utah
  - Franklin County, Idaho
- *St. George MSA:*
  - Washington County
- *Ogden-Clearfield MSA:*
  - Box Elder County
  - Davis County
  - Morgan County
  - Weber County
- *Salt Lake City MSA:*
  - Salt Lake County
  - Tooele County
- *Provo-Orem MSA:*
  - Juab County
  - Utah County
- *Salt Lake City-Provo-Orem CSA:*
  - Ogden-Clearfield MSA
  - Salt Lake City MSA
  - Provo-Orem MSA
  - Summit County
  - Wasatch County

[3] Section 107(d)(4)(A)(iv) of the Clean Air Act states that the CSA or CBSA is the presumptive boundary only if the area will be classified as Serious, Severe, or Extreme. The Wasatch Front will likely be classified as Marginal.

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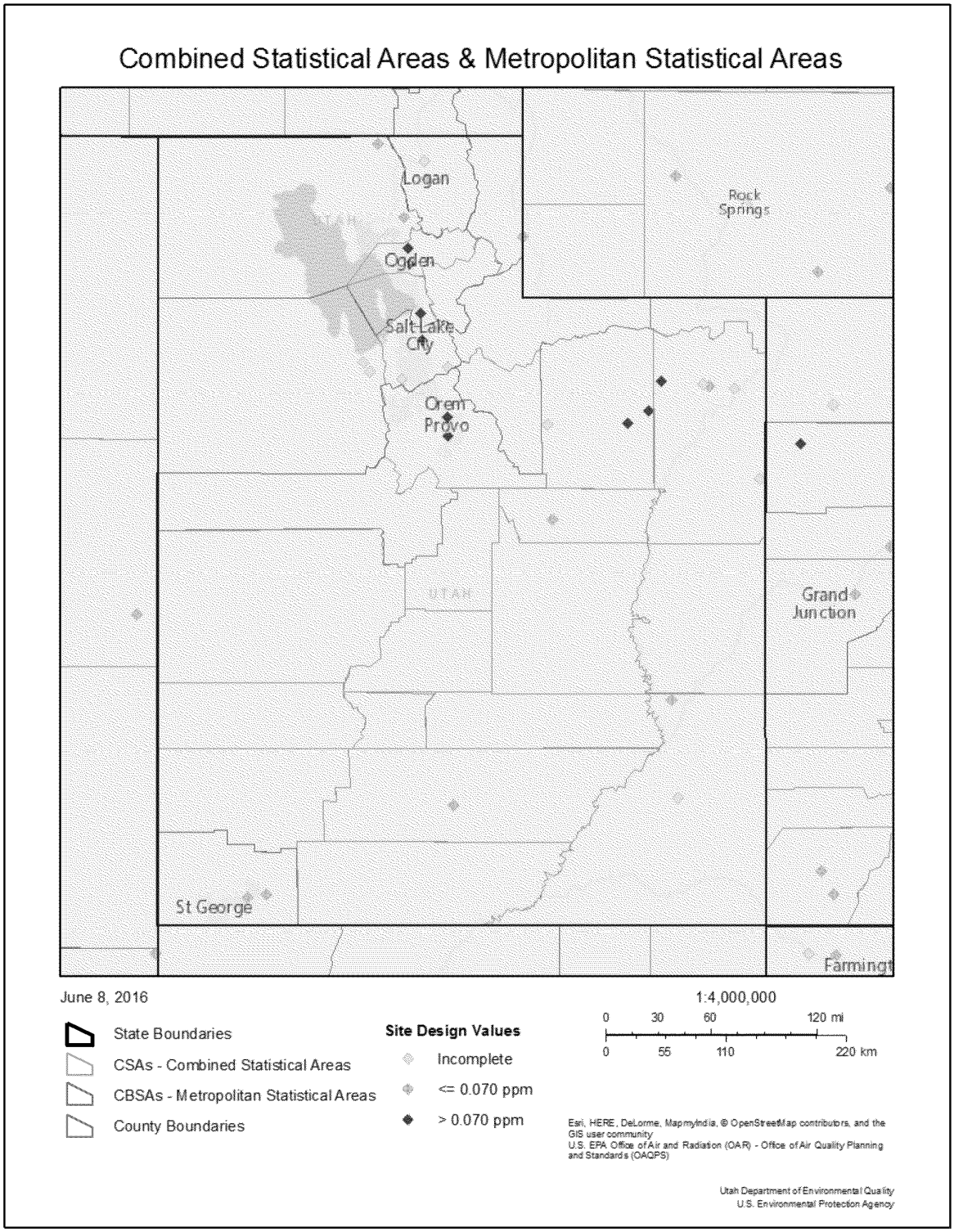

Figure 5. Utah Combined Statistical Areas and Metropolitan Statistical Areas.

Section 107(d) of the Act addresses the determination of when an area is to be designated nonattainment. With respect to the 8-hour ozone NAAQS, all areas are to be designated nonattainment if they do not meet the standard or contribute to the violation in the violating area. The guidance memorandum further stated that the EPA believes that the boundaries for each nonattainment area should be evaluated on a case-by-case basis, considering the following factors:

1) Air Quality monitoring data,
2) Emissions and emissions-related data,
3) Meteorological data,
4) Geography/Topography, and
5) Jurisdictional boundaries.

General Air Quality Data

The following table (Table 1) shows all regulatory monitors in Utah with three continuous years of ozone monitoring data. Highlighted monitors have a design value (DV) that exceeds the current 0.070 ppm ozone NAAQS.

Table 1. Utah ozone 2013-2015 design values in parts per million.

Site ID	Site Name	County	3-Year DV	2013 4th Max	2014 4th Max	2015 4th Max
49-003-0003	Brigham City	Box Elder	0.068	0.071	0.067	0.068
49-003-7001*	Portage	Box Elder	0.064	0.065	0.061	0.067
49-013-0002	Roosevelt	Duchesne	**0.075**	0.104	0.062	0.060
49-013-7011*	Myton	Duchesne	**0.074**	0.089	0.067	0.066
49-005-0004	Logan	Cache	0.064	0.066	0.059	0.067
49-007-1003	Price	Carbon	0.066	0.067	0.064	0.069
49-011-0004	Bountiful	Davis	**0.072**	0.070	0.074	0.073
49-017-0004*	Escalante National Monument	Garfield	0.065	0.067	0.060	0.068
49-035-3006	Hawthorn (Salt Lake City)	Salt Lake	**0.076**	0.077	0.072	0.081
49-037-0101*	Canyonlands National Park	San Juan	0.065	0.066	0.064	0.065
49-047-7022*	Whiterocks	Uintah	0.066	0.066	0.064	0.068
49-047-2002*	Redwash	Uintah	**0.072**	0.088	0.061	0.067
49-047-2003*	Ouray	Uintah	**0.079**	0.092	0.079	0.068
49-049-0002	North Provo	Utah	**0.072**	0.077	0.068	0.073
49-049-5010	Spanish Fork	Utah	**0.072**	0.070	0.076	0.071
49-053-0007	Hurricane	Washington	0.068	0.069	0.066	0.069
49-053-0130*	Zion National Park	Washington	0.067	0.070	0.065	0.066
49-057-0002	Ogden	Weber	**0.072**	0.076	0.070	0.072
49-057-1003	Harrisville	Weber	**0.072**	0.073	0.070	0.074

*Not maintained or operated by the State of Utah

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Based on these DVs, the following counties should be designated attainment: Box Elder, Cache, Carbon, Garfield, San Juan, and Washington. The following counties, in whole or in part, should be considered as part of Utah's initial nonattainment area designation: Duchesne, Uintah, Davis, Salt Lake, Utah, and Weber. Along with counties where the DV exceeds the NAAQS, we will consider whether adjacent counties within the CSA or CBSA significantly contribute to the ozone exceedances. The additional counties considered are Box Elder, Juab, Morgan, Summit, Tooele, and Wasatch. Of these additional counties to be considered, it should be noted that Tooele and Box Elder counties do have ozone monitors. Box Elder County's Brigham City monitor is typically below the 2015 ozone NAAQS. Its 2013-2015 DV is 0.068. The preliminary DV for 2014-2016 is 0.067. While Tooele County monitors do not have three years of monitoring data (see Table 2), the fourth highest value at either monitor has exceeded the 2015 standard three out of the last four years.

Monitors without three continuous years of data

Several monitors in Utah do not have three continuous years with at least four days of data as required for calculating a DV. Table 2 shows the existing data for each of these monitors. Each of the counties containing these monitors is already being considered as part of this recommendation because they are either in the CSA or contain another monitor with three years of data and have a DV over 70 ppb.

Table 2. Utah monitors with incomplete design values.

Site ID	Site Name	County	2013 4th Max	2014 4th Max	2015 4th Max	2016 4th Max*
49-013-1001	Fruitland	Duchesne	0.069			
49-035-2004	Beach	Salt Lake	0.075	0.064		
49-035-3013	Herriman	Salt Lake			0.074	0.076*
49-045-0003	Tooele	Tooele	0.072	0.069		
49-045-0004	Erda	Tooele			0.071	0.072*
49-047-1003	Vernal #3	Uintah	0.102	0.062		
49-047-1004	Vernal #4	Uintah			0.064	0.073*

*Data not certified

In addition to monitors without three years of continuous data, DAQ placed several temporary monitors throughout the State for research purposes. While the monitors are non-regulatory, the data collected at those sites is relevant to determining areas that contribute to the nonattainment counties. Because these temporary monitors were used to determine how ozone moves around the Salt Lake Valley and other parts of the State, it is more appropriate to address these studies as part of the meteorology factor.

The air quality data collected for Utah indicates that there are two distinct ozone issues within the State. There are the more typical summer time high ozone events along the Wasatch Front, and then the more unique wintertime events that occur in the Basin located in Duchesne and Uintah counties. As the emission sources, chemistry of ozone formation, meteorology and

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jurisdictional complexity are unique to these two areas, they will be addressed separately within the ozone designation recommendation by the State of Utah.

Wasatch Area Analysis and Recommendation

Emissions and Emissions Related Data

Ozone is not directly emitted from any source. It is formed when two precursors, VOCs and NOx, react when exposed to ultraviolet radiation. To determine which areas of Utah may be contributing to the ozone formation in Weber, Davis, Salt Lake, and Utah counties, we need to understand the sources of the emissions and analyze the total VOC and NOx emissions in each of the counties within the Salt Lake City-Provo-Orem CSA. All of the following emissions figures are from the 2011 National Emissions Inventory (NEI).

VOC Emissions

While VOCs can come from a variety of sources, biogenics make up a vast majority of the VOC emissions in Utah's more rural counties. As an example, Tooele has the highest total VOC emissions of the ten counties within the CSA, but Figure 6 shows that 93% of those emissions come from biogenic sources. Other counties with high VOC emissions relative to the four Wasatch Front counties (Figure 7) are Box Elder, Juab, Summit, and Wasatch. Biogenics make up 90%, 98%, 85%, and 91%, respectively. Morgan County has very low VOC emissions overall and 90% of them are biogenic. While it is possible that these counties may be contributing VOCs that in turn contribute to the formation of ozone along the Wasatch Front, it is unreasonable to include them in the nonattainment area because the VOCs are coming from nonanthropogenic sources.

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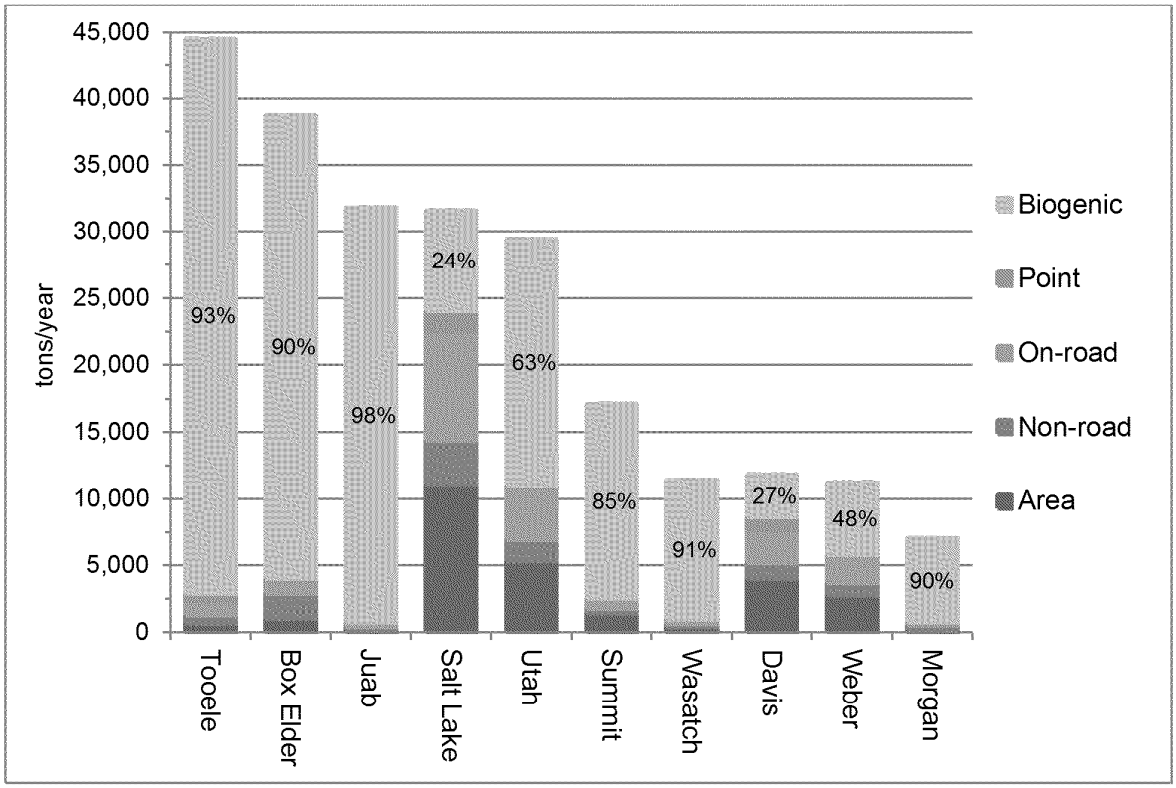

Figure 6. Total VOC emissions by county (Source: 2011 NEI).

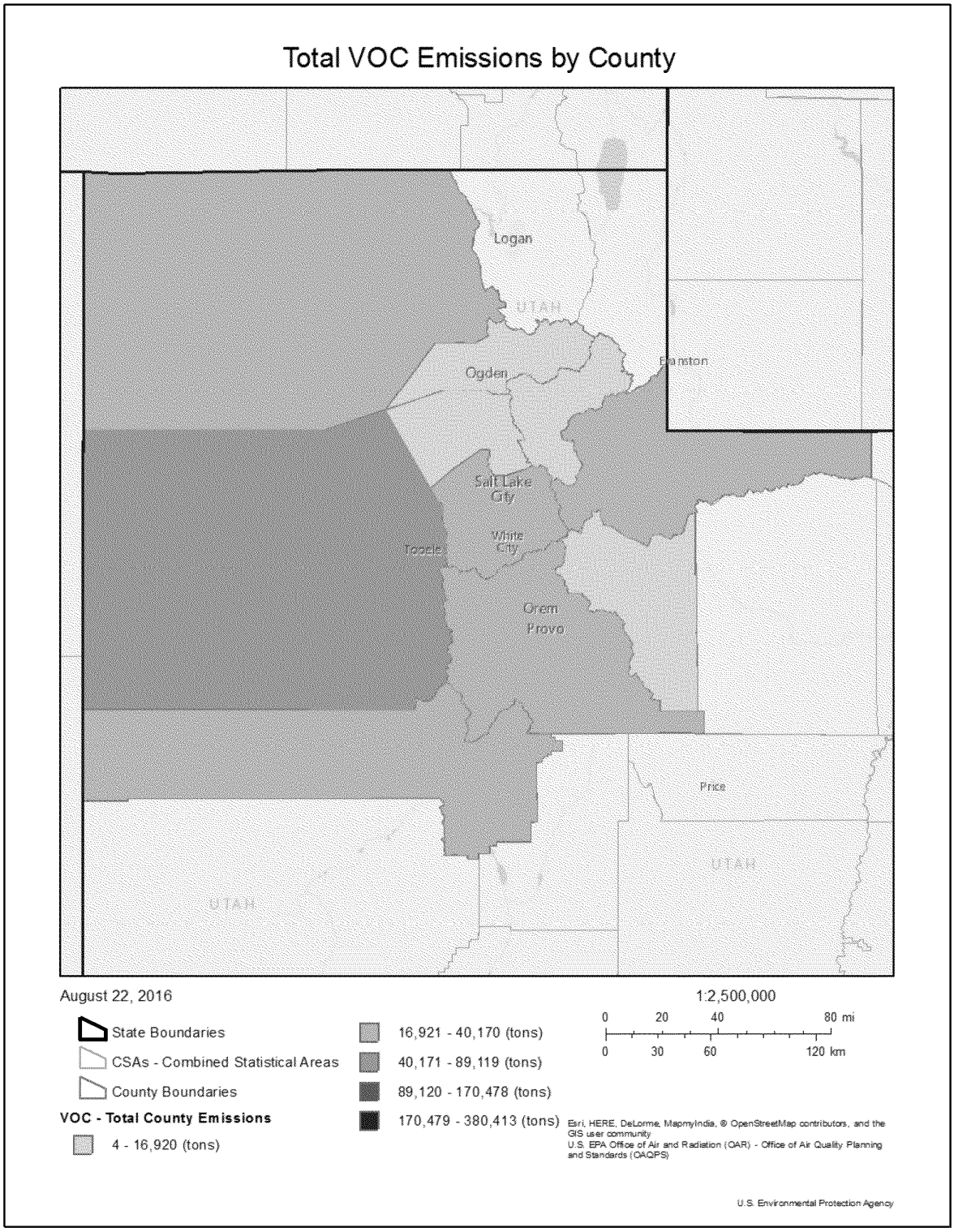

Figure 7. Map of total VOC emissions by county (Source: 2011 NEI).

NOx Emissions

As we look at emissions levels and sources of NOx emissions, it is important to recognize that there are only two ways in which emissions from one county can contribute to ozone exceedances in another county. The precursors can be transported meteorologically through the air currents or from mobile sources that originate in one county and travel to another county. Ozone itself can only be transported by meteorological means because it is not directly emitted by any source. In this section, the focus will be on transport by mobile sources. We will discuss meteorological transport in a following section. Of the six potentially contributing counties, Juab, Morgan, and Wasatch have so few mobile emissions that it is unlikely that they contribute a significant amount of NOx to affect the adjacent violating counties (see Figure 8 and Figure 9). Tooele, Box Elder, and Summit, however, could be contributing mobile emissions. For comparison, the mobile emissions for Juab are roughly half the amount of mobile emissions from Summit County.

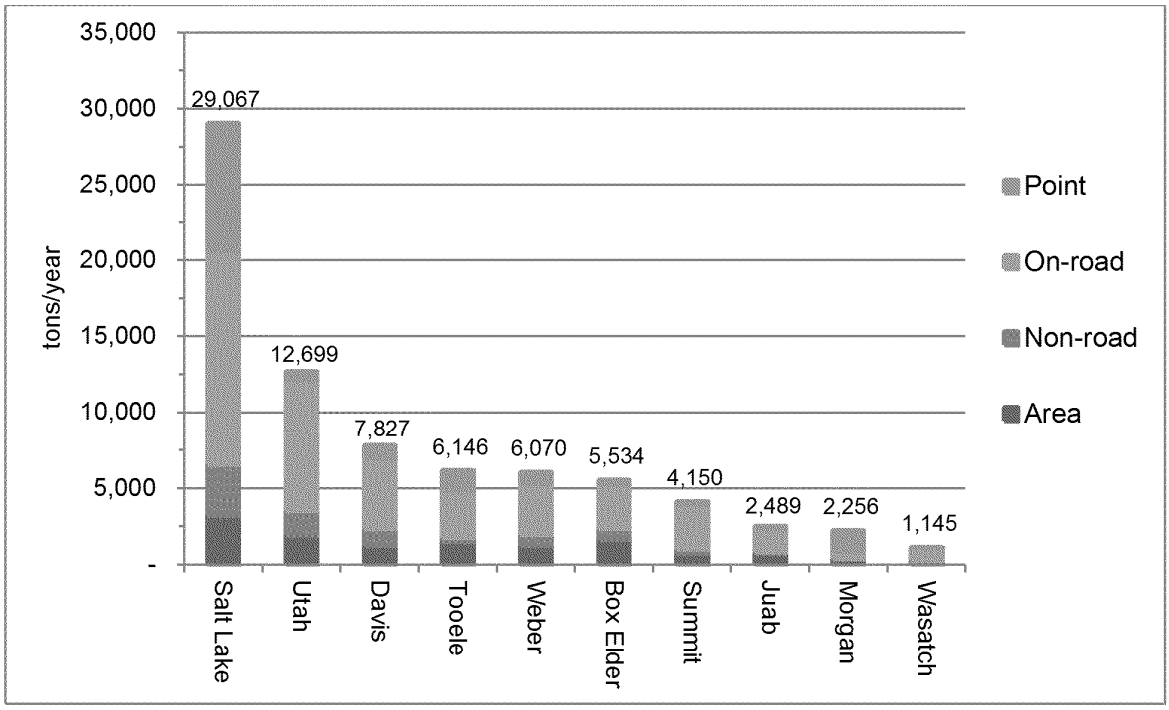

Figure 8. Total NOx emissions by county (Source: 2011 NEI).

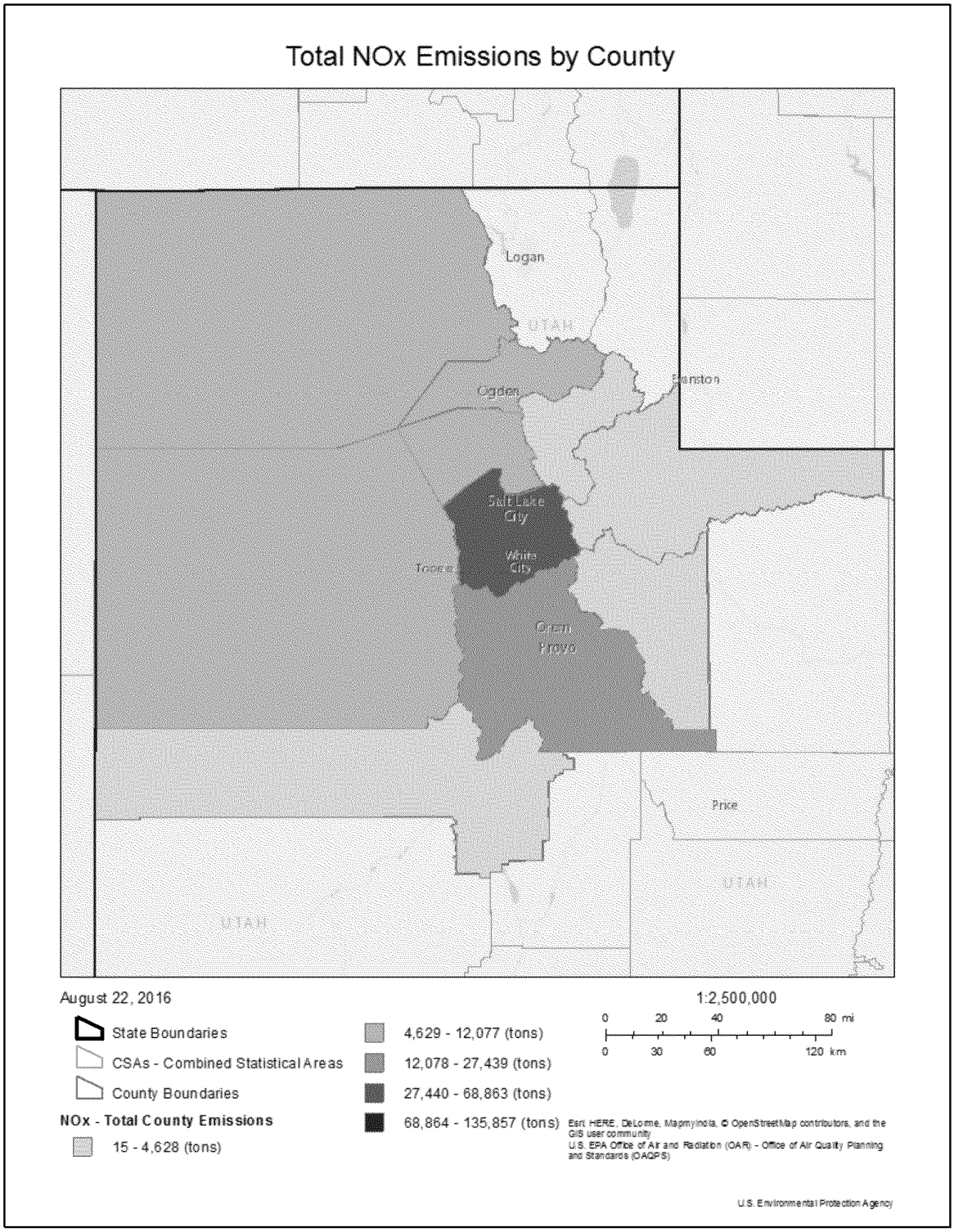

Figure 9. Map of total NOx emissions by county (Source: 2011 NEI).

Traffic and Commuting Patterns

The map in Figure 10 shows that the vehicle miles traveled (VMT) on the road network within the four violating counties is very high overall compared to the rest of the state. The VMT between Box Elder and Weber counties, Tooele and Salt Lake counties, and Summit and Salt Lake counties is elevated. Within the Weber-Davis-Salt Lake County area there are 42 million VMT per weekday. Of those VMT, 0.6% originates in Summit County, 1.2% originates in Tooele County, and 1.0% originates from Box Elder County.[4] Slightly higher percentages in Tooele and Box Elder counties show that these likely have a large percentage of people who commute into one of the violating counties for work. According to the American Community Survey conducted from 2009 to 2013, over 10,000 people commute from Tooele to one of the four violating counties each day. This is approximately 40% of the total commuters in Tooele County. Just over 5,000 people commute from Box Elder County to a violating county. Only 24% of Box Elder and Summit County commuters go to one of the violating counties (see Table 3). Trips originating from a violating county to an adjacent county will increase the VMTs along a corridor but show that emissions from those VMTs are not being contributed from the adjacent County. Over 5,600 people commute from a violating county to work in Summit County.[5] Summit County is also a tourist destination so it is safe to assume that a large portion of the VMTs between Salt Lake County and Summit County are due to people traveling from Salt Lake to Summit to recreate.

Based on mobile emissions and their origins, Utah recommends that Morgan, Wasatch, Juab, Box Elder, and Summit counties be excluded from the nonattainment area. We also recommend that some portion of Tooele County be included in the nonattainment area designation.

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[4] Utah Travel Study. 2013. Wasatch Front Regional Council (WFRC), Mountainland Association of Governments (MAG), Cache Metropolitan Planning Organization (CMPO), Dixie Metropolitan Planning Organization (DMPO), Utah Department of Transportation (UDOT), and Utah Transit Authority (UTA). Available at: http://www.wfrc.org/new_wfrc/publications/Utah_FinalReport_130228.pdf.

[5] American Community Survey 2009-2013. U.S. Census Bureau. Available at: http://www2.census.gov/programs-surveys/acs/tech_docs/accuracy/MultiyearACSAccuracyofData2013.pdf

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Table 3. County to County commuting flows within the 10-County CSA (Source: U.S. Census Bureau, American Community Survey 2009-2013. For more information see <http://www2.census.gov/programs-surveys/acs/tech_docs/accuracy/MultiyearACSAccuracyofData2013.pdf>).

County	Total # Commuting	Commuting within County	Commuting to other Counties	Violating Counties	# Commuting to four violating Counties	% Commuting to four violating Counties
BOX ELDER	21,325	14,796	6,529	Davis	1,053	5%
				Salt Lake	592	3%
				Utah	19	0%
				Weber	3,422	16%
DAVIS	140,788	75,279	65,509	Davis	X	X
				Salt Lake	44,509	32%
				Utah	860	1%
				Weber	17,205	12%
JUAB	4,277	2,585	1,692	Davis	5	0%
				Salt Lake	229	5%
				Utah	1,118	26%
				Weber	-	0%
MORGAN	4,067	1,399	2,668	Davis	706	17%
				Salt Lake	489	12%
				Utah	23	1%
				Weber	1,276	31%
SALT LAKE	504,160	468,609	35,551	Davis	10,020	2%
				Salt Lake	X	X
				Utah	11,416	2%
				Weber	1,628	0%
SUMMIT	19,261	13,697	5,564	Davis	219	1%
				Salt Lake	4,170	22%
				Utah	130	1%
				Weber	95	0%
TOOELE	25,377	14,097	11,280	Davis	390	2%
				Salt Lake	9,536	38%
				Utah	165	1%
				Weber	113	0%
UTAH	221,591	183,673	37,918	Davis	1,034	0%
				Salt Lake	31,971	14%
				Utah	X	X
				Weber	297	0%
WASATCH	11,059	5,796	5,263	Davis	3	0%
				Salt Lake	1,002	9%
				Utah	816	7%
				Weber	76	1%
WEBER	105,102	70,743	34,359	Davis	21,951	21%
				Salt Lake	8,513	8%
				Utah	360	0%
				Weber	X	X

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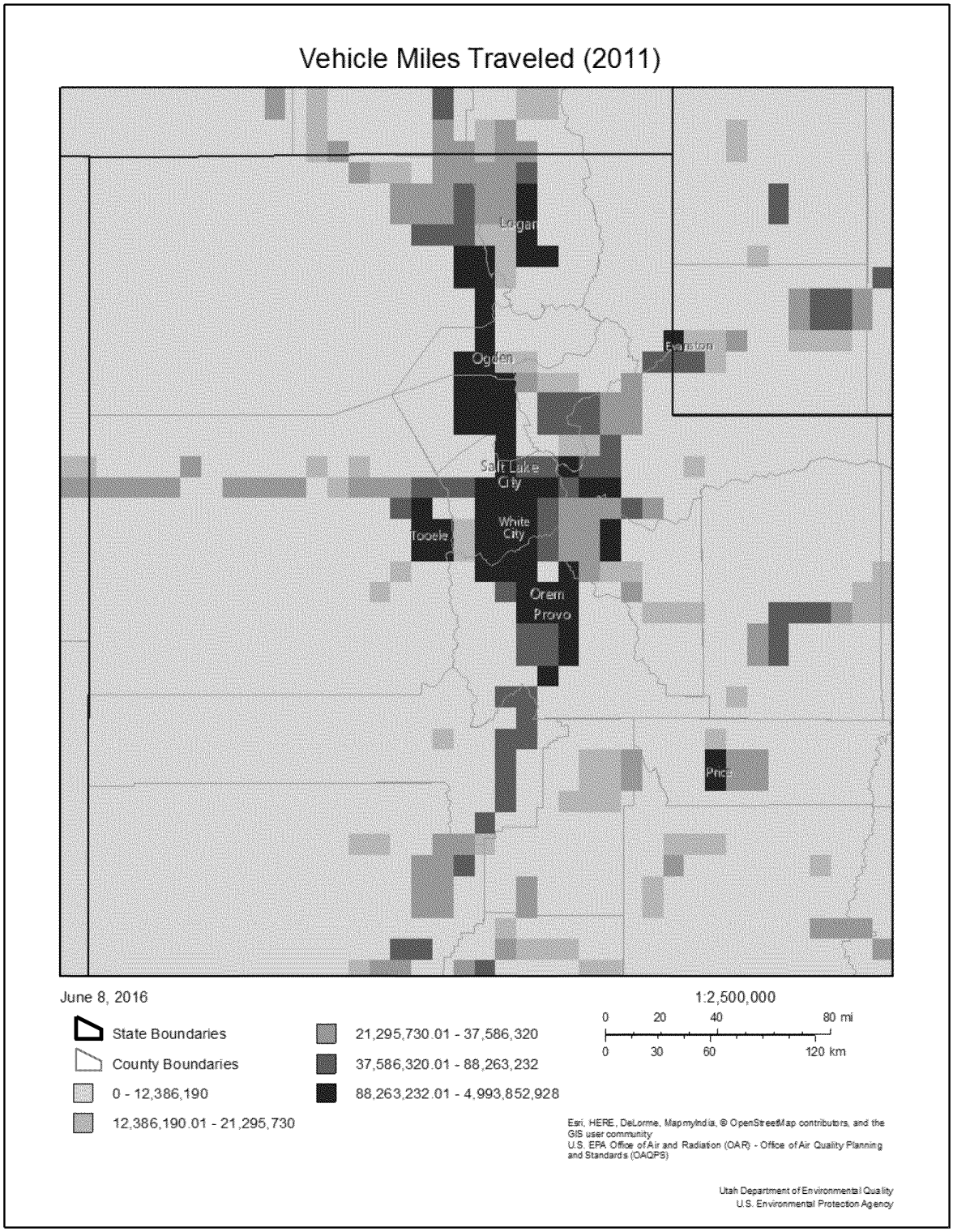

Figure 10. Vehicle Miles Traveled (VMT) on Utah roads (Source: Based on the 2011 NEI and data from the Federal Highway Administration and the U.S. Census Bureau).

Population Density and Degree of Urbanization

Some distinctions have been made in the EPA guidance document regarding urban versus rural areas, relating to the presumptive boundaries of nonattainment areas and to the level of assessment required in the case of a departure from the presumption. Urban areas are generally considered to be metropolitan areas surrounding core cities, whereas rural areas would be other areas not included in or adjacent to urban areas. In Utah there are several instances where both urban and rural areas can be found within a single MSA. In many of these instances urban and rural areas have no actual effect on each other. Reasons for this are significant separation due to topographical features, large areas of sparsely populated desert or rangeland, and very large MSAs. Figure 11 shows the population density of the counties in the CSA. Figure 12 shows the population density by census tract. The Salt Lake City-Provo-Orem CSA combines the Salt Lake City MSA, the Ogden-Clearfield MSA, the Brigham City Micropolitan Statistical Area (Box Elder County), and the Heber Micropolitan Statistical Area (Wasatch County).

There are two very noticeable features of the CSA. The first feature is the small area that is urbanized compared to the rural and uninhabited portions of the counties. The second feature is the large size of the CSA. The Salt Lake City-Provo-Orem CSA contains ten counties and covers 25,365 square miles (larger than West Virginia and nine other US states). It extends east/west from the Nevada border to the southern Wyoming border, a distance of over 220 miles, and south from the Idaho border approximately 100 miles. Each of the MSAs within the CSA includes densely populated areas, sparsely populated areas, and very large areas with no population at all. The sparse or unpopulated areas are due to extended desert in the west and extreme mountainous terrain in the east. The largest concentration of both population and industry is found in the low valleys west of, and adjacent to, the Wasatch Front. Smaller concentrations of population are also found in some of the higher valleys east of the Wasatch Range, but there are generally few or no major industrial sources located in these areas. For the reasons cited above, Utah feels it is more appropriate to designate nonattainment areas based on the core urban area rather than the CSA boundary.

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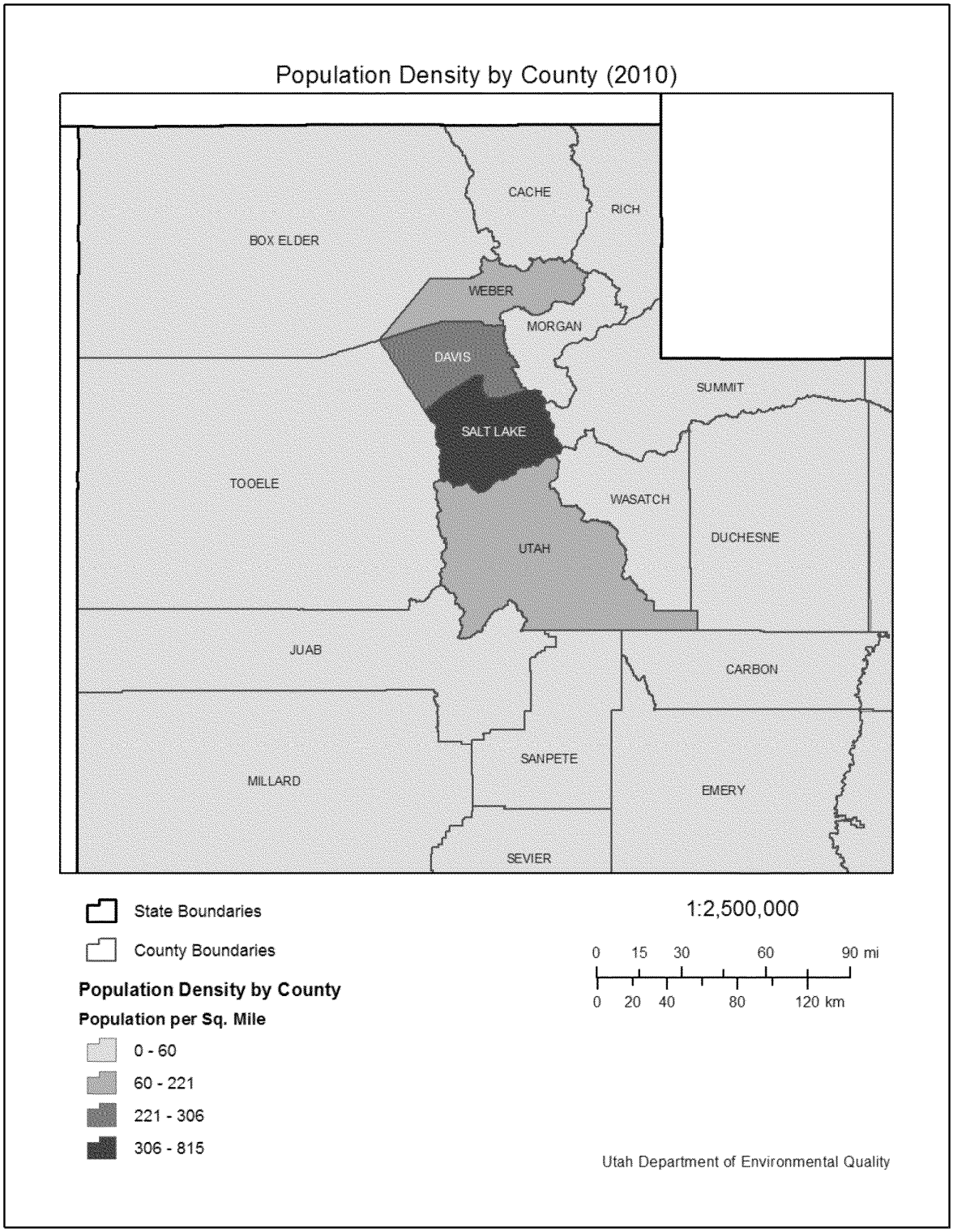

Figure 11. Population density (people/square mile) of counties in Utah. Based on the 2010 U.S. Census.

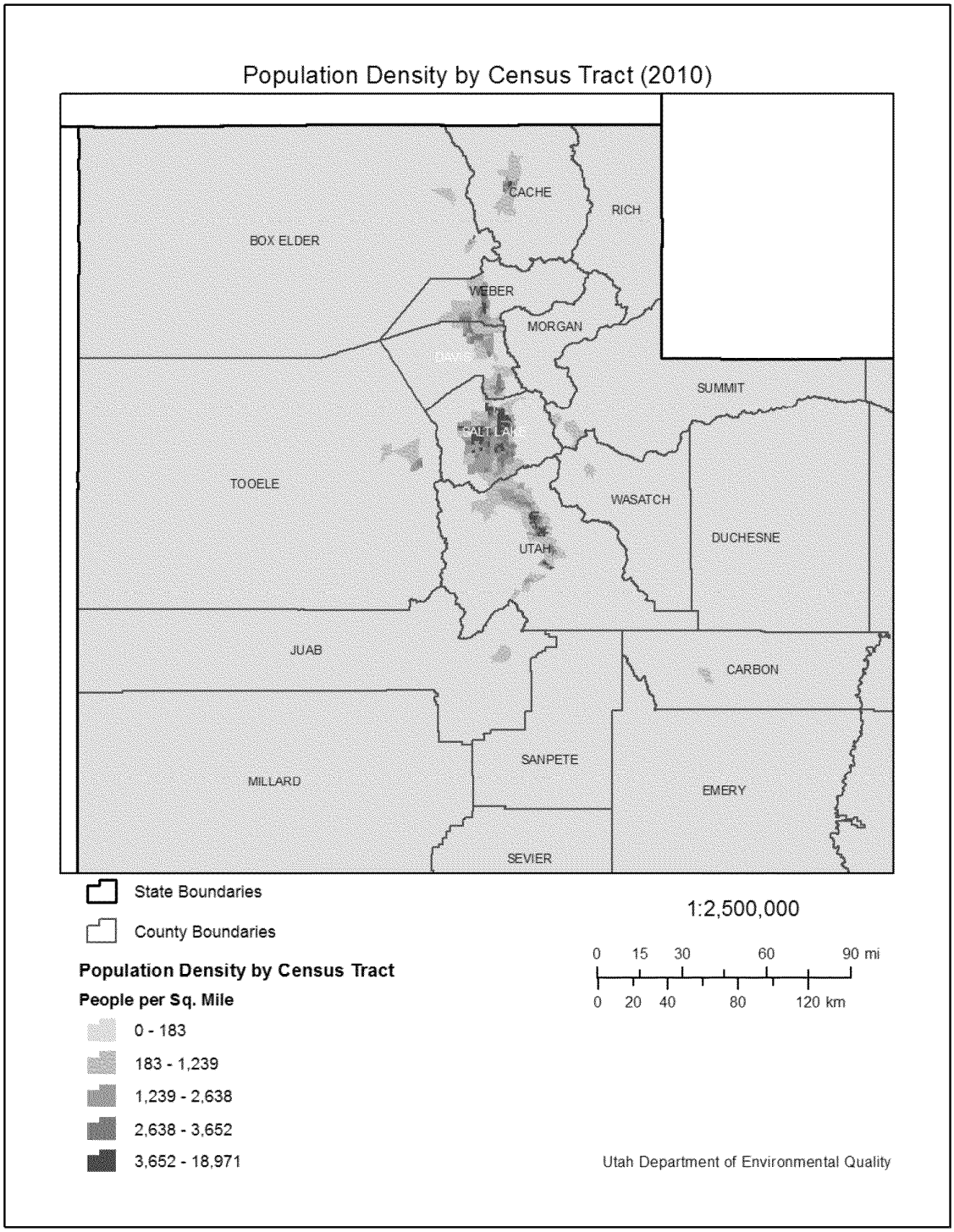

Figure 12. Population density (people/square mile) by census tract in Utah. Based on the 2010 U.S. Census.

Meteorology

In the previous section we discussed how mobile emissions move between counties due to traffic and commuting patterns. In this section we consider how meteorological and topographic patterns and features affect the distribution of emissions in the CSA. Utah's meteorology is unique because the mountain range on the east of the most urbanized area and the Great Salt Lake to the west. Over the past four years, several studies have been conducted in Utah, and specifically on the Wasatch Front, to understand how the unique meteorology and topography affect ozone formation and distribution.[6, 7]

Monitoring done as part of these studies shows elevated ozone concentrations in high mountain valleys such as the area around Park City in Summit County. The higher values are due, in part, to local diurnal airflows that will be discussed later; however, many studies point to higher levels of ozone in the intermountain west, particularly in higher elevations being caused by ozone transport from other areas in the United States, and international sources in Mexico and Asia.[8, 9] Figure 13 through Figure 16 show 24-hour back trajectory modeling using Hysplit. This model shows upper level air flow coming from neighboring states. It is important to note that there are limitations to the Hysplit model. The major limitation is the coarse model resolution. Data for these runs were based on a 40 kilometer grid. Because of this, the model does not account for large mountain ranges that block or alter air flow at lower altitudes.

High ozone levels in the Wasatch area usually occur episodically in association with a semi-permanent high pressure ridge that becomes stationary over the intermountain region, clear skies, intense direct sunlight, and stagnant air with very light surface wind movement. When these meteorological conditions occur together, they can aid in the formation of ozone while at the same time providing minimal vertical mixing.

Under these conditions, diurnal wind patterns caused by the Wasatch Mountains create mixing and dispersion of ozone along the entire Wasatch Front and adjacent counties.[7] As a result, increased concentrations of ozone are able to build up over a period of several days and to actually meander or oscillate north/south along the Wasatch Front. Under proper conditions, air originating in a southern area could move northward along the Wasatch Front, and conversely, air originating in a northern area could travel southward along the same path.

Actual day-to-day transport of the ozone along the Wasatch Front is mainly influenced by the diurnal effects of the local on-shore/off-shore flow coupled with an up-slope/down-slope airflow

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[6] Utah Department of Environmental Quality. (2013), 2012 Utah Ozone Study.

[7] Horel, J., Crosman, E., Jacques, A., Blaylock, B., Arens, S., Long, A., Sohl, J. and Martin, R. (2016), Summer ozone concentrations in the vicinity of the Great Salt Lake. Atmos. Sci. Lett.. doi:10.1002/asl.680

[8] Cooper, O. R., R.-S. Gao. D. Tarasick, T. Leblanc, and C. Sweeney. (2012), Long-term ozone trends at rural ozone monitoring sites across the United States, 1991-2010, J. Geophys. Res., 117, D22307, doi: 10.1029/2012JD018261.

[9] F. Dentener, T. Keating, H. Akimoto, Eds. (2010), Hemispheric transport of air pollution 2010, Part A: Ozone and particulate matter, Air Pollution Studies No. 17, (United Nations, New York and Geneva).

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caused by the Great Salt Lake and Utah Lake on the west, and the very prominent Wasatch Range on the east (see Table 4). As mentioned above, areas of high ozone concentration have been shown to oscillate both north and south along the Wasatch Front. They also move east and west from areas adjacent to the Wasatch Front to areas over the Great Salt Lake in Weber, Davis, and Salt Lake counties, and over the Utah Lake in Utah County. In all cases the general westward movement occurs during the late evening and nighttime hours and the reverse eastward movement occurs during the daylight hours. This is a typical mountain valley flow.

In the case of counties east of the Wasatch Range, the diurnal air flow moves air containing "ozone clouds" into and out of these counties on a routine basis and is responsible for some of the higher concentrations monitored in these counties.[6] This phenomenon is most pronounced in Summit County. Ozone studies conducted in Utah in 2012 and 2015 showed that peak daytime ozone concentrations in Summit County lagged behind those in Salt Lake County by about an hour. In other words, when 1-hour ozone levels spiked in Salt Lake County, they would then spike in Summit County approximately one hour later as the wind pushed the ozone up the canyon. In essence, Summit County is not a significant emitter of ozone or its precursors, but a receptor.

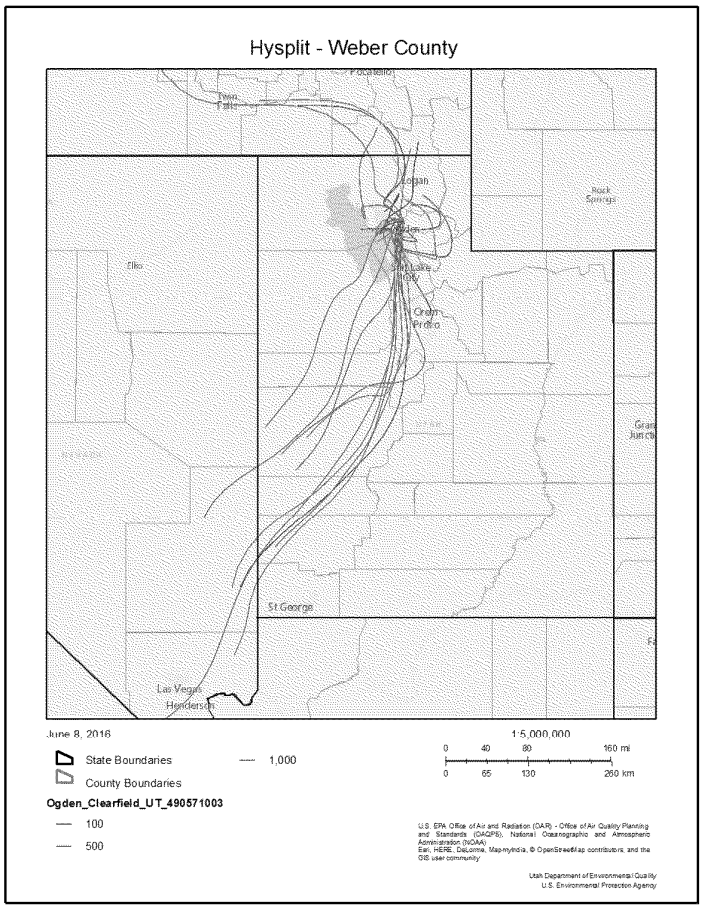

Figure 13. 24-hour back trajectory model of air flow to Weber County monitors during days where ozone concentrations exceeded the NAAQS.

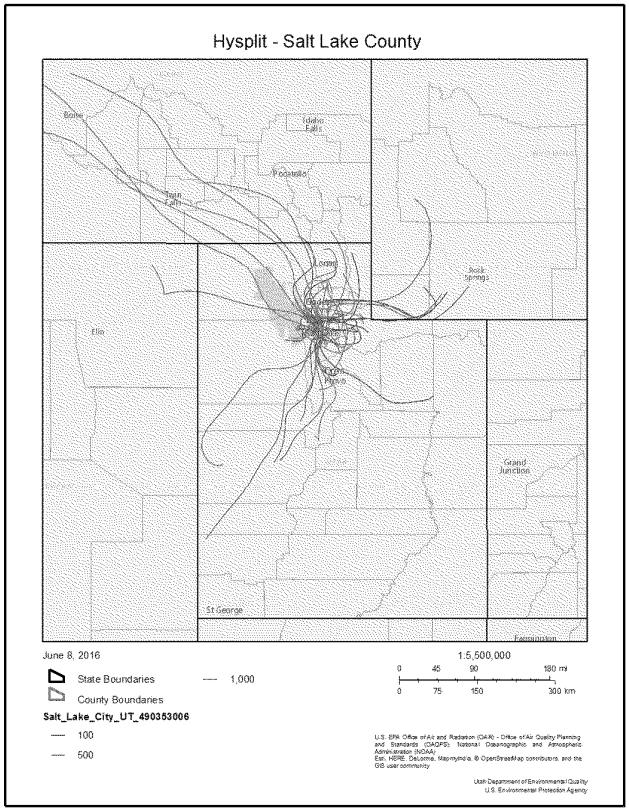

Figure 14. 24-hour back trajectory model of air flow to Salt Lake County monitors during days where ozone concentrations exceeded the NAAQS.

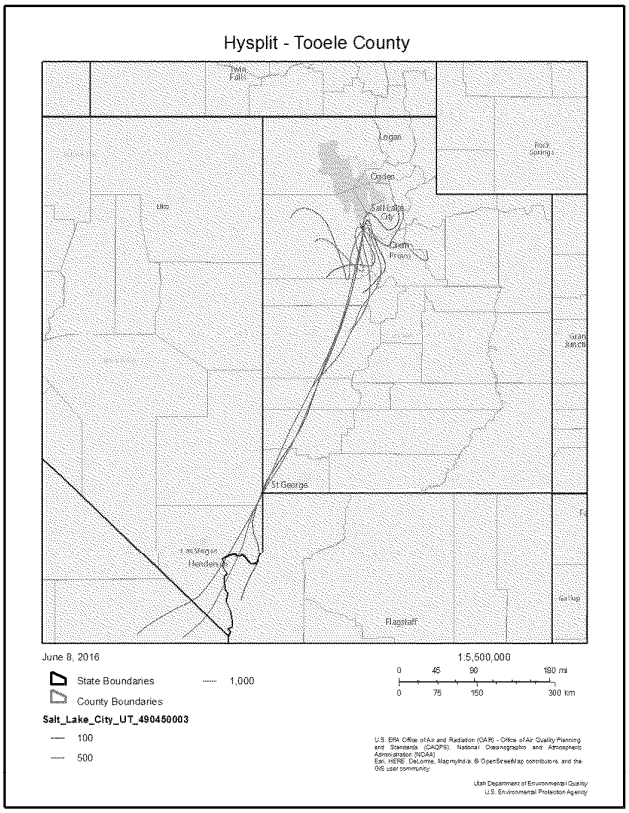

Figure 15. 24-hour back trajectory model of air flow to Tooele County monitors during days where ozone concentrations exceeded the NAAQS.

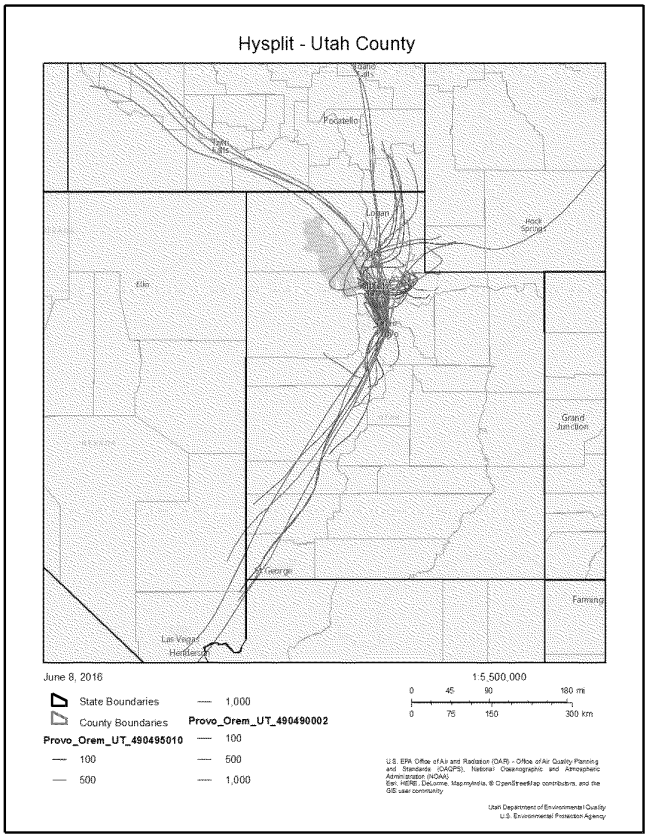

Figure 16. 24-hour back trajectory model of air flow to Utah County monitors during days where ozone concentrations exceeded the NAAQS.

Geography and Topography

The Wasatch Front is located along the eastern edge of the Great Basin. The Wasatch Range, extending from near the Idaho border to Mt. Nebo at the southern tip of the Northern Rocky Mountains, is a formidable obstacle to surface air mass movement to and from the east. A map of the terrain of the region is provided in Figure 17. The Wasatch Mountains rise abruptly to elevations of between 4,000 to 6,000 feet above the valley floor and help to define the Wasatch Front urban areas from Brigham City on the north to the numerous metropolitan areas in Utah County on the south. These valleys are bound on the West by the Great Salt Lake in the north and the Oquirrh Mountains, which also rise 4,000 to 5,000 feet above the valley floor, in the south. In an area of flat terrain one would expect an air mass to gradually be transported in a direction consistent with the prevailing air flow. Conversely, in an area of mountainous terrain, as is the case of the valleys along the Wasatch Front, one would expect the terrain to define the air mass boundaries and movement. With prevailing winds from the west through the north, the high terrain with its bowl shaped valleys that open to the north and west routinely functions to block any eastward horizontal movement of a stagnant air mass. In effect, the local topography actually contains stagnant air masses within these valleys.

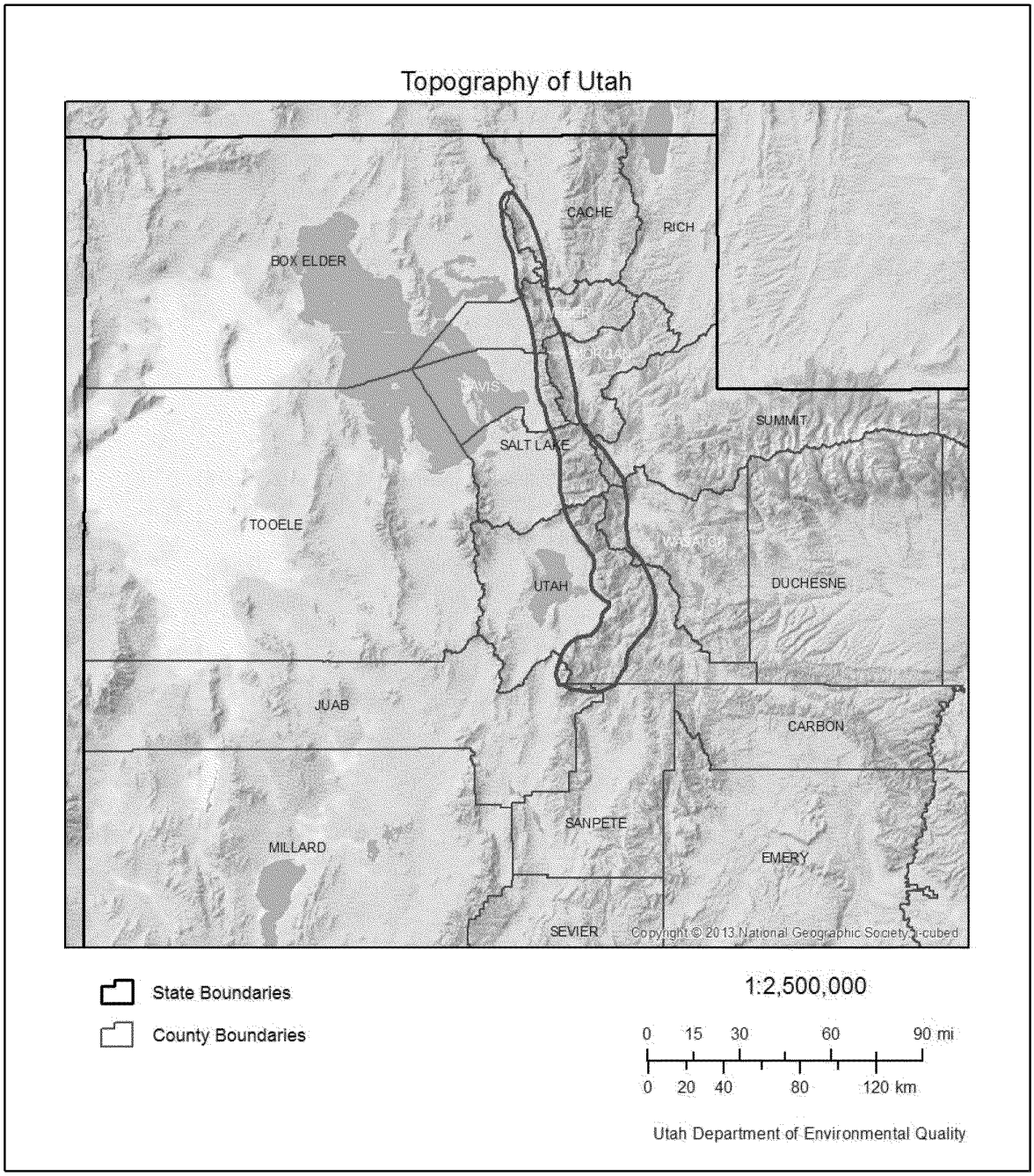

Figure 17. Wasatch Front topography.

To help appreciate the significance of the barrier that the Wasatch Front Range poses to the eastward horizontal movement of air, Table 4 gives the average valley floor elevation at several sites along the Wasatch Front and the average elevation of the Wasatch Mountain Range directly east of the valley floor location.

Table 4. Elevations of Valley Floor and Adjacent Mountains along the Wasatch Front.

	Valley Elevation	Mountain Elevation	Elevation difference
Box Elder County			
Tremonton	4,320 ft	8,979 ft	4,659 ft
Honeyville	4,291 ft	9,330 ft	5,039 ft
Brigham City	4,363 ft	8,035 ft	3,672 ft
Weber County			
Harrisville	4,390 ft	9,196 ft	4,786 ft
Ogden	4,350 ft	9,238 ft	4,888 ft
Davis County			
Kaysville	4,363 ft	9,297 ft	4,934 ft
Bountiful	4,283 ft	8,819 ft	4,536 ft
Salt Lake County			
Salt Lake City	4,363 ft	9,107 ft	4,744 ft
Cottonwood	4,455 ft	9,176 ft	4,721 ft
Utah County			
Highland	4,950 ft	10,698 ft	5,748 ft
Provo	4,691 ft	10,630 ft	5,939 ft
Spanish Fork	4,590 ft	9,430 ft	4,840 ft
Average	4,451 ft	9,328 ft	4,876 ft

As discussed in the meteorology section, it has been found in several studies that concentrations of ozone trapped in large mountain valleys along the Wasatch Front, such as the Salt Lake Valley and Utah Valley, actually move horizontally within or in and out of the valleys with the diurnal mountain-valley flow. In the Salt Lake Valley, for instance, the nighttime flow generally moves the air to the northwest over the eastern portion of the Great Salt Lake while the daytime flow moves the same air back southeastward into the valley where it is contained by the Wasatch Range. In Utah Valley, the air is more contained and generally moves westward over Utah Lake in the evening and eastward during the day. In some instances, however, the air mass in either the Salt Lake Valley or Utah Valley has moved north or south to affect the other valley. In the region north of Salt Lake City, air masses have a tendency to move both north and south along the Wasatch Front, as well as east and west with the diurnal flow.

Not only does the topography of these regions act as a barrier to air movement during conditions which lead to elevated concentrations of ozone, it also acts as the primary factor in determining where the population is located. In other words, the lower valleys which contain the air during periods of summertime stagnation are also the areas within which most people choose to live. These populations produce the emissions which lead to ozone formation under the conditions described above.

Both Figure 17 and Table 4 show that much of the eastern area of the Wasatch Front counties is at a much higher elevation than the adjacent western valleys, and should generally not experience the high concentrations of ozone produced in these urban valleys. While there may

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be limited pathways through the canyons, these regions do not have the sources of emissions necessary to produce high ozone concentrations to impact downwind urban areas.

Thus, the topography, when considered alongside the predominant meteorology, would suggest that these areas of high mountainous terrain not be included in a description of nonattainment area(s).

Jurisdictional Boundaries

In the EPA's guidance document it is noted that ". . . an assessment of relevant information may support inclusion of only part of a county."[10] Because on-road mobile and area sources account for much of the VOCs and NOx emitted in Tooele County, it would be fair to include only the more densely populated portion of the county that is shown in Figure 12. However, because VOCs and NOx are precursors to both ozone and PM2.5, it is logical that the area of Tooele County be expanded to the same boundary of Utah's current PM2.5 nonattainment area. This recommendation will allow the State and EPA to implement and enforce controls in a more uniform manner across Utah.

Within the Salt Lake City-Provo-Orem CSA there are three MSAs and two distinct metropolitan planning organizations (MPO) that carry out transportation planning for those MSAs. Wasatch Front Regional Council is the MPO that carries out regional transportation planning in Salt Lake, Tooele, Davis, Weber, Morgan, and Box Elder counties. The Mountainland Association of Governments (MAG) is the MPO responsible for transportation planning in Utah County. These two areas are also designated as two separate nonattainment areas for PM2.5. Designating all of these counties as one nonattainment area would create major hurdles for MAG and WFRC within the transportation planning and conformity requirements and obligations under the Act. Utah therefore recommends that Utah County be designated as a separate nonattainment area from the rest of the nonattainment area (Salt Lake, Tooele, Davis, and Weber counties).

State Recommendation for the Wasatch Front

As shown on Figure 18, Utah is recommending the establishment of two Wasatch Front nonattainment areas; the **Northern Wasatch Front** and **Southern Wasatch Front**.

The Northern Wasatch Front nonattainment area includes the following:

- All of Salt Lake County
- All of Davis County
- All portions of Weber County west of and including Townships 5, 6, and 7 North Range 1 West that are in Weber County and west of the ridgeline that traces the Wasatch Mountains from the southeast corner of the township to the easternmost extension of the county boundary.
- In Tooele County, the following Townships or portions thereof as noted (including Tooele City):

[10] Memorandum: Area Designations for the 2015 Ozone National Ambient Air Quality Standards. Signed by Janet McCabe, Acting Assistant Administrator. February 25, 2016.

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- Township 1 South Range 3 West
- Township 2 South Range 3 West
- Township 3 South Range 3 West
- Township 3 South Range 4 West
- Township 2 South Range 4 West
- Township 2 South Range 5 West
- Township 3 South Range 5 West
- Township 3 South Range 6 West
- Township 2 South Range 6 West
- Township 1 South Range 6 West
- Township 1 South Range 5 West
- Township 1 South Range 4 West
- Township 1 South Range 7 West
- Township 2 South Range 7 West
- Township 3 South Range 7 West
- Township 4 South Range 7 West
- Township 4 South Range 6 West
- Township 4 South Range 5 West
- Township 4 South Range 4 West
- Township 4 South Range 3 West

The Southern Wasatch Front nonattainment area includes the following:

- All portions of Utah County west of and including any portion of the following townships located within Utah County:
  - Township 3 South Range 1 East
  - Township 4 South Range 2 East
  - Township 5 South Range 3 East
  - Township 6 South Range 3 East
  - Township 7 South Range 3 East
  - Township 8 South Range 3 East
  - Township 9 South Range 3 East
  - Township 10 South Range 2 East

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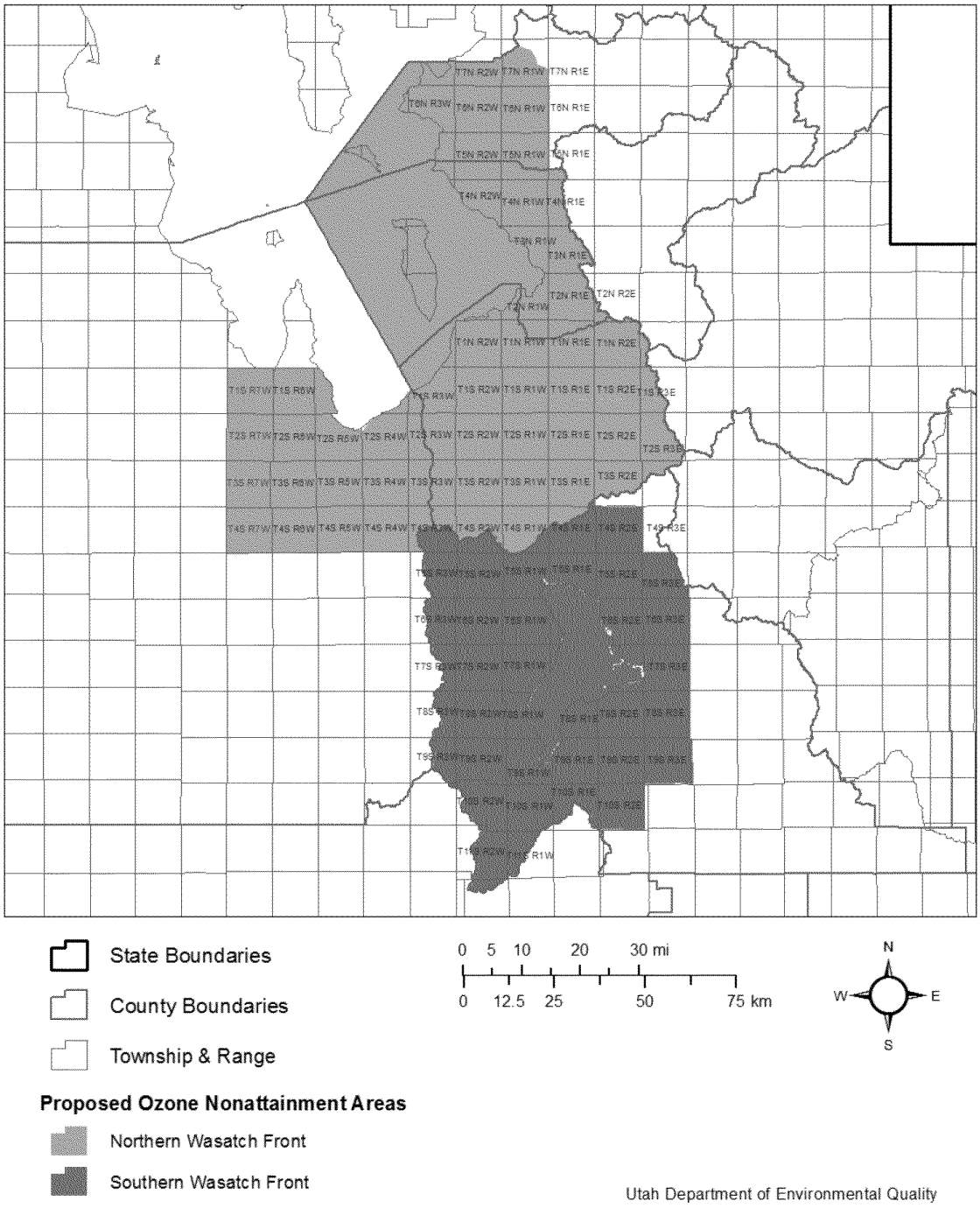

Figure 18. Recommended Wasatch Front Ozone Nonattainment Areas.

Uinta Basin Area Analysis and Recommendation

Overview

The Basin lies in the northeast corner of Utah and is bounded on the north by the Uinta Mountains, on the south by the Tavaputs Plateau, on the west by the Wasatch Range, and on the east by elevated terrain that separates it from the Piceance Basin in Colorado. The Green River runs through the Basin from northeast to southwest, exiting through Desolation Canyon. The lowest point in the Basin is near Ouray and is approximately 4,800 feet above sea level. Duchesne and Uintah counties contain most of the Basin, and the Uintah and Ouray reservation covers a significant portion of basin lands. The Basin presents a very different ozone issue than the more typical summertime urban issue found along the Wasatch Front and therefore warrants a separate discussion and analysis.

In 2006, DAQ began air quality monitoring in the Basin. DAQ's main focus was to measure potential fine particulate ($PM_{2.5}$), but also monitored for ozone and NOx. No concentrations exceeding the NAAQS for ozone were measured at that time. In 2009, EPA established two monitoring sites at Ouray and Redwash in the oil and gas production area of the Basin and measured PM2.5, NOx, ozone and meteorological parameters. It was the winter of 2009-10 when the first high levels of ozone were observed in the Basin. In the winter of 2010-11, Utah State University and DAQ conducted a special study to confirm the presence of high winter ozone and to map out the spatial extent of elevated ozone levels. Results from the study showed that ozone values were elevated throughout the Basin, with the highest concentrations tending to occur at lower elevations in the center of the Basin. The data also showed that elevated ozone correlated highly with the presence of snow-covered ground and a strong temperature inversion, and that elevated ozone values did not occur when these conditions were absent.

With this data confirming a wintertime ozone issue in the Basin, the Uinta Basin Winter Ozone Studies (UBOS) formally began in 2011 to characterize emission sources, identify chemical pathways unique to the Basin, and develop effective mitigation measures. This multi-year effort, led by DAQ, has brought together knowledgeable scientists to study this wintertime ozone phenomenon. Participants included the EPA, National Oceanic Atmospheric Administration (NOAA), Utah State University, University of Utah, and a number of other universities in both the United States and Canada. The UBOS is important for understanding the atmospheric chemistry responsible for winter ozone and developing control strategies that reduce the precursor gases that contribute to its formation. Over the past few years of study, much has been learned about the unique winter chemistry that exists in the Basin.

Since 2011, the wintertime ozone issue has continued to follow the original observation that there needs to be snow-covered ground, sunshine, and a strong temperature inversion to see high ozone values. Ozone levels outside of this set of conditions have remained below the ozone standard; therefore, exceedances of the standard do not occur every year. The UBOS has also confirmed that transport is not a major contributor to high ozone episodes. This is evidenced by seeing higher concentrations of VOC and NOx within the Basin than without and by correlations of VOC and NOx concentrations in proximity to known sources. Also the stable meteorological conditions during ozone production are not conducive to transport from outside

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the Basin, and VOC speciation in the Basin is characteristic of oil and gas operations, not of upwind urban sources. Vertical profiles collected during high ozone events show that the polluted air mass is confined to a shallow boundary layer that varies in height from 230 - 1,300 feet above ground level (UBOS 2012).

The focus of the UBOS for the past couple years has been on the chemistry of the formation of ozone and obtaining a Basin-specific emission inventory from the oil and gas industry. The development of a comprehensive and accurate winter emission inventory, including sufficient speciation of chemical compounds, is critical to support the development of air quality modeling that represents the unique wintertime ozone events in the Basin.

Air Quality Data

The State of Utah operates two Federal Reference Method (FRM) or Federal Equivalent Method (FEM) monitoring stations in the Basin that collect data in accordance with 40 CFR Part 58. These stations are located at and named for the most populated towns in the Basin—Roosevelt and Vernal. However, the site for the Vernal station was repurposed by the land owner, and the station had to be moved to a new location on January 1, 2015, and therefore, does not have three years of continuous data to be used for official attainment determination. There are other regulatory monitors located in the Basin that are managed by other agencies for which a DV can be calculated. The Ute Tribe manages four monitors on tribal land: the Myton, Whiterocks, Redwash and Ouray monitors (Figure 19). The Fruitland monitor has been in intermittent operation and is not considered to be a regulatory monitor, but provides valuable information for determining the extent of the observed wintertime inversion and ozone concentrations. The Dinosaur National Monument monitor is in its third year of monitoring, so it is not yet able to provide a DV, but it is also included as part of the air quality evaluation as it also provides additional information for this analysis.

States are to identify violating areas using the most recent three-year set of air quality data. For the state's evaluation, this encompasses the years 2013 through 2015. For the Basin, high ozone events occur during the winter months, December to March, so we consider those months the ozone season. The final designation by EPA will be made by October 2017; therefore, data collected during the 2015-2016 ozone season, which has already passed, will be evaluated as part of that decision. As such we will also consider data from the 2015-2016 ozone season, though the data has not yet been certified. Table 5 below shows the 4th highest ozone concentration as well as the three-year average of the 4th highest ozone concentrations (DV) recorded at the monitors located in the Basin. **Error! Reference source not found.**Figure 19 shows the location of these monitors. For the timeframe identified by the EPA's ozone designation guidance to be evaluated by states for their recommendation, the monitors indicating nonattainment are the tribal monitors at Myton, Roosevelt, Redwash and Ouray. Roosevelt is the only monitor that is under the control and management of the State that has a DV for 2013-2015. For the final designation timeframe that will be utilized by EPA, preliminary data indicate nonattainment at the Myton, Whiterocks, and Ouray stations. The conclusion that can be made from either the 2013-2015 DVs or 2014-2016 preliminary DVs is that several areas monitored in the Basin are nonattainment for the 2015 ozone standard.

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Table 5. Ozone 4th high values and design values for Uinta Basin monitors.

