



Final Report

AIR QUALITY MODELING ANALYSIS FOR THE DENVER EARLY ACTION OZONE COMPACT:

2007 Emission Reduction Sensitivity Modeling

Prepared for:

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1. INTRODUCTION

This report describes additional future-year (2007) sensitivity modeling carried out as part of the Denver-Northern Front Range 8-hour ozone Early Action Compact Study (Denver EAC Study).

The procedures used in the Denver EAC photochemical modeling are described in detail in the modeling protocol (Tesche et al., 2003a). Meteorological modeling performed to develop meteorological inputs for the Comprehensive Air-quality Model with extensions (CAMx) photochemical grid model and the June-July 2002 modeling period is described by McNally and co-workers (2003). The preparation of the emissions inputs for the Denver EAC modeling is described in Mansell and Dinh (2003a,b,c). The 2002 Base Case modeling and model performance evaluation is described by Morris and co-workers (2003) and the preliminary 2007 modeling analysis performed in December 2003 is described by Morris and co-workers (2004).





2. 2007 ADDITIONAL SENSITIVITY ANALYSIS RESULTS

The purpose of the additional 2007 emission reduction sensitivity analysis is to enhance our knowledge on the effectiveness of VOC and/or NOx emissions reductions in the seven county Denver Metropolitan Area (DMA) and vicinity for reducing elevated 8-hour ozone concentrations in the region. The December 2003 control strategy and emissions reduction sensitivity tests provided some initial information on 8-hour ozone sensitivity to emission controls (Morris et al., 2004). The work reported here corrected some errors in the 2007 emissions inventories (omission of non-road mobile source emissions in states east of Colorado and on-road mobile sources in California) and examines the effectiveness for reducing elevated 8-hour ozone concentrations in the Denver region of: (1) reducing VOC and/or NOx emissions in the DMA; and (2) reducing VOC emissions from mobile sources in the DMA.

REVISED 2007 BASE CASE AND THREE CONTROL STRATEGY

As part of the emissions quality assurance/quality control (QA/QC) activities, several omissions of emissions were discovered in the 2007 simulations performed in December 2003. Normally the emissions QA/QC activities are performed prior to performing the photochemical modeling. However, the aggressive schedule of the Denver EAC precluded such activities so that the QA/QC found the omissions after the runs had been completed. The following emissions were omitted from all of the 2007 emission scenarios conducted in December 2003 and presented in Morris et al., 2004:

- Non-Road mobile source emissions for states east of Colorado including Texas, Oklahoma, Kansas, Nebraska, and Louisiana; and
- On-Road mobile source emissions for California

As these emissions are outside of Colorado and are not affected by any of the control strategies, they likely will just affect the amount of background ozone entering the Denver region. Thus, their biggest effect would be to raise the estimated 2007 8-hour ozone Design Values across all scenarios, but not substantially change the incremental reductions due to the control measures.

Corrections were made to the 2007 emission scenarios and revised CAMx simulations were performed to project 8-hour ozone Design Values for the 2007 Base Case and 2007 Three Control (cntl4) emission scenarios. Table 2-1 compares the projected 8-hour ozone Design Values using the older (December 2003) and updated (January 2004) 2007 emissions. The inclusion of the missing emissions raises the 8-hour ozone Design Values by 0.4 to 0.8 ppb for the 2007 Base Case simulation. At the key Rocky Flats monitor, where the highest observed 2001-2003 8-hour ozone Design Value occurred, including the missing emissions increased the projected 8-hour ozone Design Value in the 2007 Base Case by 0.4 ppb, from 86.2 to 86.6 ppb. The 2007 Three Control Strategy (8.1 RVP + Flash + RICE) emissions scenario (cntrl4) is estimated to reduce the 8-hour ozone Design Values by 0.2 to 0.5 ppb from 2007 Base Case levels.





Table 2-1. Current year (2001-2003) observed and 2007 projected 8-hour ozone Design Values (ppb) at the Rocky Flats ozone monitor for the 2007 Base Case and 2007 Three Control strategy (cntl4).

Strategy (Griti-1).	2001- 2003	2007 Ba	se Case	2007 Three Control (cntl4)			
	Observed	Dec '03	Jan '04	Dec '03	Jan '04		
Weld County Tower	81	79.0	79.8	78.5	79.4		
Rocky Mtn. NP	81	79.3	79.7	78.9	79.2		
Fort Collins	71	70.1	70.7	69.7	70.3		
USAF Academy	73	70.9	71.4	70.6	71.1		
Welch	70	68.8	69.1	68.5	68.9		
Rocky Flats North	87	86.2	86.6	85.9	86.2		
NREL	85	84.2	84.6	83.9	84.4		
Arvada	76	75.4	75.9	75.2	75.6		
Welby	66	66.1	66.5	65.8	66.0		
S. Boulder Creek	77	76.3	76.7	76.0	76.3		
Carriage	76	74.6	75.2	74.4	75.0		
Highland	81	79.6	80.0	79.3	79.8		
Chatfield Res.	85	83.2	83.7	82.9	83.4		

The January 2004 Revised 2007 Base Case and Three Control Strategy emission updates were used for the 2007 emission reduction sensitivity simulations discussed below.

DEFINITION OF ADDITIONAL SENSITIVITY AND CONTROL SCENARIOS

The first two simulations performed under this additional (January 2004) modeling analysis was to revise the 2007 Base Case (07Base) and 2007 Three Control Strategy (Cntrl4) emissions scenarios to account for the omitted emissions:

- <u>2007 Base Case</u>: Growth and controls (on-the-books) with on-road mobile sources using a 9.0 psi RVP gasoline with a 40% ethanol market penetration (07base); and
- <u>2007 Three Control Strategy</u>: Implementation of Flash, RICE, and 8.1 psi RVP with 40% ethanol market penetration controls on top of 2007 Base (cntl4).

Emissions for the 2007 Base Case and all control factors were provided by the Colorado Department of Health and Environment (CDPHE).

The following additional VOC/NOx emission reduction sensitivity scenarios:

- 10% Reduction in Anthropogenic VOC in DMA+Weld on top of 2007 Base Case (cntl8);
- 10% Reduction in Anthropogenic NOx in DMA+Weld on top of 2007 Base Case (cntl9);
- 10% Reduction in Anthropogenic VOC and NOx in DMA+Weld on top of 2007 Base Case (cntl10);





- 10% Reduction in Anthropogenic VOC in DMA+Weld on top of 2007 Three Control Scenario (cntl11);
- 10% Reduction in Anthropogenic NOx in DMA+Weld on top of 2007 Three Control (cntl12):
- 10% Reduction in Anthropogenic VOC and NOx in DMA+Weld on top of 2007 Three Control (cntl13);
- 10% Reduction in on-road mobile source VOC emissions in the core DMA from 2007 Base Case (cntl14);
- 20% Reduction in on-road mobile source VOC emissions in the core DMA from 2007 Base Case (cntl15);
- 10% Reduction in off-road mobile source VOC emissions in the core DMA from 2007 Base Case (cntl16); and
- 20% Reduction in off-road mobile source VOC emissions in the core DMA from 2007 Base Case (cntl17).

2007 SENSITIVITY AND CONTROL STRATEGY MODELING RESULTS

The CDPHE provided the control factors for adjusting the DMA on-road mobile source emissions for the 8.1 RVP with 40% ethanol penetration Three Control Strategy emissions scenario. It should be pointed out that the control factors for the RVP control measure were later found to be in error and were corrected in subsequent modeling. Thus we focus on the directional and magnitude changes in ozone due to the emission reduction sensitivity tests.

Projected 8-Hour Ozone Design Values at Rocky Flats

Table 2-2 displays the projected 8-hour ozone Design Values at the Rocky Flats monitor for the additional emission reduction sensitivity scenarios. Details on the data used to project the 2007 8-hour ozone Design Values for each scenario and all ozone monitors are provided in Appendix A. As seen in Table 2-1 and Appendix A, in 2007 8-hour ozone attainment is demonstrated for all monitors but the Rocky Flats monitor northwest of Denver. The emission reduction sensitivity results suggest that:

- As seen in the previous (December 2003) modeling, the modeled ozone concentrations exhibit a stiff response to changes in emissions in the DMA (Morris et al., 2004).
- VOC control in the DMA is more effective than NOx control for reducing 8-hour ozone concentrations near the Rocky Flats monitor, as well as all the other monitors except Rocky Mountain National Park (Appendix A).





- NOx control in the DMA appears to be counterproductive at the levels of control examined (10%) increasing ozone over the base case conditions.
- A 10% anthropogenic VOC emissions reduction in the DMA results in a 0.3 to 0.4 ppb reduction in the projected 8-hour ozone Design Value at Rocky Flats.
- A 10% anthropogenic NOx emissions reduction in the DMA results in a 0.4 ppb increase in the projected 8-hour ozone Design Value at Rocky Flats.
- A combined 10% VOC and NOx anthropogenic emissions reductions in the DMA reduces the projected 8-hour ozone Design Value at Rocky Flats by 0.2 to 0.3 ppb.

