

MEMORANDUM

To: Toxics Rule docket, number EPA-HQ-OAR-2009-0234
From: Madeleine Strum, Emission Inventory and Analysis Group
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Subject: Emissions Overview: Hazardous Air Pollutants in Support of the Proposed Toxics Rule
Date: March 15, 2011

1 Introduction

The purpose of this document is to summarize the mercury (Hg) and non-Hg Hazardous Air Pollutants (HAPs) emissions associated with the proposed Toxics Rule. This information includes both background on these pollutants as well as emissions totals from several emissions cases developed for the proposed Toxics Rule.

2 Mercury

Mercury is an element. There is a fixed amount of it in the world. As long as it is bound up, for example in coal, it cannot affect people or the environment. Once it is released, for example via the combustion process, it enters the environment and becomes available for chemical conversion. Once emitted, Hg remains in the environment and can bioaccumulate in organisms or be remitted through natural processes. Mercury is emitted through natural and anthropogenic processes and previously deposited Hg from either process may be re-emitted. The majority of natural Hg emissions arise from volcanoes, geothermal activity, Hg-enriched topsoil, oceans/lakes, and vegetation. The category of natural Hg emissions may or may not include biomass burning, due to the difficulty in determining whether biomass burning events are started by anthropogenic or natural causes. Generally, natural Hg emissions are 95 percent elemental mercury (Hg^0), and as a result have more impact on the global pool of Hg than on deposition in the region of the emissions; however, the emissions from wildfires have a greater percentage of particulate mercury (Hg_p) (15 percent).

The categories for anthropogenic Hg emissions include the combustion of fossil-fuels, cement production, waste incineration, metals production, and other industrial processes. Anthropogenic Hg emissions consist of Hg^0 , Hg_p , and divalent gaseous mercury (Hg^{+2}).

Mercury re-emissions include previously deposited Hg originating from both natural and anthropogenic sources. At this time, it is not possible to determine the original source of previously deposited Hg, i.e., whether its source is natural emissions or re-emissions from previously deposited anthropogenic Hg.^{1,2,3} Current publications on this topic estimate that half of re-emitted Hg originates from anthropogenic sources.^{4,5}

¹ Lindberg, S., Bullock, R., Ebinghaus, R., Engstrom, D., Feng, X., Fitzgerald, W., et al. (2007). A Synthesis of Progress and Uncertainties in Attributing the Sources of Mercury in Deposition. *Ambio*, 36(1), 19-33.

² Lohman, K., Seigneur, C., Gustin, M., & Lindberg, S. (2008). Sensitivity of the global atmospheric cycle of mercury to emissions. *Applied Geochemistry*, 23(3), 454-466.

³ Seigneur, C., Vijayaraghavan, K., Lohman, K., Karamchandani, P., & Scott, C. (2004). Global Source Attribution for Mercury Speciation in the United States. *Environmental Science and Technology*(38), 555-569.

⁴ Mason, R., Pirrone, N., & Mason, R. P. (2009). Mercury emissions from natural processes and their importance in the global mercury cycle. In *Mercury Fate and Transport in the Global Atmosphere* (pp. 173-191): Springer U.S.

⁵ Selin, N. E., Jacob, D. J., Park, R. J., Yantosca, R. M., Strode, S., Jaeglé, L., et al. (2007). Chemical cycling and deposition of atmospheric mercury: Global constraints from observations. *J. Geophys. Res.*, 112, 1071-1077.