Site ID	Site	2011 4th Max	2012 4th Max	2013 4th Max	2014 4th Max	2015 4th Max	2016 4th Max[1]	2013-2015 DV	2014-2016 DV[1]
49-013-7011	Myton[2]	0.065		0.089	0.067	0.066	0.085	**0.074**	**0.073**
49-047-7022	Whiterocks[2]	0.064		0.066	0.064	0.068	0.081	0.066	**0.071**
49-013-0002	Roosevelt		0.069	0.0104	0.062	0.060	0.081	**0.075**	0.068
49-013-1001	Fruitland[3]	0.065	0.070	0.069				n/a	n/a
49-047-1002	Dinosaur NM[4]				0.064	0.067	0.075	n/a	0.069
49-047-1003	Vernal		0.064	0.0102	0.062			n/a	
49-047-1004	Vernal #4					0.064	0.073		n/a
49-047-2002	Redwash[2]			0.088	0.061	0.067	0.083	**0.072**	0.070
49-047-2003	Ouray[2]			0.092	0.079	0.068	0.096	**0.080**	**0.081**

1. Data not quality assured
2. Tribal monitors
3. Previous DAQ, taken over by BLM in January 2014, not certified as a regulatory monitor
4. National Park Service monitor

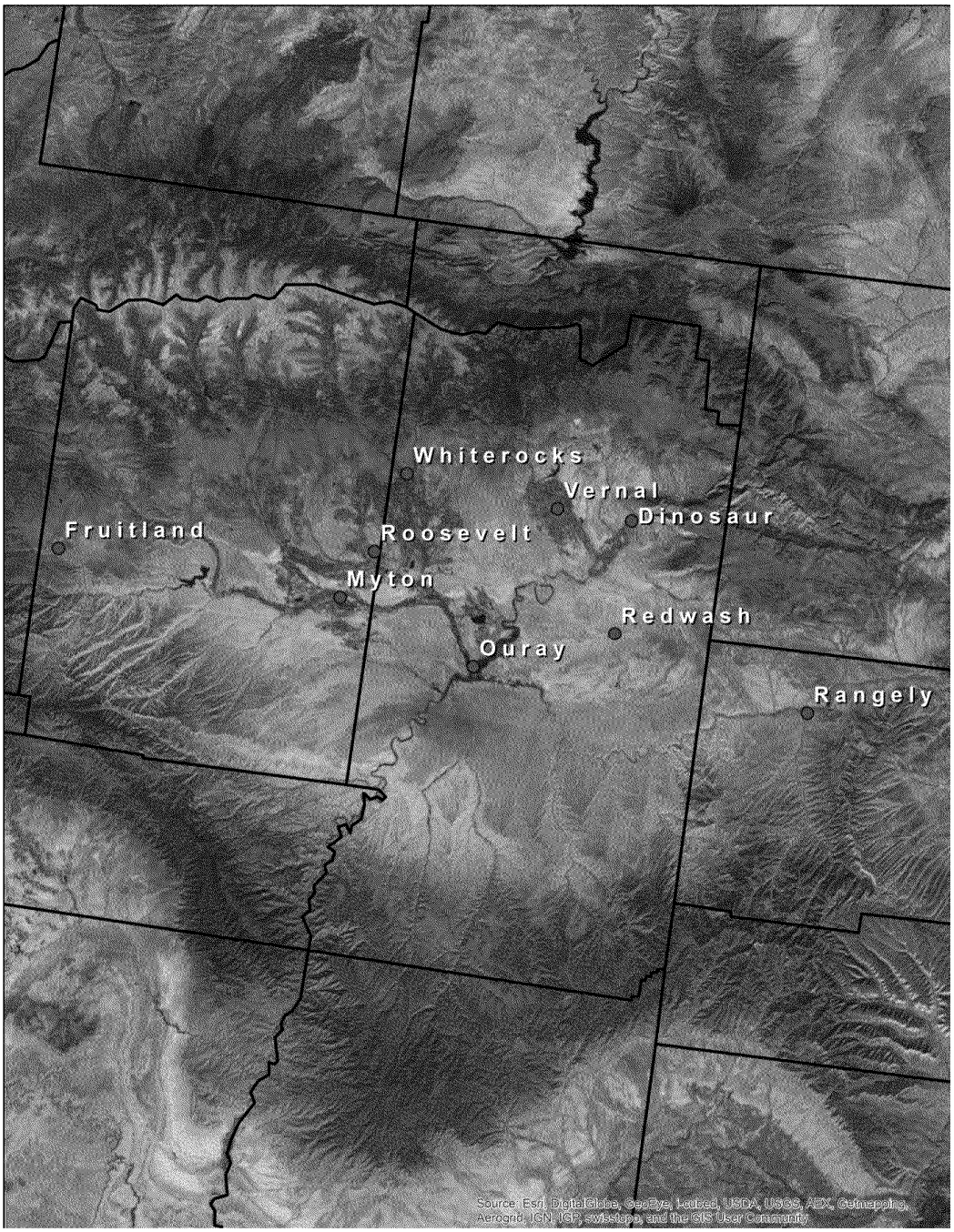

Figure 19. Map of ozone monitors in the Uinta Basin.

Emissions and Emissions Related Data

Ground-level ozone is primarily formed from reactions of VOCs and NOx in the presence of sunlight; therefore, the emissions data evaluated will focus on these precursor pollutants. As the proposed nonattainment area of the Basin primarily resides in Uintah and Duchesne counties, theirs will be the inventory data utilized for this analysis. The ozone designation guidance

memorandum recommends the use of the 2011 NEI as that is the most recent information available during the timeframe for development of the State recommendation. The 2011 NEI for Uintah and Duchesne counties reflected that 97% of the VOC emissions and 60% of NOx emissions were from oil and gas sources. The above numbers do not include VOC emissions from biogenic sources as they are not a significant contributor to the emissions in the Basin. This is especially true in the wintertime when high ozone levels are observed.

The Basin is a rural area with a combined population of about 55,000 people who primarily live in three main towns (Duchesne, Roosevelt, and Vernal). The population density is about 6.6 per square mile. Urban areas have historically been the main focus of area designations as the precursor emission sources associated with human, industrial, and motor vehicle activities occur with greater frequency in more populous areas. This is not the case for the Basin, where the economy is driven by energy production associated with the large petroleum resources. There are currently about 11,000 oil and gas wells located in Uintah and Duchesne counties, with approximately 20% of those on state lands, and 80% on the Ute Indian Reservation and Indian Country lands (Utah Division of Oil, Gas and Mining). The activities associated with the development and operation of oil and gas wells are the main source of ozone precursors in the Basin. Population density and traffic/commuting patterns are not relevant factors for the Basin's nonattainment analysis. Figure 20 provides a view of the oil and gas wells located within Duchesne and Uintah counties with the Ute Indian Reservation and Indian lands identified.

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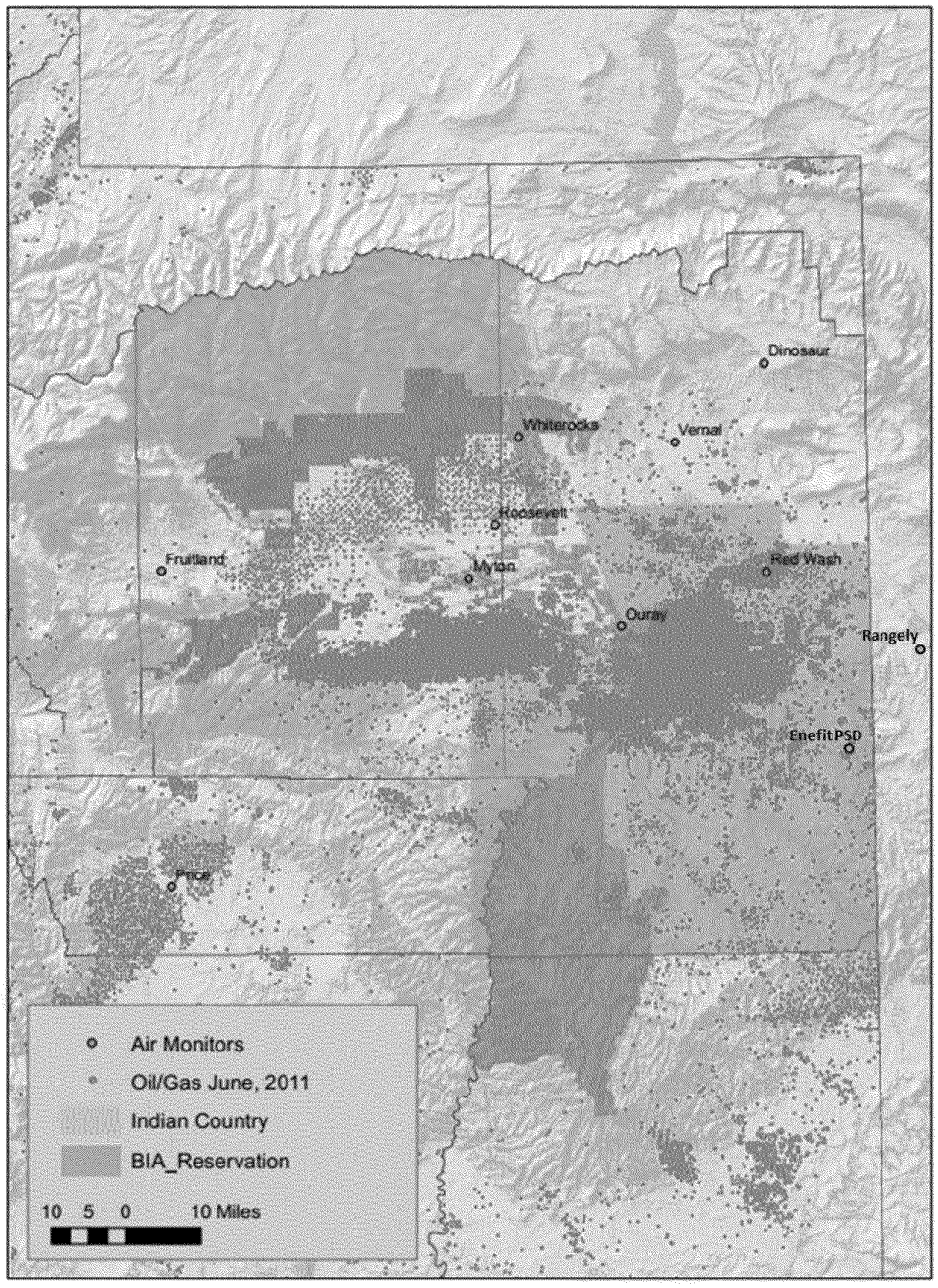

Utah Division of Air Quality January, 2011

Figure 20. Locations of oil and gas wells in Uintah and Duchesne counties.

As part of the on-going study and work the State has implemented in the Basin since the wintertime ozone issue was discovered, it was determined a Basin specific oil and gas emission inventory would be vital to developing air quality management plans and meteorological and photochemical models. In cooperation with the oil and gas producers, an oil and gas emissions

inventory specific to the Basin for 2014 has been collected and is available for study. This inventory requested emission information from all oil and gas producers operating in the Basin on both State and Indian lands and received information for approximately 96% of the registered wells in Uintah and Duchesne counties. Table 6 shows a breakdown of the NOx and VOC emissions by equipment and operations and by county. These emissions are also presented in Figure 21 through Figure 24 below.

Table 6. NOx and VOC emissions by equipment and operations and by county.

2014 Utah O&G EI	NOx (tons/year)		VOC (tons/year)	
Description	Duchesne	Uintah	Duchesne	Uintah
Dehydrators	1.96	4.49	198.93	3,686.32
Fugitives			3,362.78	11,383.67
Pneumatic Controllers			9,004.30	16,058.31
Pneumatic Pumps			305.64	11,049.57
Engines	4,127.68	31,502.35	685.50	1,977.45
Separators & Heaters	1,061.94	1,861.65	58.41	102.39
Tanks	12.33	11.57	4,309.02	8,799.15
Truck Loading			923.39	725.39
Well Completions (Drilling)	405.87	918.96	282.35	639.28
All Sources	**5,609.79**	**34,299.03**	**19,130.31**	**54,421.53**

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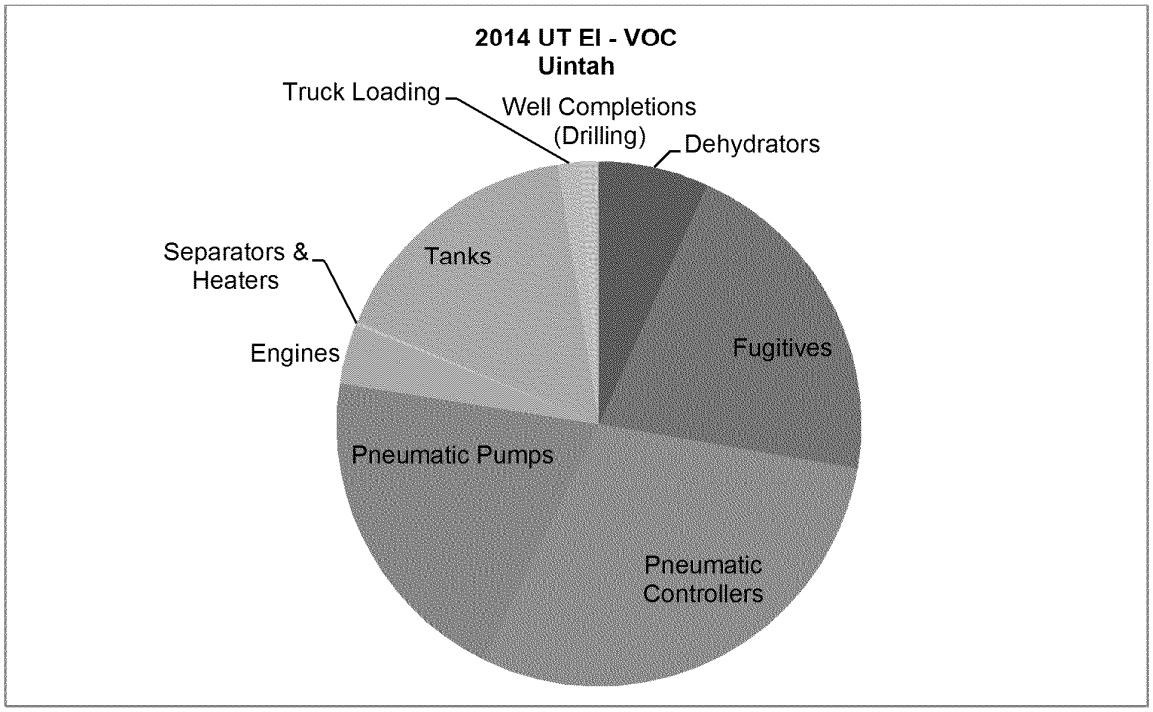

Figure 21. Uintah County VOC emissions from oil and gas production.

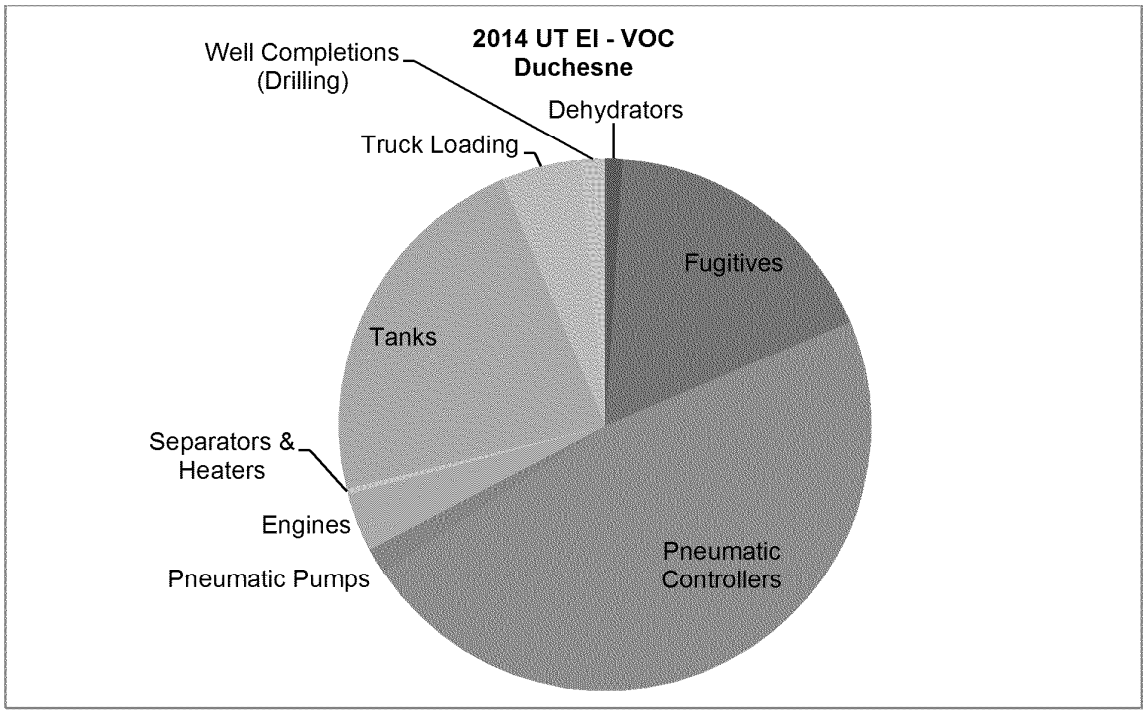

Figure 22. Duchesne County VOC emissions from oil and gas production.

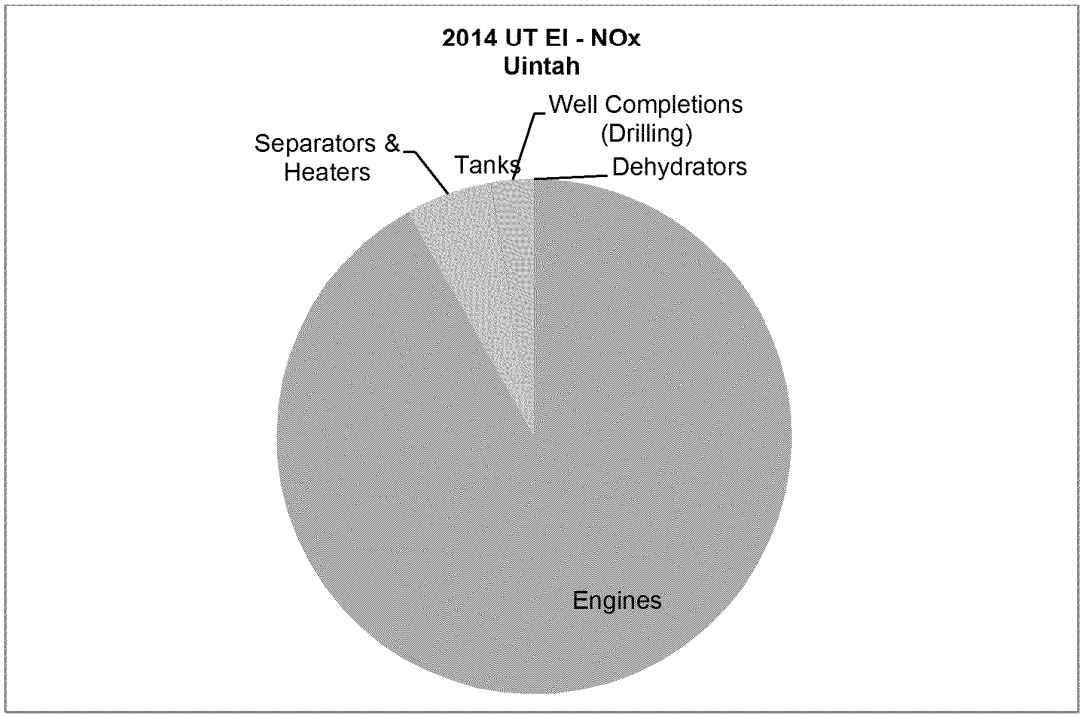

Figure 23. Uintah County NOx emissions from oil and gas production.

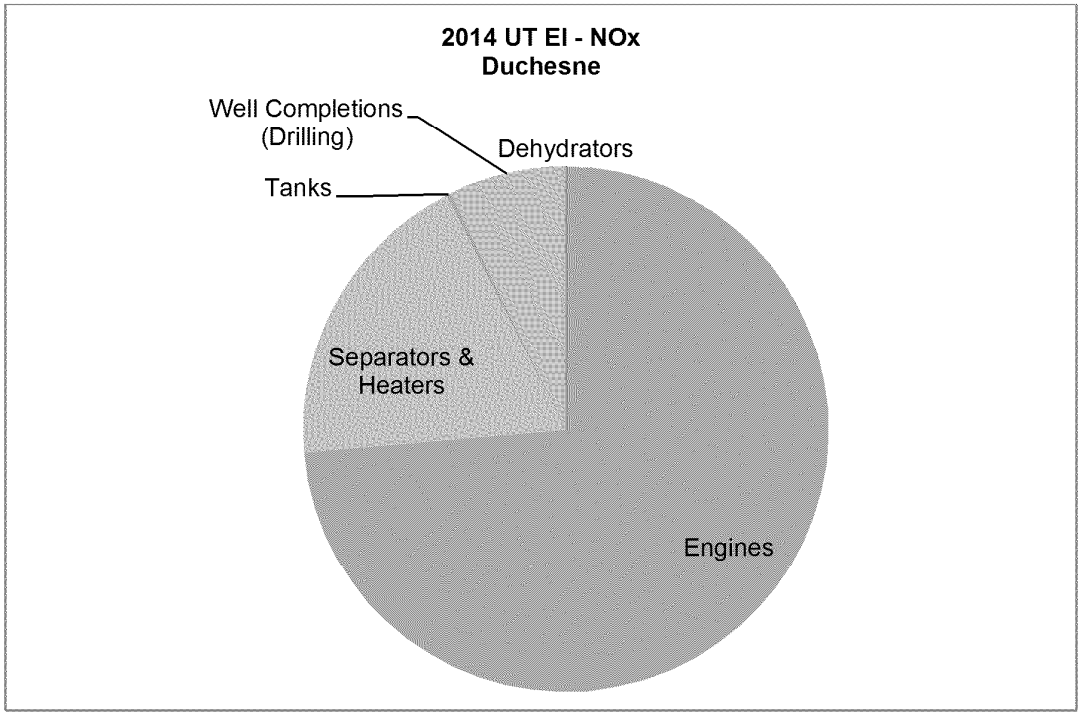

Figure 24. Duchesne County NOx emissions from oil and gas production.

In combination with the 2014 inventories, the UBOS have identified that days of high ozone coincide with elevated levels of methane, VOCs and nitrogen species indicative of the oil and gas industry (UBOS 2013). The chemistry involved in the wintertime ozone events is extremely important to understand so as to develop the most effective emission controls and mitigation efforts. Oxidation of VOCs is a key step in ozone accumulation. While the reactivity of VOCs varies widely, the relative contribution of individual VOC species to ozone formation depends on their abundance as well as their reactivity. Data collected during the winters of 2012 and 2013 in the Basin show that the characteristics of the VOC mixture in the Basin are very different from those found in urban areas. VOCs in the Basin are dominated by relatively unreactive alkanes associated with natural gas exploration and production sources as is the case in other oil and gas producing basins. In contrast, highly reactive alkenes are nearly absent in the Basin, which is in sharp contrast to typical urban VOC mixtures where gasoline powered motor vehicles and other combustion and evaporative sources of alkenes are more common.

With the emission inventory data and evidence provided by the wintertime ozone studies, it can be concluded that oil and gas production and development is the most significant emission source in the Basin. Below is a map (Figure 25) that provides the oil and gas wells located within Duchesne and Uintah counties and the location of wells with the 6,000 foot elevation highlighted.

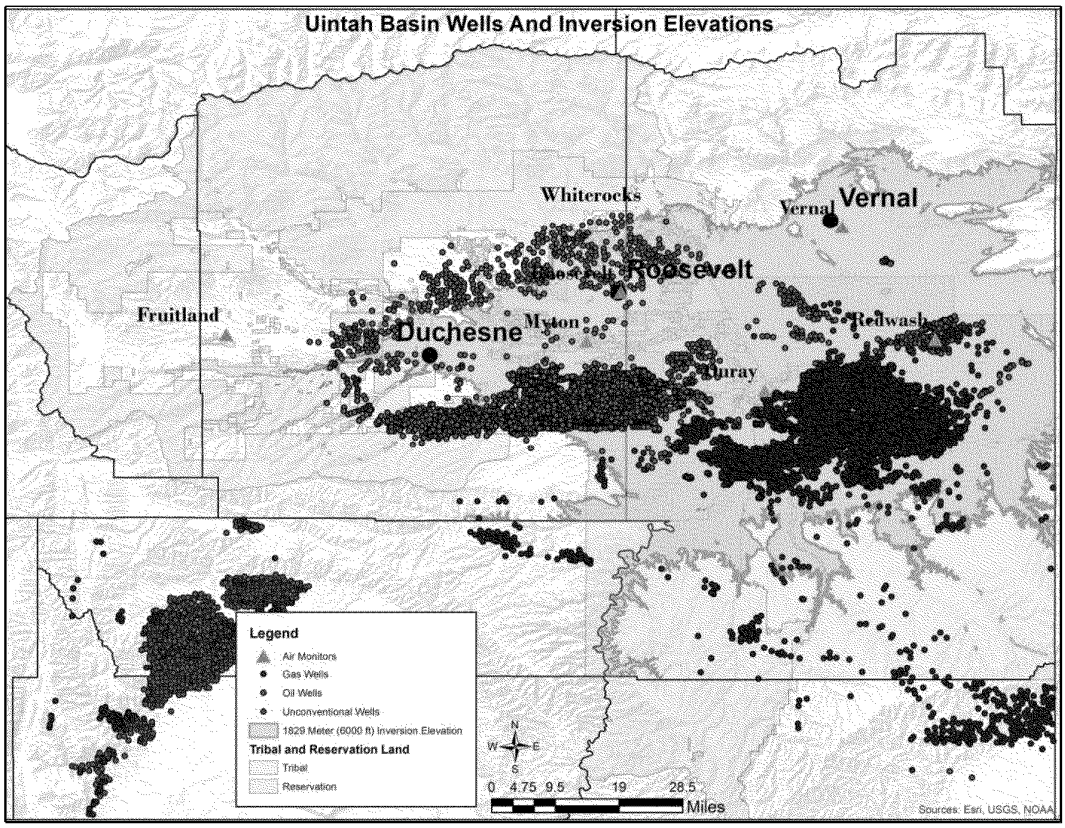

Figure 25. Uintah Basin oil and gas wells with a 6,000-foot elevation.

As we are recommending the use of a maximum elevation boundary for the ozone nonattainment area, we acknowledge that there are gas and oil sources outside of the recommended boundary. However, the wintertime cold temperature inversion that is required for ozone development effectively keeps emissions trapped within the vertical limit of the inversions. These inversion events also do not allow the transport of emissions from outside sources into the Basin during high ozone episodes.[11] This will be discussed in further detail in the meteorology analysis section. Further refinement of the Basin specific inventory is continuing as well as the UBOS study of the chemistry associated with wintertime ozone development.

Meteorology

The quality of air in the Basin is generally good, with the exception of certain episodic periods in the winter months where exceedances of the ozone standard are observed. These occurrences are associated with winter inversion periods with snow cover, light wind conditions, and strong temperature inversions. They are most common in February when the days are beginning to get longer and snow cover is still likely to be present, creating more ultraviolet rays to facilitate the photochemical reaction between NOx and VOCs. Figure 26 below illustrates ozone time series from 2009 through the winter of 2016. This shows the Basin does experience the more standard annual pattern of winter minimums and summer maximums following the availability of sunlight for ozone photolysis; this is fairly consistent each year. However, we see the spikes of high ozone values during winter months, but not consistently. The winters of 2012 and 2015 did not see the spike in ozone and exceedance of the standard. The common denominator for the winters without ozone spikes was the lack of snow on the ground and the absence of cold temperature inversions.

[11] Uinta Basin: 2013 Winter Ozone Study: Final Report. Chapter 8 Tethered Ozonesonde and Surface Ozone Measurements in the Uinta Basin, Winter 2013
http://www.deq.utah.gov/locations/U/uintahbasin/ozone/docs/2014/06Jun/UBOS2013FinalReport/UBOS_2013Sec_8_NOAAsondes.pdf

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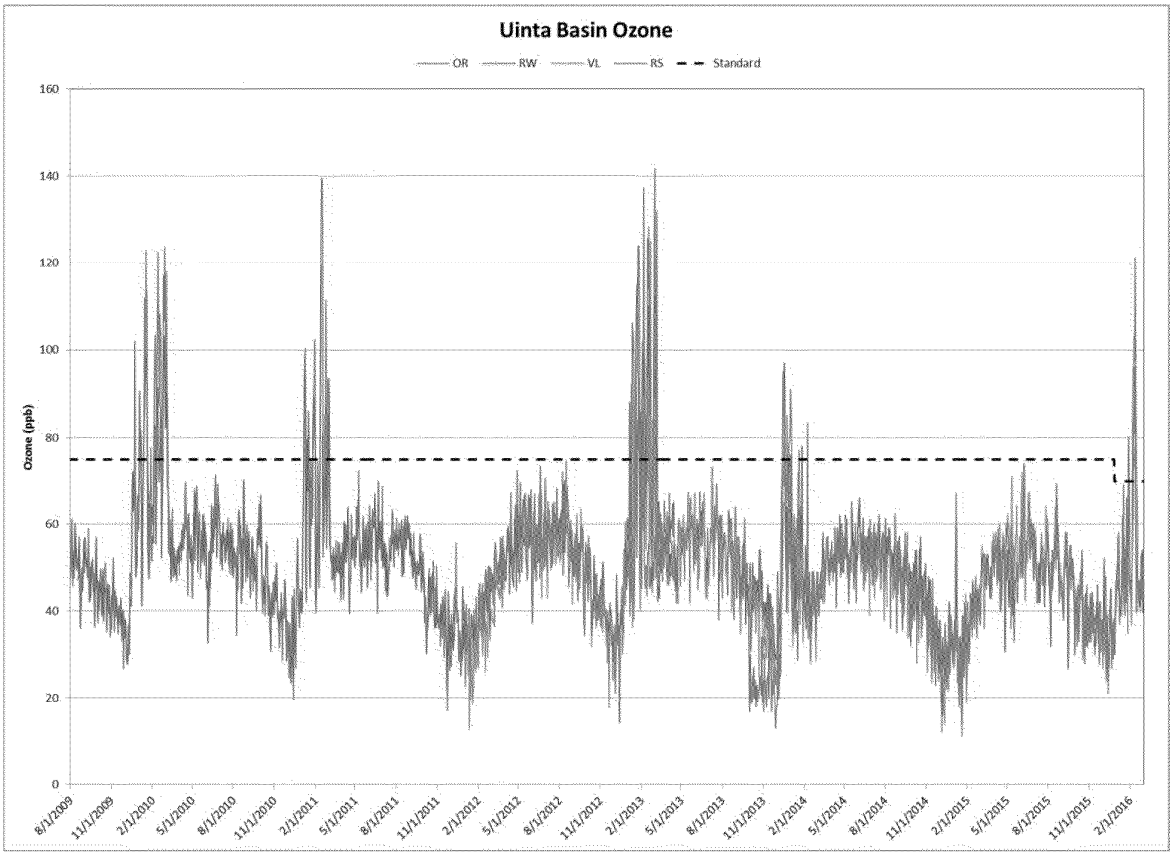

Figure 26. Time series ozone data from the Ouray, Red Wash, Vernal, and Roosevelt monitors.

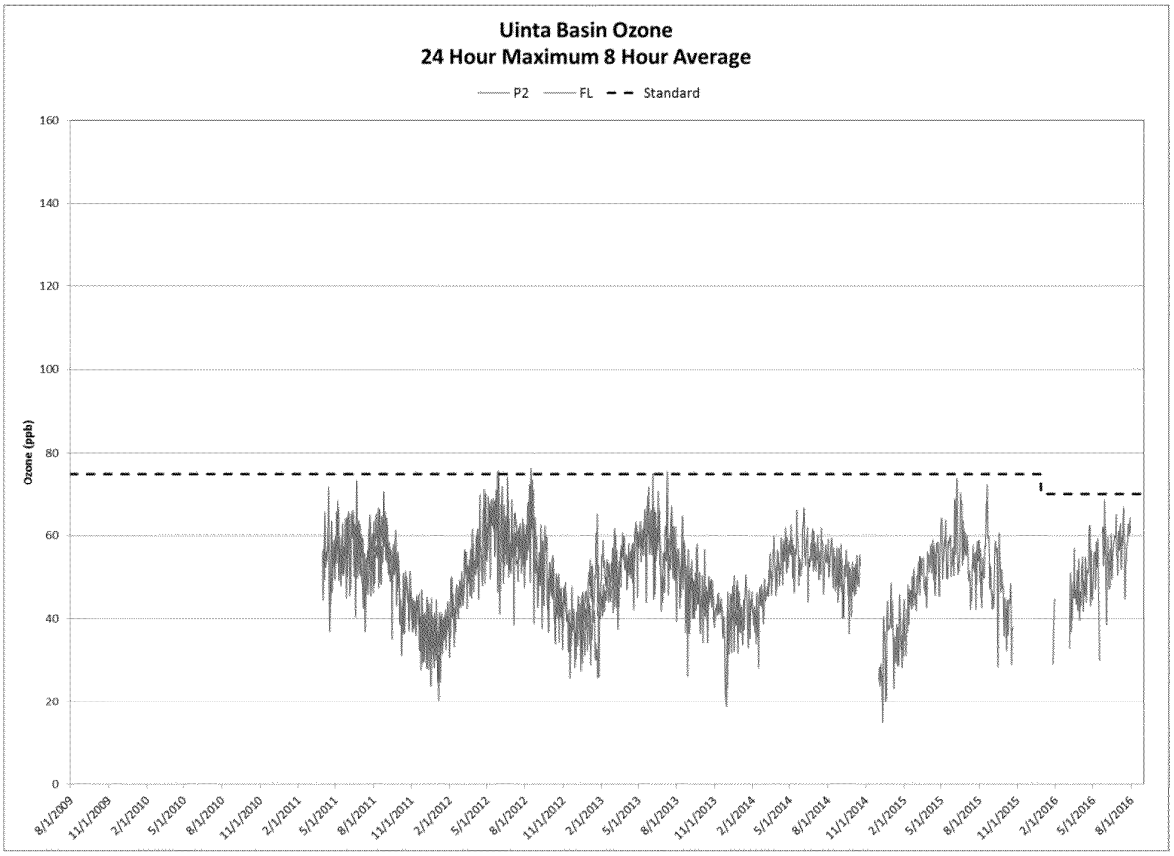

Figure 27. Time series ozone data from the Fruitland and Price monitors.

Figure 27 shows the time series ozone data for the same time period for the Fruitland and Price monitors, which are located on the rim and just outside of the basin respectively. In sharp contrast to Figure 26 for the four monitors located in the central basin below the inversion height, there are no instances of elevated ozone. This is direct evidence that the chemistry leading to elevated ozone values is contained below the 6,000 foot inversion height.

The high levels of ozone observed in the Basin are mainly associated with meteorology rather than changes in precursor emissions. The emissions from the oil and gas industry associated with all phases of production (construction, drilling, completion, production, recompletion, closure) have remained fairly consistent over time. As can be seen in the charts below (Figure 28 and Figure 29), there has been some fluctuation in production, with a downturn in 2015 and the first half of 2016, but it does not correlate with the episodes of ozone exceedances versus the correlation seen with meteorological conditions (Division of Oil, Gas and Mining).

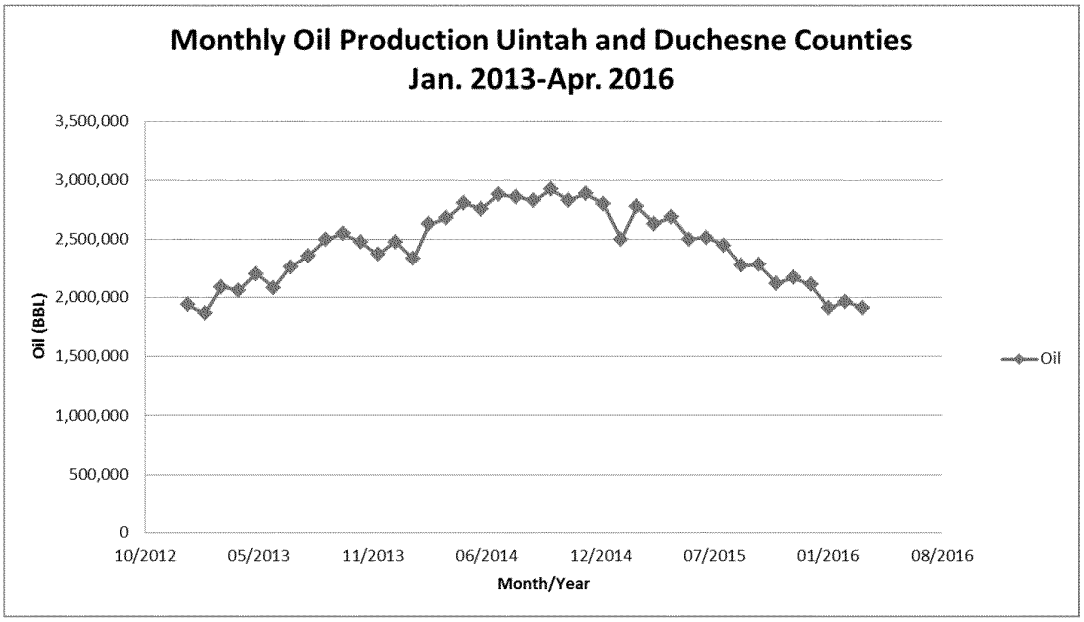

Figure 28. Monthly oil production in Uintah and Duchesne counties.

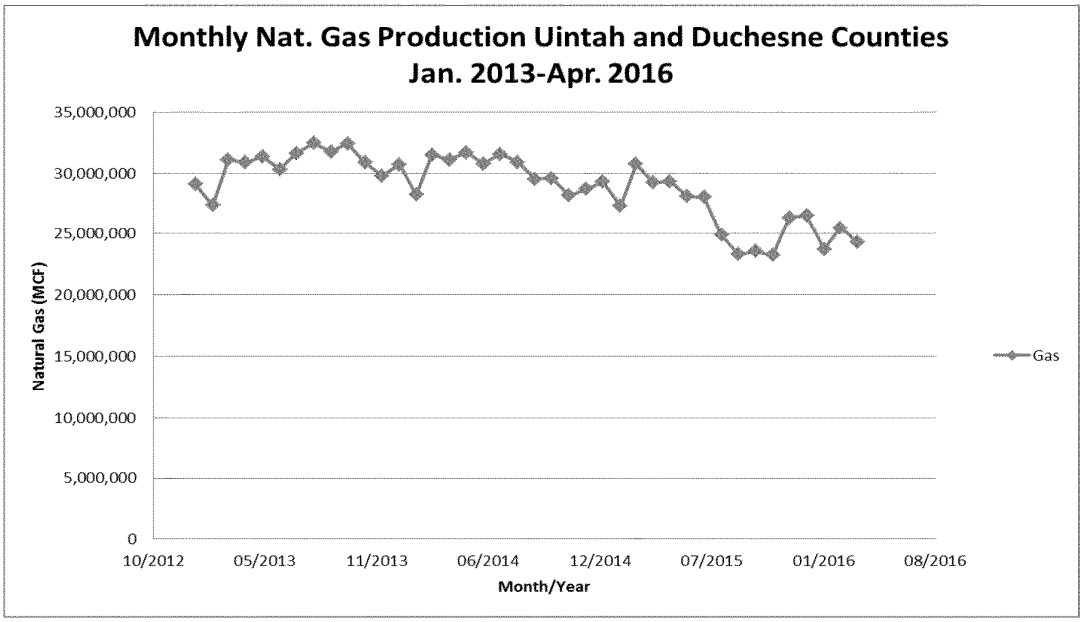

Figure 29. Monthly gas production in Uintah and Duchesne counties.

The meteorology of the wintertime inversion is also the main factor supporting the proposed nonattainment boundary being set at an elevation rather than the use of a jurisdictional boundary.

The UBOS included collecting data on vertical and spatial distribution of wintertime ozone[12,13] (UBOS 2012 and 2013). The studies collected ozone and temperature profiles from the surface to 500 meters above ground level with the use of tethered ozonesondes (ozone measuring devices) being released during high ozone episodes. The study also looked at different elevations through use of ozonesondes on a vehicle driving throughout the Basin during a high ozone event. Also free-flying ozonesondes were released during high ozone events to profile ozone values from the basin floor to 30,000 meters. These studies were performed during a non-ozone event winter (2012) and a high ozone event winter (2013). The 2013 study provides very compelling data that indicates there is no influence from ozone transport or sources outside the inversion layer.

Data from a drive around the basin during the February 6, 2013, ozone event is presented in Figure 30 below for surface ozone concentrations plotted against elevation above sea level over time. From this figure it can be seen that ozone concentrations were in the 75 ppb range when leaving Vernal, rising to 115 ppb then decreasing to 90 ppb at Red Wash (point 3) as the elevation of the road was high enough (1,720 m) that the van was beginning to poke through the top of the inversion layer. When the elevation of the road decreased, ozone concentrations increased to 120 ppb near Fantasy Canyon (point 5) and Horsepool (point 6). At Point 7, near the Ouray EPA site, surface ozone was 140 ppb. Driving up the south rim of the basin, ozone began to decrease at 1,650 m as the van ascended through the base of the inversion layer, decreasing to background ozone concentration of 50 ppb at 2,000 m. The pattern was repeated in reverse on the descent. High ozone beneath the inversion and background concentrations above the inversion layer were consistently observed in the tethered ozonesondes and aircraft data collected.

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[12] 2012 Uinta Basin Winter Ozone & Air Quality Study: Final Report. Chapter 5 Tethered Ozonesonde Measurements in the Uinta Basin, http://www.deq.utah.gov/locations/U/uintahbasin/ozone/docs/2014/03Mar/ubos_2011-12_final_report.pdf

[13] Uinta Basin: 2013 Winter Ozone Study: Final Report. Chapter 8 Tethered Ozonesonde and Surface Ozone Measurements in the Uinta Basin, Winter 2013 http://www.deq.utah.gov/locations/U/uintahbasin/ozone/docs/2014/06Jun/UBOS2013FinalReport/UBOS_2013Sec_8_NOAAsondes.pdf

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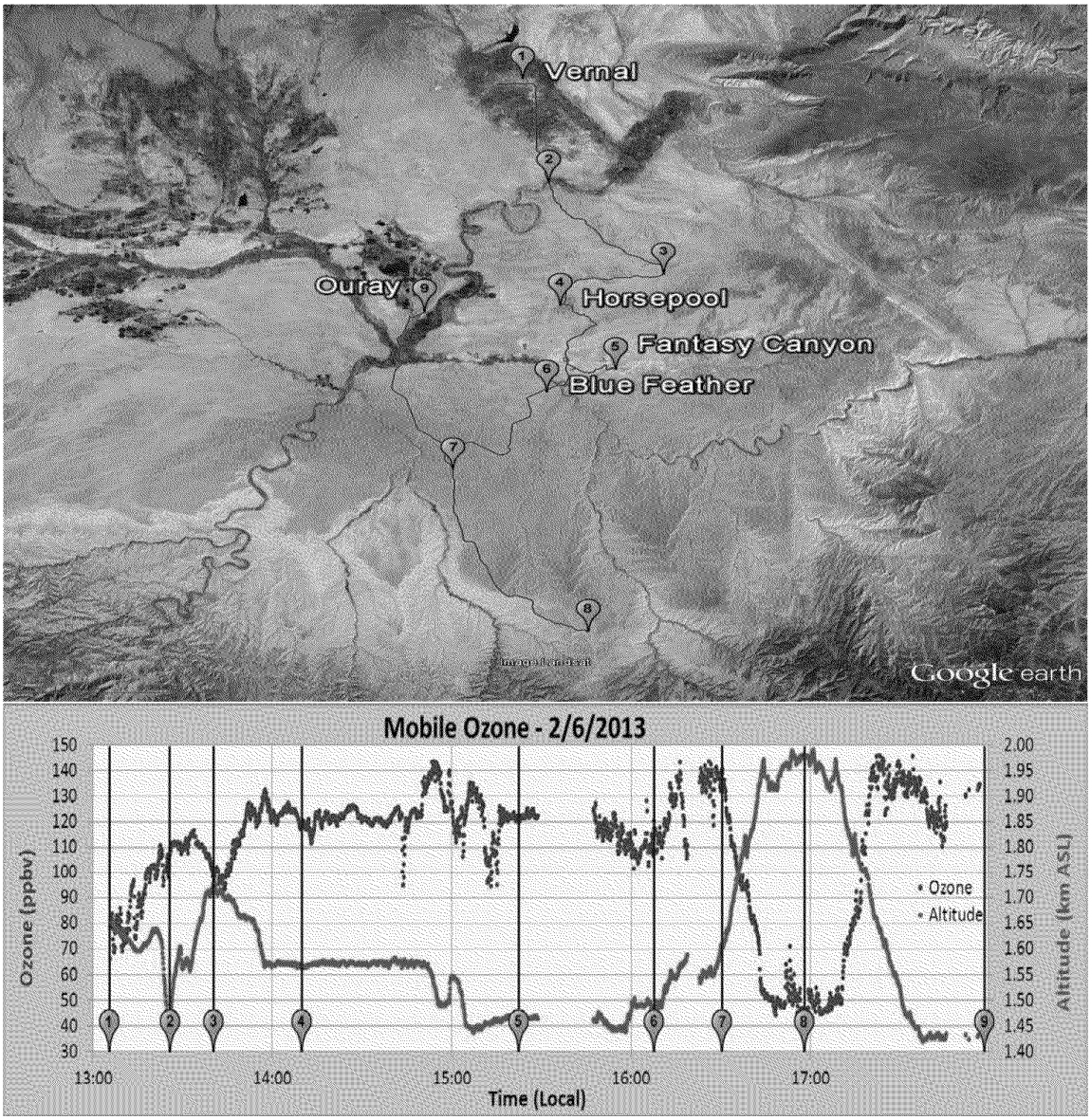

Figure 30. Surface ozone data from a drive around the basin during the February 6 ozone event plotted against elevation above sea level over time.

The conclusion of the study is that during high ozone events, the air in the Basin below 1,650-1,700m is isolated from the rest of the atmosphere and emissions at the surface are trapped in this shallow layer. There is some horizontal and vertical transport within the basin with light winds, described as 'sloshing' within the inversion.

The reasoning for use of elevation as a nonattainment boundary is supported by the characteristics of a winter inversion. The wintertime photochemical ozone production in the Basin requires snow on the ground, a shallow boundary layer, stagnation and a persistent temperature inversion capping the shallow ozone production layer. The snow helps to keep the

surface cold, reinforcing the production and maintenance of the temperature inversion. Snow also reflects daytime solar radiation that enhances photochemical ozone production. The inversion layer traps the emissions from the wells, pipelines, and compressor stations in a shallow layer where the rapid photochemical ozone production occurs. Outside of the inversion, normal background ozone levels are observed that are not above the 0.070 ppm standard.

The EPA ozone designation guidance memorandum discusses the use of the HYSPLIT modeling system for the meteorological analysis of potential source- receptor relationships in areas during high ozone events using wind speed and direction data. This is to try and model trajectories of air towards a violating monitor, called back trajectories. The HYSPLIT model does not accurately demonstrate the relationship between source and monitor for the Basin. The high ozone events are created by the development of a strong temperature inversion that effectively traps air in the Basin containing locally produced precursor emissions and effectively keeping out any possible emissions from outside the inversion. Initial attempts at modeling meteorological conditions during these high ozone episodes in the Basin indicate that obtaining accurate results with current modeling techniques will be very challenging. The information gained from utilizing the HYSPLIT model does not accurately reflect the real conditions occurring. Work has been initiated through a cooperative effort involving the DAQ, EPA, BLM, University of Utah, Utah State University and others to develop a multi-layer, grid-based photochemical model specific to the Basin. Additional data collection and model development and testing will be required to produce a good working model suitable for evaluating alternative regulatory strategies.

Geography and Topography

The Basin and Mountains are located in the northeast corner of the state and are part of a larger physiographic area known as the Colorado Plateau Province. The Uinta Mountains (the Uintas) are 150 miles long and thirty miles wide, and are oriented in an east-west direction. The Uintas contain some of the highest mountain peaks in the State, Kings Peak being the highest at 13,520 feet. The Basin lies south of the Uintas. The southern rim of the basin is formed by the Tavaputs Plateau of the Book Cliffs, and the western rim is formed by the Wasatch Mountains. The basin is 5,000 to 10,000 feet (1,500 to 3,000 meters) above sea level and corresponding to this depression is a broad east-west strip of higher plateau that rises sharply above the country to the south. On the south side of the plateau, the descent of 3,000 feet (900 meters), to the general level of eastern Utah on the south, is made in two steps. The first is the Roan Cliffs, and the second is the Book Cliffs. Eastward in Colorado, the two lines of cliffs are not very distinguished. The average annual precipitation for the Basin is less than 8.5 inches; nevertheless, the basin is well watered. The Strawberry River drains the eastern slope of the Wasatch Mountains. The south flank of the Uintas is drained by Current Creek, the Duchesne River, Lake Creek, the Uinta River, Ashley Creek, and Big and Little Brush creeks. The southern portion of the Basin contains fewer streams that carry much less water than those of the northern portion. The Green River slices through the Uintas at Split Mountain and flows through the Basin in a southwesterly direction. Below Ouray, the Green River is joined by the Duchesne River the flows from the east, and the White River that flows from the west.

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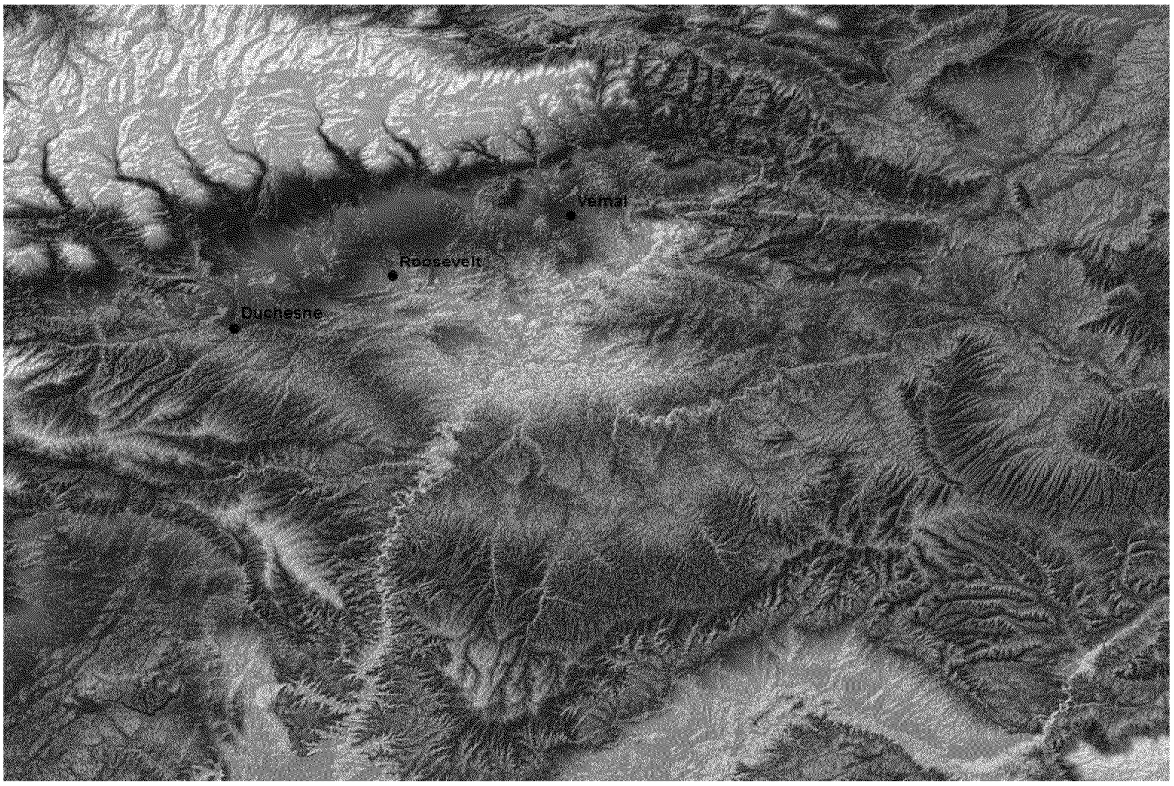

Figure 31. Uinta Basin topography.

As can be seen in Figure 31, the western side of the basin is surrounded by the higher elevations of the Uinta Mountains, Wasatch Mountains, and Book Cliffs. There is a gradual tapering of elevation towards the eastern edge of the Basin towards the Colorado state line. The terrain of the Basin has an impact on the local meteorology (wind speed, wind direction and atmospheric stability). In such mountain-valley areas, during the night, cold air moves down into the valley (downslope winds), then during the day, warmer air will flow up valley sides (upslope winds). This creates a cold pool of air at night that is denser than warm air, thus inhibiting the mixing of air. Because wind speed will be lower at the valley floor than in open plains, the terrain surrounding the Basin cuts off potential air that might normally flow through the valley. This is then compounded when a high pressure system sets in, starting the formation of a temperature inversion. The day and night varying patterns of light winds have the potential to produce gradual intra-basin transport of ozone and precursors, but combined with the temperature inversion not strong enough to move out of the Basin. This lack of movement allows the buildup of precursor emissions and eventually ozone such that the standard is exceeded.

The combined meteorology and geography of the Basin provide the strongest basis for the use of an elevation boundary for nonattainment. Any emissions from sources outside of the inversion layer that is created in the Basin do not influence or contribute to the ozone event occurring within the inversion.

Jurisdictional Boundaries

The Basin is primarily located within Duchesne and Uintah counties. As was discussed in the air quality data analyses section, there is a state run air monitor located in each county. However, only the Roosevelt monitor located in Duchesne County has the required three years of certified data to support a designation decision. The DV of the Roosevelt monitor for 2013-2015 is calculated to be 0.075 ppm and exceeds the 2015 ozone standard. Preliminary data for the 2014-2016 three year timeframe that will be utilized by EPA indicates a DV of 0.068 ppm and is below the 2015 ozone standard.

As explained above, the Vernal monitor in Uintah County was relocated in January of 2015, thus does not have the required three years of certified data for this analysis, nor will it when the EPA makes its final designation decision in October of 2017. Though its data is not certified, the Vernal monitor does provide supporting evidence indicating that the air quality has exceeded the 2015 ozone standard. The new location experienced a fourth highest maximum value of 0.073 ppm during the winter of 2016. The previous Vernal monitor location does have certified data from years 2012-2014 and would have had a potential DV of 0.076 ppm for those years, which would have exceeded the 2008 ozone standard in place for that time period of 0.075 ppm.

This air quality monitoring data would indicate that Duchesne and Uintah counties should be proposed as nonattainment based upon jurisdictional county boundaries. However, the Basin does not follow the more standard summertime ozone issue associated with areas of high population, major industries, and high local and interstate vehicular traffic. These two counties are very rural areas with low population density and low vehicle traffic.[14] The high ozone events are driven by the unique geography and meteorology of the Basin combined with emission sources of ozone precursors from the oil and gas industry. Thus, use of county lines alone does not accurately reflect the origination and extent of the elevated ozone values. The high wintertime ozone events are built within the geographical boundaries of the Basin. The portions of the Duchesne and Uintah counties not located in the Basin are not affected by the high ozone events nor do they contribute to them. As previously discussed, a 6,000 foot elevation within the Basin will define the extent of the intense wintertime inversions and bound the ozone impact.

As there is not a legal definition for the Basin to establish boundaries, it was determined to use townships and ranges and county lines combined with the maximum 6,000 foot elevation to frame the ozone nonattainment area. When the townships were overlaid on the 6,000 foot elevation line, several townships were included that had minimal contact with the elevation line. It was determined to remove those townships that had less than 10% of their area within the 6,000 foot elevation. Figure 32 provides a map of the townships to be included in the recommended nonattainment area.

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[14] United States Census Bureau, Quick Facts found at http://www.census.gov/quickfacts/table/PST045215/49047,00

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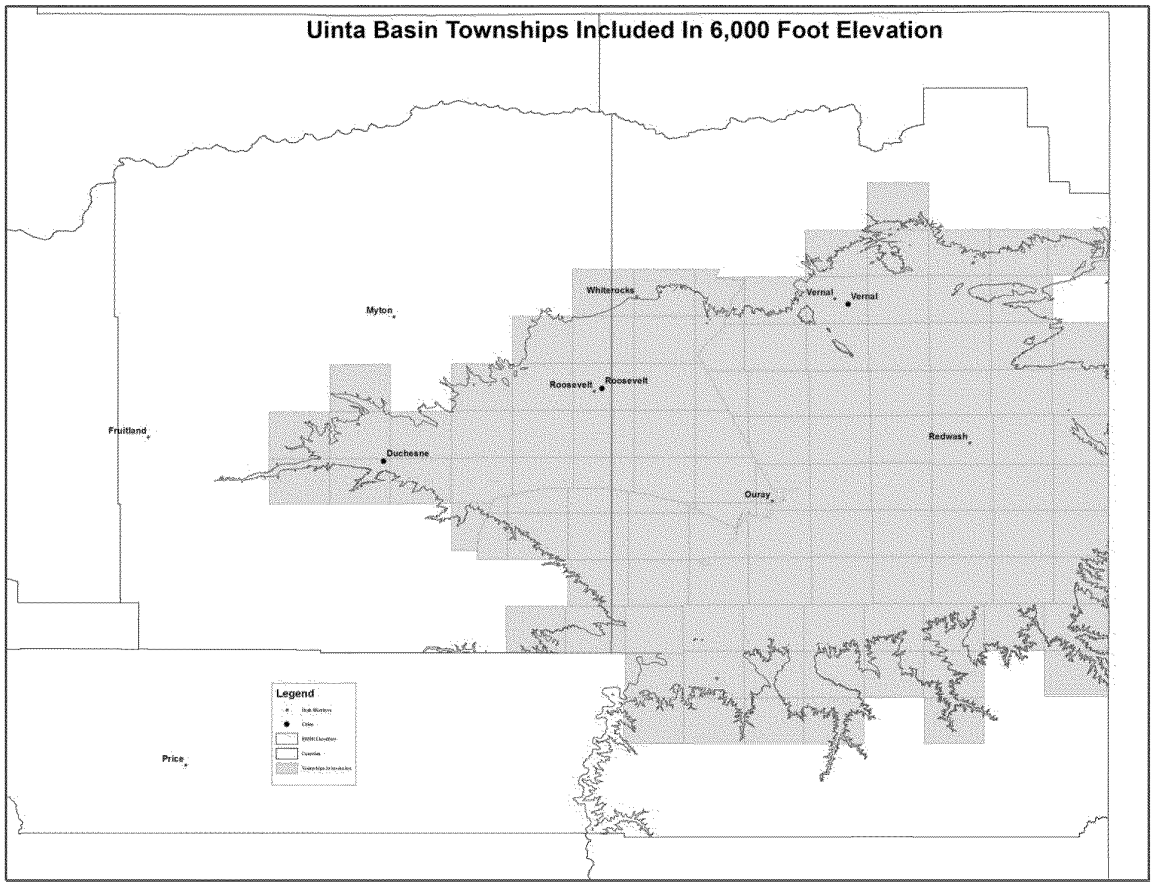

Figure 32. Uinta Basin Townships.

Uintah County is bounded to the east by the Colorado State line, which in essence coincides with the eastern most boundary of the geographic terrain that created the Basin. However, the proposed nonattainment boundary of an elevation of 6,000 feet above sea level along the mountains bounding the Basin does extend across the Colorado state line. There is a certified regulated monitor (operated by the Bureau of Land Management) located east of the Basin in Colorado identified as the Rangely monitor. There is elevated terrain between the eastern ridge of the Basin and the Rangely monitor. The Rangely monitor has not experienced an ozone exceedance since the wintertime inversion of 2013. The monitor did not measure an exceedance of the 2015 ozone standard during the wintertime inversion of 2016 where several exceedances were recorded in the Basin from Utah state monitors and Tribal monitors. There are small emission sources in the area of the Rangely monitor that are mostly associated with the oil and gas industry. Colorado has some of the strongest oil and gas regulations in the nation, as well as a comprehensive enforcement program that has had positive impacts on the air quality in the region. It would not benefit ozone attainment efforts in Utah to extend the elevation boundary into Colorado, as that area does not impact the air quality within the proposed nonattainment boundary. Thus, the eastern extent of the proposed nonattainment area is bounded by the Utah/Colorado state line.

The Basin has very complex jurisdictional boundaries. The counties are covered by the Uintah and Ouray Indian Reservations and Indian Country, which creates a complicated regulatory landscape for compliance with the Act requirements. Approximately two-thirds of currently producing oil and gas wells, three quarters of the gas production, and half of the oil production in the Basin, is located in Indian Country where, under 42 U.S. Code §7601 (d)(2), the tribes and the EPA have regulatory authority for air quality purposes. Utah has jurisdictional responsibility for the lands outside of Indian Country, where approximately 90% of the population is located. As there are distinct and separate regulatory authorities within the Basin, the recommendation for nonattainment provided by the State of Utah does not include reservation or Indian country lands.

Summary

The February 25, 2015, area designation guidance memorandum issued by EPA recommends that the presumptive boundary for designation begins with counties in the Core Based Statistical Areas (CSBA) or the CSA where a violating monitor is located. The Basin is primarily located in the Duchesne and Uinta counties which are not part of a CSBA or CSA. EPA then recommends that states evaluate relevant information associated with the county that contains the violating monitor and use a weight-of-evidence analysis for five factors. The five factors to be analyzed are air quality data, emissions and emissions-related data, meteorological data, geography/topography, and jurisdictional boundaries.

For the years 2013-2015, four regulatory monitors located within Duchesne and Uintah counties exceeded the 2015 ozone standard of 0.070 ppm. These four monitors are located within the geographical/topological boundaries of the Basin. Of the four monitors, one is located on and managed by the State of Utah and three are located on and managed by the Ute Indian Tribe. The ozone exceedances are associated with very specific meteorological conditions during winter temperature inversions when the ground is covered by snow with very light low-level winds and sunshine. These events are further bounded by the topographical influence of being located within a basin created by mountains on the north, west and south. Studies conducted during these strong wintertime inversions have determined that there is a vertical boundary to the inversion that traps ozone and ozone precursors within the limits of the inversion. It has been demonstrated that that ozone does not migrate outside of the vertical limit of the inversion nor are precursor emissions able to transport into the inversion. This vertical limit to the high ozone and the chemistry that forms high ozone was observed at 1,700 meters (5,577 feet) during one of the strongest winter inversions studied and experienced the highest ozone values recorded (UBOS 2013). To provide a level of conservatism, the State recommends an elevation of 6,000 feet above sea level as the upper boundary to the proposed nonattainment area. The February 25, 2015, designation guidance memorandum states that though EPA generally believes in the inclusion of the entire violating or contributing county in an ozone nonattainment area, they recognize that the assessment of relevant information may support the inclusion of only part of a county. The guidance also explains that there may be low elevation areas with poor air quality in violation of the NAAQS, yet the higher elevation mountainous areas in the same county can be shown not to have emission sources that contribute to the violation. That is the case for the Basin and this is documented via the UBOS.

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The Basin is a very rural area, with a population density of about 6 people per square mile[15]; therefore, the factors of population density, traffic and commuting patterns and growth rates are not significant contributors to ozone precursor emissions. The emissions of ozone precursors are primarily from the oil and gas industry that drives the economy of the Basin. Approximately 95% of VOCs, which the UBOS has shown to be the limiting precursor to ozone formation in the Basin, come from oil and gas production (WRAP 2011 EI). Though some of the oil and gas emission sources can be found outside of the proposed nonattainment area, again it has been shown through scientific studies that during the high ozone events, ozone does not migrate out nor do emissions break through into the inversion. The air masses above and below the inversion height are essentially decoupled and thus sources outside of the proposed elevation do not contribute to the high ozone values measured within the Basin.

The jurisdictional boundaries of Duchesne and Uintah counties very closely follow the natural boundary created by the surrounding mountains on the south, west and north and closely match the upper elevation boundary of 6,000 feet. Therefore, the county jurisdictional boundaries in the southern part of Uinta Basin become a reasonable boundary for the proposed nonattainment area. To the east, with the declining elevation of mountains the topographical boundaries are less dramatic; yet, there are still scattered buttes and mountains that closely coincide with the Utah and Colorado state line that the state line makes a reasonable boundary for nonattainment.

The proposed nonattainment area for the Basin encompasses the one state monitor that has violated the ozone standard for years 2013-2015 (but currently meets the standard for the DVs years of 2014-2016) and the sources most likely contributing to ozone formation with the emissions of ozone precursors. It also represents the conclusions from several years of intense study that has established the relationship of high ozone occurrences to specific meteorological events combined with topographical constraints where ozone and its precursors are trapped within a defined inversion that is so strong that precursor emissions and ozone can transport neither in nor out.

State Recommendation for the Uinta Basin

The State of Utah is recommending the establishment of a nonattainment area for the 2015 ozone standard in the counties of Duchesne and Uintah, for lands under state air jurisdiction, and a maximum elevation limit based on the temperature inversion height. The nonattainment area proposed would be at and below the 6,000 foot elevation in the southern slopes of the Uinta Mountains in the north, the eastern slopes of the Wasatch Range in the west and the northern slopes of the Tavaputs Plateau and Book Cliffs in the south. To provide legally defined boundaries, townships and ranges were overlaid onto the 6,000 foot elevation line to encompass the Basin. The townships that are at least 10% or more within the elevation line are included in the proposed nonattainment area. Therefore the proposed **Uinta Basin** nonattainment area, as shown in Figure 33, includes the areas within the following townships in Duchesne and Uintah

[15] United States Census Bureau, Quick Facts found at http://www.census.gov/quickfacts/table/PST045215/49047,00

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County that are not under EPA or tribal jurisdiction for air quality purposes under 42 U.S.C §7601(d)(2)[16]:

- Duchesne County – Salt Lake Meridian:
  - Township 10 South Range 17 East
  - Township 11 South Range 16 East
  - Township 11 South Range 17 East
  - Township 8 South Range 15 East,
  - Township 8 South Range 16 East
  - Township 9 South Range 15 East
  - Township 9 South Range 16 East
- Duchesne County – Uintah Meridian:
  - Township 4 South Range 1 West
  - Township 1 North Range 1 West
  - Township 1 South Range 1 West
  - Township 1 South Range 2 West
  - Township 2 South Range 1 West
  - Township 2 South Range 2 West
  - Township 2 South Range 3 West
  - Township 2 South Range 5 West
  - Township 3 South Range 1 West
  - Township 3 South Range 2 West
  - Township 3 South Range 3 West
  - Township 3 South Range 4 West
  - Township 3 South Range 5 West
  - Township 3 South Range 6 West
  - Township 4 South Range 2 West
  - Township 4 South Range 3 West
  - Township 4 South Range 4 West
  - Township 4 South Range 5 West
  - Township 4 South Range 6 West
  - Township 5 South Range 3 West
- Uintah County – Salt Lake Meridian:
  - Township 10 South Range 25 East
  - Township 11 South Range 25 East
  - Township 12 South Range 25 East
  - Township 2 South Range 22 East
  - Township 3 South Range 21 East
  - Township 3 South Range 22 East
  - Township 3 South Range 23 East
  - Township 3 South Range 24 East

[16] The map used to define portions of Duchesne and Uintah counties under EPA or tribal jurisdiction originated with EPA Region VIII.

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- Township 3 South Range 25 East
- Township 4 South Range 19 East
- Township 4 South Range 20 East
- Township 4 South Range 21 East
- Township 4 South Range 22 East
- Township 4 South Range 23 East
- Township 4 South Range 24 East
- Township 5 South Range 19 East
- Township 5 South Range 20 East
- Township 5 South Range 21 East
- Township 5 South Range 22 East
- Township 5 South Range 23 East
- Township 5 South Range 24 East
- Township 5 South Range 25 East
- Township 6 South Range 19 East
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- Township 6 South Range 22 East
- Township 6 South Range 23 East
- Township 6 South Range 24 East
- Township 6 South Range 25 East
- Township 7 South Range 19 East
- Township 7 South Range 20 East
- Township 7 South Range 23 East
- Township 7 South Range 24 East
- Township 7 South Range 25 East
- Township 8 South Range 17 East
- Township 8 South Range 18 East
- Township 8 South Range 25 East
- Township 9 South Range 19 East
- Township 9 South Range 25 East

- Uintah County – Uintah Meridian:
  - Township 1 North Range 1 East
  - Township 1 North Range 1 West
  - Township 1 North Range 2 East
  - Township 1 South Range 1 East
  - Township 1 South Range 1 West
  - Township 1 South Range 2 East
  - Township 2 South Range 1 East
  - Township 2 South Range 1 West
  - Township 2 South Range 2 East
  - Township 3 South Range 1 East
  - Township 3 South Range 1 West
  - Township 3 South Range 2 East
  - Township 4 South Range 1 East
  - Township 4 South Range 1 West

- Township 4 South Range 2 East
- Township 4 South Range 3 East
- Township 5 South Range 2 East
- Township 5 South Range 3 East

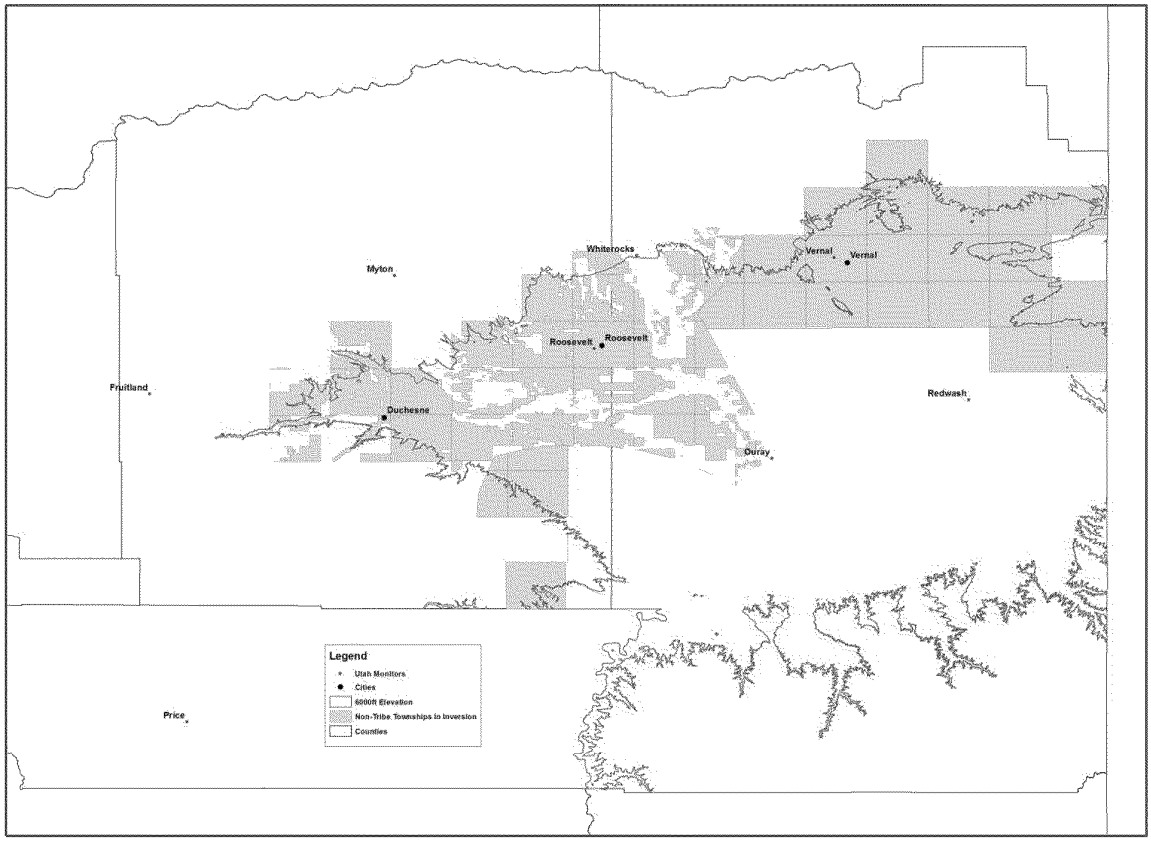

Figure 33. Recommended Uinta Basin Ozone Nonattainment Area.

State Recommendation for other Areas of Utah

Based on monitored DVs, Utah recommends that the following counties be designated attainment: Box Elder, Cache, Carbon, Garfield, San Juan, and Washington. All other areas of the State of Utah not included in the above recommendations should be designated attainment/unclassifiable.

To: cara.keslar@wyo.gov[cara.keslar@wyo.gov]
From: Payton, Richard
Sent: Fri 4/7/2017 5:12:58 PM
Subject: FW: EE presentation to AAPCA Monitoring Committee April 12
2017 Spring AAPCA_ExEvents_Final for AAPCA.pptx
SE Smoke Summit III_ExEventsSMP_2017_04_to share.pptx

Hi Cara:

I won't be able to present on the monitoring committee call on Wednesday, but I am forwarding two presentations that may serve.

The first was presented by Rhea Jones of OAQPS at the Spring AAPCA Executive Committee meeting last week, giving a general overview. The second is being presented by Ruben Casso next Tuesday at the Southeast States Smoke Summit III. It specifically addresses exceptional events and smoke management programs.

If the southeast states have specific questions on the fires from last fall, they should contact Region 4. My understanding in talking with Darren Palmer there is that he has already been working with several Region 4 states on those fires, and gave a presentation evaluating the impacted data at a Region 4 monitoring conference last month.

Give me a call if you want to discuss further (I tried your office and cell phones, but did not leave a message since I needed to send this one anyway).

Richard Payton

EPA Region 8 Air Quality Monitoring
(303) 312-6439

From: Cara Keslar [mailto:cara.keslar@wyo.gov]
Sent: Wednesday, April 05, 2017 6:32 AM
To: Payton, Richard <Payton.Richard@epa.gov>
Subject: EE presentation

Hi Richard,

I am a co-chair of the AAPCA Monitoring Committee. We were wondering if you might be able to deliver a short presentation outlining the EE Rule on our call on April 12? I figured EPA may have a brief 15 min canned presentation that you could deliver and answer general questions. The southeastern states especially are wanting an overview. after the fires this fall. If you can't make time to present, could you point me to a presentation about the Rule?

I am out at the Pond Study today, but will be back in the office tomorrow afternoon and Friday.

Thanks,

Cara

Cara Keslar

Monitoring Section Supervisor

Wyoming DEQ - Air Quality Division

(307) 777-8684 (office)

(307) 286-2383 (cell)

cara.keslar@wyo.gov

E-Mail to and from me, in connection with the transaction of public business, is subject to the Wyoming Public Records Act and may be disclosed to third parties.

To: jkarmazyn@utah.gov[jkarmazyn@utah.gov]
Cc: Rickard, Joshua[Rickard.Joshua@epa.gov]
From: Payton, Richard
Sent: Fri 3/17/2017 4:08:55 PM
Subject: Smithfield EE Flags from August 2015
AMP360 All Cache data flags PM2.5 Aug 2015.pdf

Joel:

I got your voice mail regarding the wildfire demonstration for Logan and Smithfield 2015 data. You specifically mentioned the Smithfield data. Sorry it has taken me a while to get back to you.

There are a couple of issues with the 2015 smoke data in August. First, none of the Cache County data in AQS has any exceptional events flags (Logan or Smithfield, FRM or FEM). For the exceedance days in August, however, both the Logan and the Smithfield FRM data have the "1" flag, defined as "Deviation from a CFR/Critical Criteria Requirement". Under most circumstances, data needing the "1" flag should usually be invalidated and replaced with an appropriate null code. Our guidance on the use of "1" (https://www3.epa.gov/ttnamti1/files/ambient/pm25/datamang/regions.pdf says:

1. Deviation from a CFR requirement- Data collected did not or may not meet all of the critical criteria for sampling and analysis as specified in CFR and the Validation Template critical criteria table (Table 1). As stated in the Validation Template: *"Criteria that were deemed critical to maintaining the integrity of a sample or group of samples were placed in the Critical Criteria Table (see Table 1). Observations that do not meet each and every criterion on the Critical Criteria Table should be invalidated unless there are compelling reason and justification for not doing so. Basically, the sample or group of samples for which one or more of these criteria are not met is invalid until proven otherwise."* The State/local may use this flag when it is unclear of the effect of the deviation on data quality. This flag should be rarely used, but there may be instances where other QA/QC information tend to validate the sample or changes/updates to the critical criteria table may allow utilization of the data for some purposes.