Table 2-2. Projected 2007 8-hour ozone Design Values at the Rocky Flats monitor for the emission reduction sensitivity simulations.

Scenario	Base	DV) O ₃
2001-2003 Observed		87	
2007 Base		86.6	
8.1RVP/40%EtOH, Flash/RICE (cntl4)*	07Base	86.2	-0.4
10% VOC (cntl8)	07Base	86.1	-0.5
10% NOx (cntl9)	07Base	87.0	+0.4
10% VOC+NOx (cntl10)	07Base	86.3	-0.3
Cntl4 plus 10% VOC (cntl11)	Cntl4	85.9	-0.3
Cntl4 plus 10% NOx (cntl12)	Cntl4	86.6	+0.4
Cntl4 plus 10% VOC+NOx (cntl13)	Cntl4	86.0	-0.2
10% On-Road VOC (cntl14)	07Base	86.5	-0.1
20% On-Road VOC (cntl15)	07Base	86.3	-0.3
10% Off-Road VOC (cntl16)	07Base	86.5	-0.1
20% Off-Road VOC (cntl17)	07Base	86.5	-0.1

^{*} Emission factors provided for 8.1RVP/40%EtOH scenario were in error.





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Appendix A

Details on the 8-Hour Ozone Design Value Scaling for the 2007 Emission Reduction Sensitivity Simulations

2007 Base Case

2007 Three Control Strategy (cntl 4)
2007 10% VOC (Cntl 8)
2007 10% NOx (cntl 9)
2007 10% VOC and NOx (cntl 10)
2007 Three Control Plus 10% VOC (cntl 11)
2007 Three Control Plus 10% NOx (cntl 12)
2007 Three Control Plus 10% VOC and NOx (cntl 13)
2007 10% On-Road VOC (cntl 14)
2007 20% On-Road VOC (cntl 15)
2007 1-% Off-Road VOC (cntl 16)

2007 20% Off-Road VOC (cntl 17)

Base Case: run1	1a									
Site	DV	2176	2177	2178	2179	2180	2181	2182	#Days>70	
Weld County Tow	/ 81	61	57.2	65.2	60.6	69.4	66.9	70.9	1	
Rocky Mtn. NP	81	63.1	64.3	67.4	62	71.4	76	79.1	3	
Fort Collins	71	63.2	62.6	69.5	59	65.4	70.7	73.5	2	
USAF Academy	73	56.6	63.5	56.6	66.6	61	69.4	70.6	1	
Welch	70	58.9	66.5	69.8	71.7	65.7	73	87.2	3	
Rocky Flats Nor	87	62.8	62.7	70.9	62.1	70.5	73.8	84.5	4	
NREL	85	60.4	64.6	70.9	64.9	63.1	73.8	87.2	3	
Arvada	76	59.8	60	70.8	63.1	69.1	71.8	85.1	3	
Welby	66	56.6	55.2	62.6	66.5	70	66.2	72.7	2	
S. Boulder Cree	77	63	62.8	70.9	63	70.9	74.1	84.5	4	
Carriage	76	58.4	62.3	68.8	67.9	66.6	71.9	83.8	2	
Highland	81	57.4	66.3	62.7	73	69.7	71.9	81.6	3	
Chatfield Res.	85	57.9	66.5	63.4	73	69.7	71.9	85.9	3	
			2007 B	ase Case -	- Future Y	ear: 07run	11a.a0			
Site	DV	2176	2177	2178	2179	2180	2181	2182	RRF DV	Scaled
Weld County Tow	/ 81	60.6	57	65	60.1	68.9	66.3	69.9	0.9857	79.8
Rocky Mtn. NP	81	62.7	63.8	66.3	61.4	70 5	75.4	77 E	0.0045	79.7
Fort Collins	74			00.0	01.4	70.5	75.1	77.5	0.9845	19.1
	71	62.7	62.2	68.8	58.6	70.5 64.8	75.1 71.5	77.5 72	0.9845	70.7
USAF Academy	73	62.7 56.4								
USAF Academy Welch		56.4 58.9	62.2	68.8	58.6	64.8	71.5	72	0.9952	70.7
•	73	56.4	62.2 62.8	68.8 56.1	58.6 64.9	64.8 59.8	71.5 68.3	72 69	0.9952 0.978	70.7 71.4
Welch	73 70	56.4 58.9	62.2 62.8 67.2	68.8 56.1 69.5	58.6 64.9 70.5	64.8 59.8 65.1	71.5 68.3 72.6	72 69 85.8	0.9952 0.978 0.9873	70.7 71.4 69.1
Welch Rocky Flats Nor	73 70 87	56.4 58.9 63	62.2 62.8 67.2 62.2	68.8 56.1 69.5 70.9	58.6 64.9 70.5 61.8	64.8 59.8 65.1 69.8	71.5 68.3 72.6 74.2	72 69 85.8 83.6	0.9952 0.978 0.9873 0.9958	70.7 71.4 69.1 86.6
Welch Rocky Flats Nor NREL	73 70 87 85	56.4 58.9 63 60.5	62.2 62.8 67.2 62.2 65.7	68.8 56.1 69.5 70.9 70.9	58.6 64.9 70.5 61.8 65.6	64.8 59.8 65.1 69.8 62.7	71.5 68.3 72.6 74.2 74.2	72 69 85.8 83.6 85.8	0.9952 0.978 0.9873 0.9958 0.9957	70.7 71.4 69.1 86.6 84.6
Welch Rocky Flats Nor NREL Arvada Welby S. Boulder Cree	73 70 87 85 76	56.4 58.9 63 60.5 60.1	62.2 62.8 67.2 62.2 65.7 61.1	68.8 56.1 69.5 70.9 70.9	58.6 64.9 70.5 61.8 65.6 62.6	64.8 59.8 65.1 69.8 62.7 68.5	71.5 68.3 72.6 74.2 74.2 71.7	72 69 85.8 83.6 85.8 84.7	0.9952 0.978 0.9873 0.9958 0.9957 0.9982	70.7 71.4 69.1 86.6 84.6 75.9
Welch Rocky Flats Nor NREL Arvada Welby	73 70 87 85 76 66	56.4 58.9 63 60.5 60.1 56.1	62.2 62.8 67.2 62.2 65.7 61.1 54.8	68.8 56.1 69.5 70.9 70.9 70.9 64.6	58.6 64.9 70.5 61.8 65.6 62.6 65.5	64.8 59.8 65.1 69.8 62.7 68.5 69.6	71.5 68.3 72.6 74.2 74.2 71.7 68.4	72 69 85.8 83.6 85.8 84.7 74.1	0.9952 0.978 0.9873 0.9958 0.9957 0.9982 1.0073	70.7 71.4 69.1 86.6 84.6 75.9 66.5 76.7 75.2
Welch Rocky Flats Nor NREL Arvada Welby S. Boulder Cree	73 70 87 85 76 66 77	56.4 58.9 63 60.5 60.1 56.1 63.1	62.2 62.8 67.2 62.2 65.7 61.1 54.8 62.3	68.8 56.1 69.5 70.9 70.9 70.9 64.6 70.9	58.6 64.9 70.5 61.8 65.6 62.6 65.5 62.5	64.8 59.8 65.1 69.8 62.7 68.5 69.6 70.5	71.5 68.3 72.6 74.2 74.2 71.7 68.4 74.2	72 69 85.8 83.6 85.8 84.7 74.1	0.9952 0.978 0.9873 0.9958 0.9957 0.9982 1.0073 0.9959	70.7 71.4 69.1 86.6 84.6 75.9 66.5 76.7

