OTC Modeling Committee October 12, 2017



Executive Summary

In 2015, the 8-hour ozone National Ambient Air Quality Standard (NAAQS) was lowered to 70 ppb. This was the high end of the range recommended by the Clean Air Scientific Advisory Committee (CASAC) originally and in the rule proposal by Administrator McCarthy. The lower end of the range proposed by EPA was 65 ppb. Additionally, recent research has shown health effects from ozone occur at even lower levels. Given that health effects could be caused at levels closer to what is considered background we decided to also look at 40 ppb which close to a level considered to be United States Background (USB). As a result three levels of ozone were investigated in this analysis: 70 ppb, 65 ppb, and 40 ppb.

Each year that air quality does not meet the NAAQS the health of the populations exposed to the poor air quality are impacted. OTC began examining the potential health impacts of these levels of exposure starting in 2013 and as of writing 2016 is the most recent year for which data is available. As a result the analysis will focus on each ozone season for which data has been processed, 2013-2016, with the intention of adding new information annually.

Several states in the Ozone Transport Region (OTR) exceed the NAAQS set by EPA, which were set to a level to adequately protect the public health. This implies that populations in the OTR would receive a health benefit if the entire OTR were to meet the NAAQS. Additionally, even more monitors have values above the other thresholds discussed.

This paper looks at the benefits that would have occurred each year from 2013-2016, using monitored data had the entire OTR met ozone levels of 70 ppb, 65 ppb, and 40 ppb as estimated using health benefit and economic functions that came

from peer reviewed sources employed by EPA in many studies processed with BenMAP.

We estimated that approximately 600 – 1,700 persons would have not died prematurely in a given year 2013-2016 had the OTR air quality attained a level that met the 70 ppb Ozone NAAQS with even more persons that would not have died if ozone levels were even lower.

As a point comparison in 2014 about 2,600 people died of homicide in the OTR and all of Virginia, 1,500 of HIV/AIDS, and 1,300 of Hepatitis C, which places deaths from ozone exposure among other notable health crises.

Additionally, we estimated that there would have been economic benefit to the region in the range of \$4-10 billion in all health impacts from reducing ozone to 70 ppb in any given year.

Estimated reduced mortality in the OTR from meeting different ozone levels

Ozone Level	2013	2014	2015	2016
70 ppb	1,012	637	1,716	1,698
65 ppb	1,858	1,378	2,142	2,266
40 ppb	2,280	2,162	2,677	2,620

Selected causes of mortality in the OTR and VA from 2014

Health Endpoint	Rank	Mortalities
Homicide	34	2,599
HIV/AIDS	38	1,547
Hepatitis C	41	1,266

Estimated economic benefit (billions) reduced health effects in the OTR from meeting different ozone levels

Ozone Level	2013	2014	2015	2016
70	\$5.2	\$3.7	\$8.8	\$10.0
65	\$9.5	\$8.1	\$11.0	\$13.4
40	\$11.7	\$12.7	\$13.8	\$15.5

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Introduction

In 2015, the 8-hour ozone National Ambient Air Quality Standard (NAAQS) was lowered to 70 ppb.¹ This was the high end of the range recommended by the Clean Air Scientific Advisory Committee (CASAC) originally and in the rule proposal by Administrator McCarthy. The lower end of the range proposed by EPA was 65 ppb. Additionally, recent research has shown health effects from ozone occur at even lower levels.² Given that health effects could be caused at levels closer to what is considered background we decided to also look at 40 ppb which close to a level considered to be United States Background (USB). As a result three levels of ozone were investigated in this analysis: 70 ppb, 65 ppb, and 40 ppb.

Each year that air quality does not meet the NAAQS the health of the populations exposed to the poor air quality are impacted. OTC began examining the potential health impacts of these levels of exposure starting in 2013 and as of writing 2016 is the most recent year for which data is available. As a result the analysis will focus on each ozone season for which data has been processed, 2013-2016, with the intention of adding new information annually.

Several states in the Ozone Transport Region (OTR) had monitored design values that were above the standard set by EPA. Given that the primary NAAQS are set to a level to adequately protect the public health, this implies that populations in the OTR would receive a health benefit if the entire OTR were to meet the NAAQS. This paper looks at the benefits that would have occurred each year from 2013-2016 had the entire OTR met ozone levels of 70 ppb, 65 ppb, and 40 ppb as estimated by the Environmental Benefits Mapping and Analysis Program (BenMAP) Community Edition (CE) program.³

Methods

Overview of the Health Impact Functions

BenMAP CE v1.3.52 was employed to process the health impact functions. These functions are developed to calculate the change in health incidence for a given population due to a change in air quality. The health impact functions typically consist of four variables: change in air quality, population, baseline incidence rate, and effect estimates that are drawn from epidemiological literature. The health impact functions used in the analysis were all functions provided in the downloadable version of BenMAP CE. The typical health impact function (Δy) is log-linear as follows:

$$\Delta y = y_0(e^{\beta \Delta q} - 1)pop$$

where y_0 is the baseline incidence rate, β is the effect estimate, Δq is the change in air quality, and pop is the population.

¹ US EPA, "2015 National Ambient Air Quality Standards for Ozone."

² Di et al., "Air Pollution and Mortality in the Medicare Population."

³ US EPA, "Environmental Benefits Mapping and Analysis Program – Community Edition: User's Manual."

Change in Air Quality

Monitored ozone data were obtained throughout the entire OTR and the states that border the region (Ohio, West Virginia, and the remainder of Virginia) for 2013-2016 from the Air Quality System (AQS) monitor network and the data was originally compiled by staff at the Maine Department of Environmental Protection. The Voronoi Neighborhood Averaging (VNA) inverse distance interpolation squared technique was used to interpolate to grid cells between monitors. The bordering states were included so that the VNA would not result in inappropriate values along the western and southern borders of the OTR. Monitored ozone data was not available from Canada, so VNA may create unexpected results along the northern border, but exceedances are less common in that region so the monitors would not be rolled back anyway. The national CMAQ grid was used rather than the grid clipped to the United States boundaries since using the latter resulting in data missing in many grid cells in Maine.

Annual ozone season data was imported, but in many cases monitors only are operated during a shorter time period when conditions are conducive to ozone formation as defined in federal regulations (see Table 1). Furthermore, BenMap requires that a certain thresholds to be met for the data at a particular monitor to be considered acceptable. The default time spans for data to be considered are too stringent since several monitors with 4th high 8-hour ozone values above 70 ppb would be excluded so the time span of April 1 – October 31 was used. 4th high 8-hour ozone data for each year seen in Figure 1 though Figure 4 and data for the 20 worst monitors in the OTR can be seen in Table 2.

Table 1: Ozone monitoring season requirements (40 CFR 58 Appendix D (4)(i))

State	Start Date	End Date
Connecticut	March 1	September 30
Delaware	March 1	October 31
District of Columbia	March 1	October 31
Maine	April 1	September 30
Maryland	March 1	October 31
Massachusetts	March 1	September 30
New Hampshire	March 1	September 30
New Jersey	March 1	October 31
New York	March 1	October 31
Pennsylvania	March 1	October 31
Rhode Island	March 1	September 30
Vermont	April 1	September 30
Virginia	March 1	October 31

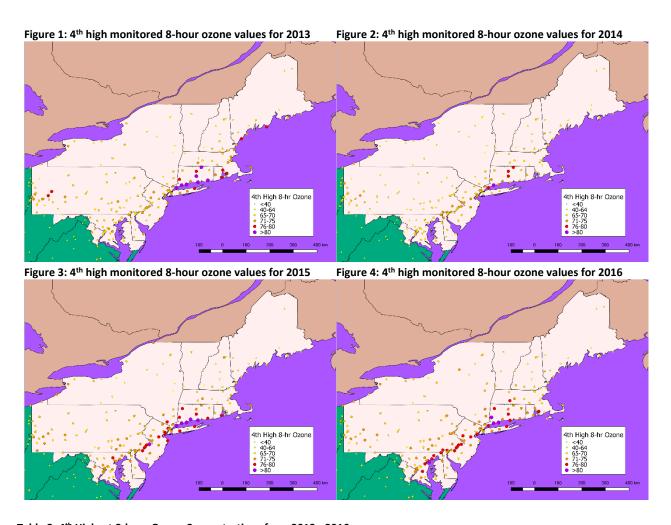


Table 2: 4^{th} Highest 8-hour Ozone Concentrations from 2013 - 2016

		AQS Code 2013 2014 2015 2016 4th High 90019003 86 81 87 87 85 90013007 90 74 86 83 83 90010017 82 78 84 79 81 90070007 82 80 78 80 80					Average 2013-16
Agency	Site Name	AQS Code	2013	2014	2015	2016	4th High
CT	Westport	90019003	86	81	87	87	85
CT	Stratford	90013007	90	74	86	83	83
CT	Greenwich	90010017	82	78	84	<i>79</i>	81
CT	Middletown	90070007	82	80	78	80	80
CT	Madison-combined (3002 9002)	90099002	85	69	81	80	79
CT	Danbury	90011123	76	74	79	81	78
PA	Bristol	420170012	73	71	82	80	77
CT	East Hartford	90031003	77	77	75	<i>75</i>	76
CT	New Haven-B	90090027	75	72	81	<i>75</i>	76
CT	Groton Fort Griswold	90110124	85	65	77	<i>75</i>	76
CT	Stafford	90131001	81	77	72	72	76
MD	Fair Hill	240150003	72	74	74	80	75
NY	NYC-Susan Wagner HS	360850067	71	72	79	77	75
PA	NEA	421010024	68	72	7 9	80	75
NJ	Leonia	340030006	74	73	76	<i>75</i>	75
NY	Riverhead	361030004	78	64	76	78	74
NJ	Clarksboro	340150002	73	70	76	76	74
NJ	Rutgers U	340230011	70	71	77	76	74
NY	White Plains	361192004	72	74	73	75	74
MD	Edgewood	240251001	72	67	74	79	73

After importing each year's monitored ozone data, BenMAP CE was employed to conduct an analysis termed "roll back." In this approach a mathematical technique is used to reduce the ozone values at the monitors so that each meets a threshold, in these cases a 4th highest daily maximum 8-hour ozone average concentration of 70 ppb, 65 ppb, or 40 ppb. Technically to demonstrate compliance with the 8-hour ozone NAAQS, the average of 3 years of the 4th highest daily maximum 8-hour ozone averages is calculated and referred to as a design value (DV) This is necessary since BenMAP CE only accepts one year worth of air quality data in an analysis. After the "roll back" is complete, the monitor data was then interpolated geographically using an inverse distance weighting technique.

There are three techniques for rolling back the monitored values to the standard: percentage reduction, incremental, and peak shaving that need to be applied to the inter-day and intra-day rollback. The peak shaving technique was employed for the inter-day rollback so values meeting the standard would not have reductions applied, which would result in more conservative results. The percentage technique was employed for the intra-day rollback since it best reflected the implementation of measures that would affect each hour of the day equally.

In conducting the analysis, including a background rate was necessary to prevent monitors from being lowered below what would occur absent anthropogenic emissions. There are a variety of estimates for background, and even several values considered background (e.g., United States Background (USB) and North American Background (NAB). For this aspect of the modeling a value of 30 ppb was used which is associated with lower levels of NAB found in the Eastern United States in the summer time as was presented in Figure 3-9 of EPA's Integrated Scientific Assessment for the 2015 Ozone NAAQS. Peak shaving was used as the inter-day rollback method and percentage reduction was used as the intra-day rollback method. In both cases 30 ppb was used for the background level.

One potential flaw with the rollback approach is that only monitors that have 4th highest values above 70 ppb were rolled back to the standard. However, in a case where controls are put on to achieve such a monitored level, downwind areas would also have reduced ozone concentrations even though their monitors are already below the standard. As a result, the health effects downwind, in New England in particular, are lower than what would be experienced in a real world scenario.

Population

US population data were based on estimates of populations in the corresponding year projected from 2010 block-level US Census data. The geographic extent of population was limited to the population that lives in the 12 full states in the OTR, the District of Columbia and the nine cities/counties in Virginia that are considered part of the OTR. However, not all health incidence are evaluated against the entire population of the OTR, some are evaluated only against sub populations based on age. The total

⁴ Lin Zhang et al., "Improved Estimate of the Policy-Relevant Background Ozone in the United States Using the GEOS-Chem Global Model with 1/2° × 2/3°Horizontal Resolution over North America"; US EPA, *Integrated Science Assessment for Ozone and Related Photochemical Oxidants*.

population used for each year and various age cohorts as well as the health endpoint group associated with the age cohort is in Table 3.

