



west virginia department of environmental protection

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## **Appendix K: NO<sub>x</sub> Emissions per Source Classification Code (SCC)**

West Virginia Division of Air Quality  
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Charleston, WV 25304

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Promoting a healthy environment.

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## **Emission Inventory Documentation**

The National Emissions Inventory (NEI) is a comprehensive and detailed estimate of air emissions of criteria pollutants, criteria precursors, and hazardous air pollutants (HAP) from air emissions sources. The NEI is released every three years (i.e., 2008, 2011, 2014 . . .) based primarily upon data provided by State, Local, and Tribal (SLT) air agencies for point, non-point, and mobile sources in their jurisdictions and supplemented by data developed by the EPA. The NEI is built using the Emissions Inventory System (EIS) first to collect the data from SLT air agencies and then to blend that data with other data sources.

The EPA also maintains a database of current emissions trends data, which includes annual data estimates for TIER 1 Categories for 1990 through 2016. Off year trends data, such as 2015 and 2016, are estimated by the EPA and are not based on actual SLT submitted data for those years.

The 2014, 2015, and 2016 NO<sub>x</sub> emissions provided below in Table “NEI Trends Data (Unmodified), TIER 1” (on page A-18) were last updated on September 19, 2017 from the NEI Air Pollutant Emissions Trends Data website. The methodology for estimating emissions is continually changing with the advancement of knowledge regarding emissions from sources and revisions to the EPA’s emission estimating tools. West Virginia reviewed this data for potential errors and updated emission calculations. West Virginia determined that the 2014 emissions and the 2015 and 2016 projections for the Petroleum and Related Industry category were overestimated due to the use of the 2014 NEI Version 1 as the basis. Therefore, West Virginia updated the data for 2014, 2015 and 2016 in Table “NEI Trends Data (WV modified Petroleum & Related Industries), TIER 1” (on page A-19) for the Petroleum and Related Industry category, as described below.

At the time of this proposal (November 2017), the EPA has not finalized Version 2 of the 2014 National Emissions Inventory (NEI). Therefore, the Version 1 data set was used as the basis for projections in the EPA's NEI trends data.

West Virginia utilizes the EPA's various emission estimating tools, such as the Oil and Gas Tool. For the 2014 NEI Version 1 submittal, West Virginia used the beta version of the Oil and Gas Tool to estimate the non-point Oil and Gas production and exploration activity emissions. After the Version 1 submittal, the EPA's software contractor made numerous tool corrections, improvements, and enhancements. This revision (2.1) to the Oil and Gas Tool incorporates the current and most accurate data and assumptions available. A list of Oil and Gas Tool production and exploration revisions are presented below.

In May 2017, West Virginia re-submitted the 2014 Oil and Gas emissions for the NEI Version 2 using the previous beta version's activity data and the Oil and Gas Tool, Version 2.1. The 2014 Version 2 NO<sub>x</sub> emissions estimates were significantly reduced as compared to the NEI Version 1 and are more consistent with the 2011 Oil and Gas NO<sub>x</sub> emissions when considering changes in production and exploration. Version 2.1 of the Tool was also used to estimate 2015 and 2016 NO<sub>x</sub> emissions using actual 2015 and 2016 West Virginia production and exploration activity data. In addition, point Oil and Gas sources are inventoried annually by the WVDAQ. These actual point source emissions for 2014, 2015, and 2016 and the non-point Oil and Gas NO<sub>x</sub> emissions estimated by the Tool were summed for each year to represent the total Petroleum & Related Industry NO<sub>x</sub> emissions.

NO<sub>x</sub> emissions were revised to: 25,885 tons (2014), 25,953 tons (2015) and 28,046 tons (2016) and are reflected in the Petroleum & Related Industry TIER 1 category. Point and non-point emission source's NO<sub>x</sub> emissions per SCC are also shown below.