Base Case: run1	1a									
Site	DV	2176	2177	2178	2179	2180	2181	2182	#Days>70	
Weld County Tow	/ 81	61	57.2	65.2	60.6	69.4	66.9	70.9	1	
Rocky Mtn. NP	81	63.1	64.3	67.4	62	71.4	76	79.1	3	
Fort Collins	71	63.2	62.6	69.5	59	65.4	70.7	73.5	2	
USAF Academy	73	56.6	63.5	56.6	66.6	61	69.4	70.6	1	
Welch	70	58.9	66.5	69.8	71.7	65.7	73	87.2	3	
Rocky Flats Nor	87	62.8	62.7	70.9	62.1	70.5	73.8	84.5	4	
NREL	85	60.4	64.6	70.9	64.9	63.1	73.8	87.2	3	
Arvada	76	59.8	60	70.8	63.1	69.1	71.8	85.1	3	
Welby	66	56.6	55.2	62.6	66.5	70	66.2	72.7	2	
S. Boulder Cree	77	63	62.8	70.9	63	70.9	74.1	84.5	4	
Carriage	76	58.4	62.3	68.8	67.9	66.6	71.9	83.8	2	
Highland	81	57.4	66.3	62.7	73	69.7	71.9	81.6	3	
Chatfield Res.	85	57.9	66.5	63.4	73	69.7	71.9	85.9	3	
		2007	Three Cont	trol Strate	gy Futur	e Year: 07	run11a.a0	cntl4		
Site	DV	2176	2177	2178	2179	2180	2181	2182	RRF DV	Scaled
Weld County Tow	/ 81	60	56.5	64.5	59.6	67.6	66	69.5	0.98	79.4
Rocky Mtn. NP	81	62.9	63	66.1	61.2	69.8	74.7	77.1	0.9783	79.2
Fort Collins	71	62.4	61.6	68.3	58.4	64	70.8	71.8	0.9897	70.3
USAF Academy	73	56.4	62.7	56.1	64.8	59.7	68.1	68.7	0.9736	71.1
Welch	70	58.9	67	69.3	70.3	64.9	72.4	85.6	0.9842	68.9
Rocky Flats Nor	87	63.2	61.9	70.7	61.4	69.3	73.9	83.2	0.9913	86.2
NREL	85	60.4	65.6	70.7	65.5	62.4	73.9	85.6	0.9925	84.4
Arvada	76	60.1	61	70.7	62.4	67.8	71.4	84.4	0.9948	75.6
Welby	66	56	54.8	64.4	65.3	68.8	68.2	73.9	0.9998	66
S. Boulder Cree	77	63.4	62.1	70.7	62.2	69.8	73.9	83.2	0.9905	76.3
Carriage	76	59.1	64.2	69.5	68.4	65.7	70.9	82.5	0.9862	75
Highland	81	57.1	66.8	63.3	71.1	67.4	70.9	81.1	0.985	79.8
Chatfield Res.	85	58	66.8	61.7	71.1	67.4	70.9	84.4	0.9811	83.4

Base Case: run11	а									
Site	DV	2176	2177	2178	2179	2180	2181	2182	#Days>70	
Weld County Tow	81	61	57.2	65.2	60.6	69.4	66.9	70.9	1	
Rocky Mtn. NP	81	63.1	64.3	67.4	62	71.4	76	79.1	3	
Fort Collins	71	63.2	62.6	69.5	59	65.4	70.7	73.5	2	
USAF Academy	73	56.6	63.5	56.6	66.6	61	69.4	70.6	1	
Welch	70	58.9	66.5	69.8	71.7	65.7	73	87.2	3	
Rocky Flats Nor	87	62.8	62.7	70.9	62.1	70.5	73.8	84.5	4	
NREL	85	60.4	64.6	70.9	64.9	63.1	73.8	87.2	3	
Arvada	76	59.8	60	70.8	63.1	69.1	71.8	85.1	3	
Welby	66	56.6	55.2	62.6	66.5	70	66.2	72.7	2	
S. Boulder Cree	77	63	62.8	70.9	63	70.9	74.1	84.5	4	
Carriage	76	58.4	62.3	68.8	67.9	66.6	71.9	83.8	2	
Highland	81	57.4	66.3	62.7	73	69.7	71.9	81.6	3	
Chatfield Res.	85	57.9	66.5	63.4	73	69.7	71.9	85.9	3	
	2	2007 10%	VOC Cont	rol in DMA	+Weld F	uture Yea	r: 07run11	a.a0-cntl8	3	
Site	DV	2176	2177	2178	2179	2180	2181	2182	RRF DV	Scaled
Weld County Tow	81	60.4	56.8	64.4	60	68.7	66.2	69.7	0.9824	79.6
Rocky Mtn. NP	81	62.3	63.5	66.1	61.3	70.3	74.8	77.4	0.9819	79.5
Fort Collins	71	62.5	62	68.3	58.5	64.7	71.4	71.9	0.9943	70.6
USAF Academy	73	56.4	62.8	56.1	64.9	59.8	68.2	69	0.9776	71.4
Welch	70	58.6	66.6	69.2	70.2	64.9	72.2	85.4	0.9821	68.7
Rocky Flats Nor	87	62.3	61.9	70.5	61.5	69.5	73.7	83	0.99	86.1
NREL	85	60.1	65	70.5	65.3	62.4	73.7	85.4	0.99	84.1
Arvada	76	59.8	60.4	70.5	62.2	68.1	71.3	84.2	0.9922	75.4
Welby	66	56	54.6	64.2	65.3	69.2	67.9	73.4	0.9995	66
S. Boulder Cree	77	62.5	62.1	70.5	62.4	70.2	73.7	83	0.9901	76.2
Carriage	76	58.7	63.6	69.3	68.3	65.9	70.9	82.3	0.9845	74.8
Highland	81	57	66.3	63.3	71	67.6	70.9	80.9	0.9839	79.7
Chatfield Res.	85	57.8	66.4	61.7	71	67.6	70.9	84.2	0.9795	83.3

Base Case: run1	1a									
Site	DV	2176	2177	2178	2179	2180	2181	2182	#Days>70	
Weld County Tow	/ 81	61	57.2	65.2	60.6	69.4	66.9	70.9	1	
Rocky Mtn. NP	81	63.1	64.3	67.4	62	71.4	76	79.1	3	
Fort Collins	71	63.2	62.6	69.5	59	65.4	70.7	73.5	2	
USAF Academy	73	56.6	63.5	56.6	66.6	61	69.4	70.6	1	
Welch	70	58.9	66.5	69.8	71.7	65.7	73	87.2	3	
Rocky Flats Nor	87	62.8	62.7	70.9	62.1	70.5	73.8	84.5	4	
NREL	85	60.4	64.6	70.9	64.9	63.1	73.8	87.2	3	
Arvada	76	59.8	60	70.8	63.1	69.1	71.8	85.1	3	
Welby	66	56.6	55.2	62.6	66.5	70	66.2	72.7	2	
S. Boulder Cree	77	63	62.8	70.9	63	70.9	74.1	84.5	4	
Carriage	76	58.4	62.3	68.8	67.9	66.6	71.9	83.8	2	
Highland	81	57.4	66.3	62.7	73	69.7	71.9	81.6	3	
Chatfield Res.	85	57.9	66.5	63.4	73	69.7	71.9	85.9	3	
	2	2007 10%	NOx Cont	rol in DMA	+Weld F	uture Yea	r: 07run11	a.a0-cntl9)	
Site	DV	2176	2177	2178	2179	2180	2181	2182	RRF DV	Scaled
Weld County Tow	/ 81	60.3	56.8	65.5	59.7	68.2	66.1	69.8	0.9838	79.7
Rocky Mtn. NP	81	63.5	63.3	66	61.2	69.9	74.9	76.5	0.977	79.1
Fort Collins	71	62.7	62	68.9	58.4	64.4	70.9	71.9	0.9902	70.3
USAF Academy	73	56.4	62.7	56	64.3	59.5	68	68.3	0.9681	70.7
Welch	70	59.4	67.8	69.6	70.1	64.9	73	86	0.9879	69.2
Rocky Flats Nor	87	64.4	62.4	71.2	61.8	69.7	74.7	84	0.9996	87
NREL	85	61.1	66.7	71.2	66.1	63.6	74.7	86	0.9997	85
Arvada	76	60.9	62.6	71.2	63.5	69	72.1	84.8	1.0016	76.1
Welby	66	56.7	56.8	65.7	65.7	69.7	69.5	75.8	1.0194	67.3
S. Boulder Cree	77	64.4	63.1	71.2	62.3	70.2	74.7	84	0.999	76.9
Carriage	76	60	65.6	70.2	68.8	66.8	71.2	82.8	0.9901	75.2
_	70	• •								
Highland	81	57.5	67.8	63.5	70.5	66.7	71.2	81.5	0.9858	79.8