Current estimates of total global Hg emissions based on a 2005 inventory range from 7,300 to 8,300 tons per year (tpy).^{6,7} The United Nations Environment Programme (UNEP) estimates of global Hg emissions for 2005 are somewhat lower, at 5,600 metric tpy^{8,9} (which is about 6,200 tpy). Global anthropogenic Hg emissions, excluding biomass burning, have been estimated by many researchers. UNEP's estimate (2005) is approximately 2,100 tpy (with a range of 1,300 tpy to 3,300 tpy)¹⁰ and the 2005 estimate by Pirrone, et al. is approximately 2,600 tpy. Global fossil-fuel fired power plants total approximately 500 to 900 tpy, a large fraction (25 to 35 percent) of the total global anthropogenic emissions.^{11,12} The U.S. contribution to global anthropogenic emissions has declined from 10 percent in 1990 to 5 percent in 2005¹³ due to reductions in U.S. emissions and increases in emissions from other countries. Although total U.S. anthropogenic Hg has decreased, the electric generating utilities (EGU) sector remains the largest contributor to the total. Table 1 below shows the trend of U.S. EGU Hg compared to the total U.S. inventory from 1990 through 2016.

In 1990, U.S. EGU Hg emissions were 59 tons out of a total of 264 tons, and by 1999 U.S. EGU Hg emissions were 49 out of 115 tons. In 2005, they were 53 tons out of a total of 105 tons. As part of the development of the Toxics Rule, EPA completed in 2010 an Information Collection Request (ICR) that gathered the latest available emissions data from EGU sources. One hundred eighty-six boilers reported emission factors (EFs) for Hg. These data were used to develop industry-wide average emission factors (EFs) associated with boiler configuration, which considers combinations of fuel type, boiler type, and control devices. The average emission factors were assigned to untested boilers based on configuration. The boiler-specific EFs from the test data and the average EFs were applied to the operating data gathered for all units (tested and untested). The operating data used for these calculations were the 3-year average capacity factor for 2007 to 2009 and the boiler maximum heat input. The resultant estimates were used to represent a year 2010 EPA estimate of 29 tons of Hg from EGUs. More information on the ICR and the associated inventory is available in the Toxics Rule docket (EPA-HQ-OAR-2009-0234). The 2010 estimates reflect the U.S. EGU Hg reductions achieved since 1990, which include reductions resulting from the installation of Hg controls to comply with state Hg-specific rules, voluntary reductions, as well as from the co-benefits of Hg reductions from control devices installed for the reduction of SO₂ and PM as a result of state and federal actions, such as New Source Review (NSR) enforcement actions.

⁶ Lindberg, S., Bullock, R., Ebinghaus, R., Engstrom, D., Feng, X., Fitzgerald, W., et al. (2007). A Synthesis of Progress and Uncertainties in Attributing the Sources of Mercury in Deposition. *Ambio*, 36(1), 19–33.

⁷ Pirrone, N., Cinnirella, S., Feng, X., Finkelman, R. B., Friedli, H. R., Leaner, J., et al. (2010). Global mercury emissions to the atmosphere from anthropogenic and natural sources. *Atmospheric Chemistry and Physics Discussions*, 10(2), 4719–4752.

⁸ UNEP (United Nations Environment Programme), Chemicals Branch, 2008. The Global Atmospheric Mercury Assessment: Sources, Emissions and Transport, UNEP Chemicals, Geneva.

⁹ The 5,600 metric ton estimate is from the Figure on page 37 of the report. The report also provides ranges in the executive summary.

¹⁰ Study on Mercury Sources and Emissions and Analysis of the Cost and Effectiveness of Control Measures “UNEP Paragraph 29 study”, UNEP (DTIE)/Hg/INC.2/4. November, 2010.

¹¹ Pirrone, N., Cinnirella, S., Feng, X., Finkelman, R. B., Friedli, H. R., Leaner, J., et al. (2010). Global mercury emissions to the atmosphere from anthropogenic and natural sources. *Atmospheric Chemistry and Physics Discussions*, 10(2), 4719–4752.

¹² Study on Mercury Sources and Emissions and Analysis of the Cost and Effectiveness of Control Measures “UNEP Paragraph 29 study”, UNEP (DTIE)/Hg/INC.2/4. November, 2010.

¹³ U.S. anthropogenic emissions of 105 tons in 2005 (Table 1) divided by global anthropogenic emissions of 2,100 tons (UNEP value for global anthropogenic emissions, stated above) is 5%.

Table 1: U.S. anthropogenic Hg emissions trends for U.S. EGUs.

