

## **59 Power Plant Toxics Characterization**

### **Program Overview**

#### **Program Description**

This program provides methods and tools for measuring and managing potentially toxic emissions and discharges from power plants. This program is the first step in power plant discharge characterization. Issues are defined and addressed, and a deep understanding of the interplay among environmental media is created. Once research on a specific issue is mature, the work is transferred to the appropriate Electric Power Research Institute (EPRI) research program for further examination as necessary. This program is particularly important in light of the recent court decision remanding the Clean Air Mercury Rule (CAMR) back to the U.S. Environmental Protection Agency (EPA), as the door is once again open to an examination of all hazardous air pollutants (HAPs). Due to the court decision, EPA may be required to proceed with a new Maximum Achievable Control Technology (MACT) rulemaking for mercury and other HAPs such as arsenic and hydrochloric acid. This program assists electric power companies in preparing to meet the evolving regulations. The program products also help members evaluate discrete air, water, and land environmental impacts as well as the interplay between these receiving media that might result from changes in fuel composition or fuel blend, implementation of new or enhanced control technologies, or changes in operating practices at conventional power plants. Characterization of power plant discharges requires accurate and sensitive analytical methods; where these do not exist, this program supports method development studies. The program also addresses environmental impacts from advanced generation technologies such as integrated gasification combined-cycle (IGCC), as well as from renewable technologies (e.g., biomass, solar) and distributed generation facilities (e.g., microturbines, fuel cells). Products also assist generators with permitting and reporting processes by providing credible emissions data on a timely basis. The Power Plant Integrated Systems Chemical Emissions Studies (PISCES) Database, the cornerstone of this program, contains the most comprehensive set of data available on HAPs emissions. It is a comprehensive multimedia database containing primary information on the concentration and fate of substances in power plant process and discharge streams. The PISCES database will become more critical as EPA examines the need to consider MACT for all HAPs in addressing the remand of CAMR.

#### **Industry Needs and Issues Addressed**

- Current and forthcoming regulations on air toxics emissions, water discharges, and solid waste disposal will result in increasingly stringent limits and substantially increased costs for companies. For instance, in view of the recent court decision to vacate CAMR, there is a need to review and update power plant emissions characterization data for mercury and other HAPs.
- There is a critical need to address environmental releases in a holistic, multimedia manner so that a pollutant removed by a control technology in one medium (e.g., flue gas) does not adversely affect the regulatory situation in the other media (water and solid waste).
- Environmental issues associated with new and emerging technologies such as renewables and energy efficiency need to be examined in advance of widespread deployment.

#### **Impact**

- This research provides suitable measurement methods and critical characterization of chemical substances in air, water, and solid discharges from fossil fuel power plants, especially coal-fired plants. Results play a key role in informing the regulatory debate on mercury.
- Use of appropriate sampling and analytical methods can reduce the risk of permit violations.
- Significant cost savings can be obtained from use of multimedia tools such as the PISCES Database and Toxics Release Inventory (TRI) reporting software.

- A holistic, multimedia approach can help minimize the cost of overall environmental compliance and management.
- Early warning of potential issues can inform the development of technology and address potential public perception issues.

### **Key Accomplishments**

- PISCES power plant mercury characterization data provided critical information to members and regulators during the development of CAMR and played a key role in informing the discussions leading to the Rule.
- The PISCES program developed and tested QuickSEM, sorbent tube continuous mercury monitor system, for cost-effective mercury emissions monitoring. EPA approved QuickSEM as a mercury emissions reference method.
- Program research enhanced understanding of flue gas mercury chemistry to help improve selective catalytic reduction (SCR) and flue gas desulfurization (FGD) performance for better mercury removal.
- The program provided updated tools (the PISCES Database and LARK-TRIPP software) for environmental compliance and improved plant operation.