**EPA's Revision Log for the Oil and Gas Tool (Production):**

ID	Change	Change Date	Version
1	Recode Tool to allow for State-Basin-Level-Attainment Status Efs for Hydraulic Fracturing	09-Sep-15	1.0
2	Recode Tool to allow for State-Basin-Level-Attainment Status Efs for Well Completions	09-Sep-15	1.0
3	Recode Tool to allow for State-Basin-Level-Attainment Status Efs for Mud Degassing	09-Sep-15	1.0
4	Recode Tool to allow for State-Basin-Level-Attainment Status Efs for Drilling	09-Sep-15	1.0
5	Recode Tool to display 2011 Data in the Drilling, Mud Degassing, Hydraulic Fracturing, and Well Completions data forms	14-Sep-15	1.0
6	Recode Tool to display 2011 Data in the Hydraulic Fracturing basin data forms	14-Sep-15	1.0
7	Recode Tool to display 2011 Data in the Well Completions basin data forms	14-Sep-15	1.0
8	Recode Tool to display 2011 Data in the Mud Degassing basin data forms	14-Sep-15	1.0
9	Recode Tool to display 2011 Data in the Drill Rigs basin data forms	14-Sep-15	1.0
10	Developed Reference Builder	01-Oct-15	1.0
11	Developed Import/Export Routine for activity and basin data forms	01-Oct-15	1.0
12	Updated VOC EF for Well Completions from 0.09 LB/MMBTU to 0.57 LB/MMBTU	01-Oct-15	1.0
13	Updated WELL_COMP_FRACTION_WITH_FLARING from 0.2843423 to 0.83	01-Oct-15	1.0
14	Updated WELL_COMP_CBM_WT_FRACTION_H2S and WELL_COMP_GAS_WT_FRACTION_H2S from 0.03553 to 0.0006	01-Oct-15	1.0
15	Updated WELL_COMP_OIL_UNCONV_VOL_GAS_VENTED for EPA default counties from null to 999	12-Oct-15	1.0
16	Removed Bedford City, VA (FIPS = 51515); officially subsumed into Bedford County (FIPS = 51019)	04-Nov-15	1.0
17	Updated 2014 Well Completion, Spud Counts, and Estimated Feet Drilled from HPDI and several state OGC databases	10-Nov-15	1.0
18	Updated Hydraulic Fracturing basin factors for TX	24-Feb-16	1.1
19	Updated Hydraulic Fracturing basin factors for Permian Basin in NM	24-Feb-16	1.1

ID	Change	Change Date	Version
20	Updated Mud Degassing basin speciation factors for TX	02-Mar-16	1.1
21	Updated Mud Degassing basin speciation factors for Permian Basin in NM	02-Mar-16	1.1
22	Revised and updated the Well Completion Activity Data equation; error in Green Completion term.	09-May-16	1.2
23	Minor corrections to two Subpart W identifiers: 1) identified FIPS = 02170 to Copper River Basin; and 2) added Subpart Basin ID = 890 to the Arctic Coastal Plains Province Subpart W Basin	09-May-16	1.2
24	Corrected spud counts and feet drilled for Payette County, ID	20-May-16	1.5
25	Added spud counts and feet drilled for Virginia	25-Jun-16	1.5
26	Updated spud counts and feet drilled for Alabama	25-Jun-16	1.5
27	Updated spud counts and feet drilled for Louisiana	25-Jun-16	1.5
28	Updated spud counts and feet drilled for Texas	25-Jun-16	1.5
29	Updated spud counts for Michigan	25-Jun-16	1.5
30	Updated Hydraulic Fracturing Emissions Equations to use unconventional wells that were spudded in 2014 as the input parameter	27-Jun-16	1.5
31	Updated gas composition data from EPA SPECIATE 4.5, Profile 95417 for 5 Uinta Basin counties in Utah for Well Completions at gas wells.	07-Jul-16	1.5
32	Updated VOC and formaldehyde emission factors for Well Completions based on December 2016 update of EPA's AP-42 Chapter 13.5	06-Feb-17	2.0
33	Updated speciation factors from SPECIATE4.5 and BOEM for Well Completions	07-Feb-17	2.0
34	Updated Activity data from HPDI for states which did not provide data	15-Feb-17	2.0
35	Revised the activity data to account for double-counting in certain counties	20-Feb-17	2.1
36	Updated the Export buttons on Well Completions and Mud Degassing Basin Factor Forms	27-Mar-17	2.2
37	Updated the Well Completion basin factors for the EPA Default Value and reference for select counites	24-Apr-17	2.2