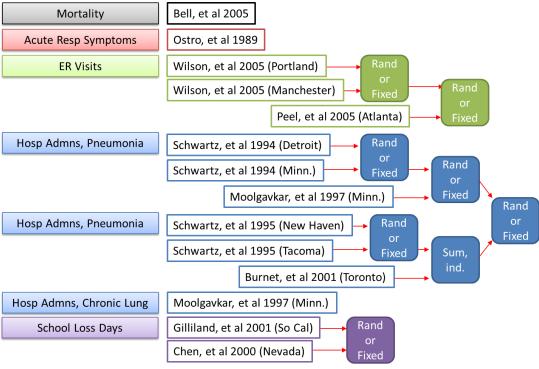
Table 3: Population for each age cohort by year analyzed

Population	Health Endpoint Group	2013	2014	2015	2016
Total	Mortality, Emergency Room Visits	66,403,000	66,610,000	66,928,000	67,301,000
18-64	Acute Respiratory Symptoms	42,120,000	42,152,000	42,246,000	42,321,000
0-1 and 65+	Hospital Admissions	9,651,000	9,899, 000	10,167,000	10,437,000
5-17	School Loss Days	10,682,000	10,592,000	10,504,000	10,463,000

Selection of Health Impact Functions

There is evidence of a relationship between long-term exposure to concentrations of ozone and premature respiratory mortality, which is one of a few studies that detect an increase in mortality from long-term ozone exposure.⁵ However there remain questions as to whether long-term mortality has the same direct relationship to ozone exposure as short-term mortality does since this is a newer finding in the literature, so this paper will only examine short-term mortality. Additionally, several functions representing morbidity, including acute respiratory symptoms, respiratory hospital admissions, respiratory emergency rooms visits, and school loss days, were used, which are functions typically used in EPA studies. The process to aggregate the results of the health studies is in Figure 5.

Figure 5: Aggregation of health effects studies



⁵ Jerrett et al., "Long-Term Ozone Exposure and Mortality."

Baseline Incidence Rates

Baseline incidence rates that are part of EPA's dataset were used in this analysis. Incidence rate data sets are not available for every year so selections of which year to use are largely made based on the proximity of the year the incidence data set is for to the year of the monitored data being evaluated. Projections of mortality incidence rates were available in five year increments and 2015, which coincided with one of the years analyzed, was determined to be the most appropriate data set to use with the mortality health impact functions. Only one incidence data set was available for the other health endpoints so the incidence estimates for 2014 were used for the other health endpoints excepting school loss days where 2000 was the only data set available and acute respiratory systems which has a slightly different form than the other functions, so baseline incidence rates are not included in the equation.

Economic Analysis

In order to quantify the impact of the health benefits the reduced incidence is multiplied by a valuation estimated through one of several techniques. In the case of mortality, the Value of Statistical Life (VSL) based upon a normal distribution was used. The VSL uses differences in salaries and the inherent risk of a job to infer the rate at which life is valued. A Willingness to Pay (WTP) estimate was used to monetize acute respiratory symptoms. WTP relies on survey data to determine how much people value not having an adverse health effect. Cost of Illness (COI) estimates were used to value emergency room visits and hospital admissions. COI totals up the amount spent on medicine, hospital visits, etc. due to an adverse heath effect. Since the VSL is based on hedonic economic analysis it best characterizes the complete value of the effect, with the WTP estimates characterizing less of the true cost, and COI capturing the least of the true cost. The process undertaken to aggregate the economic results are in Figure 6.

Additionally, income effects were adjusted to the year analyzed and all valuations are in 2010 U.S. Dollars, inflated using the Consumer Price Index (CPI) and Employer Costs for Employee Compensation (ECEC).

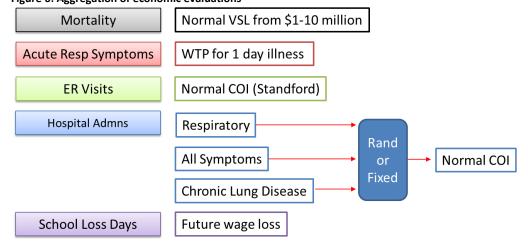


Figure 6: Aggregation of economic evaluations

Figure 7: Change in avg. 8-hour max. ozone due to roll back to 70 ppb using data from 2013

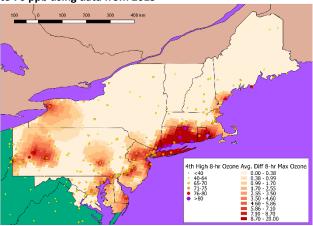


Figure 8: Change in avg. 8-hour max. ozone due to roll back to 65 ppb using data from 2013

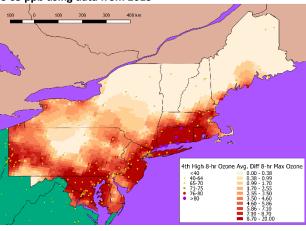


Figure 9: Change in avg. 8-hour max. ozone due to roll back to 40 ppb using data from 2013

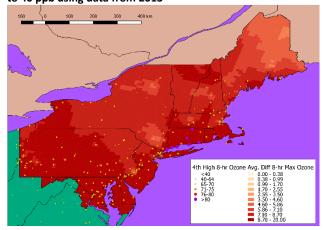


Figure 10: Change in avg. 8-hour max. ozone due to roll back to 70 ppb using data from 2014

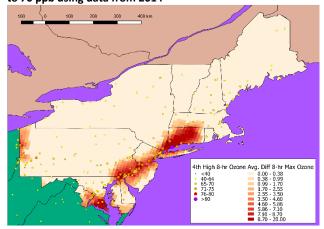


Figure 11: Change in avg. 8-hour max. ozone due to roll back to 65 ppb using data from 2014

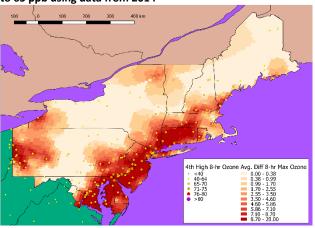


Figure 12: Change in avg. 8-hour max. ozone due to roll back to 40 ppb using data from 2014

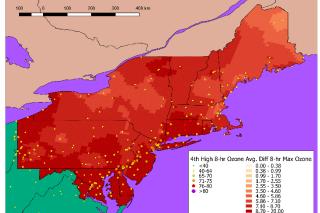


Figure 13: Change in avg. 8-hour max. ozone due to roll back to 70 ppb using data from 2015

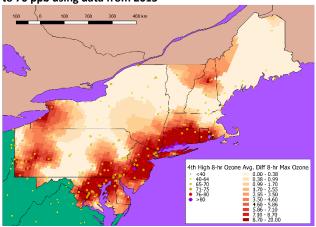


Figure 14: Change in avg. 8-hour max. ozone due to roll back to 65 ppb using data from 2015

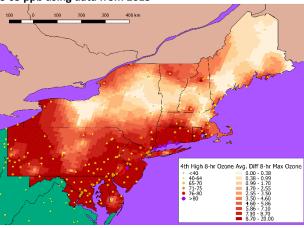


Figure 15: Change in avg. 8-hour max. ozone due to roll back to 40 ppb using data from 2015

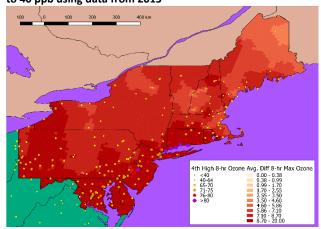


Figure 16: Change in avg. 8-hour max. ozone due to roll back to 70 ppb using data from 2016

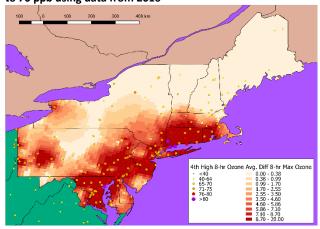


Figure 17: Change in avg. 8-hour max. ozone due to roll back to 65 ppb using data from 2016

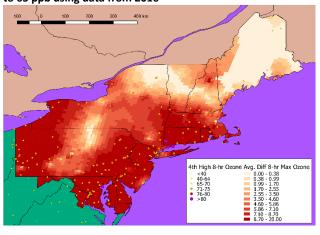
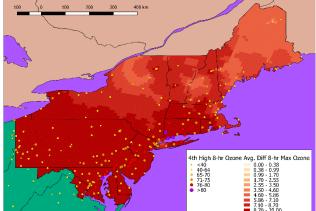


Figure 18: Change in avg. 8-hour max. ozone due to roll back to 40 ppb using data from 2016



Results

Monitor Rollback

The majority of the reductions in ozone levels in 70 ppb rollbacks occurred in the I-95 corridor between Washington, DC and New York City, NY, with smaller reductions extending north to Boston, MA. Western Pennsylvania also saw reductions in the 70 ppb rollback scenarios except in 2014. Central Pennsylvania saw reductions in 2015 and 2016. Northern New Hampshire also saw reductions in some years, though this was highly dependent on the value of a mountain monitor that is in a very rural area and can experience stratospheric intrusions, and likely is not leading to the high level of population exposures that the model suggests.

In the 65 ppb scenario the reductions were greater in the I-95 corridor and Western Pennsylvania, Eastern Pennsylvania, and Central New York saw reductions in all years. Several years also saw reductions in coastal Maine.

The entire region saw massive reductions in ozone levels in the 40 ppb rollback scenarios including many rural areas in the region.

Overview maps of the changes in average 8 hour maximum ozone concentrations in the OTR after being rolled back to 70 ppb in left most figures from Figure 7 through Figure 18 to 65 ppb in the center figures and to 40 ppb in the right most figures.

Health Impact

After processing the health impact functions, we estimated that had the entire OTR had 4th highest monitor results at or under 70 ppb it is expected that there would have been anywhere from 50 to 860 fewer short term mortalities due to ozone exposure. A similar pattern of results happened for 65 and 40 ppb rollbacks, but with higher levels of reduced mortality. Emergency room visit were not estimated to be significant different than 0. The same pattern of results occurred for the other health endpoints as mortality with the magnitude being of hospital admissions being about half of the mortality incidence, acute respiratory symptoms being roughly 2000 times, and school loss days being roughly 500 times. State level graphs showing the mean mortality for each year from 2013-2016 for having met 70 ppb, 65 ppb, and 40 ppb are in Figure 19, Figure 20, and Figure 21, respectively. A full listing of the reduced health incidence pooled for the OTR is in Table 4 with a state level breakout in Table 7.

Figure 19: Estimated state mortalities that could have been avoided by meeting the 70 ppb NAAQS from 2013-2016

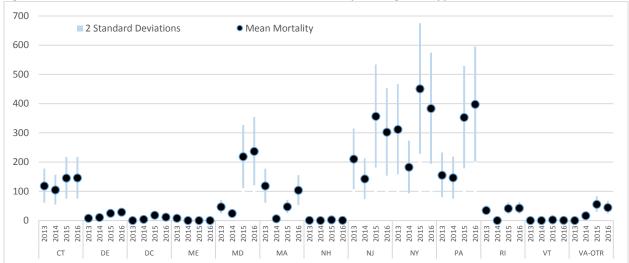
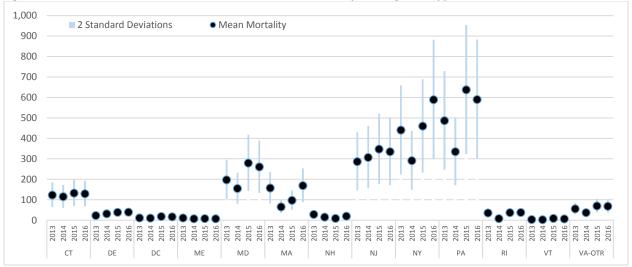


Figure 20: Estimated state mortalities that could have been avoided by meeting the 65 ppb NAAQS from 2013-2016



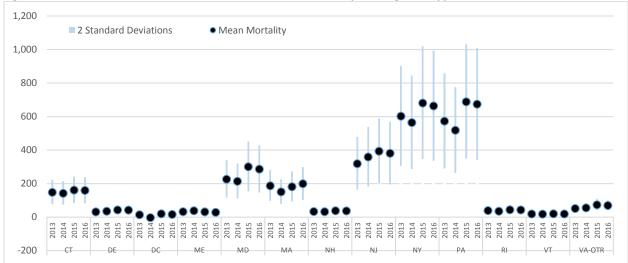


Figure 21: Estimated state mortalities that could have been avoided by meeting the 40 ppb NAAQS from 2013-2016

Economic Impact

Following analysis of the health impacts, economic impacts were estimated using the previously discussed techniques. The value of the mortalities outweigh the other economic impacts considerably, though one should consider that some economic benefits such as reduced personal suffering may not have been monetized for morbidity due to the data, such as cost of illness estimates, used in developing the cost estimates. Again emergency room visits were not found to be significantly different from zero, as were minor restricted activity days. Total economic benefits for the OTR, excluding emergency room visits and minor restricted activity days, are found for each year from 2013-2016 for having met 70 ppb, 65 ppb, and 40 ppb in Figure 22, Figure 23, and Figure 24, respectively. A full break down of the economic impacts is in Table 5 with a state level breakout in Table 8.