Base Case: run1	1a									
Site	DV	2176	2177	2178	2179	2180	2181	2182	#Days>70	
Weld County Tow	/ 81	61	57.2	65.2	60.6	69.4	66.9	70.9	1	
Rocky Mtn. NP	81	63.1	64.3	67.4	62	71.4	76	79.1	3	
Fort Collins	71	63.2	62.6	69.5	59	65.4	70.7	73.5	2	
USAF Academy	73	56.6	63.5	56.6	66.6	61	69.4	70.6	1	
Welch	70	58.9	66.5	69.8	71.7	65.7	73	87.2	3	
Rocky Flats Nor	87	62.8	62.7	70.9	62.1	70.5	73.8	84.5	4	
NREL	85	60.4	64.6	70.9	64.9	63.1	73.8	87.2	3	
Arvada	76	59.8	60	70.8	63.1	69.1	71.8	85.1	3	
Welby	66	56.6	55.2	62.6	66.5	70	66.2	72.7	2	
S. Boulder Cree	77	63	62.8	70.9	63	70.9	74.1	84.5	4	
Carriage	76	58.4	62.3	68.8	67.9	66.6	71.9	83.8	2	
Highland	81	57.4	66.3	62.7	73	69.7	71.9	81.6	3	
Chatfield Res.	85	57.9	66.5	63.4	73	69.7	71.9	85.9	3	
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	2007		C+NOx Co	ntroi in Di	/IA+Weid -	- Future Y	ear: 07run	TTa.au-cr	เนาบ	
Site	DV	2176	2177	2178	2179	2180	2181	2182	RRF DV	Scaled
Site Weld County Tow	DV				2179 59.6					Scaled 79.3
	DV	2176 60.1 63	2177 56.6 63.1	2178 64.9 65.7	2179 59.6 61	2180 67.9 69.7	2181 66 74.5	2182 69.5 76.4	RRF DV 0.9794 0.9736	79.3 78.9
Weld County Tow	DV / 81	2176 60.1	2177 56.6	2178 64.9 65.7 68.4	2179 59.6	2180 67.9	2181 66	2182 69.5	RRF DV 0.9794	79.3
Weld County Tow Rocky Mtn. NP	DV / 81 81 71 73	2176 60.1 63 62.5 56.4	2177 56.6 63.1 61.8 62.7	2178 64.9 65.7 68.4 56	2179 59.6 61 58.3 64.3	2180 67.9 69.7 64.2 59.5	2181 66 74.5 70.8 67.9	2182 69.5 76.4 71.8 68.3	RRF DV 0.9794 0.9736 0.9892 0.9678	79.3 78.9 70.2 70.6
Weld County Tow Rocky Mtn. NP Fort Collins USAF Academy Welch	DV / 81 81 71 73 70	2176 60.1 63 62.5 56.4 59	2177 56.6 63.1 61.8 62.7 67.1	2178 64.9 65.7 68.4 56 69.2	2179 59.6 61 58.3 64.3 69.7	2180 67.9 69.7 64.2 59.5 64.7	2181 66 74.5 70.8 67.9 72.6	2182 69.5 76.4 71.8 68.3 85.3	RRF DV 0.9794 0.9736 0.9892 0.9678 0.9812	79.3 78.9 70.2 70.6 68.7
Weld County Tow Rocky Mtn. NP Fort Collins USAF Academy	DV / 81 81 71 73	2176 60.1 63 62.5 56.4 59 63.7	2177 56.6 63.1 61.8 62.7 67.1 61.9	2178 64.9 65.7 68.4 56	2179 59.6 61 58.3 64.3	2180 67.9 69.7 64.2 59.5 64.7 69.2	2181 66 74.5 70.8 67.9	2182 69.5 76.4 71.8 68.3 85.3 83.3	RRF DV 0.9794 0.9736 0.9892 0.9678	79.3 78.9 70.2 70.6
Weld County Tow Rocky Mtn. NP Fort Collins USAF Academy Welch	DV 7 81 81 71 73 70 87 85	2176 60.1 63 62.5 56.4 59 63.7 60.7	2177 56.6 63.1 61.8 62.7 67.1 61.9 65.9	2178 64.9 65.7 68.4 56 69.2 70.6	2179 59.6 61 58.3 64.3 69.7 61.5 65.6	2180 67.9 69.7 64.2 59.5 64.7 69.2 63.2	2181 66 74.5 70.8 67.9 72.6 74.2 74.2	2182 69.5 76.4 71.8 68.3 85.3 83.3 85.3	RRF DV 0.9794 0.9736 0.9892 0.9678 0.9812 0.9921 0.9921	79.3 78.9 70.2 70.6 68.7 86.3 84.3
Weld County Tow Rocky Mtn. NP Fort Collins USAF Academy Welch Rocky Flats Nor	DV , 81 , 81 , 71 , 73 , 70 , 87 , 85 , 76	2176 60.1 63 62.5 56.4 59 63.7 60.7	2177 56.6 63.1 61.8 62.7 67.1 61.9 65.9 61.8	2178 64.9 65.7 68.4 56 69.2 70.6 70.6	2179 59.6 61 58.3 64.3 69.7 61.5 65.6	2180 67.9 69.7 64.2 59.5 64.7 69.2 63.2 68.5	2181 66 74.5 70.8 67.9 72.6 74.2 74.2 71.7	2182 69.5 76.4 71.8 68.3 85.3 83.3	RRF DV 0.9794 0.9736 0.9892 0.9678 0.9812 0.9921 0.9921 0.9946	79.3 78.9 70.2 70.6 68.7 86.3 84.3 75.6
Weld County Tow Rocky Mtn. NP Fort Collins USAF Academy Welch Rocky Flats Nor NREL Arvada Welby	DV 7 81 81 71 73 70 87 85	2176 60.1 63 62.5 56.4 59 63.7 60.7 60.4 56.4	2177 56.6 63.1 61.8 62.7 67.1 61.9 65.9 61.8	2178 64.9 65.7 68.4 56 69.2 70.6 70.6 70.6 65.1	2179 59.6 61 58.3 64.3 69.7 61.5 65.6 63 65.2	2180 67.9 69.7 64.2 59.5 64.7 69.2 63.2 68.5 69.3	2181 66 74.5 70.8 67.9 72.6 74.2 74.2 71.7 69	2182 69.5 76.4 71.8 68.3 85.3 85.3 85.3 84.2 74.9	RRF DV 0.9794 0.9736 0.9892 0.9678 0.9812 0.9921 0.9921 0.9946 1.0104	79.3 78.9 70.2 70.6 68.7 86.3 84.3 75.6 66.7
Weld County Tow Rocky Mtn. NP Fort Collins USAF Academy Welch Rocky Flats Nor NREL Arvada Welby S. Boulder Cree	DV / 81 81 71 73 70 87 85 76 66 77	2176 60.1 63 62.5 56.4 59 63.7 60.7 60.4 56.4 63.7	2177 56.6 63.1 61.8 62.7 67.1 61.9 65.9 61.8 56 62.5	2178 64.9 65.7 68.4 56 69.2 70.6 70.6 70.6 65.1 70.6	2179 59.6 61 58.3 64.3 69.7 61.5 65.6 63 65.2 62.1	2180 67.9 69.7 64.2 59.5 64.7 69.2 63.2 68.5 69.3 69.9	2181 66 74.5 70.8 67.9 72.6 74.2 74.2 71.7 69 74.2	2182 69.5 76.4 71.8 68.3 85.3 85.3 85.3 84.2 74.9 83.3	RRF DV 0.9794 0.9736 0.9892 0.9678 0.9812 0.9921 0.9921 0.9946 1.0104 0.9919	79.3 78.9 70.2 70.6 68.7 86.3 84.3 75.6 66.7 76.4
Weld County Tow Rocky Mtn. NP Fort Collins USAF Academy Welch Rocky Flats Nor NREL Arvada Welby S. Boulder Cree Carriage	DV / 81 81 71 73 70 87 85 76 66 77 76	2176 60.1 63 62.5 56.4 59 63.7 60.7 60.4 56.4 63.7 59.5	2177 56.6 63.1 61.8 62.7 67.1 61.9 65.9 61.8 56 62.5 64.8	2178 64.9 65.7 68.4 56 69.2 70.6 70.6 70.6 65.1 70.6 69.7	2179 59.6 61 58.3 64.3 69.7 61.5 65.6 63 65.2 62.1 68.3	2180 67.9 69.7 64.2 59.5 64.7 69.2 63.2 68.5 69.3 69.9 66.3	2181 66 74.5 70.8 67.9 72.6 74.2 71.7 69 74.2 70.9	2182 69.5 76.4 71.8 68.3 85.3 85.3 85.3 84.2 74.9 83.3 82.3	RRF DV 0.9794 0.9736 0.9892 0.9678 0.9812 0.9921 0.9921 0.9946 1.0104 0.9919 0.9843	79.3 78.9 70.2 70.6 68.7 86.3 84.3 75.6 66.7 76.4 74.8
Weld County Tow Rocky Mtn. NP Fort Collins USAF Academy Welch Rocky Flats Nor NREL Arvada Welby S. Boulder Cree	DV / 81 81 71 73 70 87 85 76 66 77	2176 60.1 63 62.5 56.4 59 63.7 60.7 60.4 56.4 63.7	2177 56.6 63.1 61.8 62.7 67.1 61.9 65.9 61.8 56 62.5	2178 64.9 65.7 68.4 56 69.2 70.6 70.6 70.6 65.1 70.6	2179 59.6 61 58.3 64.3 69.7 61.5 65.6 63 65.2 62.1	2180 67.9 69.7 64.2 59.5 64.7 69.2 63.2 68.5 69.3 69.9	2181 66 74.5 70.8 67.9 72.6 74.2 74.2 71.7 69 74.2	2182 69.5 76.4 71.8 68.3 85.3 85.3 85.3 84.2 74.9 83.3	RRF DV 0.9794 0.9736 0.9892 0.9678 0.9812 0.9921 0.9921 0.9946 1.0104 0.9919	79.3 78.9 70.2 70.6 68.7 86.3 84.3 75.6 66.7 76.4