ID	Change	Change Date	Version
38	Minor corrections in the Dashboard appearance	05-May-17	2.2
39	Updated basin and speciation factors for the Permian and San Juan basins in New Mexico based on WRAP and NM inputs	30-May-17	2.2
40	Updated the Tool with Drilling and Well Completion activity data for WV	23-Jun-17	2.2
41	Corrected Well Completions Flaring Capture Efficiency from 1 to 100 for the San Juan Basin in New Mexico	21-Aug-17	2.3



**EPA's Revision Log for the Oil and Gas Tool (Exploration):**

<b>ID</b>	<b>Change</b>	<b>Change Date</b>	<b>Version</b>
<b>1</b>	Recode Tool to allow for State-Basin-Level-Attainment Status Efs for Hydraulic Fracturing	09-Sep-15	1.0
<b>1</b>	Updated Activity data from HPDI for states which did not provide data	08-Sep-15	1.0
<b>2</b>	Recode Tool to allow for State-Basin-Level-Attainment Status Efs for Artificial Lifts	08-Sep-15	1.0
<b>3</b>	Recode Tool to allow for State-Basin-Level-Attainment Status Efs for Wellhead Compressors	08-Sep-15	1.0
<b>4</b>	Recode Tool to allow for State-Basin-Level-Attainment Status Efs for Lateral Compressors	08-Sep-15	1.0
<b>5</b>	Recode Tool to allow for State-Basin-Level-Attainment Status Efs for Heaters	09-Sep-15	1.0
<b>6</b>	Recode Tool to allow for State-Basin-Level-Attainment Status Efs for Condensate Tanks	09-Sep-15	1.0
<b>7</b>	Recode Tool to allow for State-Basin-Level-Attainment Status Efs for Dehydrators	09-Sep-15	1.0
<b>8</b>	Recode Tool to allow for State-Basin-Level-Attainment Status Efs for Liquids Unloading	09-Sep-15	1.0
<b>9</b>	Recode Tool to allow for State-Basin-Level-Attainment Status Efs for Associated Gas	09-Sep-15	1.0
<b>10</b>	Recode Tool to allow for State-Basin-Level-Attainment Status Efs for Crude Oil Tanks	09-Sep-15	1.0
<b>11</b>	Recode Tool to allow for State-Basin-Level-Attainment Status Efs for Fugitives	09-Sep-15	1.0
<b>12</b>	Updated NOx EF for Heaters and Dehydrator-Reboiler from 100 LB/E6FT3S to 58.2 LB/E6FT3S	28-Sep-15	1.0
<b>13</b>	Recode Tool to display 2011 Data in the Oil, CBM, NG, and Produced Water data forms	28-Sep-15	1.0
<b>14</b>	Recode Tool to display 2011 Data in the Artificial Lifts basin data forms	28-Sep-15	1.0
<b>15</b>	Recode Tool to display 2011 Data in the Wellhead Compressors basin data forms	28-Sep-15	1.0
<b>16</b>	Recode Tool to display 2011 Data in the Lateral/Gathering Compressors basin data forms	28-Sep-15	1.0
<b>17</b>	Recode Tool to display 2011 Data in the Heaters basin data forms	28-Sep-15	1.0
<b>18</b>	Recode Tool to display 2011 Data in the Condensate Tanks basin data forms	28-Sep-15	1.0
<b>19</b>	Recode Tool to display 2011 Data in the Dehydrators basin data forms	28-Sep-15	1.0