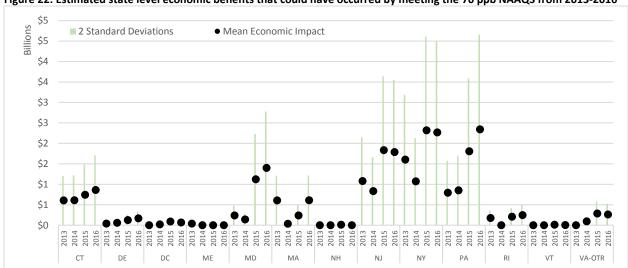


Figure 22: Estimated state level economic benefits that could have occurred by meeting the 70 ppb NAAQS from 2013-2016

Figure 23: Estimated state level economic benefits that could have occurred by meeting the 65 ppb NAAQS from 2013-2016

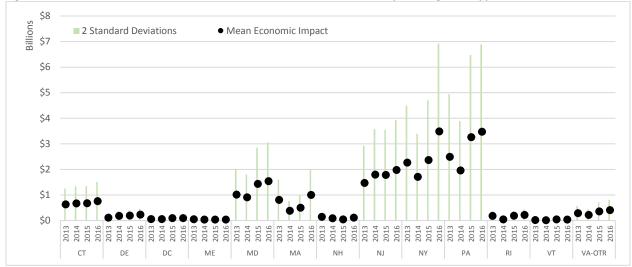


Figure 24: Estimated state level economic benefits that could have occurred by meeting the 40 ppb NAAQS from 2013-2016

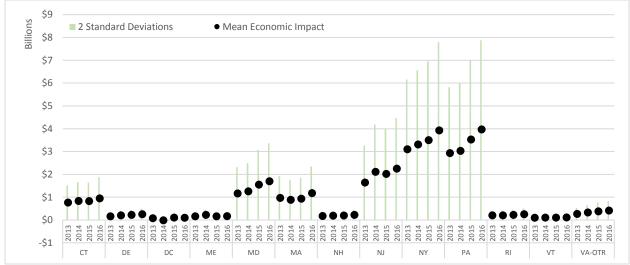


Table 4: Estimated ozone-related health impacts following monitor rollback to 70, 65, and 40 ppb for 2013-2016 in the OTR

Table 4:	Estimate	a ozone-r	eiated ne	eaith impa	acts tolic	owing mo	onitor ro	праск то	o 70, 65, a	nd 40 ppb for	2013-2016 in 1	ne OTK			
	Mortali	ty, All Cau	ıses ⁶	Emerge	ncy Roo	m	Hospita	I Admis	ssions	Acute Respi	ratory Sympto	ms ¹⁴	School Loss	Days ¹⁵¹⁶	
				Visits R	espirato	ry ⁷⁸	Respira	tory ⁹¹⁰¹	.11213					-	
	Mean	-2σ	2σ	Mean	-2σ	2σ	Mean	-2σ	2σ	Mean	-2σ	2σ	Mean	-2σ	2σ
2013															
40	2,280	1,146	3,415	2,247	-449	4,944	1,284	377	2,191	4,197,816	1,892,705	6,502,927	1,202,964	486,281	1,919,647
65	1,620	813	2,427	1,689	-339	3,717	927	274	1,581	3,075,827	1,381,628	4,770,027	890,618	360,100	1,421,135
70	817	410	1,224	911	-184	2,006	466	142	789	1,610,165	721,417	2,498,912	456,384	184,554	728,213
2014															
40	2,193	1,101	3,284	2,175	-435	4,786	1,246	365	2,127	4,045,310	1,822,237	6,268,383	1,152,382	465,887	1,838,876
65	1,378	692	2,065	1,535	-308	3,378	788	237	1,339	2,648,090	1,188,791	4,107,388	752,984	304,483	1,201,484
70	97	48	145	111	-16	237	57	16	98	194,477	85,659	303,295	54,890	22,216	87,563
2015															
40	2,642	1,331	3,953	2,601	-511	5,713	1,489	449	2,530	4,747,440	2,164,519	7,330,360	1,374,614	485,734	2,263,494
65	2,142	1,076	3,207	2,164	-432	4,760	1,205	367	2,043	3,877,164	1,748,947	6,005,381	1,098,322	444,039	1,752,605
70	1,716	862	2,570	1,928	-384	4,240	978	299	1,657	3,299,106	1,489,185	5,109,027	928,840	375,517	1,482,164
2016															
40	2,620	1,317	3,923	2,545	-506	5,595	1,501	446	2,557	4,677,157	2,115,095	7,239,219	1,311,394	530,069	2,092,719
65	2,266	1,139	3,394	2,276	-454	5,006	1,294	384	2,204	4,099,376	1,849,093	6,349,658	1,147,950	464,077	1,831,822
70	1,698	853	2,543	1,736	-347	3,819	983	301	1,665	3,132,862	1,410,641	4,855,084	880,268	355,906	1,404,630
70	1,098	833	2,543	1,730	-347	3,013	303	301	1,005	3,132,002	1,410,041	4,033,004	000,200	333,300	1,404,030

⁶ Bell, Dominici, and Samet, "A Meta-Analysis of Time-Series Studies of Ozone and Mortality with Comparison to the National Morbidity, Mortality, and Air Pollution Study."

⁷ Peel et al., "Ambient Air Pollution and Respiratory Emergency Department Visits."

⁸ Wilson et al., "Air Pollution, Weather, and Respiratory Emergency Room Visits in Two Northern New England Cities: An Ecological Time-Series Study"; Peel et al., "Ambient Air Pollution and Respiratory Emergency Department Visits."

⁹ Moolgavkar, Luebeck, and Anderson, "Air Pollution and Hospital Admissions for Respiratory Causes in Minneapolis-St. Paul and Birmingham"; Schwartz, "PM10 Ozone, and Hospital Admissions for the Elderly in Minneapolis-St. Paul, Minnesota"; Schwartz, "Air Pollution and Hospital Admissions for the Elderly in Detroit, Michigan."

¹⁰ Schwartz, "PM10 Ozone, and Hospital Admissions for the Elderly in Minneapolis-St. Paul, Minnesota."

¹¹ Schwartz, "Air Pollution and Hospital Admissions for the Elderly in Detroit, Michigan."

¹² Schwartz, "Short Term Fluctuations in Air Pollution and Hospital Admissions of the Elderly for Respiratory Disease."

¹³ Burnett et al., "Association between Ozone and Hospitalization for Acute Respiratory Diseases in Children Less than 2 Years of Age."

¹⁴ Ostro and Rothschild, "Air Pollution and Acute Respiratory Morbidity: An Observational Study of Multiple Pollutants."

¹⁵ Chen et al., "Elementary School Absenteeism and Air Pollution."

 $^{^{16}}$ Gilliland et al., "The Effects of Ambient Air Pollution on School Absenteeism due to Respiratory Illnesses."

Table 5: Estimated ozone-related economic impacts (2010\$) following monitor rollback to 70, 65, and 40 ppb for 2013-2016 in the OTR

i abic 5.	Mortality, All Caus		iipacts (20103) ioliow	-	oom Visits, Asth		Hospital Adm		atory
	Mean	-2σ	2σ	Mean	-2σ	2σ	Mean	-2σ	2σ
2013									
40	\$11,519,485,792	\$170,072,048	\$22,868,899,536	\$509,316	-\$101,640	\$1,120,272	\$21,681,375	\$5,500,972	\$37,861,779
65	\$9,384,812,704	\$136,750,106	\$18,632,875,302	\$427,626	-\$85,729	\$940,981	\$17,854,061	\$4,591,009	\$31,117,112
70	\$5,113,000,701	\$73,367,741	\$10,152,633,661	\$238,148	-\$48,003	\$524,299	\$9,966,407	\$2,500,940	\$17,431,873
2014									
40	\$12,471,234,255	\$163,240,374	\$24,779,228,136	\$495,992	-\$99,509	\$1,091,493	\$20,674,349	\$5,382,028	\$35,966,671
65	\$7,950,936,124	\$114,978,588	\$15,786,893,660	\$347,812	-\$69,830	\$765,455	\$13,264,398	\$3,388,041	\$23,140,755
70	\$3,676,306,592	\$52,454,418	\$7,300,158,766	\$189,667	-\$38,234	\$417,568	\$6,147,040	\$1,604,490	\$10,689,590
2015									
40	\$13,526,233,880	\$202,842,248	\$26,849,625,512	\$600,523	-\$119,090	\$1,320,137	\$25,622,879	\$6,657,492	\$44,588,266
65	\$10,819,146,524	\$160,019,168	\$21,478,273,880	\$490,483	-\$97,806	\$1,078,773	\$20,357,843	\$5,265,817	\$35,449,868
70	\$8,669,561,586	\$128,426,438	\$17,210,696,734	\$436,934	-\$86,989	\$960,857	\$16,439,036	\$4,315,551	\$28,562,521
2016									
40	\$15,255,727,776	\$228,054,912	\$30,283,400,640	\$576,679	-\$114,542	\$1,267,901	\$25,314,355	\$6,567,577	\$44,061,133
65	\$13,196,190,772	\$194,904,888	\$26,197,476,656	\$515,766	-\$102,811	\$1,134,343	\$21,806,648	\$5,638,167	\$37,975,128
70	\$9,887,347,069	\$145,099,195	\$19,629,594,943	\$393,345	-\$78,685	\$865,375	\$16,638,993	\$4,292,512	\$28,985,474
	Minor Restricted A	ctivity Days		School Loss D	ays				
2013									
40	\$93,033,327	-\$29,589,066	\$215,655,720	\$81,691,996	\$33,186,346	\$130,197,645			
65	\$77,393,080	-\$24,668,140	\$179,454,300	\$68,301,008	\$27,746,898	\$108,855,117			
70	\$42,458,928	-\$13,567,426	\$98,485,281	\$36,864,577	\$14,976,270	\$58,752,884			
2014									
40	\$92,449,008	-\$29,624,650	\$214,522,666	\$79,107,465	\$27,295,867	\$130,919,064			
65	\$61,688,814	-\$19,686,569	\$143,064,197	\$51,134,326	\$20,773,428	\$81,495,224			
70	\$30,452,374	-\$9,742,403	\$70,647,150	\$24,993,965	\$10,154,098	\$39,833,831			
2015									
40	\$107,488,235	-\$34,076,689	\$249,053,160	\$92,946,422	\$37,758,059	\$148,134,785			
65	\$85,925,006	-\$27,316,821	\$199,166,833	\$74,585,860	\$30,300,006	\$118,871,715			
70	\$73,112,556	-\$23,230,578	\$169,455,690	\$63,076,564	\$25,624,412	\$100,528,715			
2016									
40	\$109,304,954	-\$34,676,755	\$253,286,663	\$89,055,374	\$36,177,323	\$141,933,425			
65	\$95,810,665	-\$30,462,266	\$222,083,595	\$77,956,033	\$31,668,925	\$124,243,140			
70	\$73,226,288	-\$23,313,403	\$169,765,979	\$59,778,074	\$24,284,628	\$95,271,519			

Table 6: Top causes of death according to 2014 CDC data for the OTR and all of Virginia

Health Endpoint	Rank	Mortalities	Health Endpoint	Rank	Mortalities
Coronary Heart Disease	1	91,148	Homicide	33	2,599
Lung Cancers	2	34,976	Stomach Cancer	34	2,592
Stroke	3	27,908	Diarrhoeal diseases	35	2,442
Lung Disease	4	27,039	Oral Cancer	36	1,763
Diabetes Mellitus	5	16,138	HIV/AIDS	37	1,547
Hypertension	6	15,474	Alcohol	38	1,492
Alzheimers	7	15,175	Congenital Anomalies	39	1,440
Influenza & Pneumonia	8	13,774	Hepatitis C	40	1,266
Colon-Rectum Cancers	9	12,017	Low Birth Weight	41	1,077
Kidney Disease	10	11,559	Skin Disease	42	995
Blood Poisoning	11	10,816	Multiple Sclerosis	43	798
Breast Cancer	12	9,842	Asthma	44	728
Pancreas Cancer	13	9,823	Cervical Cancer	45	722
Poisoning	14	9,748	Anaemia	46	652
Endocrine Disorders	15	9,176	Rheumatic/Heart	47	617
Lymphomas	16	7,882	Malnutrition	48	404
Suicide	17	7,779	Drug Use	49	293
Inflammatory/Heart	18	7,233	Peptic Ulcer Disease	50	273
Falls	19	6,799	Birth Trauma	51	218
Liver Disease	20	6,632	Rheumatoid Arthritis	52	208
Prostate Cancer	21	6,522	Fires	53	135
Parkinson's Disease	22	5,811	Drownings	54	68
Liver Cancer	23	5,304	Diphtheria	55	-
Road Traffic Accidents	24	5,197	Measles	55	-
Leukemia	25	5,173	Osteoarthritis	55	-
Other Injuries	26	4,753	Meningitis	55	-
Bladder Cancer	27	4,010	Oral conditions	55	-
Other Neoplasms	28	3,698	Pertussis	55	-
Oesophagus Cancer	29	3,608	Tetanus	55	-
Ovary Cancer	30	3,319	Prostatic Hypertrophy	55	-
Skin Cancers	31	2,720	War	55	-
Uterin Cancer	32	2,609	Appendicitis	55	-

Table 7: Estimated ozone-related health impacts following monitor rollback to 70, 65, and 40 ppb for 2013-2016 in the OTR by State