Base Case: run11a										
Site	DV	2176	2177	2178	2179	2180	2181	2182	#Days>70	
Weld County Tow	81	61	57.2	65.2	60.6	69.4	66.9	70.9	1	
Rocky Mtn. NP	81	63.1	64.3	67.4	62	71.4	76	79.1	3	
Fort Collins	71	63.2	62.6	69.5	59	65.4	70.7	73.5	2	
USAF Academy	73	56.6	63.5	56.6	66.6	61	69.4	70.6	1	
Welch	70	58.9	66.5	69.8	71.7	65.7	73	87.2	3	
Rocky Flats Nor	87	62.8	62.7	70.9	62.1	70.5	73.8	84.5	4	
NREL	85	60.4	64.6	70.9	64.9	63.1	73.8	87.2	3	
Arvada	76	59.8	60	70.8	63.1	69.1	71.8	85.1	3	
Welby	66	56.6	55.2	62.6	66.5	70	66.2	72.7	2	
S. Boulder Cree	77	63	62.8	70.9	63	70.9	74.1	84.5	4	
Carriage	76	58.4	62.3	68.8	67.9	66.6	71.9	83.8	2	
Highland	81	57.4	66.3	62.7	73	69.7	71.9	81.6	3	
Chatfield Res.	85	57.9	66.5	63.4	73	69.7	71.9	85.9	3	
2007	Three Co	ontrols plus	10% VOC	Control in	DMA+Wel	d Future	Year: 07r	un11a.a0	-cntl11	
Site	DV	2176	2177	2178	2179	2180	2181	2182	RRF DV	Scaled
Weld County Tow	81	59.9	56.3	63.9	59.5	67.8	65.9	69.3	0.977	79.1
Rocky Mtn. NP	81	62.5	62.8	65.9	61	70	74.4	77	0.9773	79.2
Fort Collins	71	62.2	61.4	67.9	58.2	64.1	70.8	71.8	0.9889	70.2
USAF Academy	73	56.4	62.7	56.1	64.8	59.8	68	68.7	0.9733	71
Welch	70	58.6	66.5	69	70	64.8	72	85.1	0.9792	68.5
Rocky Flats Nor	87	62.6	61.6	70.3	61.2	69.3	73.5	82.7	0.987	85.9
NREL	85	60.1	64.9	70.3	65.1	62.3	73.5	85.1	0.987	83.9
Arvada	76	59.7	60.4	70.3	62.1	67.8	71.1	83.9	0.9892	75.2
Welby	66	55.8	54.6	64	65	68.8	67.7	73.2	0.995	65.7
S. Boulder Cree	77	62.9	61.7	70.3	62.1	69.9	73.5	82.7	0.9864	76
Carriage	76	58.7	63.6	69.1	68.1	65.6	70.7	82.1	0.9815	74.6
Highland	81	57	66.2	63.2	70.9	67.5	70.7	80.7	0.981	79.5

Base Case: run11a	ì									
Site	DV	2176	2177	2178	2179	2180	2181	2182	#Days>70	
Weld County Tow	81	61	57.2	65.2	60.6	69.4	66.9	70.9	1	
Rocky Mtn. NP	81	63.1	64.3	67.4	62	71.4	76	79.1	3	
Fort Collins	71	63.2	62.6	69.5	59	65.4	70.7	73.5	2	
<b>USAF</b> Academy	73	56.6	63.5	56.6	66.6	61	69.4	70.6	1	
Welch	70	58.9	66.5	69.8	71.7	65.7	73	87.2	3	
Rocky Flats Nor	87	62.8	62.7	70.9	62.1	70.5	73.8	84.5	4	
NREL	85	60.4	64.6	70.9	64.9	63.1	73.8	87.2	3	
Arvada	76	59.8	60	70.8	63.1	69.1	71.8	85.1	3	
Welby	66	56.6	55.2	62.6	66.5	70	66.2	72.7	2	
S. Boulder Cree	77	63	62.8	70.9	63	70.9	74.1	84.5	4	
Carriage	76	58.4	62.3	68.8	67.9	66.6	71.9	83.8	2	
Highland	81	57.4	66.3	62.7	73	69.7	71.9	81.6	3	
Chatfield Res.	85	57.9	66.5	63.4	73	69.7	71.9	85.9	3	
		_								
200	7 Thr	ee Contr	ols plus 10	% NOx Co	ntrol in Di	MA+Weld -	- Future Y	ear: 07ru	n11a.a0-cntl	12
Site	<b>07 Thr</b> DV	<b>ee Contr</b> 2176	ols plus 10 2177	% <b>NOx Co</b> 2178	ntrol in DI 2179	<b>MA+Weld</b> - 2180	- Future Y 2181	ear: <b>07ru</b> 2182	n11a.a0-cntl RRF DV	12 Scaled
			-							
Site	DV	2176	2177	2178	2179	2180	2181	2182	RRF DV	Scaled
Site Weld County Tow	DV 81	2176 59.7	2177 56.3	2178 65	2179 59.2	2180 67.3	2181 66	2182 69.4	RRF DV 0.9784	Scaled 79.2
Site Weld County Tow Rocky Mtn. NP	DV 81 81	2176 59.7 63.5	2177 56.3 62.6	2178 65 65.8	2179 59.2 60.9	2180 67.3 69.6	2181 66 74.6	2182 69.4 76.1	RRF DV 0.9784 0.9723	Scaled 79.2 78.8
Site Weld County Tow Rocky Mtn. NP Fort Collins	DV 81 81 71	2176 59.7 63.5 62.4	2177 56.3 62.6 61.5	2178 65 65.8 68.4	2179 59.2 60.9 58.2	2180 67.3 69.6 63.9	2181 66 74.6 70.3	2182 69.4 76.1 71.7	RRF DV 0.9784 0.9723 0.985	Scaled 79.2 78.8 69.9
Site Weld County Tow Rocky Mtn. NP Fort Collins USAF Academy	DV 81 81 71 73	2176 59.7 63.5 62.4 56.3	2177 56.3 62.6 61.5 62.7	2178 65 65.8 68.4 56	2179 59.2 60.9 58.2 64.2	2180 67.3 69.6 63.9 59.4	2181 66 74.6 70.3 67.8	2182 69.4 76.1 71.7 68.2	RRF DV 0.9784 0.9723 0.985 0.9659	79.2 78.8 69.9 70.5
Site Weld County Tow Rocky Mtn. NP Fort Collins USAF Academy Welch	DV 81 81 71 73 70	2176 59.7 63.5 62.4 56.3 59.4	2177 56.3 62.6 61.5 62.7 67.6	2178 65 65.8 68.4 56 69.4	2179 59.2 60.9 58.2 64.2 69.9	2180 67.3 69.6 63.9 59.4 64.8	2181 66 74.6 70.3 67.8 72.8	2182 69.4 76.1 71.7 68.2 85.7	RRF DV 0.9784 0.9723 0.985 0.9659 0.9845	Scaled 79.2 78.8 69.9 70.5 68.9
Site Weld County Tow Rocky Mtn. NP Fort Collins USAF Academy Welch Rocky Flats Nor	DV 81 81 71 73 70 87	2176 59.7 63.5 62.4 56.3 59.4 64.7	2177 56.3 62.6 61.5 62.7 67.6 62.1	2178 65 65.8 68.4 56 69.4 70.9	2179 59.2 60.9 58.2 64.2 69.9 61.4	2180 67.3 69.6 63.9 59.4 64.8 69.4	2181 66 74.6 70.3 67.8 72.8 74.4	2182 69.4 76.1 71.7 68.2 85.7 83.6	RRF DV 0.9784 0.9723 0.985 0.9659 0.9845 0.9957	Scaled 79.2 78.8 69.9 70.5 68.9 86.6
Site Weld County Tow Rocky Mtn. NP Fort Collins USAF Academy Welch Rocky Flats Nor NREL	DV 81 81 71 73 70 87 85	2176 59.7 63.5 62.4 56.3 59.4 64.7 61.1	2177 56.3 62.6 61.5 62.7 67.6 62.1 66.6	2178 65 65.8 68.4 56 69.4 70.9 70.9	2179 59.2 60.9 58.2 64.2 69.9 61.4 65.9	2180 67.3 69.6 63.9 59.4 64.8 69.4 63.5	2181 66 74.6 70.3 67.8 72.8 74.4 74.4	2182 69.4 76.1 71.7 68.2 85.7 83.6 85.7	RRF DV 0.9784 0.9723 0.985 0.9659 0.9845 0.9957 0.9962	Scaled 79.2 78.8 69.9 70.5 68.9 86.6 84.7
Site Weld County Tow Rocky Mtn. NP Fort Collins USAF Academy Welch Rocky Flats Nor NREL Arvada	DV 81 81 71 73 70 87 85 76	2176 59.7 63.5 62.4 56.3 59.4 64.7 61.1 60.8	2177 56.3 62.6 61.5 62.7 67.6 62.1 66.6 62.5	2178 65 65.8 68.4 56 69.4 70.9 70.9	2179 59.2 60.9 58.2 64.2 69.9 61.4 65.9 63.2	2180 67.3 69.6 63.9 59.4 64.8 69.4 63.5 68.6	2181 66 74.6 70.3 67.8 72.8 74.4 74.4 71.9	2182 69.4 76.1 71.7 68.2 85.7 83.6 85.7 84.5	RRF DV 0.9784 0.9723 0.985 0.9659 0.9845 0.9957 0.9962 0.9983	Scaled 79.2 78.8 69.9 70.5 68.9 86.6 84.7 75.9
Site Weld County Tow Rocky Mtn. NP Fort Collins USAF Academy Welch Rocky Flats Nor NREL Arvada Welby	DV 81 81 71 73 70 87 85 76 66	2176 59.7 63.5 62.4 56.3 59.4 64.7 61.1 60.8 56.7	2177 56.3 62.6 61.5 62.7 67.6 62.1 66.6 62.5 56.7	2178 65 65.8 68.4 56 69.4 70.9 70.9 70.9 65.5	2179 59.2 60.9 58.2 64.2 69.9 61.4 65.9 63.2 65.4	2180 67.3 69.6 63.9 59.4 64.8 69.4 63.5 68.6 69.2	2181 66 74.6 70.3 67.8 72.8 74.4 74.4 71.9 69.2	2182 69.4 76.1 71.7 68.2 85.7 83.6 85.7 84.5 75.5	RRF DV 0.9784 0.9723 0.985 0.9659 0.9845 0.9957 0.9962 0.9983 1.0138	Scaled 79.2 78.8 69.9 70.5 68.9 86.6 84.7 75.9 66.9
Site Weld County Tow Rocky Mtn. NP Fort Collins USAF Academy Welch Rocky Flats Nor NREL Arvada Welby S. Boulder Cree	DV 81 81 71 73 70 87 85 76 66 77	2176 59.7 63.5 62.4 56.3 59.4 64.7 61.1 60.8 56.7 64.7	2177 56.3 62.6 61.5 62.7 67.6 62.1 66.6 62.5 56.7 62.8	2178 65 65.8 68.4 56 69.4 70.9 70.9 70.9 65.5 70.9	2179 59.2 60.9 58.2 64.2 69.9 61.4 65.9 63.2 65.4 62	2180 67.3 69.6 63.9 59.4 64.8 69.4 63.5 68.6 69.2 69.9	2181 66 74.6 70.3 67.8 72.8 74.4 74.4 71.9 69.2 74.4	2182 69.4 76.1 71.7 68.2 85.7 83.6 85.7 84.5 75.5 83.6	RRF DV 0.9784 0.9723 0.985 0.9659 0.9845 0.9957 0.9962 0.9983 1.0138 0.9949	Scaled 79.2 78.8 69.9 70.5 68.9 86.6 84.7 75.9 66.9 76.6