### **Current Year Objectives**

- Collect toxics characterization data on power plant flue gas streams, including partitioning of chemicals in power plant control equipment.
- Continue to populate the PISCES database with power plant waste stream characterization data; document sampling and analytical methods used. Continue support to meet TRI needs.
- Evaluate, develop, and validate sampling and analytical methods for multimedia (gas, liquid, and solid streams) characterization. PISCES will act as the clearinghouse for media-specific sampling and analytical methods.
- Evaluate multimedia environmental impacts of fuel changes and control technologies on conventional generation plants, IGCC systems, and distributed generation.

### **Industry Involvement**

- Estimated 2009 funding: \$2.2M

### **Program Technical Lead**

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## **Summary of Projects**

<b>Project Number</b>	<b>Project Title</b>	<b>Value</b>
P59.001	Mercury Flue Gas Toxics Characterization	EPA issued CAMR in 2005. Recently a federal circuit court remanded CAMR back to EPA for reconsideration. EPA may be required to proceed with a new MACT rulemaking for mercury and other HAPs such as arsenic and hydrochloric acid. Many power plants are installing SCRs and wet FGDs for nitrous oxide (NO <sub>x</sub> ) and sulfur dioxide (SO <sub>2</sub> ) compliance and are depending upon mercury cobenefit removal with existing SCRs and FGDs. This project will evaluate the impact of halogen concentrations in coal and flue gas on SCR mercury oxidation to enhance overall mercury removal. The research will refine existing correlations to predict speciated mercury emissions and removal based on fuel type, control technology, and level of halogens in coal.

<b>Project Number</b>	<b>Project Title</b>	<b>Value</b>
P59.002	Sampling & Analytical Methods	The PISCES program acts as the clearinghouse for media-specific measurement techniques for chemicals of potential regulatory interest. The project will evaluate the performance of current methods for measuring total chemical concentrations, as well as speciation where appropriate. Where analytical methods no longer provide the required detection sensitivity, work will be carried out to develop/refine the methods to meet the new needs.
P59.003	Non-Mercury Flue Gas Characterization	Other potential HAPs in addition to mercury are of regulatory interest, such as arsenic, chromium, hydrofluoric acid, and hydrochloric acid from coal-fired power plants. This project provides characterization data—total chemical concentrations and speciation (where appropriate)—as well as partitioning of the chemicals in the different sections of flue gas streams from power plants.
P59.004	Multimedia Environmental Impacts - Conventional, IGCC, and Distributed Generation	This project characterizes discharges to air, water, and land resulting from fuel changes or from new control technologies that remove SO <sub>x</sub> , NO <sub>x</sub> , and mercury. Potential issues will be identified and multimedia approaches will be developed. These studies will also include fuel analyses and detailed chemical engineering assessment of available data to improve understanding of the fate of chemicals in power plant systems.
P59.005	PISCES Database	The PISCES Database is a comprehensive multimedia database containing information on the concentration and fate of chemical substances in power plant process and discharge streams. This database offers easily accessible data of known quality that can be used for various purposes within a company.
P59.006	TRI Technical Needs	This project assists companies in responding to EPA's TRI reporting requirements by providing technical approaches, software, emission factors, and data evaluation to reduce reporting costs and improve release estimates.

## **Project Descriptions**

### **P59.001 Mercury Flue Gas Toxics Characterization (101138)**

#### **Issue**

EPA issued the Clean Air Mercury Rule (CAMR) in 2005. Recently, a federal circuit court remanded CAMR back to EPA for reconsideration, creating uncertainty on the direction of federal mercury regulations. EPA may be required to proceed with a new Maximum Achievable Control Technology (MACT) rulemaking for mercury as well as other hazardous air pollutants (HAPs) such as arsenic and hydrochloric acid. Many power plants are installing selective catalytic reduction (SCR) and wet flue gas desulfurization (FGD) systems for NO<sub>x</sub> and SO<sub>2</sub> compliance and were depending upon mercury cobenefit removal with the SCR and wet FGD systems to meet some or all of their CAMR requirements. The possible change in regulatory focus to a MACT rulemaking means that controls specifically targeted at mercury reduction may be required in the future. Power plant owners/operators need to understand the impact of coal choice, power plant design and operation, and mercury capture technologies on expected mercury removals. Power plants will need continuous monitors as well as approaches to conducting QA/QC tests (e.g., relative accuracy test audits).