		.		_	_		_	_		_	_		_	_		_	_
r	Level	State	Mean	-2σ	2σ	Mean	-2σ	2σ	Mean	-2σ	2σ	Mean	-2σ	2σ	Mean	-2σ	2σ
13	40	CT	64	-4	132	150	-30	329	86	24	148	270,339	122,480	418,198	81,539	32,973	130,10
		DE	14	0	29	24	-5	53	20	6	33	55,722	25,092	86,352	16,545	6,686	26,40
		DC	6	0	13	14	-3	30	8	2	13	36,432	16,422	56,442	7,676	3,102	12,24
		ME	13	-3	28	1	0	2	21	5	36	43,484	19,458	67,511	11,548	4,670	18,42
		MD	98	-5	201	239	-48	526	128	37	219	446,526	201,270	691,781	129,580	52,368	206,79
		MA	80	-6	166	149	-30	328	135	39	231	351,452	158,136	544,768	99,127	40,082	158,17
		NH	13	-3	29	30	-6	67	18	5	31	58,949	26,422	91,476	16,452	6,651	26,25
		NJ	147	3	290	342	-68	753	184	56	311	633,307	285,843	980,772	185,396	74,939	295,85
		NY	287	12	563	742	-148	1,632	332	101	563	1,217,842	549,514	1,886,171	343,969	139,055	548,88
		PA	249	-12	510	449	-90	988	288	88	489	816,993	367,992	1,265,995	234,480	94,773	374,18
		RI	17	-1	35	28	-6	62	23	7	39	66,416	29,983	102,848	18,560	7,504	29,61
		VT	7	-2	17	8	-2	18	9	1	16	27,283	12,219	42,346	7,400	2,993	11,80
		VA	20	-4	45	71	-14	156	34	8	60	173,071	77,875	268,267	50,694	20,484	80,90
	40 Total			-27	2,059	2,247	-449	4,944	1,284	378	2,191	4,197,816	1,892,705	6,502,927	1,202,964	486,281	1,919,64
	65	СТ	53	-4	109	123	-25	272	71	19	123	223,639	100,748	346,531	67,003	27,097	106,91
		DE	10	0	21	17	-3	38	14	4	24	40,115	17,992	62,238	11,610	4,693	18,52
		DC	5	0	10	10	-2	22	6	2	10	27,616	12,401	42,832	5,706	2,306	9,10
		ME	4	-1	9	1	0	1	7	2	12	14,138	6,282	21,993	3,633	1,470	5,79
	MD	85	-5	176	202	-41	445	112	32	192	401,530	180,658	622,401	117,320	47,423	187,21	
		MA	67	-5	140	124	-25	273	114	32	197	294,404	132,091	456,718	84,749	34,273	135,22
		NH	12	-2	25	28	-6	62	16	4	28	54,624	24,512	84,737	15,448	6,248	24,64
		NJ	132	3	261	308	-62	678	166	50	281	571,485	257,372	885,598	168,046	67,941	268,15
		NY	213	10	415	584	-117	1,286	245	75	415	914,001	410,606	1,417,396	258,868	104,657	413,07
		PA	212	-10	434	386	-77	849	247	75	419	700,787	314,978	1,086,595	201,700	81,542	321,85
		RI	15	-1	31	25	-5	56	20	6	34	59,246	26,667	91,825	16,528	6,683	26,37
		VT	1	0	3	1	0	3	2	0	3	4,614	2,036	7,192	1,265	512	2,01
		VA	22	-5	48	76	-15	167	37	9	64	185,552	83,686	287,418	53,897	21,788	86,00
	65 Total			-19	1,681	1,887	-379	4,152	1,056	310	1,803	3,491,750	1,570,027	5,413,474	1,005,774	406,632	1,604,91
	70	СТ	52	-7	110	121	-24	266	69	20	118	218,396	98,421	338,371	65,567	26,521	104,61
		DE	4	0	8	5	-1	11	5	2	9	12,110	5,381	18,838	3,210	1,297	5,12
		DC	0	0	0	0	0	0	0	0	0	248	110	387	66	27	10
		ME	3	-1	7	0	0	0	5	1	8	10,440	4,628	16,252	2,644	1,070	4,21
		MD	20	-3	44	50	-10	110	27	8	45	90,787	40,284	141,290	26,154	10,569	41,74
		MA	52	-7	110	94	-19	208	87	24	150	216,184	96,740	335,629	61,031	24,685	97,37
		NH	0	0	1	1	0	1	0	0	1	1,255	552	1,957	352	142	56
		NJ	98	-4	200	219	-44	482	122	38	205	411,724	184,422	639,026	120,062	48,541	191,58
		NY	156	2	310	421	-85	926	175	55	295	681,661	306,103	1,057,219	188,785	76,342	301,22
		PA	69	-8	145	115	-23	254	78	23	134	213,914	95,366	332,462	58,629	23,701	93,55
		RI	15	-2	32	25	-5	54	20	6	34	58,711	26,430	90,991	16,352	6,614	26,09
		VT	0	0	0	0	0	0	0	0	0	2	1	4	1	0	
		VA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	70 Total	VA		-29	968	1,051	-212	2,314	588	177	999	1,915,432	858,439	2,972,426	542,853	219,507	866,199

Table 7: Estimated ozone-related health impacts following monitor rollback to 70, 65, and 40 ppb for 2013-2016 in the OTR by State

			Mortality			Emergency Room	visits Res	spiratory	Hospital Admissi	ons Resp	iratory	Acute Respir	atory Symptoms		School Loss D	vays	
•	Level	State	Mean	-2σ	2σ	Mean	-2σ	2σ	Mean	-2σ	2σ	Mean	-2σ	2σ	Mean	-2σ	2σ
L4	40	СТ	61	-4	127	142	-28	313	83	23	143	256,950	116,906	396,994	77,959	27,799	128,11
		DE	16	0	31	26	-5	56	22	6	37	58,809	26,767	90,851	18,000	5,963	30,03
		DC	-1	-2	0	-3	-6	1	-1	-2	0	-6,247	-10,126	-2,367	-1,469	-2,892	-4
		ME	15	-3	34	1	0	2	28	6	49	50,957	23,102	78,812	13,728	5,083	22,37
		MD	93	-5	190	225	-44	494	123	36	209	397,871	180,596	615,146	121,448	38,440	204,45
		MA	65	-5	134	119	-24	261	110	31	188	277,277	125,957	428,597	79,998	29,043	130,95
		NH	13	-2	28	29	-6	63	17	5	30	55,648	25,214	86,081	15,675	5,626	25,72
		NJ	165	3	326	390	-77	858	206	63	349	702,299	319,221	1,085,378	210,090	71,350	348,83
		NY	271	14	528	731	-145	1,606	314	97	532	1,150,179	521,478	1,778,880	326,259	117,244	535,27
		PA	225	-12	461	421	-83	925	260	81	439	760,059	345,046	1,175,073	223,819	76,879	370,7
		RI	15	-1	31	25	-5	55	20	6	35	58,537	26,452	90,622	16,603	5,556	27,65
		VT	7	-2	16	7	-1	16	8	1	15	25,326	11,427	39,225	6,842	2,768	10,9
		VA	22	-5	49	75	-15	166	37	9	65	182,221	82,568	281,875	55,955	17,801	94,10
	40 Total			-25	1,955	2,189	-440	4,817	1,226	363	2,089	3,969,887	1,794,608	6,145,167	1,164,905	400,661	1,929,1
	65	СТ	49	-3	102	115	-23	254	68	20	116	209,122	94,228	324,017	62,106	25,123	99,0
		DE	14	0	28	24	-5	52	19	6	33	54,944	24,743	85,144	16,216	6,557	25,8
		DC	4	0	9	9	-2	20	5	2	9	24,970	11,159	38,782	5,190	2,098	8,2
		ME	3	-1	6	0	0	1	4	1	7	9,045	4,022	14,068	2,290	926	3,6
		MD	67	-4	138	167	-34	368	88	27	149	302,491	135,606	469,375	86,564	34,992	138,1
		MA	28	-2	58	54	-11	118	48	14	82	120,853	53,878	187,828	34,844	14,091	55,5
		NH	6	-1	13	15	-3	33	9	3	15	29,128	12,974	45,282	8,033	3,249	12,8
		NJ	141	3	279	333	-66	732	177	55	300	610,279	275,172	945,386	177,501	71,789	283,2
		NY	143	9	278	491	-99	1,080	166	51	281	656,796	294,490	1,019,102	182,421	73,764	291,0
		PA	147	-6	299	275	-55	606	173	52	293	500,530	224,507	776,552	142,804	57,742	227,8
		RI	3	0	7	5	-1	12	5	1	8	13,218	5,849	20,586	3,634	1,468	5,7
		VT	1	0	2	1	0	2	1	0	2	3,553	1,567	5,540	919	372	1,4
		VA	15	-3	32	46	-9	100	24	6	42	113,161	50,596	175,725	30,462	12,312	48,6
	65 Total			-9	1,251	1,535	-308	3,378	787	237	1,338	2,648,090	1,188,791	4,107,388	752,984	304,483	1,201,4
	70	СТ	46	-6	98	108	-22	237	63	18	107	194,637	87,700	301,574	58,141	23,526	92,7
		DE	5	-1	10	9	-2	20	6	2	10	21,457	9,595	33,320	6,346	2,567	10,1
		DC	2	0	4	4	-1	8	2	1	4	9,732	4,304	15,160	1,959	792	3,1
		ME	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		MD	10	-2	22	20	-4	44	14	4	24	50,147	22,290	78,005	14,603	5,903	23,3
		MA	3	0	6	7	-1	16	5	1	8	11,070	4,913	17,226	3,297	1,333	5,2
		NH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		NJ	66	-3	135	168	-34	369	84	25	143	302,301	135,147	469,455	85,085	34,410	135,7
		NY	92	2	183	372	-75	819	104	31	177	430,264	192,397	668,132	117,569	47,552	187,5
		PA	66	-6	138	129	-26	285	77	23	131	236,121	105,815	366,426	67,273	27,210	107,3
		RI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		VT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		VA	7	-2	15	21	-4	45	11	3	19	51,361	22,727	79,995	13,779	5,569	21,98
	70 Total			-18	610	837	-169	1,843	365	109	622	1,307,091	584,888	2,029,295	368,051	148,862	587,24

Table 7: Estimated ozone-related health impacts following monitor rollback to 70, 65, and 40 ppb for 2013-2016 in the OTR by State

			Mortality			Emergency Room	visits Res	spiratory	Hospital Admissi	ons Resp	iratory	Acute Respira	atory Symptoms		School Loss D	pays	
•	Level	State	Mean	-2σ	2σ	Mean	-2σ	2σ	Mean	-2σ	2σ	Mean	-2σ	2σ	Mean	-2σ	2σ
5	40	СТ	69	-4	143	158	-31	348	94	26	163	287,259	130,352	444,166	83,952	33,946	133,95
		DE	19	0	39	31	-6	69	26	8	45	72,268	32,742	111,794	21,277	8,599	33,95
		DC	9	0	18	19	-4	41	11	3	18	49,379	22,419	76,339	10,577	4,275	16,88
		ME	12	-3	28	1	0	2	21	5	37	41,113	18,386	63,840	10,715	4,333	17,09
		MD	131	-6	268	314	-62	690	171	50	292	575,099	260,865	889,333	166,138	67,146	265,12
		MA	78	-6	161	143	-29	314	133	37	228	337,234	151,602	522,865	92,084	37,217	146,95
		NH	15	-3	34	34	-7	74	21	6	36	65,103	29,215	100,992	17,536	7,088	27,98
		NJ	180	4	357	420	-83	924	227	70	385	761,751	345,458	1,178,044	219,447	88,702	350,19
		NY	326	14	637	856	-170	1,881	379	116	641	1,352,466	612,024	2,092,908	375,936	151,969	599,90
		PA	301	-13	614	539	-107	1,185	351	109	593	975,341	441,268	1,509,414	276,046	111,574	440,51
		RI	19	-1	39	31	-6	68	26	8	44	72,940	32,995	112,885	19,765	7,990	31,54
		VT	8	-2	18	8	-2	18	10	2	17	27,407	12,274	42,540	7,216	2,919	11,51
		VA	29	-6	64	96	-19	212	49	12	86	233,306	105,660	360,952	68,005	27,482	108,52
	40 Total			-27	2,420	2,650	-526	5,826	1,519	452	2,586	4,850,666	2,195,260	7,506,073	1,368,692	553,237	2,184,14
	65	СТ	57	-4	117	129	-26	284	77	22	132	234,948	105,962	363,935	68,153	27,559	108,74
		DE	17	0	34	28	-6	62	23	7	39	65,948	29,832	102,064	19,393	7,840	30,94
		DC	8	0	16	17	-3	37	10	3	16	44,884	20,314	69,453	9,598	3,880	15,31
		ME	3	-1	7	0	0	0	6	1	10	9,481	4,205	14,758	2,396	969	3,82
		MD	121	-6	248	289	-57	635	158	49	268	536,168	242,646	829,690	154,801	62,582	247,02
		MA	42	-3	86	75	-15	166	72	20	124	164,717	73,669	255,765	45,988	18,591	73,38
		NH	4	-1	8	7	-1	15	5	1	8	13,705	6,062	21,348	3,547	1,435	5,65
		NJ	160	3	316	369	-74	812	201	63	339	672,882	303,976	1,041,789	193,135	78,081	308,18
		NY	224	12	435	633	-127	1,392	257	81	433	942,483	424,119	1,460,847	262,140	105,976	418,30
		PA	278	-12	569	496	-99	1,090	325	100	550	896,941	405,020	1,388,861	254,251	102,794	405,70
		RI	16	-1	33	25	-5	56	21	7	36	60,537	27,246	93,828	16,322	6,599	26,04
		VT	3	-1	8	4	-1	8	4	1	7	13,193	5,861	20,525	3,497	1,415	5,57
		VA	28	-6	61	92	-18	201	46	12	81	221,277	100,034	342,519	65,102	26,318	103,88
	65 Total			-19	1,938	2,164	-432	4,760	1,205	367	2,043	3,877,164	1,748,947	6,005,381	1,098,322	444,039	1,752,60
	70	СТ	64	-8	135	143	-28	313	86	25	147	259,183	117,235	401,131	75,447	30,513	120,38
		DE	11	-1	23	18	-4	39	16	5	26	41,197	18,464	63,930	11,702	4,728	18,67
		DC	8	-1	17	17	-3	37	10	3	16	44,229	20,017	68,441	9,403	3,801	15,00
		ME	0	0	0	0	0	0	0	0	0	391	172	609	94	38	15
		MD	97	-11	204	246	-49	542	122	38	207	429,429	193,997	664,860	122,477	49,509	195,44
		MA	21	-3	44	39	-8	86	36	11	61	79,140	35,279	123,000	22,267	9,001	35,53
		NH	1	0	2	1	0	3	1	0	2	2,522	1,114	3,931	614	249	97
		NJ	166	-7	339	388	-77	854	207	64	350	704,852	319,175	1,090,529	202,196	81,753	322,63
		NY	225	2	448	683	-136	1,501	252	79	425	962,188	434,439	1,489,937	267,977	108,349	427,60
		PA	159	-15	332	292	-59	643	184	56	313	528,694	237,829	819,559	148,792	60,141	237,44
		RI	18	-2	38	28	-6	62	24	7	41	67,522	30,488	104,557	18,238	7,375	29,10
		VT	1	0	2	1	0	2	1	0	2	3,098	1,366	4,829	829	336	1,32
		VA	23	-6	51	72	-14	158	38	10	66	176,661	79,610	273,712	48,805	19,725	77,88
	70 Total			-52	1,637	1,928	-384	4,240	978	298	1,657	3,299,106	1,489,185	5,109,027	928,840	375,517	1,482,16