	1990 (tons)	1999 (tons)	2005 (tons)	2010¹ (tons)	Final 2016 Base Case² (tons)
U.S. EGUs	59	49	53	29	29
Non-EGU Anthropogenic U.S. Mercury	205	66	52	Not Available ³	35
Total U.S. Anthropogenic Mercury	264	115	105	Not Available ³	64
Percent of U.S. Anthropogenic Mercury Emissions from EGUs					
	1990	1999	2005	2010	2016
	22%	43%	50%	Not Available ³	45%
<ol style="list-style-type: none"> 1. We believe the estimate of the current level of Hg emissions based on the 2010 ICR database may underestimate total EGU Hg emissions due to targeting of the 2010 ICR on the best performing EGUs. 2. The 2016 base case scenario represents predicted emissions including known Federal measures for all sectors. It reflects projected economic changes and fuel usage for the EGU and mobile sectors. Note that the projected future year inventory used for this analysis is generally representative of several years around 2016 such as 2015. The term “Final” is used to indicate that the EGUs were projected utilizing the final version of the IPM version 4.10 developed for the Proposed Toxics Rule as opposed to the Interim version. “Base” indicates that these are the projected emissions in absence of the Proposed Toxics Rule policy. 3. Information on recent U.S. EGU emissions was obtained using an Information Collection Request for EGUs only. This same information is not available for other sources, which were not covered by the Information Collection Request. 					

Table 1 above shows past U.S. emissions of Hg as well as future emission projections to the year 2016. The Integrated Planning Model (IPM) was used to estimate future-year Hg emissions for U.S. EGUs.¹⁴ More information on IPM is available in the “Documentation Supplement for EPA Base Case v.4.10 PTR – Updates for Proposed Toxics Rule” which can be found in the Toxics Rule docket (EPA-HQ-OAR-2009-0234).

Below, Table 2 provides the projections for non-EGU emission sources that include expected future reductions from existing and proposed regulations for HAPs that were finalized or are expected to be finalized prior to this proposal. These regulations include Portland Cement; Industrial, Commercial and Institutional Boilers and Process Heaters; Gold Ore Mining and Production, Electric Arc Furnaces, Hazardous Waste Incineration, and Mercury Cell Chlor-alkali facilities. The projections also include the replacement of a smelter and a pulp and paper plant, which will result in the elimination of Hg emissions, along with other known plant closures. This projection shows that U.S. EGU emissions will continue to comprise a significant, dominant portion of the total U.S. anthropogenic inventory in 2016. In 2016, U.S. EGU Hg is projected to be 29 tons out of a total of 64 tons. More information on the non-EGU projections of Hg is available in the Emission Inventory Technical Support Document (TSD) for the proposed Toxics Rule.

¹⁴ IPM is a multi-regional, dynamic, deterministic linear program model of the U.S. power sector that determines the least cost solution to meeting a set of environmental constraints while still meeting specified electric demand. For more detail on IPM see: <http://www.epa.gov/airmarkets/progsregs/epa-ipm/index.html>

Table 2: Anthropogenic Hg emissions and projections in the Continental U.S.

Category	2005 Mercury (tons)	2016 Mercury (tons)
Electric Generating Units	53	29
Portland Cement Manufacturing	7.5	1.1
Stainless and Nonstainless Steel Manufacturing: Electric Arc Furnaces	7.0	4.6
Industrial, Commercial, Institutional Boilers & Process Heaters	6.4	4.6
Chemical Manufacturing	3.3	3.3
Hazardous Waste Incineration	3.2	2.1
Mercury Cell Chlor-Alkali Plants	3.1	0.3
Gold Mining	2.5	0.7
Municipal Waste Combustors	2.3	2.3
Sum of other source categories (each of which emits less than 2 tons)	17	16
Total	105	64

3 Non-Hg HAP Emissions

Fossil-fuel fired boilers emit a variety of metal HAP, organic HAP and HAP that are acid gases. Acid gas and metal HAP emissions are discussed below.