### Description

If EPA proceeds with a new MACT rulemaking, EPRI and its members will provide the best information available to assist all stakeholders. EPRI may also assist in providing its review and synthesis of the available emissions data and potentially updating the 2000 mercury emissions inventory estimates for U.S. coal-fired power plants.

The U.S. power industry needs to understand the impacts of coal choice and power plant design and operation (SCR/FGD systems) on expected mercury removals. The industry also needs cost-effective mercury capture approaches, continuous mercury monitors, and approaches to conducting necessary QA/QC tests.

- Evaluate the impact of halogen concentrations in coal and flue gas on SCR mercury oxidation to enhance overall mercury removal. Refine existing correlations to predict (speciated) mercury emissions and removal based on coal type, control technology, and level of halogen in coal.

### Value

- Provides the best available emissions characterization data and inventory of industry emissions to assist EPA and other stakeholders in any potential mercury MACT rulemaking
- Provides power plants with tools to estimate and predict SCR/FGD mercury cobenefit removals
- Provides cost-effective approaches to enhancing overall SCR/FGD mercury removal
- Assists power plant operators in monitoring mercury emissions using sorbent tube sampling methods

### How to Apply Results

Project findings and deliverables will be employed by personnel in environmental affairs/compliance departments of power companies in responding to possible EPA mercury/HAPs MACT rulemaking, as well as in developing cost-effective controls and compliance strategies for mercury and other criteria pollutants. Plant personnel can use the information in EPRI report(s) on sorbent tube methods, along with the services of an experienced sampling and analytical contractor, to operate equipment to obtain reliable measurements of mercury in flue gas.

### 2009 Products

Product Title & Description	Planned Completion Date	Product Type
<b>Mercury Characterization and Emissions Inventory:</b> This project will review mercury characterization data, especially new data collected since the 1999 Mercury Information Collection Request. The review will include updated information on mercury removal performance of newer control technologies (e.g., activated carbon injection) and, hopefully, more-accurate data on mercury stack gas emissions. The report will also revise and update the mercury emissions inventory for coal-fired power plants.	12/31/2009	Technical Report
<b>Enhancing Mercury SCR/FGD Cobenefits:</b> Field studies evaluating various approaches (e.g. halogen addition, activated carbon injection) to enhance mercury SCR/FGD cobenefits will be summarized.	12/31/2009	Technical Update
<b>Mercury Field Site Report(s):</b> The field site reports will summarize individual field measurements characterizing mercury speciation and removal, as well as other trace elements.	12/31/2009	Technical Update

Product Title & Description	Planned Completion Date	Product Type
<p><b>Guidelines for Sorbent Tube Monitoring:</b> Lessons learned from EPRI's past research on sorbent tube mercury sampling and analysis will be summarized in a guidance document that will assist power generators in obtaining accurate monitoring results. (Joint project with Program 77, Continuous Emissions Monitoring.)</p>	12/31/2009	Technical Report

### Future Year Products

Product Title & Description	Planned Completion Date	Product Type
<p><b>Mercury Field Site Report(s):</b> The field site reports will summarize individual field measurements characterizing mercury speciation and removal, as well as other trace elements.</p>	2010	Technical Update
<p><b>Enhancing Mercury SCR/FGD Cobenefits:</b> Field studies evaluating various approaches (e.g., halogen addition, activated carbon injection) to enhance mercury SCR/FGD cobenefits will be summarized.</p>	2010	Technical Update

## P59.002 Sampling & Analytical Methods (065616)

### Issue

Accurate characterization of potentially toxic chemicals in fuels, reagents, intermediate streams, air emissions, liquid and solid waste streams, and other discharges is essential for developing effective strategies for multimedia management of these chemicals. Some of the existing sampling and analytical methods do not have the required detection sensitivity or specificity to meet increasingly stringent regulatory needs. Work in this area will be coordinated with the needs of other programs, as appropriate (e.g., work on arsenic and selenium speciation in flue gas desulfurization waters may be coordinated with work in Program 56, Effluent Guidelines and Water Quality Management).