Table 7: Estimated ozone-related health impacts following monitor rollback to 70, 65, and 40 ppb for 2013-2016 in the OTR by State

		.		_	_		_	_		_	_		_	_		_	_
	Level	State	Mean	-2σ	2σ	Mean	-2σ	2σ	Mean	-2σ	2σ	Mean	-2σ	2σ	Mean	-2σ	2σ
.6	40	СТ	69	-4	142	154	-30	337	94	26	161	278,435	126,432	430,439	80,068	32,379	127,75
		DE	19	0	38	30	-6	67	26	8	45	70,242	31,819	108,666	20,594	8,323	32,86
		DC	7	0	15	15	-3	34	9	3	15	40,758	18,448	63,068	8,848	3,575	14,12
		ME	11	-3	25	1	0	2	19	5	33	36,367	16,245	56,488	9,410	3,805	15,01
		MD	125	-6	255	294	-58	646	165	48	282	534,767	242,349	827,185	154,093	62,275	245,91
		MA	85	-6	177	154	-31	338	146	40	253	364,039	163,950	564,129	98,491	39,818	157,16
		NH	15	-3	33	32	-7	71	21	6	36	62,919	28,270	97,568	16,753	6,773	26,7
		NJ	175	3	346	401	-80	882	221	68	375	731,870	331,612	1,132,129	209,815	84,807	334,8
		NY	317	16	619	815	-162	1,792	372	113	632	1,305,401	589,845	2,020,956	360,061	145,537	574,58
		PA	294	-13	601	521	-104	1,146	346	107	584	940,678	425,257	1,456,099	264,860	107,049	422,67
		RI	18	-1	38	30	-6	66	25	7	43	70,149	31,736	108,561	18,719	7,568	29,87
		VT	7	-2	16	7	-1	16	9	2	17	24,900	11,155	38,644	6,486	2,624	10,34
		VA	28	-6	61	90	-18	197	47	12	83	216,632	97,978	335,287	63,195	25,536	100,85
	40 Total			-25	2,366	2,545	-506	5,595	1,502	444	2,559	4,677,157	2,115,095	7,239,219	1,311,394	530,069	2,092,71
	65	СТ	55	-4	114	123	-25	271	76	21	131	224,399	101,213	347,584	63,962	25,865	102,05
		DE	17	0	35	28	-6	62	24	7	42	65,337	29,527	101,148	19,251	7,782	30,72
		DC	7	0	15	15	-3	33	9	2	15	39,517	17,872	61,162	8,585	3,470	13,70
		ME	3	-1	6	0	0	1	4	1	7	8,620	3,822	13,418	2,121	858	3,3
		MD	113	-5	232	265	-53	584	150	44	256	490,135	221,521	758,749	140,955	56,976	224,9
		MA	73	-5	150	126	-25	278	124	34	213	298,076	133,854	462,299	81,835	33,090	130,5
		NH	8	-1	17	17	-4	39	11	3	19	34,125	15,199	53,051	9,138	3,695	14,5
		NJ	154	3	304	358	-71	788	195	59	331	652,499	294,692	1,010,306	186,011	75,197	296,82
		NY	282	13	552	768	-153	1,689	326	101	551	1,179,441	531,936	1,826,947	323,412	130,747	516,07
		PA	258	-11	526	456	-91	1,002	303	94	513	823,907	371,513	1,276,302	231,240	93,477	369,0
		RI	16	-1	34	26	-5	58	22	6	38	61,858	27,884	95,832	16,446	6,649	26,2
		VT	2	-1	5	2	0	5	3	1	6	7,077	3,150	11,005	1,834	742	2,9
		VA	27	-6	60	89	-18	196	46	11	81	214,384	96,912	331,856	63,160	25,530	100,79
	65 Total			-19	2,051	2,276	-454	5,006	1,294	384	2,204	4,099,376	1,849,093	6,349,658	1,147,950	464,077	1,831,82
	70	СТ	63	-4	129	140	-28	307	85	25	146	253,957	114,965	392,949	72,662	29,395	115,92
		DE	13	0	26	20	-4	45	18	5	30	47,383	21,323	73,443	13,499	5,457	21,5
		DC	5	0	10	10	-2	23	6	2	10	27,884	12,506	43,262	5,958	2,408	9,50
		ME	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		MD	104	-4	211	256	-51	564	136	43	230	441,626	199,432	683,821	126,550	51,163	201,9
		MA	45	-3	92	80	-16	177	77	21	132	179,241	80,346	278,135	50,087	20,254	79,9
		NH	0	0	1	0	0	1	0	0	0	743	328	1,158	197	80	3
		NJ	139	3	275	315	-63	694	176	56	297	588,563	265,538	911,588	168,543	68,148	268,9
		NY	188	12	365	505	-102	1,111	220	69	370	806,475	362,406	1,250,544	221,519	89,558	353,4
		PA	174	-6	355	324	-65	713	210	64	355	583,926	262,468	905,385	166,312	67,233	265,39
		RI	18	-1	38	30	-6	65	25	8	42	69,289	31,338	107,241	18,497	7,482	29,5
		VT	0	0	1	0	0	1	0	0	1	861	381	1,342	212	86	33
		VA	18	-4	39	54	-11	119	30	7	52	132,913	59,611	206,216	36,233	14,642	57,82
	70 Total	VA	766	-9	1,542	1,736	-347	3,819	983	301	1,665	3,132,862	1,410,641	4,855,084	880,268	355,906	1,404,63

Table 8: Estimated ozone-related economic impacts (2010\$) following monitor rollback to 70, 65, and 40 ppb for 2013-2016 in the OTR by State

		Mortality, All Cause				- · ·			Hospital Admissions, Respiratory			Any of 19 Respira	tory Symptoms	School Loss Days			
L	Level	State	Mean	-2σ	2σ	Mean	-2σ	2σ	Mean	-2σ	2σ	Mean	-2σ	2σ	Mean	-2σ	2σ
-	40	СТ	\$750,099,008	\$11,315,776	\$1,488,882,240	\$33,959	-\$6,729	\$74,647	\$1,466,865	\$358,329	\$2,575,402	\$5,990,317	-\$1,897,363	\$13,877,996	\$5,537,194	\$2,249,510	\$8,824,877
		DE	\$161,184,416	\$2,368,432	\$320,000,400	\$5,440	-\$1,088	\$11,967	\$329,684	\$77,598	\$581,770	\$1,234,986	-\$393,193	\$2,863,165	\$1,123,539	\$456,410	\$1,790,668
		DC	\$73,143,904	\$1,078,760	\$145,209,048	\$3,091	-\$617	\$6,800	\$130,097	\$31,997	\$228,198	\$807,431	-\$256,871	\$1,871,732	\$521,248	\$211,744	\$830,752
Т		ME	\$162,391,888	\$2,314,048	\$322,469,728	\$212	-\$43	\$466	\$334,905	\$60,094	\$609,716	\$963,975	-\$308,382	\$2,236,331	\$784,184	\$318,579	\$1,249,789
		MD	\$1,144,223,104	\$16,872,704	\$2,271,573,504	\$54,201	-\$10,824	\$119,225	\$2,163,295	\$536,027	\$3,790,563	\$9,896,141	-\$3,148,336	\$22,940,618	\$8,799,656	\$3,574,652	\$14,024,661
		MA	\$947,392,768	\$13,884,416	\$1,880,901,120	\$33,738	-\$6,751	\$74,227	\$2,320,658	\$571,467	\$4,069,849	\$7,789,591	-\$2,481,541	\$18,060,722	\$6,731,614	\$2,734,722	\$10,728,506
		NH	\$169,792,560	\$2,436,256	\$337,148,864	\$6,877	-\$1,385	\$15,139	\$301,214	\$71,653	\$530,775	\$1,306,720	-\$417,507	\$3,030,947	\$1,117,238	\$453,865	\$1,780,612
		NJ	\$1,612,304,256	\$23,934,720	\$3,200,673,792	\$77,552	-\$15,461	\$170,565	\$3,119,042	\$747,038	\$5,491,046	\$14,034,993	-\$4,460,133	\$32,530,119	\$12,590,035	\$5,114,513	\$20,065,558
		NY	\$3,045,696,000	\$45,089,280	\$6,046,302,720	\$168,154	-\$33,527	\$369,835	\$5,546,286	\$1,454,639	\$9,637,932	\$26,989,458	-\$8,578,974	\$62,557,890	\$23,358,554	\$9,489,191	\$37,227,917
		PA	\$2,893,900,032	\$42,578,432	\$5,745,221,632	\$101,817	-\$20,356	\$223,991	\$4,867,464	\$1,344,991	\$8,389,936	\$18,107,132	-\$5,763,774	\$41,978,038	\$15,923,256	\$6,468,538	\$25,377,974
		RI	\$199,846,656	\$2,969,008	\$396,724,304	\$6,369	-\$1,269	\$14,008	\$381,635	\$92,836	\$670,435	\$1,471,854	-\$467,646	\$3,411,354	\$1,260,400	\$512,030	\$2,008,770
		VT	\$97,971,424	\$1,402,632	\$194,540,216	\$1,808	-\$364	\$3,980	\$141,416	\$19,449	\$263,383	\$604,790	-\$193,343	\$1,402,924	\$502,500	\$204,150	\$800,849
		VA	\$261,539,776	\$3,827,584	\$519,251,968	\$16,100	-\$3,224	\$35,423	\$578,815	\$134,854	\$1,022,776	\$3,835,940	-\$1,222,005	\$8,893,886	\$3,442,579	\$1,398,444	\$5,486,714
4	40 Total			\$170,072,048	\$22,868,899,536	\$509,316	-\$101,640	\$1,120,272	\$21,681,375	\$5,500,972	\$37,861,779	\$93,033,327	-\$29,589,066	\$215,655,720	\$81,691,996	\$33,186,346	\$130,197,645
	65	СТ	\$621,645,568	\$9,145,792	\$1,234,145,344	\$27,981	-\$5,592	\$61,554	\$1,216,396	\$293,028	\$2,139,765	\$4,956,520	-\$1,577,538	\$11,490,577	\$4,550,112	\$1,848,513	\$7,251,711
		DE	\$115,627,536	\$1,668,792	\$229,586,280	\$3,901	-\$785	\$8,587	\$237,327	\$55,897	\$418,756	\$889,202	-\$283,967	\$2,062,371	\$788,419	\$320,281	\$1,256,557
		DC	\$55,228,644	\$800,400	\$109,656,888	\$2,293	-\$461	\$5,047	\$98,962	\$24,145	\$173,779	\$612,139	-\$195,314	\$1,419,592	\$387,512	\$157,418	\$617,605
		ME	\$54,018,252	\$742,676	\$107,293,828	\$114	-\$23	\$252	\$110,462	\$19,424	\$201,500	\$313,428	-\$100,833	\$727,688	\$246,709	\$100,232	\$393,187
		MD	\$997,326,336	\$14,547,456	\$1,980,105,216	\$45,812	-\$9,195	\$100,820	\$1,899,183	\$467,321	\$3,331,045	\$8,899,531	-\$2,835,265	\$20,634,327	\$7,967,047	\$3,236,496	\$12,697,597
		MA	\$793,683,776	\$11,460,544	\$1,575,907,008	\$28,106	-\$5,649	\$61,861	\$1,966,029	\$481,494	\$3,450,564	\$6,525,844	-\$2,083,449	\$15,135,136	\$5,755,207	\$2,338,090	\$9,172,324
		NH	\$142,714,048	\$2,051,680	\$283,376,416	\$6,413	-\$1,289	\$14,115	\$267,436	\$63,510	\$471,363	\$1,210,814	-\$386,523	\$2,808,152	\$1,049,081	\$426,197	\$1,671,965
		NJ	\$1,447,347,456	\$21,265,664	\$2,873,429,248	\$69,855	-\$13,973	\$153,682	\$2,813,830	\$708,712	\$4,918,949	\$12,665,966	-\$4,032,227	\$29,364,159	\$11,411,854	\$4,636,002	\$18,187,706
		NY	\$2,224,221,184	\$32,303,616	\$4,416,138,752	\$132,431	-\$26,575	\$291,437	\$4,088,748	\$1,098,840	\$7,078,656	\$20,259,140	-\$6,461,712	\$46,979,992	\$17,579,448	\$7,141,535	\$28,017,361
		PA	\$2,458,908,928	\$35,804,160	\$4,882,013,696	\$87,436	-\$17,535	\$192,407	\$4,170,160	\$1,148,808	\$7,191,511	\$15,532,896	-\$4,952,378	\$36,018,170	\$13,697,199	\$5,564,374	\$21,830,024
		RI	\$177,630,528	\$2,602,784	\$352,658,272	\$5,724	-\$1,145	\$12,593	\$338,917	\$81,239	\$596,596	\$1,313,108	-\$418,212	\$3,044,429	\$1,122,419	\$455,983	\$1,788,856
		VT	\$17,608,192	\$233,246	\$34,983,138	\$330	-\$68	\$727	\$25,182	\$2,710	\$47,655	\$102,278	-\$33,085	\$237,641	\$85,896	\$34,900	\$136,892
		VA	\$278,852,256	\$4,123,296	\$553,581,216	\$17,230	-\$3,439	\$37,898	\$621,428	\$145,883	\$1,096,973	\$4,112,215	-\$1,307,637	\$9,532,067	\$3,660,107	\$1,486,880	\$5,833,333
6	65 Total			\$136,750,106	\$18,632,875,302	\$427,626	-\$85,729	\$940,981	\$17,854,061	\$4,591,009	\$31,117,112	\$77,393,080	-\$24,668,140	\$179,454,300	\$68,301,008	\$27,746,898	\$108,855,117
	70	СТ	\$598,174,208	\$8,805,824	\$1,187,542,592	\$27,395	-\$5,472	\$60,262	\$1,182,717	\$285,280	\$2,080,154	\$4,840,252	-\$1,540,109	\$11,220,613	\$4,452,616	\$1,808,938	\$7,096,294
		DE	\$40,669,472	\$566,972	\$80,771,972	\$1,153	-\$235	\$2,542	\$91,334	\$20,897	\$161,772	\$268,469	-\$86,361	\$623,299	\$218,003	\$88,558	\$347,448
		DC	\$402,978	\$5,373	\$800,582	\$22	-\$4	\$48	\$626	\$163	\$1,089	\$5,503	-\$1,778	\$12,784	\$4,459	\$1,811	\$7,106
		ME	\$39,692,324	\$539,032	\$78,845,616	\$47	-\$10	\$103	\$75,144	\$15,044	\$135,243	\$231,457	-\$74,602	\$537,516	\$179,563	\$72,953	\$286,174
		MD	\$235,554,272	\$3,204,176	\$467,904,368	\$11,314	-\$2,315	\$24,943	\$455,581	\$106,515	\$804,647	\$2,012,696	-\$648,240	\$4,673,631	\$1,776,124	\$721,499	\$2,830,749
		MA	\$598,376,192	\$8,543,744	\$1,188,208,640	\$21,372	-\$4,309	\$47,054	\$1,498,453	\$359,295	\$2,637,612	\$4,792,455	-\$1,533,094	\$11,118,003	\$4,144,556	\$1,683,777	\$6,605,334
		NH	\$3,509,845	\$45,966	\$6,973,723	\$136	-\$28	\$301	\$6,454	\$1,479	\$11,430	\$27,812	-\$9,012	\$64,636	\$23,877	\$9,700	\$38,054
		NJ	\$1,061,794,816	\$15,248,384	\$2,108,341,248	\$49,633	-\$10,003	\$109,270	\$2,068,118	\$515,142	\$3,621,094	\$9,126,936	-\$2,917,526	\$21,171,398	\$8,153,305	\$3,312,234	\$12,994,376
		NY	\$1,574,211,072	\$22,858,752	\$3,125,563,392	\$95,365	-\$19,205	\$209,935	\$2,923,012	\$777,756	\$5,068,268	\$15,109,460	-\$4,820,728	\$35,039,648	\$12,820,182	\$5,208,249	\$20,432,115
		PA	\$784,301,120	\$10,963,584	\$1,557,638,656	\$26,150	-\$5,308	\$57,607	\$1,326,640	\$338,077	\$2,315,202	\$4,742,594	-\$1,521,579	\$11,006,767	\$3,981,423	\$1,617,408	\$6,345,438
		RI	\$176,304,816	\$2,585,808	\$350,023,824	\$5,561	-\$1,113	\$12,234	\$338,305	\$81,287	\$595,323	\$1,301,242	-\$414,380	\$3,016,863	\$1,110,427	\$451,125	\$1,769,729
		VT	\$9,587	\$126	\$19,047	\$0	\$0	\$0	\$23	\$5	\$40	\$53	-\$17	\$123	\$43	\$17	\$68
1.		VA	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
7	70 Total			\$73,367,741	\$10,152,633,661	\$238,148	-\$48,003	\$524,299	\$9,966,407	\$2,500,940	\$17,431,873	\$42,458,928	-\$13,567,426	\$98,485,281	\$36,864,577	\$14,976,270	\$58,752,884