3.1 Acid Gases

Acid gas emissions from EGUs include hydrogen chloride (HCl), hydrogen fluoride (HF), chlorine (Cl₂) and hydrogen cyanide (HCn). These pollutants are emitted as a result of fluorine, chlorine, and nitrogen components of the fuels. Table 3 shows emissions of certain acid gases from EGUs, based on the 2010 ICR data by fuel type. Although Cl₂ was not included in the data collected from the 2010 ICR, Cl₂ gas is expected to be emitted at significantly lower amounts than HCl (ratios of HCl-to- Cl₂ can be as high as 200:1¹⁵).

Similar to the Hg estimates, the 2010 ICR data for the acid gases included emission factors generated from boiler-specific emission tests (acid gas emission factors based on test data were generated for 186 boilers). Year 2010 estimates are not available for other U.S. anthropogenic emission sources, so the latest available complete set of data, 2005, were used to approximate the percentage contribution of EGUs to total U.S. anthropogenic emissions. As illustrated by Table 3, U.S. EGUs are estimated to emit the majority of HCl and HF nationally.

¹⁵ 200:1 is based on testing done at the EPA's pilot facility in Research Triangle Park, NC. Personal communication, Nick Hutson (email to Madeleine Strum from Nick Hutson 01/30/2011 11:16 pm).

Table 3: Summary of acid gas emissions from EGU sources.

	Selected Nationwide Acid HAP emissions (tons/yr) in 2010 from EGUs					2005 Acid HAP Emissions (tons/yr) from the inventory used for the National Air Toxics Assessment (NATA) ¹		Percent of U.S. Anthropogenic Emissions from EGUs, based on the inventory used for the 2005 NATA
	Coal	IGCC ²	PC ³	Oil	Total 2010 EGU ⁴	Total 2005 EGU	2005 Non- EGU	
Hydrogen Cyanide⁵	7,678	1	76	107	7,900	1,200	14,000	8%
Hydrogen Chloride	105,507	2	72	304	106,000	350,000	78,000	82%
Hydrogen Fluoride	36,345	1	8	79	36,000	47,000	28,000	62%

¹ 2005 NATA: <http://www.epa.gov/ttn/atw/nata2005/> EGU emissions were extracted from the total using the MACT code field (1808)

² IGCC = integrated gasification combined cycle

³ PC = petroleum coke

⁴ We believe our estimate of the current level of acid gas emissions based on the 2010 ICR database may underestimate total EGU emissions due to targeting of the 2010 ICR on the best performing EGUs.

⁵ Used cyanide emissions for hydrogen cyanide

3.2 Metal HAP

Metals are emitted primarily because they are present in fuels. Table 4 shows selected metals emitted by EGUs and emission estimates based on data from the 2010 ICR. Similar to the Hg and acid gas estimates, the 2010 ICR data for the metal HAPs included emission factors generated from boiler-specific emission tests (metal emission factors based on test data were generated for 196 boilers). Year 2010 estimates are not available for other U.S. anthropogenic emission sources, so the latest available complete set of data, 2005, was used to approximate the percentage contribution of EGUs to total U.S. anthropogenic emissions.

Table 4: Summary of metal emissions from EGU sources.

	Selected Nationwide Metal HAP emissions(tons/yr) in 2010 from EGUs					2005 Metal HAP Emissions from the inventory used for the National Air Toxics Assessment (NATA) ¹		Percent of U.S. Anthropogenic Emissions from EGUs, based on the inventory used for the 2005 NATA
	Coal	IGCC ²	PC ³	Oil	Total 2010 EGU ⁴	Total 2005 EGU	2005 Non-EGU	
Antimony	8	0	0	16	25	19	83	19%
Arsenic	42	0	1	1	43	200	120	62%
Beryllium	2	0	0	0	2	10.	13	44%
Cadmium	3	0	0	0	3	25	38	39%
Chromium	216	0	0	6	222	120	430	22%
Cobalt	11	0	0	8	19	54	60.	47%
Manganese	168	0	0	15	183	270	1800	13%
Nickel	198	0	0	188	387	320	840	28%
Selenium	257	0	0	1	258	580	120	83%

¹2005 NATA: <http://www.epa.gov/ttn/atw/nata2005/> EGU emissions were extracted from the total using the MACT code field (1808)

² IGCC = integrated gasification combined cycle

³ PC=petroleum coke

⁴ We believe our estimate of the current level of metal emissions based on the 2010 ICR database may underestimate total EGU metal emissions due to targeting of the 2010 ICR on the best performing EGUs.