Flags would be placed only on data for which the State/local was uncertain of its quality, not on data it considers to be invalid, which should not be entered.

These flags were developed very early in the PM2.5 program, when agencies were first learning

how to meet the CFR requirements of the PM2.5 method, and the EPA is currently discussing removing the "1" flag from AQS now that the program is mature.

Before we could consider reviewing the demonstrations for smoke in August 2015, exceptional event flags would need to be on the data in AQS, and we would need to know why the "1" flag was applied, and how Utah validated the data despite failing to meet CFR or critical criteria.

Next, in the 2016 exceptional event rule, the EPA established that flagged data would have to impact determinations of attainment or violation by the EPA. The rule identified five types of EPA actions for which exceptional event considerations are appropriate. Those are:

(A) An action to designate an area, pursuant to Clean Air Act section 107(d)(1), or redesignate an area, pursuant to Clean Air Act section 107(d)(3), for a particular national ambient air quality standard;

(B) The assignment or re-assignment of a classification category to a nonattainment area where such classification is based on a comparison of pollutant design values, calculated according to the specific data handling procedures in 40 CFR part 50 for each national ambient air quality standard, to the level of the relevant national ambient air quality standard;

(C) A determination regarding whether a nonattainment area has attained the level of the appropriate national ambient air quality standard by its specified deadline;

(D) A determination that an area has data for the specific NAAQS, which qualify the area for an attainment date extension under the CAA provisions for the applicable pollutant;

(E) A determination under Clean Air Act section 110(k)(5), if based on an area violating a national ambient air quality standard, that the state implementation plan is inadequate under the requirements of Clean Air Act section 110; and

(F) Other actions on a case-by-case basis as determined by the Administrator.

For Smithfield in particular, no data was collected in January 2015, so the 1st quarter of 2015 is only 57% complete, and due to invalid data, 2nd Q is 66% complete. In general, incomplete data can only be used to calculate a violating design value, not a valid attaining design value. It is unknown yet if the 2015-2017 design value will violate, as only January FRM data is in AQS for 2017 (January and February FEM data is in AQS). As of now, the 98th percentile (including August data) for 2015 is 32.7, the 98th for 2016 combining FRM and FEM data is 34.4, and the 8th max combining Jan FRM and Feb FEM for 2017 is 37. The current 2015-2017 DV appears to be something like 34.7, and since that is attaining, it is invalid and can't be used. Conceivably, either the FRM will have higher February data than the FEM currently has in AQS, or, there could be exceedances in December that would result in a violation; that violating design value would then be valid, but, what rulemaking are you anticipating that would use that 2015-2017 violating DV? Since you are already nonattainment, and we have already bumped the area up to serious nonattainment, I am not aware of a future rulemaking that would use a violating 2015-2017 design value. In this scenario, concurring on EE flags for 2015 might reduce the 2015 98th from 32.7 to the 9th max of 22.6, and that in turn could move the 2015-2017 from a hypothetical valid violating DV to a possible attaining but invalid DV after EE concurrence, but again, what rulemaking will depend on that data and DV status change?

Think about the above, and we can talk. I have attached an AMP360 report that shows all the QA and other flags on PM2.5 data in Cache County for August 2015 (with no EE flags found).

Thanks,

Richard

To: minnieg@utetribe.com[minnieg@utetribe.com]
Cc: Olson, Kyle[Olson.Kyle@epa.gov]
From: Payton, Richard
Sent: Thur 6/8/2017 4:19:24 PM
Subject: Exceptional Event Request Approval
5-7-17 Signed by Sarah Dunham ltr to The Honorable Shaun Chapoose.pdf
OAR-17-000-9373 Enclosure to Response Letter.pdf

Minnie:

Attached are the letter approving your exceptional event request for ozone data on June 8 and 9, 2015, signed by Sarah Dunham, Acting Assistant Administrator for the EPA Office of Air and Radiation, and the technical support document EPA headquarters prepared to summarize the decision.

EPA headquarters would like us to ask for permission from the Ute Indian Tribe to post the demonstration for this event that you submitted last year, as well as our response letter, on our national Exceptional Events web page (https://www.epa.gov/air-quality-analysis/exceptional-events-submissions-table) as an example of how to demonstrate a stratospheric intrusion. If you would not mind us posting the information, please let me know, and I will get back to the headquarters folks.

Thanks very much,

Richard Payton

EPA Region 8 Air Quality Monitoring

(303) 312-6439

To: Sheila Vance[svance@utah.gov]; Ostendorf, Jody[ostendorf.jody@epa.gov]
From: Payton, Richard
Sent: Thur 11/3/2016 4:30:06 PM
Subject: RE: Exceptional Event

Yours was the only public comment received.

We will now need to review and concur or non-concur on the request. Since I was the principal author, I will be getting peer review of the demonstration from OAQPS and (probably) one other regional office (normally, we handle the review in-house for Region 8 EE requests, with the option of OAQPS support for unusual circumstances). We will be making the determination on the request in time to inform our response to your and the tribes NAA recommendations. That response is due to you no later than June 2, 2017.

Richard Payton

EPA Region 8 Air Quality Monitoring

(303) 312-6439

From: Sheila Vance [mailto:svance@utah.gov]
Sent: Thursday, November 03, 2016 10:25 AM
To: Ostendorf, Jody <ostendorf.jody@epa.gov>; Payton, Richard <Payton.Richard@epa.gov>
Subject: Exceptional Event

Jody or Richard - as I am a bit new still to this, just wondering what happens now with the exceptional event submitted by the Tribe for the June 8-9, 2015 event? Is there a formal approval or denial process? I assume there were no public comments? Just curious what happens next! Thanks!

Sheila

Sheila Vance | Environmental Scientist

Phone: 801.536.4001

195 North 1950 West, Salt Lake City, UT 84116

Website | Blog | Twitter | Facebook

To: gregory.harshfield@state.co.us[gregory.harshfield@state.co.us]; cindy.wike@state.co.us[cindy.wike@state.co.us]
Cc: Gordon Pierce[gordon.pierce@state.co.us]
From: Payton, Richard
Sent: Wed 4/19/2017 7:26:15 PM
Subject: FW: URGENT ACTION – Invalidation of Ozone data in AQS due to QC issues
Ozone 1-point data quality evaluation_V9_4_12_17.docx
Ozone_data_invalidations_2013_2016 Colorado.xlsx

Hi folks. This is a follow-up message to the one I sent last week about ozone monitors with some "failing" QC check data (QC check errors greater than 7%) with associated raw data in AQS (rather than null codes). Your situation is different from that assumed in this e-mail from OAQPS and the attached memo: in general, OAQPS assumed the raw data is invalid and needs to be nulled in AQS; in your case, you have nightly span or other checks you used to validate some of the data between bi-weekly manual QC checks. Your solution is to at least delete the failing QC check for which raw data has already been nulled, and optionally, enter "bookend" QC data around the nulled data to show that the remaining data are all valid.

I have edited the OAQPS provided spreadsheet (originally a 50 state assessment) to show only the Colorado data. The spreadsheet shows both your data, as well as S. Ute, NPS, CASTNET, and USFS data; I have separated the data so yours is first, followed by a blank line, and then the other agencies' data. We don't expect you to do anything about the other agency data, but I thought you should know about the QC check status of those other networks in Colorado.

I think this will be a topic on tomorrow's NACAA Monitoring Call.

Please let me know if you have questions.

Richard

-----Original Message-----
From: Weinstock, Lewis
Sent: Thursday, April 13, 2017 6:44 AM
To: Judge, Robert <Judge.Robert@epa.gov>; Khan, Mazeeda <Khan.Mazeeda@epa.gov>; Chow, Alice <chow.alice@epa.gov>; Rinck, Todd <Rinck.Todd@epa.gov>; Compher, Michael <compher.michael@epa.gov>; Verhalen, Frances <verhalen.frances@epa.gov>; Davis, Michael <Davis.Michael@epa.gov>; Fallon, Gail <fallon.gail@epa.gov>; Flagg, MichaelA <Flagg.MichaelA@epa.gov>; Hall, Chris <Hall.Christopher@epa.gov>
Cc: Payton, Richard <Payton.Richard@epa.gov>; Brown, Ethan <Brown.Ethan@epa.gov>; Papp, Michael <Papp.Michael@epa.gov>; Wells, Benjamin <Wells.Benjamin@epa.gov>; Naess, Liz <Naess.Liz@epa.gov>; Rice, Joann <Rice.Joann@epa.gov>
Subject: URGENT ACTION – Invalidation of Ozone data in AQS due to QC issues
Importance: High

Good morning:

As you all are aware by now, we have recently identified ambient ozone data in AQS that was reported during periods of time when 1-point QC checks were outside the critical criteria in the QA Handbook and contained in approved monitoring organization QAPP's. We are currently in the middle of the ozone designations process and it is important that we maintain the integrity of that process. It is critical that we base our designations decisions on defensible data for areas both attaining and not attaining the standard. To this end, we believe that the data identified as outside these critical criteria be null coded in AQS so that the underlying design values supporting the designations process are based on valid data. We understand that there is limited time to complete this work due to the tight timelines for designations. Therefore, this process has been divided into two phases as explained below:

Phase 1:
These are high priority monitors whose 2014-2016 design value would change or become incomplete due to the data invalidations. Attached to this message is an Excel table that explicitly lists the monitors and periods of time for when ozone data should be null coded (coded as Phase 1). We ask that you communicate with the affected monitoring organizations to ensure that these data are invalidated in AQS no later than May 1, 2017 (we will be doing our design value pull from AQS on the morning of May 2). Luckily this first phase only affects about 80 monitors, as some states have already begun invalidating their data.

Phase 2:
The list of the remaining monitors that will have similar data invalidation actions are coded as Phase 2 in the Excel table. These monitors have a less immediate impact on designations so are being included in the Phase 2 action. We recognize that this phase affects a larger number of monitors, therefore we are providing more time to invalidate this data. Please work with your monitoring organizations to complete this exercise by August 1, 2017.

Additional details on the Excel table: The attachment contains three tabs: (1) Data Invalidations – which contains specific information for the data invalidation, (2) 2014-2016 Design Values – design values before and after ("a" added to column heading) data invalidations, and (3) Failed QC Checks – details on the actual QC checks.

For additional background information on this quality assurance issue, please refer to the attached memo entitled "Ozone 1-point QC Check Data Quality Evaluation and Next Steps".

We will be checking in periodically during our monthly conference calls to answer any questions and assess progress on this action. Thank you for your prompt attention to this matter.

Lewis Weinstock (Ambient Air Monitoring Group and Liz Naess (Air Quality Analysis Group)

Air Quality Assessment Division - Mail Code C304-06 | Office of Air Quality Planning & Standards | U.S. Environmental Protection Agency | Research Triangle Park, NC 27711 |

To: gregory.harshfield@state.co.us[gregory.harshfield@state.co.us]; gordon.pierce@state.co.us[gordon.pierce@state.co.us]
From: Payton, Richard
Sent: Wed 11/2/2016 2:20:37 PM
Subject: demonstrations for 2016 ozone EE flags

Gordon and Greg:

I spoke with Beth Palma of OAQPS on your question about 2016 ozone flags, and we are in agreement in our interpretation of the reg language and our intent.

40 CFR 50.14(c)(2)(vi) says

"Table 2 to §50.14 identifies the submission process for data that will or may influence the initial designation of areas for any new or revised national ambient air quality standard."

If your 2016 ozone flags influence the initial designation (change from NAAQS violation to NAAQS attainment, change DV in a way that would change the marginal/moderate classification, or impact the boundary of a non-attainment area) then the demonstration is due May 31. If, on the other hand, the flags would not impact those initial designation decisions, the schedule of 50 CFR 50.14(c)(3) applies:

"Submission of demonstrations. (i) Except as provided under paragraph (c)(2)(vi) of this section, a State that has flagged data as being due to an exceptional event and is requesting exclusion of the affected measurement data shall, after notice and opportunity for public comment, submit a demonstration to justify data exclusion to the Administrator according to the schedule established under paragraph (c)(2)(i)(B)."

40 CFR 50.14(c)(2)(i)(B) in turn says:

"For data that may affect an anticipated regulatory determination or where circumstances otherwise compel the Administrator to prioritize the resulting demonstration, the Administrator shall respond to a State's Initial Notification of Potential Exceptional Event with a due date for demonstration submittal that considers the nature of the event and the anticipated timing of the associated regulatory decision;"

We still intend to develop "alternate paths" guidance, which would deal with situation like exceptional events impacting modeling baseline design values used for SIP modeling of future attainment, but, if instead we decide that that case is covered by 50.14, we would develop a due date later that was in time to support the SIP modeled attainment demonstration. So, for now, you can flag 2016 at your convenience, and wait until later to see if a demonstration is needed.

Let me know if you have questions or further concerns.

Richard Payton

EPA Region 8 Air Quality Monitoring

(303) 312-6439

To: Tonnesen, Gail[Tonnesen.Gail@epa.gov]; Brad Pierce - NOAA Federal[brad.pierce@noaa.gov]
Cc: Sheryl Fontaine[sfontaine@ndep.nv.gov]; Bohnenkamp, Carol[Bohnenkamp.Carol@epa.gov]; Kay, Rynda[Kay.Rynda@epa.gov]
From: Payton, Richard
Sent: Tue 10/18/2016 6:23:14 PM
Subject: RE: November Stratospheric Intrusion Work Group call for Oct 18th

November 8, election day, is an all-day workshop for exceptional events in Denver; Nov. 29 is a similar workshop in Dallas. Those might be conflicts for many EPA, State and local monitoring folks interested in exceptional events.

Richard

From: Tonnesen, Gail
Sent: Tuesday, October 18, 2016 12:21 PM
To: Brad Pierce - NOAA Federal <brad.pierce@noaa.gov>
Cc: Sheryl Fontaine <sfontaine@ndep.nv.gov>; Bohnenkamp, Carol <Bohnenkamp.Carol@epa.gov>; Kay, Rynda <Kay.Rynda@epa.gov>; Payton, Richard <Payton.Richard@epa.gov>
Subject: RE: November Stratospheric Intrusion Work Group call for Oct 18th

Hi Brad - we can do a different Tuesday in November, or delay this meeting until the 3rd Tuesday in December. Do you want to suggest a Tuesday 10 am MT date that works for you and Sheryl?

thanks,

Gail

From: Brad Pierce - NOAA Federal [mailto:brad.pierce@noaa.gov]
Sent: Tuesday, October 18, 2016 11:27 AM
To: Tonnesen, Gail <Tonnesen.Gail@epa.gov>
Cc: Sheryl Fontaine <sfontaine@ndep.nv.gov>; Bohnenkamp, Carol <Bohnenkamp.Carol@epa.gov>; Kay, Rynda <Kay.Rynda@epa.gov>; Payton, Richard <Payton.Richard@epa.gov>
Subject: Re: November Stratospheric Intrusion Work Group call for Oct 18th

Gail,

Unfortunately, I will be on travel on Nov 15, and not able to dial in. Maybe we can discuss this case at a later date.

Sorry,

Brad

On Tue, Oct 18, 2016 at 11:46 AM, Tonnesen, Gail <Tonnesen.Gail@epa.gov> wrote:

Hi Brad,

Thanks for offering to do this presentation, and I'll put it on the Agenda for the Nov 15 call. Also, I wanted to note that EPA encourages the states to submit EE demonstrations only for events that affect the regulatory status, and if this event does not affect the attainment status it might not be necessary to submit a demonstration (EPA Region 9 staff are cc'd and can provide advice on this). However, even if NV does not submit an EE demonstration, this will still be an interesting case to share with the SI group for illustrating technical analysis methods, so I like to go ahead with the presentation for the November call.

Thanks,
Gail
303-312-6113

-----Original Message-----
From: Sheryl Fontaine [mailto:sfontaine@ndep.nv.gov]
Sent: Tuesday, October 18, 2016 10:38 AM
To: Brad Pierce - NOAA Federal <brad.pierce@noaa.gov>; Tonnesen, Gail <Tonnesen.Gail@epa.gov>
Subject: RE: cancelling Stratospheric Intrusion Work Group call for Oct 18th

Hi Brad and Gail,

Thank you for the email and for thinking of us. I apologize for the delay in my response, we're traveling this week (to Great Basin, actually), and have limited email access.

We would be more than happy to participate in the call, and we would really appreciate input from the group, but please understand that we are very new to this. We're definitely learning (slowly!) as we go, and would definitely benefit from some help.

Thanks again and we look forward to hearing from you.

Sheryl

_____
From: Brad Pierce - NOAA Federal [brad.pierce@noaa.gov]
Sent: Tuesday, October 18, 2016 6:18 AM
To: Tonnesen, Gail
Cc: Sheryl Fontaine
Subject: Re: cancelling Stratospheric Intrusion Work Group call for Oct 18th

Gail,

Maybe for next month we can discuss the June 2015 Great Basin event that Sheryl (cc'd) and I have been analyzing (attached).

Hate to see this working group lose momentum.

Brad

On Tue, Oct 18, 2016 at 8:10 AM, Tonnesen, Gail <Tonnesen.Gail@epa.gov<mailto:Tonnesen.Gail@epa.gov>> wrote:
All,

I don't have any agenda items so I'm cancelling the October 18th Stratospheric Intrusion Workgroup call. I don't expect much activity on this topic until spring when intrusions are more likely to occur, so we might not have any additional calls until spring 2017. But if please let me know If you have suggestions for topics before then.

Thanks,
Gail

==========
Gail Tonnesen, Ph.D.
EPA Region 8 - Air Program
1595 Wynkoop St.
Denver, CO 80202
303-312-6113<tel:303-312-6113>

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R. Bradley Pierce

NOAA/NESDIS
Center for SaTellite Applications and Research (STAR) Advanced Satellite Products

Branch (ASPB)
1225 West Dayton Street
Madison, WI 53706

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R. Bradley Pierce

NOAA/NESDISCenter for SaTellite Applications and Research (STAR) Advanced Satellite Products Branch (ASPB)1225 West Dayton StreetMadison, WI 53706

To: cara.keslar@wyo.gov[cara.keslar@wyo.gov]; Gordon Pierce[Gordon.Pierce@dphe.state.co.us]; Joel Karmazyn[jkarmazyn@utah.gov]; Brad Schultz[brad.schultz@state.sd.us]; chyatt@nd.gov[chyatt@nd.gov]
From: Payton, Richard
Sent: Mon 9/19/2016 7:59:16 PM
Subject: FW: Webinar: Final Revisions to the Exceptional Events Rule and Announcement of Availability of Final Exceptional Events Implementation Guidance for Wildfire Events

For distribution to Regions, State, Local and Tribal Air Agencies, communities, industry, environmental groups, and the general public:

Webinar: **Final Revisions to the Exceptional Events Rule and Announcement of Availability of Final Exceptional Events Implementation Guidance for Wildfire Events**
Date: Wednesday, September 21, 2016
Time: 2:00 – 3:30 PM Eastern Time
Intended Audience: Regions, State, Local, and Tribal Air Agencies, communities, industry, environmental groups, and the general public
Link to Join Webinar: https://epawebconferencing.acms.com/e-events

Description: On September 16, 2016, the EPA finalized revisions to the 2007 Exceptional Events Rule to address issues raised by stakeholders since finalizing the 2007 rule and to increase the administrative efficiency of the Exceptional Events Rule process. This action also provides notice to States with areas subject to newly issued mitigation requirements and announces the availability of the final version of the non-binding guidance document, *Guidance on the Preparation of Exceptional Events Demonstrations for Wildfire Events that May Influence Ozone Concentrations*, which explains how to apply the rule revisions to wildfire events that could influence monitored ozone concentrations. The EPA will host an informational webinar to summarize the key elements of the final rule revisions and the final exceptional events implementation guidance for wildfire/ozone events. For more information or to download a copy of this final rule and guidance, go to the EPA's Exceptional Events website at https://www.epa.gov/air-quality-analysis/treatment-data-influenced-exceptional-events.

Logistics: You will listen to the audio via your computer. We highly recommend running a connect test on your system before logging into the webinar to ensure that the proper add-ins are enabled and the audio is working properly: http://admin.adobeconnect.com/common/help/en/support/meeting_test.htm.

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EXCEPTIONAL EVENTS AND SMOKE MANAGEMENT PROGRAMS

Ruben Casso
Air Quality Policy Division
OAQPS, U.S. EPA
April 11, 2017

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Exceptional Events

- On September 16, 2016, the EPA finalized the **2016 Revisions to the Exceptional Events Rule**, which address issues raised by stakeholders and increase the administrative efficiency of the rule process
  - https://www.epa.gov/air-quality-analysis/treatment-data-influenced-exceptional-events
  - Rule effective date was September 30, 2016
  - Published in Federal Register on October 3, 2016 (81 FR 68216)
  - NRDC/Sierra Club filed a Petition for Review on December 2, 2016 (petitioners' brief due 5/17/17, EPA response due 8/17/17)

- General Exceptional Events Rule Background
  - Establishes procedures and criteria for identifying and evaluating air quality monitoring data affected by exceptional events
  - Provides a mechanism by which air quality data can be excluded from regulatory decisions and actions
  - Applies to all criteria pollutants and NAAQS and all event types to which the rule applies
  - Applies to all state air agencies, to (delegated) local air agencies, to tribal air agencies that operate air quality monitors that produce regulatory data and to federal land managers/federal agencies if agreed by the state
  - Affects design value calculations, NAAQS designation decisions, attainment determinations, and State / Tribal / Federal Implementation Plan (SIP/FIP/TIP) development

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Exceptional Events Rule Revisions

- Clarify the types of determinations and actions to which the authorizing statutory authority in Clean Air Act (CAA) section 319(b) applies
- Return to the core statutory elements of CAA section 319(b)
  - The event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation (as supported by a comparison of the claimed event-influenced concentration(s) to concentrations at the same monitoring site at other times)
  - The event was not reasonably controllable and the event was not reasonably preventable
  - The event was a human activity that is unlikely to recur at a particular location or was a natural event
- Clarify "not reasonably controllable or preventable" criteria
- Clarify high wind elements currently addressed in guidance
- Codify requirements for the content and organization of exceptional events submittals
- Remove "general schedule" deadlines for data flagging and demonstration submittal

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Exceptional Events Rule Revisions

- New fire-related rule language and preamble text (more on following slides)
- Mitigation Regulatory Requirements
- Other provisions
  - Address who may submit a demonstration
  - Event aggregation
  - Identified in preamble intended timelines for EPA response

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Exceptional Events Rule Revisions

- Fire-related rule language and preamble text
  - Define fire-related terms in regulatory language
    - Wildland means an area in which human activity and development are essentially non-existent, except for roads, railroads, power lines, and similar transportation facilities. Structures, if any, are widely scattered.
    - Prescribed Fire is any fire intentionally ignited by management actions in accordance with applicable laws, policies, and regulations to meet specific land or resource management objectives.
    - Wildfire is any fire started by an unplanned ignition caused by lightning; volcanoes; other acts of nature; unauthorized activity; or accidental, human-caused actions, or a prescribed fire that has developed into a wildfire. A wildfire that predominantly occurs on wildland is a natural event.
  - Clarify that all wildfires on wildland are natural events
  - Clarify that prescribed fire on wildland is a human-caused event eligible for treatment as an exceptional event

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Exceptional Events Rule Revisions

- Provisions for prescribed fires
  - Language in the preamble recognizes the need for and benefits of prescribed fire
  - Applying rule criteria to prescribed fire
    - *Clear causal relationship* – analyses similar to those for wildfires (see guidance)
    - *Human activity unlikely to recur* – recurrence is either the natural fire return interval OR the fire frequency needed to establish, restore and/or maintain a sustainable and resilient wildland ecosystem (as documented in a land/resource management plan)
    - *Not reasonably preventable* – incorporates concept of "foregone benefits" and uses same approach as unlikely to recur
    - *Not reasonably controllable* – fire conducted under a certified and implemented Smoke Management Program or using basic smoke management practices

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Exceptional Events Rule Revisions

- Recommended Smoke Management Program (SMP) elements (rule preamble)
  - *Authorization to Burn* – process for granting approval to manage Rx fire (could include burn permits)
  - *Minimizing Air Pollutant Emissions* – either follow appropriate emission reduction techniques or consider/evaluate alternatives to fire
  - *Smoke Management Components of Burn Plans* – identifies components if SMP includes burn plans (i.e., actions to minimize fire emissions, approaches to evaluate smoke dispersion, public notification and exposure reduction procedures, and air quality monitoring)
  - *Public Education and Awareness* – criteria for issuing health advisories and procedures for notification
  - *Surveillance and Enforcement* – procedures to ensure compliance with terms of SMP
  - *Program Evaluation* – provides for periodic review of SMP effectiveness and program revision
- SMPs must be state-certified
  - "Certified" – responsible official "certifies" in a letter to the EPA Administrator or Regional Administrator
  - SMPs in SIPs are certified

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Exceptional Events Rule Revisions

Basic Smoke Management Practices (Table 1 in rule)

Basic Smoke Management Practice[b]	Benefit achieved with the BSMP	When the BSMP is Applied – Before/During/After the Burn
Evaluate Smoke Dispersion Conditions	Minimize smoke impacts	Before, During, After
Monitor Effects on Air Quality	Be aware of where the smoke is going and degree it impacts air quality	Before, During, After
Record-Keeping/Maintain a Burn/Smoke Journal	Retain information about the weather, burn and smoke. If air quality problems occur, documentation helps analyze and address air regulatory issues.	Before, During, After
Communication – Public Notification	Notify neighbors and those potentially impacted by smoke, especially sensitive receptors	Before, During
Consider Emission Reduction Techniques	Reducing emissions through mechanisms such as reducing fuel loading can reduce downwind impacts	Before, During, After
Share the Airshed – Coordination of Area Burning	Coordinate multiple burns in the area to manage exposure of the public to smoke	Before, During, After

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Exceptional Events Rule Revisions

Example Elements in Burn Plans/Post-Burn Reports (Table 4 in preamble)

Element	Burn Plan	Post-Burn Report
Fire Name[a]	Include	Include
Permit number (if appropriate)	Include	Include
Latitude/longitude and physical description	Include	Include
Date of burn, ignition time and completion time (duration of burn)	Include	Include
AQI status on burn day, if available (both in the vicinity of the fire and in the affected upwind area)	Predicted	Actual
Acres burned	Planned	Actual (blackened)
Description of fuel loading	Estimated	Actual (tons consumed)
Meteorological data (weather conditions, wind speed and direction, dispersion)	Predicted conditions (including predicted dispersion)	Actual conditions (including actual dispersion)
Smoke Impacts	Anticipated smoke impacts	Observed or reported smoke impacts (include nature, duration, spatial extent and copies of received complaints)
BSMP actions to reduce impacts	Expected BSMP actions	Actual BSMP actions
Recommendations for future burns in similar areas		Include
Analytics (modeled/actual fire spread, satellite imagery and analysis, webcam/video, PM/ozone concentrations over the course of the fire)		Include

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Exceptional Events Rule Revisions

- Provisions for prescribed fires (cont'd)
  - Remove existing rule language requiring a state to reconsider adopting a SMP after each exceptional event
  - Require land managers, bun managers and air agencies to collaborate regarding the process by which the agencies will work together to include general expectations for selection and application of appropriate BSMP (2-year phase in period)
- Land/resource management plans and exceptional events
  - Can be relied upon to address recurrence and not reasonably preventable
  - Requirements apply equally to federal, public and private landowners

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Exceptional Events Rule Revisions

- Prescribed fire recurrence
  - Different for prescribed fire on wildland and other event types
  - Different for "unlikely to recur" and the trigger for mitigation plan development
- Fire roles and responsibilities
  - Burn manager/agency can provide fire-specific information (e.g., emissions, acres burned, meteorology, modeling, communication and outreach, etc.)
  - Air agency and/or FLM can assess regulatory significance and the usefulness of getting EPA approval for data exclusion
  - Air agency and/or FLM can prepare the technical demonstration, which involves several data gathering and analysis tasks (EPA strongly encourages air agency and land manager collaboration and leveraging of resources and expertise)
  - Air agency is responsible for initial notification to EPA (can be delegated to FLM), deciding (with EPA input) whether to submit a demonstration, and submitting the prepared demonstration and/or endorsing the FLM's submission

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Exceptional Events Implementation: Available Resources

- Exceptional Events Website at http://www2.epa.gov/air-quality-analysis/treatment-data-influenced-exceptional-events
- Quick reference guide for exceptional events demonstrations
- Examples of reviewed exceptional event submissions
- Best practices documents
- Links to publicly available support information and tools
- Links to rule and guidance resources
  - Final rule
  - Final Wildfire/Ozone Exceptional Events Implementation Guidance
  - Fact sheets
  - 2013 interim guidance documents

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Exceptional Events Implementation: Next Steps

- The 2016 rule revisions and final wildfire/ozone guidance were needed first steps, but efficient and coordinated implementation is critical.
- What is next?
- Additional Implementation Materials
  - Revisions to 2013 *Interim Exceptional Events Guidance Documents*
  - Stratospheric Ozone Intrusion Document
  - Alternate Paths for Data Exclusion Document
  - Prescribed Fire/Ozone Document
- Continued development of exceptional events tools
  - Templates
  - Website updates
  - AQS modifications to reflect rule revisions guided by feedback from newly created AQS workgroup
  - Standardized metrics and tracking
  - Targeted efforts with FLMs – communications and tools
  - Best practices for multi-agency exceptional events demonstrations

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Questions and Comments

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUN 07 2017

OFFICE OF
AIR AND RADIATION

The Honorable Shaun Chapoose
Chairman
Ute Tribal Business Committee
Ute Indian Tribe of the Uintah and
Ouray Reservation
Post Office Box 190
Fort Duchesne, Utah 84026

Dear Chairman Chapoose:

This letter responds to the Ute Indian Tribe of the Uintah and Ouray Reservation's (Ute Tribe) submittal of August 23, 2016, claiming that a stratospheric ozone intrusion elevated ozone levels at the Myton, Whiterocks, Ouray and Redwash tribal ozone monitors and caused exceedances of the 2015 8-hour ozone National Ambient Air Quality Standards on June 8 and 9, 2015.

In 2016, the U.S. Environmental Protection Agency revised the Exceptional Events Rule (EER) found in sections 50.14 and 51.930 of 40 CFR parts 50 and 51 of the Clean Air Act. *See* Treatment of Data Influenced by Exceptional Events (81 FR 68216, October 3, 2016). After careful consideration of the information provided, the EPA concurs, based on the weight of evidence, that the Ute Tribe has provided sufficient information to make the demonstrations referred to in 40 CFR 50.14(a)(2) and (b)(1). In addition, the Ute Tribe has met the schedule and procedural requirements in section 50.14(c) with respect to the same information. The EPA has reviewed the documentation provided by the Ute Tribe to demonstrate that the exceedances identified in the submitted demonstration for the dates of June 8 and 9, 2015, at the Myton, Whiterocks, Ouray and Redwash tribal ozone monitors meet the criteria for an exceptional event in the EER. The basis for our concurrence is set forth in the enclosed technical support document. My staff has entered or shortly will enter "concurrence flags" for these data into the EPA's Air Quality System data repository.

The EPA's concurrence is a preliminary step in the regulatory process for actions that may rely on the dataset containing the event-influenced data and does not constitute final agency action. If the EPA takes a regulatory action that is affected by exclusion of ozone data as described by this concurrence, the EPA intends to publish notice of its proposed action in the *Federal Register*. The EPA's concurrence and accompanying technical support document will be included as part of the technical basis for that proposal. When the EPA issues that regulatory action, it will be a final agency action subject to judicial review.

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If you have any questions or wish to discuss this matter further, please have your staff contact Beth Palma, (919) 541-5432 or *palma.elizabeth@epa.gov*.

Sincerely,

Sarah Dunham
Acting Assistant Administrator

Enclosure

EXCEPTIONAL EVENTS TECHNICAL SUPPORT DOCUMENT FOR EPA CONCURRENCE WITH O_3 EXCEEDANCES CAUSED BY A STRATOSPHERIC O_3 INTRUSION IN THE UINTA BASIN OF UTAH ON JUNE 8-9, 2015

In the spring of 2016, the Ute Indian Tribe of the Uintah and Ouray Reservation (Ute Tribe), the State of Utah Department of Environmental Quality (UT DEQ), and the EPA Region 8 office became aware of a stratospheric O_3 intrusion that may have caused O_3 exceedances at four O_3 monitoring sites operated by the Ute Tribe in the Uinta Basin of Utah on June 8-9, 2015. Under the Exceptional Events Rule (EER), air agencies can request the exclusion of event-influenced data, and the EPA can agree to exclude these data, from the data set used for certain regulatory decisions. Although the EER applies to all states; to local air quality agencies to whom a state has delegated relevant responsibilities for air quality management including air quality monitoring and data analysis; and to tribal air quality agencies operating ambient air quality monitors that produce regulatory data, under the Tribal Authority Rule (TAR) at 40 CFR §49.2, tribes can request EPA's assistance in implementing the provisions of the Clean Air Act (CAA), including the provisions of the EER.

At the request of the Ute Tribe and in accordance with the provisions of the TAR, the EPA Region 8 office began working with the Ute Tribe and the UT DEQ to investigate the potential stratospheric O_3 intrusion claimed to have caused O_3 exceedances at four tribal O_3 monitoring locations in the Uinta Basin of Utah on June 8-9, 2015. Ultimately, also at the request of the Ute Tribe, the EPA Region 8 office assisted in drafting the exceptional events demonstration and facilitating the public comment process.[1] The public comment process, which ran from August 30 through September 29, 2016,[2] resulted in a single public submission from UT DEQ supporting the Ute Tribe demonstration.[3] Following the public comment process, the Ute Tribe formally submitted the exceptional events demonstration and requested EPA's review.[4] Because EPA Region 8 played a significant role in drafting the exceptional events demonstration, EPA's Office of Air and Radiation and Office of Air Quality Planning and Standards has independently reviewed the submittal and prepared this Technical Support Document supporting a concurrence with the Ute Tribe's request to exclude data under the EER. The remainder of this document summarizes the event and EPA's review process.

EXCEPTIONAL EVENTS RULE REQUIREMENTS

EPA promulgated the EER in 2007, pursuant to the 2005 amendment of CAA section 319. In 2016, EPA finalized revisions to the EER. The 2007 EER and the 2016 EER revisions added

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[1] *See* email dated August 29, 2016, from Kyle R. Montour, Attorney with Fredericks Peebles & Morgan LLP representing the Ute Tribe, to Jody Ostendorf, US EPA Region 8, requesting that EPA conduct a public comment process for the June 8-9, 2015 stratospheric intrusion exceptional event demonstration provided to EPA in draft format on August 23, 2015, in accordance with 40 CFR §50.14.

[2] *See* documentation of announcement of public comment period for O_3 NAAQS exceedances occurring June 8 and 9, 2015, in the Uinta Basin of Utah. The announcement was posted on EPA's website at *https://www.epa.gov/air-quality-analysis/treatment-data-influenced-exceptional-events* from August 30 through September 29, 2016.

[3] *See* letter dated September 21, 2016, from Alan Matheson, Executive Director Utah Department of Environmental Quality, to Shaun McGrath, US EPA Region 8 Regional Administrator, supporting the exceptional events package demonstrating the impact of stratospheric O_3 intrusion on the O_3 data from monitors operate by the Ute Tribe for June 8-9, 2015.

[4] *See* email dated November 22, 2016, from Minnie Grant, Ute Tribe, to Richard Payton, US EPA Region 8, requesting that EPA review the final June 8-9, 2015 stratospheric intrusion exceptional event demonstration in accordance with 40 CFR §50.14(c)(3).

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sections 50.1(j)-(r), 50.14, and 51.930 to title 40 of the Code of Federal Regulations (CFR). These sections contain definitions, criteria for EPA approval, procedural requirements, and requirements for air agency demonstrations. EPA reviews the information and analyses in the air agency's demonstration package using a weight of evidence approach and decides to concur or not concur. The demonstration must satisfy all of the EER criteria for EPA to concur with excluding the air quality data from regulatory decisions.

Under 40 CFR §50.14(c)(3)(iv), the air agency demonstration to justify data exclusion must include:

A. "A narrative conceptual model that describes the event(s) causing the exceedance or violation and a discussion of how emissions from the event(s) led to the exceedance or violation at the affected monitor(s);"

B. "A demonstration that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation;"

C. "Analyses comparing the claimed event-influenced concentration(s) to concentrations at the same monitoring site at other times" to support requirement (B) above;

D. "A demonstration that the event was both not reasonably controllable and not reasonably preventable;" and

E. "A demonstration that the event was a human activity that is unlikely to recur at a particular location or was a natural event."[5]

In addition, the air agency must meet several procedural requirements, including:

1. submission of an Initial Notification of Potential Exceptional Event and flagging of the affected data in the EPA's Air Quality System (AQS) as described in 40 CFR §50.14(c)(2)(i),

2. completion and documentation of the public comment process described in 40 CFR §50.14(c)(3)(v), and

3. implementation of any applicable mitigation requirements as described in 40 CFR §51.930.

For data influenced by exceptional events to be used in initial area designations, air agencies must also meet the initial notification and demonstration submission deadlines specified in Table 2 to 40 CFR §50.14.

Some air agencies, including the Ute Tribe, submitted exceptional events demonstrations under

[5] A natural event is further described in 40 CFR §50.1(k) as "an event and its resulting emissions, which may recur at the same location, in which human activity plays little or no direct causal role. For purposes of the definition of a natural event, anthropogenic sources that are reasonably controlled shall be considered to not play a direct role in causing emissions."

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the provisions of the 2007 EER. However, because the 2016 EER is currently in effect, this document discusses the specific requirements of the 2016 EER and also provides a crosswalk between the provisions of the 2007 EER and the 2016 EER. We include below a description of the EER criteria identified in 40 CFR §50.14(c)(3)(iv).

Regulatory Significance

The 2016 EER includes regulatory language that applies the provisions of CAA section 319 to a specific set of regulatory actions. As identified in 40 CFR §50.14(a)(1)(i), these regulatory actions include initial area designations and redesignations; area classifications; attainment determinations (including clean data determinations); attainment date extensions; findings of State Implementation Plan (SIP) inadequacy leading to a SIP call; and other actions on a case-by-case basis as determined by the Administrator. Air agencies and EPA should discuss the regulatory significance of an exceptional events demonstration during the Initial Notification of Potential Exceptional Event prior to the air agency submitting a demonstration for EPA's review.

Narrative Conceptual Model

The 2016 EER directs air agencies to submit, as part of the demonstration, a narrative conceptual model of the event that describes and summarizes the event in question and provides context for analyzing the required statutory and regulatory technical criteria. Air agencies may support the narrative conceptual model with summary tables, maps or other figures or graphics that facilitate understanding of the event and the resulting monitored exceedance or violation. For stratospheric O_3 intrusion events, EPA recommends that the narrative conceptual model also discuss the local geography/topography, the meteorological conditions that led to the intrusion, how the O_3-containing stratospheric air created elevated ground-level O_3 concentrations at the affected monitor(s), the chemistry of typical non-event O_3 formation in the area, and, under 40 CFR §50.14(a)(1)(i), the regulatory significance of the requested data exclusion.

Clear Causal Relationship and Supporting Analyses

EPA considers a variety of evidence when evaluating whether there is a clear causal relationship between the specific event and the monitored exceedance or violation. For stratospheric O_3 intrusion events, air agencies should compare the O_3 data requested for exclusion with seasonal and annual historical concentrations at the air quality monitor to establish a clear causal relationship between the event and monitored data. In addition to providing this information on the historical context for the event-influenced data, air agencies should further support the clear causal relationship criterion by providing evidence that the O_3-containing stratospheric air was transported into the troposphere and that this O_3-rich air reached the ground-level monitor.

Not Reasonably Controllable or Preventable

EPA requires that air agencies establish that the event be both not reasonably controllable and not reasonably preventable at the time the event occurred. This requirement applies to both natural events and events caused by human activities; however, it is presumed that stratospheric O_3

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intrusion events satisfy both factors of the "not reasonably controllable or preventable" element unless evidence in the record clearly demonstrates otherwise.[6]

Natural Event or Event Caused by Human Activity That is Unlikely to Recur

The 2016 EER preamble acknowledges that stratospheric O_3 intrusion events are natural events. Once an agency provides evidence that a stratospheric O_3 intrusion occurred and demonstrates that there is a clear causal relationship between the measurement under consideration and the event, EPA expects minimal documentation to satisfy the "human activity that is unlikely to recur at a particular location or a natural event" element.

EPA REVIEW OF EXCEPTIONAL EVENTS DEMONSTRATION

On November 22, 2016, the Ute Indian Tribe submitted an exceptional events demonstration for a stratospheric O_3 intrusion event that caused eight exceedances of the 2015 8-hour O_3 standard at the tribal-operated Myton, Whiterocks, Ouray, and Redwash monitoring stations within the Uinta Basin of Utah on June 8-9, 2015. In light of the analysis provided in the demonstration, the Ute Tribe concluded that the eight exceedances measured on June 8-9, 2015, were "unseasonably high, not consistent with historical readings and patterns, and that they coincided with the intrusion of stratospheric air into the troposphere contributing ozone to the surface measurements." Accordingly, the demonstration requests "that the EPA concur on stratospheric ozone exceptional event flags the tribe has applied to the impacted data in the AQS database, and that the EPA exclude the exceedances . . . from calculations of O_3 exceedances and violations for 2015."

Regulatory Significance

EPA determined that the exclusion of these eight exceedances may have regulatory significance for initial area designations for the 2015 8-hour O_3 standard. Specifically, the exclusion of the event-influenced data is likely to make a difference between a marginal and moderate classification for the Uinta Basin in Utah for the 2015 8-hour O_3 NAAQS if initial area designation decisions are based on data from years 2014 through 2016. Table 1 summarizes these exceedances.

Table 1: EPA 8-hour O_3 Exceedance Summary

Exceedance Date	Monitor/Site Name	AQS ID	8-hour Avg. (ppm)	Annual Rank
June 8, 2015	Ouray	49-047-2003	0.071	1st
	Redwash	49-047-2002	0.074	1st
	Myton	49-013-7011	0.071	2nd
	Whiterocks	49-047-7022	0.073	1st

[6] According to 40 CFR §50.14(b)(6), "Where a State demonstrates to the Administrator's satisfaction that emissions from stratospheric intrusions caused a specific air pollution concentration in excess of one or more national ambient air quality standard at a particular air quality monitoring location and otherwise satisfies the requirements of this section, the Administrator will determine stratospheric intrusions to have met the requirements identified in paragraph (c)(3)(iv)(D) of this section regarding the not reasonably controllable or preventable criterion and shall exclude data from use in determinations of exceedances and violations."

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Exceedance Date	Monitor/Site Name	AQS ID	8-hour Avg. (ppm)	Annual Rank
June 9, 2015	Ouray	49-047-2003	0.071	2nd
	Redwash	49-047-2002	0.072	2nd
	Myton	49-013-7011	0.072	1st
	Whiterocks	49-047-7022	0.073	2nd

Narrative Conceptual Model

The Ute Tribe's demonstration provided a narrative conceptual model to describe how O_3-containing stratospheric air was transported into the troposphere and caused O_3 exceedances at the tribal-operated Myton, Whiterocks, Ouray, and Redwash monitoring stations. The conceptual model discussed local geography/topography and the meteorological conditions that led to the stratospheric O_3 intrusion and provided a depiction of the area showing the monitor locations (*see* page 4 of the demonstration) and a seasonal time series plot depicting 8-hour O_3 concentrations at remote, rural, high-elevation monitoring sites in the intermountain west during May and June of 2015 (*see* page 6 of the demonstration).

Specifically, the demonstration's conceptual model characterized the Uinta Basin of Utah as a winter O_3 region, which, in a typical year, records its highest O_3 concentrations in December through mid-March when the area experiences cold, clear high pressure conditions with low wind speeds and significant snow cover. But from December 2014 through March 2015, the Uinta Basin did not experience persistent snow cover or the typical wintertime O_3 production, and the two highest O_3 days were recorded on June 8-9, 2015, which is very unusual for the area. The conceptual model attributes these elevated levels to a stratospheric O_3 intrusion and explains that beginning on June 4, 2015, a closed upper level low around California slowly moved east and weakened, leaving an elongated zone of lowered tropopause heights, low pressure, and elevated free troposphere and total column O_3 stretching from Nevada into Colorado and Wyoming. As this upper level low system moved through the intermountain west in early June 2015, remote, rural high elevation O_3 monitors in Nevada, Utah, Wyoming, and Colorado recorded relatively high levels of O_3 that, during the May 25-June 1 period, had not exceeded 8-hour O_3 values above 60 ppb.[7]

Table 2: Documentation of Narrative Conceptual Model

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
June 8-9, 2015	Section 2: pp. 4-6	Sufficient	Yes

Clear Causal Relationship and Supporting Analyses

The Ute Tribe's demonstration established a clear causal relationship between the monitored concentrations under consideration and the stratospheric O_3 intrusion event. The demonstration included a comparison of the O_3 data requested for exclusion with seasonal and annual historical

[7] The seasonal time series plot identified as Figure 2 in the demonstration shows a decrease in the 8-hour O_3 concentrations on June 4-5, 2015, at several of the high-elevation monitors. As acknowledged in the demonstration, thunderstorms can both enhance the transport of free tropospheric and stratospheric O_3 to the surface or, as was the case on June 4-5, lower surface O_3 while still showing the effects of the intrusion.

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concentrations at the four monitors (see Table 2 and Figures 4-7 in the Ute Tribe's demonstration). The demonstration further showed that O_3-containing stratospheric air was transported into the troposphere and that this O_3-rich air reached the ground-level monitors.

Specifically, the demonstration included plots of daily maximum 8-hour average O_3 concentration against the day of year, for, at a minimum, all data in the years 2011, 2013-2015 (data periods presented in Figures 4-7 varied for each monitor). The demonstration also provided plots of diurnal O_3 compared to historical norms. Considered together, these plots compare the event-related exceedances with historical concentrations. A summary table (Table 2 in the Ute Tribe's demonstration) provided further comparisons to mean and maximum concentrations for the base period, as well as percentiles and ranks for the event-related exceedances. As indicated in Table 2, the June 8-9 concentrations recorded at the four subject monitors rank in the top five readings for the April-June data set. In addition, the recorded concentrations are among the top 94-99th percentiles in annual data recorded (*i.e.*, even including the typically higher wintertime O_3 months, these days show a peak) further indicating that the concentrations identified for exclusion are not consistent with historical annual and seasonal data.

The demonstration also included synoptic-scale meteorological observation and sounding analyses at upper and mid-low levels of the atmosphere, which illustrate conditions conducive to a stratospheric intrusion. Satellite images of NOAA's Geostationary Operational Environmental Satellite total column O_3 (Figures 27-29 in the Ute Tribe's demonstration) show higher O_3 levels coincident with these meteorologically-conducive areas. Additionally, as shown in Figures 35-36 in the Ute Tribe's demonstration, specific output parameters of the North American Mesoscale (NAM) forecast system indicate conditions conducive to stratospheric intrusion in three-dimensional space over the Uinta Basin and down to a level of 4000-5000 meters. Modeling of O_3 vertical distribution produced by the NOAA Realtime Air Quality Modeling System (Figures 37-41 in the Ute Tribe's demonstration) support the vertical profile suggested by NAM. Upper-air soundings for Grand Junction, CO (Figure 43 in the Ute Tribe's demonstration) and Flagstaff, AZ (Figure 44 in the Ute Tribe's demonstration, misnamed as Albuquerque, NM in the text but correctly labeled in the figure) illustrate meteorological conditions conducive to stratospheric intrusion as low as 4000 meters. These soundings also show maximum height of the mixed layer—calculated by EPA as part of the demonstration review process using the soundings provided in the Ute Tribe's demonstration and the dry adiabatic/mixing ratio method—to be at least 4400 meters at times during June 8-9, demonstrating transport of stratospheric O_3 to the ground-level monitors.

The analyses included in the Ute Tribe's demonstration, specifically those elements mentioned earlier in this section, sufficiently demonstrate a clear causal relationship between the stratospheric O_3 intrusion event and the eight exceedances measured at the Myton, Whiterocks, Ouray, and Redwash monitoring sites on June 8-9, 2015.

Table 3: Documentation of Clear Causal Relationship and the Supporting Analyses

Exceedance Date	**Demonstration Citation**	**Quality of Evidence**	**Criterion Met?**
June 8-9, 2015	Section 3 (Clear Causal Relationship): pp. 7-50 Section 4 (Affects Air Quality): pp. 50-52 Section 5 (No Exceedance But For): p. 53	Sufficient	Yes

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Not Reasonably Controllable or Preventable

The EER presumes that stratospheric O_3 intrusion events are not reasonably controllable or preventable. 40 CFR §50.14(b)(6). Through the analyses provided in the clear causal relationship portion of the demonstration, the Ute Tribe established that a stratospheric O_3 intrusion occurred and caused the identified exceedances. Therefore, the documentation provided demonstrates that the event was not reasonably controllable and not reasonably preventable.

Table 4: Documentation of not Reasonably Controllable or Preventable

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
June 8-9, 2015	Section 7: pp. 53-54	Sufficient	Yes

Natural Event or Event Caused by Human Activity That is Unlikely to Recur

The 2016 EER preamble acknowledges that stratospheric O_3 intrusion events are natural events. The Ute Tribe's demonstration establishes that the event in question was a stratospheric O_3 intrusion. The Ute Tribe has therefore shown that the event was a natural event.

Table 5: Documentation of Natural Event

Exceedance Date	Demonstration Citation	Quality of Evidence	Criterion Met?
June 8-9, 2015	Section 6: p. 53	Sufficient	Yes

Schedule and Procedural Requirements

In addition to technical demonstration requirements, 40 CFR §50.14(c) and 40 CFR §51.930 specify schedule and procedural requirements an air agency must follow to request data exclusion. Table 6 outlines EPA's evaluation of these requirements.

Table 6: Schedules and Procedural Criteria

	Reference	Demonstration Citation	Criterion Met?
Did the agency provide prompt public notification of the event?	40 CFR §50.14 (c)(1)(i)	N/A	Yes – event not recognized until after exceedances recorded, but notice provided through the public comment process.
Did the agency submit an Initial Notification of Potential Exceptional Event and flag the affected data in the EPA's Air Quality System (AQS)?	40 CFR §50.14 (c)(2)(i)	See discussion in the Overview portion of this TSD	Yes
Did the initial notification and demonstration submittals meet the deadlines for data influenced by exceptional events for use in initial area designations, if applicable? Or the deadlines established by EPA during the	40 CFR §50.14 Table 2	See discussion in the Overview portion of this TSD	Yes

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	Reference	Demonstration Citation	Criterion Met?
Initial Notification of Potential Exceptional Events process, if applicable?			
Did the agency conduct a public comment period for a minimum of 30 days?	40 CFR §50.14 (c)(3)(v)(A)	See discussion in the Overview portion of this TSD and footnote 4	Yes
Did the agency submit the public comments it received along with its demonstration?	40 CFR §50.14 (c)(3)(v)(B)	See discussion in the Overview portion of this TSD and footnote 5	Yes
Did the agency address in its submission those public comments disputing or contradicting factual evidence provided in the demonstration?	40 CFR §50.14 (c)(3)(v)(C)	N/A	N/A
Has the agency met requirements regarding submission of a mitigation plan, if applicable?	40 CFR §51.930(b)	N/A	N/A

CONCLUSION

EPA has reviewed the documentation provided by the Ute Tribe to support claims that O_3-containing stratospheric air was transported into the troposphere and that this O_3-rich air reached the ground-level monitors and caused exceedances of the 2015 8-hour O_3 NAAQS at the tribal-operated Myton, Whiterocks, Ouray, and Redwash monitoring stations on June 8-9, 2015. EPA has determined that the flagged exceedances at these monitoring sites on June 8-9, 2015, satisfy the exceptional event criteria: the event was a natural event, which affected air quality in such a way that there exists a clear causal relationship between the event and the monitored exceedance, and was not reasonably controllable or preventable. EPA has also determined that the Ute Tribe has satisfied the procedural requirements for data exclusion.

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Appendix A: Regulatory Crosswalk between the 2007 and 2016 Exceptional Events Rules

Technical Criteria Under the 2016 EER	Related Criteria Under the 2007 EER	Demonstration Citation	Criterion met
Initial notification of potential exceptional event [40 CFR §50.14(c)(2)]	N/A	N/A	Yes – event not recognized until after exceedances recorded, but notice provided through the public comment process.
A narrative conceptual model that describes the event(s) causing the exceedance or violation and a discussion of how emissions from the event(s) led to the exceedance or violation at the affected monitor(s) [40 CFR §50.14(c)(3)(iv)(A)]	N/A	Section 2: pp. 5-6	Yes
A demonstration that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation [40 CFR §50.14(c)(3)(iv)(B)]	The event affects air quality [40 CFR §50.1(j), 40 CFR §50.14(c)(3)(iv)(A)]	Section 4: pp. 50-52	Yes
	There is a clear causal relationship between the measurement under consideration and the event that is claimed to have affected the air quality in the area [40 CFR §50.14(c)(3)(iv)(B)]	Section 3: pp. 7-50	Yes
	There would have been no exceedance or violation but for the event [40 CFR §50.14(c)(3)(iv)(D)]	Section 5: p. 53	Yes
Analyses comparing the claimed event-influenced concentration(s) to concentrations at the same monitoring site at other times to support the clear causal relationship requirement [40 CFR §50.14(c)(3)(iv)(C)]	The event is associated with a measured concentration in excess of normal historical fluctuations, including background [40 CFR §50.14(c)(3)(iv)(C)]	Section 3A: pp. 7-22	Yes
A demonstration that the event was both not reasonably controllable and not reasonably preventable [40 CFR §50.14(c)(3)(iv)(D)]	The event is not reasonably controllable or preventable [40 CFR 50.1(j), 40 CFR §50.14(c)(3)(iv)(A)]	Section 7: pp. 53-54	Yes

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Technical Criteria Under the 2016 EER	Related Criteria Under the 2007 EER	Demonstration Citation	Criterion met
A demonstration that the event was a human activity that is unlikely to recur at a particular location or was a natural event [40 CFR §50.14(c)(3)(iv)(E)]	The event is caused by human activity that is unlikely to recur at a particular location or a natural event [40 CFR 50.1(j), 40 CFR §50.14(c)(3)(iv)(A)]	Section 6: p. 53	Yes
Documentation that the State followed the public comment process and conducted at least a 30-day comment period [40 CFR §50.14(c)(3)(v)(A)]	The State must document that the public comment process was followed [40 CFR §50.14(c)(3)(v)]	See discussion in the Overview portion of this TSD and footnote 4	Yes
Submit the public comments with the demonstration [40 CFR §50.14(c)(3)(v)(B)]	N/A	See discussion in the Overview portion of this TSD and footnote 5	Yes
Address in the demonstration those comments disputing or contradicting factual evidence provided in the demonstration [40 CFR §50.14(c)(3)(v)(C)]	N/A	N/A	N/A

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C. EVIDENCE OF STRATOSPHERIC INTRUSION

NOAA Geostationary Operational Environmental Satellite (GOES) ozone sounder images from June 4, 2015 show enhanced total column ozone along the western edge of the upper level trough forming along the U. S. Pacific coast (seen in Figure 17), as shown in Figure 27. Enhance total column ozone is observed in regions of folds in the tropopause, which brings stratospheric air (and stratospheric ozone) down into the upper troposphere.

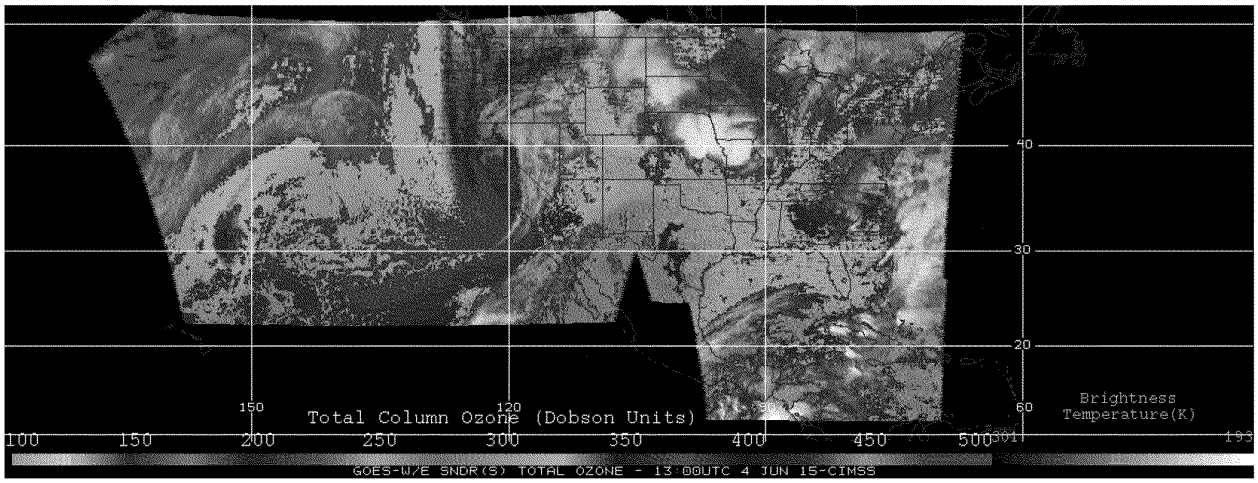
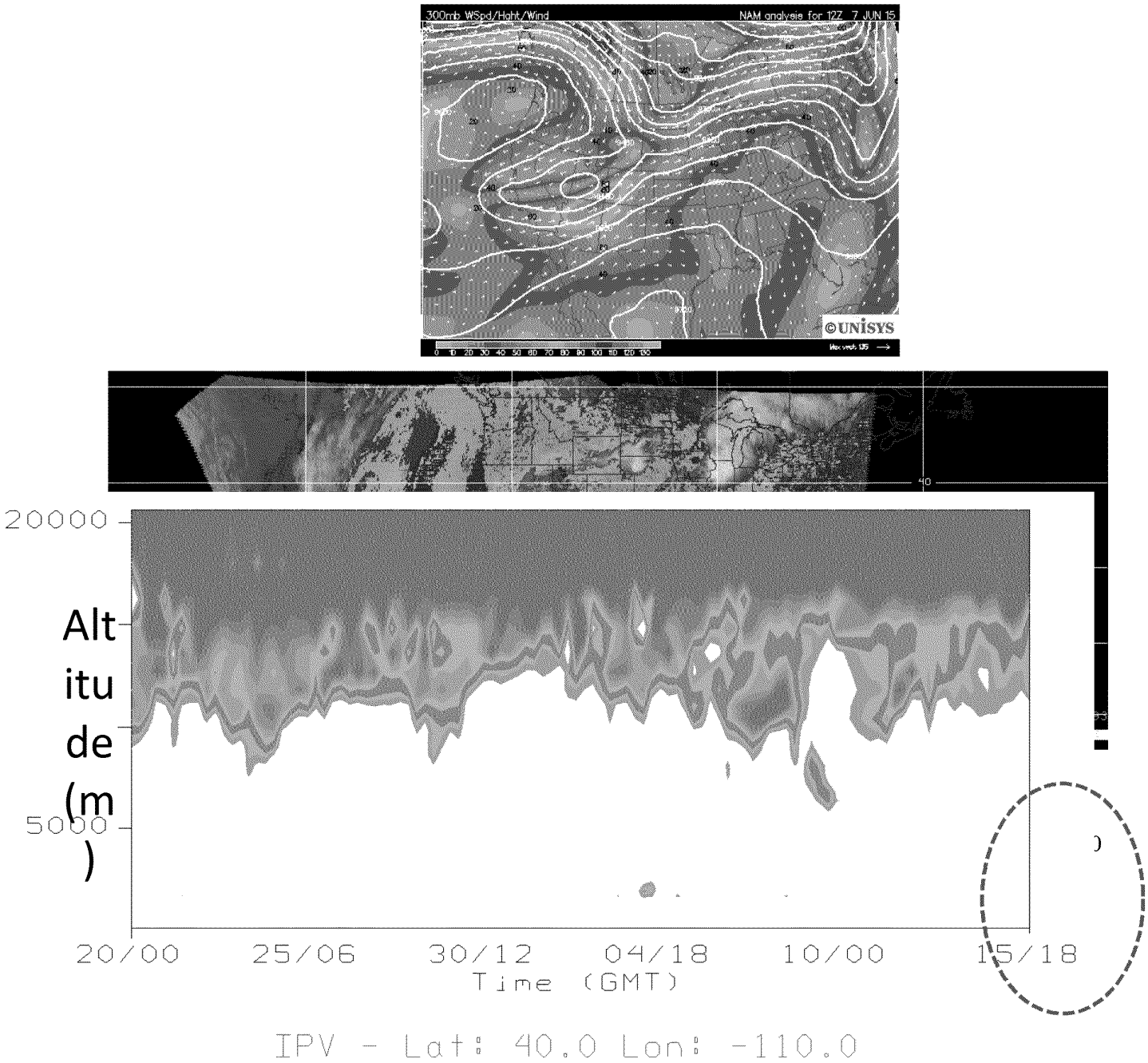


Figure 27 GOES Total Column Ozone, 6:00 am MST

A similar sounding on June 7 at 5:00 am MST shows an area of enhance total column ozone coinciding with the elongated trough extending from western South Dakota to California, south of San Francisco, as shown in Figure 28.



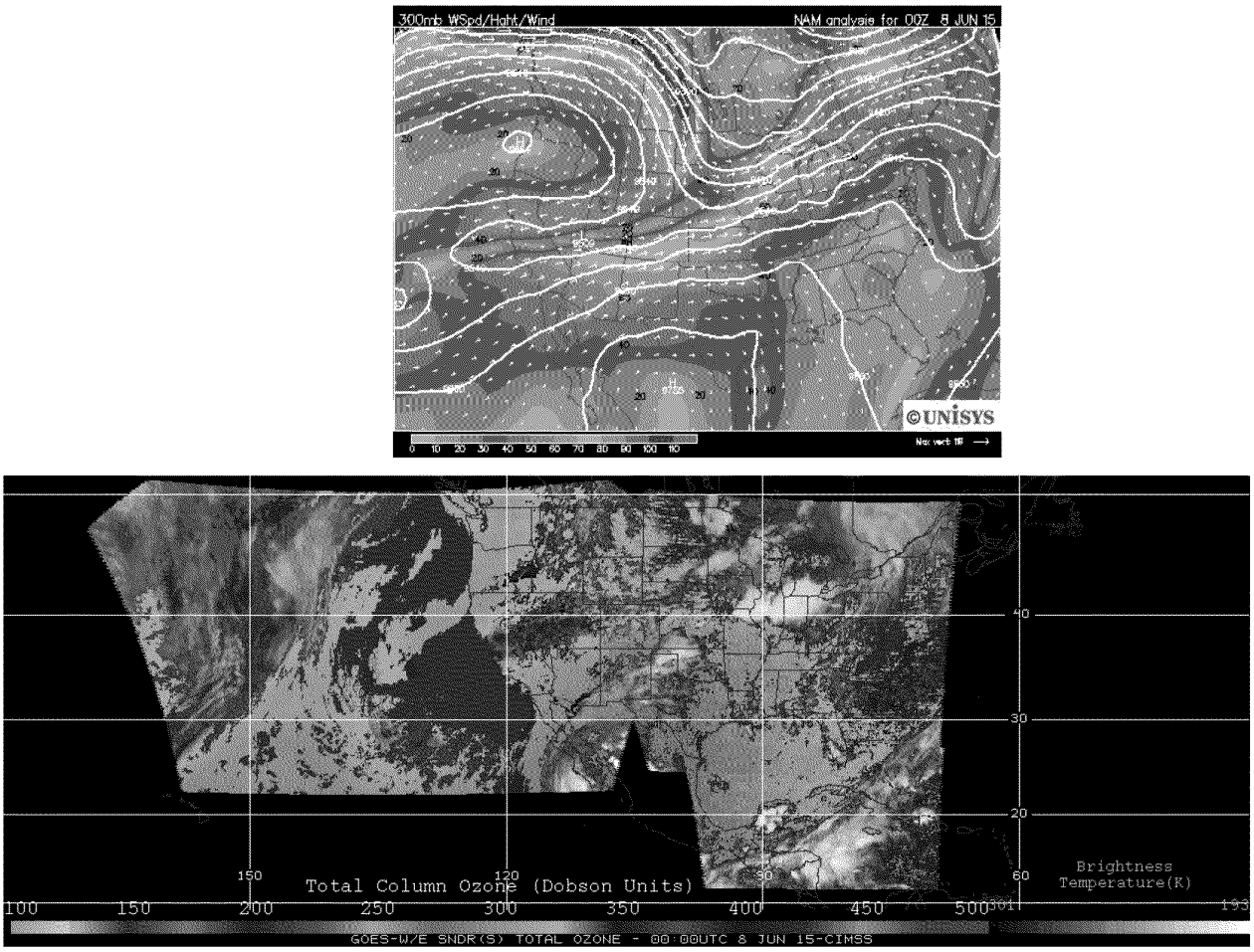


Figure 29 300 mb Height, Wind Speed and Wind Direction (top), and GOES Total Column Ozone, June 7, 2015, 5:00 apm MST

Dr. Huy Tran of the Utah State University Bingham Research Center has plotted NOAA/NWS North American Mesoscale Forecast System (NAM) isentropic potential vorticity (IPV) over the Uinta Basin for the period from May 20 through June 15.[1] IPV was described in an exceptional event demonstration prepared by the Wyoming Department of Environmental Quality as "a proxy for atmospheric spin and is a conservative property with values of up to two orders of magnitude [100 times] greater for stratospheric air than that of tropospheric air".[2] The IPV plot shown in Figure 30 shows the tropopause generally between 10,000 and 15,000 meters (32,808 to 49,213 feet) in the period from May 20 through June 14. Significant excursions of the tropopause below 10,000 meters occur between May 22 through

[1] Investigation of Possible Ozone Exceptional Events in June 2015 in the Uintah Basin, Tran, Huy, Seth Lyman, Trang Tran, Marc Mansfield, Brigham Entrepreneurship & Energy Research Center, Utah State University, April 2016.

[2] Exceptional Event Demonstration Package for the Environmental Protection Agency, Big Piney and Boulder, Wyoming Ozone Standard Exceedances June 14, 2012, Wyoming DEQ, August 2013, citing Shapiro, M. A. "Turbulent Mixing within Tropopause Folds as a Mechanism of Chemical Constituents between the Stratosphere and Troposphere." Journal of the Atmospheric Sciences (American Meteorological Society) 37 (1980): 994-1004.

25 (approximately 7,500 meters, or 24,600 feet on May 23) and between May 28 and May 30 (approximately 8,000 meters, or 26,250 feet on May 28). The most significant tropopause lowering of the period then occurs on between June 5 and June 10 (circled in Figure 30), with a large mass of stratospheric air with IPV values between 8 and 10 IPV units at around 10,000 meters on May 7 and 8. On May 9, a large filament of stratospheric air has descended to as low as 5,500 meters, while the tropopause has reached its high point of the period at approximately 19,000 meters; this indicates a fold in the tropopause lies over the Uinta basin.

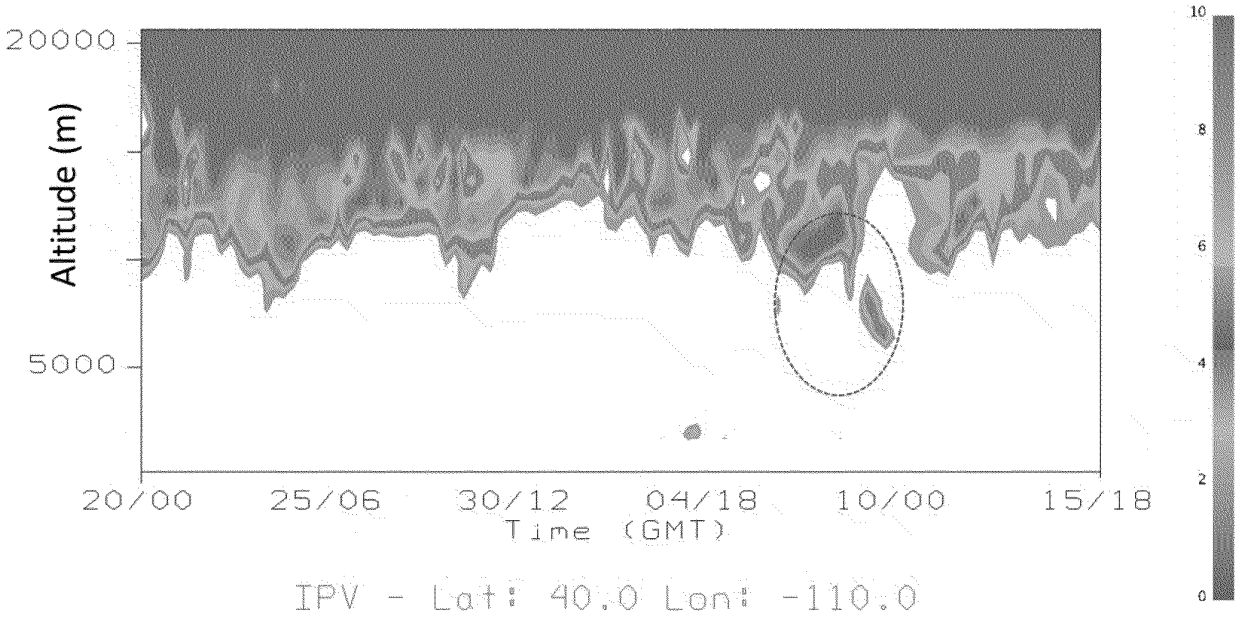


Figure 30 NAM IPV Plot Showing Tropopause Height May 20-June 15, 2015, and a Tropopause Fold Over the Uinta Basin of Utah on June 9, 2015 (circled)[3]

Dr. Tran also used NAM to generate a vertical profile of relative humidity plot above the Uinta Basin in the same period, shown in Figure 31; NAM shows a lobe of low humidity air coincident with the IPV lobe indicating the Tropopause fold on June 9, 2015. Stratospheric air, in addition to having high IPV and ozone, has low relative humidity when compared to tropospheric air.

[3] Investigation of Possible Ozone Exceptional Events in June 2015 in the Uintah Basin, Tran, Huy, et al.

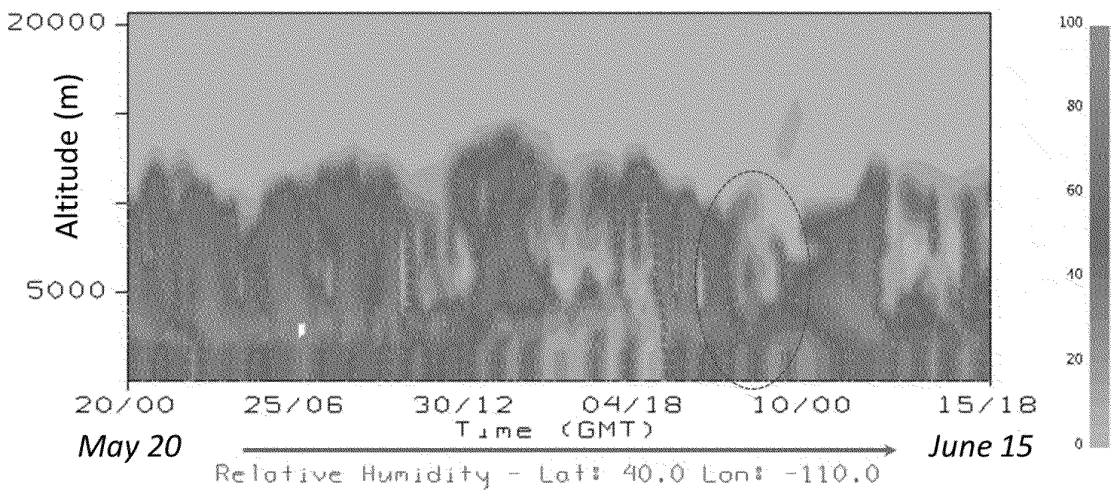


Figure 31 NAM Relative Humidity Plot Showing Approximate Tropopause Height, and a Tropopause Fold Over the Uinta Basin of Utah on June 9, 2015[4]

In addition to NAM vertical profiles, Dr. Tran used the GEOS-Chem global atmospheric chemistry model to estimate the vertical profile of ozone over the Uinta Basin for the period from June 1, 2015 through June 12, 2015. Figure 32 shows the GEOS-Chem ozone profile over the Ouray monitor. Lobes of stratospheric ozone with concentrations above 100 ppb are shown (circled) descending well into the troposphere on June 8 and 9 (hours 168-216) which correspond well with the IPV and humidity lobes from NAM. Corresponding elevations in ground level ozone is seen below the intrusion lobes. The GEOS-Chem predictions are used here qualitatively to support the conclusion that stratospheric air reach the ground and impacted the Ute Indian Tribe monitors, but the GEOS-Chem results are not expected to accurately predict the actual concentrations measured by the monitors.

[4] Ibid.

Colorado Environmental Performance Partnership Agreement

FY2016-2017

Colorado Department of Public Health & Environment

U.S. Environmental Protection Agency Region 8

COLORADO
Department of Public
Health & Environment

APPROVALS

By signing this FY 2016-2017 Colorado Performance Partnership Agreement (CEPPA), the Colorado Department of Public Health and Environment (CDPHE) and the U.S. Environmental Protection Agency (EPA) Region 8 jointly agree to continue the National Environmental Performance Partnership System for the next two federal fiscal years beginning on October 1, 2015 and continuing through September 30, 2017. The EPA commits funding to the CDPHE in amounts specified herein and as specified in fiscal applications submitted by the CDPHE before September 30, 2015 under the terms of the CDPHE Environmental Performance Partnership Grant. In return, the CDPHE will expend the federal resources to carry out the environmental programs described herein for a two-year period. EPA Region 8 also agrees to carry out its roles and work as defined in the updated agreement and work plans for the two-year period.

Colorado Department of Public Health and Environment

Larry Wolk, MD, MSPH
Executive Director and Chief Medical Officer

U.S. Environmental Protection Agency Region 8

Shaun L. McGrath
Regional Administrator

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Chapter 1 INTRODUCTION AND OVERVIEW TO THE ROLES OF EPA AND CDPHE

1.1 Background

The Colorado Environmental Performance Partnership Agreement (CEPPA) is an agreement that identifies and explains the key environmental priorities and goals in the State of Colorado, and the working relationship between the Colorado Department of Public Health and Environment (CDPHE) and the U.S. Environmental Protection Agency (EPA). The FY 2016-2017 CEPPA continues the pattern established in the previous agreements, to achieve the goals of the National Environmental Performance Partnership System (NEPPS). The FY 2016-2017 CEPPA also reflects joint efforts to create authentic or genuine multiyear grant workplans in accordance with EPA/state progress in implementing multiyear EPA National Program Manager (NPM) Grant Guidance.