Table 8: Estimated ozone-related economic impacts (2010\$) following monitor rollback to 70, 65, and 40 ppb for 2013-2016 in the OTR by State

		Mortality, All Cause		pacts (20204) .		toom Visits, Astl			ions, Respirator	y	Any of 19 Respira	ntory Symptoms	School Loss Days			
Level	State	Mean	-2σ	2σ	Mean	-2σ	2σ	Mean	-2σ	2σ	Mean	-2σ	2σ	Mean	-2σ	2σ
40	СТ	\$823,669,632	\$12,663,552	\$1,634,675,712	\$32,244	-\$6,350	\$70,837	\$1,412,732	\$347,980	\$2,477,484	\$5,983,671	-\$1,888,402	\$13,855,743	\$5,294,136	\$1,894,220	\$8,694,051
	DE	\$202,228,192	\$3,112,688	\$401,343,696	\$5,789	-\$1,140	\$12,719	\$365,357	\$86,291	\$644,422	\$1,369,512	-\$432,069	\$3,171,093	\$1,222,333	\$406,026	\$2,038,639
	DC	-\$13,234,753	-\$26,435,010	-\$34,496	-\$615	-\$1,377	\$148	-\$22,369	-\$41,560	-\$3,179	-\$145,467	-\$343,285	\$52,351	-\$99,754	-\$196,317	-\$3,191
	ME	\$221,642,912	\$3,348,096	\$439,937,728	\$227	-\$45	\$499	\$447,813	\$81,351	\$814,275	\$1,186,668	-\$375,638	\$2,748,974	\$932,232	\$346,507	\$1,517,956
	MD	\$1,234,967,296	\$18,749,312	\$2,451,185,280	\$50,960	-\$10,074	\$111,994	\$2,075,881	\$518,641	\$3,633,122	\$9,265,393	-\$2,929,875	\$21,460,661	\$8,247,434	\$2,616,839	\$13,878,028
	MA	\$872,642,688	\$13,256,000	\$1,732,029,376	\$26,955	-\$5,326	\$59,237	\$1,879,470	\$470,503	\$3,288,437	\$6,457,054	-\$2,040,464	\$14,954,571	\$5,432,563	\$1,979,377	\$8,885,749
	NH	\$186,121,040	\$2,803,392	\$369,438,688	\$6,537	-\$1,296	\$14,369	\$292,242	\$71,642	\$512,842	\$1,295,923	-\$410,428	\$3,002,274	\$1,064,440	\$383,447	\$1,745,433
	NJ	\$2,073,911,808	\$31,724,416	\$4,116,099,200	\$88,464	-\$17,441	\$194,369	\$3,501,584	\$924,693	\$6,078,475	\$16,354,677	-\$5,165,535	\$37,874,889	\$14,266,981	\$4,859,600	\$23,674,362
	NY	\$3,253,559,808	\$49,161,472	\$6,457,958,144	\$165,568	-\$32,753	\$363,890	\$5,246,267	\$1,393,662	\$9,098,872	\$26,785,002	-\$8,478,410	\$62,048,414	\$22,155,870	\$7,990,233	\$36,321,507
	PA	\$2,989,001,728	\$45,461,760	\$5,932,541,696	\$95,432	-\$18,859	\$209,723	\$4,376,770	\$1,279,397	\$7,474,142	\$17,699,802	-\$5,596,288	\$40,995,892	\$15,199,289	\$5,236,835	\$25,161,743
	RI	\$201,837,024	\$3,010,352	\$400,663,696	\$5,649	-\$1,124	\$12,423	\$338,513	\$81,482	\$595,544	\$1,363,326	-\$432,804	\$3,159,455	\$1,127,490	\$378,417	\$1,876,564
	VT	\$104,529,056	\$1,547,576	\$207,510,536	\$1,693	-\$338	\$3,723	\$131,951	\$19,211	\$244,691	\$589,881	-\$187,511	\$1,367,273	\$464,618	\$188,761	\$740,475
	VA	\$320,357,824	\$4,836,768	\$635,878,880	\$17,087	-\$3,387	\$37,562	\$628,139	\$148,735	\$1,107,544	\$4,243,567	-\$1,343,944	\$9,831,077	\$3,799,835	\$1,211,922	\$6,387,748
40 Total			\$163,240,374	\$24,779,228,136	\$495,992	-\$99,509	\$1,091,493	\$20,674,349	\$5,382,028	\$35,966,671	\$92,449,008	-\$29,624,650	\$214,522,666	\$79,107,465	\$27,295,867	\$130,919,064
65	СТ	\$661,329,600	\$9,729,600	\$1,312,929,600	\$26,134	-\$5,221	\$57,488	\$1,144,874	\$275,490	\$2,014,257	\$4,871,003	-\$1,550,074	\$11,292,079	\$4,217,563	\$1,713,463	\$6,721,663
	DE	\$181,257,456	\$2,660,032	\$359,854,880	\$5,352	-\$1,070	\$11,773	\$324,435	\$74,685	\$574,185	\$1,279,806	-\$407,438	\$2,967,049	\$1,101,206	\$447,368	\$1,755,044
	DC	\$57,496,168	\$812,964	\$114,179,372	\$2,101	-\$425	\$4,626	\$91,075	\$21,910	\$160,240	\$581,797	-\$186,314	\$1,349,907	\$352,427	\$143,167	\$561,687
	ME	\$39,194,708	\$541,036	\$77,848,380	\$77	-\$16	\$171	\$67,199	\$13,587	\$120,810	\$210,754	-\$67,762	\$489,269	\$155,483	\$63,167	\$247,799
	MD	\$893,904,192	\$12,854,016	\$1,774,954,368	\$37,837	-\$7,624	\$83,299	\$1,484,963	\$360,769	\$2,609,157	\$7,047,087	-\$2,251,281	\$16,345,454	\$5,878,493	\$2,388,065	\$9,368,921
	MA	\$376,192,928	\$5,263,072	\$747,122,784	\$12,183	-\$2,467	\$26,834	\$820,216	\$197,296	\$1,443,136	\$2,815,959	-\$903,454	\$6,535,372	\$2,366,191	\$961,276	\$3,771,106
	NH	\$85,687,400	\$1,191,208	\$170,183,592	\$3,406	-\$692	\$7,505	\$143,224	\$33,126	\$253,323	\$678,713	-\$217,905	\$1,575,332	\$545,541	\$221,630	\$869,451
	NJ	\$1,770,997,248	\$26,136,576	\$3,515,857,920	\$75,362	-\$15,044	\$165,769	\$3,013,734	\$762,818	\$5,264,650	\$14,214,646	-\$4,521,042	\$32,950,334	\$12,053,924	\$4,897,029	\$19,210,819
	NY	\$1,679,304,064	\$24,134,784	\$3,334,473,344	\$111,222	-\$22,341	\$244,786	\$2,775,388	\$771,737	\$4,779,040	\$15,301,212	-\$4,887,542	\$35,489,966	\$12,388,017	\$5,032,650	\$19,743,384
	PA	\$1,933,490,944	\$27,831,424	\$3,839,150,464	\$62,365	-\$12,545	\$137,274	\$2,898,604	\$763,766	\$5,033,442	\$11,660,548	-\$3,723,604	\$27,044,700	\$9,697,673	\$3,939,673	\$15,455,673
	RI	\$45,624,380	\$613,220	\$90,635,540	\$1,229	-\$252	\$2,711	\$75,918	\$16,095	\$135,741	\$307,961	-\$99,401	\$715,322	\$246,764	\$100,238	\$393,289
	VT	\$13,210,044	\$174,112	\$26,245,976	\$231	-\$48	\$510	\$15,687	\$1,930	\$29,444	\$82,784	-\$26,796	\$192,364	\$62,435	\$25,369	\$99,501
	VA	\$213,246,992	\$3,036,544	\$423,457,440	\$10,312	-\$2,085	\$22,709	\$409,082	\$94,834	\$723,331	\$2,636,546	-\$843,958	\$6,117,050	\$2,068,611	\$840,335	\$3,296,887
65 Total			\$114,978,588	\$15,786,893,660	\$347,812	-\$69,830	\$765,455	\$13,264,398	\$3,388,041	\$23,140,755	\$61,688,814	-\$19,686,569	\$143,064,197	\$51,134,326	\$20,773,428	\$81,495,224
70	СТ	\$604,037,824	\$8,877,952	\$1,199,197,696	\$24,398	-\$4,874	\$53,671	\$1,058,763	\$255,030	\$1,862,497	\$4,533,612	-\$1,442,718	\$10,509,941	\$3,948,278	\$1,604,115	\$6,292,441
	DE	\$60,630,992	\$859,540	\$120,402,444	\$2,062	-\$417	\$4,541	\$102,092	\$23,379	\$180,805	\$499,936	-\$160,015	\$1,159,887	\$430,960	\$175,081	\$686,839
	DC	\$22,332,848	\$299,294	\$44,366,402	\$816	-\$168	\$1,800	\$35,902	\$8,349	\$63,455	\$226,751	-\$73,220	\$526,721	\$133,061	\$54,053	\$212,069
	ME	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	MD	\$139,018,736	\$1,919,616	\$276,117,856	\$4,521	-\$921	\$9,963	\$235,151	\$54,263	\$416,040	\$1,168,443	-\$375,792	\$2,712,678	\$991,646	\$402,846	\$1,580,446
	MA	\$36,909,584	\$502,968	\$73,316,200	\$1,613	-\$329	\$3,555	\$79,179	\$18,804	\$139,553	\$257,915	-\$83,056	\$598,887	\$223,923	\$90,969	\$356,877
	NH	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	NJ	\$821,036,928	\$11,623,680	\$1,630,450,176	\$37,995	-\$7,678	\$83,668	\$1,417,851	\$364,387	\$2,471,314	\$7,043,378	-\$2,254,817	\$16,341,573	\$5,777,998	\$2,347,358	\$9,208,638
	NY	\$1,053,095,936	\$14,970,560	\$2,091,221,312	\$84,321	-\$16,994	\$185,635	\$1,738,910	\$483,508	\$2,994,312	\$10,024,740	-\$3,208,701	\$23,258,181	\$7,983,962	\$3,243,583	\$12,724,342
	PA	\$844,264,768	\$12,122,880	\$1,676,406,656	\$29,291	-\$5,899	\$64,482	\$1,293,170	\$355,064	\$2,231,276	\$5,500,947	-\$1,757,817	\$12,759,711	\$4,568,442	\$1,855,989	\$7,280,894
	RI	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	VT	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	VA	\$94,978,976	\$1,277,928	\$188,680,024	\$4,650	-\$954	\$10,254	\$186,022	\$41,706	\$330,338	\$1,196,653	-\$386,266	\$2,779,572	\$935,696	\$380,105	\$1,491,287
70 Total			\$52,454,418	\$7,300,158,766	\$189,667	-\$38,234	\$417,568	\$6,147,040	\$1,604,490	\$10,689,590	\$30,452,374	-\$9,742,403	\$70,647,150	\$24,993,965	\$10,154,098	\$39,833,831