Base Case: run11a										
Site	DV	2176	2177	2178	2179	2180	2181	2182	#Days>70	
Weld County Tow	81	61	57.2	65.2	60.6	69.4	66.9	70.9	1	
Rocky Mtn. NP	81	63.1	64.3	67.4	62	71.4	76	79.1	3	
Fort Collins	71	63.2	62.6	69.5	59	65.4	70.7	73.5	2	
<b>USAF</b> Academy	73	56.6	63.5	56.6	66.6	61	69.4	70.6	1	
Welch	70	58.9	66.5	69.8	71.7	65.7	73	87.2	3	
Rocky Flats Nor	87	62.8	62.7	70.9	62.1	70.5	73.8	84.5	4	
NREL	85	60.4	64.6	70.9	64.9	63.1	73.8	87.2	3	
Arvada	76	59.8	60	70.8	63.1	69.1	71.8	85.1	3	
Welby	66	56.6	55.2	62.6	66.5	70	66.2	72.7	2	
S. Boulder Cree	77	63	62.8	70.9	63	70.9	74.1	84.5	4	
Carriage	76	58.4	62.3	68.8	67.9	66.6	71.9	83.8	2	
Highland	81	57.4	66.3	62.7	73	69.7	71.9	81.6	3	
Chatfield Res.	85	57.9	66.5	63.4	73	69.7	71.9	85.9	3	
20	007 Th	ree Cont	trol plus 10	% VOC+N	Ox in DM	A+Weld	Future Yea	ar: 07run1	1a.a0-cntl13	1
Site	DV	2176	2177	2178	2179	2180	2181	2182	RRF DV	Scaled
Weld County Tow	81	59.5	56.2	64.4	59.1	67.1	65.9	69.1	0.9744	78.9
Rocky Mtn. NP	81	63.1	62.4	65.5	60.8	69.3	74.2	76	0.9692	78.5
Fort Collins	71	62.2	61.2	67.9	58	63.7	70.2	71.6	0.9841	69.9
<b>USAF</b> Academy	73	56.3	62.7	56	64.2	59.4	67.7	68.1	0.9656	70.5
Welch	70	59	66.9	69	69.5	64.6	72.3	85	0.9781	68.5
Rocky Flats Nor	87	63.9	61.6	70.4	61.1	69.1	73.9	82.9	0.9888	86
NREL	85	60.7	65.8	70.4	65.4	63.1	73.9	85	0.9889	84.1
Arvada	76	60.4	61.7	70.4	62.7	68.1	71.5	83.9	0.9915	75.4
Welby	66	56.4	55.9	64.9	65	68.8	68.7	74.6	1.0052	66.3
S. Boulder Cree	77	64	62.3	70.4	61.8	69.5	73.9	82.9	0.9881	76.1
Carriage	76	59.5	64.7	69.5	68.1	66	70.7	82	0.9811	74.6
Highland										
	81	57.2	66.8	63.2	70.1	66.5	70.7	80.6	0.9774	79.2

Base Case: run11a										
Site	DV	2176	2177	2178	2179	2180	2181	2182	#Days>70	
Weld County Tow	81	61	57.2	65.2	60.6	69.4	66.9	70.9	1	
Rocky Mtn. NP	81	63.1	64.3	67.4	62	71.4	76	79.1	3	
Fort Collins	71	63.2	62.6	69.5	59	65.4	70.7	73.5	2	
USAF Academy	73	56.6	63.5	56.6	66.6	61	69.4	70.6	1	
Welch	70	58.9	66.5	69.8	71.7	65.7	73	87.2	3	
Rocky Flats Nor	87	62.8	62.7	70.9	62.1	70.5	73.8	84.5	4	
NREL	85	60.4	64.6	70.9	64.9	63.1	73.8	87.2	3	
Arvada	76	59.8	60	70.8	63.1	69.1	71.8	85.1	3	
Welby	66	56.6	55.2	62.6	66.5	70	66.2	72.7	2	
S. Boulder Cree	77	63	62.8	70.9	63	70.9	74.1	84.5	4	
Carriage	76	58.4	62.3	68.8	67.9	66.6	71.9	83.8	2	
Highland	81	57.4	66.3	62.7	73	69.7	71.9	81.6	3	
Chatfield Res.	85	57.9	66.5	63.4	73	69.7	71.9	85.9	3	
	2	2007 10% O	n-Road VO	C Control	in DMA Cor	e Future Ye	ear: 07run1	1a.a0-cntl	14	
Site	DV	2176	2177	2178	2179	2180	2181	2182	RRF DV	Scaled
Weld County Tow	81	60.6	57	64.9	60.1	68.9	66.3	69.9	0.9857	79.8
Rocky Mtn. NP	81	62.6	63.8	66.3	61.4	70.4	75	77.5	0.9839	79.7
Fort Collins	71	62.7	62.2	68.7	58.6	64.8	71.4	72	0.9952	70.7
USAF Academy	73	56.4	62.8	56.1	64.9	59.8	68.3	69	0.9779	71.4
Welch	70	58.8	67	69.3	70.4	65	72.5	85.7	0.9855	69
Rocky Flats Nor	87	62.8	62.2	70.7	61.7	69.7	74	83.4	0.9938	86.5
NREL	85	60.3	65.5	70.7	65.5	62.6	74	85.7	0.9936	84.5
Arvada	76	60	60.9	70.7	62.5	68.4	71.6	84.5	0.9959	75.7
Welby										
•	66	56	54.7	64.4	65.5	69.5	68.3	73.9	1.0047	66.3
S. Boulder Cree	66 77	56 62.9	54.7 62.3	64.4 70.7	62.5	70.4	74	83.4	0.9939	76.5
S. Boulder Cree Carriage	66 77 76	56 62.9 58.9	54.7 62.3 64.1	64.4 70.7 69.5	62.5 68.5	70.4 66.2	74 71.1	83.4 82.6	0.9939 0.9877	76.5 75.1
S. Boulder Cree	66 77	56 62.9	54.7 62.3	64.4 70.7	62.5	70.4	74	83.4	0.9939	76.5