The NEPPS provides a framework for delineation of CDPHE and EPA roles in carrying out environmental laws in the state. It allows Colorado to identify key state priorities, allocate federal resources to the highest state priorities and have appropriate flexibility in finding ways to achieve mutually agreed upon goals. The EPA seeks to work jointly with the state to find the most effective ways to achieve national standards and goals while meeting state environmental priorities and recognizing resource limitations.

This CEPPA covers two federal fiscal years, FY 2016-2017. For financial and programmatic flexibility, Colorado has also requested a two-year budget and project period to align with associated workplan commitments. The two-year budget and project period will begin on October 1, 2015 and end on September 30, 2017. If needed, Colorado may ask for a one-year time extension in order to close financial and administrative aspects of this grant. Colorado and the EPA may revisit, review, or reopen this multiyear agreement and workplan should mutually acceptable conditions or circumstance warrant. These may include:

- New initiatives or actions from the Governor, State Legislature, State Courts, Federal Courts, U.S. Congress (e.g., statutory changes, regulatory changes, policy changes, Executive Orders, or legal decisions/court orders).
- Significant budgetary changes that impact CDPHE/Region 8 programs (e.g., program elimination, addition, restructuring, or emergency responses to natural or man-made disasters).
- Unanticipated events that significantly impact CDPHE program strategies/activities (e.g., emergency response to natural or man-made disasters).

1.2 Purpose

The Colorado Environmental Performance Partnership Agreement serves several purposes.

- It identifies the roles of and the relationship between EPA and the environmental programs of CDPHE.
- It identifies the major CDPHE management framework to address current environmental problems and avoid future issues in Colorado. The document describes the priority goals, objectives and key initiatives to address the problems, and establishes the environmental indicators and performance measures to evaluate progress.
- It is the document that defines Colorado's set of program commitments for which federal resources are made available to CDPHE to manage environmental programs. It constitutes the full program plan for the CDPHE environmental Performance Partnership Grant (PPG) to CDPHE and will be used to evaluate the success of the PPG.
- The CEPPA seeks to enhance public involvement regarding environmental issues and priorities in the state.

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1.3 Scope

The CEPPA addresses the environmental programs within CDPHE with emphasis on those that receive funding from EPA. The CEPPA delineates those programs and activities that are grant commitments in Chapters 3 through 7. In addition, this CEPPA describes a number of programs and activities which are either not funded by or not required by federal law to be included in the Agreement. These are included to demonstrate the comprehensive and integrated approach to managing these programs that is in place, and to enhance communications with stakeholders and the public. The fact that programs are described in this document that are neither funded nor mandated by EPA, does not translate into federal control of these programs if it would not otherwise exist.

The current CEPPA specifically describes the work commitments to be completed during the work plan period of FY 2016-2017 (October 1, 2015 through September 30, 2017). The work plans described are based upon the levels of federal funding shown in Table 7.1. Any decrease in available federal funding will necessitate a work plan review, including reprioritization and possible reductions in the number, and/or scope, of work commitments. Significant reductions in allowable federal funding may require prioritization of critical programs and the possible elimination of program elements and corresponding work commitments.

The CEPPA is intended to provide a working framework for the agencies that incorporates existing Memorandums of Agreement, delegations and enforcement agreements, but does not supersede them. CDPHE will maintain the core programs required by federal and state statutes and rules, and reflected in program authorizations and other formal agreements. In addition, the core program requirements also relate to the maintenance of regional and national databases associated with the environmental health programs and the development of Quality Assurance Project Plans for specific program activities like monitoring or remediation. CDPHE will fulfill the data entry, quality assurance and data validation requirements and will perform timely and complete updating of information by state and EPA staff and managers.

To provide a comprehensive description of the environmental efforts throughout the state, the CEPPA also includes EPA efforts to support CDPHE environmental programs and to carry out federal responsibilities. In some instances, EPA works with other state agencies in Colorado to carry out activities. The information provided on these activities with other agencies is only descriptive and should in no way imply a commitment on the part of those agencies or CDPHE. Nonetheless, CDPHE will coordinate with both EPA and other state agencies to address environmental problems. Where appropriate, CDPHE also will work closely with other state agencies, cities and county agencies to implement many of the programs described in this agreement.

1.4 Relationship Between EPA and CDPHE

There is a long-standing relationship between EPA and CDPHE to protect public health and the environment in Colorado. The federal system of government, through a series of environmental statutes, delineates specific roles for federal and state agencies in the development and implementation of programs for protection of public health and the environment. Different statutes require different roles. For example, some programs established by federal legislation may be delegated to state agencies with requisite authority, resources and capability. Other programs cannot be delegated under federal law, like the federal Superfund program. Other environmental programs or initiatives have been developed at the state level independent of federal authorities. In addition, there are other initiatives that both agencies agree result in increased environmental protection in an efficient and cost effective manner. Often, CDPHE and EPA play significant roles in these efforts and work to coordinate their approaches in Colorado.

1.5 Environmental Protection Agency Role

Under most of the programs covered by the CEPPA, the U.S. Congress gave EPA the initial responsibility for development and implementation. Many of these statutes also contain Congressional preference for delegation of the program to the states when states demonstrate capacity to carry them out. The federal resources for program development and management are given to EPA annually by Congress. EPA has developed various mechanisms for implementation of the programs in partnership with the states. Given the evolving nature of this partnership, there will continue to be coordinated planning and priority setting between EPA and Colorado. These joint activities will occur as part of the development of future partnership agreements and on a more long-term, strategic basis.

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FEDERAL-ONLY ACTIVITY In some cases, implementation of environmental programs is primarily a federal role. Some examples include non-delegated programs, certain Indian Country issues and interstate problems. Even so, many of these activities require support and activity by CDPHE. One example is the Emergency Planning and Community Right-to-Know Act program that is directly implemented by EPA, but relies heavily on state information and data.

DEVELOPMENT OF NATIONAL PROGRAM STRUCTURE AND STANDARDS EPA is responsible, through its statutory management and rule-making authority, for determining the federal management structure for the program and minimum national standards. For many environmental programs, national standards have been set for the country. EPA must ensure that the efforts of all states are used to achieve baseline environmental quality throughout the country and require that states adhere to a minimum set of national environmental standards. In addition, EPA facilitates resolution of interstate issues. Federal activity is geared to monitor consistency, national trends and federal initiatives when standards are not met.

RESEARCH AND DEVELOPMENT Often, the standards and guidance, which are developed by EPA, are the result of research and development, which it has undertaken and/or funded. Development and testing of innovative technologies and similar initiatives are valuable components of many environmental programs.

TECHNICAL ASSISTANCE EPA often provides technical assistance that may not be available to a particular state program. For example, EPA assists in building state capability to implement federal environmental programs by providing clear statements of policy and guidance, and delivering assistance and training on new regulations and national priorities. Additionally, EPA will assist CDPHE when requested, by providing technical information from other states, reviewing proposed engineering treatment processes, researching data, conducting risk assessments and facilitating peer review and peer matching. For EPA activities that will not require a major commitment of federal resources, EPA personnel will be available on an ongoing basis. For activities that will require a major commitment of EPA resources, that role will be described in the program-specific tables and work plans in the later chapters of this CEPPA.

WORKSHARING EPA will work to identify opportunities for enhanced worksharing and resource and workload flexibility in instances where budget reductions may negatively impact state programs.

ENFORCEMENT, COMPLIANCE AND ENVIRONMENTAL JUSTICE EPA performs essential enforcement and compliance assurance functions in order to ensure the protection of public health and the environment, and to assure that polluters do not gain a competitive advantage over those regulated entities that comply with federal environmental regulations.

The core EPA functions include: setting national priorities, monitoring compliance on a national basis, assuring national consistency in the implementation and enforcement of federal environmental requirements, taking enforcement actions against regulated entities with significant noncompliance at facilities in several states or against sources where releases to the environment threaten the health or environment of another state or country, or where states do not address particular violations, EPA offers incentives for violators to come into and remain in compliance, conducting compliance assistance for high-priority sectors and federally-implemented program and evaluating state performance.

For national programs that are not delegated to the state and for new regulations and policies, EPA will perform compliance assurance activities such as the development of compliance assistance materials and services tailored to promote compliance within high priority sectors. It will address compliance problems in federally implemented programs, and publicize and explain new regulatory requirements. In delegated programs, such materials and services should be delivered by the state.

EPA will promote environmental compliance and pollution prevention in the federal sector through enforcement, technical and compliance assistance activities. Careful administration of compliance assistance, pollution prevention, and enforcement will be directed toward the overall goal of achieving increased compliance and reducing risk in all priority areas. State RCRA, CWA, CAA and PWSS enforcement program performance will be evaluated as described in the Region 8 State Enforcement Performance Oversight Protocol and as described in the state-specific State Oversight Plan. EPA and CDPHE agree to follow the revised State Review Framework elements one through five in reviewing and assessing state compliance activities and

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programs. The review will be done once every four to five years beginning in FY 2007 for programs determined to be adequate. The most current review of FY 2010 performance occurred in FY 2011 and was completed in 2012. The next SRF review of FY 2015 performance is scheduled to take place in FY 2016.

RESOURCES In addition to the programmatic and technical assistance provided, many of the programs covered by this CEPPA are partially funded by federal grants administered by EPA. EPA is accountable to Congress for the expenditure of these resources consistent with federal law and grant agreements.

SPECIAL PROJECTS/INITIATIVES The President, the Administrator of the EPA, or the Regional Administrator may identify particular initiatives or projects, which are a high priority. EPA works with state agencies and others to implement projects or initiatives that the state is interested in pursuing.

CROSS-CUTTING INITIATIVES The EPA Region 8 office will be working with EPA Headquarters, the state and local communities in several cross-cutting areas. EPA has identified a number of cross-cutting areas within its strategic themes. These themes include energy, agriculture, revitalization, mercury and ensuring adequate investment in state capacity. Other cross-cutting areas include ecosystem protection, pollution prevention, reinventing environmental management, environmental management systems, environmental justice, environmental accountability, partnerships and strong science and data. Cross-cutting activities found within these themes include community-based environmental protection, industrial sector compliance activities, integrated environmental data systems and funding to achieve equitable environmental results.

VERIFICATION OF STATE PERFORMANCE (OVERSIGHT) EPA works jointly with the state to set forth the procedures for reviewing state and EPA accomplishments and issues annually and at the end of the PPA cycle, grant reporting requirements and other assessments. Through the assessment process, EPA works with the state to evaluate accomplishments, discuss progress, make adjustments to meet commitments in the current PPA and plan for future efforts. EPA is ultimately responsible for ensuring that grant requirements, including program commitments, have been met.

In cases where EPA delegates implementation authority for environmental programs to a state, it must also ensure that the state meets the requirements of the delegation. This distinct oversight role is necessary for EPA to carry out its unique federal responsibilities as reflected in the items above. EPA will review CDPHE performance and evaluate it against national environmental statutes, regulations and pertinent fiscal/grant requirements (see Chapters 7 and 8: Fiscal and Oversight Chapters).

In instances of effective state performance, the EPA oversight role lessens. In instances of less than satisfactory performance, the EPA oversight role increases. In both scenarios, EPA must ensure compliance with environmental laws and determine its level of activity accordingly.

1.6 CDPHE Role in the CEPPA

For the majority of programs covered by this CEPPA, CDPHE is the primary implementing agency. Some of the roles described have parallels at the local level.

DEVELOPMENT OF STATE PROGRAM STRUCTURE AND STANDARDS Colorado is responsible through its statutory and regulatory authority to determine the state management structure for the program. In addition, the state adopts its standards through the Colorado Administrative Procedures Act and requirements of implementing statutes. This is done through the various state commissions or boards: the Air Quality Control Commission, Water Quality Control Commission, Solid and Hazardous Waste Commission, and Colorado Board of Health. CDPHE also received advice on sustainability, pollution prevention and leadership from the Governor-appointed Pollution Prevention Advisory Board.

RESEARCH AND DEVELOPMENT The state also may participate in research and development efforts relevant to its environmental programs.

PROGRAMMATIC AND TECHNICAL ASSISTANCE Due to the maturity of many of the programs described in this CEPPA, the state sometimes provides programmatic and technical assistance to EPA. This is often done through agreements under which the state undertakes lead responsibility for particular projects or activities for which EPA is primarily responsible.

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RESOURCES CDPHE commits state financial resources to nearly all of the programs and activities described in this CEPPA.

SPECIAL PROJECTS/INITIATIVES CDPHE may also undertake particular projects or initiatives that are a high priority for the state. CDPHE works with EPA and others to implement those projects or initiatives.

DIRECT IMPLEMENTATION For most of the programs and activities described in this CEPPA, CDPHE directly implements the program or activity. CDPHE will undertake the work when a program is not authorized by federal law. As CDPHE and EPA develop their priorities, CDPHE may identify priority work that EPA cannot or will not undertake. CDPHE may then choose to do this work. Local health departments also directly implement a number of programs and activities and some reference is made to these in this CEPPA.

COMPLIANCE ASSURANCE AND ENFORCEMENT The State of Colorado has sufficient authority under state statute to perform essential compliance assurance and enforcement functions in order to ensure the protection of public health and the environment and to assure that polluters do not gain a competitive advantage over those entities that must meet state regulatory requirements.

1.7 Description of Environmental Programs

This CEPPA includes a wide breadth of efforts administered by each of the department's environmental divisions. Listed in the table below are many of the programs funded, in whole or in part, through the grant provided under this CEPPA. Programs are described in the following chapters.

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Colorado Department of Public Health and Environment Office of Environmental Programs			
Hazardous Materials & Waste Management Division	**Air Pollution Control Division**	**Division of Environmental Health & Sustainability**	**Water Quality Control Division**
Hazardous Waste Program Radon Program	Policy & Planning Program Mobile Sources Program Stationary Sources Program Compliance and Enforcement Program Indoor Environments Program Technical Services Program Administrative Program	Sustainability Unit • Environmental Leadership Program • Supplemental Environmental Projects Coordination • Pollution Prevention • Health Equity & Environmental Justice • SARA Programs • Small Business Ombudsman • State Recycling and P2 Grants • Greening Government • Medication Take-Back • Self Audit Law Environmental Health Programs • School Laboratory Inspections Environmental Agriculture Program	Clean Water Program • Compliance & Enforcement Unit • Permits Section • Watershed Section Safe Drinking Water Program • Local Assistance Unit • Compliance Assurance Section • Engineering Section • Field Services Section Administration Program • Grants & Loans Unit • Business Services Unit • Fiscal Services Unit • Community Development and Partnership Section

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Chapter 2 STRATEGIC DIRECTION AND PRIORITIES

This chapter describes the overarching strategic planning guiding the work of CDPHE and EPA and identifies shared priorities for the term of the CEPPA. It also describes the CDPHE and EPA joint commitment to advance these priorities through implementation of innovative and non-traditional practices when faced with resource reductions or emerging environmental conditions.

2.1 CDPHE Strategic Plan 2011 - 2016

To be successful in its work, the department must be poised to anticipate, respond to and oversee new and existing environmental challenges, such as expanding energy development, ozone, climate change, stresses on clean water, drinking water compliance, legacy mining, milling and industrial operations and public health and environmental emergencies.

In 2011, to help meet the numerous challenges to protecting the health of the state's environment and its people, the department adopted the CDPHE Strategic Plan 2011-2016 (Plan). The Plan was prepared in compliance with HB10-1119 (SMART Act), which increases legislative oversight and seeks to tie actual departmental performance to the state budget development process.

The Plan maps the department's strategy and describes what it must do to carry out its mission to and achieve its vision. The Plan includes the following major elements:

2.1.1 Mission Statement

The mission of the Colorado Department of Public Health and Environment is to protect and improve the health of Colorado's people and the quality of its environment.

2.1.2 Vision Statement

Colorado will be the healthiest state with the highest quality environment.

2.1.3 Strategic Map

The Strategic Map summarizes the department's strategy for the next five years.

2.1.3.1 Central Challenge

The department's central challenge is to align priorities and resources to improve and sustain public health and environmental quality. This challenge serves as the focal point for the department's strategies and guides what the organization needs to do to support its mission.

2.1.3.2 Strategic Priorities

The Strategic Map lists five strategic priorities, or performance-based goals, critical for meeting the central challenge. These include:

- Achieve Targeted Improvements in Colorado's Winnable Battles
- Promote Programmatic Excellence
- Strengthen the Integrated Public and Environmental Health System
- Foster a Competent, Empowered Workforce
- Create a More Efficient, Effective, Customer-Oriented Department

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2.1.3.3 Cross-Cutting Strategic Priorities

The Strategic Map lists three cross-cutting strategic priorities, considered to be foundational to meeting the central challenge, and the implementation of which must be imbedded in all other strategic priorities. These include:

- Promote Health Equity and Environmental Justice
- Use Performance-Based Measures and Evaluation to Continuously Improve Effectiveness and Prioritize Resources
- Strengthen Internal and External Communication

2.1.3.4 Strategic Objectives

Strategic objectives have been identified to guide progress towards the success of each strategic priority. The strategic objectives are evaluated annually to guide the work of the department. During the current state fiscal year, focus has been placed on the following:

- Develop and Implement Strategies to Achieve Winnable Battles
- Promote Policies that Support Winnable Battles
- Achieve Clear, Specific, Measurable Goals
- Strengthen Cross-Departmental Collaboration/Integration
- Meet Regulatory and Statutory Requirements
- Implement the Public Health Improvement Plan
- Create and Support Healthy, Sustainable Communities
- Attain, Retain and Recognize Talented and Diverse Employees
- Provide Professional Development and Advancement Opportunities
- Develop a Leadership Succession Plan
- Deliver Excellent Customer Service
- Employ LEAN Methodologies to Improve Business Processes
- Secure Sustainable, Diversified Funding

2.2 CDPHE Winnable Battles

To keep pace with emerging public health challenges, to address the leading causes of death and disability, and to improve, protect and preserve Colorado's environment and natural resources, the department initiated an effort to achieve measurable impact quickly in a few areas. Colorado's 10 Winnable Battles are public health and environmental priorities with large-scale impact on health and the environment, and with known, effective strategies to address them. For maximum effectiveness and efficiency, Colorado's 10 Winnable Battles were chosen with consideration of national and local goals including the CDC's Winnable Battles, the Seven Priorities of EPA's Future and local public health and environmental priorities.

Colorado's 10 Winnable Battles are:

- Clean Air
- Clean Water
- Infectious Disease Prevention
- Injury Prevention
- Mental Health and Substance Abuse
- Obesity
- Oral Health
- Safe Food
- Tobacco
- Unintended Pregnancy

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2.3 EPA Strategic Plan FY 2014-2018

The FY 2014-2018 EPA Strategic Plan creates a focus for EPA to develop and use creative, flexible, cost-effective, and sustainable actions to deliver significant benefits in support of its mission to protect human health and the environment. These actions will embody EPA's core values of science, transparency, and the rule of law.

2.3.1 Strategic Goals

The Plan identifies five strategic goals that target measurable human health outcomes and describe how they will be achieved.

- Addressing Climate Change and Improving Air Quality
- Protecting America's Waters
- Cleaning Up Communities and Advancing Sustainable Development
- Ensuring the Safety of Chemicals and Preventing Pollution
- Protecting Human Health and the Environment by Enforcing Laws and Assuring Compliance

2.3.2 Cross-Agency Strategies

The Plan also establishes four cross-agency strategies designed to change the way EPA works, both internally and externally, to achieve the outcomes articulated in the Plan.

- Working Toward a Sustainable Future
- Working to Make a Visible Difference in Communities
- Launching a New Era of State, Tribal, Local, and International partnerships
- Embracing EPA as a High-Performing Organization

2.4 CDPHE and EPA Shared Priorities

CDPHE and EPA share common goals of clean air; clean water; clean land; healthy, sustainable communities; and compliance with environmental laws. From these common goals, shared priorities have been identified for emphasis during the term of the CEPPA.

2.4.1 Environmental Justice

CDPHE established a commitment to environmental justice by identifying a cross-program objective in its 5-year Strategic Map to promote health equity and environmental justice. Department leadership supported the creation of the Health Equity and Environmental Justice Collaborative in 2012. The collaborative is overseen by a Steering Committee comprised of representatives from each division; all are tasked with coordinating health equity and environmental justice goals and objectives for CDPHE. In addition, work groups have been formed around strategic work plan goals and include over 75 members dedicated to embedding health equity and environmental justice concepts throughout our programs and activities. CDPHE's commitment continues as our new Department Implementation Plan retains health equity and environmental justice as a main priority of focus and will guide improvements in future years.

CDPHE will advance environmental justice goals through the following activities:

- The department will consider the adoption of a comprehensive health equity and environmental justice policy to guide activities/programs.
- The department will ensure that a meaningful opportunity for community input from low income and minority populations is provided early in regulatory processes through a robust stakeholder involvement process.
- When the department takes enforcement actions it will promote the use of SEPs which directly benefit disproportionately impacted low income and minority communities (e.g. the community SEP process will be considered for large enforcement settlements with willing violators).
- CDPHE will meet regularly with EPA to discuss environmental issues of mutual concern

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- EPA will provide CDPHE access to environmental justice information tools, provide information to CDPHE on environmental justice grants and provide environmental justice training for CDPHE staff.

2.4.2 Compliance Assurance and Enforcement

CDPHE's compliance assurance and enforcement program is responsible for statewide environmental enforcement of environmental laws and includes compliance assistance and education for sources. CDPHE and EPA Region 8 believe that a compliance assurance program, which respects state primacy in delegated programs and incorporates strong enforcement components, is crucial for successful environmental protection. CDPHE will continue to promote a strong, integrated and strategic compliance assurance program.

The function of compliance assurance and enforcement is located throughout various programs within the air, water, waste and environmental health and sustainability divisions. Compliance assurance activities include: environmental education; civil enforcement investigations and actions; investigation of environmental crimes (i.e., abandoned drums and waste tires and illegal dredge and fill activities); responding to environmental disasters; hazardous material incidents; and spills that threaten the environment. Integral to this program is CDPHE's commitment to educate sources and residents on environmental laws as well as to take enforcement actions as appropriate.

The key elements of CDPHE's compliance and enforcement monitoring program include:

- Inspection and compliance monitoring programs at the state and federal levels that adequately identify significant noncompliance.
- Maintaining a sufficient, qualified inspector field presence to effectively encourage regulated entities to comply with environmental laws and regulations.
- Adequate investment in compliance assistance initiatives.
- CDPHE and EPA Region 8 are committed to maintaining and improving the capacity to adequately monitor compliance with environmental requirements. The authority and capacity to respond to noncompliance are crucial elements of a strong enforcement program.

The shared commitment of CDPHE and EPA Region 8 specific to compliance assurance and enforcement include:

- Coordination in inspections of priority areas and sectors.
- Timely determination whether the source represents a significant risk to human health and the environment.
- Coordination in providing outreach, assistance and the dissemination of information to individuals, communities, businesses, governmental agencies and educational institutions for priority areas and sectors.
- Timely and appropriate enforcement.
- Assessment of penalties that collect economic benefits and the necessary gravity component in order to deter future noncompliance.
- Consideration of cross-media impacts in all areas of compliance assurance.
- Improving measures of success that focus on environmental outcomes and seeking new measures of environmental improvement from compliance assurance efforts.
- Mutual respect of each agency's enforcement roles.
- Identification of sources that require less oversight.
- The need to focus on statutorily regulated sources that have not obtained required permits or submitted required notifications.
- Encouraging the inclusion of supplemental environmental projects in settlement agreements where appropriate.
- Changing behavior and motivating the regulated community to prevent pollution.

To be effective, CDPHE and EPA Region 8 agree that compliance and enforcement programs must be based upon requirements that are enforceable and include the following: continuous education of staff and sources (i.e., outreach efforts); ongoing monitoring and inspections to measure compliance; identification of violations in a comprehensive, consistent and timely manner; consistent responses to violations through compliance assurance and

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enforcement actions that require appropriate changes to achieve compliance, prevent and deter future noncompliance, promote going beyond compliance and compel remediation of any harm caused by noncompliance; clear articulation of local, state, and federal roles and responsibilities; commitment of adequate staff resources, guidance and training to compliance and enforcement; and a process to evaluate program results.

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For the Clean Water Act Program, the Water Quality Control Division and EPA Region 8 will continue to work together to implement the EPA Administrator's Clean Water Action Plan that lays out three priorities:

- Target compliance assurance resources to the most important water pollution problem
- Strengthen oversight of the states
- Improve transparency and accountability

This effort continues and principally involves the Water Quality Control Division and EPA Region 8 identifying priorities for deploying respective resources and agreement on work sharing to achieve the greatest level of water quality protection/improvement. This approach will ultimately redefine the framework for prioritizing compliance and permitting actions and will require more significant change to the EPA/state approach to permitting and compliance assurance.

2.4.3 Community-Based Environmental Protection

CDPHE and EPA Region 8 offices will be working to encourage community-based programs along with effective partnerships in several areas throughout Colorado. The community-based environmental protection concept promotes a "place-driven approach" rather than a "program-driven approach".

In addition, CDPHE will continue its commitment to community preservation. The divisions of the Office of Environmental Programs will provide a comprehensive array of resources for communities to access and utilize. Such examples as Brownfields, grants to communities for water treatment facilities, pollution prevention grants, supplement environmental projects and air program grants will assist communities in meeting capacity, infrastructure and data needs. As CDPHE data capabilities expand, CDPHE will assist communities to better understand and respond to community problems and to assist in helping communities define their vision of a sustainable quality of life.

2.4.4 Other Priorities

CDPHE and EPA agree to the following priorities:

- Mitigating environmental impacts from energy development
- Improving air quality including attainment of national ozone standards
- Compliance with national drinking water standards

2.5 Strategic Investments and Innovations

This section sets forth the parameters both agencies agree to when developing, implementing and evaluating innovative programs and projects in Colorado.

2.5.1 Investing in Innovation

CDPHE and EPA Region 8 recognize the need for resource investments to develop new strategies and new ways of doing business in order to meet emerging environmental protection challenges. In light of impending reductions in federal and state funding, new strategies and new ways of doing business are needed to sustain and improve critical core program work as well as to address emerging challenges.

2.5.2 Creating a Work Environment to Support Innovation and Non-Traditional Program Implementation

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CDPHE and EPA Region 8 management will proactively support the following key practices to create and sustain an innovative work environment:

- Encourage environmental problem solving and collaborative efforts to achieve environmental results;
- Encourage creative thinking that achieves program goals in non-traditional ways.
- With management approval, reward experimentation that is intended to improve our programs and human health and the environment;
- Communicate to agency staff and external stakeholders the opportunities and challenges of the agencies' innovation and non-traditional projects;
- Communicate between CDPHE and Region 8 to identify and collaboratively address issues early in the process;
- Allow sufficient time for innovations and non-traditional projects to evolve and to be appropriately evaluated;
- Place innovative programs and non-traditional projects on equal par with established traditional core programs; and
- Ensure that the innovations and non-traditional projects are measured appropriately and fairly.

2.5.3 Mainstreaming Innovation into Agency Processes

CDPHE and EPA Region 8 are committed to fully integrating innovation and non-traditional projects into the planning, resource allocation and evaluation processes of each agency and expressly as part of the agencies' CEPPA. With respect to the planning process, the agencies agree to take specific actions to foster innovations and non-traditional projects, including:

- Actively seek potential innovation and non-traditional projects and identify them as part of the ordinary program planning and CEPPA planning activities of CDPHE and EPA and agree upon resource allocations for these projects,
- Hold periodic meetings with staff to promote "bottom up" innovation, non-traditional projects, and capacity building ideas, and
- Expressly incorporate planned innovation, non-traditional projects, and capacity building projects into the agencies' annual plans, the CEPPA and related implementation plans.

2.5.4 Strategic Resource Investments and Divestments to Support Innovation

CDPHE and EPA agree that innovations and non-traditional projects require strategic resource investments and divestments. While maintaining support needed to fulfill core program functions, CDPHE and EPA will strive to devote the necessary resources, if available, to fund and evaluate the innovations and non-traditional projects presented here.

2.5.5 Measuring Innovative Work

CDPHE and EPA are committed to measuring, evaluating, and learning from all innovation and non-traditional projects. To accomplish this, the agencies agree to the following:

- Each identified innovation and non-traditional project will include a measurement and evaluation component;
- The agencies will strive to include environmental outcome measures whenever possible, but also may employ activity counts and other performance measures as appropriate; and
- The agencies may support projects that require longer-term measures or the creation of new types of measurement approaches if easily attainable short-term measures are not readily available.

2.6 Quality Management Plan

The department has an approved Quality Management Plan (QMP) and has been collecting and managing data under that plan. Department staff is actively updating this plan so that it may be renewed by the end of 2015.

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Once the Department plan is renewed, the environmental divisions will be required to update their existing plans to match with the Department plan.

2.7 Energy Development - Oil and Gas Consultation

The Department obtained responsibility to consult with the Colorado Oil and Gas Conservation Commission (COGCC) on public health, welfare, safety and environment during the 2008 rulemaking hearings. The consultation responsibilities are triggered by: 1) requests for variances to environmental rules for oil and gas development; 2) requests for an increase to well density; or 3) local government requests for consultation.

In fulfilling this role, the Oil and Gas Liaison coordinates the environmental reviews conducted by the Water Quality Control, Air Pollution Control and Hazardous Materials and Waste Management Divisions for drilling permits meeting one of the three triggers listed above. The Department recommendations are submitted to the COGCC for consideration in the review of applications for drilling permits or well density requests.

The Oil and Gas Liaison is involved with Department energy related projects and serves on the STRONGER Board of Directors assisting in reviews of other state oil and gas regulatory programs. This position also coordinates CDPHE's input on potential oil shale development, reviews BLM oil and gas development plans and conducts oil and gas outreach meetings to discuss environmental and public health issues with local governmental officials and the general public.

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Chapter 3 DIVISION OF ENVIRONMENTAL HEALTH AND SUSTAINABILITY

3.1 Overview

Colorado is a truly great place to live with clear skies, distinct geography and world-class recreational opportunities. These attributes continue to keep Colorado as one of the fastest growing states in the nation. Yet population increase brings along challenges in sustaining Colorado's high quality of life, environment, and unique ecosystems. The work of the Division of Environmental Health and Sustainability (the division) helps advance our vision of a sustainable Colorado through the implementation of programs and activities as well as through engaging strong partners. In addition, the division continues to enhance its ability to collect and report information to the public on how activities result in direct benefits to our state.

The division is comprised of several work units, including the: Sustainability Unit; Environmental Agriculture Program, Direct Programs Implementation Unit; Institutions and Emerging Programs Unit; Retail Food Program, and Fiscal & Administrative Unit. The division is dedicated to the goal of protecting and improving Colorado's environment and human health through education, collaboration, and compliance assurance while promoting sustainability practices. Each unit is overseen by a manager and includes at least one workgroup lead to oversee day-to-day programmatic functions and advance the strategic goals and objectives of the department.

The Division is responsible for a diverse array of environmental health responsibilities, many of which are not subject to oversight by EPA. Examples of the Division's work outside the purview of EPA include: monitoring food, milk, and drugs; regulating food preparation environments such as restaurants, food manufacturers and processing plants; ensuring safe and sanitary conditions at day care centers and correctional facilities; regulating, reviewing and investigating foods; consumer products and household substances; coordinating consumer protection activities with local, state and federal agencies; and assisting consumers with complaints. Functions within the Division that are included in the PPA are activities administered by the Division's Sustainability Unit, Environmental Agriculture Program and Institutions and Emerging Programs Unit.

3.2 Structure

The principal functions of the Division of Environmental Health and Sustainability fall into the following units and programs:

Sustainability Unit

- Environmental Leadership Program
- Pollution Prevention Program
- Medication Take Back Program
- Small Business Ombudsman
- Pollution Prevention Advisory Board
- State Grant & Rebate Programs for Waste Diversion and Pollution Prevention
- Self Audit Law
- Environmental Justice
- Greening Government
- SARA Programs
- Supplemental Environmental Projects Coordination
- Cross-media and Emerging Environmental Issues

Environmental Agriculture Program

- Animal Feeding Operation (AFO, CAFO and HCSFO) Programs
- Cross Cutting Agricultural Sector Programs

Institutions and Emerging Programs Unit

- Child Care
- Local Assistance Program
- School Chemical Hazards
- Cottage Foods

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Retail Food Program *

- Retail Survey Standardization, Food Defense & Training Coordination
- Direct Service Compliance & Local Partners Coordination

Direct Implementation Unit *

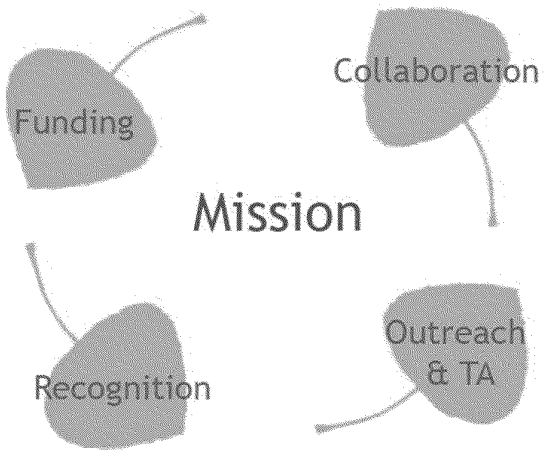
- Wholesale Food & Recalled Product Coordination
- Dairy Plant/Farms Coordination
- Penal Institutions, Tanning & Body Art

* These program and units do not administer programs under the purview of EPA authority.

3.3 Program Descriptions

3.3.1 Sustainability Unit

The mission of the Sustainability Unit is to instill a sustainability perspective in all of CDPHE's work and to encourage practices that protect and improve the environment, grow sustainable business, and lead to healthy communities. The unit provides resources that support community efforts to be innovative in reaching these goals. In order to accomplish this mission, the unit implements programs falling under four main focus areas: Funding; Recognition; Outreach and Technical Assistance; and Collaboration and Partnerships.



3.3.1.1 Funding

Supplemental Environmental Projects

The Division's Sustainability Unit serves a coordinating role regarding the oversight of Supplemental Environmental Projects (SEPs). Agreements to implement SEPs are negotiated as part of enforcement settlements and result in beneficial environmental or public health projects that a regulated entity is not otherwise legally required to perform. SEPs are approved at CPDHE's discretion and at a minimum must go beyond mere compliance with applicable laws and regulations. To help guide the SEP process, the department developed a SEP policy that was last revised in 2008.

The SEP Coordinator in the Sustainability Unit acts as a liaison to third party SEP recipients, regulated entities and department enforcement staff. The SEP Coordinator also assists in ensuring that projects are completed successfully and achieve the expected project outcomes. Furthermore, with the goal of increasing community accessibility of the SEP Program and selecting high-quality projects, the SEP Coordinator has collaborated with regulated entities and enforcement staff to implement a more open and transparent process for large penalties.

Medication Take Back Program

This program provides a secure, convenient and environmentally-sound option for the disposal of unused and unwanted household medications at numerous locations in the greater Denver metro area. Unused medications are dangerous as they can fall into the hands of small children and cause accidental poisoning. More than 1 million children under age 5 are treated each year in the United States for poisoning caused by household chemicals and medications. When over-the-counter or prescription medications are no longer needed, they should be removed from the home and disposal done in a way that minimizes the chance of misuse and protects the environment. According to a recent survey, 20% of Coloradans admitted to flushing leftover prescriptions down the toilet. The medications collected through this program are sent to a specialized

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industrial landfill, offering a high degree of environmental protection. In 2015, the department received state General Funds to expand this program statewide.

State Grant & Rebate Programs for Waste Diversion and Pollution Prevention

The Pollution Prevention Advisory Board was created in 1992 to provide overall policy guidance, coordination and advice to the department on pollution prevention activities. The board also is responsible for approving certain state grant and rebate requests, including:

- The Recycling Resources Economic Opportunity Grants fund implementation projects that promote economic development through the productive management of recyclable materials that would otherwise be treated as discards. Since its inception, the grant has awarded more than $9 million to Colorado businesses, local governments, nonprofit groups and schools and universities throughout Colorado to help develop recycling infrastructure.

- The Pollution Prevention (P2) Grant funds are designed to support P2 activities and technical assistance for businesses. The funds also are used as matching dollars in the department's EPA P2 grant application.

3.3.1.2 Outreach and Technical Assistance

Pollution Prevention (P2) Program

The Sustainability Unit is dedicated to promoting and supporting long-term process improvements and best management practices that reduce or eliminate waste before it is generated in commercial and industrial scenarios. Specifically, the unit advances P2 goals through the implementation of the following activities:

- Conducting technical assistance, outreach and training on P2 and sustainability concepts to Colorado businesses;
- Continuation of Agricultural P2 activities;
- Promoting strategic and innovative P2 techniques through the development of Colorado-specific case studies; and
- Integrating P2 concepts and expertise into our regulatory programs.

SARA Title III (EPCRA) Programs

The SARA Title III programs provide for the collection and tracking of information regarding the use, storage, production and release of hazardous chemicals at Colorado facilities using their annual Tier II Hazardous Chemical Inventory reports and annual Toxic Release Inventory reports.

Small Business Ombudsman

The Small Business Ombudsman serves as a troubleshooter and a liaison between the department's environmental programs and small business owners and managers. In addition, the ombudsman serves an oversight role to the department's Small Business Assistance Program, coordinates the department's Compliance Advisory Panel and renders advisory opinions as to whether regulations, policies, and guidance appropriately consider the concerns of small businesses.

Greening Government

An executive order issued in 2005 by former Governor Bill Owens established the first Colorado Greening Government Council. In 2014, after nearly a decade and three administrations, the council embarked on a substantial strategic planning process that resulted in the development of a new vision and structure for the council that is built on bottom-up leadership and continued support from executive orders. The Greening Government Leadership Council engages state employees and helps Colorado state government agencies establish and carry out a vision of sustainability for Colorado business operations through collaborative action,

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education, and leadership. In support of the council, the Sustainability Unit provides administrative and technical support in addition to coordinating the department's own greening government activities. The Sustainability Unit directs, manages and oversees progress towards the department's environmental goals as well as assists other state agencies in meeting the goals established in the executive order.

3.3.1.3 Recognition

Environmental Leadership Program

The Division's Colorado Environmental Leadership Program (ELP), is a voluntary program designed to recognize and reward organizations and businesses that demonstrate superior environmental performance and, as a result, consistently operate at a level that goes beyond mere compliance with environmental regulations. Membership in the program is open to all types of organizations and businesses from large corporate entities to small businesses, government agencies, nonprofits, and academic institutions. To participate in the leadership program, an organization must meet ELP eligibility related compliance requirements and fit within a specific tier of the program. In exchange, leadership members are provided recognition and regulatory and non-regulatory benefits and incentives from the State (incentives are specific for each tier level).

Through the ELP, technical assistance will be provided on EMS development as well as source reduction and other P2 initiatives. An EMS requires a company to determine their most significant impacts to the environment. Goals are then set to reduce those impacts, which in turn generally result in economic benefits and improved environmental performance.

3.3.1.4 Collaboration and Partnerships

Environmental Justice

The department works to integrate awareness of health equity and environmental justice concerns into existing environmental programs at all levels. In 2012, the department created the Health Equity and Environmental Justice Collaborative with representation from each department division. The mission of the collaborative is to build an organizational culture that empowers and supports staff at every level in addressing the root causes of health inequity and environmental injustice. The collaborative aims to advance this mission through communication, shared data, training, and the application of health equity and environmental justice principles in everyday work. Furthermore, the collaborative seeks to develop and implement department-wide policies and guidance that support this work. The Sustainability Unit plays a unique role in this cross-cutting effort by actively participating in a number of collaborative work groups and by acting as the EPA liaison to the department on environmental justice.

Self-Audit Law

The Colorado Environmental Audit Privilege and Immunity Law enacted in 1994, provides that all state civil and administrative penalties and penalties for criminally negligent violations of Colorado environmental laws may be waived if such violations are voluntarily disclosed as the result of an audit conducted by or for the entity. The audit law is codified at section 13-25-126.5 of the Colorado Revised Statutes (audit privilege); section 13-90-107, C.R.S., (testimonial privilege); and section 25-1-114.5, C.R.S., (penalty immunity). The Sustainability Unit coordinates the department's implementation of this law and notifies EPA in accordance with the terms set forth in the protocols for implementation section of the Colorado Audit Privilege and Immunity Law, Memorandum of Agreement and the department's Self-Audit Policy. EPA and the department consider self-audit immunity submittals to the department to be equivalent to an inspection or compliance evaluation and the department shall appropriately document these submittals.

Cross-Media and Emerging Environmental Initiatives

The department is committed to efficiently targeting its resources to address environmental problems within the state. The Sustainability Unit helps to coordinate a forum for communication, resource sharing, and innovative problem solving among the various health and environmental disciplines at the department. The focus of this effort is

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to encourage environmental and public health staff to work together, and with the regulated community, to utilize innovative, cross-media strategies to identify, address and resolve environmental problems. This approach enhances the department's ability to deliver cost-effective environmental services.

The Cross-Media Innovation and Strategy Team (CMIST) facilitates communication between divisions and programs to identify opportunities for implementation of cross-media strategies. Effective cross-media strategies can reduce duplications of effort across divisions and streamline compliance assistance activities among regulated sectors. Some of the department's current or anticipated cross-media projects include: Polycyclic Aromatic Hydrocarbons (PAHs) and environmental health, Rural Colorado Priorities Project, and the Colorado Medication Take-Back Program rules development.

Another cross-divisional team within the department is the Cross-Media Enforcement Team. This team works to streamline and better integrate enforcement policies, approaches, and guidance. The increased collaboration of environmental staff provides the department with a more consistent and effective compliance and enforcement presence.

The Sustainability Unit addresses emerging environmental and health issues such as mercury pollution, pharmaceuticals in the environment and other emerging contaminants or pollutants that have not been effectively addressed by traditional regulatory programs. Included in this role are duties related to analyzing the relevance and importance of environmental and public health impacts caused by unregulated pollutants and/or emerging contaminants to determine and implement critical policy and program direction for the department.

Agricultural P2 Initiatives

The Sustainability Unit coordinates the Rocky Mountain National Park (RMNP) Ag Subcommittee and supports best management practices to reduce the release and volatilization of nitrogen compounds and ammonia from agricultural sources. In addition, the unit supports the Early Warning System as a promising method to reduce transport of nitrogen compounds from Colorado's Front Range and eastern plains to RMNP. The RMNP Ag Subcommittee comprises a diverse group of agriculture interests that are committed to working with Memorandum of Understanding agencies (EPA, National Park Service and CDPHE) to address excessive nitrogen deposition at RMNP. The Sustainability Unit also represents the department on actively recruiting Ag sector representatives to join the Environmental Leadership Program and recognize improved environmental performance.

3.3.2 Environmental Agriculture Program

The Environmental Agriculture Program is a sector-based program that administers an entire regulatory suite of air and water quality activities, including state-only and National Pollutant Discharge Elimination System (NPDES) programs applicable to animal feeding operations. The program conducts site inspections at animal feeding operations, develops and implements policies and regulations, provides compliance assistance and conducts compliance assurance activities. In addition, the Environmental Agriculture Program serves as a single-point of contact for the agricultural sector on environmental issues that cut across various CDPHE programs, such as permitting issues related to bio-fuel technologies, on-farm composting, etc.

3.3.3 School Chemical Hazards

The Division's school chemical hazards program consists of inspection activities, training and compliance assistance. Inspections are conducted in the 9 counties in Colorado that lack local health agencies. Training on school chemical hazards will be provided to inspection staff at local health agencies and school personnel.

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3.4 Division of Environmental Health and Sustainability FY 2016-2017 Work Plan

Sustainability Unit

Strategic Focus Area: Funding

Supplemental Environmental Projects

Supports EPA 2014-2018 Strategic Goals - Goal 1: Addressing Climate change and Improving Air Quality; Goal 2: Protecting America's Waters; Goal 3: Cleaning up Communities and Advancing Sustainable Development; Goal 4: Ensuring the Safety of Chemicals and Preventing Pollution.

Goals	Objectives	Timeline	Performance Measures
Support and advise Cross-Media Enforcement Team (CMET) on SEP related issues.	Review SEP and Eligible Governmental Entity policies annually and make recommendations to CMET as needed.	Annually	# policies reviewed: # CMET meetings attended:
Increase efficacy and efficiency of SEP program.	As requested by environmental divisions: coordinate directly with regulated entities to: present SEP policy and assist in finding appropriate SEP ideas; analyze and evaluate SEP proposals; track project progress and interim deadlines; and review SEP Completion Reports.	Ongoing	# SEP proposals evaluated: Finalized [#] SEP agreements totaling [$x,xxx,xxx]. # SEP Completion Reports reviewed:
	Administer SEP idea database and Sharepoint site; develop and administer the department's SEP website; develop SEP Report to track environmental outcomes from SEPs.	Ongoing	# new SEP ideas included in database: # hits on SEP website: Annual SEP Report posted on website Environmental and public health outcomes from SEPs are tracked using an internal Sharepoint site and available at any time upon request.
Increase community awareness of and access to the SEP program.	When appropriate, partner with regulated entities to implement a community SEP process.	Ongoing	# of times a community SEP Process was used # of SEP applications received # of SEP applications approved
	Create best management practices for implementing community SEP process.	September 2016	Guidelines developed and approved
	Present to local public health agencies, non-profits, and community groups on SEPs.	Ongoing	# of entities reached

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Sustainability Unit

Strategic Focus Area: Funding

Medication Take-Back Program

Supports EPA 2014-2018 Strategic Goals - Goal 2: Protecting America's Waters; Goal 4: Ensuring the Safety of Chemicals and Preventing Pollution.

Goal	Objectives	Timeline	Performance Measures
Reduce pharmaceuticals in the environment (PIE).	Execute new services contract for the Colorado Medication Take-Back Program to include collection of prescribed controlled substances. Continue program operation and expand its reach to include at least one law enforcement collection location in every Colorado county.	Ongoing	Signed services contract Pounds of medications collected # of locations added # of citizen inquiries
	Engage stakeholders and develop Take-Back Program rules for consideration and adoption by the Solid and Hazardous Waste Commission.	May 2016	Rules adoption by Commission # of stakeholder meetings
	Assist with the problem identification and outreach efforts surrounding PIE.	Ongoing	# of stakeholders contacted # of projects initiated

Sustainability Unit

Strategic Focus Area: Funding

State Grant & Rebate Programs for Waste Diversion and Pollution Prevention

Supports EPA 2014-2018 Strategic Goals - Goal 1: Addressing Climate change and Improving Air Quality; Goal 3: Cleaning up Communities and Advancing Sustainable Development; Goal 4: Ensuring the Safety of Chemicals and Preventing Pollution.

Goals	Objectives	Timeline	Performance Measures
Administer the P2 Grants Program from the state P2 Fund.	Assist and support PPAB in grant review and selection process.	Annually	# of new projects awarded for a total of $xx,xxx.

	Provide technical assistance to grantees. Track project progress and outcomes.	Annually	Environmental benefits of completed P2 grants
Assist and support PPAB and the Assistance Committee in implementation of the Colorado Recycling Resources Economic Opportunity Grant Program.	Assist in the development of criteria for grants. Announce grant solicitation and assist in the application evaluations.	Annually	Criteria developed Grants announced and awarded
	Support grant recipients and track project performance, make project results available to the public.	Ongoing	Projects completed in a timely manner Results available to public within 30 days of completion of each project Environmental benefits and jobs created
RREO Rebate Program	Assist in the development of criteria for rebates and announce rebate solicitation.	Annually	Criteria Developed # of rebates applications received and approved $xx,xxx total funding awarded

Sustainability Unit

Strategic Focus Area: Outreach and Technical Assistance

Pollution Prevention Program

Supports EPA 2014-2018 Strategic Goals - Goal 1: Addressing Climate change and Improving Air Quality; Goal 2: Protecting America's Waters; Goal 3: Cleaning up Communities and Advancing Sustainable Development; Goal 4: Ensuring the Safety of Chemicals and Preventing Pollution.

Goals	Objectives	Timeline	Performance Measures
Create cooperative partnerships among businesses, the environmental community and the department through which technical assistance, outreach and education activities are coordinated and conducted.	Provide on-site P2 Technical Assistance	Ongoing	Number of facilities visited Number of food manufacturers visited Number of facilities implementing at least one recommendation
	Provide Outreach, training and workshops on P2 and sustainability concepts	Ongoing	Number of training events Number of participants

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	Develop outreach materials and a Colorado-specific case study on an innovative P2 technique.	Ongoing	Number of outreach materials developed Number of people reached
Integrating P2 concepts into department regulatory programs.	Coordinate with department inspectors to distribute P2 sector-based information and make P2 referrals	Ongoing	Number of inspectors trained Number of outreach materials distributed Number of P2 referrals made
Increase employee engagement in sustainability activities.	Hold CDPHE-wide Cherry Creek Cleanups along the creek designated for CDPHE.	Fall & Spring 2016 and 2017	# of participants

Sustainability Unit

Strategic Focus Area: Outreach and Technical Assistance

SARA Programs

Supports EPA 2014-2018 Strategic Goal - Goal 4: Ensuring the Safety of Chemicals and Preventing Pollution.

Goals	Objectives	Timeline	Performance Measures
Effectively and efficiently implement the EPCRA/SARA Title III TRI and Tier II programs including all associated databases.	Receive and enter TRI (using the Exchange Network) and Tier II data from Colorado businesses (currently 9,000 facilities; 16,000 chemicals).	Annually TRI - July Tier II - March	Timely and effective data entry # of electronic Tier II reports received # of paper Tier II reports received
	Develop and maintain the TRI/Tier II database.	Ongoing	Database is searchable and maintained
	Assess SARA (P2) fees, generate and mail bills, monitor payments and follow-up with unpaid accounts.	Annually	Fees assessed and bills sent annually in December. $ total amount of fees assessed # bills sent
	Review state required fields for electronic reporting of Tier II reports using EPA Tier2Submit software. Updated as needed.	Annually	# of state fields updated

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Provide information on program internally, and to public and facilities.	Respond to inquiries regarding Tier II and TRI reporting and payment requirements from Colorado businesses.	Ongoing	# of inquiries received Response provided in a timely manner
	Respond to inquiries on information to the public and appropriate parties.	Ongoing	# of data requests # of public inquiries
	Consult with Health Equity and Environmental Justice Data Workgroup as requested, to discuss TRI and Tier II data needs and uses.	Ongoing	Datasets reviewed for HE & EJ use
	Generate chemical inventory reports for electronic transmittal to appropriate parties (LEPCs, CEPC, EPA, HMWMD Records Center, EMP).	Ongoing	# of Electronic Tier2Submit reports provided to appropriate parties

Sustainability Unit

Strategic Focus Area: Outreach and Technical Assistance

Small Business Ombudsman

Supports EPA 2014-2018 Strategic Goals - Goal 1: Addressing Climate change and Improving Air Quality; Goal 2: Protecting America's Waters; Goal 3: Cleaning up Communities and Advancing Sustainable Development; Goal 4: Ensuring the Safety of Chemicals and Preventing Pollution.

Goals	Objectives	Timeline	Performance Measures
Represent Colorado at the national and regional level as CDPHE's Small Business Ombudsman.	National: Serve on the 507 Programs national Steering Committee or various subcommittees (includes attending monthly conference calls and annual meeting, and providing relevant materials related to CO's program). Solicit comments on new/modified regulations from the small business community through CO's Compliance Advisory Panel (CAP) and provide, as appropriate to the national Steering Committee for	Ongoing	# of subcommittees participated on # of activities completed Contribute information to SBAP/SBO/CAP's Annual report submitted to EPA's SBO

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	submittal to EPA. Regional: Maintain connection to WY, Montana and Utah's 507 Programs (includes inviting them to CAP meetings and sharing information as requested or appropriate)		
Provide and track assistance provided to Colorado's small businesses.	Refer small businesses to technical resource in the Small Business Assistance Program (SBAP) and other Sustainability Unit programs as appropriate (such as RREO, P2, ELP, Emerging Contaminants, etc.). Send small businesses customer assistance evaluation surveys to gauge value of SBAP services, and provide summaries to CAP, SBAP and EPA.	Ongoing	# of calls received # referred to SBAP # of surveys sent to SBs Identification of positive trend in survey results compared to past survey data
Serve as a resource for small businesses.	Serve as an impartial resource for small businesses that have complaints or concerns about fair treatment by the environmental divisions. (includes reaching out to environmental divisions at CDPHE)	Ongoing	# of times assistance provided to business # of contacts made with environmental staff Environmental outcomes of assistance efforts
	Review SBAP guidance documents and provide comments to SBAP prior to issuance.	Ongoing	# requested and completed
	Provide training and outreach on tools available for small businesses and the assistance available through SBAP.	Ongoing	# of SBs reached
	Review SBO web page for improvements	Sept 2016	Revisions implemented
Support and coordinate the Compliance Advisory Panel.	Assist in ensuring the Compliance Advisory Panel is an effective resource for small businesses and CDPHE.	Ongoing	# CAP meetings held # of presentations presented to the CAP, including guidance documents, projects and issues for its advisory opinions # new members provided orientation/training

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Sustainability Unit

Strategic Focus Area: Outreach and Technical Assistance

Greening State Government Initiative

Supports EPA 2014-2018 Strategic Goals - Goal 1: Addressing Climate change and Improving Air Quality; Goal 2: Protecting America's Waters; Goal 3: Cleaning up Communities and Advancing Sustainable Development; Goal 4: Ensuring the Safety of Chemicals and Preventing Pollution.

Goals	Objectives	Timeline	Performance Measures
Administer Greening Government Program to reduce environmental impacts from state operations.	Participate as a lead state agency in implementing Greening Government programs and activities.	Ongoing	Annual report on Greening Government projects that were completed during FY 2014
	Attend and participate in regular meetings with other state agencies participating on the Greening Government Coordinating Council.	Ongoing	Participation at meetings # of meetings attended
	Establish an internal greening government team to increase employee engagement.	Ongoing	Team established # of members
	Identify targets and objectives for annual Greening Government Projects.	Ongoing	Setting Targets and Objectives and report results at the end of FY2015
	Implement projects to meet targets and objectives.	Ongoing	Environmental outcomes.
	Provide assistance to other state agencies.	Ongoing	# of agencies provided assistance
	Report on projects and efforts.	Ongoing	Develop Greening Government website Results communicated to employees
Encourage, award, and educate the use of sustainability practices throughout Colorado.	Provide education and training to business, state and local government, and employees on sustainability practices.	Ongoing	# of individuals reached Environmental and cost benefits if measurement is possible

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Sustainability Unit

Strategic Focus Area: Environmental Recognition

Environmental Leadership Program

Supports EPA 2014-2018 Strategic Goals - Goal 1: Addressing Climate change and Improving Air Quality; Goal 2: Protecting America's Waters; Goal 3: Cleaning up Communities and Advancing Sustainable Development; Goal 4: Ensuring the Safety of Chemicals and Preventing Pollution.

Goals	Objectives	Timeline	Performance Measures
Encourage organizations to go beyond compliance to achieve significant environmental benefits by providing meaningful incentives and recognition.	Plan and hold an annual awards and recognition event for new and renewing ELP members.	Annually each October	# of attendees
	Expand membership in the Bronze, Silver and Gold levels of ELP in order to further P2 activities and increase environmental benefits.	Ongoing	# of new gold leaders # of EMS assessed # of renewing gold leaders # of new silver partners # of new bronze achievers # of new food manufacturers
	Promote the ELP by providing ELP presentations to internal divisions, businesses, and other organizations.	Ongoing	# of internal presentations # of external presentations Total number of participants # of ELP referrals from state and local employees # of new members as a result of internal referral
Provide EMS technical assistance and P2 education and training to ELP members and potential members.	Promote the adoption of EMSs to environmental programs and state agencies by holding EMS training events.	Ongoing	# of EMS training events # of new companies applying to the ELP as a result
	Provide technical assistance and gap analysis for potential ELP members.	Ongoing	# of facilities provided assistance

	In partnership with Colorado Environmental Partnership, provide P2 and sustainability education and training to businesses, government, and department employees.	Ongoing	# of educational events held # of participants
Provide additional member services, mentoring and reporting.	Provide mentoring opportunities.	Ongoing	# of mentoring opportunities
	Develop general guidance for ELP members on how to measure, track and reports metrics	Ongoing	# of companies receiving guidance Improved data quality and understanding of calculating metrics
	Survey ELP members to obtain environmental results from implementation of improvement projects.	Annually by October 1	# of survey responses collected
	Develop an annual ELP progress report.	Annually by December 31	Completion and electronic distribution of report

Sustainability Unit

Strategic Focus Area: Collaboration

Environmental Justice

Supports EPA 2014-2018 Strategic Goals - Goal 1: Addressing Climate change and Improving Air Quality; Goal 2: Protecting America's Waters; Goal 3: Cleaning up Communities and Advancing Sustainable Development; Goal 4: Ensuring the Safety of Chemicals and Preventing Pollution.

Goals	Objectives	Timeline	Performance Measures
Serve as the department's liaison to EPA on environmental justice (EJ) issues.	Raise awareness within the DEHS and other CDPHE programs on Health Equity (HE) and EJ issues that affect daily work duties and responsibilities.	Ongoing	Documented environmental justice outcomes, if available # of documents/policies reviewed
	Participate in meetings between DEHS, and other CDPHE staff and communities, as appropriate. This may also include participating in community events.	Ongoing	# of events or meetings participated in for CDPHE # of CDPHE staff participating # of community members reached

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	Work with EPA to provide training to CDPHE staff on emerging EJ issues, as appropriate.	Ongoing	# of trainings on HE/EJ topics \# of attendees at CDPHE-HE/EJ trainings or educational opportunities
	Meet regularly with EPA to discuss EJ issues of mutual concern. Assist in bringing EJ training opportunities to CDPHE.	Ongoing	# of events or meetings with EPA attending (e.g., Denver Env Equity Forum, EPA EJ training, etc.)
Participate in the CDPHE Health Equity/Environmental Justice (HE/EJ) Collaborative.	Actively participate in identifying and implementing CDPHE's path forward regarding HE and EJ issues.	Ongoing	# of meetings attended Guidance, tools and training shared with staff and EPA, and added to intranet site
	Review EJ-related documents/policies, collaborate with department staff on EJ projects or efforts (obtain information from EPA, community newsletters, contacts).	Ongoing	Adoption of a comprehensive HE/EJ policy to guide CDPHE programs and activities Adopt improved stakeholder involvement process in CDPHE's regulatory programs

Sustainability Unit

Strategic Focus Area: Collaboration

Self Audit Law

Supports EPA 2014-2018 Strategic Goals - Goal 5: Protect Human Health and the Environment by Enforcing Laws and Assuring Compliance.

Goals	Objectives	Timeline	Performance Measures
Maintain the Self-Audit Policy and partner with EPA.	Abide by the Memorandum of Agreement and the EPA Self-Audit Policy.	Ongoing	# of entities submitting Self-Audit Requests
Maintain internal contacts with each CDPHE division.	Coordinate Self-Audit submittals to appropriate divisions	Ongoing	# of Closed Self-Audit requests \# of Open Self-Audit requests
Continue to expand, enhance and update the Self-Audit website.	Provide access to information as appropriate	Ongoing	# of internet hits

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Sustainability Unit

Strategic Focus Area: Collaboration

Cross Media and Emerging Environmental Initiatives

Supports EPA 2014-2018 Strategic Goals - Goal 1: Addressing Climate change and Improving Air Quality; Goal 2: Protecting America's Waters; Goal 3: Cleaning up Communities and Advancing Sustainable Development; Goal 4 Ensuring the Safety of Chemicals and Preventing Pollution.

Goals	Objectives	Timeline	Performance Measures
Assist in the coordination of CDPHE innovations and cross-media approaches and strategies.	Coordinate regular Cross-Media Innovation and Strategy Team (CMIST) meetings to discuss cross-media opportunities and projects. Discuss emerging contaminants and other emerging environmental issues.	Ongoing	# of meetings held # of CDPHE staff participating in CMIST efforts # of projects identified Outcomes of projects
Streamline and integrate enforcement policies and guidance in a consistent manner across the department.	Participate in the Cross-Media Enforcement Team.	Ongoing	# of meetings held Outcomes of meetings
Reduce mercury in the environment.	Explore opportunities for mercury reduction and recycling programs.	Ongoing	#of projects implemented and resulting environmental outcomes

Sustainability Unit

Strategic Focus Area: Collaboration

Agriculture Pollution Prevention Initiative

Supports EPA 2014-2018 Strategic Goals - Goal 1: Addressing Climate change and Improving Air Quality; Goal 2: Protecting America's Waters; Goal 3: Cleaning up Communities and Advancing Sustainable Development; Goal 4: Ensuring the Safety of Chemicals and Preventing Pollution.

Goals	Objectives	Timeline	Performance Measures
Coordinate the Rocky Mountain National	Coordinate meetings of the subcommittee and interested stakeholders.	Ongoing	# of meetings held

Park (RMNP) Agricultural Subcommittee.	Develop incentives to promote implementation of ammonia reduction best management practices (BMPs).	Ongoing	# of incentives recommended and/or implemented
	Develop outreach materials to educate agricultural producers on agriculture's contribution to nitrogen deposition in RMNP. Plan for at least two Ag Outreach seminars in 2016-2017	Ongoing	# of outreach materials developed and distributed # of producers reached
	Coordinate with CSU and other partners to assure continuous ammonia monitoring and science-based information is reported back to the committee.	Ongoing	# of summaries provided
	Seek resources (grants) to support BMP research, outreach, monitoring, etc.	Ongoing	# of grants applied for and awarded # of ammonia-related outcomes of projects
	Participate in contingency plan measures updates, if applicable.	Ongoing	# of contingency measures developed and actions taken to implement measures
Serve as lead on NRCS Air Quality Committee	Work to implement recommendations from the crop and livestock sectors into NRCS conservation programs, including air and water quality conservation practices.	Ongoing	# of recommendations made to the NRCS State Technical Committee # of recommendations supported or implemented by NRCS within existing programs
	Work with USDA Natural Resources Conservation Service to promote ammonia reduction BMPs.	Ongoing	# of BMPs promoted to Ag producers.
Increase compliance assistance and pollution prevention information to agriculture sector.	Provide outreach and interpretation to livestock producers on applicable solid waste and industrial waste water requirements.	Ongoing	# of producers seeking assistance on cross-cutting issues (i.e., composting and biofuels, etc.)
	Coordinate communication within environmental divisions on issues impacting agriculture. (i.e., biofuel technologies, land application of sludges, composting, pollution prevention opportunities, etc.) Assist with permitting issues and questions from the ag industry on cross-cutting technologies.	Ongoing	# of multi-media meetings held # of cross-cutting issues resolved # of producers assisted

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Environmental Agriculture Program
Animal Feeding Operation (CAFO, HCSFOS, AFO) Programs

Supports EPA 2014-2018 Strategic Goals Goal 2: Protecting America's Waters; Goal 5: Protecting Human Health and the Environment by Enforcing Laws and Assuring Compliance

Subgoals	Objectives	Timeline	Performance Measures
CAFO REGULATIONS Implement state- water quality regulatory programs specific to animal feeding operations (AFOs), concentrated animal feeding operations (CAFOs) and housed commercial swine feeding operations (HCSFOs) as appropriate.	Improve sector compliance through the development of effective water quality protection regulations that are in compliance with federal and state statutes and rules.	As necessary, update and implement state CAFO regulations to address CAFOs that are impacting water quality, or to reflect changes made to the federal CAFO rule.	Revise applicable state CAFO regulations within one year of the effective date of applicable federal rules. 100% consensus with all stakeholders on proposed regulatory revisions prior to the final state rulemaking hearing before the Colorado Water Quality Control Commission.
CAFO PERMITS Permit CAFOs in accordance with applicable federal and state regulatory requirements and deadlines. Reporting of permitted CAFO data to EPA.	• Certify permitted CAFOs under Colorado CAFO general permit no. COA 932000. • Permit any new discharging CAFOs in accordance with applicable federal and state regulations. • Enter all data requirements on permitted CAFOs into ICIS, including the required elements of the approved Nutrient Management Plan. • Participate as appropriate in quarterly meetings with EPA to discuss progress towards meeting annual permitting and enforcement commitments.	On-going Within 180 days of receipt of complete application. Mid Yr by April 30 EOY by Oct. 31 Quarterly, as scheduled	# of permitted CAFOs recertified under COA 932000. # of new CAFOs certified under permit COA 932000. % of permitted CAFOs entered into ICIS.

CAFO INSPECTIONS Conduct inspections to determine compliance with applicable federal and state regulatory and/or permit requirements.	• Inspect all permitted CAFOs at least once during the life of the permit, every unpermitted CAFO at least once every five years, and all medium AFOs at least once to determine if it is a medium CAFO. • Complete a minimum of 40 compliance inspections by the end of each inspection year (i.e., Sept. 30th) in accordance with Colorado's Inspection Plan. • Participate in up to four joint/oversight EPA/State CAFO inspections, in addition to any other oversight inspections that may be conducted. (EPA will contact the Ag Program to schedule joint/oversight inspections at facilities identified in the CAFO inspection plan.	Ongoing over rolling five year periods. Annually by Sept. 30	% of known CAFO universe inspected every five years (at a minimum). # of CAFOs inspected. # of medium AFOs inspected. % of return to compliance actions completed within established compliance deadline included in the follow up inspection report. # and type of [joint/oversight] inspections completed.
Report CAFO inspection information to EPA. Submit CAFO Inspection Plan to EPA.	• Enter all permitted CAFO inspections into ICIS. • Submit to EPA draft CAFO inspection plan that includes CDPHE inspection commitments for the coming federal fiscal year. • Finalize CAFO inspection plan within 15 days of receiving EPA comments.	Mid Yr by April 30 EOY by Oct. 31 Annually by Sept. 1 Annually by Sept. 30	% of permitted CAFO inspections entered into ICIS by established timeline. Submission of final CAFO inspection plans by established timelines.
CAFO ENFORCEMENT Maintain a high overall compliance rate with applicable state and federal water quality CAFO requirements.	• Evaluate all violations to determine appropriate response consistent with priorities established in CDPHE's Clean Water Action Plan, the CAFO compliance and enforcement strategy and the Animal Feeding Operations Enforcement Response Guide (AFO ERG).	Annually by Sept. 30	# informal enforcement actions issued. # formal enforcement actions issued. # of return to compliance results.

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	• Take timely and appropriate action when necessary against facilities to protect communities and the environment, including formal enforcement actions for any large or medium CAFO determined to have discharged to waters of the U.S. • Continue to update the AFO ERG and the compliance and enforcement strategy as necessary. • Enter enforcement actions into ICIS for permitted CAFOs.	Mid Yr by April 30 EOY by Oct. 31	Avg. no. of days to return to compliance after initial notice of violation and submittal deadline is provided to the facility.
CAFO END-OF-YEAR REPORTING & ACTIVITIES Submit PPA EOY reporting information to EPA.	• Report to EPA on the number of CAFOs permitted under Colorado general and individual CAFO permits. • Report to EPA on the number of inspections completed, inspection status and the status of inspection follow up activities. • Submit an electronic copy of the CAFO inventory to EPA and report on progress made toward inventory development. • Report to EPA on compliance assistance activities, training and presentations provided to the livestock industry.	Annually by Dec. 31	% of permitted CAFO renewals entered into ICIS within 60 days of effective date of the permit. % of enforcement data entered into ICIS by established deadline. EOY report and CAFO inventory submitted to EPA by the established timeline.

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Environmental Health
Regulatory Uniformity

Supports EPA 2014-2018 Strategic Goals Goal 2: Protecting America's Waters; Goal 4: Ensuring the Safety of Chemicals and Preventing Pollution; Goal 5: Protecting Human Health and the Environment by Enforcing Laws and Assuring Compliance

Subgoals	Objectives	Timeline	Performance Measures
Provide inspectional oversight to schools in rural areas.	Regulatory inspections performed in counties without local public health agencies under the jurisdiction of the department.	Ongoing	Percentage of schools with chemical laboratories inspected at least once during the performance period.
Provide training and assistance to state and local public health personnel to assure uniformity in the application of the new school regulation.	Train school inspection program staff of local organized county health department through joint regulatory school inspections and by providing technical assistance.	FY 2016	Complete 6 joint regulatory school inspections and provide technical assistance as necessary to assure competency by local public health agency in program administration by end of performance period.
Provide training and assistance to state schools to assure uniformity in the application of the new school regulation.	Coordinate the development and implementation of a classroom training course for school teachers and school personnel in county without local public health agencies under the jurisdiction of the department. Assist with the coordination and development of regulation training sessions for school teachers and school personnel in local public health agency jurisdiction.	FY 2016	Successful implementation of 1 school regulation training session for school teachers and school personnel in county without local public health agencies under the jurisdiction of the department. Successful implementation of 5 school regulation training sessions for school teachers and school personnel in local public health agency jurisdiction.
Increase uniformity of school regulation implementation and school inspection program administration.	Develop program standards to assure regulatory uniformity for school inspection programs administered by local public health agencies statewide.	FY 2016	Development of framework for school program standards for school inspection programs within local public health agencies.

Chapter 4 AIR POLLUTION CONTROL DIVISION

4.1 Overview

Chapter 4 of the CEPPA addresses the protection of air quality in Colorado. The agency with primary responsibility for protecting the air resources of Colorado is the Air Pollution Control Division (APCD) of CDPHE. This chapter includes:

- The APCD mission, goals, and organizational structure;
- Environmental conditions related to air quality in Colorado; and
- The PPA APCD work plan which includes program strategies, activities, and the program milestones or measures to show progress.

The PPA APCD work plan is organized according to the goals of both the CDPHE and the U.S. EPA, as reflected in:

- The Colorado Department of Public Health and Environment Strategic Plan, which contains the internal work plan for APCD; and
- The FY2014-18 EPA Strategic Plan.

Additionally, a significant amount of the APCD effort is conducted in cooperation with local health agencies in Colorado. The APCD may assist local agencies or contract directly with a local agency to assist in the implementation of delegated programs such as compliance monitoring and ambient monitoring.

4.2 Mission

The Mission of the APCD is stated below. In achieving this mission the staff and managers of the APCD will maintain consistency and coordination with other CDPHE programs, the EPA and other partners and stakeholders.

> The mission of the Air Pollution Control Division is to improve and protect the air quality in Colorado through the development and implementation of cost-effective and efficient air pollution control measures that are consistent with the requirements of state and federal law.

4.3 State and Federal Law, Mandates and Initiatives

In carrying out its mission, the APCD will meet the requirements of the federal Clean Air Act, Colorado Air Pollution Prevention and Control Act, and the applicable federal and state rules and regulations that implement the acts.

In addition to meeting these laws and mandates, the APCD will:

- Address new initiatives such as those assigned to the APCD by the Colorado Air Quality Control Commission or the Colorado General Assembly; and
- Ensure air quality problems are addressed that do not fall under federal or state programs.

4.4 Air Division's Major Goals

The Air Division focuses on three major goals with related sub-goals:

1. Achieve a level of air quality that protects and preserves human health
    a. Attain and maintain the National Ambient Air Quality Standards
    b. Protect citizens from exposures to air toxics

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2. Achieve levels of air quality in Colorado that protect the integrity of the natural ecosystem
    a. Protect environment from acid deposition damage - Ensure all Class I areas are protected from acid deposition impacts and other Air Quality Related Values are protected.
    b. Protect stratospheric ozone - Ensure the control of CFC compounds.
    c. Take action on climate change - Ensure greenhouse gas emissions are managed.
    d. Protect environment from Mercury contamination.

3. Achieve a level of ambient air quality that protects and preserves standards for visibility and aesthetic concerns for pollutants that cause odors.
    a. Improve Urban Visibility (Denver AIR Program Area and Fort Collins) - Ensure a decrease in the number of days the Colorado Visibility Standard is exceeded in the areas of applicability
    b. Reduce Regional Haze (for National Parks and Class I Wilderness areas) - Ensure natural background visibility conditions in all Mandatory Class I Areas by 2064 through the development and implementation of the Colorado Regional Haze SIP
    c. Control odors (state only program)

4.5 Air Quality Environmental Conditions

4.5.1 NAAQS

Colorado became the first state in the nation to come into attainment with all the national ambient air quality standards. That milestone was reached in 2002, and since that time trends in ambient air quality have continued to improve. However, with a stricter ozone standard established by the EPA in 1997, and unfavorable meteorological conditions for several years, the Denver and North Front Range area was designated by EPA as a non-attainment area for ozone in 2007. An even stricter ozone standard set in 2008 has resulted in more ozone violations.

Colorado developed an ozone action plan and state implementation plan (SIP) revision to meet the 1997 standard, the most recent of which was submitted to the EPA on June 18, 2009. The plan placed new emission controls on the oil and gas industry and expanded the motor vehicle emissions testing program to the North Front Range to include Fort Collins, Greeley and nearby areas. Colorado is in the process of evaluating its ozone action plan and SIP to ensure it will meet the stricter requirements of the 2008 standard. Colorado was designated by the EPA as a marginal nonattainment area for the 2008 ozone standard effective July 20, 2012. Colorado is set to become a moderate nonattainment area for ozone in 2015 which will require further SIP development.

4.5.2 Regional Haze

Across the country, visual range has been substantially reduced by air pollution. In eastern parks, average visual range has decreased from 90 miles to 15-25 miles. In the West, visual range has decreased from an average of 140 miles to 35-90 miles. Colorado has some of the best visibility in the West, but also has a number of areas where visibility is impaired due to a variety of sources.

Colorado's Regional Haze Plan demonstrates the current level of visibility impairment in National Parks and Wilderness Areas, and presents an enforceable strategy to achieve gradual and continuous visibility improvements. The EPA gave its final approval to Colorado's Regional Haze Plan in October of 2012 and reissued its approval of the plan on May 26, 2015 in response to a court petition to review its original approval. The plan will reduce the emission of approximately 71,000 tons of visibility-impairing pollutants in Colorado every year, including both nitrogen oxide (NOx) and sulfur dioxide (SO2) emissions. The reduction of NOx emissions also will be beneficial to reducing ground-level ozone in Colorado.

4.5.3 Greenhouse Gases

Colorado's 2007 Climate Action Plan projected that greenhouse gas (GHG) emissions would increase 81 percent above 1990 levels by 2020. Effective in 2011, new state and federal regulations require some of Colorado's

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largest industries to obtain permits if their GHG emissions are above certain levels, and to report their emissions to the EPA. Greenhouse gases, such as carbon dioxide (CO2) have been linked to climate change.

Under the permitting program, sources may need to limit their emissions of GHGs or utilize Best Available Control Technology to reduce emissions. The permitting program falls under the federal "Tailoring Rule," which has been submitted to the EPA for incorporation into the state SIP. The rule tailors emission thresholds to apply to the largest sources of GHGs.

On June 23, 2014, the U.S. Supreme Court issued its decision in Utility Air Regulatory Group v. EPA (Case No. 12-1146). The court said EPA may not treat greenhouse gases as an air pollutant for purposes of determining whether a source is a major source required to obtain a PSD or Title V permit. The court also said that PSD permits that are otherwise required (based on emissions of other pollutants) may continue to require limitations on greenhouse gas emissions based on the application of Best Available Control Technology (BACT). We and EPA are evaluating the implications of the court's decision.

A separate reporting rule administered by EPA requires facilities that emit 25,000 or more metric tons per year of CO2 equivalent to submit annual reports of the emissions to the EPA.

Non-regulatory GHG initiatives

Colorado has participated as a member of The Climate Registry for several years. The Climate Registry is a nonprofit collaboration among North American states, provinces, territories and tribes that sets standards to calculate, verify and publicly report greenhouse gas emissions into a single registry. The registry supports both voluntary and mandatory reporting programs and provides comprehensive, accurate data to reduce greenhouse gas emissions.