Table 8: Estimated ozone-related economic impacts (2010\$) following monitor rollback to 70, 65, and 40 ppb for 2013-2016 in the OTR by State

		Mortality, All Cause				oom Visits, Ast			sions, Respirator	y	Any of 19 Respira	ntory Symptoms	School Loss Days			
Level	State	Mean	-2σ	2σ	Mean	-2σ	2σ	Mean	-2σ	2σ	Mean	-2σ	2σ	Mean	-2σ	2σ
40	СТ	\$814,833,216	\$12,382,016	\$1,617,284,416	\$35,898	-\$7,097	\$78,893	\$1,608,554	\$392,941	\$2,824,166	\$6,365,076	-\$2,013,226	\$14,743,378	\$5,701,062	\$2,316,056	\$9,086,068
	DE	\$217,442,960	\$3,282,992	\$431,602,928	\$7,092	-\$1,406	\$15,590	\$449,264	\$105,324	\$793,203	\$1,601,357	-\$507,204	\$3,709,918	\$1,444,870	\$586,945	\$2,302,794
	DC	\$101,980,912	\$1,554,280	\$202,407,544	\$4,241	-\$838	\$9,321	\$183,186	\$45,723	\$320,649	\$1,094,138	-\$345,910	\$2,534,186	\$718,307	\$291,797	\$1,144,816
	ME	\$159,522,528	\$2,266,400	\$316,778,656	\$221	-\$45	\$487	\$346,968	\$64,988	\$628,948	\$911,431	-\$291,706	\$2,114,569	\$727,633	\$295,602	\$1,159,663
	MD	\$1,520,464,896	\$23,061,760	\$3,017,868,032	\$71,164	-\$14,070	\$156,398	\$2,900,834	\$759,151	\$5,042,517	\$12,743,066	-\$4,031,941	\$29,518,073	\$11,282,222	\$4,583,168	\$17,981,276
	MA	\$917,608,640	\$13,391,040	\$1,821,826,240	\$32,328	-\$6,478	\$71,135	\$2,288,027	\$560,410	\$4,015,644	\$7,474,708	-\$2,382,847	\$17,332,262	\$6,253,325	\$2,540,284	\$9,966,365
	NH	\$192,920,704	\$2,780,976	\$383,060,432	\$7,595	-\$1,527	\$16,716	\$353,006	\$83,457	\$622,554	\$1,443,086	-\$460,663	\$3,346,834	\$1,190,852	\$483,762	\$1,897,942
	NJ	\$1,985,330,176	\$30,088,576	\$3,940,571,776	\$95,255	-\$18,847	\$209,358	\$3,863,241	\$1,016,830	\$6,709,651	\$16,878,936	-\$5,341,564	\$39,099,436	\$14,902,417	\$6,053,869	\$23,750,965
	NY	\$3,440,701,952	\$51,514,112	\$6,829,889,792	\$193,910	-\$38,431	\$426,252	\$6,317,263	\$1,660,919	\$10,973,606	\$29,969,736	-\$9,502,508	\$69,441,980	\$25,529,380	\$10,371,022	\$40,687,738
	PA	\$3,479,167,744	\$52,121,600	\$6,906,213,888	\$122,167	-\$24,264	\$268,599	\$5,893,049	\$1,644,499	\$10,141,598	\$21,613,038	-\$6,854,194	\$50,080,270	\$18,745,974	\$7,615,212	\$29,876,736
	RI	\$223,557,968	\$3,351,200	\$443,764,736	\$7,001	-\$1,391	\$15,394	\$430,647	\$103,628	\$757,666	\$1,616,329	-\$512,654	\$3,745,311	\$1,342,207	\$545,255	\$2,139,158
	VT	\$101,697,480	\$1,454,400	\$201,940,560	\$1,816	-\$366	\$3,997	\$151,095	\$21,272	\$280,918	\$607,553	-\$194,241	\$1,409,347	\$490,018	\$199,078	\$780,957
	VA	\$371,004,704	\$5,592,896	\$736,416,512	\$21,833	-\$4,331	\$47,998	\$837,748	\$198,349	\$1,477,148	\$5,169,783	-\$1,638,031	\$11,977,596	\$4,618,157	\$1,876,008	\$7,360,306
40 Total			\$202,842,248	\$26,849,625,512	\$600,523	-\$119,090	\$1,320,137	\$25,622,879	\$6,657,492	\$44,588,266	\$107,488,235	-\$34,076,689	\$249,053,160	\$92,946,422	\$37,758,059	\$148,134,785
65	СТ	\$666,502,848	\$9,854,528	\$1,323,151,168	\$29,252	-\$5,837	\$64,340	\$1,313,984	\$321,154	\$2,306,814	\$5,206,953	-\$1,655,774	\$12,069,680	\$4,628,171	\$1,880,208	\$7,376,133
	DE	\$192,948,272	\$2,885,328	\$383,011,216	\$6,434	-\$1,278	\$14,147	\$394,480	\$91,876	\$697,084	\$1,461,381	-\$463,518	\$3,386,280	\$1,316,942	\$534,997	\$2,098,887
	DC	\$92,485,544	\$1,389,144	\$183,581,944	\$3,853	-\$765	\$8,472	\$166,490	\$41,242	\$291,738	\$994,589	-\$315,311	\$2,304,489	\$651,774	\$264,777	\$1,038,771
	ME	\$39,556,540	\$539,888	\$78,573,192	\$50	-\$10	\$110	\$89,192	\$14,122	\$164,263	\$210,198	-\$67,723	\$488,119	\$162,692	\$66,098	\$259,287
	MD	\$1,409,804,672	\$21,146,112	\$2,798,463,232	\$65,472	-\$12,996	\$143,940	\$2,694,680	\$667,134	\$4,722,226	\$11,881,098	-\$3,766,903	\$27,529,099	\$10,512,401	\$4,270,574	\$16,754,228
	MA	\$491,604,384	\$6,998,784	\$976,209,984	\$17,096	-\$3,447	\$37,638	\$1,236,512	\$296,192	\$2,176,833	\$3,651,582	-\$1,168,616	\$8,471,781	\$3,123,007	\$1,268,690	\$4,977,324
	NH	\$44,491,584	\$597,548	\$88,385,620	\$1,574	-\$323	\$3,470	\$81,447	\$18,635	\$144,260	\$303,818	-\$98,095	\$705,731	\$240,842	\$97,849	\$383,835
	NJ	\$1,755,764,608	\$26,155,008	\$3,485,374,208	\$83,682	-\$16,656	\$184,020	\$3,413,000	\$866,739	\$5,959,261	\$14,911,458	-\$4,735,036	\$34,557,952	\$13,115,588	\$5,328,112	\$20,903,064
	NY	\$2,325,110,528	\$34,014,464	\$4,616,206,592	\$143,385	-\$28,669	\$315,439	\$4,292,461	\$1,149,622	\$7,435,299	\$20,889,128	-\$6,654,102	\$48,432,358	\$17,801,632	\$7,231,761	\$28,371,503
	PA	\$3,219,975,424	\$47,866,112	\$6,392,084,736	\$112,330	-\$22,374	\$247,034	\$5,464,575	\$1,519,520	\$9,409,631	\$19,877,094	-\$6,314,190	\$46,068,378	\$17,265,880	\$7,014,172	\$27,517,588
	RI	\$185,051,536	\$2,711,184	\$367,391,888	\$5,764	-\$1,154	\$12,681	\$358,182	\$85,145	\$631,218	\$1,341,731	-\$427,352	\$3,110,813	\$1,108,443	\$450,298	\$1,766,588
	VT	\$44,515,992	\$608,460	\$88,423,524	\$844	-\$172	\$1,860	\$60,257	\$8,011	\$112,502	\$292,480	-\$94,107	\$679,068	\$237,482	\$96,484	\$378,481
	VA	\$351,334,592	\$5,252,608	\$697,416,576	\$20,748	-\$4,126	\$45,623	\$792,583	\$186,427	\$1,398,740	\$4,903,496	-\$1,556,095	\$11,363,086	\$4,421,007	\$1,795,987	\$7,046,027
65 Total			\$160,019,168	\$21,478,273,880	\$490,483	-\$97,806	\$1,078,773	\$20,357,843	\$5,265,817	\$35,449,868	\$85,925,006	-\$27,316,821	\$199,166,833	\$74,585,860	\$30,300,006	\$118,871,715
70	СТ	\$734,515,840	\$11,000,448	\$1,458,031,232	\$32,306	-\$6,418	\$71,030	\$1,450,157	\$351,330	\$2,548,985	\$5,743,407	-\$1,821,766	\$13,308,579	\$5,123,527	\$2,081,476	\$8,165,577
	DE	\$124,563,064	\$1,794,272	\$247,331,856	\$4,005	-\$807	\$8,816	\$259,990	\$60,754	\$459,225	\$913,216	-\$291,794	\$2,118,226	\$794,662	\$322,807	\$1,266,517
	DC	\$91,195,712	\$1,369,680	\$181,021,744	\$3,776	-\$750	\$8,302	\$164,470	\$40,745	\$288,196	\$980,079	-\$310,721	\$2,270,879	\$638,569	\$259,412	\$1,017,726
	ME	\$1,574,884	\$20,667	\$3,129,101	\$4	-\$1	\$10	\$4,653	\$977	\$8,329	\$8,658	-\$2,805	\$20,122	\$6,385	\$2,595	\$10,176
	MD	\$1,104,352,128	\$16,468,480	\$2,192,235,776	\$55,850	-\$11,099	\$122,798	\$2,060,581	\$519,306	\$3,601,855	\$9,516,384	-\$3,021,841	\$22,054,609	\$8,317,292	\$3,378,786	\$13,255,798
	MA	\$238,223,696	\$3,328,432	\$473,118,960	\$8,833	-\$1,790	\$19,457	\$612,265	\$146,192	\$1,078,338	\$1,754,579	-\$562,953	\$4,072,111	\$1,512,135	\$614,282	\$2,409,987
	NH	\$11,666,236	\$155,381	\$23,177,091	\$285	-\$59	\$629	\$19,239	\$4,405	\$34,073	\$55,917	-\$18,076	\$129,911	\$41,698	\$16,942	\$66,454
	NJ	\$1,801,618,560	\$27,074,816	\$3,576,162,304	\$88,010	-\$17,451	\$193,470	\$3,503,864	\$898,770	\$6,108,959	\$15,618,738	-\$4,949,316	\$36,186,792	\$13,730,891	\$5,578,138	\$21,883,645
	NY	\$2,278,637,824	\$33,829,120	\$4,523,446,528	\$154,739	-\$30,776	\$340,255	\$4,206,002	\$1,187,116	\$7,224,887	\$21,323,144	-\$6,774,136	\$49,420,424	\$18,198,010	\$7,392,896	\$29,003,124
	PA	\$1,783,733,504	\$26,003,584	\$3,541,463,424	\$66,221	-\$13,263	\$145,704	\$3,099,164	\$857,034	\$5,341,293	\$11,718,100	-\$3,733,740	\$27,169,940	\$10,104,278	\$4,104,693	\$16,103,863
	RI	\$207,129,504	\$3,079,936	\$411,179,072	\$6,408	-\$1,277	\$14,093	\$399,568	\$95,874	\$703,262	\$1,496,370	-\$475,370	\$3,468,110	\$1,238,521	\$503,149	\$1,973,893
	VT	\$11,979,914	\$158,262	\$23,801,566	\$218	-\$45	\$480	\$17,054	\$2,200	\$31,908	\$68,672	-\$22,224	\$159,567	\$56,325	\$22,885	\$89,764
	VA	\$280,370,720	\$4,143,360	\$556,598,080	\$16,280	-\$3,254	\$35,813	\$642,029	\$150,848	\$1,133,210	\$3,915,292	-\$1,245,835	\$9,076,420	\$3,314,271	\$1,346,351	\$5,282,191
70 Total			\$128,426,438	\$17,210,696,734	\$436,934	-\$86,989	\$960,857	\$16,439,036	\$4,315,551	\$28,562,521	\$73,112,556	-\$23,230,578	\$169,455,690	\$63,076,564	\$25,624,412	\$100,528,715