Base Case: run11a										
Site	DV	2176	2177	2178	2179	2180	2181	2182	#Days>70	
Weld County Tow	81	61	57.2	65.2	60.6	69.4	66.9	70.9	1	
Rocky Mtn. NP	81	63.1	64.3	67.4	62	71.4	76	79.1	3	
Fort Collins	71	63.2	62.6	69.5	59	65.4	70.7	73.5	2	
USAF Academy	73	56.6	63.5	56.6	66.6	61	69.4	70.6	1	
Welch	70	58.9	66.5	69.8	71.7	65.7	73	87.2	3	
Rocky Flats Nor	87	62.8	62.7	70.9	62.1	70.5	73.8	84.5	4	
NREL	85	60.4	64.6	70.9	64.9	63.1	73.8	87.2	3	
Arvada	76	59.8	60	70.8	63.1	69.1	71.8	85.1	3	
Welby	66	56.6	55.2	62.6	66.5	70	66.2	72.7	2	
S. Boulder Cree	77	63	62.8	70.9	63	70.9	74.1	84.5	4	
Carriage	76	58.4	62.3	68.8	67.9	66.6	71.9	83.8	2	
Highland	81	57.4	66.3	62.7	73	69.7	71.9	81.6	3	
Chatfield Res.	85	57.9	66.5	63.4	73	69.7	71.9	85.9	3	
	2007	20% On-R	oad VOC in	<b>DMA Core</b> -	- Future Ye	ar: 07run11a	a.a0-cntl15			
Site	DV	2176	2177	2178	2179	2180	2181	2182	RRF DV	Scaled
Weld County Tow	81	60.6	57	64.8	60.1	68.9	66.3	69.9	0.9857	79.8
Weld County Tow Rocky Mtn. NP	81 81	60.6 62.6	57 63.7	64.8 66.2	60.1 61.4	68.9 70.4	66.3 74.9	69.9 77.5	0.9857 0.9833	79.8 79.6
Rocky Mtn. NP	81	62.6	63.7	66.2	61.4	70.4	74.9	77.5	0.9833	79.6
Rocky Mtn. NP Fort Collins	81 71	62.6 62.7	63.7 62.2	66.2 68.7	61.4 58.6	70.4 64.8	74.9 71.4	77.5 72	0.9833 0.9951	79.6 70.7
Rocky Mtn. NP Fort Collins USAF Academy	81 71 73	62.6 62.7 56.4 58.7 62.6	63.7 62.2 62.8	66.2 68.7 56.1	61.4 58.6 64.9	70.4 64.8 59.8	74.9 71.4 68.3	77.5 72 69 85.5 83.2	0.9833 0.9951 0.9778	79.6 70.7 71.4
Rocky Mtn. NP Fort Collins USAF Academy Welch	81 71 73 70	62.6 62.7 56.4 58.7	63.7 62.2 62.8 66.8	66.2 68.7 56.1 69.2	61.4 58.6 64.9 70.3	70.4 64.8 59.8 65	74.9 71.4 68.3 72.4	77.5 72 69 85.5	0.9833 0.9951 0.9778 0.9838	79.6 70.7 71.4 68.9
Rocky Mtn. NP Fort Collins USAF Academy Welch Rocky Flats Nor	81 71 73 70 87	62.6 62.7 56.4 58.7 62.6 60.2 59.8	63.7 62.2 62.8 66.8 62.1	66.2 68.7 56.1 69.2 70.5 70.5	61.4 58.6 64.9 70.3 61.7 65.4 62.4	70.4 64.8 59.8 65 69.6 62.5 68.3	74.9 71.4 68.3 72.4 73.9	77.5 72 69 85.5 83.2	0.9833 0.9951 0.9778 0.9838 0.9918 0.9914 0.9938	79.6 70.7 71.4 68.9 86.3 84.3 75.5
Rocky Mtn. NP Fort Collins USAF Academy Welch Rocky Flats Nor NREL	81 71 73 70 87 85	62.6 62.7 56.4 58.7 62.6 60.2	63.7 62.2 62.8 66.8 62.1 65.3	66.2 68.7 56.1 69.2 70.5	61.4 58.6 64.9 70.3 61.7 65.4	70.4 64.8 59.8 65 69.6 62.5	74.9 71.4 68.3 72.4 73.9 73.9	77.5 72 69 85.5 83.2 85.5	0.9833 0.9951 0.9778 0.9838 0.9918 0.9914	79.6 70.7 71.4 68.9 86.3 84.3
Rocky Mtn. NP Fort Collins USAF Academy Welch Rocky Flats Nor NREL Arvada	81 71 73 70 87 85 76 66 77	62.6 62.7 56.4 58.7 62.6 60.2 59.8 56 62.7	63.7 62.2 62.8 66.8 62.1 65.3 60.7 54.7 62.3	66.2 68.7 56.1 69.2 70.5 70.5 64.2 70.5	61.4 58.6 64.9 70.3 61.7 65.4 62.4 65.4 62.5	70.4 64.8 59.8 65 69.6 62.5 68.3 69.4 70.3	74.9 71.4 68.3 72.4 73.9 73.9 71.5 68.1 73.9	77.5 72 69 85.5 83.2 85.5 84.3 73.6 83.2	0.9833 0.9951 0.9778 0.9838 0.9918 0.9914 0.9938 1.0021 0.9919	79.6 70.7 71.4 68.9 86.3 84.3 75.5 66.1 76.4
Rocky Mtn. NP Fort Collins USAF Academy Welch Rocky Flats Nor NREL Arvada Welby S. Boulder Cree Carriage	81 71 73 70 87 85 76 66 77	62.6 62.7 56.4 58.7 62.6 60.2 59.8 56 62.7 58.8	63.7 62.2 62.8 66.8 62.1 65.3 60.7 54.7 62.3 63.9	66.2 68.7 56.1 69.2 70.5 70.5 64.2 70.5 69.3	61.4 58.6 64.9 70.3 61.7 65.4 62.4 65.4 62.5 68.4	70.4 64.8 59.8 65 69.6 62.5 68.3 69.4 70.3 66.1	74.9 71.4 68.3 72.4 73.9 73.9 71.5 68.1 73.9 71	77.5 72 69 85.5 83.2 85.5 84.3 73.6 83.2 82.4	0.9833 0.9951 0.9778 0.9838 0.9918 0.9914 0.9938 1.0021 0.9919 0.986	79.6 70.7 71.4 68.9 86.3 84.3 75.5 66.1 76.4 74.9
Rocky Mtn. NP Fort Collins USAF Academy Welch Rocky Flats Nor NREL Arvada Welby S. Boulder Cree	81 71 73 70 87 85 76 66 77	62.6 62.7 56.4 58.7 62.6 60.2 59.8 56 62.7	63.7 62.2 62.8 66.8 62.1 65.3 60.7 54.7 62.3	66.2 68.7 56.1 69.2 70.5 70.5 64.2 70.5	61.4 58.6 64.9 70.3 61.7 65.4 62.4 65.4 62.5	70.4 64.8 59.8 65 69.6 62.5 68.3 69.4 70.3	74.9 71.4 68.3 72.4 73.9 73.9 71.5 68.1 73.9	77.5 72 69 85.5 83.2 85.5 84.3 73.6 83.2	0.9833 0.9951 0.9778 0.9838 0.9918 0.9914 0.9938 1.0021 0.9919	79.6 70.7 71.4 68.9 86.3 84.3 75.5 66.1 76.4

Base Case: run11a										
Site	DV	2176	2177	2178	2179	2180	2181	2182	#Days>70	
Weld County Tow	81	61	57.2	65.2	60.6	69.4	66.9	70.9	1	
Rocky Mtn. NP	81	63.1	64.3	67.4	62	71.4	76	79.1	3	
Fort Collins	71	63.2	62.6	69.5	59	65.4	70.7	73.5	2	
USAF Academy	73	56.6	63.5	56.6	66.6	61	69.4	70.6	1	
Welch	70	58.9	66.5	69.8	71.7	65.7	73	87.2	3	
Rocky Flats Nor	87	62.8	62.7	70.9	62.1	70.5	73.8	84.5	4	
NREL	85	60.4	64.6	70.9	64.9	63.1	73.8	87.2	3	
Arvada	76	59.8	60	70.8	63.1	69.1	71.8	85.1	3	
Welby	66	56.6	55.2	62.6	66.5	70	66.2	72.7	2	
S. Boulder Cree	77	63	62.8	70.9	63	70.9	74.1	84.5	4	
Carriage	76	58.4	62.3	68.8	67.9	66.6	71.9	83.8	2	
Highland	81	57.4	66.3	62.7	73	69.7	71.9	81.6	3	
Chatfield Res.	85	57.9	66.5	63.4	73	69.7	71.9	85.9	3	
	2007 10	0% Off-Ro	oad VOC i	n DMA Co	re Futur	e Year: 07ı	un11a.a0-	cntl16		
Site	DV	2176	2177	2178	2179	2180	2181	2182	RRF DV	Scaled
Weld County Tow	81	60.6	57	64.9	60.1	68.9	66.3	69.9	0.9857	79.8
Rocky Mtn. NP	81	62.6	63.8	66.3	61.4	70.4	75	77.5	0.9841	79.7
Fort Collins	71	62.7	62.2	68.7	58.6	64.8	71.4	72	0.9952	70.7
USAF Academy	73	56.4	62.8	56.1	64.9	59.8	68.3	69	0.9779	71.4
Welch	70	58.8	67.1	69.4	70.5	65.1	72.5	85.8	0.9862	69
Rocky Flats Nor	87	62.8	62.2	70.8	61.7	69.7	74.1	83.5	0.9948	86.5
NREL	85	60.4	65.5	70.8	65.6	62.7	74.1	85.8	0.9946	84.5
Arvada	76	60	61	70.8	62.6	68.5	71.6	84.6	0.997	75.8
Welby	66	56.1	54.7	64.5	65.5	69.5	68.3	74	1.0058	66.4
S. Boulder Cree	77	62.9	62.3	70.8	62.5	70.5	74.1	83.5	0.9948	76.6
	77	02.9	02.5	70.0	02.0	70.0	17.1	00.0	0.5546	7 0.0
Carriage	7 <i>7</i> 76	59	64.2	69.6	68.6	66.2	71.1	82.7	0.9884	75.1