The Colorado Department of Public Health and Environment works closely with the Governor's Energy Office, primarily with its Greening Government Initiative that seeks to reduce energy usage from state buildings and fleets. The Air Pollution Control Division has helped analyze energy usage data to better understand where state government can reduce its emissions of GHGs.

The Division also participates in Clean Cities, a national coalition of government agencies and private businesses that works to reduce petroleum use in the transportation sector. Colorado has supported a Clean Cities grant application that, if awarded, would provide the state with funding to plan for development of its electric vehicle fleet.

4.5.4 Toxics

Toxic or hazardous air pollutants are those that are known or suspected to cause cancer or other serious health problems. Several air monitoring studies of toxics in Colorado have been done, including in Denver, Pueblo, Grand Junction and Garfield County. In general, the studies have found that most air toxics levels are low with a few localized exceptions related to specific sources. Urban areas where motor vehicles and industries are concentrated, have the most impacts in Colorado. Rural areas where oil and gas development occurs are also impacted, particularly areas associated with specific development activities.

While no ambient air quality standards have been set for air toxics, the EPA published an original list of 188 air toxics and has developed National Emission Standards for Hazardous Air Pollutants (NESHAPS) specific to those pollutants. The state routinely adopts Maximum Achievable Control Technology requirements to implement the federal NESHAPS. The requirements are technology-based controls or work-practices for specific industries and are designed to reduce hazardous air pollutant emissions to a maximum achievable degree, taking into consideration the cost of reductions and other factors.

Air toxics also are reduced through automobile inspection and maintenance, ozone reduction measures such as condensate tank controls to reduce volatile organic chemicals, chlorofluorocarbon reduction and phase-out, mercury pollution prevention and emission reduction efforts, a diesel school bus and emissions control retrofit program, and pollution prevention in industries and communities statewide.

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4.6 Organizational Structure of the Air Division

The Air Division is organized into six program areas as listed below. Performance Partnership Grant funds are utilized in all programs listed:

Air Pollution Control Division **Director's Office**						
Planning and Policy Program	Mobile Sources Program	Stationary Sources Program	Compliance and Enforcement Program	Indoor Environment Program	Technical Services Program	Administrative Program
SIP planning Regulatory development Small Business Assistance Transportation conformity Air quality advisories Education and Outreach Environmental assessments Emerging issues Regional collaboration Integrated air toxics efforts Regional Haze planning Climate change planning	Alternate fuels High altitude emissions testing and research Automotive Inspection and Readjustment (A.I.R.) Diesel emissions control Oxygenated and clean fuels Remote sensing Smoking vehicles	Operating permits Construction permits Inventory & technical support Oil and gas	Enforcement Inspections Field services Compliance assistance	Asbestos Lead-based Paint CFCs Indoor Air Quality	Ambient air quality monitoring Air pollution modeling Inventory development Rural acid deposition and visibility research Air quality forecasting - summer/winter Prescribed fire/smoke management Quality assurance	Fiscal policy and planning Division budget development, expenditure and revenue management Contract/procure-ment management Information technology support in coordination with the State's Office of Information Technology Personnel and human resource coordination and support

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4.7 Air Pollution Control Division FY 2016-2017 Work Plan

APCD Goal 1: Achieve a level of air quality that protects and preserves human health

Sub-goals include:

- Attain and maintain National Ambient Air Quality Standards
- Protect citizens from exposures to toxic air pollutants

EPA 2014-2018 Strategic Plan:

- **Goal 1: Addressing Climate Change and Improving Air Quality**
- **Goal 4: Ensuring the Safety of Chemicals and Preventing Pollution (Reduce Children's Blood Lead Levels)**
- **Goal 5: Protecting Human Health and the Environment by Enforcing Laws and Assuring Compliance**

Program Strategy	Activity	Milestone/Measure
MOBILE SOURCE PROGRAMS		
1.1 Operate Automobile Inspection and Readjustment (A.I.R.) Program and Clean Screen Program - Regulation No. 11	Operate A.I.R. program in Denver metro and North Front Range areas.	Ongoing
	Integrate North Front Range IM Program into state ozone SIP	Work with Policy and Planning, RAQC, and AQCC
	Ensure that the A.I.R. program in Denver metro and North Front Range areas is consistent with and continues to meet all SIP requirements.	Ongoing
	Inspector training/certification maintained.	Ongoing
	Data collection and processing systems maintained.	Ongoing
	Support field enforcement activities by Dept. of Revenue.	Ongoing
	Monitor program quality and performance.	Ongoing. Annual report developed each year.
	Provide support to customers, inspectors, auto entities and repair technicians.	Ongoing
1.2 Operate Diesel Inspection and Self-	Similar operation and training measures as A.I.R. Program.	Ongoing

Program Strategy	Activity	Milestone/Measure
certification Program - Regulation No. 12 (State only)	Work with our counterparts at the regional and local levels to support the Colorado Clean Diesel Program. Continue to implement best practices as part of the Colorado Diesel Self-Certification Program.	Ongoing
	Support legislative and/or regulatory changes that permit the use of OBD or other innovative IM diesel tests that may be used to supplement or replace the current diesel test methods.	Track and respond to diesel bills in the legislature. Modify Regulation No. 12 as needed.
1.3 Develop and participate in mobile source air quality improvement strategies	Contribute to and engage in new ozone SIP developments.	Ongoing
	Participate in RAQC's Mobile Source/Fuels subcommittee. Assist and contribute to the formation and development of mobile source SIP strategies. Provide technical support and analysis on potential mobile source strategies, conduct vehicle emissions modeling in behalf of SIP activities, and provide guidance on various potential fuel strategies.	Ongoing
	Track, research, and advise senior management on legislative activities in support of new SIP development.	Ongoing
	Develop modifications to AQCC Regulations as needed. Present proposed modified regulations to the AQCC for their consideration.	Ongoing
	Implement any necessary SIP strategies.	Ongoing
	Continue remote sensing activities	Ongoing
	Implement and continue smoking vehicle programs.	Ongoing
	Participate in Regional Air Quality Council programs.	Ongoing
	Continue to review auditor A.I.R. Program recommendations. Make changes to IM Program as needed.	Ongoing
	Conduct public outreach, with emphasis on the newly implemented IM program.	Ongoing
	Contribute area-wide assessment of RVP levels, and other gasoline parameters, as part of Ozone SIP development.	Ongoing. Conduct Summer and Winter gasoline surveys.
	Utilize MOVES model in SIP planning and mobile source air quality assessment activities. Continue participation in model improvement and development activities.	Ongoing
	Monitor Federal Renewable Fuels Program.	Ongoing

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Program Strategy	Activity	Milestone/Measure
	Monitor federal new Tier 3 vehicle emissions certification, GHG, and CAFÉ rules. Continue to contrast federal rules to California's LEV program, including the use of zero emitting vehicles.	Ongoing
	Examine the use of remote sensing to identify vehicles with high evaporative emissions.	Conducting research.
	Continue OBD effectiveness study.	Conducting research.
	Conduct vehicle OBD deterioration study. Study examines vehicle emissions deterioration in OBD equipped vehicles.	Conducting research.
1.4 Support mobile source strategies through technical studies and operation of testing equipment and facilities	Provide mobile source emission inventories and emission factors.	Ongoing
	Operate and maintain Technical Centers.	Ongoing
	Operate and maintain mass emissions testing facility.	Ongoing
	Conduct an analysis of Colorado fuel market including: volatility, ethanol content, market status and other parameters	Ongoing
	Contribute to division inventory report of actual annual emission data.	Ongoing
STATIONARY SOURCE PROGRAMS		
1.5 Conduct activities of the Construction Permits Program for stationary sources	Issue permits to minor sources in Colorado.	Number of minor source permits issued
	Issue synthetic minor permits to applicable sources in Colorado.	Number of synthetic minor permits issued
	Issue PSD permits.	Number of PSD permits issued
	Issue permits to major sources in nonattainment areas.	Number of NAA NSR permits issued
	Enter RACT/BACT/LAER determinations in EPA's clearinghouse database (RBLC) within 30 days following permit issuance, including the "application acceptance date" and "date of permit issuance."	Data entered on a continuing basis
	Prepare AIRS data entry and forward to Inventory Group.	Ongoing
	Track PSD increment periodically to meet the requirement of 40 CFR 51.166(a)(4).	Ongoing
1.6 Conduct activities of the Operating Permits Program for stationary sources	Ensure sources submit Title V applications for renewal.	Monitored throughout the year.
	Prepare AIRS data entry and forward to Inventory Group.	Ongoing
	Continue development of program with EPA guidance (Part	Ongoing

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Program Strategy	Activity	Milestone/Measure
	70) and input from affected parties.	
	Continue to issue proposed, initial, renewal, and modified Title V permits.	Ongoing
	Prepare and submit TOPS data to the Region for entry into EPA's national database.	Ongoing
	Address recordkeeping and information request requirements.	Ongoing
	Coordinate with EPA on petitions for Title V permits.	Ongoing
1.7 Operate stationary source emissions and facility data system	Utilize the Exchange Network to transfer the Emissions Inventory System information.	Ongoing
	Participate in ongoing training provided on National Emission Inventory.	Ongoing
Compliance and Enforcement Program:		
1.8 Develop regulations and strategies to support compliance with regulations	Continue to evaluate methods to incorporate P2 into regulations and permits.	Ongoing
	Provide support and training to engineers and inspectors (policy interpretation, settlement documents, assist in negotiation of settlements, enforcement data base).	Ongoing
	Revise NSR and PSD regulations as needed.	Ongoing
	Revise Reg. 6 - New Source Performance Standards.	Annual - Ongoing
	Revise Reg. No. 8 Parts A & E incorporating MACT and NESHAP rulemaking updates and development of cooperative federal/state work plan. To include: funding options; addressing 112(j) compliance deadlines; development and implementation of area source rules; development of information; incorporation of pollution prevention where appropriate; and analyses regarding air toxics.	Annual - Ongoing
	Revise Common Provisions, Regulation 1, Regulation 3, Regulation 4, Regulation 7 regulations to maintain an updated SIP or in respond to EPA SIP disapproval actions.	Ongoing
1.9 Continue oversight of local health department contracts and inspections	Negotiate contracts annually.	Local agency contracts follow the state fiscal year (July 1 through June 30).
1.10 Conduct compliance inspections and	Inspection review, assistance as needed, enter reports on ICIS-AIR, maintain tracking logs, monitor quarterly reports.	Compliance and enforcement activities ongoing; reports are reviewed and entered into ICIS-AIR as they are received, assistance is provided to local

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Program Strategy	Activity	Milestone/Measure
evaluations for industrial sources (major and minor) and final approval evaluations.		agencies as needed and upon request, monthly and quarterly reports are maintained to track local agency activity per contracts
Report information to EPA through the ICIS-Air Database.	Ensure proper certifications (odor & opacity) in place for local agency staff.	Contracts require agency staff attend and obtain opacity and odor certifications. Division does periodic spot checks of certification status.
	Operating and other final permits reviewed.	Ongoing
	Conduct final approval evaluations for facilities.	Ongoing; Sources are required to submit a "self-certification" for compliance with initial approval permits; Division reviews all of the required documents before approving the permit for "final approval"
	Perform stack testing, source audits and CEM certifications.	Ongoing Number of stack tests Approximately 600+ tests conducted per year Number of relative accuracy test audits Approximately 75 RATAs conducted per year
	Evaluate excess emission reports.	EERs are submitted on a quarterly basis and are reviewed in detail following submittal.
	Provide ICIS-AIR updates as necessary through:	ICIS-AIR updated approximately once per month, including all of the MDRs on all sources; all CMS sources are flagged in ICIS-AIR and HPVs are correctly identified; Division conducts periodic reviews to ensure data is correct
	1. Provide timely data to ICIS-AIR as identified in the National Minimum Data Requirements (MDR's) on CMS sources evaluated or investigated, and on any other sources that are major according to CAA definition.	Ongoing
	2. Coordinate with EPA to ensure that CMS sources are flagged in ICIS-Air for inspection, and to ensure that high priority violations are correctly identified in ICIS-AIR.	
	3. Perform periodic reviews of ICIS-AIR data to ensure required data have been entered correctly.	
	Participate in Cross Media Innovation and Strategy Team	Ongoing
	Submit Compliance Monitoring Strategy to EPA	Submitted to EPA by September 30 of each year for the EPA fiscal year beginning on October 1.
1.11	Participate in High Pollution Advisory Program in Denver metro	Ongoing. Daily air quality "Action Day" forecasts are

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Program Strategy	Activity	Milestone/Measure
Conduct residential burning emissions control program	area.	issued from November 1 to March 31.
	Respond to and follow up on complaints.	Complaints are investigated as they are received.
	Coordinate with WESTAR and EPA in identifying PM2.5 and HAP emission contributions from minor source wood boilers and identifying possible control measures if necessary.	Division participates in workshops, trainings and discussions regarding wood boilers.
	Issue warning letters, compliance advisories, NOVs and compliance orders. Conduct AQCC hearings and Settlement Agreements (both state and local agencies)	Ongoing
1.12 Conduct general open burning program	Issue open burning permits and coordinate enforcement against illegal burning and open burning bans.	Ongoing
1.13 Conduct testing and evaluation of industrial sources	Maintain emissions and facility data system from new, revised and renewed APENs into data system.	Ongoing
1.14 Monitor local SIP commitments for Reg. No. 16 street sanding	Monitoring and assessing community SIP sanding reduction activities and reports.	Ongoing
INDOOR ENVIRONMENT PROGRAM		
1.15 Reduce asbestos exposure to the public through operation of the Asbestos Program	Conduct 200 inspections for compliance with Regulation No. 8 and NESHAP.	Ongoing Number of inspections completed
	Review notifications; issue abatement and demolition permits.	Ongoing Number of demolition permits issued Number of abatement permits issued
	Process certification applications; issue certifications.	Ongoing Number of certifications reviewed and processed for Workers, Supervisors, Building Inspectors, Management Planners, Project Designers, Air Monitoring Specialists and General Abatement Contractors. Number of registrations reviewed and processed for asbestos laboratories, training providers and asbestos consulting firms.
	Initiate enforcement actions; timely and appropriate resolution of cases.	Ongoing Number of non-school cases opened Number of non-school cases closed Number of school cases opened

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Program Strategy	Activity	Milestone/Measure
		Number of school cases closed
	Conduct outreach activities.	Ongoing Number of outreach activities conducted
	Incorporate asbestos enforcement requirements in local health department contracts.	The Asbestos Unit currently has contracts with three local health departments to perform asbestos inspections.
	Conduct Rulemaking, as necessary.	The Asbestos Unit will revise Colorado Reg. No. 8 when necessary.
	Enter data into a database for all asbestos NESHAP notifications and enforcement actions.	Data for all abatement, demolition, certification and enforcement actions is entered into the database on an ongoing basis.
	Implement the TSCA Asbestos-in-Schools Program according to federal and state rules.	The Asbestos Unit continues to implement the TSCA Program, assisting schools to manage asbestos in their buildings. Activities include inspections, being available as a resource for school personnel and responding to complaints. All grant related reports were filed with EPA in a timely manner.
1.16 Reduce occurrences of asbestos in schools	Conduct 48 TSCA/AHERA inspections. Conduct approval and maintenance audits of instructors and classes.	Ongoing Number of inspections conducted Number of course audits conducted
1.17 Operation of lead-based paint certification and abatement program.	Conduct 20 inspections for compliance with Regulation No. 19. Conduct 5 406(b) rule inspections.	Ongoing: Number of inspections conducted
	Implement the 406(b) rule (Part B of Regulation No. 19).	Ongoing.
	Process certification applications, issue certifications.	Ongoing: Number of certifications processed and issued.
	Conduct lead-based paint course audits. Conduct approval and maintenance audits of instructors and classes.	Ongoing: Number of audits conducted
	Initiate enforcement actions, timely and appropriate resolution of cases.	Ongoing: Number of actions initiated, Number of resolved
	Distribute educational materials.	Ongoing
	Partner with local health departments. Partner with state and local housing agencies.	Ongoing
	Conduct Rulemaking as necessary.	As needed
PLANNING AND POLICY - SIP DEVELOPMENT, REGULATORY DEVELOPMENT, REGIONAL COLLABORATION, EMERGING ISSUES, COMMUNITY RELATIONS AND		

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Program Strategy	Activity	Milestone/Measure
COMMUNICATIONS		
1.18 Develop and implement community based air quality programs in cooperation with local agencies or local governments	Monitor community initiatives in San Luis Valley, Lamar (to support maintenance SIP), Grand Valley - Grand Junction area, and other regions of Colorado as warranted.	Ongoing,
	Coordinate Western Colorado Regional Air Quality Collaboration, a voluntary community partnership to promote consistency and collaboration regarding air quality issues.	Ongoing
	Provide assistance to Garfield County community-based initiative to address natural gas development concerns.	Ongoing
	Work to Identify other at risk areas through monitoring or other methods.	Ongoing
	Respond to citizen concerns and inquiries regarding Colorado's air quality and air pollution control strategies	Ongoing
1.19 Develop and/or revise maintenance SIPs and redesignation requests for current nonattainment and attainment/maintenance areas in Colorado	Develop a moderate nonattainment area ozone SIP for the 2008 ozone NAAQS.	Air Quality Control Commission rulemaking in 2016. Submittal to EPA in 2017.
	Develop/Prepare Regional Haze 5-year Progress Report SIP.	Submit SIP to Air Quality Control Commission for proposed adoption in fall 2015. RH SIP due to EPA on May 25, 2016.
	Develop/Prepare 111(d) Clean Power Plan	Submit Plan to Air Quality Control Commission for review in 2016 and submit initial plan to EPA, followed by a final plan in 2017.
1.20 Develop and submit recommended NAAQS designations, as needed	Follow federal NAAQS revision process and prepare recommended designations to submit to EPA as needed.	As needed. Submit potential 2015 ozone NAAQS designation recommendations in 2016.
	Develop/Prepare List of SO2 Sources required to Model/Monitor air quality for future SO2 NAAQS designation	Submit source designations to EPA by January 15, 2016. Complete additional impact analysis by 2016 to ascertain compliance with standard.
1.21 Develop and submit Infrastructure SIPs	Develop and submit 2012 PM2.5 NAAQS infrastructure SIP/certification.	Submit to EPA in late 2015.
1.22 Develop and submit Interstate Transport SIPs	Prepare 2010 SO2 NAAQS Interstate Transport SIP.	To be developed based on EPA guidance.
1.23 Monitor transportation conformity determinations of MPO and CDOT	Monitor conformity determinations for Metropolitan Planning Organizations (MPOs) along Front Range.	Ongoing

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Program Strategy	Activity	Milestone/Measure
programs and projects - Regulation No. 10		
1.24 Support NEPA activities including review of air quality impacts disclosed in NEPA documents	Review and comment on documents/letters prepared for NEPA process such as Environmental Impact Statements and Resource Management Plans.	Ongoing
1.25 Conduct Regional Modeling for ozone and other purposes	Continue review National Air Toxics Assessments data and comment on proposed rules and policy.	Ongoing
1.26 Operate General Air Toxics Program	Work with other Division programs to seek funding for additional monitoring and grant funding (such as DERA grants).	Ongoing
	Complete additional diesel school bus retrofits contingent upon receipt of DERA funds.	Ongoing
	Improve oil and gas related emission inventories with additional focus on diesel truck traffic.	Ongoing
	Continue implementation of state-only and federal Mercury control/reduction rules. Assist with Mercury TMDL analysis as needed.	Ongoing
1.27 Implement cross-media initiatives	Continue coordination with other CDPHE programs in development and implementation of: Cross Media Programs, and Environmental Coordinating Committee.	Ongoing
1.28 Operate Small Business Assistance Program	Conduct industry workshops, data collection and coordination.	Ongoing
	Support Compliance Advisory Panel	Ongoing
	Update small businesses through site visits and technical assistance (MOU with Field Services Unit).	Site visits performed when requested by business, Field Services, or others.
	Provide consultations and site visits in accordance with MOU with Field Services Unit on enforcement referrals.	Site visits performed when requested by business, Field Services, or others.
	Outreach and coordination with local health departments.	Ongoing. Local health departments invited to workshops.

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Program Strategy	Activity	Milestone/Measure
	Participate in Cross Media Innovation and Strategy Team - sector projects and coordination.	Ongoing
	Develop End-of-year report on compliance assistance efforts	Ongoing - Report developed annually
TECHNICAL SERVICES PROGRAM -- MONITORING, EMISSION INVENTORIES, MODELING, PRESCRIBED FIRE		
1.29 Monitor Air Quality	Per CFR Schedule, submit all ambient criteria pollutant data to the Air Quality System (AQS). Per the Exchange Network requirements for regulatory and national system reporting, submit data in XML-format.	Ongoing
	Implement ambient air monitoring program in accordance with 40 CFR Part 58.	Ongoing
	Submit five-year Network Assessment.	Submitted by July 1, 2015 deadline. Next 5-year Assessment due by 7/1/2020.
	Submit annual SLAMS data certification.	Ongoing, due by May 1 each year.
	Operate and maintain monitoring sites statewide (gaseous, particulate, meteorology). Perform daily, weekly, monthly, quarterly, and semi-annual inspections, cleaning, and preventive maintenance per SOP schedules. Perform manual bi-weekly precision tests.	Ongoing
	Provide updates to department-wide Quality Assurance Management Plan (QMP) and submit to EPA as needed.	Completed in 2011. Full revision to be submitted to EPA by late 2015.
	Revise Quality Assurance Project Plan (QAPP) and submit to EPA.	Ongoing/revisions in progress, to be completed by late 2015 and submitted to EPA.
	Operate ambient air monitoring network in accordance with QAPP.	Ongoing
	Modify and update CDPHE sites and data in EPA AQS System.	Ongoing
	Produce Annual Air Quality Data Report.	Ongoing

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Program Strategy	Activity	Milestone/Measure
	QA / QC Review.	Ongoing
	Submit Annual Network Plan to EPA that is oriented toward the new National Air Monitoring Strategy guidance. Review site files.	Ongoing, due by July 1 each year.
	Conduct daily forecasting, summer and winter pollution advisories, and prepare High Pollution Advisory Season and Summer Ozone Advisory Statistics.	Ongoing. Forecasting for Denver and Colorado Springs areas is required by CFR, based on population. Additional non-required forecast areas include Fort Collins-Greeley, Grand Junction, and Colorado River Valley.
	Continue Emergency Response Forecasting and Support to CDPHE Emergency Response Planning.	Ongoing
	Continue NCore monitoring station as approved by EPA.	Ongoing at LaCasa site in Denver.
	Maintain awareness of requirements for monitoring for new NAAQS. Install sites as needed to meet requirements.	Ongoing. Second near-road NO2 site in Denver installed in late 2015.
	Maintain awareness of new requirements for Exceptional Events. Flag data in AQS related to natural and exceptional events. Develop and submit documentation to EPA.	Ongoing. Calendar year flags and initial event descriptions in AQS by July 1 of the following year. Development and submittal of exceptional event documents is ongoing.
	Conduct Special Monitoring Projects.	As needed. Ozone precursor/NMOC sites ongoing in Denver/Weld county area. North Front Range Emissions and Dispersion Study commenced in 2013, scheduled to end 6/30/2016. Community-Scale Air Toxics Grant to commence in late 2015: Determining local scale air toxics gradients near the I-25/I-70 interchange in environmental justice communities in Denver, Colorado.
	Continue National Air Toxics Trends monitoring site in Grand Junction: Maintain and repair VOC/carbonyl, PAH and PM10/metals monitoring equipment. Install and maintain	Ongoing. QAPP/SOP updates to be completed and submitted to EPA in late 2015.

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Program Strategy	Activity	Milestone/Measure
	additional equipment as required. Perform calibrations and audits on the equipment. Interpret and report data received from the analytical lab. Submit data to AQS within 90 days after the end of each quarter. Provide quarterly analysis updates. Perform monitoring according to the NATTS Technical Assistance Document. Review and update QAPP as necessary.	
	Assist local agencies in special monitoring studies.	Ongoing. Work on a locally supported source air toxics study targeted at development activities in Garfield County is continuing.
1.30 Develop and Maintain Emissions Inventories	Provide updated emission inventory reports using new EIS system for point, nonpoint and mobile sources (type B) using 2015 emission data and based on the EPA-established reporting thresholds for SOX, NOX, VOC, PM2.5 and PM10, CO, Pb and NH3.	Ongoing
	Develop of an Integrated Approach / Methodology for Inventory Development.	Ongoing
	Support inventory development for state SIPs including Ozone SIP.	Ongoing
	Continue work on the 3-state pilot program: monitoring, emissions/data warehouse (as identified in the "2010 Three-State Pilot Project: Air Monitoring Site Installation and Operation, Emissions Inventory Data Warehouse Development - Colorado Workplan and Budget"), and modeling (as funding is available). This project will be re-named the "Intermountain West Data Warehouse".	Ongoing. Ozone/meteorological site near Elk Springs is operational. A site near Paradox is to be installed. Development and implementation of the Data Warehouse is continuing.
1.31 Conduct Air Quality Modeling	Conduct modeling for stationary source permits.	Ongoing
	Conduct regional modeling for ozone and other purposes.	Ongoing
	Conduct modeling for state SIPS as needed.	Ongoing. Current efforts include 75 ppb Ozone SIP bump-up to moderate, 1-hour SO2 designations.
1.32 Conduct Prescribed Fire Program	Implement prescribed fire program (develop MOU and issue permits for significant users of prescribed fire through implementation of state-only program through Reg. No. 9: Open Burning, Prescribed Fire and Permitting.)	Ongoing

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Program Strategy	Activity	Milestone/Measure
	Conduct oversight to ensure that permittees implement best air quality protection practices in prescribed burning events.	Ongoing
	Implement local delegation component of program.	Ongoing
	Continue evaluating and implementing recommendations from report developed by HB-09-1199 mandate to review and evaluate Smoke Management Program. Recommendations focus on improved and simplified permitting, communications, monitoring and observation of fires and smoke, resource identification and data analysis.	Ongoing Work is continuing on relaxing standard conditions, as appropriate. Work on pilot burns and subsequent data analysis is ongoing.

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APCD Goal 2: Achieve levels of air quality in Colorado that protect the integrity of the natural ecosystem

APCD Sub-goals include:

- Protect environment from acid deposition damage - Ensure all Class I areas are protected from acid deposition impacts and other Air Quality Related Values are protected.
- Protect stratospheric ozone - Ensure the control of CFC compounds.
- Take action on climate change - Ensure greenhouse gas emissions are managed.
- Protect environment from Mercury contamination.

EPA 2014-2018 Strategic Plan

- **Goal 1: Addressing Climate Change and Improving Air Quality:**
    - **Objective 1.1 Address Climate Change**
    - **Objective 1.2 Improve Air Quality**
    - **Objective 1.3 Restore and Protect the Ozone Layer**

Program Strategy	Activity	Milestone/Measures
2.1 Ensure acid rain minimized through operation of construction and operating permit programs	Issue permits to utilities.	Ongoing
2.2 Ensure acid deposition emissions are minimized through testing and evaluation of industrial sources	Conduct stack testing, source audits and CEM certifications for utilities.	Ongoing
	Evaluate excess emission reports for utilities	Ongoing
2.3 Ensure acid rain minimized though updates to Regulation No.18 as necessary	Revise regulation.	Ongoing
2.4	Annually assess monitoring/research data.	Ongoing

Program Strategy	Activity	Milestone/Measures
Reduce nitrogen deposition through implementation of Rocky Mountain National Park Initiative	Work with agricultural stakeholders to develop studies, projects, and Best Management Practices to reduce ammonia emissions	Ongoing
	Assess ammonia inventory categories regularly and potential reduction and/or communication strategies.	Ongoing
	Focus additional attention to RMNP in regard to AQRV impairment. Begin to review and update 2010 Contingency Plan. Continue tracking of nitrogen deposition reduction. Continue collaboration with Agriculture Subcommittee and other stakeholder groups.	Ongoing
2.5 Protect stratospheric ozone levels through minimizing emissions of CFCs from applicable sources	Equipment registration and facility notification.	Number of equipment items registered, Number of facility notifications
	Inspections (both state and local agencies) for compliance with Regulation No. 15.	Number of inspections conducted
	Training and outreach (including pollution prevention).	Ongoing
	Continue to negotiate local health department contracts annually for CFC inspections and enforcement.	Ongoing
2.6 Ensure man-made climate change impacts minimized	Develop policies and regulations as needed to implement the federal GHG rules.	Policies and/or regulations developed to allow state implementation of the federal GHG rules as necessary or directed by EPA.
	Issue Title V and PSD permits for GHG as provided in federal rules.	Ongoing
	Monitor and evaluate reduction strategies.	Ongoing
	Monitor legislative activity locally and nationally.	Ongoing
	Continue to coordinate with efforts to implement Governor's Climate Change Initiative and greening Government Executive Order	Ongoing
	Continue to coordinate with efforts to implement Governor's Climate Action Plan.	Ongoing
2.7 Reduce mercury pollution through Colorado cross-media programs	CDPHE Strategic Programming process (see discussion in Chapter 2 of PPA). Assist the Water Division with Mercury TMDLs analyses as needed and ongoing assessment of emissions and deposition.	Ongoing

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APCD Goal 3: Achieve a level of ambient air quality that protects and preserves standards for visibility and aesthetic concerns for pollutants that cause odors

APCD Sub-goals include:

- Improve Urban Visibility (Denver AIR Program Area and Fort Collins) - Ensure a decrease in the number of days the Colorado Visibility Standard is exceeded in the areas of applicability
- Reduce Regional Haze (for National Parks and Class I Wilderness areas) - Ensure natural background visibility conditions in all Mandatory Class I Areas by 2064 through the development and implementation of the Colorado Regional Haze SIP
- Control Odors

EPA 2014-2018 Strategic Plan

- **Goal 1: Addressing Climate Change and Improving Air Quality**

Program objective	Activity	Milestone/Measure
3.1 Reduce pollutants causing haze through the operation of mobile source strategies: Reg. No. 11 - A.I.R. Program Reg. No 12 - Diesel Inspection Smoking vehicles Clean fuels	Described earlier in work plan.	Described earlier Contributed to CDOT/Colorado Energy Office's "Energy Smart Transportation Committee" efforts to promote clean fuels and vehicles, such as CNG and electric vehicles.

Program objective	Activity	Milestone/Measure
3.2 Reduce pollutants causing haze through the operation of the stationary sources program objectives Operation of Construction and Operating Permit Programs Small Business Assistance Program Compliance monitoring and enforcement of stationary sources Wood burning Control Program - High Pollution Advisory Program and state and local woodstove regulations	Described earlier in work plan.	Described earlier
3.3 Support reduction of haze-causing pollutants through regulation updates	Described earlier in work plan.	Described earlier
3.4 Track program indicators through urban haze monitoring, inventories and modeling	Operate visibility monitoring network in Denver and Fort Collins (transmissometers, nephelometers and web cameras).	Ongoing
	Air quality "Action Day" forecasts year-round	Ongoing
	Conduct sample speciation and chemical mass balance modeling	Ongoing Supports exceptional event technical documents.
	Perform daily, weekly, monthly, quarterly, and semi-annual inspections, cleaning, and preventive maintenance per SOP schedules. Perform manual bi-weekly precision tests.	Ongoing
	Operate and maintain gaseous/continuous sites statewide.	Ongoing
	Operate and maintain particulate monitoring sites statewide.	Ongoing
	Operate and maintain meteorological monitoring equipment.	Ongoing
	Air Quality Forecasting and Air Quality Index (AQI) Reporting on a daily basis.	Ongoing
3.5 Implement the Colorado Regional Haze SIP	Develop SIP strategic plan to coordinate, to the extent allowed, planning efforts for ozone and Regional Haze.	Ongoing
3.6 Support Class I Attributable Visibility Impairment Visibility SIP	Assemble and analyze IMPROVE monitoring data using statistical methods such as factor analysis, trajectory models, and chemical mass balance models.	Ongoing, as needed.

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Program objective	Activity	Milestone/Measure
	Provide technical assistance to various visibility workgroups as requested.	Ongoing
	Participate in SIP calls.	Ongoing
3.7 Continue implementation of effective fire and smoke management and prescribed fire program	Develop and revise, as needed, Wildfire Response Plan and Protocol. During wildfire events and large prescribed fires, assist land managers in conducting PM monitoring. Coordinate with public information officer and meteorologist.	Ongoing
	Participate in the Front Range Roundtable as appropriate.	Ongoing
	Work with local communities and partnerships to address wildland fuels treatment as needed.	Ongoing
3.8 Track program effectiveness indicators through haze monitoring, inventories and modeling	Coordinate with Federal agencies and private entities conducting visibility, lake chemistry and acid deposition monitoring and research in Colorado. Agencies and contractors, to varying degrees, are also involved in AQRV model development.	Ongoing
	Perform audits of IMPROVE samplers.	Ongoing

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Chapter 5 WATER QUALITY CONTROL DIVISION

5.1 Mission

The Water Quality Control Division has responsibility for maintaining, restoring and improving the quality of the state's waters and assuring that safe drinking water is provided from public water systems for the people of the state. In short, the division's mission is to protect and restore water quality for public health and the environment in Colorado. In order to meet these responsibilities, division staff implement delegated programs authorized by the Clean Water Act (CWA), the Safe Drinking Water Act (SDWA) and Colorado statutes.

The Water Quality Control Division has developed a strategic plan for 2015-2019 outlining the division's mission, vision, values and strategic goals. The Safe Drinking Water and Clean Water programs have also developed work/action plans that clearly align the efforts of staff with the goals of the strategic plan. The strategic plan will be adjusted, as necessary, to reflect departmental revisions to strategic priorities and to incorporate new objectives. The division will collect data to quantify progress toward achieving targeted results. The division continues to pursue resources to enhance its ability to meet goals and persists in stakeholder discussions to gain support for a fee increase that will provide additional staff. The division continues to refine its inspection planning process to address a wider spectrum of discharging facilities.

5.2 Clean Water Act Program

A complete Clean Water Program consists of the following strategic functional elements: ambient water quality monitoring; water quality assessment; standards development (e.g., providing scientific support for adoption of standards and other control regulations by the Water Quality Control Commission); water quality management planning and Total Maximum Daily Load (TMDL) development; source control mechanisms (including permitting, facility siting approval), engineering plan review and approval; compliance assistance (including facility planning and financial assistance); compliance assurance (including evaluation of self- reported data, compliance sampling inspections, facility inspections and enforcement); and water quality restoration and enhancement efforts.

Environmental conditions, historically discussed in Chapter 1, are now addressed within each division's specific chapter. The water quality environmental conditions are based on data compiled for the 2012 Integrated Report: approximately 64,000 river miles met the federal Clean Water Act "swimmable" goal and over 54,000 river miles met the act's "fishable" goal. Of the river miles assessed, 2,000 miles fell short of the "swimmable" goal and about 11,000 miles did not meet the "fishable" goal. For lakes, a total of 73,000 acres met the "fishable" goal while 127,000 acres met the "swimmable" goal. Approximately 70,000 lake acres failed to achieve the "fishable" goal and 3,700 acres did not meet the "swimmable" goal.

As long as water quality deficiencies exist, there are potential public health problems of concern to the Colorado Clean Water Program. These include chemical and pathogenic contamination of source waters used for public water supplies in addition to gastrointestinal illnesses and other health problems (e.g., dermatitis, eye infections) that may result from water-based recreation in waters where standards are not attained.

Specific environmental problems in surface waters include those listed as impaired principally due to the following pollutants and activities: metals that are often located in areas of historic but largely abandoned mining activity; selenium in the Colorado and Arkansas River Basins; dredge and fill operations that could impair aquatic habitat; and non-point source runoff that may adversely impact in-stream uses. There continue to be concerns over the impact of water quality on aquatic habitat conditions in the Lower South Platte, Arkansas and Colorado Rivers and over the decline of Colorado native fishes in certain identified segments.

Groundwater quality in Colorado ranges from excellent in mountain areas where snowfall is heavy and development is sparse to poor in certain alluvial aquifers of major rivers where surface and groundwater are used and reused. Shallow, unconfined aquifers in Colorado are susceptible to contamination from surface activities. Many have become contaminated, especially with nitrates and salts, from agricultural activities and from urban development, particularly along the South Platte downstream from Denver. Rapid development in mountainous areas located on top of fractured crystalline rock and in alluvial valleys has increased the threat

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of high levels of nitrates and pathogens in groundwater from the use of individual septic disposal systems. Deeper bedrock aquifers tend to show higher levels of natural constituents but lower levels of surface contaminants, especially if the aquifers are confined.

5.3 Safe Drinking Water Act Program

The Safe Drinking Water Program's strategic functional elements include: source water protection; regulatory development (e.g., recommending treatment standards and performance requirements for public water systems for adoption by the Water Quality Control Commission); control mechanisms (e.g., ensuring public water systems comply with promulgated treatment standards); data management; compliance assistance (including engineering plan review, sanitary surveys, capacity development, technical assistance and financial assistance); compliance assurance (including compliance surveillance monitoring and compliance inspections such as sanitary survey follow-ups); and formal enforcement using civil or criminal authorities as appropriate.

As with clean water, environmental conditions related to drinking water are now addressed within this chapter. There are approximately 2,000 active public water systems operating in Colorado. Typically, six percent of these systems violate health-based regulations each year affecting about five percent of the population served. Moreover, about 450 systems fail to monitor and/or report for one or more contaminants as required by the *Colorado Primary Drinking Water Regulations*. Monitoring results reported by public water systems indicate that the most common contaminants causing health-based violations of drinking water regulations in Colorado are radionuclides, microbiological entities (measured by total coliform), nitrate, fluoride, arsenic and disinfection byproducts. Other violations include surface water treatment rules along with the most common - failure by systems to monitor/report. Surface water, including groundwater-under-the influence-of-surface water, is used by 27% of Colorado public water systems and provides drinking water to 90% of the population served. Groundwater is used by 73% of the water systems but provides drinking water to only about 10% of the population served. In some localities, groundwater is the sole source of drinking water. From an environmental standpoint, disposal of contaminated residuals from water treatment facilities, particularly for those removing radionuclides, continues to be an emerging concern.

5.4 Water Quality Control Division - Organizational Structure

The Water Quality Control Division consists of the following organizational units which address all of the above strategic functional elements of water quality management under authority of the CWA and the provision of safe drinking water under the authority of the SDWA. Figure 5.1 shows the Water Division's current organizational chart.

Figure 5.1

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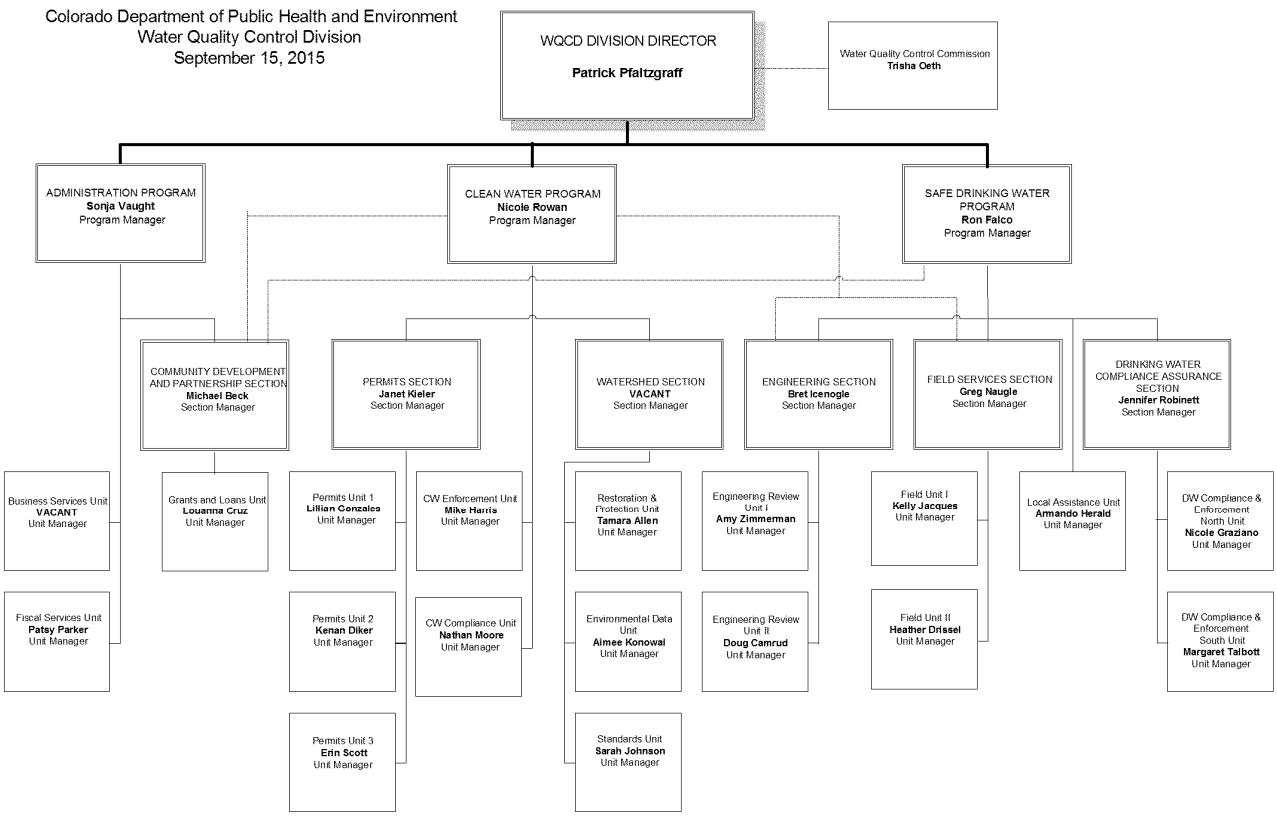

5.5 Water Quality Control Division Challenges

5.5.1 The Regulated Community

The scale and scope of the regulatory programs administered by the Water Quality Control Division are quite large. For example, there are over 100,000 stream miles in the state with designated water uses and standards assigned. The division has issued over 2,400 water discharge permits to municipalities and industries and approximately 5,000 stormwater permits. There are approximately 2,000 active public drinking water systems in Colorado with 5% of these systems serving 80% of the population. Colorado has drinking water systems and wastewater treatment systems in parts of the state where they did not exist a generation ago. In addition, new federal requirements, with respect to both the Clean Water Act and Safe Drinking Water Act, have imposed challenges for both the division and its regulated community. Small communities with resource limitations find it especially difficult meeting these requirements.

How does the division address these challenges?

- Compliance assistance. The division helps dischargers and water systems by answering regulatory and technical questions, conducting training, etc.
- Discharger compliance. With respect to dischargers, there are a variety of regulatory processes that can extend the time to full compliance: temporary modifications and discharger specific variances to standards; site-specific standards based on local conditions; and changes to compliance schedules in permits.
- Discharger violations. When compliance assistance and interim commitments do not produce improvement, enforcement measures are undertaken.
- Lack of facility resources. Low interest and zero interest loans are available through the division's partner agency, the Colorado Water Resources and Power Development Authority.

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- Source water protection. Colorado is blessed by containing the headwaters for most of the nation. As development occurs at higher elevation and elsewhere in the state, community efforts, with the help of the division, are accelerating to protect the watershed of drinking water systems.
- Water Quality Improvement Fund. State House Bill 06-1337 established a fund for addressing various water quality issues through provision of grants for the following: stormwater projects; design, construction, or upgrades of domestic wastewater treatment plants; and non-point source projects. The fund consists of penalties collected as a result of violations specified in the Colorado Water Quality Control Act.

5.5.2 Resource Needs for the Division

State Senate Bill 03-276 required that the division consult with the Water Quality Control Commission, Board of Health and interested parties to address a list of identified questions evaluating the implementation of the Clean Water Act and Safe Drinking Water Act at the state level. After an extensive outreach and stakeholder process, the division issued the Senate Bill 276 Report which responded to these questions and projected a resource gap between available division staffing and resources and what was needed at that time. In the 2006 and 2007 legislative sessions, the legislature provided a total of 22 full-time exempt positions (12 clean water, 10 drinking water) using a combination of fees and general funds. Since 2008 the division has provided an annual report to the state general assembly that provides an estimate of resource needs. During the 2013 legislative session, the general assembly provided the division with an additional 16 positions via general funds. The majority of these positions were assigned to the division's Clean Water Program. The remaining 2.5 positions were allotted to the Safe Drinking Water and Administration programs.

During the 2014 Colorado legislative session, the Joint Budget Committee proposed Senate Bill 14-134 to modernize the Clean Water Program's outdated fee structure and to increase fees to sustain the program over a three-year period. The bill was postponed indefinitely with direction from the legislature to establish a fee stakeholder process between the Colorado Department of Public Health and Environment and the regulated community. The stakeholder process began in July 2014. Following introductory meetings, the department worked with stakeholders and held individual meetings for distinct wastewater generating sectors in order to more thoroughly address specific concerns within each area and to improve financial transparency. Six sector workgroups were formed: Commerce and Industry (C&I); Construction; Municipal Separate Storm Sewer System (MS4); Public and Private Utilities (PPU); Pesticides; and Water Quality Certification. Over a six-month period, the department held 34 meetings totaling 56 hours of formal dialogue between the department and its stakeholders.

At the conclusion of the stakeholder process, the department requested each participant to complete a sector-specific survey to gain feedback on the overall stakeholder process, modernization of the fee structure and implementation of a fee increase to sustain the program for the next three years. At the end of the process, there was little consensus among stakeholders to support a bill to increase fees during the 2015 legislative session. However, House Bill 15-1249 was proposed and adopted in place of a comprehensive fee increase, and its content revised the current fee structure to create five sectors: Commerce and Industry; Construction; Public and Private Utilities (including MS4); Pesticides; and Water Quality Certification. Although the bill did not increase fees for any sector during state fiscal year 2015-16, new fees were created for fiscal year 2016-17 for the Water Quality Certification, Pesticides and Construction sectors. The bill did not increase fees for Commerce and Industry or Public and Private Utilities (including MS4s).

In addition to the changes provided by H.B. 15-1249, the Clean Water section of the Long Bill was expanded to include separate line items for each of the sectors identified above (with the addition of a Municipal Separate Storm Sewer System sector). With this new expanded structure, the department will be able to collect and report both revenue and expenditure data for each new sector which will improve financial transparency as well as assist in determining the proper fee structure needed for each sector moving forward. By tracking specific expenditures by sector, fees can be adjusted proportionally within each sector to ensure that sufficient revenues are collected to cover its specific costs. In this way, varying fee adjustments can be made to ensure that each sector is generating enough revenue to cover its own costs and pay its "fair share", thus eliminating the need for one sector to subsidize another. However, until a comprehensive fee bill is completed to rectify the funding shortfall in the Clean Water Program, the division anticipates potential reductions in the size and scope of the program.

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5.6 Water Quality Control Division FY2016-2017 Workplan

TABLE 1: FFY16-17 NATIONAL WATER PROGRAM GUIDANCE MEASURES					
EPA G/O/S	**EPA FFY16 ACS Code**	**EPA FFY16 Measure Text**	**EPA FFY16 Planning Target**	**Colorado FFY16-17 Goals**	**Colorado FFY16-17 Commitment Text**
Goal 2: Protecting America's Waters					
Objective 2.1 Protect Human Health					
Subobjective 2.1.1 Water Safe to Drink					
2.1.1	SDW-211	Percent of the population served by community water systems that receive drinking water that meets all applicable health-based drinking water standards through approaches including effective treatment and source water protection.	92%	92%	Monitor self-reported data submitted by the state's drinking water suppliers, to ensure that reported data meet all existing federal and state requirements; ensure reported data are accurately entered into the state's data system; and that violations are determined and responded to. Measure state outcomes against national targets.
2.1.1	SDW-SP1.N11	Percent of community water systems that meet all applicable health-based standards through approaches that include effective treatment and source water protection.	90% FFY16 (92% FFY18)	90%	See state commitment narrative for SDW-211.
2.1.1	SDW-SP2	Percent of "person months" (i.e. all persons served by community water systems times 12 months) during which community water systems provide drinking water that meets all applicable health-based drinking water standards.	95%	95%	See state commitment narrative for SDW-211.
2.1.1	SDW-SP4a	Percent of community water systems where risk to public health is minimized through source water protection.	49% (national) 35% (regional)	16%	Report to EPA in the SWAP Performance Accountability Report (PAR) report the population numbers served by community water systems where "minimized risk is achieved by substantial implementation" of source water protection actions, as determined by Colorado.
2.1.1	SDW-SP4b	Percent of the population served by community water systems where risk to public health is minimized through source water protection.	59% (national) 35% (regional)	15%	1. Reduce potential consumer exposure of community drinking water systems to various contaminants in raw water sources. 2. Report to EPA in the SWAP Performance Accountability Report (PAR) report the number of source water areas with "minimized risk achieved by substantial implementation" of source water protection actions as

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TABLE 1: FFY16-17 NATIONAL WATER PROGRAM GUIDANCE MEASURES					
EPA G/O/S	EPA FFY16 ACS Code	EPA FFY16 Measure Text	EPA FFY16 Planning Target	Colorado FFY16-17 Goals	Colorado FFY16-17 Commitment Text
					determined by Colorado.
2.1.1	SDW-01a	Percent of community water systems (CWSs) that have undergone a sanitary survey within the past three years (five years for outstanding performers or those ground water systems approved by the primacy agency to provide 4-log treatment of viruses).	79%	81%	1. Eliminate sanitary defects at public water systems that could increase the risk that contaminated drinking water will be distributed to consumers. 2. Conduct sanitary surveys (eight-part) at public water systems as required by Primary Drinking Water Regulations. 3. The state will enter into SDWIS/STATE, the most recent sanitary survey date completed in the last three (3) years for all Subpart H Community Water Systems which have received a survey consistent with the eight-part requirements of 40 CFR 142.16(b)(3) by January 31. 4. In accordance with 40 CFR 142.15(a)(5), the state shall submit to the Region 8 Drinking Water Unit a list of all Subpart H Systems that have had a Sanitary Survey meeting the eight part requirements of 40 CFR 142.16(b)(3) during the prior calendar year by the end of January. Colorado will meet its obligation for such a list by entering the completion date of each required Subpart H System survey into SDWIS/STATE and will submit to the Region 8 Drinking Water Program an evaluation of its program for conducting Subpart H System Sanitary Surveys in accordance with 40 CFR 142.16(b)(3) during the prior calendar year as required by 40 CFR 142.15(a)(5) by February 15. 5. Provide in the end-of-year report the number of CWSs that have undergone a sanitary survey and the number and percentage of systems not surveyed within required timeframes in each of the following categories: a) Community groundwater systems not surveyed in the last 3 years; b) Community surface water systems not surveyed in the last 3 years; c) Non-community water systems not surveyed in the last 5 years.
2.1.1	SDW-15	Number and percent of small CWS and NTNCWS (<500, 501-3,300, 3,301-10,000) with repeat health based Nitrate/Nitrite,	Indicator	N/A - Indicator	See state commitment narrative for SDW-211.

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TABLE 1: FFY16-17 NATIONAL WATER PROGRAM GUIDANCE MEASURES					
EPA G/O/S	**EPA FFY16 ACS Code**	**EPA FFY16 Measure Text**	**EPA FFY16 Planning Target**	**Colorado FFY16-17 Goals**	**Colorado FFY16-17 Commitment Text**
		Stage 1 D/DBP, SWTR and TCR violations.			
2.1.1	SDW-17	Number and percent of schools and childcare centers that meet all health-based drinking water standards.	Indicator	N/A - Indicator	See state commitment narrative for SDW-211.
Subobjective 2.1.2 Fish and Shellfish Safe to Eat					
2.1.2	FS-1a	Percent of river miles where fish tissue were assessed to support waterbody-specific or regional consumption advisories or a determination that no consumption advice is necessary. (Great Lakes measured separately; Alaska not included) (Report every two years)	Indicator	N/A	1. Issue or rescind Fish Consumption Advisories where appropriate. 2. Update on National List of Fish Advisories. 3. Implement statewide fish consumption guidelines.
2.1.2	FS-1b	Percent of lake acres where fish tissue were assessed to support waterbody-specific or regional consumption advisories or a determination that no consumption advice is necessary. (Great Lakes measured separately; Alaska not included) (Report every two years)	Indicator	N/A	1. Issue or rescind Fish Consumption Advisories where appropriate. 2. Update on National List of Fish Advisories. 3. Implement statewide fish consumption guidelines.
Subobjective 2.1.3 Water Safe for Swimming					
2.1.3	SS-1	Number and national percent, using a constant denominator, of Combined Sewer Overflow (CSO) permits with a schedule incorporated into an appropriate enforceable mechanism, including a permit or enforcement order, with specific dates and milestones, including a completion date consistent with agency guidance, which requires: 1) Implementation of a Long Term Control Plan (LTCP) which will result in compliance with the technology and water quality-based requirements of the Clean Water Act; or 2) implementation of any	801 (93%)	N/A	Colorado has no CSOs.

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TABLE 1: FFY16-17 NATIONAL WATER PROGRAM GUIDANCE MEASURES					
EPA G/O/S	**EPA FFY16 ACS Code**	**EPA FFY16 Measure Text**	**EPA FFY16 Planning Target**	**Colorado FFY16-17 Goals**	**Colorado FFY16-17 Commitment Text**
		other acceptable CSO control measures consistent with the 1994 CSO Control Policy; or 3) completion of separation after the baseline date. (cumulative)			
Objective 2.2 Protect and Restore Watersheds and Aquatic Ecosystems					
Subobjective 2.2.1 Improve Water Quality on a Watershed Basis					
2.2.1	WQ-SP10.N11	Number of waterbodies identified in 2002 as not attaining water quality standards where standards are now fully attained. (cumulative)	4,166 (national) 382 (regional) (4,430 FFY18 national)	1 FFY16 1 FFY17	1. Targeted number of water segments fully restored in FFY15-16 and FFY16-17 (SP-10); 1. 2. Targeted number of water quality impairments restored in F FY15-16 and FFY16-17 (SP-11); 1.
2.2.1	WQ-SP11	Remove the specific causes of waterbody impairment identified by states in 2002. (cumulative)	13,228 (national) 920 (regional)	1 FFY16 1 FFY17	1. Targeted number of water segments fully restored in FFY15-16 and FFY16-17 (SP-10); 1. 2. Targeted number of water quality impairments restored in FFY15-16 and FFY16-17 (SP-11); 1.
2.2.1	WQ-SP12.N11	Improve water quality conditions in impaired watersheds nationwide using the watershed approach. (cumulative)	484 (national) 68 (regional) (575 FFY18 national)	1	By January 1, 2016, develop a prioritized list of candidate watersheds for submittal to EPA. The candidate watersheds will be identified based on a number of factors such as: NPS project/activities location information; impairment status; existing data evaluation; identification of data gaps. By May 1, 2016, identify for submittal to EPA at least two near-term, priority watersheds to focus resources for further evaluation and develop workplans, including sampling and analysis plans, to address data and information needs and define milestones necessary to show reasonable progress toward documenting improvement in water quality conditions for each of the near-term, priority watersheds within three years. By September 30, 2016, report to EPA progress on implementing workplans for near-term, priority watersheds, especially status of meeting reasonable progress milestones and need to re-evaluate other candidates in lieu of a near-term, priority watershed(s) if reasonable progress is not being made.

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TABLE 1: FFY16-17 NATIONAL WATER PROGRAM GUIDANCE MEASURES					
EPA G/O/S	**EPA FFY16 ACS Code**	**EPA FFY16 Measure Text**	**EPA FFY16 Planning Target**	**Colorado FFY16-17 Goals**	**Colorado FFY16-17 Commitment Text**
2.2.1	WQ-01d	Number of numeric water quality standards planned to be adopted within 3 years for total nitrogen and total phosphorus for all waters within the state or territory for each of the following waterbody types: lakes/reservoirs, rivers/streams, and estuaries, based on a full set of performance milestone information supplied annually by states and territories (cumulative, out of a universe of 280).	16 (national) 4 (regional)	N/A	Continue to implement the Nutrient Criteria Development Plan for Colorado, September 26, 2002, Colorado Department of Public Health & Environment, or any revisions to this plan. Provide work products on the tasks identified in milestone schedule and number of applicable standards actions.
2.2.1	WQ-03a	Number, and national percent, of states and territories that within the preceding three year period, submitted new or revised water quality criteria acceptable to EPA that reflect new scientific information from EPA or other resources not considered in the previous standards.	41 (73.3%) (national) 3 (regional)	N/A	Continually review water quality standards and revise them if necessary in accordance with State and Federal statute and Water Quality Control Commission schedule. 1. Scoping Hearing Reg #34/35: 10/2015 and #32/36 10/2016. 2. Formulation Hearing Reg #31 11/2015 and #34/25 11/2016. 3. Rulemaking Hearing All Regs (Temp Mods): 12/2015 and 12/2016. 4. Rulemaking Reg #31 6/2016 and #34/35 6/2017. 5. Prepare notice for Temp Mods rulemaking (by 8/1/2016 and 8/1/2017).
2.2.1	WQ-04a	Percentage of submissions of new or revised water quality standards from states and territories that are approved by EPA.	100%	3	Work with EPA and stakeholders to propose revisions to disapproved water quality standards provision in the 2016 Regulation #31 proceedings: a) Nitrate footnote b) Arsenic footnote c) Use Protected designation for effluent dependent/ dominated waters
2.2.1	WQ-09a	Estimated annual reduction in million pounds of nitrogen from nonpoint sources to waterbodies (Section 319 funded projects only).	9.1	N/A	Report actual load reductions in GRTS as project-specific information. Request load reduction estimates from new projects.
2.2.1	WQ-09b	Estimated annual reduction in million pounds	4.5	N/A	Report actual load reductions in GRTS as project-specific

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TABLE 1: FFY16-17 NATIONAL WATER PROGRAM GUIDANCE MEASURES					
EPA G/O/S	**EPA FFY16 ACS Code**	**EPA FFY16 Measure Text**	**EPA FFY16 Planning Target**	**Colorado FFY16-17 Goals**	**Colorado FFY16-17 Commitment Text**
		of phosphorus from nonpoint sources to waterbodies (Section 319 funded projects only).			information. Request load reduction estimates from new projects.
2.2.1	WQ-09c	Estimated annual reduction in million tons of sediment from nonpoint sources to waterbodies (Section 319 funded projects only).	1.2	N/A	Report actual load reductions in GRTS as project-specific information. Request load reduction estimates from new projects.
2.2.1	WQ-10	Number of waterbodies identified by states (in 1998/2000 or subsequent years) as being primarily nonpoint source (NPS)-impaired that are partially or fully restored. (cumulative)	644 (national) 40 (regional, 3 (new success stories)	1	By January 1, 2016, develop a prioritized list of candidate watersheds for submittal to EPA. The candidate watersheds will be identified based on a number of factors such as: NPS project/activities location information; impairment status; existing data evaluation; identification of data gaps. By May 1, 2016, identify for submittal to EPA at least two near-term, priority watersheds to focus resources for further evaluation and develop workplans, including sampling and analysis plans, to address data and information needs and define milestones necessary to show reasonable progress toward documenting improvement in water quality conditions for each of the near-term, priority watersheds within three years. By September 30, 2016, report to EPA progress on implementing workplans for near-term, priority watersheds, especially status of meeting reasonable progress milestones and need to re-evaluate other candidates in lieu of a near-term, priority watershed(s) if reasonable progress is not being made.
2.2.1	WQ -11	Number, and national percent, of follow-up actions that are completed by assessed NPDES (National Pollutant Discharge Elimination System) programs. (cumulative)	Indicator	N/A	The division does not currently have any follow-up actions.
2.2.1	WQ-12a	Percent of non-tribal facilities covered by NPDES permits that are considered current. [Measure will still set targets and commitments and report results in both %	90%	75% FFY16 1,124	The Division's priorities for FY16 and FY17 are to continue issuing individual permits based on the watershed schedule, to complete the sand and gravel stormwater renewals, the hydrostatic testing renewal, the

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TABLE 1: FFY16-17 NATIONAL WATER PROGRAM GUIDANCE MEASURES

EPA G/O/S	EPA FFY16 ACS Code	EPA FFY16 Measure Text	EPA FFY16 Planning Target	Colorado FFY16-17 Goals	Colorado FFY16-17 Commitment Text
		and #.]		85% FFY17 1,263	construction SW renewal, and the aquatic animal production renewal. This means the national target will not be met for FY16 because while work will be done on the water treatment plant renewal, it may not be completed until FY17 and while work will be done on the commercial washing renewal it may not be completed until FY18.
2.2.1	WQ-13a	Number of MS-4s covered under either an individual or general permit.	Indicator	Report	The division maintains permitted MS4 information in ICIS.
2.2.1	WQ-13b	Number of facilities covered under either an individual or general industrial storm water permit.	Indicator	Report	The division maintains the majority of permitted industrial stormwater information in ICIS. Any permits not maintained in ICIS are reported to EPA through the PMOS database.
2.2.1	WQ-13c	Number of sites covered under either an individual or general construction storm water site permit.	Indicator	Report	The division is working to upload construction stormwater permit information to ICIS. If this project is not complete by the end of FY 2016 or FY2017 then construction stormwater permit information will be reported through the PMOS database.
2.2.1	WQ-13d	Number of facilities covered under either an individual or general CAFO permit.	Indicator	N/A	Information provided by our Division of Environmental Health and Sustainability.
2.2.1	WQ-14a	Number, and national percent, of Significant Industrial Users (SIUs) that are discharging to POTWs with Pretreatment Programs that have control mechanisms in place that implement applicable pretreatment standards and requirements.	20,700 98.0%		Colorado is not delegated for implementation of the pretreatment program; therefore, EPA is the lead authority on measure WQ14a and the EPA Region 8 reports on this national measure.
2.2.1	WQ-14b	Number, and national percent, of Categorical Industrial Users (CIUs) that are discharging to POTWs without Pretreatment Programs that have control mechanisms in place that implement applicable pretreatment standards and requirements.	Indicator		Colorado is not delegated for implementation of the pretreatment program; therefore, EPA reports on this national measure. As Colorado has a state pretreatment program, Colorado actively works to permit SIUs in non-pretreatment POTWs and provides that information to EPA.
2.2.1	WQ-19a	Number of high priority state NPDES permits issued in the fiscal year.	442		The Division will enter a high priority permit commitment into the PMOS database. The Division will submit the

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TABLE 1: FFY16-17 NATIONAL WATER PROGRAM GUIDANCE MEASURES					
EPA G/O/S	**EPA FFY16 ACS Code**	**EPA FFY16 Measure Text**	**EPA FFY16 Planning Target**	**Colorado FFY16-17 Goals**	**Colorado FFY16-17 Commitment Text**
					number of priority permits within 30 days of receiving the draft list from EPA.
2.2.1	WQ-27	Extent of priority areas identified by each state that are addressed by EPA-approved TMDLs or alternative restoration approaches for impaired waters that will achieve water quality standards. These areas may also include protection approaches for unimpaired waters to maintain water quality standards.	8%	Percent unknown because areas are not yet computed	Computation of priority areas by EPA is in progress. As a placeholder, FY16 targets are being reported as segment and number of TMDLs: Coal/Slate, COGUUG07_08_10_11_12, TMDLs: 12 Wildhorse Creek, COARMA04a, TMDL: 1 Swede/Kerr Gulch, COSPBE05, TMDL: 1 Big Dry Creek, COSPBD01, TMDL: 1 Boggs Creek, COARMA18a, TMDLs: 2
2.2.1	WQ-28	State-wide extent of activities leading to completed TMDLs or alternative restoration approaches for impaired waters, or protection approaches for unimpaired waters.	Indicator	N/A	N/A

TABLE 2: FFY16-17 NATIONAL OFFICE OF ENFORCEMENT AND COMPLIANCE ASSURANCE GUIDANCE MEASURES					
EPA G/O/S	**EPA FFY16 ACS Code**	**EPA FFY16 Measure Text**	**EPA FFY16 Planning Target**	**Colorado FFY16-17 Goals**	**Colorado FFY16-17 Commitment Text**
5	SDWA02	The primacy agency must address with a formal enforcement action or return to compliance the priority systems that have a score of 11 or higher on the ETT report. State, territory and tribal breakouts shall be indicated in the comment field of the Annual Commitment System. Please note: A primacy agency's success at addressing violations will be tracked by means of the quarterly ETT reports. Numerical targets may be adjusted at mid-year. While it remains the ERP's goal that all			1. Annotate the quarterly Enforcement Targeting Tool (ETT) list created by the Enforcement Response Policy (ERP) by indicating the state actions planned for each identified priority ETT system, the projected timeframe for such actions and other relevant information that helps EPA evaluate candidates for federal enforcement. Return the annotated list to EPA within 30 days of the ETT list being posted on ECHO. 2. Address all priority ETT systems (through formal enforcement or appropriate return to compliance) within 6 months of their being identified as priorities, with the goal of taking action before systems reach the priority status. The date that EPA makes the ETT list

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TABLE 2: FFY16-17 NATIONAL OFFICE OF ENFORCEMENT AND COMPLIANCE ASSURANCE GUIDANCE MEASURES					
EPA G/O/S	**EPA FFY16 ACS Code**	**EPA FFY16 Measure Text**	**EPA FFY16 Planning Target**	**Colorado FFY16-17 Goals**	**Colorado FFY16-17 Commitment Text**
		of a priority system's violations will be returned to compliance, a primacy agency has met its commitment under the SDWA ACS measure with respect to a priority system if the score for that system has been brought below, and remains below, eleven.			available on ECHO is day zero (0) of the six-month timeliness period. 3. Provide EPA with access to state PWS files and data for EPA's oversight purposes at the state's offices. Provide EPA a copy of all final settlement agreements, both administrative and judicial, upon issuance or EPA request. Copies of actions will be provided to EPA Region 8 in electronic format unless EPA requests a hard copy. Upon request make penalty calculations and supporting documentation available to EPA.
	CWA07	NPDES Compliance Monitoring Strategy (CMS) plan for each authorized state in the region and a regional plan wherever EPA direct implementation occurs (i.e., non-authorized states, territories, Indian country, pretreatment, etc.), targeting the most significant sources with potential to impact water quality. Each CMS plan should be developed in accordance with the guidelines in Part 1 of the 2014 revised CMS. Any proposed alternative CMS plan should be provided to OECA for consultation and review by August 15, unless the region and OECA agree upon a later date. By December 31, 2015, provide for each state and EPA direct implementation area, a numerical end-of-year report on EPA and state inspection plan outputs from the prior year, by category and subcategory, corresponding to each of the planed CMS activities. The ACS commitment for each region should reflect the total number of state and regional CMS plans and end of year reports to		Report	Colorado's draft 2016 NPDES Compliance Monitoring Strategy (CMS) plan will be provided to EPA by August 15, 2015, and the plan will be finalized within 15 days of receiving Region 8 EPA's comments or by October 1, 2015. Colorado's draft 2017 NPDES Compliance Monitoring Strategy (CMS) plan will be provided to EPA by August 15, 2016, and the plan will be finalized within 15 days of receiving Region 8 EPA's comments or by October 1, 2016.

TABLE 2: FFY16-17 NATIONAL OFFICE OF ENFORCEMENT AND COMPLIANCE ASSURANCE GUIDANCE MEASURES					
EPA G/O/S	EPA FFY16 ACS Code	EPA FFY16 Measure Text	EPA FFY16 Planning Target	Colorado FFY16-17 Goals	Colorado FFY16-17 Commitment Text
		be submitted to OECA for the year (e.g., an annual ACS commitment of 12 for a region that will submit six state and regional CMS plans and six state and regional CMS end-of-year reports).			

TABLE 3: FFY16-17 REGIONAL ECOSYSTEMS PROTECTION PROGRAM GUIDANCE ELEMENTS					
EPA G/O/S	EPA FFY16 ACS Code	EPA FFY16 Measure Text	EPA FFY16 Planning Target	Colorado FFY16-17 Goals	Colorado FFY16-17 Commitment Text
Goal 2: Protecting America's Waters					
Objective 2.1 Protect Human Health					
Subobjective 2.1.1 Water Safe to Drink					
2.1.1	N/A	State, Tribal and Federal water resource management agencies need to effectively manage all ground-water resources in a way that promotes sustainable use of the resource and protects vital ecological resources that rely on ground-water discharge.	N/A	N/A	Groundwater is managed by multiple state agencies per state Senate Bill 181.

TABLE 4: FFY16-17 REGIONAL OFFICE OF ENFORCEMENT, COMPLIANCE, AND ENVIRONMENTAL JUSTICE GUIDANCE ELEMENTS					
EPA G/O/S	EPA FFY16 ACS Code	EPA FFY16 Measure Text	EPA FFY16 Planning Target	Colorado FFY16-17 Goals	Colorado FFY16-17 Commitment Text
Cross-Program Initiatives					
N/A	N/A	States should incorporate environmental justice into their programs and document	N/A	N/A	The division will include consideration and evaluation for meeting environmental justice in its 2016 and 2017 Clean

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TABLE 4: FFY16-17 REGIONAL OFFICE OF ENFORCEMENT, COMPLIANCE, AND ENVIRONMENTAL JUSTICE GUIDANCE ELEMENTS					
EPA G/O/S	**EPA FFY16 ACS Code**	**EPA FFY16 Measure Text**	**EPA FFY16 Planning Target**	**Colorado FFY16-17 Goals**	**Colorado FFY16-17 Commitment Text**
		their commitments in the agreement.			Water CMSs.
Clean Water Program					
N/A	N/A	The state agency must maintain national databases.	N/A	N/A	For all domestic and industrial entities (including select stormwater sector permits) with NPDES permits, the division intends to enter permit facility data, permit event data and inspection data, including SSO Inspections, and enforcement actions into ICIS. The division commits to reenter permit facility data, permit event data and inspection data, including SSO Inspections, into ICIS for existing permitted facilities as the permits are renewed and for new facilities as the permits are issued. CDPHE opts to maintain ICIS-NPDES and have data for the annual non-major facilities noncompliance report pulled by EPA in lieu of annual reporting.
N/A	N/A	States are asked to provide projections of program activity for regional and state inspections.	N/A	N/A	Provided in the CMS.
N/A	N/A	Clean Water Act Action Plan.	N/A	N/A	The state and EPA will work together to implement the Clean Water Act Action Plan. The state and EPA will conduct planning meetings including NPDES compliance and enforcement, permitting and water quality standard personnel to identify water quality issues of greatest concern for Colorado and develop collaborative annual work plans to leverage both state and EPA resources to address these issues. A collaborative work plan will be
N/A	N/A	Evaluate violations and determine an appropriate response as identified in Colorado's Enforcement Management System. Where violations cause or threaten water quality impacts, determine an appropriate response consistent with priorities established in the Clean Water Action Plan and associated Division work plan			Continue to implement the Stormwater Enforcement Response Guide following consideration of available enforcement resources and strategic work plan priorities. Continue to implement the CAFO Enforcement Response Guide following consideration of available enforcement resources and strategic work plan priorities.

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TABLE 4: FFY16-17 REGIONAL OFFICE OF ENFORCEMENT, COMPLIANCE, AND ENVIRONMENTAL JUSTICE GUIDANCE ELEMENTS					
EPA G/O/S	**EPA FFY16 ACS Code**	**EPA FFY16 Measure Text**	**EPA FFY16 Planning Target**	**Colorado FFY16-17 Goals**	**Colorado FFY16-17 Commitment Text**
		strategies that focus on achieving environmental outcomes.			Continue to implement the Enforcement Response Guide for major/minor domestic and industrial wastewater dischargers, including the enforcement response procedures for whole effluent toxicity (WET), following consideration of available enforcement resources and strategic work plan priorities. Submit as part of the State End-of-Year Report: • A list of facilities who entered into a TIE or TRE in FY16; and • A list of any formal enforcement actions taken in FY16 that included WET violations. A list of any formal enforcement actions taken in FY16 that included WET violations. Quarterly during the fiscal year, and upon receipt from the EPA, the division will provide a response to the Quarterly Non-Compliance Report (QNCR), including an explanation of what the division is doing to respond to the facilities in Significant Non Compliance (SNC) on the QNCR.
N/A	N/A	EPA will perform inspections in regional and national enforcement initiatives according to national and regional guidance and the national 2014-2018 Performance Based strategies and the collaborative annual work plans. The enforcement initiatives include: Municipal Wet Weather Infrastructure; Concentrated Animal Feeding Operations (CAFOs); and Energy Extraction. EPA will conduct inspection follow up and enforcement for those facilities it inspects.	N/A	N/A	N/A
N/A	N/A	States are encouraged to continue piloting the Wet Weather SNC Policy in FY16. States are also encouraged to provide feedback in FY16 to the EPA on the SNC Policy if they have piloted it in prior fiscal years.	N/A	N/A	CDPHE will continue to implement its Single Event Violation (SEV) business process in FY16 in order to generally implement the EPA Wet Weather SNC Policy. This includes entering significant (i.e., SNC) Wet Weather single event violations and enforcement actions into ICIS.

TABLE 4: FFY16-17 REGIONAL OFFICE OF ENFORCEMENT, COMPLIANCE, AND ENVIRONMENTAL JUSTICE GUIDANCE ELEMENTS					
EPA G/O/S	**EPA FFY16 ACS Code**	**EPA FFY16 Measure Text**	**EPA FFY16 Planning Target**	**Colorado FFY16-17 Goals**	**Colorado FFY16-17 Commitment Text**
					CDPHE will provide updates to EPA regarding the SEV process during quarterly meetings.
N/A	N/A	Continue to implement the Sanitary Sewer Overflow (SSO) Response Strategy until such time as the SSO regulations are finalized.	N/A	N/A	Provide to EPA by October 15 of each year: 1. An updated SSO inventory; 2. The number of NPDES inspections targeted to evaluate SSO issues; 3. The number and percent of SSO inspections in priority watersheds (i.e. 303(d) listed for E. coli) including the name of the priority watershed (beginning with the October 2013 report); 4. The number and type of informal and formal enforcement actions taken in response to SSOs; 5. The percent of enforcement actions in priority watersheds for SSOs (beginning with the October 2013 report); and 6. A list of SSOs addressed. Copies of all SSO inspections will be submitted to EPA.
N/A	N/A	Continue to conduct the DMR Quality Assurance Program.			Follow up on all significant problems with DMR QA and provide EPA with a summary of follow-up actions in the State End-of-Year Report.
N/A	N/A	Promote communication with EPA.	N/A	N/A	Report to EPA: • Final settlement agreements; and • A description of any SEPs included in the state enforcement actions concluded in the federal fiscal year. Upon request, penalty calculations, including adjustments and BEN for state enforcement actions concluded during the fiscal year, will be made available to EPA at the state's offices. Quarterly meetings between EPA and the division will be held to discuss current and projected enforcement cases, inspections commitments, worked conducted in priority areas and sectors, environmental justice issues, and any

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TABLE 4: FFY16-17 REGIONAL OFFICE OF ENFORCEMENT, COMPLIANCE, AND ENVIRONMENTAL JUSTICE GUIDANCE ELEMENTS					
EPA G/O/S	**EPA FFY16 ACS Code**	**EPA FFY16 Measure Text**	**EPA FFY16 Planning Target**	**Colorado FFY16-17 Goals**	**Colorado FFY16-17 Commitment Text**
					other items as necessary.
Drinking Water Program					
N/A	SDWA	The state agency must maintain national databases.	N/A	N/A	1. The state commits to entering all sanitary surveys performed within 90 days of completion of field work in the previous inspection year into SDWIS/FED (by December 31 for inspections conducted in the previous FFY). 2. Upload all violations, enforcement actions and applicable return-to-compliance codes into SDWIS the quarter following their occurrence. 3. Ensure that all enforcement actions are linked to violations in SDWIS to avoid orphan exceptions, except for the approved orphan actions identified in guidance.
N/A	SDWA	Adopt regulations within statutory deadlines or EPA approved extension schedule.	N/A	N/A	1. Colorado currently has primacy enforcement authority for all existing rules. Colorado will submit primacy applications or apply for extensions before statutory deadlines. Colorado commits to maintaining and implementing regulations that are at least as stringent as the federal Safe Drinking Water Act. 2. Colorado's Increased Readability Rulemaking (IRR) project was undertaken to improve readability of Colorado's drinking water regulations in accordance with the governor's initiative to improve efficiency and reduce unneeded regulations. The changes to the

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TABLE 4: FFY16-17 REGIONAL OFFICE OF ENFORCEMENT, COMPLIANCE, AND ENVIRONMENTAL JUSTICE GUIDANCE ELEMENTS					
EPA G/O/S	**EPA FFY16 ACS Code**	**EPA FFY16 Measure Text**	**EPA FFY16 Planning Target**	**Colorado FFY16-17 Goals**	**Colorado FFY16-17 Commitment Text**
					drinking water regulations that resulted from the IRR project became effective in March 2014. Because of the significant reorganization of the rewritten regulation, EPA's review generated a significant number of comments. EPA and Colorado commit to addressing EPA's comments and issues related to stringency.
N/A	SDWA	Implement all primary Drinking Water Regulations for which Colorado has been delegated primary enforcement authority.			Colorado will report on the status of the following EPA-identified requirements of the surface water treatment rule. By November 15, provide to EPA: A list of all systems that are required to filter under the SWTR but are not yet filtering. Report the violations to SDWIS-FED. For systems on compliance schedules, provide the schedule from the enforcement document. If any system is not under a compliance schedule, provide a rationale and proposed action and time frame for securing compliance.