### Description

Accurate methods are needed to characterize chemicals in fuels, air emissions, and liquid and solid waste discharges.

- Evaluation of PM<sub>2.5</sub> and condensable particulate sampling methods
- Index of sampling and analytical methods

### Value

- Availability of suitable sampling and analytical methods is critical for accurate characterization of power plant streams. This work will enable development of effective strategies for management of these chemicals.

### How to Apply Results

Project findings and deliverables will be employed by personnel in chemistry labs and environmental affairs/compliance departments of power companies, who will apply the most suitable sampling and analytical methods to meet regulatory and other needs. These personnel can also use the information to negotiate reasonable permits and to respond to EPA and state agencies in developing sound environmental regulations. Members should send key stakeholders the results, ensure that stakeholders

understand those results, and suggest that results be considered in the development of permit limits and environmental policies. The results will also assist engineering staff (design and plant operations) to accurately measure the concentrations of chemicals of concern and help develop and implement effective management options for controlling release of toxic substances from generating facilities.

### 2009 Products

Product Title & Description	Planned Completion Date	Product Type
<p><b>Evaluation of PM2.5 and Condensable Particulate Sampling Methods:</b> Implementation of EPA's PM<sub>2.5</sub> National Ambient Air Quality Standards will require improved methods for measuring fine particulates and condensable particulate matter. EPRI will conduct research on ways to improve these methods in order to more accurately measure these regulated parameters in power plant stack gases, including scrubbed stacks.</p>	12/31/2009	Technical Update
<p><b>Index of Analytical Methods:</b> This project will produce an index of sampling and analytical methods applicable to power plant streams and environmental media. The project will also provide guidance on selection and application of these methods.</p>	12/31/2009	Technical Resource
<p><b>Analytical Methods for Metals in FGD Waters:</b> This report will evaluate analytical methods for total and dissolved metals in complex matrices such as FGD water. Current methods are subject to chemical and physical interferences that create a severe challenge to obtaining accurate results, which are needed to design treatment systems and verify compliance with discharge limits.</p>	12/31/2009	Technical Update
<p><b>Arsenic and Selenium Speciation Methods Evaluation:</b> Arsenic and selenium can be present in power plant wastewaters. Treatability is affected by the species present (e.g., Se<sup>+4</sup> or Se<sup>+6</sup>). Existing speciation methods have problems measuring these elements accurately in complex liquid matrices such as flue gas desulfurization wastewater. This project will lead to improved methods for these analyses.</p>	12/31/2009	Technical Update

### Future Year Products

Product Title & Description	Planned Completion Date	Product Type
<p><b>Arsenic and Selenium Analytical Methods:</b> The arsenic and selenium method development is expected to occur over some time. This report will summarize the previous work and provide protocols and procedures for accurate measurement of arsenic and selenium in power plant waste streams.</p>	2010	Technical Update
<p><b>Index of Sampling and Analytical Methods:</b> The methods index will be updated, as needed.</p>	2011	Technical Update

### P59.003 Non-Mercury Flue Gas Characterization (058662)

### Issue

Recently, a federal circuit court remanded the Clean Air Mercury Rule (CAMR) back to EPA for reconsideration. This court decision created uncertainty about regulations for mercury as well as other hazardous air pollutants (HAPs) such as arsenic and hydrochloric acid. EPA may be required to proceed with a new Maximum Achievable Control Technology (MACT) rulemaking for all HAPs. Accurate, reliable measurement data is required to support sound regulatory decisions.

### Description

If EPA proceeds with a new MACT rulemaking, EPRI will provide the best information available to assist all stakeholders. EPRI may also assist in providing its review and synthesis of the available emissions data and estimates of HAPs emissions from all U.S. coal- and oil-fired power plants. Other HAPs emissions such as arsenic, chromium, hydrofluoric acid, and hydrochloric acid from coal-fired power plants may require further examination in a variety of plant configurations.