Base Case: run11a										
Site	DV	2176	2177	2178	2179	2180	2181	2182	#Days>70	
Weld County Tow	81	61	57.2	65.2	60.6	69.4	66.9	70.9	1	
Rocky Mtn. NP	81	63.1	64.3	67.4	62	71.4	76	79.1	3	
Fort Collins	71	63.2	62.6	69.5	59	65.4	70.7	73.5	2	
USAF Academy	73	56.6	63.5	56.6	66.6	61	69.4	70.6	1	
Welch	70	58.9	66.5	69.8	71.7	65.7	73	87.2	3	
Rocky Flats Nor	87	62.8	62.7	70.9	62.1	70.5	73.8	84.5	4	
NREL	85	60.4	64.6	70.9	64.9	63.1	73.8	87.2	3	
Arvada	76	59.8	60	70.8	63.1	69.1	71.8	85.1	3	
Welby	66	56.6	55.2	62.6	66.5	70	66.2	72.7	2	
S. Boulder Cree	77	63	62.8	70.9	63	70.9	74.1	84.5	4	
Carriage	76	58.4	62.3	68.8	67.9	66.6	71.9	83.8	2	
Highland	81	57.4	66.3	62.7	73	69.7	71.9	81.6	3	
Chatfield Res.	85	57.9	66.5	63.4	73	69.7	71.9	85.9	3	
	2007 2	20% Off-Ro	oad VOC ii	n DMA Cor	e Future	Year: 07r	un11a.a0-c	ntl17		
Site	DV	2176	2177	2178	2179	2180	2181	2182	RRF DV	Scaled
Weld County Tow	81	60.6	57	64.8	60.1	68.9	66.3	69.9	0.9857	79.8
Weld County Tow										70.7
Rocky Mtn. NP	81	62.5	63.7	66.2	61.4	70.4	74.9	77.5	0.9837	79.7
		62.7	62.2	66.2 68.6	61.4 58.6	70.4 64.8	74.9 71.4	72	0.983 <i>7</i> 0.9951	79.7 70.7
Rocky Mtn. NP	81 71 73	62.7 56.4	62.2 62.8	68.6 56.1	58.6 64.9	64.8 59.8	71.4 68.2	72 69	0.9951 0.9778	70.7 71.4
Rocky Mtn. NP Fort Collins	81 71 73 70	62.7 56.4 58.8	62.2 62.8 66.9	68.6 56.1 69.4	58.6 64.9 70.4	64.8 59.8 65	71.4 68.2 72.4	72 69 85.7	0.9951 0.9778 0.9851	70.7 71.4 69
Rocky Mtn. NP Fort Collins USAF Academy Welch Rocky Flats Nor	81 71 73 70 87	62.7 56.4 58.8 62.7	62.2 62.8 66.9 62.2	68.6 56.1 69.4 70.7	58.6 64.9 70.4 61.7	64.8 59.8 65 69.7	71.4 68.2 72.4 74	72 69 85.7 83.4	0.9951 0.9778 0.9851 0.9937	70.7 71.4 69 86.5
Rocky Mtn. NP Fort Collins USAF Academy Welch	81 71 73 70 87 85	62.7 56.4 58.8 62.7 60.3	62.2 62.8 66.9 62.2 65.4	68.6 56.1 69.4 70.7 70.7	58.6 64.9 70.4 61.7 65.5	64.8 59.8 65 69.7 62.6	71.4 68.2 72.4 74 74	72 69 85.7 83.4 85.7	0.9951 0.9778 0.9851 0.9937 0.9934	70.7 71.4 69 86.5 84.4
Rocky Mtn. NP Fort Collins USAF Academy Welch Rocky Flats Nor	81 71 73 70 87 85 76	62.7 56.4 58.8 62.7 60.3 60	62.2 62.8 66.9 62.2 65.4 60.8	68.6 56.1 69.4 70.7	58.6 64.9 70.4 61.7 65.5 62.5	64.8 59.8 65 69.7 62.6 68.4	71.4 68.2 72.4 74 74 71.5	72 69 85.7 83.4 85.7 84.5	0.9951 0.9778 0.9851 0.9937 0.9934 0.9958	70.7 71.4 69 86.5 84.4 75.7
Rocky Mtn. NP Fort Collins USAF Academy Welch Rocky Flats Nor NREL Arvada Welby	81 71 73 70 87 85 76 66	62.7 56.4 58.8 62.7 60.3 60 56	62.2 62.8 66.9 62.2 65.4 60.8 54.7	68.6 56.1 69.4 70.7 70.7 70.7 64.5	58.6 64.9 70.4 61.7 65.5 62.5 65.4	64.8 59.8 65 69.7 62.6 68.4 69.5	71.4 68.2 72.4 74 74 71.5 68.2	72 69 85.7 83.4 85.7 84.5 73.9	0.9951 0.9778 0.9851 0.9937 0.9934 0.9958 1.0043	70.7 71.4 69 86.5 84.4 75.7 66.3
Rocky Mtn. NP Fort Collins USAF Academy Welch Rocky Flats Nor NREL Arvada Welby S. Boulder Cree	81 71 73 70 87 85 76 66 77	62.7 56.4 58.8 62.7 60.3 60 56 62.8	62.2 62.8 66.9 62.2 65.4 60.8 54.7 62.3	68.6 56.1 69.4 70.7 70.7 70.7 64.5 70.7	58.6 64.9 70.4 61.7 65.5 62.5 65.4 62.5	64.8 59.8 65 69.7 62.6 68.4 69.5 70.4	71.4 68.2 72.4 74 74 71.5 68.2 74	72 69 85.7 83.4 85.7 84.5 73.9 83.4	0.9951 0.9778 0.9851 0.9937 0.9934 0.9958 1.0043 0.9938	70.7 71.4 69 86.5 84.4 75.7 66.3 76.5
Rocky Mtn. NP Fort Collins USAF Academy Welch Rocky Flats Nor NREL Arvada Welby S. Boulder Cree Carriage	81 71 73 70 87 85 76 66 77 76	62.7 56.4 58.8 62.7 60.3 60 56 62.8 58.9	62.2 62.8 66.9 62.2 65.4 60.8 54.7 62.3 64	68.6 56.1 69.4 70.7 70.7 70.7 64.5 70.7 69.6	58.6 64.9 70.4 61.7 65.5 62.5 65.4 62.5 68.5	64.8 59.8 65 69.7 62.6 68.4 69.5 70.4 66.1	71.4 68.2 72.4 74 74 71.5 68.2 74 71	72 69 85.7 83.4 85.7 84.5 73.9 83.4 82.6	0.9951 0.9778 0.9851 0.9937 0.9934 0.9958 1.0043 0.9938 0.9874	70.7 71.4 69 86.5 84.4 75.7 66.3 76.5
Rocky Mtn. NP Fort Collins USAF Academy Welch Rocky Flats Nor NREL Arvada Welby S. Boulder Cree	81 71 73 70 87 85 76 66 77	62.7 56.4 58.8 62.7 60.3 60 56 62.8	62.2 62.8 66.9 62.2 65.4 60.8 54.7 62.3	68.6 56.1 69.4 70.7 70.7 70.7 64.5 70.7	58.6 64.9 70.4 61.7 65.5 62.5 65.4 62.5	64.8 59.8 65 69.7 62.6 68.4 69.5 70.4	71.4 68.2 72.4 74 74 71.5 68.2 74	72 69 85.7 83.4 85.7 84.5 73.9 83.4	0.9951 0.9778 0.9851 0.9937 0.9934 0.9958 1.0043 0.9938	70.7 71.4 69 86.5 84.4 75.7 66.3 76.5