TABLE 5: FFY16-17 COLORADO ELEMENTS					
EPA G/O/S	**EPA FFY16 ACS Code**	**EPA FFY16 Measure Text**	**EPA FFY16 Planning Target**	**Colorado FFY16-17 Goals**	**Colorado FFY16-17 Commitment Text**
N/A	N/A	N/A	N/A		Colorado is not delegated to implement the biosolids program and maintains a state level program with authority over the land application of biosolids. The division will work collaboratively with EPA to implement the state program in a manner at least as stringent as federal requirements to avoid establishing conflicting requirements. EPA and the division will also coordinate oversight to recognize authorities and avoid duplication of effort as outlined in the inspection plan.
N/A	N/A	N/A	N/A		Colorado is not delegated to implement the pretreatment

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TABLE 5: FFY16-17 COLORADO ELEMENTS					
EPA G/O/S	EPA FFY16 ACS Code	EPA FFY16 Measure Text	EPA FFY16 Planning Target	Colorado FFY16-17 Goals	Colorado FFY16-17 Commitment Text
					program and maintains a state level program with authority over discharges to POTWs and implements requirements in permits to implement water quality standards decisions that at times have a nexus to pretreatment implementation. The division will work collaboratively with EPA to implement the state program in a manner to avoid establishing conflicting requirements. EPA and the division will also coordinate oversight to recognize authorities and avoid duplication of effort both in permitting and in compliance oversight as outlined in the inspection plan. EPA will provide pretreatment language for approved and non-approved programs to CDPHE for incorporation into state-issued NPDES permits.
N/A	N/A	N/A	N/A		As requested by Region 8 staff, CDPHE will continue to provide EPA with an electronic copy of industrial and construction stormwater permit information for permits that are not in ICIS on a quarterly basis.
N/A	N/A	N/A	N/A		EPA and CDPHE will coordinate on the performance by EPA of inspections in regional and national enforcement initiatives to minimize overlap and the potential for conflicting determinations. Colorado will begin the implementation of a new strategy to address discharges of stormwater, groundwater dewatering, and hydrostatic testing (and associated discharges from pipes and tanks) associated with construction activities. Included in the strategy will be developing and implementing in FFY2017 an alternative NPDES Compliance Monitoring Strategy meeting the approval criteria in the EPA NPDES Compliance Monitoring Strategy. Colorado will include increased CEI inspections for the construction sector from what was identified in FFY2015 and develop a

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TABLE 5: FFY16-17 COLORADO ELEMENTS					
EPA G/O/S	EPA FFY16 ACS Code	EPA FFY16 Measure Text	EPA FFY16 Planning Target	Colorado FFY16-17 Goals	Colorado FFY16-17 Commitment Text
					compliance assistance strategy for implementation in FFY2017. Although EPA reserves the ability to conduct inspections as necessary, EPA will not include CEIs of the associated construction sector discharges as part of its inspection plan for FFY2016 except as associated with regional and national enforcement initiatives, and federal facilities.
N/A	N/A	N/A	N/A	N/A	CDPHE will continue to implement its monitoring strategy for surface and groundwater (The 10 Elements) and maintain established schedules. CDPHE will: • Develop and implement the Colorado's Water Quality Monitoring and Assessment Strategy (The 10 Elements 2015-2025). • Continue to complete the annual feedback loop with EPA R8 to report/discuss progress of The 10 Elements Implementation. • Develop the enhanced annual monitoring plan by June 30 each year. • Work to improve the data flow between CDPHE and EQuIS. • Upload state water quality date into national STORET warehouse annually.
2.2.1	WQ-SP12.N11	Improve water quality conditions in impaired watersheds nationwide using the watershed approach.	N/A	N/A	Colorado will provide: • River, stream and lake segmentation will be available in a GIS Environment. • Information from the 303(d) and M&E lists will be managed in a database that can be linked to GIS information.
N/A	N/A	N/A	N/A	N/A	CDPHE will continue to develop a comprehensive integrated assessment of the conditions of Colorado's waters consistent with 305(b) and 303(d) of the Clean Water Act. CDPHE will: • Develop the 2014/2016 303(d) List of Impaired Waters. • Develop the 2014/2016 Integrated Report.

Chapter 6 HAZARDOUS MATERIALS WASTE MANAGEMENT DIVISION

6.1 Organization and Programs

HMWMD is comprised of several programs that regulate sites and facilities through a combination of traditional elements; i.e., licenses, certifications, permits, and inspections; augmented as needed by a variety of enforcement activities and compliance assistance. These regulatory programs include Colorado's equivalents of the EPA's Resource Conservation and Recovery Act (RCRA) solid and hazardous waste programs, the Nuclear Regulatory Commission's radioactive materials program, and the Food and Drug Administration's x-ray / mammography risk and quality control programs.

As the Performance Partnership Agreement and Grant are aimed at the RCRA hazardous waste program and the Radon Program in HMWMD, the remainder of this chapter expands on only those efforts.

Hazardous Waste Program: Compliance assurance and compliance assistance form the centerpiece of efforts in HMWMD each year. The division is dedicated to the adoption of reasonable regulations and guidelines that safeguard the environment and public health; outreach to the regulated community and the public to assure awareness and understanding of such requirements; routine inspections that evaluate compliance at a significant percentage of the regulated facilities each year; and concerted efforts to achieve timely compliance and corrective action. In addition, at sites where the improper disposal of wastes or chemical spills may impact the environment or place the safety and health of the citizen in question, HMWMD is focused on achieving rapid stabilization, and environmentally sound and cost-effective clean-ups.

The Division maintains vital compliance assistance components in addition to the more traditional compliance assurance activities. This includes waste minimization and pollution prevention aspects. These efforts are integrated with similar activities in HMWMD and other divisions to improve consistency and effectiveness in all compliance assistance and compliance assurance efforts. HMWMD has established a variety of resources for providing technical assistance and regulatory guidance through trainings, workshops, published materials, compliance aids, the Division homepage, and the customer technical assistance phone line.

Information disseminated during inspections encourages effective waste management practices within the regulated community. The use of waste minimization and pollution prevention-based Supplemental Environmental Projects as a frequent part of enforcement actions has emphasized the importance of these concepts. The results of the HMWMD waste prevention and minimization efforts can be demonstrated by a downward trend in the amount of waste generated by many Colorado businesses and the downward trend in the number of hazardous waste generators in the state.

The strength of the corrective action program component lies in the expertise of the staff, their ability to use creative and problem-solving approaches, and their willingness to work in a collaborative fashion with other agencies and with facility representatives to achieve a common goal. The Division's strength is increased by the close interaction of similar cleanup efforts in the different divisional programs, although each is driven by a different set of laws and regulations. HMWMD works continuously to increase consistency among remediation requirements and to expedite the cleanup process for the regulated community. Please see the organization chart following this section.

Significant progress continued in the cleanup of high priority RCRA corrective action sites. Colorado continues to exceed EPA national goals for environmental indicators for this universe.

In February 2015, the 14th annual report required by SB-00-177 was delivered to the Colorado General Assembly. This report presents the extensive efforts in HMWMD for improving efficiency and effectiveness within the hazardous waste program. The 2015 report documented the continued emphasis on compliance assistance and self-certification of compliance, expanding on HMWMD efforts of past years.

HMWMD concentrates on performance-based measures for planning and implementing activities in all its programs. HMWMD places its priority on the parity of approaches to cleanups under all of its various programs

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and on improving the processes used for conducting cleanups. This approach is evident, for instance, in the equivalency of the Voluntary Cleanup Program and the Hazardous Waste Corrective Action Plan process. In another example, in 2014, the Division finalized a significant new policy entitled *Conditional Closure of Low Threat Sites with Residual Ground Water Contamination* and an associated guidance document. This policy establishes a consistent set of criteria to be used by all the remedial programs for making the important decision of when ceasing remediation and monitoring at sites with small amounts of residual ground water contamination can be made. In addition, the Radiation Management staff coordinates remediation oversight at several sites with the Superfund and Hazardous Waste program staff.

Radon Grant Activities: The Radon Hotline is a customer service effort provided by this Division. Radon information dissemination, outreach and presentations upon request are provided by HMWMD, using EPA grant dollars, and are augmented by participation and training efforts contributed by state and local personnel. In an effort to expand the public outreach of the radon grant, roughly twenty grants to local governments, extension offices and partners will be distributed. Additional radon reinvigoration projects by the HMWMD include mass mailings of radon information targeted to all schools, newspapers, realtors, homebuilders and building officials. Annual surveys of measurement results, mitigation providers, schools and builders are now being conducted in order to provide an accurate assessment of outreach impact in Colorado as requested in the EPA radon reinvigoration strategy. A public education video created by CDPHE is also available for public viewing on our website at www.coloradoradon.info.

Table 6.1 Hazardous Materials & Waste Management Division Organization

Work Unit	Core Functions					
Director's Office	Community Relations	Emergency Planning & Preparedness				
Administration	Fiscal Management	Human Resources Services & Training	GIS & Scientific Data Management	Network Support Services	Records Management & Administrative Services	
Hazardous Waste Program	Hazardous Waste Permitting, Compliance, Enforcement, Compliance Assistance, & Corrective Action	Regulatory Development	Financial Assurance (for all compliance elements)	Data Management	Meth Lab Cleanup Program	
Solid Waste Program	Solid Waste Permitting Compliance, Enforcement, Compliance Assistance, & Corrective Action	Regulatory Development	Financial Assurance (for all compliance elements)	Data Management	Waste Tire Program Waste Grease Program	
Radiation Management Program	Radioactive Materials Licensing, Compliance, Enforcement, & Corrective Action	X-ray/ Mammography Facility Compliance, Enforcement, & Corrective Action	Regulatory Development	Testing and Certification of Service Companies, Qualified Inspectors and Experts, etc.	State Indoor Radon Grant Activities	Radiological Response
Remediation Program	Superfund remediation lead and support agency;	Preliminary Assessment, Site Investigation,	Voluntary Cleanup Program	Brownfields Revolving Loan Fund; Targeted Brownfields	Defense Facilities Remediation & Restoration	

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	Superfund O&M			Assessments		

6.2 Successes under the CEPPA

The HMWMD has enjoyed many successes under the CEPPA. This section presents several recent examples.

- HMWMD has had stable funding for hazardous waste corrective action and compliance and enforcement since 2000. In May 2015, the fees were increased in a manner projected to provide adequate revenue for complete program implementation through FY17. In recent End-of-Year and State Review Framework Reports, EPA has agreed that the Division is capable of implementing a fully authorized program and all necessary program elements are in place and functioning at a high and efficient level.

- The Hazardous Waste Control Program has made substantial progress in the area of safe waste management. HMWMD's program has exceeded national targets for having operating permits and post-closure permits in place. HMWMD has also made substantial strides in Hazardous Waste Corrective Action. Historically, Colorado has met or exceeded the GPRA goals for the remedy selection, remedy construction, and human health exposures under control environmental measures for the 2020 baseline facilities.

6.3 Cross-Cutting Themes

Across the programs within HMWMD, there are several cross-cutting areas of activity and effort. These include customer service, compliance assistance, compliance assurance, and community-based environmental protection. While not always specifically discussed in the HMWMD workplan tables presented later in this chapter, these themes or concepts have a high priority in everything HMWMD accomplishes. The following sections describe some of the Division's efforts in these areas.

6.3.1 Customer service

On-going customer service efforts include:

- The half-time technical assistance function in HMWMD provides technical assistance to the public for all HMWMD programs during business hours.

- A nationally published dedicated radon information line with a 1-800 number available for long distance inquiries.

- The records center is open to the public for document reviews all day every working day.

- Extended and improved and continuously updated information on the division's Home Page.

- Environmental records searches.

- Voluntary Cleanup reviews and assistance functions.

- Field assistance, consultative services, and training on hazardous waste regulation implementation.

6.3.2 Compliance Assistance and Assurance

For several years, the various HMWMD programs have undertaken a number of both traditional and innovative Compliance Assistance efforts.

- During FY14, HMWMD provided 16 compliance assistance training sessions related to hazardous waste that reached 1,007 people.

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- Compliance guidance documents and bulletins have been published on a wide range of topics and are available at no cost to the public on the HMWMD Homepage and as printed materials. These documents are also available on CD-ROM for attendees at training sessions. HMWMD evaluates the distribution of contacts (correspondence, phone inquiries, website "hits", etc.) to direct development of new guidance or updates to existing guidance.

- Guidance documents and compliance documents have been developed and / or updated to provide regulatory interpretations for the regulated public and HMWMD inspectors.

- HMWMD continues its half-time customer technical assistance availability and a 1-800 number for contacts from outlying parts of the state. This service continues to see relatively heavy use from the public.

- HMWMD has continued to update and improve the Division's web page. The web page continues to show a trend of increased use.

- HMWMD is implementing full-scale self-certification (aka, Environmental Results Program or ERP) projects in the auto-body, dry cleaner, long-term care (nursing homes), and SQG sectors. These efforts include air quality self-certification checklists and hazardous waste checklists.

- HMWMD has continued the Generator Assistance Program or GAP. This program is designed to provide, upon request, an on-site compliance audit for any hazardous waste generator in Colorado. These GAP site visits are performed by inspectors, but in a compliance assistance mode. In fact, participants are assured that discovered violations will not result in enforcement provided there are no imminent and substantial threats to health and environment at the facility and provided that the facility agrees to a prompt return to compliance. In FY14, HMWMD performed 15 GAP site visits. These site visits are being entered into RCRAInfo as "compliance visits" or CAVs.

6.3.3 Pollution Prevention

Pollution prevention continues as a central theme in many Division activities.

- Inspectors communicate pollution prevention concepts and, when possible, specific ideas to regulated entities routinely during inspections. Training efforts also emphasize pollution prevention as an effective environmental management tool.

- Pollution prevention activities were negotiated as Supplemental Environmental Projects (SEPs) as part of penalty settlements in several significant enforcement cases. Such projects included replacement of outdated systems to improve materials usage and reduce waste and replacement of equipment that requires the use of chemicals that end up as hazardous wastes streams. Also, assistance to other facilities with similar problems, education and outreach on environmental issues and spill and leak prevention equipment and improvements are included in some SEPs that are considered pollution prevention based. HMWMD efforts on SEPs in settlement agreements have been consistent with the CDPHE agency-wide SEP policy.

6.3.4 Community-Based Environmental Protection

There are many remediation sites that invest time and effort into soliciting and resolving the concerns of the community that surrounds them. Strong examples of the right way to achieve community involvement include several examples from HMWMD.

- Extensive community involvement has continued regarding the proposed Chemical Demilitarization facility being built at the Pueblo Chemical Depot. Monthly public meetings are held regarding the permit in association with the Citizen's Advisory Commission. In addition, Division public involvement staff spends considerable time with citizens and civic groups in the Pueblo area distributing information on the chemical demilitarization project.

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6.4 Goals and Objectives for this FY2016-2017 CEPPA

6.4.1 Hazardous Waste Program Goals

HW General Program Management and Partnership

HW 1 Implement an efficient and effective hazardous waste regulatory program with adequate fiscal and personnel resources.

HW 2 Develop a partnership between the State and EPA that improves the program. Support this partnership and achieve efficient implementation of a hazardous waste program that reflects goals and objectives of both the State and EPA including appropriate work sharing.

HW 3 The State and EPA will work together to identify and achieve environmental indicators. Actions necessary to achieve environmental indicators will be planned and tracked. Determination documentation for those facilities "under control" will be provided by the State to EPA; EPA will, in turn, provide guidance for what constitutes "adequate documentation".

HW Operating Permits and Closure/Post-Closure Permit Goals

HW 4 Issue and maintain operating permits, closure plans, and post-closure permits that include conditions necessary to assure that hazardous wastes are managed in ways that will protect public health and environmental quality. Ensure protection of public health and the environment by inspecting facilities to determine their compliance with permit or closure plan conditions.

HW 5 Develop mechanisms to improve state-to-state cooperation on permitting of promising innovative waste remediation technologies and the development of such technologies.

HW Compliance Monitoring and Enforcement Goals

HW 6 Ensure protection of public health and the environment by achieving compliance at regulated hazardous waste facilities through implementation of an effective monitoring and enforcement program. Detect and deter violations through inspections and enforcement actions and promote compliance with hazardous waste laws and regulations.

- HW 6.1 Ensure that annual inspection requirements are achieved and that inspections are of high quality. Inspection of treatment, storage and disposal facilities will meet the statutory requirements.
- HW 6.2 Maintain a high level of expertise to ensure that quality inspections consistent with national guidance are being conducted.
- HW 6.3 Promote compliance at regulated facilities by ensuring that enforcement actions are timely and appropriate. Actions necessary to assure return to compliance (RTC) and consistent with the Enforcement Response Policy will be documented.

HW Corrective Action Goals

HW 7 Clean up releases of hazardous waste that threaten the public or the environment in an efficient and effective manner.

HW 8 Provide regulatory assistance and technical expertise to all parties responsible for cleaning up releases of hazardous waste at their facilities. This consists of frequent communication and the sharing of our expertise in correspondence, guidance documents, or policy.

HW Pollution Prevention and Compliance Assistance Goals

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HW 9 Implement a compliance assistance program that increases the compliance rate within HMWMD's regulated communities.

HW 10 Implement a pollution prevention program that encourages reduction of the amount and toxicity of wastes generated through waste minimization, treatment, and recycling of hazardous wastes, thereby reducing the risks associated with waste management.

HW 11 Integrate compliance assistance, waste minimization, pollution prevention, waste diversion, and recycling into all program activities and support waste minimization efforts statewide.

6.4.2 Radon Program Goals

RA 1 Increase radon awareness. Assure that Colorado homes continue to be tested for radon, with intervention to reduce radon risk if a test result calls for action.

RA 1.1 Increase awareness, testing and mitigation of homes with elevated radon levels. Work toward adoption of more radon-resistant building codes.

RA 1.2 Strengthen radon public health activities in Colorado's zone 1 (high radon potential) counties.

The State Indoor Radon Grant is used to develop effective, efficient activities for the state with emphasis on raising awareness of radon issues, increasing testing rates and encouraging mitigation in response to elevated radon levels. Homeowners, local governments, realtors and builders will continue to be target groups for communicating about radon testing and radon-resistant new construction. Distribution of funding to local health departments, cooperative extension offices and other entities at the local level will ensure coverage throughout Colorado. Annual surveys will be conducted on measurement results, mitigation providers, builders and schools as requested by the EPA Radon Reinvigoration Strategy.

A survey of measurement results from 2005-2012 indicated that 145,819 tests were conducted statewide with results ranging from 0-4,277 PCi/L, with 67,971 or 46.6% of the test results ≥ 4 PCi/L. A survey of mitigation providers for 2012 indicated that 7,500 mitigations systems were installed statewide. In 2012, the CDPHE Radon website received 23,200 web hits, the radon hotline received 1,600 phone calls, and CDPHE distributed approximately 20,000 pieces of literature related to radon via mail, conferences, presentations and community outreach activities.

6.5 Summary of Program Assessment Process

6.5.1 Hazardous Waste Program

EPA will perform a mid-year and end-of-year review of all aspects of the hazardous waste program. The mid-year review will be less rigorous, but the end-of-year review will be complete and comprehensive, as appropriate. For the Inspection and Enforcement program elements, the State Review Framework (SRF) will be used every four years. Depending on the SRF findings, appropriate levels of oversight will be employed in the interim years. EPA will use the Program Oversight elements, defined in 2004 by both EPA and the Region 8 states, to oversight the permitting, closure, post-closure, and corrective action program elements.

6.5.2 Radon Program

EPA will conduct an annual program review and EPA will conduct a review of state activities in accordance with federal grant regulations.

6.6 GPRA Goals

Hazardous Waste Program:

- Number and percent of high-ranked GPRA hazardous waste facilities with human exposures under control (CA725).

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- Number and percent of high-ranked GPRA hazardous waste facilities with migration of contaminated ground water under control (CA750).
- Number and percent of high-ranked GPRA hazardous waste facilities with corrective measure construction complete (CA550).
- Number and percent of high-ranked GPRA hazardous waste facilities with CA performance standards attained/CA process terminated (CA900/CA999).

6.7 Accountability

The preceding text in Chapter 6 is provided as a description of the types and scope of environmental activities being conducted by the various programs within HMWMD. It contains examples of successes and achievements but is not intended as a comprehensive list of work completed. The chapter's text also includes activities and programs that are not driven by EPA / CEPPA funding nor by EPA program requirements. These items should not be viewed as part of any future EPA program assessment and are not work plan commitments.

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6.8 Hazardous Materials and Waste Management Division FY 2016-2017 Work Plan

6.8.1 Hazardous Waste Program

Mission: To ensure that all hazardous wastes are handled and managed in ways that protects the public and environment from the moment of waste generation until final disposal or destruction.

HW I - General Program Management and Partnership

EPA 2014 - 2018 Strategic Plan Goal 3: Cleaning Up Our Communities and Advancing Sustainable Development		
HW 1: Long Term Goal Implement an efficient and effective hazardous waste regulatory program with adequate fiscal and personnel resources.		
Short Term Goals	**Objective**	**Measures**
HW 2: Short Term Goal - Develop a partnership between the State and EPA that improves the program. Support this partnership and achieve efficient implementation of a hazardous waste program that reflects the goals and objectives of both the State and EPA including appropriate work sharing.	**Authorization** The State will pursue timely and complete authorization for new mandatory rules and progress toward overall authorization goals.	**FY16:** • RCRA Cluster XXIV (SPA 35)
		FY17: • RCRA Cluster XXV (SPA 36)
	EPA will work toward a timely review of authorization applications submitted and improve the overall pace of authorization and authorization flexibility.	
	Program Improvement The State will continue to evaluate the Hazardous Waste Control Program seeking to make further program improvements as appropriate.	Continued implementation of self-certification programs and GAP site visits.
	Data Management The State will maintain timely, accurate, and complete data in RCRAInfo. Note: The State is currently a direct user of RCRA Info and translates only new evaluation data. Colorado has applied for an Exchange Network grant to translate compliance data.	The State will have data in RCRA Info by the 15th day of the month following activity.
		The State will ensure that data is reported to RCRAInfo accurately and completely reflecting the status of the RCRA universe.

HW I - General Program Management and Partnership		
	The State will continue to work with EPA to ensure that RCRAInfo reports used to track the progress of activity are accurate.	RCRAInfo reporting will include all key measures of operating, closure and post-closure permitting; corrective action; and compliance monitoring and enforcement components of the HW program at a level sufficient to support program evaluation efforts.
	EPA will assist the State in assuring that the RCRAInfo data is current and accurate and reflects EPA HW activities as well as State activities.	
	EPA will work with the State to resolve "universe" issues .	
	EPA will provide training and technical assistance when requested.	
	The State and EPA will jointly create and generate RCRAInfo reports that are of benefit to the program.	
	Public Involvement. The State will continue to involve the public as required by statute and regulation or MOA. This includes a system to respond to requests for information and complaints or concerns from the public.	CDPHE will: • Log all complaints and track response and resolution of all complaints. • Log all requests for information and track response and resolution.
	Resource Level The State will maintain adequate resources to implement the program.	
	Financial Accountability The State will adequately account for grant dollars.	
	Program Guidance / Agreements The State and EPA will jointly develop and maintain the MOA/EA, Quality Assurance Plan and other operating Guidance.	

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HW I - General Program Management and Partnership		
	Strategic Planning The State and EPA will jointly plan and prioritize program goals, objectives and activities that address state and federal priorities and initiatives. Activities include PPA development, Annual National targets, inspection strategies, planning meetings, etc.	EPA and the State will hold meetings to share information, identify and solve problems, and engage in short term planning efforts.
	Coordination of Joint Activities The State and EPA will maintain a high level of cooperation between State and EPA staff to assure successful and effective administration of the program including evaluation of desirable technical support.	EPA and the State will hold meetings to share information, identify and solve problems, and engage in short term planning efforts.
	Program Communication The State and EPA will maintain frequent and open communication on routine matters, changes in program capability, legislation and resources levels, emergency situations and other key activities as described in the MOA.	Examples of key activities include final decisions re: variances / waivers, enforcement actions, biennial report summarization, final permits, etc.
		EPA and the State will hold meetings to share information, identify and solve problems, and engage in short term planning efforts.
	Training and Technical Assistance The State and EPA will jointly identify training and technical assistance needs.	The State will develop and implement a staff training program that results in well-qualified staff and ensures that mandatory training needs are met.
		EPA will make training and technical assistance available to the State and will work toward improving the capability to provide high quality training and technical assistance. Technical assistance will be made available through EPA staff, EPA research labs and EPA contractors.
	EPA will conduct oversight of State program activities as appropriate.	

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HW I - General Program Management and Partnership		
HW 3: Short Term Goal - The State and EPA will work together to determine progress in identifying and achieving environmental indicators. Actions necessary to achieve environmental indicators will be planned and tracked. Determination documentation for those facilities "under control" will be provided by the State to EPA; EPA will, in turn, provide guidance for what constitutes "adequate documentation".		See "Table HW IV" below.

HW II Operating Permit and Closure/Post Closure Permit Goals		
EPA 2014 - 2018 Strategic Plan Goal 3: Cleaning Up Our Communities, Objective 3.2: Preserve Land		
HW Operation **Permit** Universe Information: There is only one (1) commercial land disposal facility operating within the State; as of the end of FY15, this facility has the required permit. There are six (6) operating commercial and non-commercial treatment / storage facilities operating in the State; as of the end of FY15, all required operating permits have been issued. One unit at 1 facility (storage igloos at PCD) is deemed "interim status," but will be closed before it is permitted. Currently, there are no (0) operating combustion units within the State. An RD&D Permit has been issued for the Pueblo Chemical Agent-Destruction Pilot Plant (PCAPP) facility to allow for construction. Several permit modifications must be approved for PCAPP before pilot-test operations are authorized to begin which is also planned in FY16. PCAPP is approximately 99% constructed and into plant systemization activities.		
Short Term Goals	Objective	Measures
HW 4: Short Term Goal: Issue and maintain operating permits, closure plans, and post-closure permits that include conditions necessary to assure that hazardous wastes are managed in ways that will protect public health and environmental quality. Ensure protection of public health and the environment by inspecting facilities to	**Operating Permit Activities.** The State will demonstrate progress toward achieving operating permits (OP) program goals, objectives and activities identified in jointly developed strategies that reflect State and EPA OP priorities.	The Key Measure of the OP process is: • OP200 - final determinations / renewal determinations. Supporting Measures include: • OP100 - review activities resulting in a determination or notice of deficiency: • OP240 - permit modifications; and • Emergency Permits.

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HW II Operating Permit and Closure/Post Closure Permit Goals		
determine their compliance with permit or closure plan conditions.		**FY16:** • No (0) treatment, storage and disposal facilities needs to obtain an operating permit final determination. • Two (2) TSD facilities are anticipated to obtain a permit renewal.
		FY17: • No (0) treatment, storage and disposal facility needs to obtain an operating permit final determination. • No (0) TSD facility is anticipated to obtain a permit renewal.
	Permit maintenance; permit modifications, and emergency permits will be processed as required.	Permit modifications and emergency permits will be processed as received and required.
	EPA will conduct operating permit activities according to the joint permitting process described in the authorization memorandum of agreement.	
	EPA will provide technical assistance where requested.	
HW Closure Universe Information: There are or have been thirty-three (33) treatment/storage/disposal facilities with land disposal units on the closure track, and seventy-six (76) land disposal units at these facilities. All of the 76 land disposal units have approved closure plans. Three (3) still need closure certification and agency verifications (DuPont, and Fruita-2). Sixty-one (61) treatment/storage/disposal facilities have treatment or storage units on the closure track. Most of these treatment or storage units have had their closure plans approved. The only units without approved closure plans are units that have been referred to the CERCLA remedial process. All four (4) treatment/storage/disposal facilities with combustion units have completed the closure process. One (1) former operating TSD (Arvada Treatment Center) has stopped operating and must complete closure; the facility has an approved closure plan.		
HW 4 (cont'd) Issue operating permits	**Closure Activities** - The State will demonstrate progress toward achieving closure (CL) program goals.	The Key Measure for closure activities is: • CL360 - Closure plan approval. • CL380 - Closure verification • CL370 - Closure certification

HW II Operating Permit and Closure/Post Closure Permit Goals		
		FY16: • No (0) treatment / storage units will receive closure plan approval • One (1) treatment / storage unit will receive closure verification • Two (2) closure certifications will be approved
		FY17: • No (0) treatment / storage units will receive closure plan approval • Two (2) treatment / storage units will receive closure verification • One (1) closure certification will be approved
	EPA will participate in closure determinations through joint activities and providing technical assistance where requested	
HW Post Closure Universe Information There are twenty-seven (27) facilities in the post-closure universe in the state as of the end of FY15. The Division has lead for all of these facilities excluding three (3) superfund sites. All required post-closure permits or other approved controls are in place.		
Short Term Goals	Objective	Measures
HW 4 (cont'd) Issue operating permits	**Post-Closure Activities -** The State will demonstrate program progress toward achieving post-closure (P-C) program goals, objectives and activities that reflect State and EPA P-C priorities.	The Key Measure is: • PC200 - final post-closure permit determinations/ issuances. Post-Closure plan approvals, or other approved controls for all applicable units at facilities in the GPRA post-closure universe. Supporting measures are: • PC300 - other final post-closure permit determinations / issuances. • PC010 - post closure permit call-ins.

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HW II Operating Permit and Closure/Post Closure Permit Goals		
		FY16: • One (1) post-closure permit will be renewed • One (1) other final or other post-closure permit determination / issuance is anticipated. • No (0) post-closure permit call-ins are expected.
		FY17: • One (1) post-closure permits will be renewed • No (0) other final or other post-closure permit determination / issuance is anticipated. • No (0) post-closure permit call-ins are expected.
	EPA will participate through joint activities and by providing technical assistance as requested.	
HW 5: Short term Goal Develop mechanisms to improve state-to-state cooperation on permitting of promising innovative waste remediation technologies and the development of such technologies.	HW 2.1.3 Participate in Interstate Technology and Regulatory Cooperation Workgroup.	
EPA will conduct oversight of State operating, closure, and post-closure permitting activities.		

HW III Compliance Monitoring and Enforcement Goals
EPA 2014 - 2018 Strategic Plan Goal 3: Cleaning Up Our Communities Goal 5: Enforcing Environmental Laws, Objective 5.1

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HW III
Compliance Monitoring and Enforcement Goals

HW 6: Long Term Goal
Ensure protection of public health and environment through achieving compliance of regulated facilities by implementation of an effective monitoring and enforcement program. Detect and deter violations through inspections and enforcement actions and promote compliance with hazardous waste requirements.

Outcome Measures:
Return to compliance after enforcement is an important measure of the effectiveness for the enforcement and inspection program. Informal and formal enforcement actions issued in the reporting year are used as the basis for this measure. The measure is the percentage of compliance requirements that are met during the reporting year that they fall due. This measure is expected to be 80% or more in FY16.

Short Term Goals	Objective	Measures
HW 6.1: Short Term Goal Ensure that annual inspection requirements are achieved and that inspections are of high quality. Inspections of treatment, storage and disposal facilities will meet the statutory requirements.	All federal and state TSDs will be inspected every year. Inspections of state TSDs will be conducted jointly with EPA, with EPA acting as the lead in the inspections.	During FY16 and FY17, 100% of the compliance inspections required by statute will be conducted. CDPHE will submit to EPA, by November 15 of each year, an inspection work plan for the upcoming federal fiscal year, which includes the names of TSD and LQG facilities. A minimum of twenty percent (20%) of all large quantity generators (LQGs) will be inspected during each fiscal year and 100% of all LQGs will be inspected every 5 years.
	All active land disposal facilities will be inspected every year. All those in post-closure will be inspected every other year (every two years).	
	Ground water monitoring inspections will be conducted at active land disposal facilities that have not had such inspections in the previous two years (every three years) or as agreed to by the State and EPA.	
	All treatment and storage facilities will be inspected every other year (every two years).	
	Other Priority Inspection Areas - Permit Evaders - Surface Impoundments - Mineral processors - Waste Analysis Plans at commercial TSDFs	

HW III Compliance Monitoring and Enforcement Goals		
	The Region commits to work with the State to identify 2 TSDFs and 2 LQGs which the Region will inspect as lead. The LQGs will be identified from the national and regional priority sectors, illegal recyclers, entities with violations in more than one state, environmentally sensitive environment, unpermitted surface impoundments, improper medical waste disposal, coal combustion waste facilities, areas of environmental justice concerns and particularly recalcitrant violators.	
HW 6.2: Short Term Goal Maintain a high level of expertise to ensure that quality inspections consistent with national guidance are being conducted.	High quality inspections will be conducted in accordance with national guidance to be reviewed jointly by the State and EPA in the annual assessment.	EPA State Review Framework Evaluation
EPA Region 8 will continue to implement the CERCLA Off-Site Rule (OSR). EPA will continue to coordinate closely with the state in this implementation.		
HW 6.3: Short Term Goal Promote compliance of regulated facilities by ensuring that enforcement actions are timely. Actions necessary to assure return to compliance (RTC) and consistent with the Enforcement Response Policy will be documented.	Informal actions will be taken as appropriate within the timeframes established in the HMWMD Enforcement Response Policy.	Compliance Advisories (informal enforcement mechanism) will be used as appropriate and consistent with the State's Enforcement Response Policy.
	Formal enforcement actions, such as administrative orders, judicial referrals and referrals to EPA will be taken as appropriate and within the time frames established in the MOA and the HMWMD Enforcement Response Policy.	Formal enforcement actions will include the use of compliance schedules, assessment of penalties, and escalation of enforcement action as appropriate for the violation and consistent with the HMWMD Enforcement Response Policy.
	Enforcement follow-up and other activities will be conducted in accordance with the HMWMD Enforcement Response Policy.	Follow-up will include compliance schedules, follow-up inspections, and compliance assistance and / or escalation of enforcement responses as appropriate and consistent with the HMWMD Enforcement Response Policy.

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HW III Compliance Monitoring and Enforcement Goals		
	The State and Region 8 will work together to move closure/post closure and corrective action facilities to compliance with financial assurance requirements through the development of enforcement cases which may be taken by either the State or EPA. Region 8 will be the lead for entities with facilities in more than one state.	The State and EPA will share any information that is collected regarding the environment and / or public health benefits achieved through inspection and enforcement activities.
	Other national enforcement priority areas: Region 8 will continue to support the multimedia Energy Extraction initiative	
EPA and the State will work jointly to assure that the review of enforcement actions is timely and appropriate in accordance with the Enforcement Response Policy. Actions necessary to assure return to compliance (RTC) and consistent with the Enforcement Response Policy will be documented.	*EPA will conduct mid-year and end of year file reviews to document the progress CDPHE has made on timeliness of enforcement actions and the appropriate assessment and collection of penalties, including gravity, economic benefit and multi-day penalties.*	The State and EPA will have coordination meetings to discuss the compliance and enforcement program. EPA's State Review Framework Evaluation will be used to judge the quality of HMWMD's Program.

HW IV Corrective Action Goals		
EPA 2014 - 2018 Strategic Plan Goal 3: Cleaning Up Our Communities, Objective 3.3: Restore Land		
Corrective Action GPRA Universe Information: There are 44 high-priority facilities on Colorado's GPRA 2020 corrective action baseline. Of those facilities, all have been assessed - the RFA is complete **(CA050)**, and all have been prioritized **(CA075)**, according to RCRAInfo.		
Short Term Goals	Objective	Measures
HW 7: Long Term Goal Clean up releases of hazardous waste that threaten the public or the environment.	**Corrective Action Identification and Ranking** The State will demonstrate progress toward achieving corrective action program identification ranking goals, objectives and activities that reflect State and EPA priorities.	The Key Measures for corrective action progress are: • CA 050 -assessment completed; • CA 070 - determination of need for RFI; and • CA 075 - corrective action universe ranking.
		FY16 and FY 17: All assessment and ranking activities have been completed; therefore, no activities are planned

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HW IV Corrective Action Goals		
	EPA will provide technical assistance in identification and ranking activities as appropriate.	
GPRA Corrective Action Universe Information: There are forty-four (44) facilities on Colorado's GPRA 2020 Corrective Action Baseline. All 44 have had the CA process started with at least a RCRA Facility Investigation (RFI) imposed **(CA100)** for at least one area. Thirty-seven (37) have had RFIs approved **(CA200)** for at least one area. Thirty-five (35) have had a remedy selected **(CA400)** for at least one area. Thirty (30) have had a remedy construction completed **(CA550)**.		
HW 7: Long Term Goal Clean up releases	**Corrective Action Progress** The State and EPA will demonstrate progress toward achieving corrective action program goals, objectives and activities that reflect State and EPA priorities. Emphasis will be placed on high-ranked facilities.	The Key Measures for Corrective Action are the following activities: • CA100 - Initial RCRA Facility Investigation (RFI) imposed; • CA100 - Subsequent RFI imposed; • CA150 - RFI work plan approved; • CA200 - RFI approved • CA300 - Corrective Measure Study (CMS) work plan approved; • CA350 - CMS approved; • CA400 - Remedy Selection • CA500 - Corrective Measure (CM) work plan approved; • CA550 - Corrective Measures implemented (CMI), construction completed • CA999 - Corrective Action complete at the facility level

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HW IV Corrective Action Goals		
HW 7: Long Term Goal Clean up releases	**Corrective Action Progress (Cont'd)**	**FY16:** • No (0) initial RFIs imposed. • No (0) subsequent RFIs imposed. • No (0) RFI work plans approved. • Six (6) RFI report approved. • Twelve (12) CMS work plans approved. • Six (6) CMS reports approved. • One (1) remedy selected at the unit level. • No (0) remedies selected at the facility level. • Three (3) CM work plans approved. • Four (4) CMI construction completed at the unit level. • No (0) CMI construction completed at the facility level. • No (0) corrective action completed at the facility level
		FY17: • No (0) initial RFIs imposed. • No (0) subsequent RFIs imposed. • One (1) RFI work plans approved. • No (0) RFI reports approved. • No (0) CMS work plans approved. • Ten (10) CMS reports approved. • Eleven (11) remedy selected at the unit level. • No (0) remedies selected at the facility level. • Five (5) CM work plans approved. • Two (2) CMI construction completed at the unit level. • No (0) CMI construction completed at the facility level. • No (0) corrective action completed at the facility level.

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HW IV Corrective Action Goals		
	EPA will conduct corrective action activities at EPA-lead facilities and will conduct joint activities and provide technical assistance, as appropriate. Specifically EPA has assumed the lead for corrective action at two (2) facilities, both are anticipated to become a state- lead facility.	
Stabilization Universe Information Twenty-three (23) of the forty-four (44) high-ranked CA baseline universe facilities are in the stabilization universe. That is, the stabilization measures evaluation **(CA225)** resulted in a finding that stabilization measures are appropriate. Stabilization measures have been imposed **(CA600)** at **twenty-two (22) of the facilities**. Stabilization construction completion **(CA650)** has occurred **at seventeen (17) facilities**.		
HW 7: Long Term Goal Clean up releases ….	**Stabilization Activities (Interim Measures)** - The State will demonstrate progress towards achieving stabilization program goals, objectives and activities that reflect State and EPA priorities. Emphasis will be on increasing the number of facilities at which current human exposures and releases to ground water have been controlled and on facilities that are ranked as "high".	The Key Measures are the following stabilization activities: • CA225 - Stabilization Measures Evaluation • CA600 - Stabilization Implemented • CA650 - Stabilization Construction completed
	Stabilization Activities (Interim Measures) Cont'd	**FY16:** • No (0) Stabilization Measure Evaluations. • One (1) Stabilization Implemented. • No (0) Stabilization Construction completed.
		FY17: • No (0) Stabilization Measure Evaluations. • No (0) Stabilization Implemented. • No (0) Stabilization Construction completed.
	EPA will conduct Stabilization activities at EPA-lead facilities and will conduct joint activities and provide technical assistance, as appropriate.	
HW Indicator 2 The State will continue to evaluate the number and percentage of facilities with human exposures under control **(CA725)**. Note: The definition of "under control" is in USEPA Region 8 RCRAInfo Definition Table, and in EPA guidance (2/5/99) for RCRA corrective action environmental indicators.		

HW IV Corrective Action Goals		
GPRA Corrective Action Universe Information: There are Forty-four (44) facilities in the 2020 Corrective Action Universe. All 44 of these facilities are under control with regard to human exposure as of the end of FY15.		
HW 7: Long Term Goal Clean up releases ….	The state will work to get human exposure under control at facilities subject to corrective action. Documentation will be submitted to EPA for all facilities that have achieved this environmental indicator.	The Key Output is the number of GPRA Baseline facilities at which human exposures are under control (CA725). The following Key Outputs are planned: **FY16 and 17:** • **No (0) facility is projected to achieve this environmental indicator**
	The State will update the facility-specific strategies, identifying when each high -ranked corrective action facility presently not under control is anticipated to meet this environmental indicator and to develop plans to achieve all projected Environmental Indicators.	The cumulative total in Colorado at the conclusion of FY16 and FY17 will be 100%.
EPA has a national goal of having human exposures controlled at 95% of the GPRA Baseline facilities by FY 2005 (HW-11-24)	*EPA will work to get human exposures under control at EPA-lead facilities and will provide technical assistance as appropriate.*	
	EPA will update facility-specific strategies, identifying when each high -ranked corrective action facility presently not under control is anticipated to meet this environmental indicator and to develop plans to achieve all projected Environmental Indicators.	
HW Indicator 3 The State will continue to evaluate the number and percentage of facilities with ground water releases under control **(CA750)**. Note: The definition of "under control" is in USEPA Region 8 RCRAInfo Definition Table, and in EPA guidance (2/5/99) for RCRA corrective action environmental indicators.		
GPRA Corrective Action Universe Information: There are Forty-four (44) facilities in the 2020 Corrective Action Universe. All 44 of these facilities are under control with regard to ground water releases as of the end of FY15.		

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HW IV Corrective Action Goals		
HW 7: Long Term Goal Clean up releases	The state will work to get the migration of contaminated ground water under control at facilities subject to corrective action. Documentation will be submitted to EPA for all facilities that have achieved this environmental indicator.	The Key Measure is the number of GPRA Baseline facilities at which migration of contaminated ground water are under control (CA750). The following Key Outputs are planned: **FY16:** • **No (0) facility is projected to achieve this environmental indicator.** **FY17:** • **One (1) facility is projected to achieve this environmental indicator**
	The State will update the facility-specific strategies, identifying when each high -ranked corrective action facility presently not under control is anticipated to meet this environmental indicator and to develop plans to achieve all projected Environmental Indicators.	The cumulative total in Colorado at the conclusion of FY15 will be 98%.

HW V Pollution Prevention & Compliance Assistance Goals		
EPA 2014 - 2018 Strategic Plan Goal 3: Cleaning Up Our Communities, Objective 3.2: Preserve Land		
HW 9: Long Term Goal Implement a compliance assistance program that increases the compliance rate within HMWMD's regulated communities.		
Short Term Goals	Objective	Measures
	A schedule of quarterly compliance assistance workshops and training sessions will be established. Trainings provide compliance guidance to attendees.	Presentation of hazardous waste compliance assistance seminars, workshops, and/or training sessions: • Estimate 15 to 20 sessions with 1000 attendees each federal fiscal year.

HW V Pollution Prevention & Compliance Assistance Goals		
	Site visits will be made to provide compliance assistance to selected individual businesses that request assistance or that are identified during routine hazardous waste inspections.	Implementation of the Generator Assistance Program (GAP).
HW 10: Long Term Goal Implement a pollution prevention program that encourages reduction of the amount and toxicity of wastes generated through waste minimization, treatment, and recycling of hazardous wastes, thereby reducing the risks associated with waste management. Methods for tracking and quantifying the accomplishments of these efforts will continue to be developed.		
	Pollution prevention training will be incorporated into compliance assistance trainings, as appropriate.	Done in conjunction with compliance assistance.
	Distribute pollution prevention information and guidance documents in response to specific requests.	Done in conjunction with compliance assistance and inspections.
HW 11: Long Term Goal Integrate compliance assistance, waste minimization, pollution prevention, waste diversion, and recycling into all program activities and support waste minimization efforts statewide.		
	Develop and implement compliance assistance elements within the inspection and enforcement processes.	Provide direct compliance assistance in inspections: • Estimate 20 inspections in each federal fiscal year.
	Distribute pollution prevention information and guidance documents in response to specific requests.	Done in conjunction with compliance assistance.
	Support and maintain the technical assistance phone system.	• Estimate 3000 responses during each federal fiscal year.
	On the CDPHE homepage, provide updates in the hazardous waste activities and access to current compliance assistance and pollution prevention materials and documents.	• Maintain homepage information and track usage by Division customers • Estimate over 1,000,000 contacts during each federal fiscal year.

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HW V Pollution Prevention & Compliance Assistance Goals		
EPA has a goal of building Sustainable Materials Management (SMM) capacity in all Region 8 states.	*EPA will provide SMM assistance to Colorado, as requested priorities arise.*	*Reduction of Waste disposed.*
EPA will continue to support the environmental Compliance Assistance Center (ECAC) for all auto service businesses that request compliance assistance information. The center is based in Colorado and is available to all states.		

6.8.2 State Indoor Radon Grant

Mission: The State Indoor Radon Grant is used to develop effective, efficient activities that increase the awareness of radon health risks in Colorado. Emphasis is placed on raising awareness of radon issues, increasing testing rates and encouraging mitigation in response to elevated radon levels. Homeowners, local governments, realtors and builders will continue to be target groups for information about radon testing and radon-resistant new construction. Distribution of funding to local health departments, cooperative extension offices and other entities at the local level will ensure coverage throughout Colorado. Annual surveys will be conducted on measurement results, mitigation providers, builders and schools as requested by the EPA Radon Reinvigoration Strategy.

State Indoor Radon Grant Goals			
EPA 2014 - 2018 Strategic Plan Goal 1: Taking Action on Climate Change and Ensuring Air Quality, Objective 1.4: Minimize Exposure to Radiation			
RA 1: Long-term goal Increase radon awareness. Assure that Colorado homes continue to be tested for radon, with intervention to reduce radon risk if a test result calls for action.			
Short-term goal	**Objectives**	**Performance measures**	**Milestones**
RA 1.1 Increase awareness, testing and mitigation of homes with elevated radon levels. Work toward adoption of more radon-resistant building codes.	Contract through the grant for products and services that improve radon awareness, testing, and mitigation in Colorado.	Number and/or percent of homes that have been mitigated for elevated radon levels.	Number of homes that have been mitigated for radon.
	Provide current information to homeowners, real estate agents, buyers, sellers, and builders about radon testing and mitigation.	Percentage of homes tested for radon.	Number of homes that have been tested for radon.

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State Indoor Radon Grant Goals			
RA 1.2 Strengthen radon public health activities in all of Colorado's counties (all counties are zone 1-high potential).	Work with volunteer municipalities and counties to adopt construction standards to reduce radon in residential, school, and public buildings.	Number of homes in each county that have been built using radon-resistant features.	Number of homes and schools built radon resistant and number of local governments adopting radon resistant new construction building codes
	EPA: EPA will offer assistance in public outreach efforts, help coordinate activities of the state and the Western Regional Radon Training Center, provide support for the contracts with counties and partners that have been established and offer manpower at events.		
	EPA: EPA will also forward relevant information from HQ or other entities to the state. Guidance will be provided as needed on the information.		
	EPA: EPA will also provide support to the state in the creation of radon-related policy statements or programs such as the radon proficiency program.		
	EPA: EPA will review annual reports submitted by the state and offer a response that assures that the work plan agreed to is being followed and goals are being met.		

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Chapter 7 E-Enterprise/Exchange Network Aligned Activities

This chapter describes CDPHE's on-going cross-divisional information system initiative and projects.

CDPHE is committed to continual Quality Improvement and developing information technologies (IT) to modernize the business of environmental protection and environmental services delivery. CDPHE continues to create an information management environment that addresses and illuminates cross-media and program relationships, serves immediate and program-specific data needs and effectively protects public health and the environment in Colorado. CDPHE applies comprehensive processes to evaluate the need for Information Management, IT activities and IT Systems. All CDPHE IT projects are prioritized and evaluated against Colorado priorities as well as state/EPA joint priorities to determine if they meet the needs of CDPHE before they are allowed to proceed. It is CDPHE policy to embark upon process improvement *before* automating any process, system or business task. This policy is reflected in CDPHE's IT development strategy.

The projects and initiatives described in this chapter where identified as priorities during strategic planning events by the CDPHE leadership. Additionally, the projects and initiatives align with the joint national E-Enterprise for the Environment initiative. These CDPHE initiatives are led by the Environmental Information Manager who oversees all cross-divisional information system development for the environmental divisions.

7.1 Quality Improvement

CDPHE has conducted numerous Quality Improvement (QI) activities that have had positive results. Therefore, the department plans to continue QI activities both internally and with partners such as EPA. These QI activities will be identified based on needs and customer benefit.

7.2 Customer Interface Modernization Project for a Lean Environment (CIMPLE)

7.2.1 Process Modernization

CDPHE has identified the need to become more efficient with our interactions with the regulated communities and more transparent for the general public. To meet this need, CDPHE has developed this strategic goal:

"CDPHE's Environmental Programs will build and operate a customer-focused, integrated & interactive electronic information system by 2018."

This goal has a number of component projects, including:

7.2.1.1 Electronic Data Submission Portal

The core component of this initiative is a Cross Media Electronic Reporting Rule compliant system that will allow the regulated communities to interact with CDPHE electronically. CDPHE has developed a set of requirements for this system and plans to have a pilot system in place by June 30, 2016. Programs will participate in quality improvement efforts prior to being implemented into the system.

7.2.1.2 Internal Program System Improvements

CDPHE is also in the continued process of improving the different programmatic systems. This is necessary to support the new methods of doing business that will be developed as part of the CIMPLE initiative.

7.2.2 Data Access

7.2.2.1 Records Management

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CDPHE is currently implementing a system for management of its numerous physical and electronic records in Division of Environmental Health and Sustainability, Hazardous Materials and Waste Management Division, Air Pollution Control Division and Water Quality Control Division. When fully implemented, this system will allow for quicker and more effective access to the divisions' records for both internal staff and the general public. This project consists of moving the Environmental Divisions' current records management system to a cloud-based system, adding additional programs, and implementing an external facing records portal. This system will need to be continually improved as the CIMPLE initiative expands.

7.2.2.2 Master Facility Reporting

This part of the CIMPLE initiative incorporates a project that was already underway. This system allows for the integration and reporting of facility and compliance information from across the divisions to both internal staff and the general public. The first phase of this project included Facility information from the Solid and Hazardous Waste, Drinking Water, Clean Water, Air Stationary Sources and Toxic Release Inventory Programs and Compliance, Monitoring and Enforcement information for the Solid Waste, Drinking Water and Stationary Sources Program. The internal component of the system is in production now with the public component in place once the data has been validated. As part of this project, the department will be implementing the Facility 3.0 data exchanges. This system will need to be continually improved as the CIMPLE initiative expands.

7.2.2.3 Online Dashboards

As a future step of the CIMPLE initiative, CDPHE will be creating a unified set of dashboards to publish relevant data to internal and external customers. Currently, the department is working to identify a base system for these dashboards.

7.3 Exchange Network

CDPHE has had an operational Exchange Network Node since 2005. The list below gives the status of each of the priority data exchanges:

Phase I Exchange Network system exchanges

- WQX- The department has implemented this data flow and published data through 2012 to the national WQX system. CDPHE continues to publish the current data.
- SDWIS- The department was using the Exchange Network to transfer this information until technical issues forced submission via the older method. Given the changes that are occurring with SDWIS and the CDXweb there are no plans for reinstituting this exchange.
- UIC- The department is not delegated UIC authority and therefore has no plans to implement this exchange.
- Beach Notification - The department is not delegated Beach Notification authority and therefore has no plans to implement this exchange.
- NPDES-
    - ICIS-NPDES- The department does currently direct entry into the ICIS-NPDES system and therefore does not flow this information via the Exchange Network. A project is underway to transfer this information and the new process should be in place by December 31st, 2015. Electronic DMR reporting-The department is in the process of implementing netDMR through EPA. Therefore, there is no need to use the Exchange Network to submit the DMR data to ICIS-NPDES.
    - ICIS-AIR- The department is currently publishing the ICIS-Air data exchange via the exchange network. CDPHE continues to work to improve this process.
- AQS- The department is currently publishing the AQS data exchange via the exchange network. CDPHE continues to work to improve this process.
- EIS- The department is currently submitting data via the Exchange Network for this flow.
- RCRAInfo- The department primarily does direct entry into the RCRAInfo data system for all modules except Compliance Monitoring and Enforcement (CME). Due to purchasing delays, this project will not be completed until March 31st, 2016. CDPHE is consuming the outbound services from RCRAInfo and is incorporating that data to support the internal systems

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- FRS- CDPHE has been exchanging FRS data since 2005. As part of the Master Facility project described above, the department will be implementing Facility 3.0 services.
- TRI- The department is currently receiving the TRI data via the Exchange Network.

7.4 E-Enterprise/Exchange Network Governance activities

The Department's Environmental Information Manager will continue to be involved in E-Enterprise and Exchange Network governance activities. This includes having membership on the E-Enterprise Leadership Council, the Exchange Network Leadership Council and the coordinating teams that support these councils. Currently, this governance structure is being reevaluated, but it is expected that the Environmental Information Manager will continue to participate where appropriate.

CDPHE staff is also currently participating in various Integrated Project Teams (IPT). CDPHE plans to have staff continue to participate in relevant workgroups. Currently, staff is participating in the following groups:

- The E-Enterprise Architecture IPT
- The Portal Workgroup
- The Identity Management Workgroup
- The Facility Workgroup
- The Advanced Monitoring Integration Strategy team
- The Lean/IT Integration Toolkit development

7.5 Future Technology Framework

To support many of CDPHE's technical efforts, the department's Technology Governance group, the Business Technology Team (BTT) is developing a Future Technology Framework (FTF), this FTF will define what technology CDPHE needs to invest in to meet the evolving technology needs of department staff and customers. Once the FTF is defined, a roadmap will be developed to show what investments and projects need to be completed to move to the new framework.

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7.6 E-Enterprise/Exchange Network FY 2016-2017 Workplan

Category	Item	Goal	Timeline
Process Improvement	Process Improvement Activities Implemented	15, depending on need, size and scope of process	September 2017
Process Modernization	Pilot system in production	Complete	June 2016
Process Modernization	Submission types in production	5	June 2016
Process Modernization	Submission types in production	15, depending on need, size and scope of process	September 2017
Data Access-Records Management	System In Production	Complete	December 2015
Data Access-Records Management	Web Based Access to Records	Complete	June 2016
Data Access-Records Management	Water Quality Control Division Records In System	Complete	December 2015
Data Access-Records Management	Air Quality Control Division Records in System	Complete	December 2015
Data Access-Records Management	Environmental Commissions Records in System	Complete	December 2015
Data Access-Records Management	Hazardous Materials and Waste Management Division Records in System	Complete	September 2017
Data Access-Records Management	Division of Environmental Health and Sustainability Records in System	Complete	September 2017
Data Access-Dashboards	Base system chosen	Complete	September 2016
E-Enterprise/Exchange Network Governance	Participation in E-Enterprise/Exchange Network Governance activities, as appropriate.	100%	September 2017
Technology Infrastructure	Future Technology Framework in place	Complete	September 2016
Data Quality Management	Department Quality Management Plan in place	Complete	December 2015
Data Quality Management	Divisions Quality Management Plans in place	Complete	December 2016

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Chapter 8 FISCAL AND GRANT CONSIDERATIONS

8.1 Introduction

The purpose of this chapter is to describe the FY 2016 and FY2017 allocation of available EPA resources under the CEPPA. This chapter refers only to the fiscal resources and allocations while chapters 3 through 6 describe environmental goals, objectives, environmental indicators and program performance measures. Table 8.1A and 8.1B provides a list of elements consolidated into the single Performance Partnership Grant (PPG).

The grant policy guidelines allow the allocation of EPA grant dollars within or across media and programs. It provides the state with more flexibility to invest some of the federal grant dollars in innovative capacity building initiatives such as sustainability, climate change, oil and gas, compliance assistance and assurance, customer service, e-enterprise aligned initiatives and school chemicals. The grant will also enable the state to target more federal resources to its most serious environmental problems.

8.2 Background

The National Environmental Performance Partnership System (NEPPS) allows states to propose goals and objectives based on state environmental problems and priorities. In April 1996, the U.S. Congress authorized Performance Partnership Grants (PPG). The PPG increases state flexibility in reallocation of federal environmental grants. The NEPPS allows states to receive a consolidated environmental management grant in lieu of several categorical program grants. The CDPHE was one of the first states awarded a consolidated environmental grant. Total availability of federal funds and Colorado's cost share are the same under the consolidated grant, as they would have been using categorical grants.

The EPA Guidance includes the following elements relevant to this CEPPA:

- Description of environmental goals
- Description of quantifiable environmental objectives
- Program plan of action
- Environmental results expected
- Program performance measures
- List of activities showing schedule of accomplishments
- Set of core program commitments

8.3 Revenue Sources and Resource Allocations

Resources for the environmental programs within the CDPHE come from multiple sources. These include, state general funds, cash funds from permit license, emission fees, and various federal grants from other agencies. The CEPPA represents the total shown in Table 8.2.

The CDPHE has identified several program grants for inclusion in the FY 2016-2017 PPG, which refers to the period from October 1, 2015 through September 30, 2017. If necessary, Colorado may request a one-year time extension of this proposed grant for financial and administrative purposes. The estimated federal dollar resources and cost share associated for all EPA grants; i.e., including indirect cost charges, are summarized in Tables 8.1A and 8.1B.

CDPHE is requesting an estimated $18,897,366 at the time of application from EPA for the FY 2016-2017 PPG. Colorado's required match for this grant is $10,903,092. The PPG guidance allows Colorado to incorporate other eligible grants, including competitive grants during the year if other federal resources become available (if this occurs, the PPG will be amended by CDPHE and EPA).

In the case of competitive grants, the state may develop and submit a proposal for approval by EPA Region 8 or EPA headquarters for the particular competitive grant program. For others, EPA and the state may renegotiate and revise the goals and program commitments in the current CEPPA as necessary. For each additional award

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made during the year, an appropriate amendment to the CEPPA will be developed to reflect and account for the additional funds and work to be conducted. Upon approval of additional funds, Colorado will submit a formal grant amendment to request additional funds in the PPG and EPA will amend the PPG award to include those funds.

Tables 8.1A and 8.1.B summarizes the allocation of PPG federal funds and state match within CDPHE for environmental programs.

Table 8.2 summarizes the overall allocation of non-PPG funds within the CDPHE environmental programs.

8.4 Financial Management and Reporting

The PPG guidance and regulation states that PPG recipients must maintain accounting and financial records that adequately identify the source (i.e., federal funds and match) and application of funds provided for PPG activities. Colorado maintains records that contain relevant information such as obligations, non-obligated balances, outlays, expenditures and program income. Colorado PPG funds will be tracked to the total effort or cost incurred for the PPG work, not necessarily to individual categorical sources of funding.

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Table 8.1A - CDPHE Performance Partnership Grant Funds - Federal Funds

Division	Program	FFY2016	FFY2017	FFY2016-17
		EPA	EPA	EPA TOTAL
APCD	CAA 105 - other	$2,324,346	$2,552,440	$4,876,786
	Asbestos./TSCA	$120,051	$119,850	$239,901
	Lead	$248,591	$248,175	$496,766
HMWMD	Hz. Waste	$1,003,120	$1,001,441	$2,004,561
	Radon	$312,125	$312,171	$624,296
WQCD	CWA 106	$2,024,650	$2,021,144	$4,045,794
	Dr. Water	$1,373,767	$1,371,429	$2,745,196
	Gr. Water	$0	$0	$0
	Non Pt. Src.	$744,225	$743,133	$1,487,358
Other	EDO	$167,250	$195,882	$363,132
	EDO/CIMPLE	$232,375	$0	$232,375
	DEHS	$898,183	$883,018	$1,781,201
TOTAL		$9,448,683	$9,448,683	$18,897,366

Table 8.1B- CDPHE Performance Partnership Grant Funds - State Share

Division	Program	FFY2016	FFY2017	FFY2016-17
		STATE	STATE	STATE TOTAL
APCD	CAA 105 - other	$2,800,001	$2,800,001	$5,600,002
	Asbestos./TSCA	$44,667	$44,667	$89,334
	Lead	$65,000	$65,000	$130,000
HMWMD	Hz. Waste	$373,226	$373,226	$746,452
	Radon	$320,000	$320,000	$640,000
WQCD	CWA 106	$670,261	$670,261	$1,340,522
	Dr. Water	$512,000	$512,000	$1,024,000
	Gr. Water	$0	$0	$0
	Non Pt. Src.	$546,666	$546,666	$1,093,332
Other	EDO	$0	$0	$0
	EDO/CIMPLE	$0	$0	$0
	DEHS	$119,725	$119,725	$239,450
TOTAL		$5,451,546	$5,451,546	$10,903,092

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Table 8.2 - CDPHE Funding Support for Environmental Programs

(in millions $)

Division	State Cash/Reappropriated Funds	
	FY2016	**Est FY 2017**
APCD	$22.60	$22.60
HMWMD	$21.57	$21.57
WQCD	$5.41	$6.01
Other	$0.80	$0.80

(in millions$)

Division	State General Funds	
	FY2016	**Est FY 2017**
APCD	$0.01	$0.01
HMWMD	$0.00	$0.00
WQCD	$4.30	$4.30
Other	$0.00	$0.00

(in millions$)

Division	Est. Federal Non-PPG	
	FY2016	**Est FY 2017**
APCD	$1.84	$1.84
HMWMD	$5.47	$5.47
WQCD	$12.84	$12.84
Other	$0.50	$0.50

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Chapter 9 OVERSIGHT & ASSESSMENT

9.1 Background

Although a number of programs are delegated to the states, EPA remains responsible and accountable to the President, the Congress and the public for progress toward meeting national environmental goals and for ensuring that federal statutes are adequately enforced and federal funds are spent appropriately. EPA has the responsibility to oversee the conduct of delegated, inter-governmental programs to ensure that adequate protection is being provided across the country. In addition, EPA has the responsibility to conduct evaluations of state performance under assistance agreements (grants) to ensure that they are being utilized to achieve national goals, requirements, and mutually-agreed upon state and EPA priorities.

Oversight of state and tribal environmental program performance is a core function of the Environmental Protection Agency. Program oversight is the process by which Region 8 carries out its responsibilities for periodically assessing, ensuring and documenting that federally authorized programs are conducted by states and tribes adequately and in conformance with authorization agreements. Program oversight also encompasses continuing programs for which EPA funding is provided. Grant oversight focuses on deliverables, or action item commitments, and performance measures in grant work plans, and includes a fiduciary responsibility to ensure that grant funds are accounted for and used appropriately by recipients. EPA Region 8 has documented the oversight procedures it uses for most programs in the Regional Compendium of Standard Operating Procedures for Oversight (the Oversight Manual).

National data that will be used to support the SRF reviews are available to the regions and states through the Enforcement and Compliance History Online (ECHO) management reports and states are encouraged to periodically look at the data, ensure its accuracy and use it in managing their programs. The ECHO management reports and other information regarding the SRF are available at: http://echo.epa.gov/?redirect=echo.

In the Colorado Performance Partnership Agreement, program outcomes are measured by environmental indicators or markers of pollution in the environment. Indicators are such measurements as ambient air quality levels. Ultimately, indicators of such features as changes in exposure burden and/or changes in ecological conditions could be used. The major types of indicators being used by the state to help track outcomes of workplans found in the current CEPPA include the following examples:

DIVISION OF ENVIRONMENTAL HEALTH AND SUSTAINABLILTY

- Reduction in pollution, waste, and resource use internally within CDPHE.
- Reduction in pollution through prevention activities.

AIR QUALITY

- Trends in air quality for each of the six criteria pollutants around the state.
- Trends in number of "good" days state wide based on the Air Quality Index
- Trends in urban or rural visibility monitoring where data is available
- Trends in statewide emissions of Ozone precursors
- Statewide trends in emission of criteria pollutants
- Statewide trends in emissions of air toxics including Mercury

WATER QUALITY

- Percentage of stream miles meeting standards for designated uses.
- Percent of lake acres meeting applicable standards and supporting designated uses.
- Number of public water systems and populations served experiencing various types of MCL violations.

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HAZARDOUS WASTE

- Hazardous waste compliance rates.
- Return to compliance after enforcement.
- Human health exposures under control at high priority hazardous waste cleanup sites
- Ground water releases under control at high priority hazardous waste cleanup sites

9.2 Federal Oversight Under the National Environmental Performance Partnership System

Under the National Environmental Performance Partnership System (NEPPS), greater emphasis is being placed on performance-based evaluations, differential oversight and greater participation by the state in evaluating performance and determining solutions. In doing so, the focus of oversight is on identifying and solving problems and taking action, and to deliver more effective and efficient environmental protection. Such an approach necessitates a continuing strong EPA presence, a workable state-EPA relationship, and continuous dialogue and communication between EPA and the state.

Performance-based Evaluations

EPA is placing greater emphasis on state performance in achieving overall program results and accomplishments and less on the completion of individual products or activities. In doing so, EPA and the state have developed clear goals, objectives and performance measures to clarify requirements and expectations and the criteria for success. This framework is found in the individual program work plans in Chapters 3 through 7. The performance measures include both outputs to be completed (activities and products) and outcomes to be achieved (results). In determining overall performance, both the measurement of outputs and outcomes is necessary in determining the level of success in accomplishing the goals and objectives. Efforts are increasing to balance the use of output and outcome measures and to focus evaluations on the effectiveness and results of the work accomplished.

Differential Oversight

Region 8 is working with the states to implement a system of differential oversight in which the level of EPA oversight of state work activity corresponds to the state's prior year performance. For example, in instances of effective state performance, EPA's oversight level lessens in frequency and detail. There is greater focus on reviewing outcomes and results than the accomplishment of individual activities. In instances of less than satisfactory performance, EPA's oversight level increases and more detailed reviews of the accomplishment of activities and specific requirements may need to be conducted in order to determine and correct the cause of the problem. The differential approach to oversight is intended to provide an incentive to state programs to increase performance so that both federal and state resources can be used to address critical problems. Differential oversight should not be construed to mean that the state's and EPA's commitment to protect public health and the environment is being reduced. Maintaining a protective environmental program is a base level requirement under state and federal laws. Likewise, if the findings of the SRF indicate a need for corrective action or additional regional oversight, then EPA will make that recommendation in the SRF report, and the corrective actions required will be included in the individual program work plans included in Chapters 3 through 7 of the CEPPA.

State Involvement

A system of partnership also stipulates greater state involvement in the evaluation process. The state is increasingly becoming involved in its overall program evaluation by identifying problems and solutions and working with EPA in determining its level of performance and the appropriate level of EPA oversight.

9.3 Types of Oversight

Oversight is broadly defined as the combination of activities conducted by EPA to ensure that state programs adequately meet delegation requirements and fiscal responsibilities. EPA oversight consists of a variety of approaches.

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Base Program-wide Reviews

The base oversight activity will be an annual program-wide review conducted jointly by CDPHE and EPA. The major component of this review is a formal assessment of the state's performance in meeting commitments contained within the CEPPA. However, as part of EPA's oversight responsibilities, additional information on the implementation of delegation requirements may also be gathered to determine overall performance. In doing so, the state will be evaluated against requirements in delegation and other agreements, and the Core Performance Measures agreed to by EPA and the Environmental Council of the States (ECOS).

The intent of this review is to assess the overall performance of programs and systems. More in-depth reviews of specific activities may be conducted to examine potential or ongoing problem areas identified in the most recent SRF evaluation. Section 9.4 describes the principles of the annual review in more detail.

After-the-fact Reviews

After-the-fact reviews including, for example, reviewing completed permits, inspection reports, and enforcement actions, will occur periodically as part of EPA's oversight role. These reviews occur throughout the year to track progress on an issue identified in the previous SRF, and to ensure that delegation requirements are being met and federal statutes and regulations are being enforced. After-the-fact reviews will be the focus of EPA's ongoing oversight rather than case-by-case intervention. The number of after-the-fact reviews will be limited and will be at a level commensurate with state performance and necessary to follow-up with any issues identified in the previous SRF.

Real-time Review

These are reviews of state work products that are under development, for example, draft permits or closure plans. These reviews are only used on a selective basis to address programs with less than adequate performance or in cases where the state may request assistance or if required by national program guidance. The SRF establishes the baseline upon which off-year oversight activities of compliance and enforcement activities are developed cooperatively between the Region and the State.

9.4 Evaluation Plan: Annual Base Program-wide Review

An annual, formal evaluation of state performance is required for recipients receiving federal assistance. Although the primary purpose of the evaluation is to identify progress in accomplishing the commitments in the CEPPA, the evaluation is also essential in planning, priority-setting and continuous improvement efforts. Evaluation of delegation requirements not found in the CEPPA may also occur as part of the program-wide review. This CEPPA contains a binding set of commitments in the form of program goals and priorities and performance measures. These are found in Chapters 3 through 7. Information found in other chapters, such as priorities, roles and funding allocations, will also be used as supporting documentation in the program-wide evaluation.

9.4.1 Principles

The guiding principles to be followed by CDPHE and EPA in performance evaluations:

- EPA and the state will use the CEPPA as a management tool to continuously track the progress of work accomplished.
- The work plans contained within the CEPPA together act as the vehicle for expressing performance expectations under the CEPPA, forming the fundamental basis for awarding funds and annually evaluating state performance.
- The performance measures contained within the work plan matrices are the criteria, which will be used to report on and evaluate the progress of achieving the goals and objectives in the CEPPA.
- The state will implement and follow all delegation requirements, whether stated in the CEPPA or not, to ensure adequate protection of public health and the environment. Review of delegation requirements will be part of the annual evaluation~~,~~
- As much as feasible, the state and EPA should engage in joint analysis of identified problems to determine their nature, cause and the appropriate solutions.

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- Throughout the project period, the state and/or EPA will immediately communicate to each other any problems or issues identified and will work together to solve them or refer them to top management.
- CDPHE and/or EPA will immediately communicate any necessary changes to the CEPPA. These changes may result from a change in priorities, incorrect assessment of work to be accomplished or changes in available funding. The change must be sent to the EPA state program manager and approved by the appropriate EPA program. Any change that would require additional state resources, but where additional federal funding is not provided, must be approved by CDPHE.

9.4.2 Evaluation Process

CDPHE and EPA regional office will undertake a joint evaluation of commitments and accomplishments from the CEPPA at the end of the fiscal year. By December 31, CDPHE will produce the End-of-Year Assessment report as required by the PPG. This report will be based on CDPHE staff assessments.

CDPHE and EPA program and enforcement managers will conduct face-to-face meetings to review the End-of-Year Assessment findings. They will report results (both positive and negative) to their respective Senior Managers.

During mid- to late January, there will be joint meetings of CDPHE and EPA Program Directors with the appropriate Senior Managers of the two agencies, as necessary, to discuss results. If there are any outstanding issues, Senior Managers will resolve them by the end of January or early February.

9.4.3 Evaluation Follow-up

During the first quarter of the calendar year, the final End-of-Year Assessment report along with other reports including the SRF for RCRA Subtitle C, CAA Stationary Sources and CWA NPDES programs and the UEOS for PWSS Program will be distributed to all EPA and state managers to be used to prioritize future work efforts and track the resolution of issues identified in the SRF (UEOS for PWSS) or un-met CEPPA commitments. Changes to the CEPPA may be necessary to address new issues or priorities. Serious, ongoing performance problems may necessitate grant conditions, sanctions or other actions by EPA.

March - April - Programs conduct individual midyear reviews to check-in on progress, review and set priorities and plan for future work.

May - June - At a minimum, a program-level face-to-face meeting is held to discuss significant program issues, set joint priorities and develop plans and strategies to accomplish program objectives in the coming PPA period.

ED_001361_00018327

To: Ostendorf, Jody[ostendorf.jody@epa.gov]
Cc: Jeremy Patterson[JPatterson@ndnlaw.com]; Fallon, Gail[fallon.gail@epa.gov]; Payton, Richard[Payton.Richard@epa.gov]; minnieg@utetribe.com[minnieg@utetribe.com]
From: Monique Douville
Sent: Fri 9/30/2016 7:06:40 PM
Subject: Ute Indian Tribe designation recommendation for the recently revised NAAQS for Ozone attached
16 9 29 UTBC - EPA re designation recommendation for the recently revised National Ambient Air Quality Standards for Ozone.pdf

Ms. Ostendorf,

Attached please find the Ute Indian Tribe's designation recommendation for the recently revised National Ambient Air Quality Standards for Ozone. We are also filing this electronically as well as sending a hard copy, certified return receipt.

Thank you.

Respectfully,

Monique Douville

Assistant to Tom Fredericks and Jeremy Patterson

Fredericks Peebles & Morgan LLP

1900 Plaza Drive

Louisville, Colorado 80027

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To: Larry Horowitz[larry.horowitz@noaa.gov]; Payton, Richard[Payton.Richard@epa.gov]; Arlene Fiore[amfiore@ldeo.columbia.edu]; Tonnesen, Gail[Tonnesen.Gail@epa.gov]
From: Meiyun Lin - NOAA Affiliate
Sent: Tue 2/7/2017 3:02:50 PM
Subject: Fwd: acp-2016-1093 (author) - manuscript accepted for final publication
Lin_ACP2017_Text_Figs_Final.pdf

Hi All,
FYI. The final accepted manuscript is attached!