As shown by the table, U.S. EGUs are estimated to be a significant source of emissions nationally for these metals.

3.3 Expected Impact on Non-Hg HAP Emissions from Existing Clean Air Act (CAA) and Other Regulations and Programs

It is expected that acid gas and metal emissions will be reduced in the future due to existing CAA and other regulations and programs. Acid gases and metals are emitted by a number of other industries already regulated or scheduled for regulation under the National Emissions Standards for Hazardous Air Pollutants (NESHAP) or the Risk and Technology Review (RTR) program. In addition, because acid gases respond somewhat to the same types of controls used for SO₂, it is expected that acid gas emissions will be reduced at both EGU and non-EGU sources as a result of national, state, and local control programs to control SO₂. Likewise, metals respond to the same types of controls used for PM, and as a result it is expected that metal emissions will be reduced at both EGU and non-EGU sources due to national, state, and local control programs to control direct PM.

4. Hg and non-Hg HAP Emissions Used for the Quantitative Risk Characterizations to Inform the Appropriate and Necessary Finding

This section summarizes the emissions used in the national scale assessments conducted to inform the appropriate and necessary finding. It also includes the 2010 ICR data, which is cited above and was used for site-specific case studies conducted to evaluate inhalation risks of U.S. EGU non-Hg HAP emissions. The emissions used for the national scale efforts are described in more detail in the two emission inventory technical support documents associated with this rule: (1) the 2005 version 4.1 Platform TSD and (2) the

Emission Inventory TSD for the proposed Toxics Rule. These documents and the IPM results are available in the Toxics Rule docket. More information on the emissions used for the case studies can be found in the memorandum entitled “Non-Hg Case Study Chronic Inhalation Risk Assessment for the Utility MACT ‘Appropriate and Necessary’ Analysis, Memorandum to Docket EPA-HQ-OAR-2009-0234”.

The national scale mercury risk analysis is based on modeling mercury deposition associated with 2005 U.S. EGU mercury emissions and on 2016 projected mercury emissions before implementation of federally mandated U.S. EGU mercury emissions controls. The emission sources and the basis for the analyses described in this section are listed in Table 5. The 2005 base-year emissions case is used for air quality modeling of the 2005 base year and contains emissions of criteria pollutants, Hg, HCl, and Cl₂ from all source categories. All emissions except Hg come from the 2005 version 4.1 modeling platform, which is derived from the 2005 National Emissions Inventory (NEI). 2005 Hg emissions for all sources come from the 2005 National Air Toxics Assessment (NATA) inventory, a revised version¹⁶ of the 2005 NEI, which was further revised in this effort for non-EGU point and nonpoint sources based on data collected from the NESHAP for industrial, commercial and institutional boilers (a.k.a. the Boiler MACT). The 2010 ICR case contains emissions only for U.S. EGUs, and the Hg, HCl, and metal emissions in this inventory are based on the 2010 ICR data.

The interim 2016 base projected emissions were developed for use in modeling based on the latest available projection techniques and account for emissions reductions of all modeled pollutants from Federal measures. The interim 2016 policy case projected emissions are an interim version of the expected emissions from EGUs after reductions associated with the Toxics Rule. The interim 2016 EGU emissions for both the base and Toxics Rule policy cases were created using an interim version of the IPM because the modeling needed to be completed in advance of the final IPM revisions associated with the Toxics Rule. The non-EGU source emissions were created for the interim 2016 base projected emissions, and these are described in the Emission Inventory TSD for the Toxics Rule. These emissions were used for all other 2016 emission cases listed in Table 5.