ID	Change	Change Date	Version
20	Recode Tool to display 2011 Data in the Pneumatic Devices basin data forms	28-Sep-15	1.0
21	Recode Tool to display 2011 Data in the Associated Gas basin data forms	28-Sep-15	1.0
22	Recode Tool to display 2011 Data in the Crude Oil Tanks basin data forms	28-Sep-15	1.0
23	Recode Tool to display 2011 Data in the Liquids Unloading basin data forms	28-Sep-15	1.0
24	Recode Tool to display 2011 Data in the Gas-Actuated Pumps basin data forms	28-Sep-15	1.0
25	Recode Tool to display 2011 Data in the Loading Operations basin data forms	28-Sep-15	1.0
26	Recode Tool to display 2011 Data in the Produced Water basin data forms	28-Sep-15	1.0
27	Recode Tool to display 2011 Data in the Fugitives basin data forms	28-Sep-15	1.0
28	Updated VOC EF for Condensate Tanks, Dehydrators-Flare, Liquids Unloading, Associated Gas, and Crude Oil Tanks from 0.09 LB/MMBTU to 0.57 LB/MMBTU	28-Sep-15	1.0
29	Updated H2S Weight fraction for Liquids Unloading for WV from 0.03553 to 0.0006	28-Sep-15	1.0
30	Updated Pneumatic device count for oil wells, high and low bleed for EPA defaulted counties only	28-Sep-15	1.0
31	Developed Reference Builder	30-Sep-15	1.0
32	Updated WV Basin Factor data	30-Sep-15	1.0
33	Added Import/Export Excel tables to the Basin Factors Forms	09-Oct-15	1.0
34	Added Point Source Activity Adjustment Holding Tables	15-Oct-15	1.0
35	Added Point Source Emissions Adjustment Holding Tables	16-Oct-15	1.0
36	Update County-level temperatures for 2014	30-Oct-15	1.0
37	Removed Bedford City, VA (FIPS = 51515); officially subsumed into Bedford County (FIPS = 51019)	04-Nov-15	1.0
38	Incorporated 2014 Subpart W data into the Associated Gas, Condensate Tanks, Crude Oil Tanks, Heaters, and Pneumatic Devices basin factor tables	03-Dec-15	1.0
39	Minor code fixes related to point source activity adjustments	06-Feb-16	1.1
40	Updated production data for TX	10-Feb-16	1.1
41	Updated production data for KS	10-Feb-16	1.1

ID	Change	Change Date	Version
42	Updated Pneumatic Devices, Fugitives, and Gas-Actuated Pump speciation data for KS	10-Feb-16	1.1
43	Updated Basin Factors for Pneumatic Devices for oil, gas, and CBM wells for TX	19-Feb-16	1.1
44	Updated Basin Factors for Fugitive Composition Profile for gas and CBM wells for TX	02-Mar-16	1.1
45	Updated Basin Factors for Fugitive Composition Profile for gas and CBM wells for Permian NM	02-Mar-16	1.1
46	Updated Basin Factors for Dehydrator basin factors TX	02-Mar-16	1.1
47	Updated Basin Factors for Dehydrator basin factors for Permian NM	02-Mar-16	1.1
48	Minor code fixes related to dehydrators	02-Mar-16	1.1
49	Minor code fix to Crude Oil Tanks Calculations; include "Crude Oil Fraction directed to Tanks"	27-Apr-16	1.5
50	Updated Basin Factor for "Crude Oil Fraction directed to Tanks" and "Condensate Fraction directed to Tanks" for the North Slope, AK from 1 to 0	27-Apr-16	1.5
51	Updated production data for MI	29-Apr-16	1.5
52	Minor corrections to two Subpart W identifiers: 1) identified FIPS = 02170 to Copper River Basin; and 2) added Subpart Basin ID = 890 to the Arctic Coastal Plains Province Subpart W Basin	29-Apr-16	1.5
53	Corrected Toluene to VOC speciation ratio for pneumatic devices at gas wells	09-May-16	1.5
54	Minor code fix to Crude Oil Tanks Calculations; include "Crude Oil Fraction directed to Tanks"	10-May-16	1.5
55	Updated Indiana Oil and Gas Well Production and Well Counts	10-Jun-16	1.5
56	Updated Illinois Oil Production	25-Jun-16	1.5
57	Updated Kentucky Oil Production and Gas Production	25-Jun-16	1.5
58	Updated Nevada Oil and Associated Gas Production	25-Jun-16	1.5
59	Updated Ohio Oil Production	25-Jun-16	1.5
60	Updated Missouri Oil, Associated Gas Production, and Produced Water at Oil Wells	25-Jun-16	1.5
61	Updated gas composition data from EPA SPECIATE 4.5, Profile 95418 for 5 Uinta Basin counties in Utah for Condensate Tanks and Loading (of condensate) at gas wells.	07-Jul-16	1.5
62	Updated gas composition data from EPA SPECIATE 4.5, Profile 95419 for 5 Uinta Basin	07-Jul-16	1.5



