/Meiyun
---------- Forwarded message ----------
From: <editorial@copernicus.org>
Date: Mon, Feb 6, 2017 at 5:34 AM
Subject: acp-2016-1093 (author) - manuscript accepted for final publication
To: meiyun.lin@noaa.gov

Dear Dr. Lin,

We are pleased to inform you that your following manuscript was accepted for final publication in ACP:

Title: US surface ozone trends and extremes from 1980-2014: Quantifying the roles of rising Asian emissions, domestic controls, wildfires, and climate
Author(s): Meiyun Lin et al.
MS No.: acp-2016-1093
MS Type: Research article
Iteration: Revised Submission
Special Issue: Chemistry–Climate Modelling Initiative (CCMI) (ACP/AMT/ESSD/GMD inter-journal SI)

Presently, your manuscript is being transferred to the Copernicus Publications Production Office for typesetting and publication. To proceed, please upload all files that are required for production no later than 16 Feb 2017 at http://editor.copernicus.org/ACP/production_file_upload/acp-2016-1093. For further information on files and formats we kindly refer you to the submission guidelines: http://www.atmospheric-chemistry-and-physics.net/for_authors/submit_your_manuscript.html

In your manuscript, please use full first names for all authors. Although references are still based on initials, we will use full first names on the title page of your paper.

To log in, please use your Copernicus Office user ID 101439.

You are invited to monitor the processing of your manuscript via your MS Overview: http://editor.copernicus.org/ACP/my_manuscript_overview

In case any questions arise, please contact me.

Kind regards,

Natascha Töpfer
Copernicus Publications
Editorial Support
editorial@copernicus.org

on behalf of the ACP Editorial Board

To: Keating, Terry[Keating.Terry@epa.gov]; Dolwick, Pat[Dolwick.Pat@epa.gov]; Baker, Kirk[Baker.Kirk@epa.gov]; Henderson, Barron[henderson.barron@epa.gov]; Pinto, Joseph[Pinto.Joseph@epa.gov]
Cc: Payton, Richard[Payton.Richard@epa.gov]; Jackson, Scott[Jackson.Scott@epa.gov]
From: Tonnesen, Gail
Sent: Fri 12/2/2016 3:16:15 PM
Subject: RE: Revised manuscript (please comment by Dec 1)
LinMY_Manuscript_US_O3Trends_Nov2016_GT.docx
Main_Figures_LinMY.pdf

Terry – thanks for your comments. The text in the conclusion that refers to Figure 20 is incorrect, it should refer to Figure 21, and I think your comments below also refer to Figrure 21. I forwarded your comments to Meiyun and I also sent my attached comments.

Kirk – I'm not sure that I agree with Meiyun's conclusions about fire impacts. The conclusions might be correct for rural sites, but pehaps not for urban sites where the interaction of the fire plume with urban NOx could have larger contributions to urban O3.

Please note that this manuscript has not yet been submitted so please do not share outside of this group.

thanks,

Gail

303-312-6113

From: Keating, Terry
Sent: Thursday, December 01, 2016 3:27 PM
To: Tonnesen, Gail <Tonnesen.Gail@epa.gov>; Jackson, Scott <Jackson.Scott@epa.gov>; Fallon, Gail <fallon.gail@epa.gov>; Dolwick, Pat <Dolwick.Pat@epa.gov>
Cc: Payton, Richard <Payton.Richard@epa.gov>
Subject: RE: Revised manuscript (please comment by Dec 1)

Gail,

Based on a quick read, I just have a few editorial suggestions:

1) I think that all of the ozone concentrations and trends in the abstract refer to MDA8 values. Given that many people will only read the abstract, it would be useful to be explicit about this in the abstract.

2) The FIXEMIS scenario is not defined except to give a reference to her 2014 paper and an ambiguous description in Table 1 which states that emissions are based on a 1970-2010 climatology. Is this an average over the whole period? It would be helpful to at least define the scenario in a single sentence.

3) Figure 20: I'm assuming that the text added near the bottom of the plot provides the change in NOx emissions over the same time period for each region. For the WUS region, the change in WUS emissions as well as the change in EA+SA should be provided. The change in NEUS and SEUS should be labeled. All of this should be described in the figure caption.

4) Figure 20: Is there a way to show the change in observed values in each of these regions? Maybe just a separate whisker that shows the range of observed trends at sites in the region? It seems it's the one piece of key information missing from the figure.

Thanks for the opportunity to comment. I'll be interested in following the review on ACPD.

Terry

Terry J. Keating, Ph.D.
keating.terry@epa.gov

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Mailing Address: 1200 Pennsylvania Ave NW (Code 8725R) Washington DC 20460

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From: Tonnesen, Gail
Sent: Thursday, December 01, 2016 10:16 AM
To: Jackson, Scott <Jackson.Scott@epa.gov>; Fallon, Gail <fallon.gail@epa.gov>; Dolwick, Pat <Dolwick.Pat@epa.gov>; Keating, Terry <Keating.Terry@epa.gov>
Cc: Payton, Richard <Payton.Richard@epa.gov>
Subject: FW: Revised manuscript (please comment by Dec 1)

Hi All,

Meiyun Lin has invited Richard and me to be co-authors on the attached manuscript. She has a very short turn around time on her plans to submit this, but we can ask her to delay or remove our names while it is in review if there are concerns about us being co-authors.

thanks,

Gail

303-312-6113

From: Meiyun Lin - NOAA Affiliate [mailto:meiyun.lin@noaa.gov]
Sent: Thursday, November 24, 2016 9:30 PM
To: Larry Horowitz <larry.horowitz@noaa.gov>; Payton, Richard <Payton.Richard@epa.gov>; Arlene Fiore <amfiore@ldeo.columbia.edu>; Tonnesen, Gail <Tonnesen.Gail@epa.gov>
Subject: Revised manuscript (please comment by Dec 1)

Dear All,

I hope you all had a great Thanksgiving!

I finally finished the revisions of the paper. All are attached! It would be great if you have time to read it through again. I hope to submit the paper to ACP on Friday (Dec 2). Thus, comments and edits by Wednesday or Thursday are highly appreciated! As I am on the final stage of finishing up the manuscript, please edit the text directly if you think some of the original wording are not clear or misleading.

Just so you know - To keep the manuscript clean and easy to read, I have avoided showing tracked changes from the previous version. But I did make substantial efforts to address all the comments raised by the coauthors last time. You will know when you read it.

All the best,

Meiyun

US surface ozone trends and extremes from 1980-2014: Quantifying the roles of rising Asian emissions, domestic controls, wildfires, and climate

Meiyun Lin[1,2], Larry W. Horowitz[2], Richard Payton[3], Arlene M. Fiore[4], Gail Tonnesen[3]

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Draft: December 1, 2016
To be submitted to CCMI-ACP Special Issue

Abstract (300 words). Understanding the surface O_3 response to evolving global-to-regional precursor emissions and to variability in climate and extreme weather has implications for designing effective air quality control policies. We examine these conjoined processes through an integrated analysis of observational records and a suite of global chemistry-climate model (GFDL-AM3) hindcasts driven by observed meteorology over 1980-2014. The model captures the salient features of observed surface O_3 trends; including a marked increase over East Asia (up to 2 ppb yr^{-1}), springtime increases at western US (WUS) rural sites (0.2-0.4 ppb yr^{-1}), the largest summertime decreases at the 95th percentile and wintertime increases in the 50th to 5th percentiles observed over the eastern US (EUS). The tripling of Asian NO_x emissions since 1990 contributes as much as 65% of the modeled background O_3 increases over the WUS during spring, outpacing O_3 decreases attained via US domestic emission controls. Methane increases over this period contribute to raising WUS background O_3 by 15%. During summer, the effects of increasing Asian emissions approximately offsets the effects of US domestic emission reductions, leading to weak or insignificant observed O_3 trends at WUS rural sites. Rising Asian emissions and global methane under the RCP8.5 scenario would raise mean springtime O_3 above the WUS by ~10 ppb from 2010-2030. While wildfire emissions can result in 2-8 ppb enhancements to monthly mean O_3 at individual sites in some summers, high temperatures and the associated buildup of O_3 produced from US anthropogenic

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emissions are responsible for the highest observed summertime O_3 in both the WUS and EUS. In contrast to the WUS, long-term trends of O_3 observed in the EUS are overwhelmingly dominated by decreases in domestic emissions, with O_3 reductions more pronounced in the warmer Southeast. Regional NO_x reductions also alleviated the O_3 buildup during the recent EUS heat waves of 2011-2012 relative to earlier heat waves (e.g., 1988; 1999). Without emissions controls, the 95th percentile summer O_3 in the EUS would have increased by 0.2-0.4 ppb yr^{-1} over 1988-2014.

1. Introduction

Decreases in summertime O_3 were observed in parts of California and throughout the EUS (e.g., *Cooper et al., 2012; Simon et al., 2015*), following regional NO_x controls after the lowering of the US National Ambient Air Quality Standard (NAAQS) for O_3 in 1997 to 80 ppb. On the basis of health evidence, the level for the O_3 NAAQS has been further lowered to 75 ppb in 2008 and to 70 ppb in 2015 (*Federal Register, 2015*). There are concerns that increases in Asian anthropogenic emissions (*Jacob et al., 1999; Lin et al., 2015b*), more frequent large wildfires in summer (e.g., *Jaffe, 2011*; *Yang et al.*, 2015; *Abatzoglou et al., 2016*), and frequency of late spring deep stratospheric O_3 intrusions (*Lin et al., 2012a*; *Langford et al., 2014; Lin et al., 2015a*) may pose challenges in attaining more stringent O_3 standards at high-elevation WUS regions. A warming climate would also offset some of air quality improvements gained from regional emission controls (see a review in *Fiore et al., 2015*). Quantitative understanding on sources of O_3 variability on daily to multi-decadal time scales can provide valuable information to air quality control managers as they develop O_3 abatement strategies under the O_3 NAAQS. Here we systemically investigate the response of US surface O_3 means and extremes to changes in Asian and North American anthropogenic emissions, global methane, regional heat waves and wildfires over the course of 35 years from 1980 to 2014, using a suite of observations and chemistry-climate model (GFDL-AM3) hindcasts (*Lin et al., 2014; 2015a; 2015b*).

Rapid economic growth has led to a tripling of O_3 precursor emissions from Asia in the past 25 years (e.g., *Granier et al., 2011; Hillboll et al., 2013*). Observed 1-hour O_3 mixing ratios can frequently reach 200-400 ppb during regional pollution episodes in eastern China (*Wang T. et al.,* 2006; *Li et al., 2016*), with a seasonal peak in the late spring to early summer (*Wang Y. et al., 2008; Lin et al., 2009*). A synthesis of available observations from the mid-1990s to the 2000s indicates increases of 1-2 ppb yr^{-1} in spring to summer O_3 in China (*Ding et al., 2008; Ma et al., 2015; Sun et al., 2015*). Long-range transport of Asian pollution plumes towards western North America has long been identified by aircraft and satellite measurements and in chemical transport models (e.g., *Jaffe et al., 1999; Zhang et al., 2008; Fiore et al., 2009; Lin et al., 2012b; Huang et al., 2013; Verstraeten et al., 2015*). Systematic comparison of observed and modeled long-term O_3 trends over Asia is lacking in the published literature, but is needed to establish confidence in model application to assess the global impacts of rising Asian emissions.

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Changes in regional anthropogenic emissions and air pollution meteorology have the greatest impacts on summertime surface O_3 during pollution episodes in the densely populated EUS regions (*e.g., Jacob and Winner 2009; Rieder et al., 2015; Porter et al., 2015; Pusede et al., 2015*). Discerning directly the effect of climate change on air quality from long-term observation records of O_3 would obviously be of considerable interest, but concurrent trends in precursor emissions represent probably an insurmountable impediment. Over the WUS, background O_3 from intercontinental transport mainly enhances mean O_3 levels (e.g., *Zhang et al.,* 2008*; Lin et al., 2012b; Fiore et al., 2014*), whereas stratospheric intrusions contribute to the highest observed O_3 events at individual rural and remote sites (*Lin et al., 2012a; Lin et al., 2015*), in addition to pollution transport from California. Observation-based examinations (e.g., *Cooper et al., 2012; Parrish et al.,2012; Shen et al., 2015*) are tied closely to the actual underlying physical processes producing changes in pollutant levels, but are naturally limited in terms of identifying and quantifying the impacts of individual drivers. It is difficult to separate the impacts of changes in global-to-regional precursor emissions and different meteorological factors on O_3 at given locations without the benefit of multiple sensitivity experiments afforded by models.

On the other hand, process-oriented assessments of the models are needed to build confidence in their utility for assessing pollution control strategies, estimating tropospheric O_3 radiative forcing and projecting pollution extremes under future climate scenarios (e.g., *Monks et al., 2015*). A number of studies show that global models capture observed decreases in summertime O_3 over the EUS during 1990-2010, but have difficulties to simulate O_3 increases measured at remote high-altitude sites that are believed to represent hemispheric-scale conditions with little influence from fresh local pollution (hereafter referred to as "baseline") (e.g., *Lamarque et al., 2010*; *Koumoutsaris and Bey, 2012; Parrish et al., 2014; Brown-Steiner and Hess 2014; Strode et al., 2015*). *Lin et al.* (2015b) examined the representativeness of O_3 trends derived from sparse measurements in the free troposphere over the WUS, originally reported by Cooper et al. (2010) and one of the datasets used in previous model evaluations. They found that discrepancies between observed and simulated O_3 trends reflect measurement sampling biases. In the present study we provide additional insights into the causes of the model-observation disagreement at the WUS rural sites with continuous, high-frequency measurements. Notably, we reconcile observed and simulated O_3 trends at these sites with a baseline sampling approach.

Our goal in this paper is twofold: first, to systematically evaluate how well our BASE simulation represents trends and variability of US surface O_3 across the entire concentration distribution; second, to examine changes in US surface O_3 means and extremes in a suite of multi-decadal hindcast simulations designed to isolate the response of O_3 to increases in Asian anthropogenic emissions, North American domestic emission controls, rising global methane, interannual variability in heat waves and wildfires. Examining trends across the concentration distribution is crucial to assessing the ability

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of models to simulate the surface O_3 response under different temperature and chemical regimes depending on seasons, geographical location, and regional transport patterns. Specifically, we evaluate the trends separately for the 5th, 50th and 95th percentiles of the O_3 concentration distribution in spring (March-April-May; MAM), summer (June-July-August; JJA), and winter (December-January-February; DJF).

Section 2 briefly describes the observation records, model experiments, and analysis approach. As a first step towards assessing our understanding of the global impacts of rising Asian emissions, we briefly review Asian O_3 trends from observations in recent publications and evaluate modeled trends (Sect.3). We then focus our analysis on the US, using both observations and models to assess the response of US surface O_3 to changes in background O_3, regional anthropogenic emissions and meteorology (Section 4). In Section 5, we further separate the influence of background on WUS O_3 into components driven by rising Asian anthropogenic emissions, global methane, and wildfires. We quantify the contribution of these processes to surface O_3 in both rural areas such as national parks (Sect. 5.1 to 5.3) and in densely populated regions such as the Denver Metropolitan area (Sect. 5.4). Section 6 examines how the EUS summertime O_3 probability distribution and pollution extremes during heat waves respond to regional NO_x reductions. Finally, we summarize in Section 7 the key drivers of US surface O_3 trends and extremes and discuss model skills and shortcomings.

2. Model and Observations

2.1 Chemistry-Climate Model Experiments.

(Table 1 about here: Model Experiments)

Table 1 summarizes meteorology, radiative forcing agents and emissions used in each model experiment. All hindcast simulations include interactive stratosphere-troposphere chemistry and aerosols on a cubed sphere grid with resolution of approximately 200x200 km^2 (*Donner et al., 2011*), with height-dependent nudging to the NCEP/NCAR reanalysis zonal and meridional winds (*Lin et al.*, 2012b). Biogenic isoprene emissions and lightning NO_x are tied to model meteorology (*Guenther et al.*, 2006; *Rasmussen et al.*, 2012) and thus can respond to changes in climate, whereas soil NO_x and chemical dry deposition velocities are set to a monthly climatology, with a diurnal cycle applied for O_3 dry deposition. Our **BASE** simulation and two additional simulations with modified wildfire emissions (**FIXEMIS** and **IAVFIRE**) were previously used to interpret the causes of increasing autumnal O_3 measured at Mauna Loa Observatory in Hawaii since 1974 (*Lin et al.*, 2014), interannual variability of springtime O_3 (*Lin et al.*, 2015a) and the representativeness of free tropospheric O_3 measurements over the WUS (*Lin et al.*, 2015b). Below we describe additional simulations used in this study.

In the **IAVASIA** simulation, anthropogenic emissions from East Asian (15ºN-50ºN, 95ºE-160ºE) and South Asian (5ºN-35ºN, 50ºE-95ºE) regions are allowed to vary from year to year as in **BASE**, while anthropogenic emissions in the other regions of the world,

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global methane and wildfire emissions are held constant as in **FIXEMIS**. In the **IAVCH$_4$** simulation, global methane is allowed to vary over time as in **BASE**, but with anthropogenic and wildfire emissions held constant as in **FIXEMIS**. The **IAVASIA** and **IAVCH$_4$** simulations thus isolate the role of rising Asian anthropogenic emissions and global methane, respectively, by contrasting with the **FIXEMIS** simulation. Both BASE and IAVCH$_4$ simulations apply observed time-varying methane concentrations as lower boundary condition for chemistry (Supplementary **Fig.S1**). Thus, underestimates in historical methane emissions reported recently by *Schwietzke et al.* (2016) do not affect our results. We quantify the total contribution from meteorological variability, O_3 transported from the stratosphere, pollution from foreign continents and O_3 produced by global methane, lightning NO_x, wildfires and biogenic emissions with the **Background** simulation, in which North American anthropogenic emissions are zeroed out relative to BASE. We additionally draw upon two simulations with the GFDL Coupled Model CM3 under the 21st century RCP4.5 versus RCP8.5 global change scenarios to project changes in springtime O_3 over the WUS. Details of these CM3 simulations were described in *John et al.* (2012).

2.2 Anthropogenic and Biomass Burning Emissions

(Figure 1 about here: Changes in NO_x emissions)

We first examine how well the emission inventories implemented in AM3_BASE represent changes in regional NO_x emissions over recent decades inferred from satellite measurements of tropospheric vertical column density (VCD_{trop}) of NO_2. The combined record of GOME and SCIAMACHY shows that VCD_{trop} NO_2 over the highly polluted region of eastern China almost tripled during 1996-2011 (**Fig.1a**). In contrast, VCD_{trop} NO_2 over the EUS decreased by ~50% in the 2000s (**Fig.1b**) due to NO_x State Implementation Plans (hereafter referred to as the NO_x SIP Call). Similar decreases occur in WUS cities, resulting from other NO_x control programs to achieve O_3 and regional haze planning goals. These trends are consistent with those reported by a number of recent studies (*Hilboll et al.*, 2013), including those using OMI NO_2 data (*Russell et al.*, 2012; *Duncan et al.*, 2016). For comparison with satellite data, we sample the model archived every three hours closest to the local time of satellite overpass for the SCIAMACHY and GOME products we use in Figure 1 (10:00-10:30AM). Trends in VCD_{trop} NO_2 are similar to those in NO_x emissions (orange lines versus red triangles in **Fig.1a-1b**), indicating that the influence of changes in NO_x chemical lifetime on NO_2 column trends (e.g., *Lamsal et al., 2011*) is negligible in our model, consistent with NO_2 loss against OH being minor during the morning overpasses of GOME and SCIAMACHY. The emission inventory used in AM3_BASE, from *Lamarque et al.* (2010) with annual interpolation after 2000 to RCP8.5 (*Lamarque et al.*, 2012), mimics the opposing changes in NO_x emissions over eastern China versus the EUS during 1996-2011, consistent with changes in VCD_{trop} NO_2 retrieved from the satellite instruments. For comparison, the RCP4.5 interpolation for 2001-2010 in the historical CMIP5 simulations

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analyzed by *Parrish et al.* (2014) underestimates the increase in Chinese NO_x emissions by a factor of two (**Fig.1a**). Over the entire 1980-2014 historical period analyzed in our study, Chinese NO_x emissions under BASE increase by a factor of 5, with an acceleration in the 2000s. Note that the levelling-off of Chinese NO_x emissions after 2011 (*Duncan et al.*, 2016) is not represented in the emission inventories used in this study.

Our BASE model applies interannually-varying monthly mean emissions from biomass burning based on the RETRO inventory (*Schultz et al.*, 2008) for 1970 to 1996 and *GFEDv3* (*van der Werf et al.*, 2010) for 1997 onwards, distributed vertically as recommend by *(Dentener et al., 2006).* **Supplementary Fig. S2** illustrates the interannual variability of biomass burning CO emissions by main source regions in the Northern Hemisphere for the period 1980-2014. Boreal fire emissions in Eurasia almost doubled from 1980-1995 to 1996-2014, with large fires occurring more frequently in the recent decade as found in recent studies for the WUS (*Dennison et al.*, 2014; *Yang et al.*, 2015).

2.3 Ozone Observation Records and Uncertainties

Long-term surface O_3 observation records were obtained at 66 rural monitoring sites with 20 (1995-2014) to 27 (1988-2014) years of continuous hourly measurements from the US National Park Services, the US Clean Air Status and Trends Network (CASTNet), and the US EPA Air Quality System. *Cooper et al.* (2012) reported trends in daytime O_3 over 1990-2010 at 53 rural sites. We investigate trends in daily maximum 8-hour averaged (MDA8) O_3 and expand the analysis of Cooper *et al.* (2012) using additional data to 2014 and including 13 additional sites with measurements begun in 1991-1995. All sites have at least 20 years of data. If a site has less than 50% data availability in any season then that particular season is discarded. The trend is calculated separately for the 5th, 50th and 95th O_3 percentiles for each season through ordinary linear least-square regression. Statistics are derived for the slope of the linear regression in units of ppb yr^{-1}, the range of the slope with a 95% confidence limit (not adjusted for sample autocorrelation), and the p-value indicating the statistical significance of the trend based on a two-tailed *t* test.

(Figure 2 about here: Measurement uncertainties)

A cross-site consistency analysis was performed to determine robust changes in the time evolution of O_3 over the WUS during 1988-2014 (**Fig.2**). The monitor at Yellowstone National Park was moved 1.5 km from the Lake Yellowstone site to the Water Tank site in 1996. While the local transport patterns are slightly different for the two sites, using MDA8 data from the well-mixed midday period minimizes the differences. Observed O_3 interannual variations show large-scale similarity across sites over the Intermountain West except for the earlier period 1989-1990. During this period, observations at Yellowstone and Rocky Mountain National Parks show low-O_3 anomalies that do not appear at other sites but there is no change in measurement technique. Jaffe

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and Ray (2007) suggest this represents large-scale variations in background O_3 that are seen in common at these two parks. However, analysis of meteorological fields and model diagnostics does not reveal any obvious transport anomaly influencing background O_3 variations at these sites in 1990 (*Lin et al.*, 2015a). Observations at Pinedale in January-February 1990 are also anomalously low relative to Grand Canyon (GRC474), Centennial (CNT169), and Gothic (GTH161). These anomalous data at the beginning of measurement records can substantially influence calculated trends in short record length. For example, (*Cooper et al.*, 2012) found an O_3 increase of 0.42±0.30 ppb yr^{-1} at Yellowstone over 1990-2010 during summer. Removing data in 1990, we find a weaker increase of 0.28±0.27 ppb yr^{-1} (**Fig.2b**). Removing data in 1990 at Rocky Mountain resulted in a weaker springtime O_3 increase of 0.29±0.17 ppb yr^{-1} compared to 0.43±0.23 ppb yr^{-1} over 1990-2010 (**Fig.2c**). To assess the robust O_3 changes, we thus remove these apparently uncertain measurements in 1990 from the subsequent analysis.

2.4 Model Baseline Sampling Approach

(Figure 3 about here: Influence of baseline sampling)

Springtime O_3 observations at WUS high-elevation sites (≥ 1.5 km a.s.l.) typically represent baseline conditions with little influence from fresh local pollution. In a global model with ~200x200 km^2 horizontal resolution, however, these remote sites can reside in the same grid cell that contains urban cities where NO_x emissions have decreased. For example, Rocky Mountain National Park (2.7 km a.s.l.) is less than 100 km from the Denver Metropolitan Area in Colorado. Such limitation of large-scale models in resolving urban-to-rural gradients and sharp topography results in an artificial offset of increased baseline O_3 at remote sites by decreased urban pollution within the same model grid cell. Thus, coarse-resolution models are often unable to reproduce the observed O_3 increases at the high-elevation sites representative of remote baseline conditions (**Figs. 3a vs. 3b**), as found in many prior modeling analyses [e.g., *Parrish et al.*, 2014; *Strode et al.*, 2015 and references therein). This limitation can be addressed by using a baseline selection procedure to identify conditions for which remote sites are not influenced by model artifacts caused by poor spatial resolution, as described below.

All measurements presented in this study are unfiltered. We implement a set of regional CO-like tracers, with 50-day exponential lifetime and surface emissions constant in time from each of four northern mid-latitude source regions (*Lin et al.*, 2014), to examine the model O_3 trends when binned according to the dominant influence from different continental air regimes. To represent observed baseline conditions at intermountain sites, we sample AM3 at 700 hPa (~3 km altitude) and filter O_3 data in the BASE simulation to remove the influence from fresh local pollution. Specifically, our filter excludes data on days when the North American CO tracer (NACOt) exceeds the 67th percentile for each season. This procedure yields higher calculated baseline O_3 trends (**Fig.3c**), bringing it closer to observations (**Fig.3a**). When sampled at 700 hPa without filtering **(Fig.3d)**, AM3_BASE gives statistically significant O_3 increases but the rate of

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increase is ~0.1 ppb yr^{-1} weaker than with filtering. With North American anthropogenic emissions shut off, the model simulates significant O_3 increases both in the surface (**Fig.3e**) and at 700 hPa (**Fig.3f**) with little difference, indicating that the BASE model underestimate of observed O_3 increases when sampled at the surface (**Fig.3b**) reflects an excessive offset from local pollution in the model relative to observed conditions, as opposed to insufficient mixing of free tropospheric O_3 to the surface. As individual sites display observed trends falling in between the filtered model, and sampled at the surface versus at altitude, we can use the model to interpret which sites are most frequently sampling baseline versus influenced by North American anthropogenic emissions. For consistency, in subsequent analysis we have applied the model baseline sampling approach to all WUS sites with elevations greater than 1.5 km altitude. Due to the lower terrain of the EUS the monitor elevations are much lower than in the west and observed O_3 trends are largely controlled by regional emission changes, we always sample the model at the surface without applying data filtering.

3. Global Distribution of Lower Tropospheric O_3 Trends

3.1 Global O_3 Burden and Distribution of Trends

(Figure 4 about here: Global distribution)

We begin by examining the global distribution of lower tropospheric O_3 trends over 1988-2014 from the BASE simulation (**Fig.4**) and center our discussion on the differences between the surface and free troposphere (~700 hPa), with implications for understanding the impact of trends in hemispheric baseline O_3 on surface air quality. The model indicates that surface MDA8 O_3 levels in Asia have increased significantly by 1.5-2.5 ppb yr^{-1} in the 95th percentile (**Fig.4a-b**) and by 1-2 ppb yr^{-1} in the median values (**Fig.4c-d**), with the largest increases occurring in Southern Asia during spring and over Eastern China during summer. In contrast, there is a marked decrease in surface MDA8 O_3 in WUS cities, throughout the EUS and in central Europe, particularly at the high percentiles and during summer. The increase in surface O_3 over Asia and decreases over the US and Europe are consistent with changes in regional emissions of O_3 precursors over this period (**Fig.1**).

Over Southeast Asia (south of 30ºN) during spring, earlier springtime O_3 photochemical production at lower latitudes coupled with active frontal transport (*Liu et al.*, 2002; *Carmichael et al.*, 2003; *Lin et al.*, 2010) leads to a comparable or even greater increase of O_3 in the free troposphere than at the surface **(Figs. 4c vs. 4e).** In contrast, over Central East China during summer the simulated trends of O_3 in the free troposphere are at least a factor of three weaker than in surface air **(Fig.4d vs. 4f)**, consistent with analysis of MOZAIC aircraft data over Beijing in 1995-1999 versus 2003-2005 (*Ding et al.*, 2008). Mean O_3 at 700 hPa above parts of North America and Europe show little change in summer or even increase during spring in the model, similar to the trends at 500 hPa (**Fig.S3**), despite the significant decreases in surface air. Global tropospheric O_3

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burden in the BASE simulation increases by approximately 30 Tg over the past 35 years (**Fig.5a**), which is attributed mainly to changes in anthropogenic emissions. Over the 2004-2015 OMI/MLS satellite era, however, meteorological variability contributes approximately half to the total simulated decadal trends of O_3 burden.

3.2 Comparison of observed and simulated O_3 trends in Asia

(Figures 5 and 6 about here)

Long-term O_3 observations are very sparse in Asia, making it difficult to evaluate modeled O_3 trends. We compile available measurements from the published literature; including ozonesonde profiles at Hong Kong (2000-2014; http:/woudc.org) and Hanoi (2005-2015; SHADOZ, Thompson et al., 2007), MOZAIC aircraft profiles collected on summer afternoons in the boundary layer (below 1250 m altitude) over Beijing for 1995-2005 (*Ding et al.*, 2008), ground-based measurements at Mt. Tai (1.5 km a.s.l.) in Central Eastern China for July-August 2003-2015 (*Sun et al.*, 2016), at the GAW stations - Shangdianzi north of Beijing for 2004-2014 (*Ma et al.*, 2016) and Mt. Waliguan (3.8 km a.s.l.) in the Tibetan Plateau for 1994-2013 (*Xu et al.*, 2016), at Taiwan for 1994-2007 (*Y-K Lin et al.*, 2010), South Korea for 1990-2010 (*Lee et al.*, 2014), Mt. Happo (1.9 km a.s.l.) in Japan for 1991-2011 (*Tanimoto*, 2009; *Parrish et al.*, 2012), and a coastal site at Hong Kong in Southern China for 1994-2007 (*T Wang et al.*, 2009).

We first evaluate observed and simulated annual trends of O_3 over 900-600 hPa at Hanoi (21°N, 106°E) and Hong Kong (22°N, 114°E) ozonesonde sites in Southeast Asia (**Fig.5b-5c**), where our model indicates the greatest free tropospheric ozone increases (**Fig.4e**). Frequency of ozonesonde is 4 profiles per month at Hong Kong but just 1-2 profiles per month at Hanoi. To determine the representativeness of the O_3 trends derived from these sparse measurements, we compare observations and model results co-sampled on sonde launch days with the 'true average' determined from O_3 fields archived every three hours from the model, as in our prior work for WUS sites (*Lin et al.*, 2015a; *Lin et al.*, 2015b). The trends are generally consistent between the sonde data, model co-sampled and 'true average' results for Hong Kong, with a total increase of ~15% from 2005 to 2014. However, our analysis indicates that sampling deficiencies may influence the trends derived from ozonesondes at Hanoi recently reported by (*Y Zhang et al.*, 2016). Observations at Hanoi show an apparently rapid O_3 increase of 30% from 2005 to 2014. AM3_BASE sampled sparsely as in the ozonesondes captures the observed variability (r^2 = 0.7), whereas the 'true average' over this period indicates the trend is only half of the observed. Over the short period 2005-2014, interannual variability of O_3 resulting from wildfire emissions and meteorology in IAVFIRE is as large as the total O_3 change in BASE. Over the entire 1980-2014 period, the BASE model 'true average' simulates an O_3 increase of ~30%.

Expanding the comparison to a suite of sites across East Asia (**Fig. 6),** we find that AM3_BASE captures the key features of O_3 trends in Asia, including their seasonal to regional variations, the marked summertime O_3 increases (1-2 ppb yr^{-1}) in Central Eastern

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China where NO_x emissions have approximately tripled since 1990 (**Fig.1a**), and the springtime O_3 increases (0.5 ppb yr^{-1}) observed at Taiwan and Mt. Happo driven by pollution outflow from the Asian continent. Note that to place the trends derived from the short observational records into a broader context we show the 20-year trends over 1995-2014 from the model, except for South Korea (1990-2010) and Happo Japan (1991-2011). We match the time period in the model with observations at these two sites because AM3 shows weaker O_3 increases when data for the recent years are included, which likely reflects the offsetting effects from regional emission reductions in South Korea and Japan. Parrish *et al.* (2014) found that three chemistry-climate model simulations underestimated the observed O_3 increase at Mt. Happo by at least a factor of four. This discrepancy partly reflects the limitation of global models in resolving observed baseline conditions at Mt. Happo, as occurs at WUS sites (Sect. 2.4). Sampling our model at 700 hPa and focusing on data that are strongly influenced by outflow from the East Asian continent (Chinese CO tracer > 67th percentile), we find an O_3 increase of 0.48±0.13 ppb yr^{-1} at Mt. Happo (**Fig.6b**), approximating the observed increase of 0.76±0.35 ppb yr^{-1}. The observed and simulated trends are not statistically different given the overlapping confidence limits. The larger confidence limit (uncertainty) derived from the Happo observations likely reflects the measurement inconsistency before 1998 and instrumental problems after 2007 (*Tanimoto et al.*, 2016). We conclude that the ability of GFDL-AM3 to reproduce the marked increases of O_3 pollution in Asia lends confidence in its application to assess the global impacts of rising Asian emissions.

4. Regional and Seasonal Variability of US Surface O_3 Trends

We next focus our analysis on the US where dense, high-frequency, long-term, reliable measurements of surface O_3 facilitate process-oriented model evaluation. Comparisons of surface MDA8 O_3 trends over 1988-2014 at 66 rural monitoring sites across the US as observed and simulated in AM3_BASE are shown in **Figure 7** for spring, **Figure 8** for summer, and **Figure 9** for winter. The trends are calculated separately for the 5th, 50th and 95th percentiles of the O_3 concentration distribution, with larger circles on the maps indicate sites with statistically significant trends ($p<0.05$). We first discuss observations (Sect. 4.1), followed by model evaluation and trend attribution (Sect. 4.2).

4.1 Observations

(Figure 7 about here)

In spring (**Figure 7**), observations indicate spatial heterogeneity in O_3 trends across the Intermountain West, Northeast (north of 38°N), and Southeast US. At the 95th percentile (**Fig.7a**) the pattern of observed trends is homogeneous across the Northeast and Southeast US, with approximately 87% of the sites having statistically significant O_3 decreases of 0.4-0.8 ppb yr^{-1} and no sites showing a significant increase. In contrast, there is a significant increase at 20% of the sites in the Intermountain West and only Joshua

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Tree National Park located downwind of the Los Angeles Basin shows a significant decrease at the 95th percentile. At the 50th percentile (**Fig.7b**) there are significant O_3 decreases of 0.2-0.4 ppb yr^{-1} in the Southeast and little overall change in the Northeast, while significant increases of 0.2-0.4 ppb yr^{-1} occur at 53% of the sites in the Intermountain West. Significant springtime O_3 increases have occurred in all the percentiles of observations at Lassen Volcanic National Park in California, Great Basin National Park in Nevada, and Rocky Mountain National Park in Colorado. At the 5th percentile (**Fig.7c**) significant O_3 increases occur at most sites in the northeast while little change and some negative trends are found in the Southeast. The observed greatest O_3 decreases for the highest percentiles are consistent with high-temperature O_3 production being more NO_x-limited (*Pusede et al.*, 2015), and thus more responsive to the decreases in NO_x emissions over the past decade. The north-to-south gradient in springtime O_3 trends over the EUS reflects the earlier seasonal transition from NO_x-saturated to NO_x-sensitive O_3 production regimes in the Southeast, where plentiful radiation in spring enhances HO_x supply and biogenic isoprene emissions are turned on earlier than the Northeast.

(Figure 8 about here)

In summer (**Figure 8**), as radiation intensifies and isoprene emissions peak seasonally, the O_3 production becomes more NO_x-limited across both the Southeast and Northeast US where NO_x emission controls have led to significant O_3 decreases of 0.8-1.8 ppb yr^{-1} in the 95th percentile and 0.4-0.8 ppb yr^{-1} in the median value (**Fig.8a-8b**). In the Southeast, significant decreases have also occurred at the lowest percentiles during summer (**Fig.8c**), in strong contrast to the weak response during spring (**Fig.7c**). Despite reductions in precursor emissions in the WUS cities (**Fig.1d**), there are no significant summer O_3 decreases at the intermountain sites except at Yosemite and Joshua Tree National Parks for the 95th percentile. Instead, a significant summer increase of ~0.3 ppb yr^{-1} occurs across the entire O_3 distribution at Yellowstone National Park. Significant summer increases are found in the 5th percentile for Lassen, Mesa Verde, and Rocky Mountain National Parks.

(Figure 9 about here)

In winter (**Figure 9**), observed O_3 increases are much more common than in spring and summer across the US. Notably, the wintertime O_3 increases are strongest in the lowest percentiles over the EUS, indicating the influence from weakened NO_x titration as a result of regional NO_x emission controls (see also *Gao et al.*, 2013; *Clifton et al.*, 2014; *Simon et al.*, 2015). Some decreasing O_3 trends are found in the highest percentiles over the Southeast even during winter (**Fig.9a**), similar to the Los Angeles Basin (not shown) where tropical climate and year-round active photochemistry makes O_3 most responsive to regional NO_x emission controls. Despite the greatest NO_x emission reductions over the past decade in the central and northeast US regions, O_3 reductions have been most

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pronounced across all seasons in the Southeast.

4.2 Model Evaluation and Attribution of Observed O_3 Trends

The BASE simulation with GFDL-AM3 captures the salient features of observed O_3 trends over 1988-2014 at rural sites across the US, including the overall springtime increases and the lack of significant trends in summer over the Intermountain West , the north-to-south gradients in the 5th and 50th percentile O_3 trends during spring and the largest decreases in the 95th percentile during summer observed over the EUS, as well as wintertime increases in the 5th and 50th percentiles (left vs right panels in **Figs. 7 to 9**). AM3 also simulates the median springtime O_3 increase of 0.32±0.11 ppb yr^{-1} over 1988-2014 (0.64±0.50 ppb yr^{-1} over 2004-2014) at Mount Bachelor Observatory in Oregon, consistent with the positive trends (0.63±0.41 ppb yr^{-1}) observed over the shorter 2004-2015 period (*Gratz et al.*, 2014). These analyses indicate that the GFDL-AM3 model represents the underlying chemical and physical processes controlling the response of US surface O_3 means and extremes to changes in global-to-regional precursor emissions and climate, despite mean state biases (**Figs. S4-S5**).

The filtered model shows greater 95th percentile O_3 increases than observed at some WUS sites (e.g., Yosemite; Grand Canyon; Canyonlands) for both spring and summer (**Figs.7a,d and Fig.8a,d**), reflecting that observations at these sites sometimes can be influenced by transport of photochemically aged plumes from nearby urban areas and from southern California during late spring and summer. When sampled at the surface, AM3 simulates small summertime O_3 decreases in the 95th and 50th percentiles over the Intermountain West (**Fig.4b,d),** consistent with observations at Yosemite, Grand Canyon, and Canyonlands (**Fig.8a,b**). As illustrated in **Fig.3** for spring and discussed in Sect. 2.4, individual sites in the west display observed trends falling in between the filtered model, and sampled at the surface versus at altitude.

(Figures 10 and 11 about here)

We examine how US surface O_3 responds to changes in regional anthropogenic emissions, hemispheric background, and meteorology by comparing O_3 trends in the BASE, Background, and FIXEMIS experiments (**Figs. 10-11**). With North American anthropogenic emissions shut off in the Background simulation, little difference is discernable from the BASE simulation for the WUS O_3 trends during spring (first vs. second rows in **Fig.10**), indicating the key role of hemispheric background driving increases in springtime O_3 over the WUS. With emissions held constant in time, FIXEMIS still gives statistically significant spring O_3 increases in the 95th percentile (**Fig.10c**), approximately half of the trends simulated in BASE, for Grand Canyon, Canyon land, Mesa Verde and Rocky Mountain National Parks. Prior work shows that deep stratospheric intrusions contribute to the highest observed and simulated surface O_3 events at these sites (*Langford et al.*, 2009; *Lin et al.*, 2012a). Strong year-to-year

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variability of such intrusion events (*Lin et al.*, 2015a) can confound the attribution of springtime O_3 changes over the WUS to anthropogenic emission trends, particularly in the highest percentile and over a short record length. This is not an issue for summer when stratospheric intrusions are at their seasonal minimum and little O_3 change is found in FIXEMIS over the WUS (**Figs. 11c,f**). In contrast to spring, the model shows larger differences in WUS O_3 trends between BASE and Background during summer when the influence of North American pollution peaks seasonally (**Figs.10a,d vs. 10b,e** compared to **Figs.11a,d vs. 11b,e**). There are significant increases of 0.2-0.5 ppb yr^{-1} in the 95th and 50th percentile summer background O_3 at more than 50% of the sites in the west (**Fig.11b,e**), which offsets the O_3 decreases resulting from US NO_x reductions, leading to little overall change in total observed and simulated O_3 at WUS rural sites during summer (**Fig.8**).

Over the EUS, AM3 also simulates background O_3 increases, occurring in both the 95th and 50th percentiles, with a rate of 0.1-0.3 ppb yr^{-1} during spring (Fig.10b,e) and 0.2-0.5 ppb yr^{-1} during summer (Fig.11b,e). Based on prior model estimates that springtime background O_3 is greater in the Northeast than the Southeast (*Lin et al.*, 2012a; *Lin et al.*, 2012b; *Fiore et al.*, 2014), one might assume that the observed north-to-south gradient in the median springtime O_3 trend (**Fig.7b**) has been influenced by a rising background. However, AM3 simulates homogeneous background O_3 trends across the entire EUS (**Fig.10b,e**), indicating that the observed north-to-south gradient in O_3 trends reflects an earlier onset of NO_x-sensitive photochemistry in the Southeast as opposed to the background influence.

A warming climate is most likely to raise the highest O_3 events in polluted regions (e.g., *Schnell et al.*, 2016). With anthropogenic emissions held constant in time over 1988-2014, we find significant summer O_3 increases of 0.2-0.4 ppb yr^{-1} in the 95th percentile over the EUS (**Fig.11c**), consistent with significant increases in biogenic isoprene emissions (10 to 20 gC m^{-2} yr^{-1}; x% yr^{-1}) over this period in the model (**Fig.S6; moved to main text??**). Using self-organizing map cluster analysis, Horton *et al.* (2015) identified robust increases in the occurrence of summer and autumn anticyclonic circulations as well as high temperature extremes over eastern North America since 1990. We find that the observed increases in maximum temperature and the number of warm days above the 90th percentile were most pronounced over the Southeast in August (**Fig.S7**). The increased frequency of hot extremes over the last two decades may have offset some of air quality improvements in the EUS gained from regional NO_x reductions, although we note that changes in regional temperature extremes on 20 to 30-year time series may merely reflect internal climate variability (*Shepherd, 2015*).

5. Impacts of rising Asian emissions, methane and wildfires on western US O_3

5.1 Historical western US O_3 trends in spring

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(Figure 12 about here; moved to supplemental??)

Figure 12 depicts a hemispheric view of changes in decadal mean lower tropospheric O_3 levels from 1981-1990 to 2003-2012 for spring versus summer in the Background simulation. Mean springtime O_3 between the two decades increases significantly by 5-15 ppb downwind of Asia between 15°-40°N: extending from the East China Sea to the subtropical North Pacific Ocean to the southwestern US (**Fig.12a**), where it impacts the six CASTNet sites which show an observed O_3 increase in spring (**Fig.7b**). In summer the region experiencing strongest O_3 increases in Asia shifts approximately 10 degrees to the north compared to spring, due to the influence from East Asian Summer Monsoon in low-latitude regions (e.g., *Lin et al.*, 2009). Over the US during summer, the strongest O_3 increases occur in the northwest, coincident with the observed strongest O_3 increase at Yellowstone National Park (**Fig.12b**). Significant increases of lower tropospheric O_3 during summer also occur over Siberia, Alaska, and Southern Canada, in response to the doubling of boreal fire emissions between the two decades (**Fig. S2**).

(Figure 13 about here: Time series analysis)

Further indications of the factors driving baseline O_3 changes over the WUS can be inferred by examining the time series at several high-elevation sites, which are most frequently sampling baseline O_3 in the free troposphere during spring (Sect. 2.4). **Figure 13** shows the results, both observed and simulated, for six of such monitoring sites: Great Basin National Park in Nevada (2.1 km a.s.l.), Rocky Mountain National Park (2.7 km a.s.l.) in Colorado, US Air Force Academy (1.9 km a.s.l.) in Colorado Springs, Yellowstone National Park (2.4 km a.s.l.) and Pinedale (2.4 km a.s.l.) in Wyoming, and Mesa Verde National Park (2.2 km a.s.l.) in the Colorado-New Mexico-Arizona-Utah four corner region. The observed median values of springtime MDA8 O_3 have increased significantly at a rate of 0.2-0.4 ppb yr^{-1} over the past 20-27 years at these sites, except Pinedale, where the increase in background O_3 is likely offset by the O_3 decrease due to recent emission control for the large oil and gas production fields in this area (http://deq.wyoming.gov/aqd/winter-ozone/resources/technical-documents/).

When filtered to remove the influence from fresh regional pollution (Sect. 2.4) AM3_BASE captures long-term trends of O_3 observed at these sites, driven by increasing background (0.4 ppb yr^{-1}). Correlating AM3_Background directly with the observations indicates that most of the observed variability reflects changes in the background, with fluctuations in stratospheric influence contributing to anomalies on interannual time scales (e.g., the 1999 anomaly, *(Lin et al., 2015a)*), whereas Asian influence dominates the decadal trends as discussed below. We show model results for the entire 1980-2014 period for Great Basin, Rocky Mountain, and US Air Force Academy to provide context for observed trends in the recent two decades (**Fig.13a**). In the 1980s when Chinese NO_x emissions (~4 Tg/yr NO) were much lower than US NO_x emissions (~15 Tg/yr NO) (*Granier et al.*, 2011), there was little overall O_3 change over the WUS in the model.

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From the mid-1990s onwards, with NO_x emissions in China rising steeply (**Fig.1a**) and becoming even greater than US emissions in the 2000s, we find that the O_3 trends at remote WUS sites appear to be dominated by trends of background, driven by trends of emissions outside the US. The O_3 reduction resulting from US anthropogenic emission controls is less than 0.1 ppb yr^{-1} (BASE minus Background) at these WUS baseline sites.

(Table 2 about here: Trend attribution)

Table 2 contains a summary of the drivers of O_3 trends in the model at seven CASTNet sites with a significant springtime O_3 increase observed over the period 1988-2012. Here we focus our attribution analysis on the period 1988-2012 (instead of 1988-2014) because the IAVASIA and $IAVCH_4$ simulations only extend to 2012. Meteorology varies from year to year in all experiments, and thus we quantify the contributions from rising Asian emissions in IAVASIA, global methane in $IAVCH_4$, and wildfire emissions in IAVFIRE by subtracting out the slope of the linear regression of seasonal O_3 means in FIXEMIS. Simulated O_3 with anthropogenic emissions varying in both South and East Asia (red boxes in **Fig.1c**) but held constant elsewhere gives statistically significant increases of 0.1-0.2 ppb yr^{-1} ($p \leq 0.01$; IAVASIA minus FIXEMIS in Table 2), explaining 50-65% of the total background O_3 increases in spring (Background in Table 2). With only methane varying, the model gives trends less than 0.1 ppb yr^{-1} ($IAVCH_4$ minus FIXEMIS), accounting for an average of 15% of the total background increases. The contribution from wildfire emissions during spring is of minor importance, as evidenced by the small differences between FIXEMIS and IAVFIRE (**Table 2**). A stratospheric O_3 tracer (O_3Strat) in AM3 (*Lin et al.*, 2012a; *Lin et al.*, 2015a) demonstrates a positive but insignificant trend in stratospheric O_3 transport to the sites. We examine the trends of lower tropospheric O_3 at these sites when transport conditions favor the import of Asian pollution into western North America, as diagnosed by East Asian CO tracer (EACOt) exceeding the 67th percentile for each spring. Similar to the conclusion of *Lin et al.*, (2015b){Lin, 2015 #620;Cooper, 2010 #90;VanCuren, 2015 #695}, we find that the rate of O_3 increase under strong transport from Asia is greater by 0.05-0.1 ppb yr^{-1} than without filtering in the Background simulation. Filtering the IAVASIA simulation for Asian influence also results in greater O_3 increases than filtering for baseline conditions. [Arlene, please add one sentence somewhere in this paragraph to compare with your HTAP results.]

Increasing O_3 from rising Asian emissions can also influence trends of O_3 downwind of the Los Angeles Basin during spring. For instance, air quality in Joshua Tree National Park (1.2 km a.s.l.) is overwhelmingly dominated by pollution transport from the Los Angeles Basin, which regularly places the rural park in exceedance of the NAAQS for O_3 (*Langford et al.*, 2010; *Burley et al.*, 2014; *VanCuren*, 2015). Cooper *et al.* (2012) found that O_3 measured in Joshua Tree National Park shows an increase of 0.31±0.25 ppb yr^{-1} in spring over 1990-2010, despite significant improvements in O_3 air quality in the Los Angeles Basin (*Warneke et al.*, 2012). An extended O_3 record to 2014 shows a decline in

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the 95th percentile O_3 in Joshua Tree National Park for both spring and summer (**Figs. 7-8**), whereas the 5th percentile continues to increase in spring and there is no significant trend in the median. Sampling the model background simulation at this site indicates rising background (0.31±0.14 ppb yr^{-1}). Aircraft measurements in May-June 2010 indicate the presence of Asian pollution layers 2 km above Joshua Tree National Park with distinct sulfate enhancements coincident with low organic mass (*Lin et al.*, 2012b), supporting the conclusion that rising Asian emissions can contribute to trends of O_3 observed in this region. Yosemite National Park (1.6 km a.s.l.) in California and Chiricahua National Monument (1.5 km a.s.l.) in Arizona are also influenced by both pollution transport from California and Asia. Ozone observed at Yosemite show an increase from 1995 to around 2012 (0.40±0.29 ppb yr^{-1}; **Fig.S8**), which the model attributes to rising background (primarily from trends of Asian emissions; **Table 2**), but observations have remained constant since then, reflecting an offset by O_3 decreases in California (**Fig.4**).

5.2 Projecting western US springtime O_3 for the 21st Century

(Figure 14 about here: Future Projections).

Under the RCP8.5 scenario, Chinese NO_x emissions are projected to peak in 2020-2030, reflecting an increase from year 2010 by ~50% (**Fig.1a),** and global methane would increase by ~60% from 2010-2050 (**Fig.S1**). Under the RCP4.5 scenario, in contrast, NO_x emissions in China change little over 2010-2030 and global methane remain almost constant from 2010-2050. NO_x emissions in the US would decrease through 2050 under both RCP4.5 and 8.5, by ~40% from 2010. We examine the extent to which these changes would influence trends of O_3 over the WUS during spring. A number of studies have examined future US O_3 changes under the RCPs (*Wild et al.*, 2012; *Gao et al.*, 2013; *Clifton et al.*, 2014; *Pfister et al.*, 2014; *Fiore et al.*, 2015; *Barnes et al.*, 2016). However, as discussed earlier in this study the trends of O_3 in the model when sampled near the surface are overwhelmingly dominated by the trends of regional anthropogenic emissions. Thus, the future O_3 changes estimated by these prior studies do not represent baseline conditions, particularly its response to rising Asian emissions. In **Figure 14** we show changes of free tropospheric (700 hPa) O_3 relative to 2010 over the WUS in the CM3 future simulations under RCP8.5 versus RCP4.5. Historical hindcasts and observations averaged from Lassen, Great Basin, and Rocky Mountain are also shown for context. Springtime O_3 over the WUS shows little overall change over 2010-2050 under RCP 4.5, reflecting that the effects of US anthropogenic emission reductions approximately offset the effects of rising methane in the model. Under RCP8.5, however, springtime O_3 over the WUS would increase by as much as 10 ppb from 2010 to 2030 and remain almost constant from 2030-2050.

5.3 Trends and variability of western US O_3 in summer

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(Figure 15 about here: Yellowstone)

Yellowstone National Park is the only site with statistically significant summer O_3 increases observed across all percentiles (**Fig.8a-8c**). The 1988-2012 trends for the median from observations and model simulations are summarized in **Figure 15a**. Observations show an increase of 0.32±0.18 ppb yr^{-1} for JJA, with a greater rate of increase in June (0.38±0.25 ppb yr^{-1}) than in July-August (0.26±0.18 ppb yr^{-1}). AM3_BASE filtered for baseline conditions (hatched pink bar in **Fig.15a**) captures the observed increase. Without baseline filtering (solid pink bar), North American emission reductions offset almost 50% of the O_3 increase at Yellowstone in the model, causing the model to underestimate the observed O_3 trend. Both IAVCH$_4$ and IAVFIRE simulations show no significant O_3 change from the FIXEMIS simulation. The model attributes much of the observed long-term O_3 increase at Yellowstone in summer to rising Asian emissions, with IAVASIA simulating an O_3 increase of 0.31±0.19 ppb yr^{-1} under baseline conditions, increasing to 0.42±0.23 ppb yr^{-1} when under conditions of Asian influence (EACOt > 67th percentile). The stronger increase measured in June than in July-August is consistent with the seasonality of pollution transport from Asia.

(Figure 16 about here: Wildfires)

We examine the factors driving interannual variability of summertime O_3 over the WUS. **Figure 16** shows year-to-year variability in surface MDA8 O_3 enhancements from wildfires during summer, as diagnosed by the differences between IAVFIRE with time-varying wildfire emissions and FIXEMIS with climatological wildfire emissions. The results are shown for individual months, since fires are highly episodic. During the summers of 1998, 2002, and 2003, biomass fires burned a large area of Siberia and parts of the North American boreal forests, raising carbon monoxide burden across the Northern Hemisphere as detected from space (*Jaffe et al.*, 2004; *van der Werf et al.*, 2004; *Yurganov et al.*, 2005). Long-range transport of the Siberian fire plumes resulted in 2-6 ppb enhancements in surface MDA8 O_3 at the US west coast and in parts of the Intermountain West according to AM3. The model calculates enhancements in monthly mean MDA8 O_3 of up to 8 ppb from the intense wildfire events in Northern California during July 2008 (*Huang et al.*, 2013; *Pfister et al.*, 2013), over Texas-Mexico during June 2011 (*Y Wang et al.*, 2015), and in Wyoming-Utah during August 2012 (*Jaffe et al.*, 2013). The AM3 estimates are roughly consistent with analysis of boundary layer aircraft data with and without fire influences (as diagnosed by CH_3CN) during June 2008 over California (*Pfister et al.*, 2013).

Enhanced wildfire activity in hot and dry weather is thought to be a key driver of interannual variability of surface O_3 in the Intermountain West during summer and fall (*Jaffe et al.*, 2008; *Pfister et al.*, 2008; *Jaffe*, 2011). However, hot and dry conditions also facilitate the buildup of O_3 produced from regional anthropogenic emissions, which can complicate the unambiguous attribution of observed O_3 enhancements. Using August data

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at Yellowstone as an example, we isolate the relative contribution of these two processes to observed O_3 with the FIXEMIS and IAVFIRE experiments (**Fig.15b**). Note that here we sample AM3 in the surface level to account for any influence from boundary layer mixing. Even with wildfire emissions held constant in time, FIXEMIS captures much of the observed year-to-year variability of August mean O_3 at Yellowstone (r=0.67). IAVFIRE with time-varying fire emissions only moderately improves the correlations (r = 0.75). Meteorological variability also contributes to the observed August O_3 increase from the early 1990s to around 2002, although over the entire 1988-2014 (or 1988-2012) period IAVFIRE gives ~0.1 ppb yr^{-1} greater O_3 trends than FIXEMIS, consistent with an overall increase in boreal wildfire activity **(Fig.S2).** Note that rising Asian emissions primarily affect the trend in early summer as discussed previously.

While fires during hot and dry summers clearly result in enhanced O_3 at individual sites for some summers, the ability of AM3 with constant fire emissions to simulate variability of O_3 (±8 ppb) for a high (e.g., 1988; 2002; 2006) versus low (e.g., 1997; 2009) fire activity year indicates that biomass burning is not the primary driver of summer O_3 interannual variability. Year-to-year variability of JJA mean MDA8 O_3 observed at Yellowstone is strongly correlated ($r > 0.6$) with observed large-scale variations in JJA mean daily maximum temperature across the Intermountain West and the Great Plains (**Fig.15c**). Correlations for other ground stations show a similar large-scale feature. Similar to the conclusion from (*L Zhang et al.*, 2014), our analysis indicates that the correlation between O_3 and biomass burned reported by *Jaffe et al.* (2008, 2011) at rural sites reflects common underlying correlations with temperature rather than a causal relationship of fire on O_3. At remote mountain sites (e.g., Yellowstone), warmer surface temperatures lead to deeper mixed layers that facilitate mixing of free tropospheric air with higher O_3 concentrations down to the surface (*Brown-Steiner and Hess*, 2011). At sites nearby sources of air pollution, hot and dry conditions enhance regional O_3 production and orographic lifting of urban pollution to mountain-top sites during daytime, as occurs at Rocky Mountain National Park located downwind of the Denver Metropolitan area during summer (**Sect. 5.4**).

5.4 Ozone Trends in the Denver Metropolitan Area

(Figure 17 about here: Denver)

Efforts to improve air quality have led to a marked decrease in high-O_3 events in the Los Angeles Basin as illustrated with annual 4th highest MDA8 O_3 at Crestline – a regionally representative monitor operated continuously from 1980 to present (**Fig.17a**). In striking contrast, the 4th highest MDA8 O_3 in the Denver Metropolitan area shows little change over the past decades, despite significant reductions in NO_x (**Fig.1**) and CO emissions (-80% from 1990-2010; *Cooper et al.*, 2012). Note that in Denver the maximum concentration monitors were not sited continuously until around 1993. We thus computed the annual 4th highest from any monitor available in Denver non-attainment counties.

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Although recent field measurements indicate that volatile organic compound (VOC) emissions from increasing oil and natural gas operations are an important source of O_3 precursors in the Denver-Julesberg Basin (*Gilman et al.*, 2013; *Halliday et al.*, 2016; *McDuffie et al.*, 2016), total VOC emissions in Denver may not be increasing over time due to the marked reductions in VOC emissions from vehicles (*Bishop and Stedman*, 2008; 2015).

We seek insights into the causes of the lack of significant O_3 responses to emission controls in Denver by separately analyzing trends in spring and summer. The ~200x200 km^2 AM3 simulations are not expected to resolve the urban-to-rural differences between Rocky Mountain National Park and the Denver area. However, if observed O_3 variability in Denver correlates with that at remote sites in the Intermountain West, then model attribution for the remote sites can be used to infer sources of observed O_3 in Denver. This is demonstrated in **Fig.17b** for spring using data at three representative sites in the Denver Metropolitan region: Rocky Flats North, National Renewable Energy Lab (NREL), and Welby with continuous measurements since the early 1990s. Year-to-year variability of median MDA8 O_3 at these sites during spring correlates strongly with that in Great Basin National Park (r^2= ~0.5) - a fairly remote site in Nevada not influenced by urban emissions in Denver. Median spring O_3 observations in Denver increased significantly by ~0.3 ppb yr^{-1} similar to the rate of increase at Great Basin National Park which the model attributes to rising background (**Fig.13a**), implying that the tripling of Asian emissions since 1990 also raised mean O_3 in the Denver metropolitan area during spring. Trends in the 95th percentile are statistically insignificant.

During summer, changes in regional emissions and temperature have the greatest impacts on the highest observed O_3 concentrations in polluted environments. **Fig.17c** shows times series of July-August 95th percentile MDA8 O_3 at Rocky Flats North and NREL, together with the distribution of daily maximum temperature. In every year since 1993 the highest summer MDA8 O_3 observed at these sites exceeds the 70 ppb NAAQS level. There is a small negative trend that is swamped by large interannual variability. The summers with the highest observed O_3 coincide with those with the highest observed temperatures, such as 1998, 2003, 2007, 2011 and 2012. During these summers, enhancements of MDA8 O_3 were also recorded at Rocky Mountain National Park, reflecting enhanced lifting of pollution from Denver under warmer conditions (*Brodin et al.*, 2010). Appling quantile regression (e.g., *Porter et al.*, 2015) to daily observations at Rocky Flats North over 1993-2015, we find a 2 ppb $°C^{-1}$ sensitivity of 95th percentile July-August O_3 to changes in maximum daily temperature. We suggest that the substantial increases in extreme heat occurrence over central North America over the last two decades, as found by *Horton et al.* (2015), contribute to raising summer O_3 in Denver, which offsets O_3 reductions that otherwise would have occurred due to emission controls in Denver. Potential shifts in the O_3 photochemistry regime can also contribute to trends of summer O_3 in Denver, although advancing this knowledge would require a high-resolution air quality model.

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6. Summer O_3 pollution extremes over the eastern US

(Figure 18 about here: Interannual Variability)

We discuss in this section interannual variability and long-term changes in summer O_3 over the EUS, where air stagnation and the associated high temperatures are typically responsible for the highest O_3 observed in surface air. Evaluating the ability of models to simulate the high-O_3 anomalies during large-scale heat waves is crucial to establishing confidence in the model projection of pollution extremes under a warming climate. **Figure 18** shows comparisons of July mean MDA8 O_3 at one regionally representative site – the Pennsylvania State CASTNet site - as observed and simulated by the model. With time-varying emissions, the BASE model simulates an O_3 decrease (-0.45±0.32 ppb yr^{-1}) consistent with observations (-0.67±0.33 ppb yr^{-1}), and captures the observed July mean O_3 interannual variability (r^2= 0.67) that is correlated with large-scale variations in daily maximum temperature (r^2 = 0.33). In particular, the O_3 pollution extremes are successfully simulated during the EUS summer heat waves of 1988, 1999, 2002, 2011 and 2012 (*Leibensperger et al.*, 2008; *Schnell et al.*, 2014; *Fiore et al.*, 2015; *Jia et al.*, 2016). Year-to-year variations in such stagnant air events can explain 30% of the total observed O_3 variability (r^2 = 0.30), as inferred by FIXEMIS with constant anthropogenic emissions. If US anthropogenic emissions were still at 1990s levels (as in FIXEMIS), then anomalies in July mean MDA8 O_3 would have been 10 ppb greater during the 2011-2012 extreme heat waves. *Loughner et al.* (2014) found that half of the days in July 2011 would have been classified as O_3 exceedance days for much of the Mid-Atlantic region if emissions did not change.

(Figure 19 about here: Changes in O_3 distribution)

Figure 19a compares the probability density functions of MDA8 O_3 at 40 EUS surface sites for JJA in the pre-NO_x SIP Call (1988-2002) versus post-NO_x SIP Call (2003-2014) periods and during the extreme heat waves of 1988 versus 2012. Following the NO_x SIP Call, observed JJA MDA8 O_3 over the EUS manifested a downward shift in the probability distribution (black vs. gray lines in **Fig.19a**), with the median value declining by 9 ppb and the largest decreases occurring in the upper tails, leading to weaker day-to-day O_3 variability and a narrower O_3 range (standard deviation σ decreased from 16.4 to 12.9 ppb). Using fewer data in 1995-1998 vs. 2002-2005, *Rieder et al.* (2015) also noted a shift in the O_3 distribution. These observed O_3 changes driven by regional NO_x reductions are even more prominent when comparing the heat waves of 1988 versus 2012 (red vs. brown lines in **Fig.19a**): σ = 22.3 vs. 13.4 ppb and median value μ= 68.6 vs. 52.2 ppb. Regional emission reductions significantly alleviated the O_3 buildup during the 2012 heat wave relative to earlier heat waves.

Fig.19b shows the corresponding comparisons using the results from AM3 BASE. Despite the high model mean bias (~20 ppb), AM3 captures the overall structure of the

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changes in the surface O_3 distributions and thus the response of surface O_3 to the NO_x SIP Call, including the reductions of high-O_3 events during the heat wave of 2012 compared to 1988. Nevertheless, there is a noticeable difference between the observations and simulations in the shape of MDA8 O_3 probability distributions for summer 1988, particularly in the upper tail of the distribution (red lines in **Figs.19a vs. 19b**). One possible explanation for this bias is that the 1988 heat wave coincided with severe drought conditions (*Seager and Hoerling*, 2014), which can effectively "turn off" the O_3 deposition sink to vegetation, leading to a substantial increase in surface O_3 concentrations as found during the 2003 European heat wave (*Solberg et al.*, 2008; *Emberson et al.*, 2013), whereas AM3 (as most models) does not include interannually varying dry deposition velocities for O_3. Quantile mapping can be applied to correct systematic distributional biases in surface O_3 compared to observations (*Rieder et al., 2015*), but this approach has limitations if there are structural biases in the O_3 distribution due to missing physical processes in the model as occurs for 1988.
(Figure 20a and 20b about here: MD8 probability distributions)

Travis et al. (2016) suggest that the National Emission Inventory (NEI) for NO_x from the US Environmental Protection Agency is too high nationally by 50% and that decreasing US NO_x emissions by this amount corrects their model bias for boundary layer O_3 by 12 ppb in the Southeast for summer 2013, while surface MDA8 O_3 in their model is still biased high by 8±13 ppb which the authors attribute to excessive boundary layer mixing. US NO_x emissions in the emission inventory used in AM3 (Sect. 2.2) are approximately 15% lower than that from the US NEI. Decreased NO_x emissions by 35% from the pre-NO_x SIP Call to the post-NO_x SIP Call in the model reduces mean O_3 by 8 ppb in the EUS, which can correct 40% of the mean model bias of ~20 ppb. These estimates support the idea that the common model biases in simulating surface O_3 over the Southeast US (e.g., *Fiore et al.*, 2009) may partly reflect excessive NO_x emissions (as much as 50% in the US NEI inventory and 35% in Lamarque et al.). Some of the positive O_3 biases could be also due to the averaging over a deep vertical box in the model surface layer that can't resolve near-surface gradients.

7. Conclusions

(Figure 20 about here: 2003-2012 minus 1981-1990)

Through a comprehensive analysis of interannual variability and long-term trends in sources of O_3 over the past 35 years, we have discussed the key factors controlling US surface O_3 pollution. In **Fig.21**, we summarize the overall statistics, drawing upon the decadal mean O_3 changes from 1981-1990 to 2003-2012 in the AM3 BASE and sensitivity simulations. The changes in BASE are: over the WUS 4.3±1.8 ppb for spring and 1.6±1.2 ppb for summer; over the Northeast -1.8±1.7 ppb for spring and -6.0±2.0 ppb for summer; over the Southeast -3.9±1.4 ppb for spring and -7.5±1.6 ppb for summer.

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Increasing O_3 under BASE for the WUS coincides with an increase of background O_3 by 6.3±1.9 ppb for spring and 4.2±2.0 ppb for summer. Under conditions of strong transport from Asia, the background trend rose to 7.6±2.2 ppb for spring and 6.0±2.1 ppb for summer (green dots in **Fig.21**). The total background O_3 increase in the WUS reflects the contribution from increases in Asian anthropogenic emissions (by 50% for spring; 52% for summer), rising global methane (by 13% for spring; 23% for summer), and variability in biomass burning (by 6% for spring; 12% for summer; with the meteorological influence subtracted out). We conclude that rising Asian anthropogenic emissions is the major driver of increasing background O_3 over the WUS for both spring and summer.

As a first step towards assessing the impacts of rising Asian emissions, we evaluated trends of surface and free tropospheric O_3 over Asia. Our synthesis of available observations and model simulations indicates that O_3 over East Asia has increased by 1-2 ppb yr^{-1} since 1990 (i.e., 25-50 ppb over 25 years), with significant implications for regional air quality and global tropospheric O_3 burden (**Figs.4-6**). We find 0.2-0.4 ppb yr^{-1} increases across the entire distribution of springtime O_3 measured at several WUS high-elevation sites that are frequently sampling baseline O_3 (**Figs. 3 and 7**). With a novel baseline sampling approach, we show that the GFDL-AM3 model captures these increases. The tripling of Asian NO_x emissions since 1990 contributes to as much as 65% of the modelled background O_3 increases over the WUS during spring (Table 2), outpacing O_3 decreases resulting from U.S. domestic emission controls. Consequently, springtime O_3 observed at WUS rural sites increases despite regional emission controls. Springtime O_3 observed in the Denver and Colorado Springs metropolitan areas has increased at a rate similar to those at rural sites (**Figs. 13 and 18b**). We further show that mean spring O_3 above the WUS would increase by ~10 ppb from 2010-2030 under the RCP8.5 global change scenario but would remain constant throughout 2010-2050 under the RCP4.5 scenario (**Fig.14**).

During summer, the effects of rising Asian anthropogenic emissions approximately offset the effects of US domestic emission controls, leading to weak or insignificant O_3 trends observed at most WUS rural sites (**Figs.8 and 11**). Wildfire emissions can result in 2-8 ppb enhancements to monthly mean O_3 at individual sites in some summers, but they are not the primary driver of observed O_3 interannual variability over the Intermountain West (**Figs.15 and 16**). Instead, boundary layer depth, high temperatures and the associated buildup of O_3 produced from regional anthropogenic emissions are the key drivers of observed year-to-year variability of O_3 in summer. We find that summertime O_3 measured in the Denver metropolitan area frequently exceeds 75 ppb during pollution episodes, with little overall trend despite stringent emission controls (**Fig.17c**), which likely reflects the influence from more frequent occurrences of hot extremes in the last decade.

In contrast to the WUS, the observed trends of surface O_3 in the EUS are overwhelmingly dominated by decreases in US anthropogenic emissions. Following the NO_x SIP Call, surface O_3 over the EUS manifested a downward shift in the probability

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distribution, with the largest decreases occurring in the highest percentiles during summer (-0.8 to -1.8 ppb yr^{-1}; **Fig.8**). Spatially, the O_3 decreases are most pronounced in the Southeast with an earlier onset of biogenic isoprene emissions and NO_x-sensitive O_3 production. Regional NO_x controls also alleviated the O_3 buildup during the recent heat waves of 2011-2012 relative to earlier heat waves (e.g., 1988; 1999). Despite high mean state biases, the model captures the salient features of observed O_3 trends over the EUS, including the largest decreases in the 95th percentile during summer, the north-to-south gradient in O_3 trends during spring, as well as wintertime increases in the 5th and 50th percentiles. The model also captures enhancements in monthly mean O_3 due to large-scale heat waves, although it has difficulties to simulate the structure of the O_3 distribution during the 1988 heat wave with coincident droughts (**Figs.18 and 19**). Without emission controls, the 95th percentile summer O_3 over the EUS would have increased by 0.2-0.4 ppb yr^{-1} over 1988-2014 (**Fig.11c**), indicating that more frequent hot summer extremes and increases in biogenic isoprene emissions over this period may have offset some of air quality improvements gained from regional NO_x reductions.

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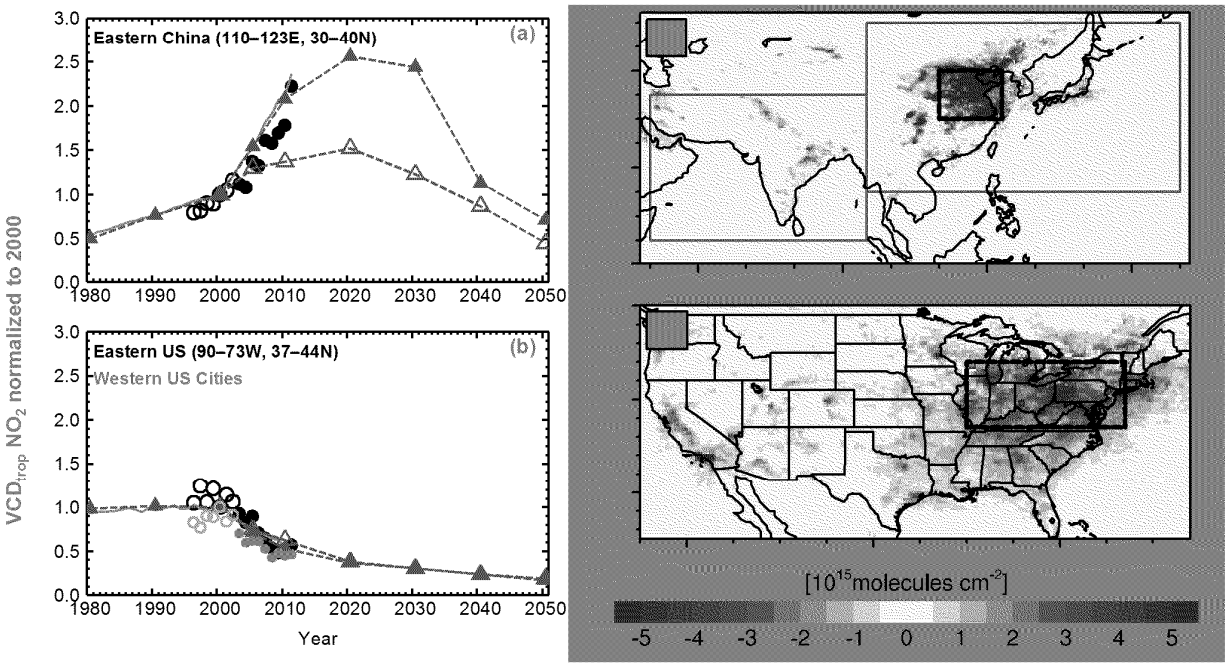

Figure 1. Changes in NO_x emissions. (a-b) Mean annual vertical column densities of tropospheric (VCD_{trop}) NO_2 normalized to 2000 for the Eastern China and Eastern US domains (black boxes on map) from GOME (1996-2002, open circles) and SCIAMACHY (2003-2011, closed circles) measurements and AM3_BASE simulations (orange lines). Gray circles in (b) show the average trend for western US cities. Triangles indicate trends in NO_x emissions from Lamarque et al. (2010) and RCP8.5 (red) versus RCP4.5 (blue) projections. (c-d) Differences in SCIAMACHY VCD_{trop} NO_2 from 2003-2005 to 2009-2011. The red boxes denote the regions where emissions vary over time in the IAVASIAsimulation (Table 1). Satellite NO_2 data are from www.temis.nl, with retrieval technique described in Boersma et al.(2004).