After IPM was finalized and all policy decisions made for the proposed Toxics Rule, the resulting emissions are labeled as the final 2016 base and policy cases. The final IPM emissions are cited in the preamble for the Toxics Rule and in any summaries stating the final 2016 emissions associated with the rule generally. Due to timing considerations, the final base and policy case emissions were not used in the modeling.

¹⁶ Mercury revisions for NATA primarily affected non-EGU sources such as cement kilns and hazardous waste combustors.

Table 5: Emission sources and basis for current and future-year emissions inventories.

Emissions Case	Pollutants	Sector	Emissions source
2005 base year	Criteria pollutants, hydrogen chloride, and chlorine	EGU Non-EGU point Non-point Mobile	2005 emissions from the version 4.1 modeling platform, derived from the 2005 National Emission Inventory (NEI) data
	Hg	EGU Mobile	2005 National Air Toxics Assessment (NATA) data
		Non-EGU point Non-point	2005 NATA data, adjusted to account for Boiler MACT ICR data
2010 ICR Emissions	Mercury, hydrogen chloride, and metals	EGU	2010 Utility MACT ICR: EGU emissions inventory based on unit-specific emission factors for tested units and average emission factors for untested units.
Interim 2016 Base Case projections	Criteria pollutants, mercury and hydrogen chloride	EGU	Interim IPM v.4.10, including the Transport Rule Proposal
		Non-EGU point Nonpoint Mobile	Emissions from the version 4.1 modeling platform: projected 2005 emissions to account for all known national rules, consent decrees, and plant closures
Interim 2016 Policy Case projections	Criteria pollutants, mercury and hydrogen chloride	EGU	Interim IPM v.4.10, including the Transport Rule Proposal and interim Toxics Rule Proposal
		Non-EGU point Nonpoint	Same as interim 2016 base projections
Final 2016 Base Case projections	Criteria pollutants, mercury and hydrogen chloride	EGU	IPM v.4.10, including the Transport Rule Proposal
		Non-EGU point Nonpoint Mobile	Same as interim 2016 base projections
Final 2016 Policy Case projections	Criteria pollutants, mercury and hydrogen chloride	EGU	IPM v.4.10, including the Transport Rule Proposal and Toxics Rule Proposal
		Non-EGU point Nonpoint	Same as interim 2016 base projections

Table 6 summarizes the Hg and HCl emissions for the anthropogenic sources of these emissions across the various cases. The 2005 base case includes 105 tons of Hg and 430,000 tons of HCl from all sources, of which 53 tons of Hg and 350,000 tons of HCl are from EGUs. The 2010 ICR shows the EGU Hg and HCl totals are lower than in 2005, at 29 tons and 106,000 tons respectively. The interim 2016 base total Hg emissions from all sources are 64 tons and HCl emissions are 140,000 tons, with 29 tons of Hg and 74,000 tons of HCl from EGUs. For the interim Toxics Rule policy case, total Hg was estimated to be 42 tons, with 6.8 tons from EGUs. For HCl, the interim Toxics Rule policy case shows a total of 75,000 tons from all sources with EGU emissions emitting 8,800 tons. The final Toxics Rule policy case for Hg from all

sources is 42 tons with EGUs contributing 6.4 tons. For HCl, total emissions are 77,000 tons with EGUs contributing 6,600 tons.

Table 6. Summary of mercury and HCl emissions for emissions cases.