Table 8: Estimated ozone-related economic impacts (2010\$) following monitor rollback to 70, 65, and 40 ppb for 2013-2016 in the OTR by State

o o: =o:.		Mortality, All Cause		pacts (20204) .		loom Visits, Ast			ions, Respirator	y	Any of 19 Respira	atory Symptoms				
Level	State	Mean	-2σ	2σ	Mean	-2σ	2σ	Mean	-2σ	2σ	Mean	-2σ	2σ	Mean	-2σ	2σ
40	СТ	\$929,629,312	\$14,181,184	\$1,845,077,440	\$34,790	-\$6,871	\$76,452	\$1,591,080	\$394,638	\$2,787,522	\$6,506,411	-\$2,056,761	\$15,069,583	\$5,437,324	\$2,208,941	\$8,665,708
	DE	\$246,596,032	\$3,717,504	\$489,474,560	\$6,907	-\$1,369	\$15,184	\$444,656	\$103,875	\$785,437	\$1,641,464	-\$519,989	\$3,802,917	\$1,398,535	\$568,125	\$2,228,945
	DC	\$97,975,200	\$1,471,880	\$194,478,520	\$3,505	-\$696	\$7,707	\$154,316	\$38,140	\$270,492	\$952,478	-\$301,950	\$2,206,905	\$600,874	\$244,088	\$957,661
	ME	\$164,763,760	\$2,325,344	\$327,202,176	\$205	-\$41	\$450	\$311,625	\$58,068	\$565,182	\$850,256	-\$272,366	\$1,972,878	\$639,041	\$259,609	\$1,018,474
	MD	\$1,668,289,920	\$25,214,336	\$3,311,365,504	\$66,571	-\$13,176	\$146,318	\$2,805,323	\$732,447	\$4,878,199	\$12,496,577	-\$3,957,170	\$28,950,324	\$10,464,267	\$4,250,874	\$16,677,661
	MA	\$1,161,696,896	\$17,092,864	\$2,306,300,928	\$34,826	-\$6,960	\$76,612	\$2,519,083	\$618,033	\$4,420,133	\$8,508,846	-\$2,708,775	\$19,726,467	\$6,688,404	\$2,717,116	\$10,659,692
	NH	\$217,713,120	\$3,155,264	\$432,270,976	\$7,356	-\$1,476	\$16,187	\$350,889	\$83,466	\$618,312	\$1,470,764	-\$469,055	\$3,410,583	\$1,137,700	\$462,181	\$1,813,219
	NJ	\$2,218,380,032	\$33,500,672	\$4,403,259,392	\$90,886	-\$18,013	\$199,785	\$3,759,530	\$988,716	\$6,530,343	\$17,102,628	-\$5,416,608	\$39,621,864	\$14,248,303	\$5,788,140	\$22,708,466
	NY	\$3,862,450,688	\$57,447,168	\$7,667,454,208	\$184,719	-\$36,726	\$406,165	\$6,206,629	\$1,628,925	\$10,784,334	\$30,507,766	-\$9,685,714	\$70,701,246	\$24,451,384	\$9,932,982	\$38,969,786
	PA	\$3,923,023,616	\$58,549,504	\$7,787,497,728	\$118,106	-\$23,484	\$259,696	\$5,804,571	\$1,611,669	\$9,997,474	\$21,983,694	-\$6,976,440	\$50,943,828	\$17,986,364	\$7,306,609	\$28,666,119
	RI	\$250,036,560	\$3,748,848	\$496,324,272	\$6,815	-\$1,353	\$14,983	\$420,304	\$100,061	\$740,548	\$1,639,342	-\$519,901	\$3,798,584	\$1,271,193	\$516,411	\$2,025,974
	VT	\$109,333,152	\$1,567,464	\$217,098,840	\$1,670	-\$336	\$3,676	\$144,001	\$20,735	\$267,267	\$582,098	-\$186,047	\$1,350,244	\$440,456	\$178,943	\$701,970
	VA	\$405,839,488	\$6,082,880	\$805,596,096	\$20,324	-\$4,039	\$44,686	\$802,349	\$188,806	\$1,415,893	\$5,062,631	-\$1,605,980	\$11,731,241	\$4,291,529	\$1,743,306	\$6,839,753
40 Total			\$228,054,912	\$30,283,400,640	\$576,679	-\$114,542	\$1,267,901	\$25,314,355	\$6,567,577	\$44,061,133	\$109,304,954	-\$34,676,755	\$253,286,663	\$89,055,374	\$36,177,323	\$141,933,425
65	СТ	\$749,387,072	\$11,091,968	\$1,487,682,176	\$27,920	-\$5,570	\$61,409	\$1,286,315	\$313,921	\$2,258,708	\$5,244,680	-\$1,667,650	\$12,157,009	\$4,343,595	\$1,764,602	\$6,922,588
	DE	\$229,414,560	\$3,422,144	\$455,406,976	\$6,429	-\$1,279	\$14,138	\$413,411	\$97,770	\$729,052	\$1,526,949	-\$484,725	\$3,538,622	\$1,307,331	\$531,087	\$2,083,576
	DC	\$94,993,352	\$1,422,296	\$188,564,408	\$3,401	-\$676	\$7,478	\$149,649	\$36,925	\$262,372	\$923,511	-\$292,964	\$2,139,985	\$583,018	\$236,842	\$929,195
	ME	\$39,350,168	\$534,956	\$78,165,380	\$58	-\$12	\$128	\$70,604	\$14,088	\$127,119	\$201,526	-\$64,947	\$468,000	\$144,046	\$58,519	\$229,573
	MD	\$1,515,896,576	\$22,608,384	\$3,009,184,768	\$60,158	-\$11,963	\$132,279	\$2,541,355	\$625,389	\$4,457,321	\$11,454,567	-\$3,635,869	\$26,545,003	\$9,572,077	\$3,888,515	\$15,255,639
	MA	\$985,670,464	\$14,320,448	\$1,957,020,480	\$28,655	-\$5,750	\$63,060	\$2,133,225	\$520,710	\$3,745,740	\$6,967,822	-\$2,223,093	\$16,158,736	\$5,557,351	\$2,257,674	\$8,857,028
	NH	\$114,046,088	\$1,584,184	\$226,507,992	\$3,964	-\$806	\$8,734	\$186,117	\$42,888	\$329,346	\$797,881	-\$256,183	\$1,851,945	\$620,518	\$252,084	\$988,952
	NJ	\$1,948,979,200	\$28,966,528	\$3,868,991,872	\$81,199	-\$16,168	\$178,566	\$3,297,223	\$834,248	\$5,760,199	\$15,249,464	-\$4,843,454	\$35,342,382	\$12,631,798	\$5,131,542	\$20,132,054
	NY	\$3,430,339,840	\$50,567,680	\$6,810,112,000	\$174,052	-\$34,665	\$382,770	\$5,429,092	\$1,467,317	\$9,390,866	\$27,566,160	-\$8,765,776	\$63,898,096	\$21,962,540	\$8,922,099	\$35,002,981
	PA	\$3,433,818,624	\$50,692,096	\$6,816,945,152	\$103,265	-\$20,612	\$227,141	\$5,085,920	\$1,405,436	\$8,766,404	\$19,256,676	-\$6,124,464	\$44,637,816	\$15,703,287	\$6,379,272	\$25,027,302
	RI	\$220,013,424	\$3,245,520	\$436,781,328	\$5,994	-\$1,197	\$13,185	\$371,101	\$87,701	\$654,502	\$1,445,787	-\$459,939	\$3,351,514	\$1,116,808	\$453,701	\$1,779,916
	VT	\$36,160,636	\$501,964	\$71,819,308	\$509	-\$103	\$1,121	\$53,022	\$6,684	\$99,359	\$165,476	-\$53,162	\$384,115	\$124,533	\$50,594	\$198,472
	VA	\$398,120,768	\$5,946,720	\$790,294,816	\$20,162	-\$4,010	\$44,335	\$789,615	\$185,090	\$1,394,141	\$5,010,166	-\$1,590,042	\$11,610,374	\$4,289,130	\$1,742,394	\$6,835,865
65 Total			\$194,904,888	\$26,197,476,656	\$515,766	-\$102,811	\$1,134,343	\$21,806,648	\$5,638,167	\$37,975,128	\$95,810,665	-\$30,462,266	\$222,083,595	\$77,956,033	\$31,668,925	\$124,243,140
70	СТ	\$848,786,496	\$12,771,008	\$1,684,801,984	\$31,666	-\$6,283	\$69,615	\$1,453,733	\$357,913	\$2,549,554	\$5,934,736	-\$1,881,096	\$13,750,568	\$4,934,402	\$2,004,706	\$7,864,098
	DE	\$165,834,432	\$2,431,968	\$329,236,896	\$4,630	-\$927	\$10,187	\$299,483	\$70,673	\$528,293	\$1,107,542	-\$352,791	\$2,567,876	\$916,727	\$372,411	\$1,461,042
	DC	\$66,452,124	\$957,492	\$131,946,756	\$2,374	-\$478	\$5,226	\$105,662	\$25,519	\$185,805	\$651,849	-\$208,169	\$1,511,867	\$404,596	\$164,358	\$644,835
	ME	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
	MD	\$1,379,350,528	\$20,559,872	\$2,738,141,184	\$58,088	-\$11,535	\$127,710	\$2,333,809	\$594,556	\$4,073,062	\$10,321,243	-\$3,278,487	\$23,920,973	\$8,593,847	\$3,491,201	\$13,696,493
	MA	\$602,347,136	\$8,663,488	\$1,196,030,784	\$18,179	-\$3,653	\$40,010	\$1,319,270	\$319,042	\$2,319,497	\$4,190,172	-\$1,338,697	\$9,719,042	\$3,401,384	\$1,381,821	\$5,420,946
	NH	\$3,369,719	\$44,626	\$6,694,813	\$78	-\$16	\$173	\$4,630	\$1,041	\$8,219	\$17,364	-\$5,618	\$40,346	\$13,368	\$5,430	\$21,305
	NJ	\$1,762,382,720	\$26,097,280	\$3,498,668,160	\$71,471	-\$14,259	\$157,200	\$3,005,921	\$762,396	\$5,249,446	\$13,755,847	-\$4,372,941	\$31,884,635	\$11,445,564	\$4,649,748	\$18,241,380
	NY	\$2,234,221,056	\$32,479,744	\$4,435,962,368	\$114,371	-\$22,992	\$251,735	\$3,669,335	\$979,912	\$6,358,758	\$18,851,656	-\$6,011,466	\$43,714,778	\$15,043,089	\$6,111,162	\$23,975,016
	PA	\$2,314,386,688	\$33,593,344	\$4,595,180,032	\$73,462	-\$14,730	\$161,655	\$3,518,645	\$964,804	\$6,072,487	\$13,649,374	-\$4,351,682	\$31,650,430	\$11,294,078	\$4,588,110	\$18,000,047
	RI	\$246,691,376	\$3,693,232	\$489,689,520	\$6,743	-\$1,340	\$14,826	\$414,147	\$98,033	\$730,261	\$1,619,272	-\$513,675	\$3,752,218	\$1,256,106	\$510,311	\$2,001,901
	VT	\$4,282,186	\$57,237	\$8,507,134	\$61	-\$13	\$135	\$5,889	\$538	\$11,240	\$20,132	-\$6,503	\$46,767	\$14,392	\$5,846	\$22,937
	VA	\$259,242,608	\$3,749,904	\$514,735,312	\$12,221	-\$2,460	\$26,902	\$508,469	\$118,086	\$898,852	\$3,107,101	-\$992,278	\$7,206,479	\$2,460,522	\$999,523	\$3,921,520
70 Total		\$9,887,347,069	\$145,099,195	\$19,629,594,943	\$393,345	-\$78,685	\$865,375	\$16,638,993	\$4,292,512	\$28,985,474	\$73,226,288	-\$23,313,403	\$169,765,979	\$59,778,074	\$24,284,628	\$95,271,519