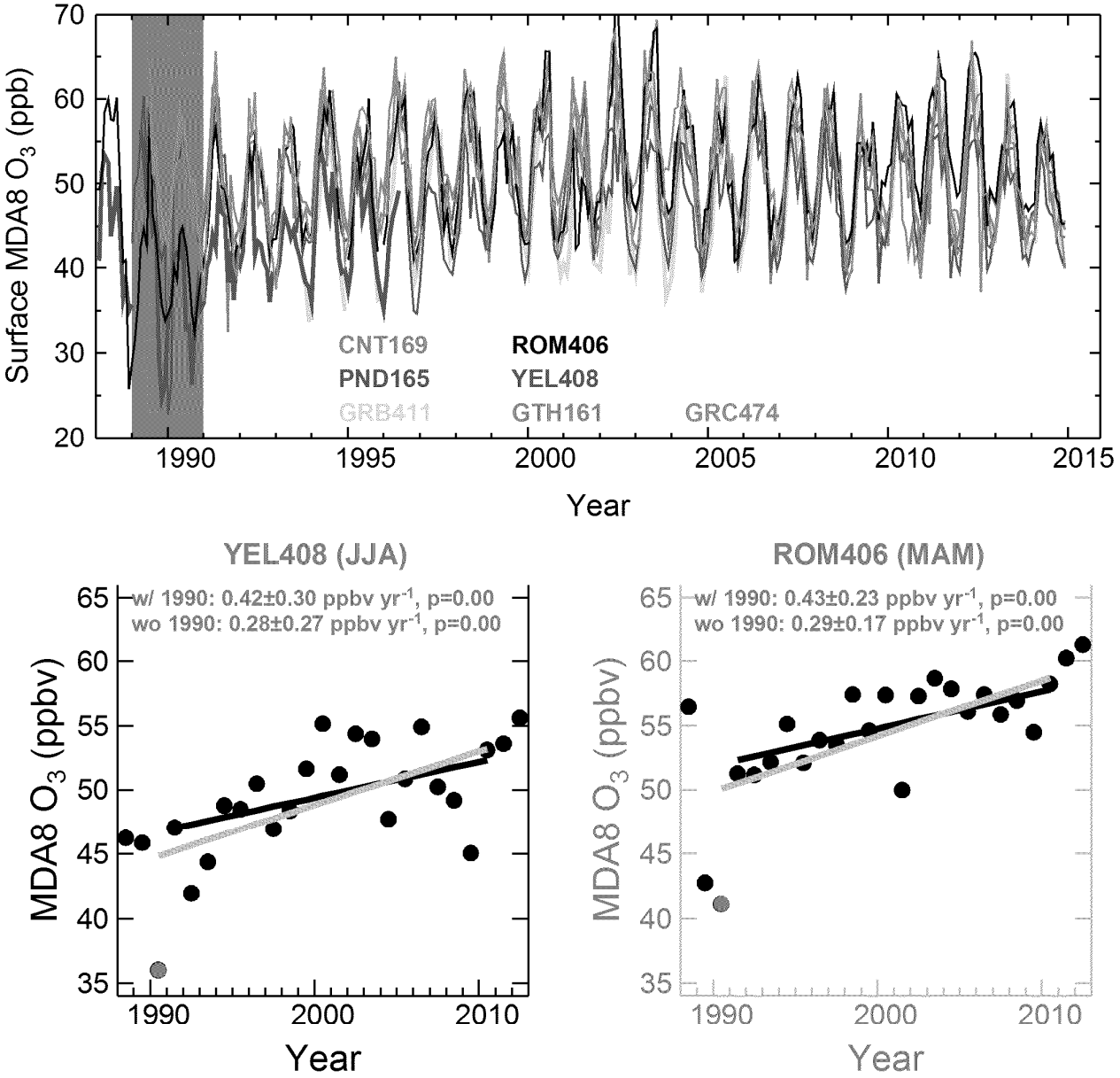

Figure 2. Measurement uncertainties. (Top) Comparison of observed monthly mean MDA8 ozone at western US CASTNet sites. The grey shading denotes the period when data at Yellow Stone (red) and Rocky Mountain (black) were inconsistent with the other sites. (Bottom) The 1990-2010 trends of JJA median MDA8 O_3 at Yellowstone and MAM median MDA8 O_3 at Rocky Mountain with and without biased data in 1990.

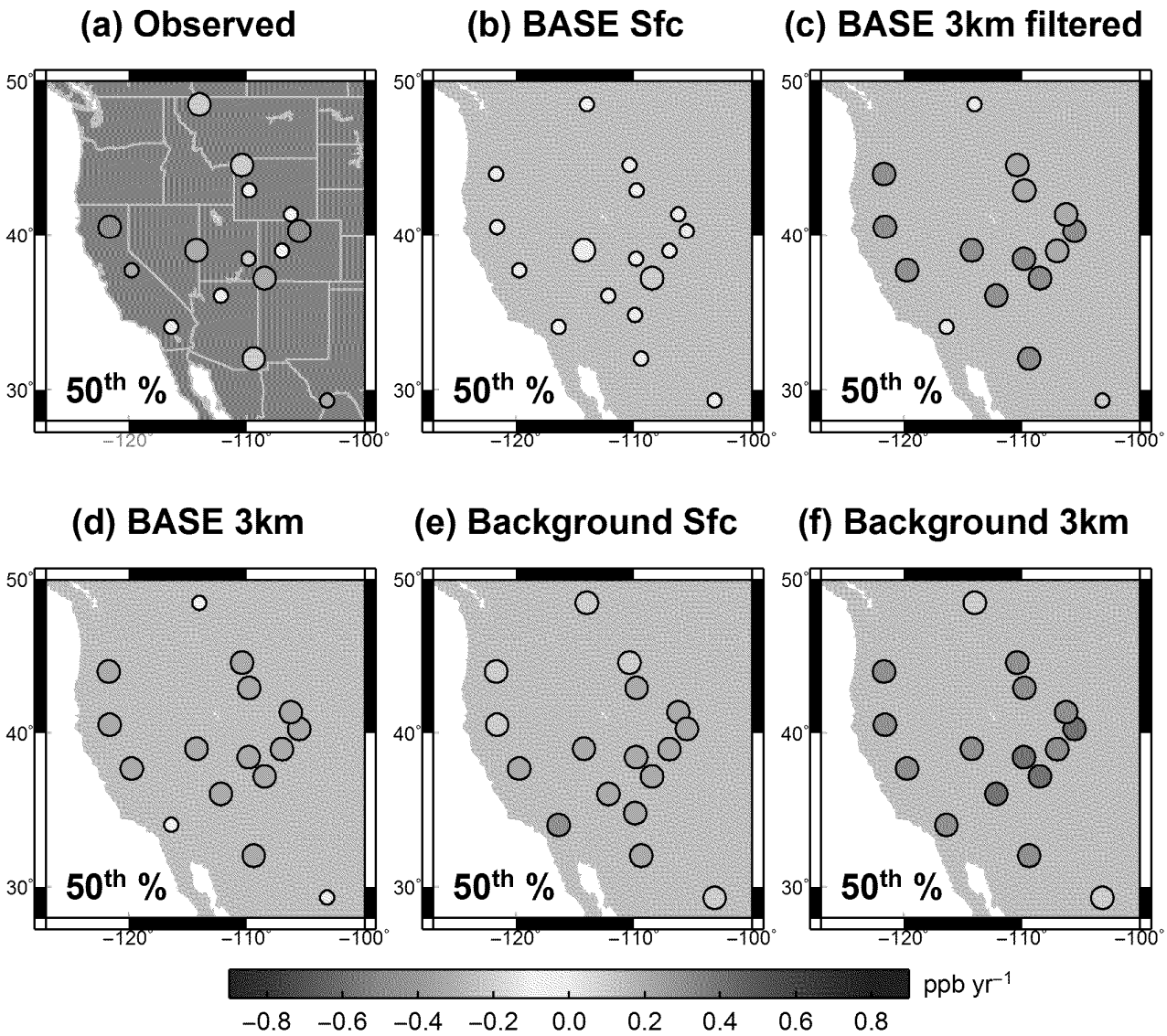

Figure 3. Influence of baseline sampling. Spring median MDA8 ozone trends (in ppb yr^{-1}) over 1988-2014 at western US sites: (a) from observations; (b) from AM3_BASE sampled in the model surface level; (c) from AM3_BASE sampled at 700 hPa and filtered to remove the influence from fresh local pollution (see Sect. 2.4); (d) from AM3_BASE sampled at 700 hPa without filtering; (e) from AM3_Background (with North American anthropogenic emissions shut off) sampled in surface air and (f) at 700 hPa. Note that three low-elevation sites (Joshua Tree, Big Beng NP, and Glacier NP) are always sampled in the surface level.

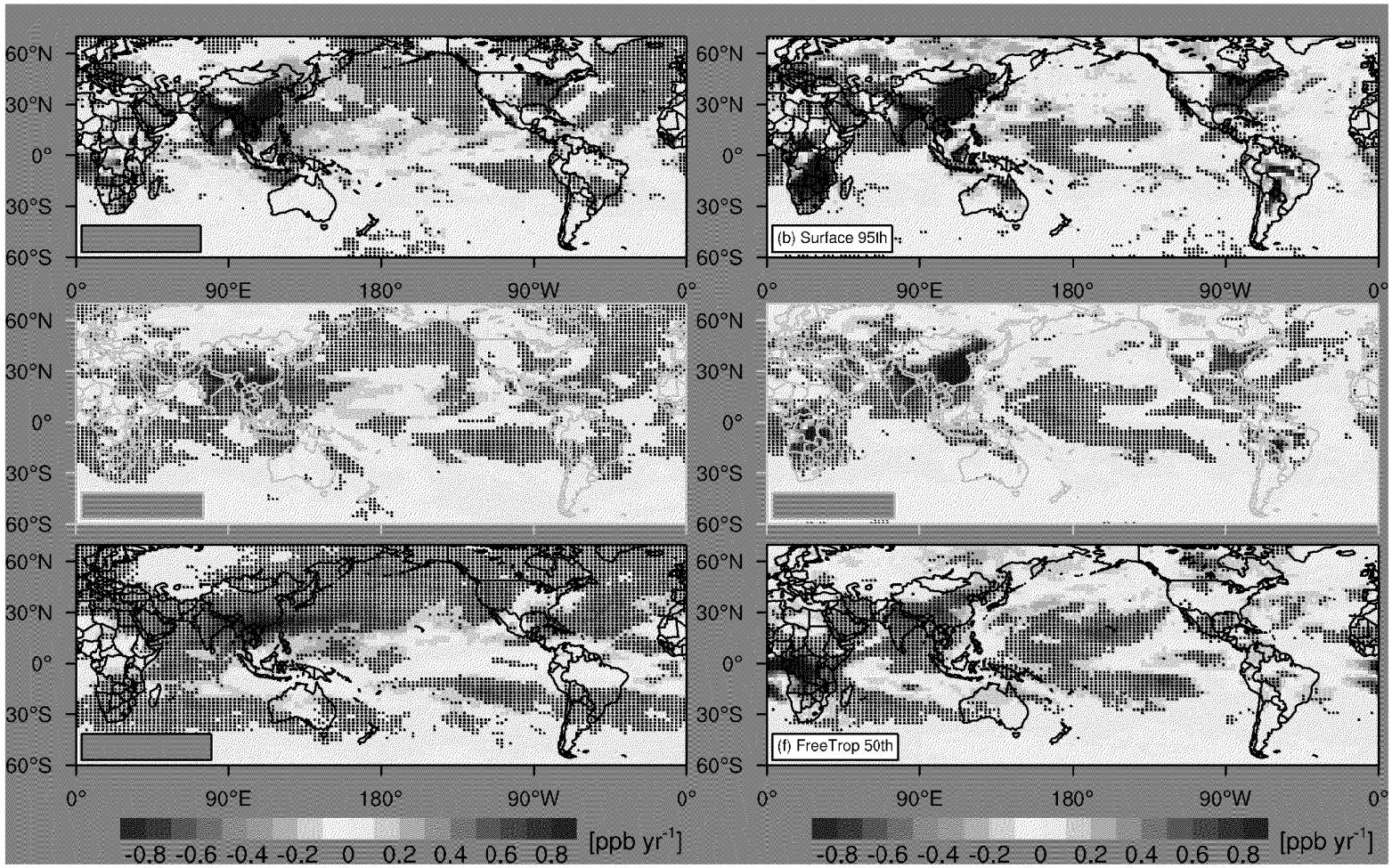

Figure 4. Global distribution of ozone trends. The 1988-2014 MDA8 ozone trends during spring (left) and summer (right) in AM3_BASE for the 95th percentile at the surface (a-b), median at the surface (c-d), and median in the free troposphere (700hPa; e-f).

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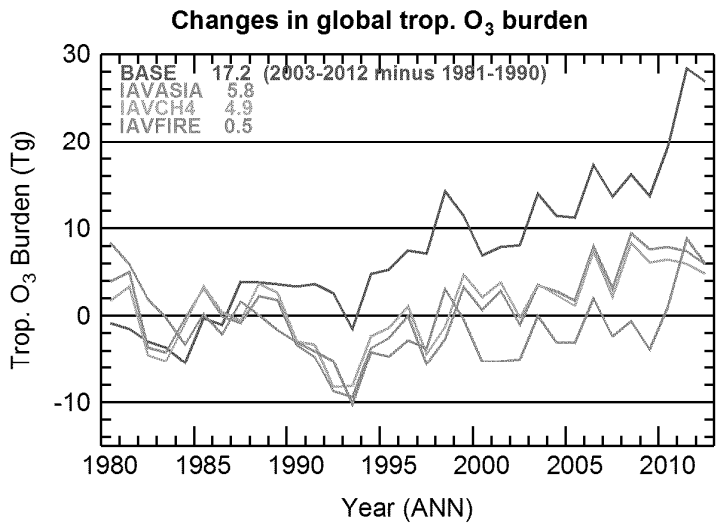

Figure 5. Global budgets. Changes in global tropospheric ozone burdens (in Tg yr^{-1}, using the e90 tropopause) relative to the 1981-1990 mean from AM3_BASE (red), IAVASIA (purple), IAVCH4 (cyan), and IAVFIRE (orange). Changes in two 10-year means (2003-2012 minus 1981-1990) are reported at the top of the graph.

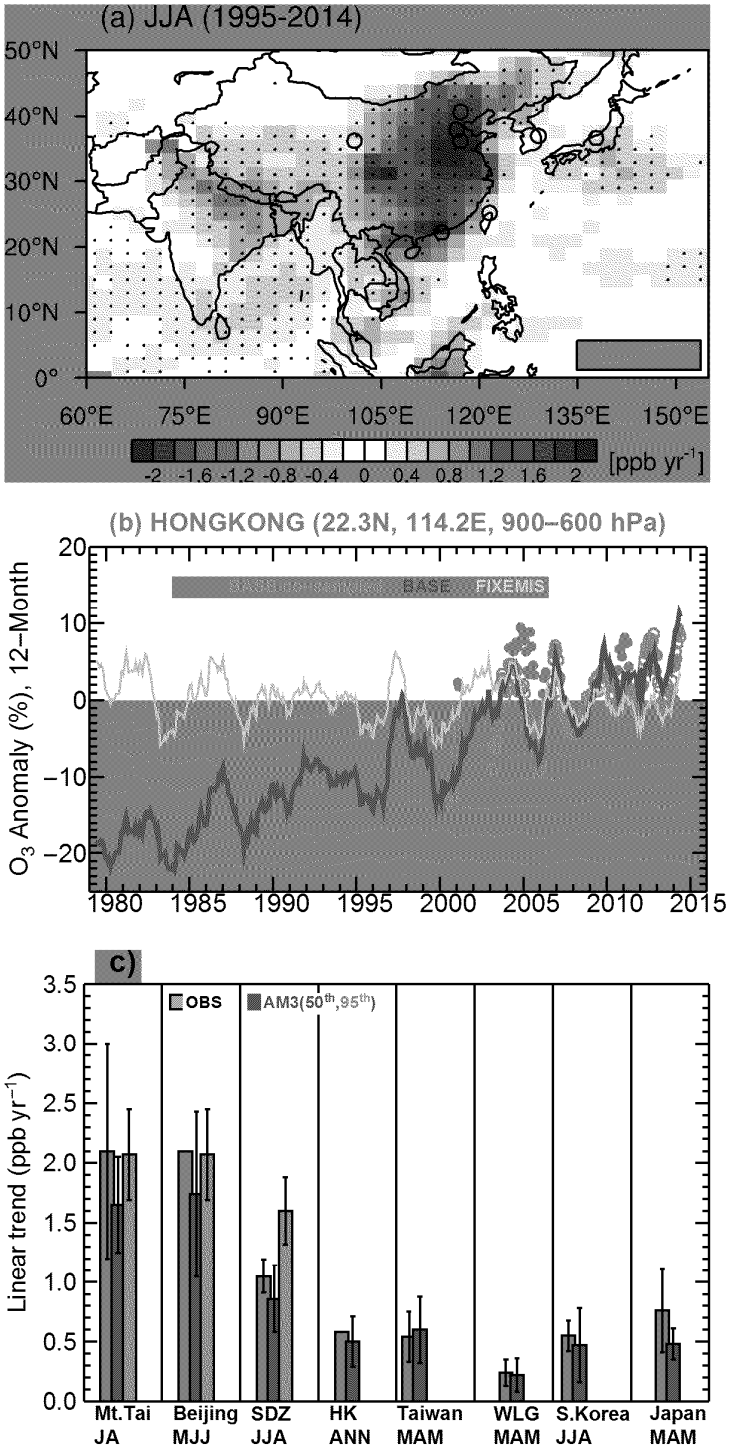

Figure 6. Surface ozone trends in Asia. (a) Observation sites superimposed on map of the 1995-2014 trends in the 95th percentile JJA MDA8 ozone in AM3. (b) 12-Month moving mean anomalies (in percent relative to the 2000-2014 mean) of ozone averaged over 900-600 hPa at Hong Kong from: the averages of weekly ozonesondes (black circles) and AM3_BASE co-sampled on sonde launch days (orange circles) and the true average from AM3_BASE (red lines) and FIXEMIS (blue lines). (c) Comparison of median ozone trends from AM3_BASE with observations: in Central Eastern China at Mt. Tai (July-August, Sun et al. 2016), Beijing (May-June-July, Ding et al. 2008) and Shangdianzi (SDZ) (JJA, Ma et al. 2016); in South China at Hong Kong (HK) (annual average, Wang et al. 2009) and Taiwan (MAM, Lin YK et al. 2010); at Mt. Waliguan (WLG) in western China (MAM, Xu et al. 2016); at South Korea (JJA; Lee et al. 2013) and Mt. Happo Japan (MAM, Tanomoto et al. 2009). Simulated trends for the 95th percentile (purple) are also shown for three sites in Eastern China. For Mt. Happo AM3 is sampled at 700 hPa and filtered for the influence from Asian continental air.

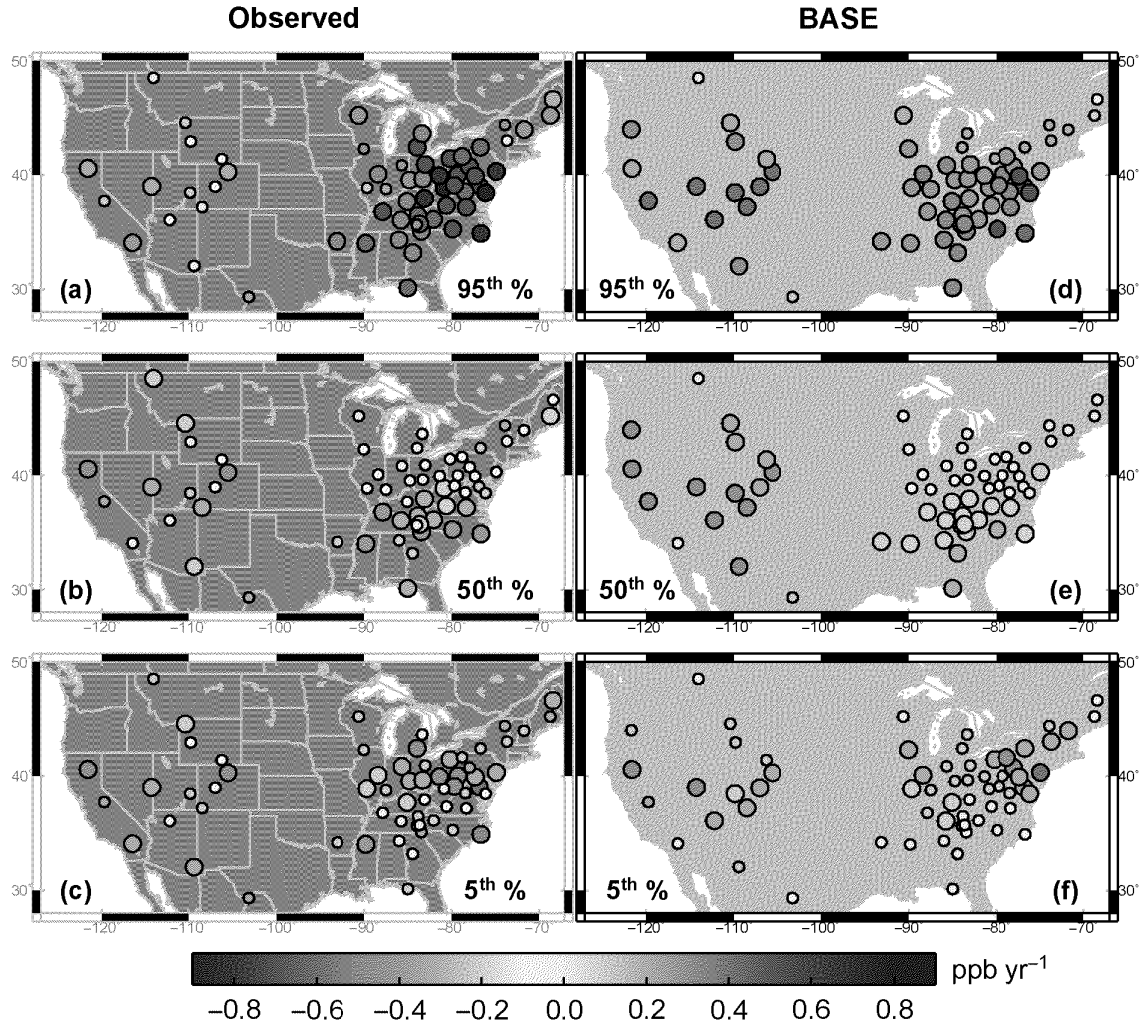

Figure 7. Linear trends in spring (MAM) MDA8 ozone over 1988-2014 (ppb yr^{-1}) at US rural sites for the 95th, 50th, and 5th percentiles observed (left) and simulated (right) in AM3 BASE. Larger circles indicate sites with statistically significant trends ($p < 0.05$). For western US high-elevation sites, the model is sampled at 700 hPa and filtered to remove local influence (NACOt ≤ 67th) - more representative of observed conditions at remote mountain sites (Sect. 2.4).

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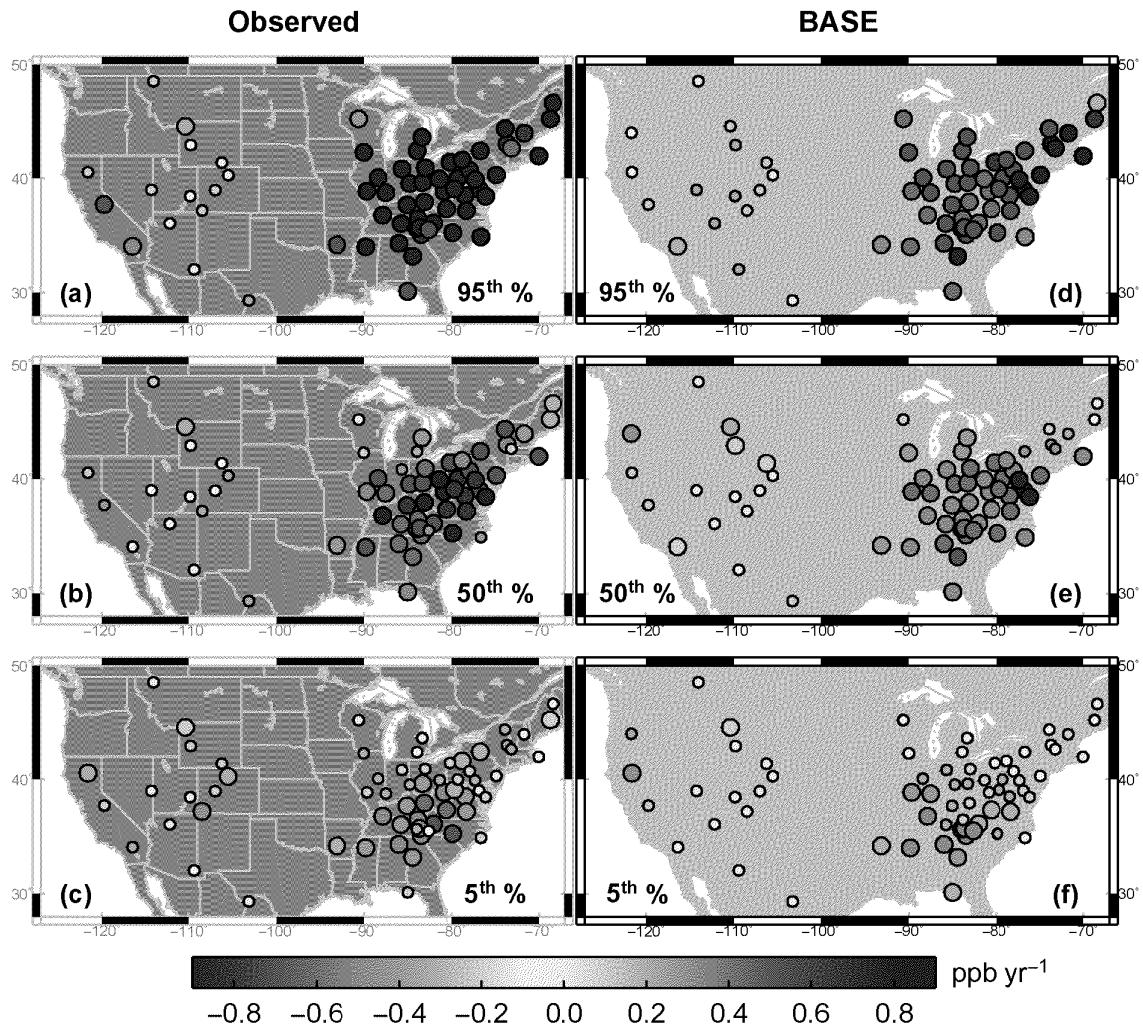

Figure 8. As in Figure 7, but for summer (JJA).

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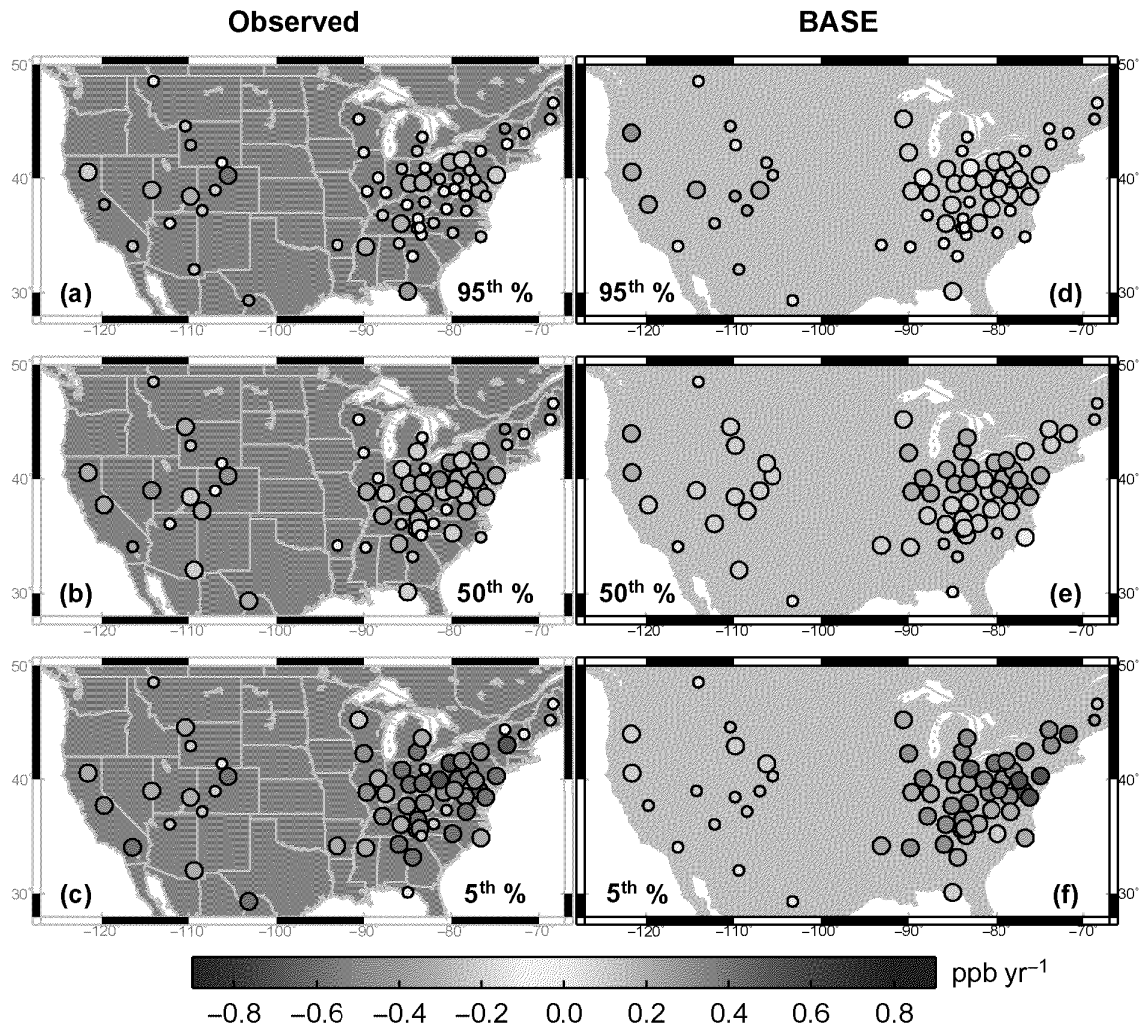

Figure 9. As in Figure 7, but for winter (DJF).

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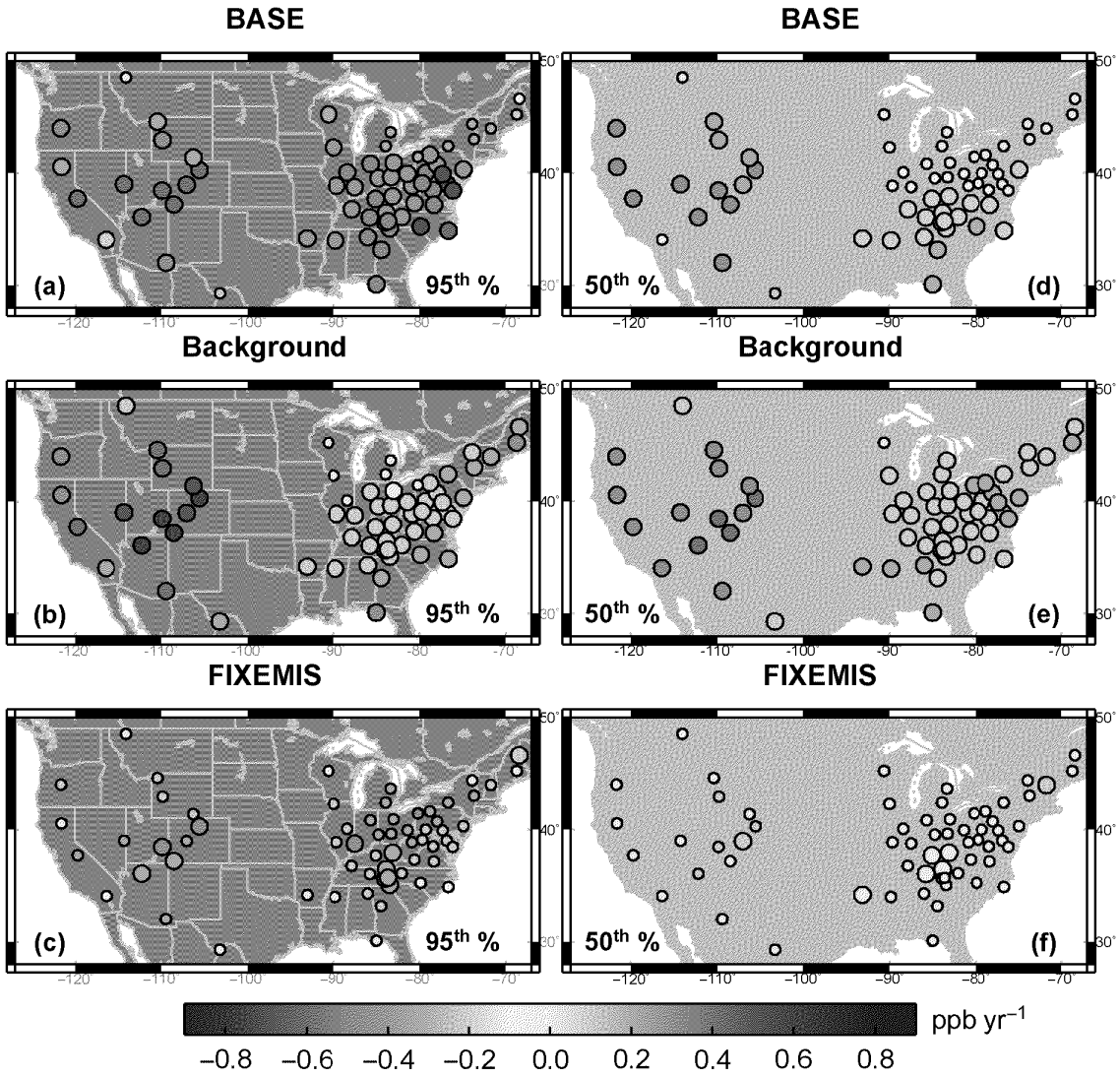

Figure 10. Linear trends in spring (MAM) MDA8 ozone over 1988-2014 at US rural sites for the 95th (left panels) and 50th (right panels) percentiles in AM3_BASE (top), Background (middle) and FIXEMIS (bottom).

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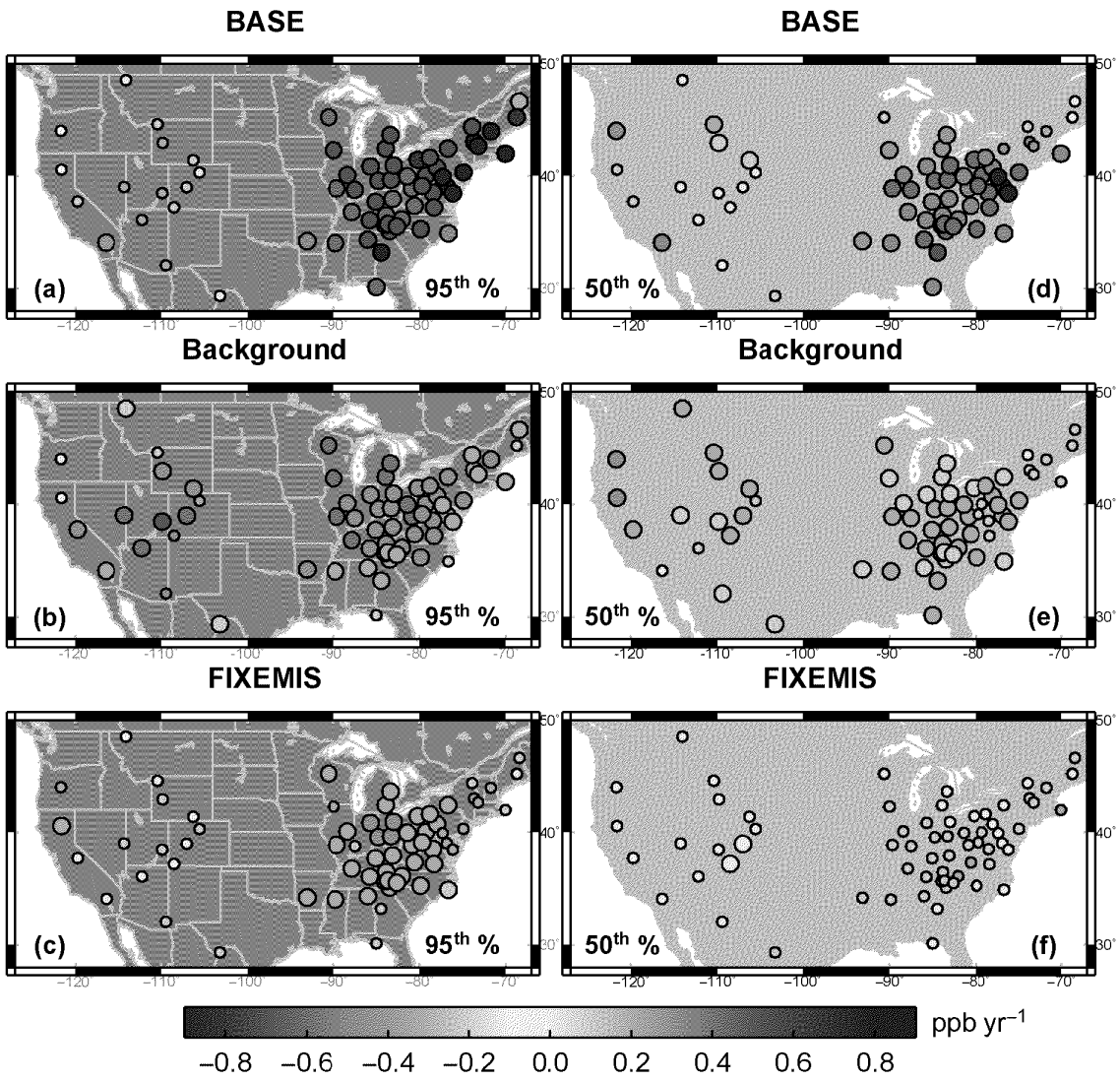

Figure 11. As in Figure 10, but for summer (JJA).

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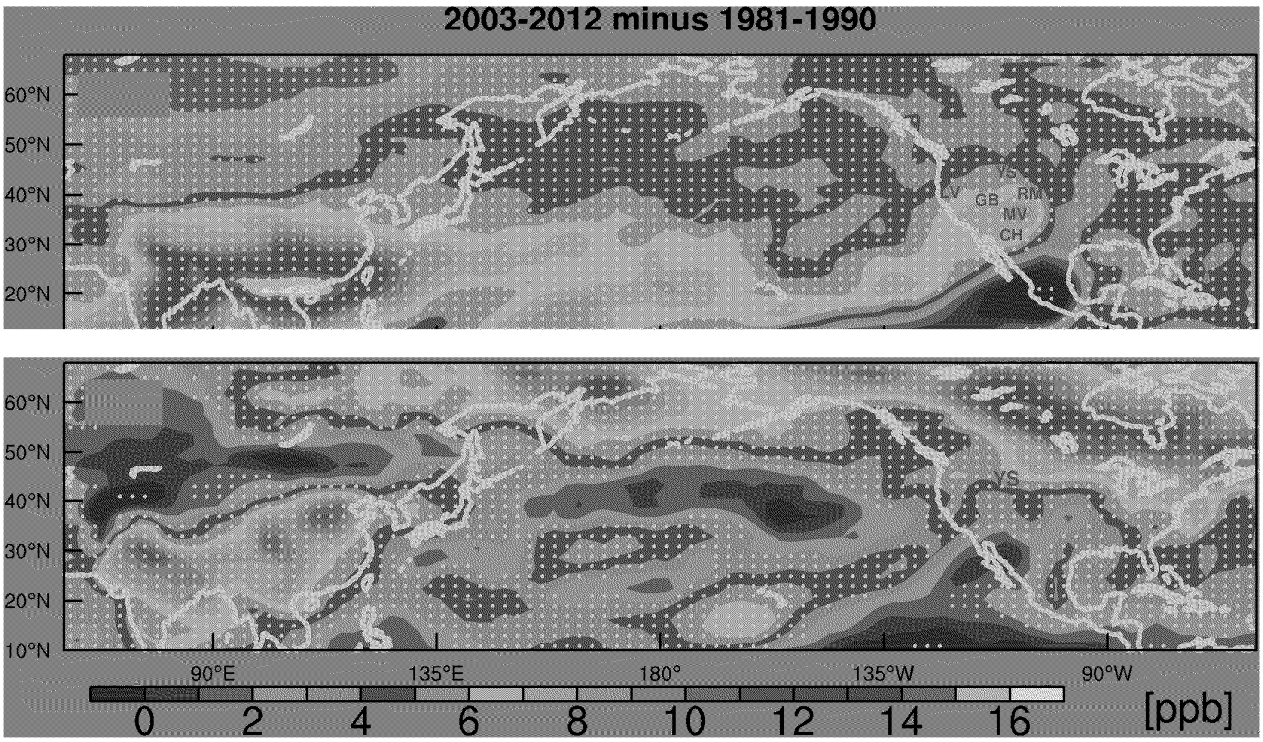

Figure 12. Maps of changes in lower tropospheric ozone (700 hPa) between two 10-year means (2003-2012 minus 1981-1990) from AM3 Background for spring (top) and summer (bottom). Stippling denotes areas where the change is statistically significant based on Student's t-test ($p<0.05$). Letters in red denote the western US CASTNet sites where signficant ozone increases have been observed.

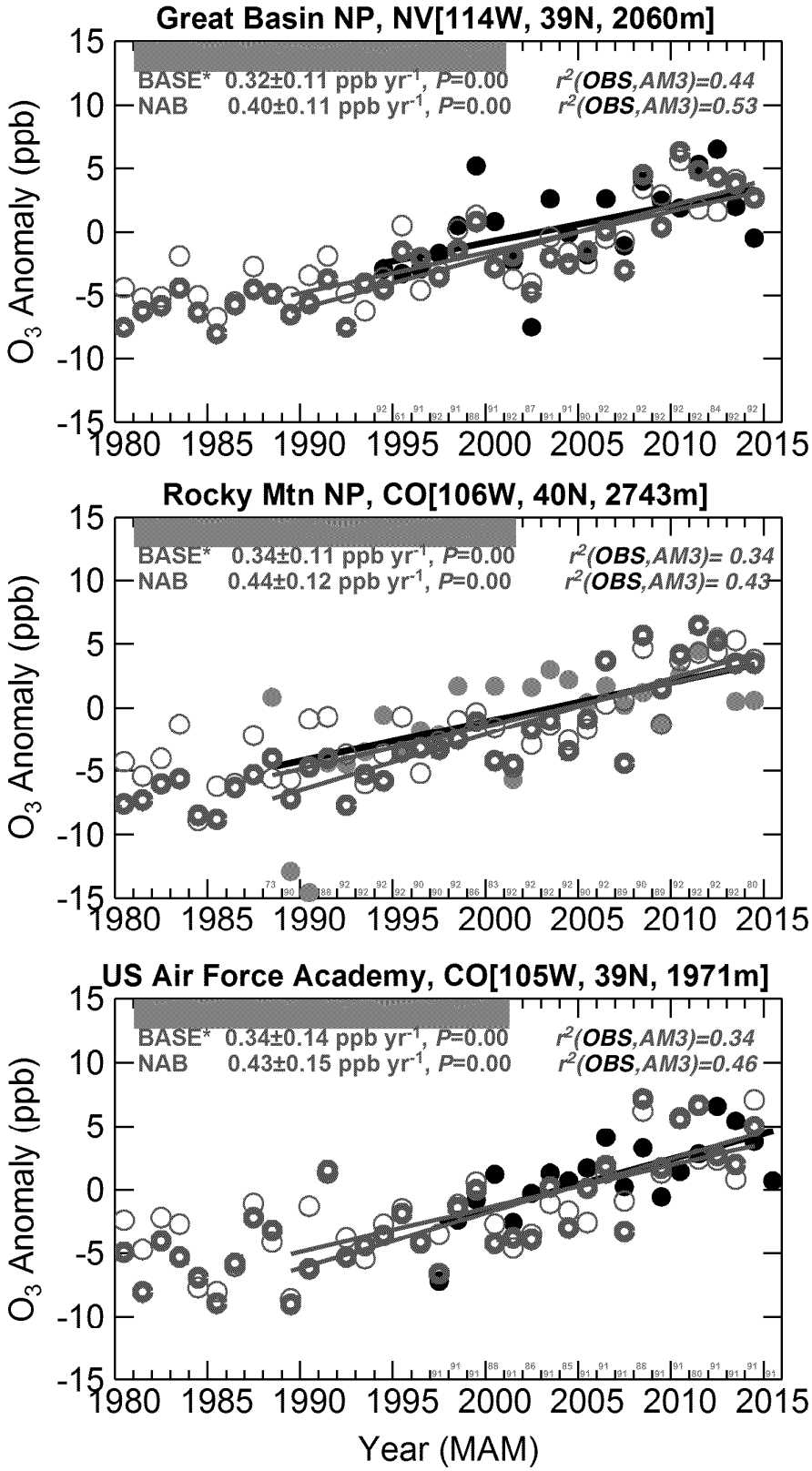

Figure 13. Time series of spring MDA8 O_3 anomalies (relative to the 1995-2010 mean) at Great Basin NP, Rocky Mountain NP, and US Air Force Academy Colorado Spring as observed (black) and simulated in AM3_BASE subsampled for baseline conditions (NACOt≤67th; red) and in Background with North American anthropogenic emissions zero out (NAB; green). Presented on the top of the graph are statistics from the linear fit and correlations between observations and simulations. Numbers on the bottom of the graph denote the sample size of observations for each year. Grey points indicate biased observations that are not included in the linear fit (see Sect. 2).

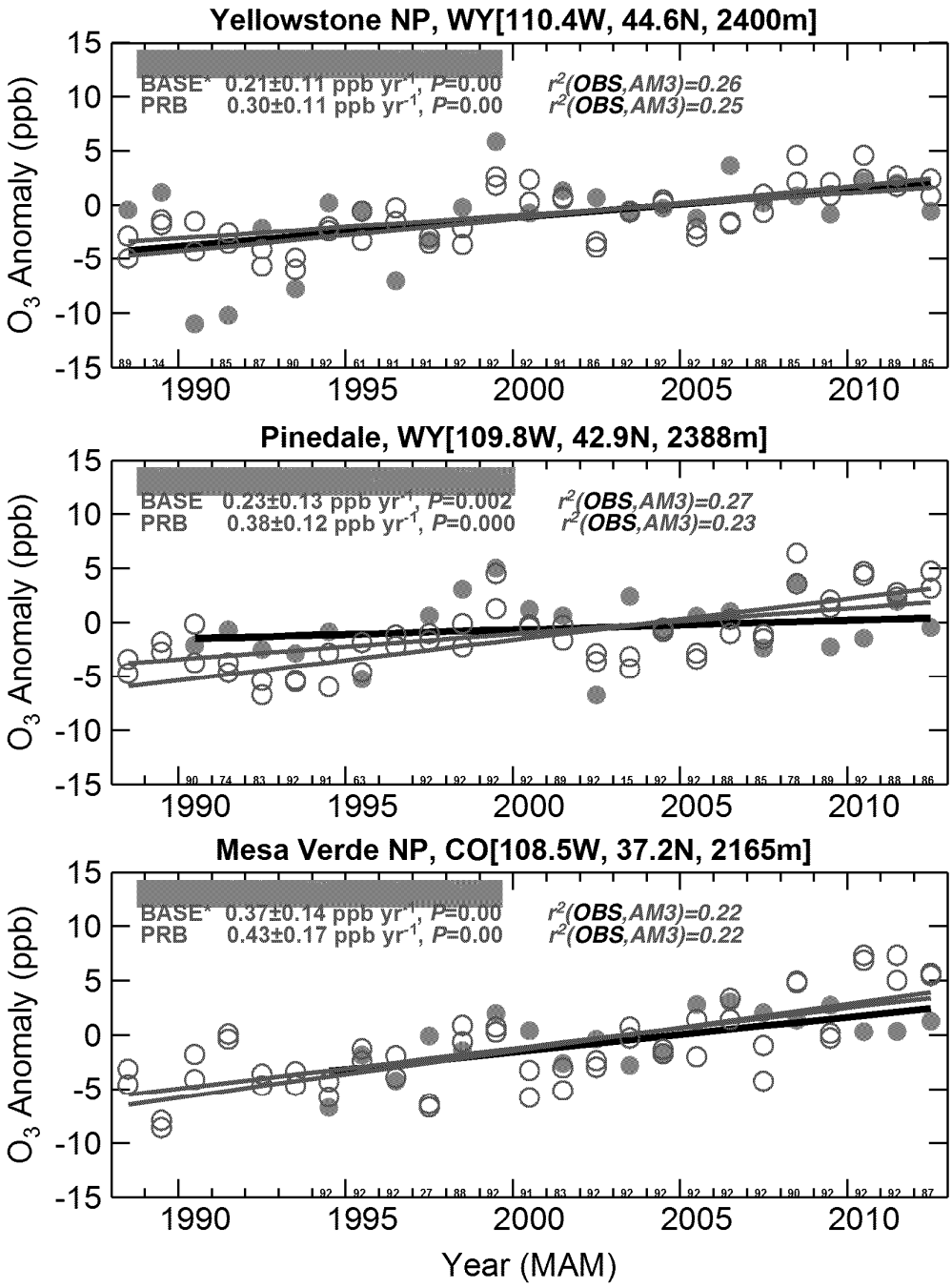

Figure 14. Same as Figure 13, but for Yellowstone, Pinedale, and Mesa Verde over the period 1988-2012.

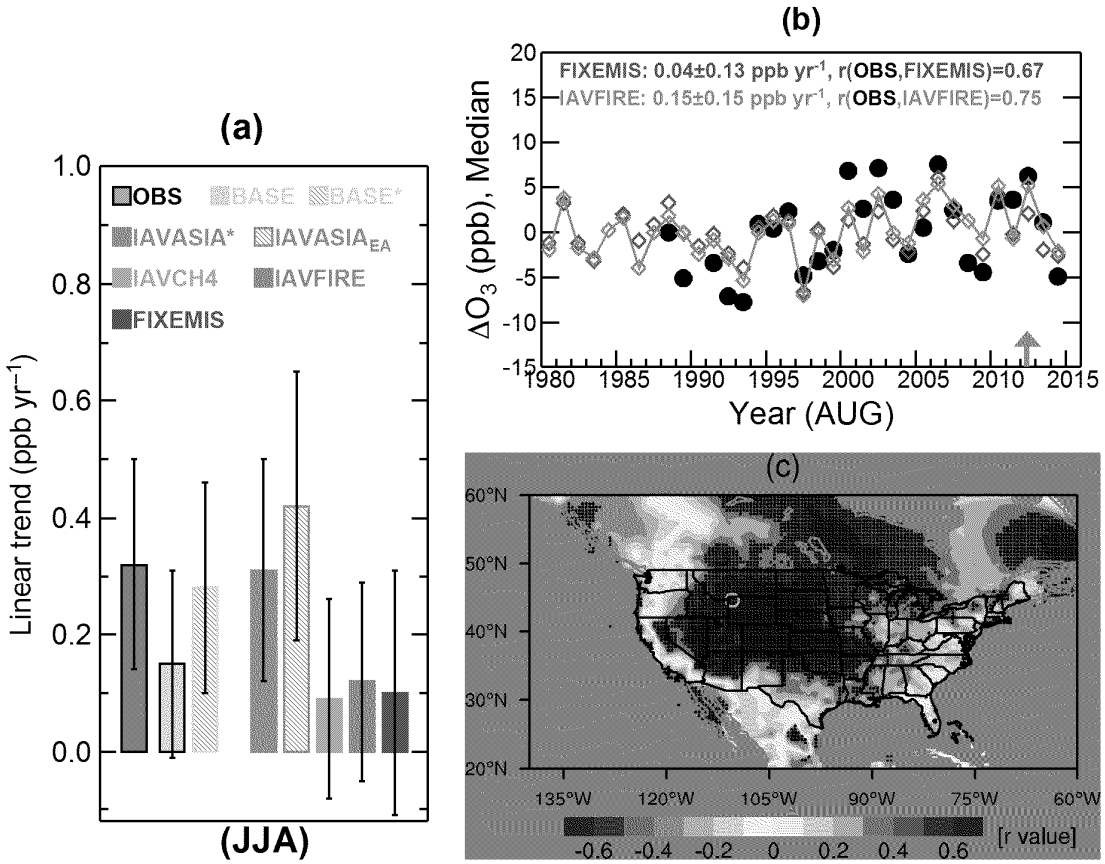

Figure 15. Variability and trends of summertime ozone at Yellowstone NP. (a) JJA median MDA8 O_3 trends over 1988-2012 at Yellowstone from observations (black) and simulations sampled at 700 hPa for AM3_BASE without filtering (pink), AM3_BASE subsampled for baseline conditions (NACOt≤67th, strapped pink), IAVASIA (solid purple), IAVASIA subsampled for Asian influence (EACOt≥67th, strapped purple), IAVCH$_4$ (cyan), IAVFIRE (orange) and FIXEMIS (red). (b) Anomalies in August median MDA8 O_3 at Yellowstone as observed (black) and simulated by GFDL-AM3 sampled in the model surface level, with constant (red) and varying (orange) wildfire emissions. (c) Temperal correlations of JJA mean MDA8 O_3 at Yellowstone with JJA mean daily maximum temperature from CRU observations over 1988 to 2014.

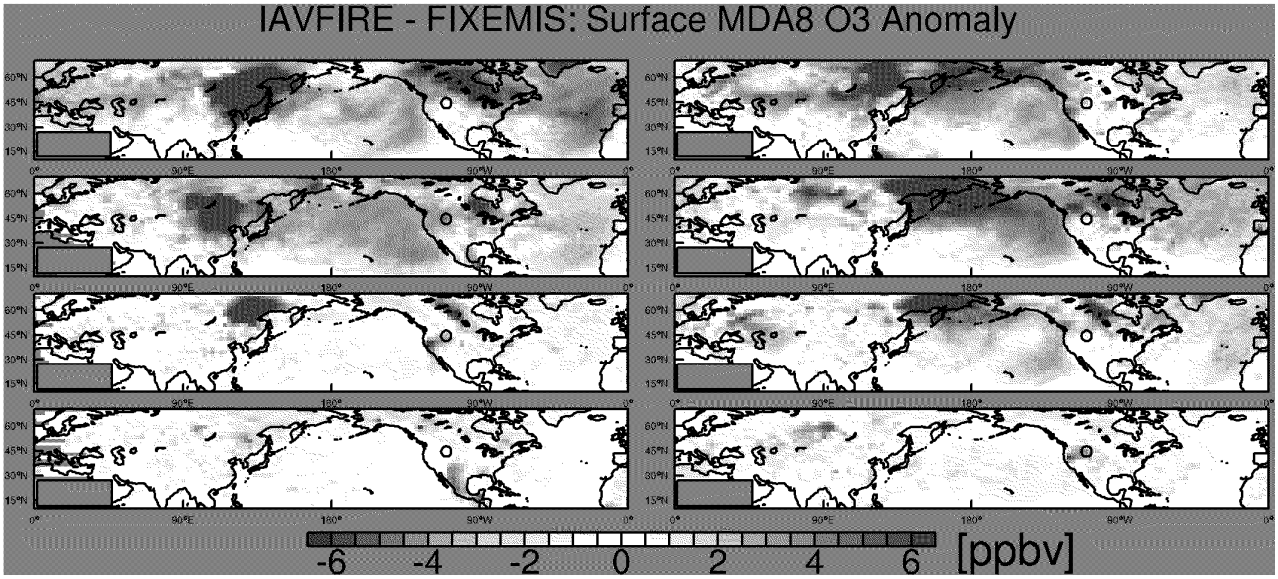

Figure 16. Surface MDA8 ozone enhancements from year-to-year variations in wildfire emissions during the summer months as diagnosed by the differences between IAVFIRE and FIXEMIS. The black circle denotes the location of Yellowstone NP.

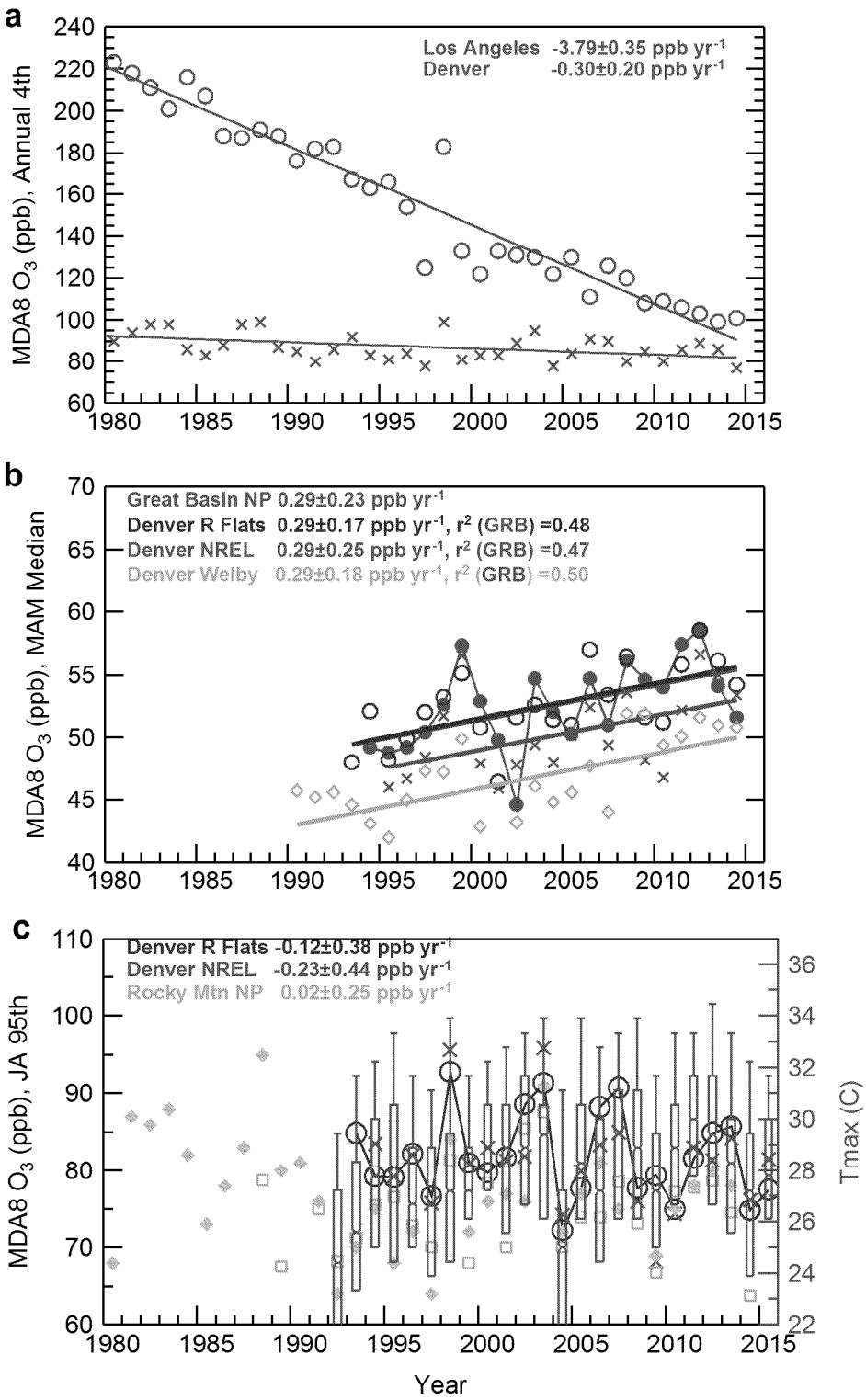

Figure 17. Denver Ozone Trends. (a) Comparison of observed trends in annual 4th highest MDA8 O_3 at Crestline Los Angeles (brown) and in Denver (blue, all monitors). (b) Time series of observed springtime median MDA8 O_3 at Great Basin NP Nevada (red), in comparison with three monitors in the Denver Metropolitan area: Rocky Flats North (darkblue circles), National Renewable Energy Lab (NREL - blue crosses), and Welby (cyan diamonds). (c) Time series of observed July-August 95th percentile MDA8 O_3 in Denver, together with statistics (25th, 50th, 75th, 95th) of observed July-August daily maximum temperature at Rocky Flats (red, right axis). Gray: Highland Reservior sites (any change in monitoring locations?)

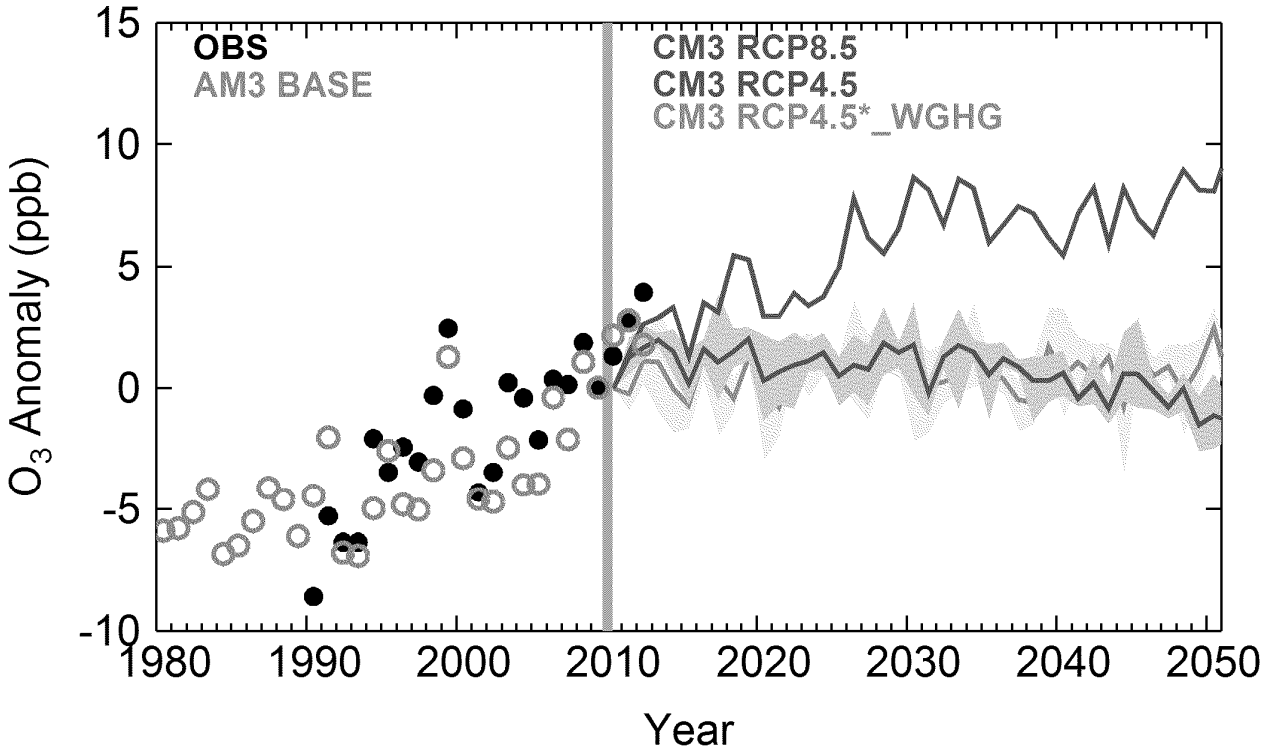

Figure 18. Future projections. Spring lower tropospheric O_3 changes relative to 2010 over the high-elevation western US (~700 hPa, 35-45N, 120-105W) in GFDL AM3 hindcast (orange circles) and CM3 future simulations for RCP8.5 (red), RCP4.5 (blue), and RCP4.5 due to GHGs warming (purple); Shading represents the range of CM3 ensemble members. Black circles indicate observed changes averaged from Lassen, Great Basin, and Rocky Mountain that ...

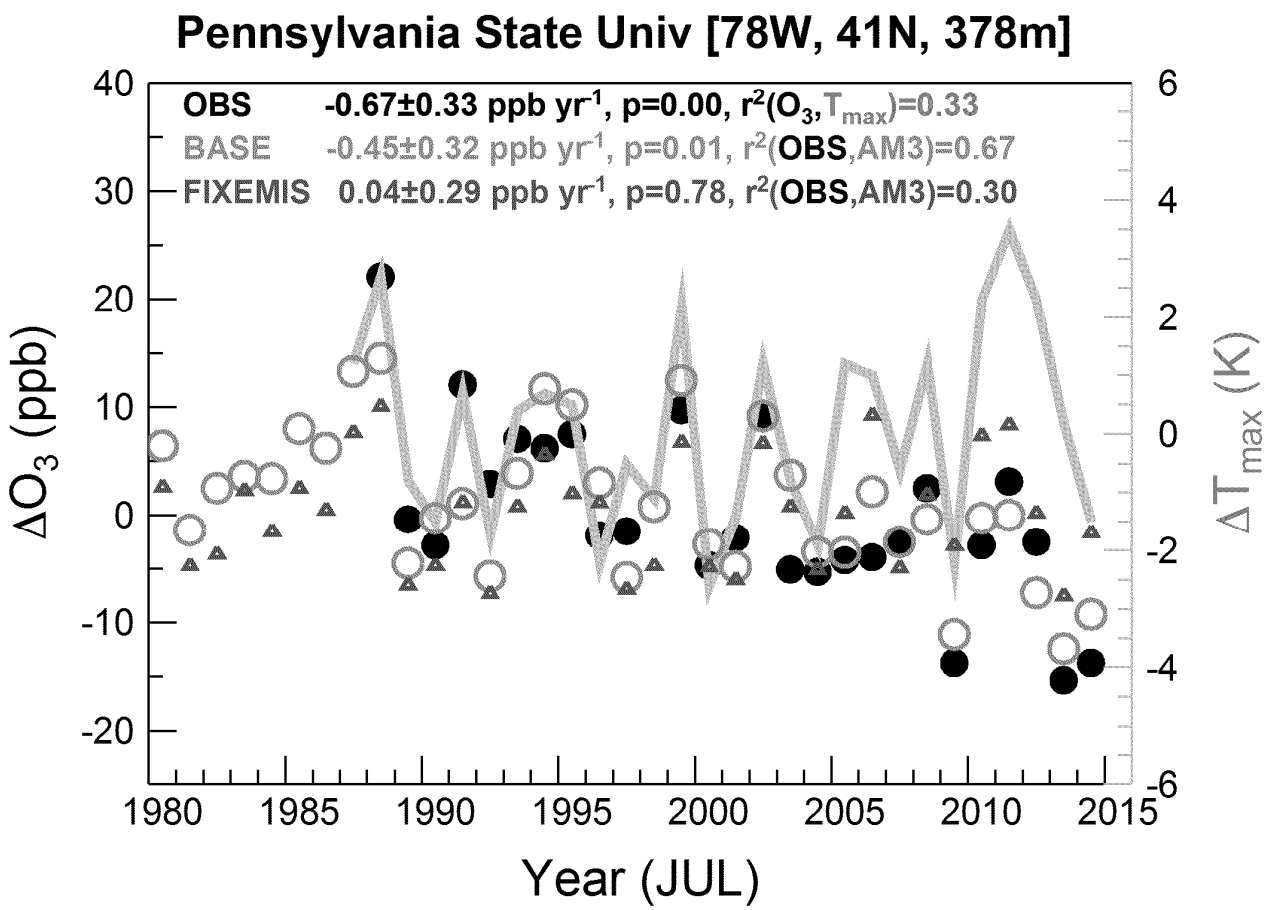

Figure 19. Anomalies in July mean MDA8 O_3 at the Pennsylvania State CASTNET site as observed (black) and simulated by the GFDL-AM3 model with time-varying (purple) and constant emissions (red). Observed anomalies in July mean daily maximum temperature are shown in gray using right axis.

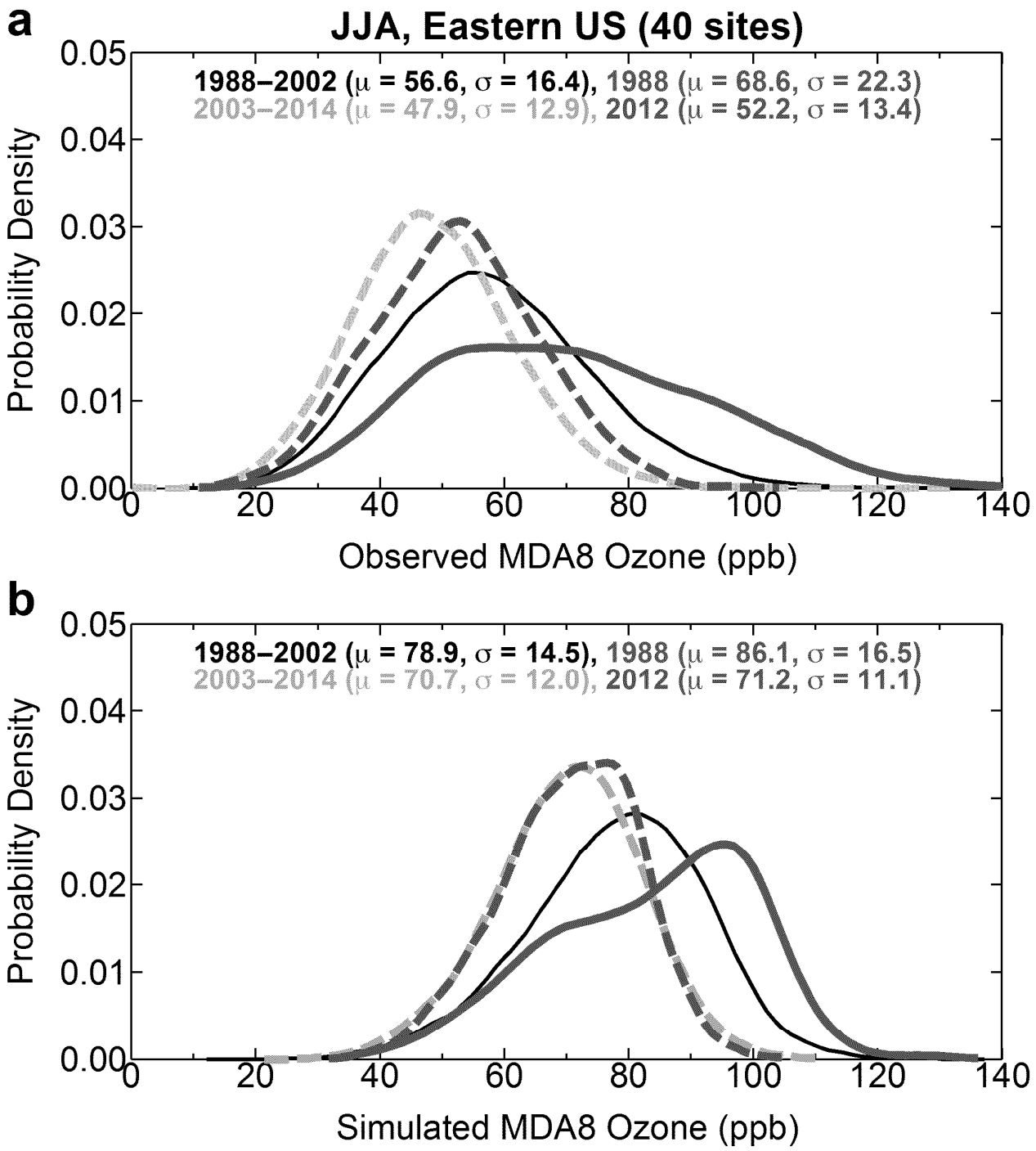

Figure 20. (a) Comparisons of probability distributions of summertime (JJA) MDA8 O_3 from CASTNet over the EUS domain for the pre-NO_X SIP Call (1988-2002; solid black lines) versus post-NO_X SIP Call (2003-2014; dashed gray lines) periods and during the extreme heat waves of 1988 (solid red lines) versus 2012 (dashed brown lines). (b) Same as (a) but from AM3_BASE. The median (μ) and standard deviation (σ) are shown (ppb).

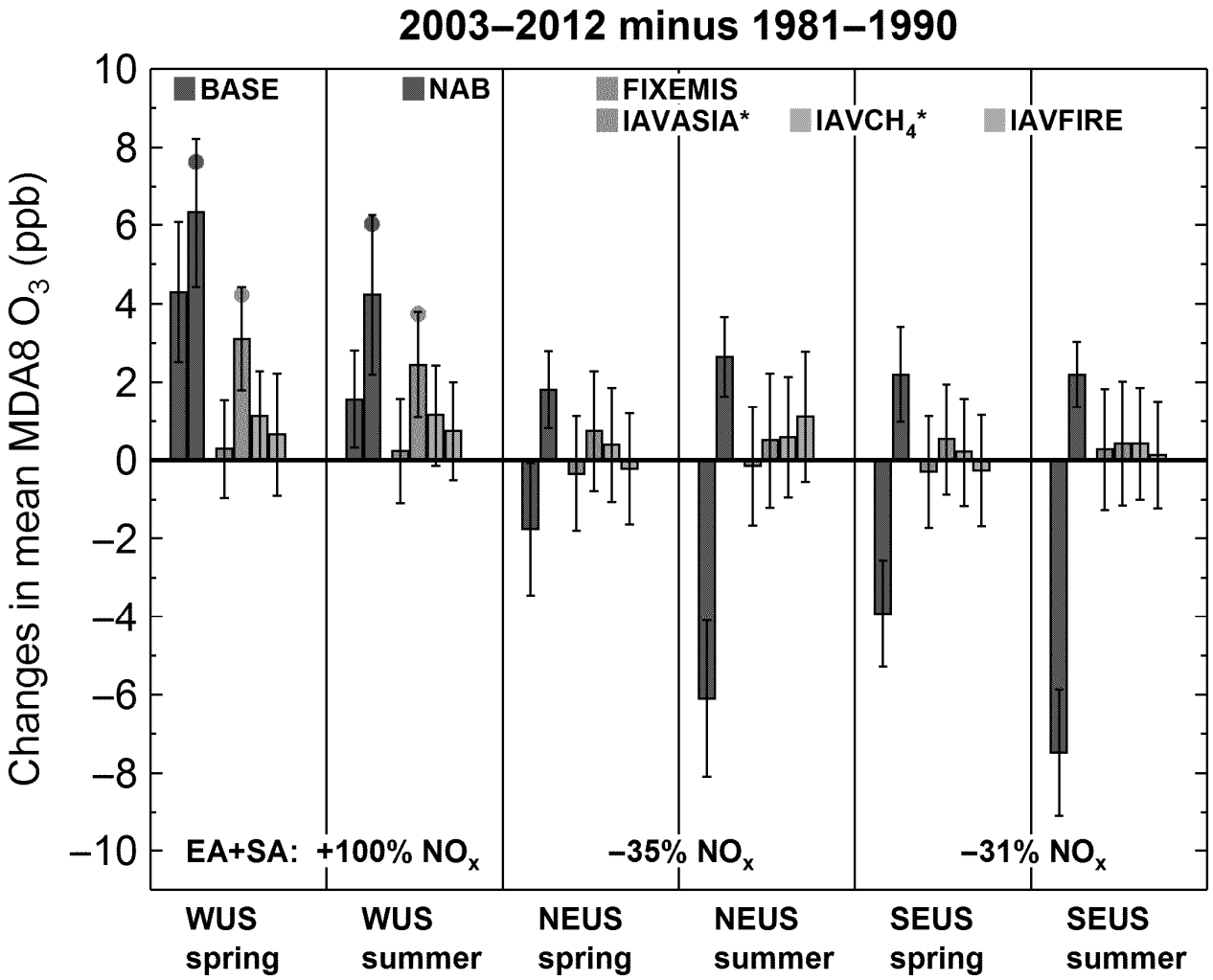

Figure 21. Summary of US surface ozone trends and drivers. Changes in MDA8 ozone between two 10-year means (2003-2012 minus 1981-1990) simulated in a suite of GFDL-AM3 experiments for spring and summer for the western (32N-46N and 123W-102W), Northeast (37N-45N and 90W-65W) and Southeast (30N-36N and 95W-77W) US domains. Experiments are color-coded with the error bars indicating the range of the mean change at the 95% confidence level. Filled circles represent the changes under Background (green) and IAVASIA (purple) when filtered for Asian influence (EACOt ≥ 67th%).