	Hg(0) (tons)	Hg(2+) (tons)	Hg(p) (tons)	Total Hg (tons)	Hydrogen chloride (tons)
2005 Base Case Emissions (tons)					
EGU *	30	21	1.6	53	350,000
NonEGU Point	30	11	6.2	46	49,000
Nonpoint	3.1	1.06	0.65	4.8	29,000
Mobile	0.79	0.29	0.13	1.2	
All sources	64	33	8.5	105	430,000
2010 ICR Emissions (tons)					
EGU				29	106,000
Interim 2016 base case projections (tons)					
EGU **	21.1	6.9	0.67	28.7	74,000
NonEGU Point	16.9	7.9	4.4	29.2	38,000
Nonpoint	3.1	1.06	0.65	4.8	29,000
Mobile	0.79	0.29	0.13	1.2	
All sources	42	16	5.9	64	140,000
Interim 2016 policy case projections (tons)					
EGU **	4.8	1.6	0.36	6.8	8,800
NonEGU Point	17	7.9	4.4	29	38,000
Nonpoint	3.1	1.06	0.65	4.8	29,000
Mobile	0.79	0.29	0.13	1.2	
All sources	26	11	5.6	42	75,000
Final 2016 base case projections (tons)					
EGU	21	6.8	0.78	29	74,000
NonEGU Point	17	7.9	4.4	29	41,000**
Nonpoint	3.1	1.06	0.65	4.8	29,000
Mobile	0.79	0.29	0.13	1.2	
All sources	42	16	5.8	64	140,000
Final 2016 policy projections (tons)					
EGU	4.7	1.4	0.26	6.4	6,600
NonEGU Point	17	7.9	4.4	29	41,000**
Nonpoint	3.1	1.06	0.65	4.8	29,000
Mobile	0.79	0.29	0.13	1.2	
All sources	26	11	5.4	42	77,000

* For this table, the EGU Sector is defined as follows: (1) For all pollutants other than mercury (Hg): 2005 NEI v2 point source EGUs mapped to the Integrated Planning Model (IPM) model using the National Electric Energy Database System (NEEDS) 2006 version 4.10 database. A few revisions were made to the 2005 NEI v2 annual emission estimates as discussed in the 2005-based, Version 4.1 platform document. (2) For Hg: 6/18/2010 version of the inventory used for the 2005 National Air Toxics Assessment (NATA) mapped to IPM using NEEDS version 4.10. The NATA inventory is an update to the 2005 NEI v2 and was divided into EGU and non-EGU sectors consistent with the other pollutants. We additionally removed Hg from sources from the NESHAP for Industrial, Commercial, and Institutional Boilers and Process Heaters (aka “Boiler MACT”) Information Collection Request (ICR) database because we included these emissions in the non-EGU sector. For more information, see the 2005-based Platform Documentation, version 4.1.

** EGU Sector for 2016 is consistent with the 2005 base case discussed above. The future year emissions were generated by the Interim version of IPM4.10 and adjustments were made to remove Hg associated with the Boiler MACT ICR (which is accounted for in the Non-EGU sector), and to apply the impact of the final Boiler MACT for the other pollutants. For more information, see the Technical Support Document for the Proposed Toxics Rule, Emissions Inventories.

***NonEGU Point for the Final base and policy case projections are computed as 37,549 plus emissions for units < 25 megawatts

To summarize that table for EGUs only, Table 7 lists only the EGU emissions totals for the various cases. It also includes the average percent of divalent gaseous and particulate Hg for the EGUs in each case. As can be seen the divalent gaseous Hg ranges from 20% to 40% of the total Hg and the average particulate Hg ranges from 2 to 5% of total.

Table7: EGU emissions of Hg and HCl for emissions cases.

	Hg(0) (tons)	Hg(2+) (tons)	Hg(p) (tons)	Total Hg (tons)	Hydrogen chloride (tons)	Hg(2+) Percent of total Hg	Hg(p) Percent of total Hg
2005 Base Case Emissions	30	21	1.6	53	350,000	40%	3%
2010 ICR Emissions	N/A*	N/A	N/A	29	106,000		
Interim 2016 base case projections	21.1	6.9	0.67	28.7	74,000	24%	2%
Interim 2016 Toxics Rule policy case projections	4.8	1.6	0.36	6.8	8,800	24%	5%
Final 2016 base case projections	21	6.8	0.78	29	74,400	23%	3%
Final 2016 Toxics Rule policy case projections	4.7	1.4	0.26	6.4	6,600	22%	4%

* Speciation data were not collected for Hg in the 2010 ICR