### Value

- Provides the best available emissions characterization data and inventory of industry emissions to assist EPA and other stakeholders in any potential MACT rulemaking
- Improves decisionmaking and supports development of scientifically sound environmental regulations and cost-effective emission control strategies for air toxics other than mercury (e.g., arsenic, chromium, acid gases, and organics) through accurate characterization of power plant toxics emissions

### How to Apply Results

Project findings and deliverables will be employed by personnel in environmental affairs/compliance departments of power companies in responding to EPA and state agencies in the context of possible EPA's HAPs MACT rulemaking as well as in developing sound environmental regulations and permits. The environmental staff should send the results to key stakeholders, ensure that stakeholders understand those results, and suggest that results be considered as decisions are made related to control of these chemicals. The results will also assist engineering staff (design and operations) in developing and implementing effective management options for controlling emissions of these pollutants. EPRI staff will work with regulators at the federal and state level by providing pertinent information as the regulatory process proceeds.

### 2009 Products

Product Title & Description	Planned Completion Date	Product Type
<b>Field Site Report(s):</b> Field studies characterizing non-mercury HAPs will summarize the results along with the sampling and analytical protocols.	12/31/2009	Technical Update
<b>HAPs Emission Inventory Update:</b> If necessary to assist EPA and other stakeholders in a MACT rulemaking, EPRI will review the available HAPs emissions data and update industry estimates of HAPs from coal- and oil-fired power plants.	12/31/2009	Technical Report

## Future Year Products

Product Title & Description	Planned Completion Date	Product Type
<b>Field Site Report(s):</b> The report(s) will summarize site-specific HAPs measurements at a power plant. The results will be used by EPRI and others in a summary report synthesizing all previous and recent measurements.	2010	Technical Update

### P59.004 Multimedia Environmental Impacts - Conventional, IGCC, and Distributed Generation (063346)

#### Issue

As a trace element (e.g., mercury or selenium) is removed from one medium (such as flue gas), this pollutant is transferred to the other media (water and/or solids). Understanding the multimedia fate is critical for sound environmental management as well as for responses to state and local regulatory drivers. Renewable energy portfolio requirements in many states are leading to new interest in alternative fuel sources (e.g., biomass, biofuels) as well as distributed generation. The potential for multimedia environmental issues associated with manufacture and use of these energy sources must be fully understood.

#### Description

Studies will improve understanding of fate of chemicals in power plant systems, leading to cost-effective management in both central station and distributed generation facilities.

- For conventional plants, characterize changes to air, water, and land releases from fuel changes (e.g., biomass, biofuels) and new control technologies (e.g., activated carbon)
- For integrated gasification combined-cycle (IGCC) plants, characterize streams and evaluate impacts
- For distributed generation facilities, characterize releases from microturbines, fuel cells, and fuel-cell vehicles
- Life-cycle assessment of chemical releases

#### Value

- Assist power plant environmental engineers and compliance staff to evaluate the impact of changing fuels and controls on the fate of toxic chemicals in power plants
- Assists power plants in managing multimedia impacts and responding to state and local issues

#### How to Apply Results

Project findings and deliverables will be employed by personnel in environmental affairs/compliance departments of power companies in responding to EPA and state agencies in developing sound environmental regulations and permits. Members should send key stakeholders the results, ensure that stakeholders understand those results, and suggest that results be considered as environmental policies are developed. The results will also assist engineering staff (design and operations) in developing and implementing effective management options for controlling toxics emissions from power generation facilities. EPRI staff will also communicate the results to key stakeholders such as regulatory agencies and environmental policymakers.

## 2009 Products

Product Title & Description	Planned Completion Date	Product Type
<b>Impact of Fuel Changes:</b> This research will characterize the multimedia impact of fuel switching, including coal blends, alternative fuels, and biofuels, on the fate and amount of toxic chemicals in power plant waste streams.	12/31/2009	Technical Update
<b>Impact of Control Technologies:</b> This research will evaluate the impact of new approaches to flue gas cleanup (e.g., nitrous oxides, sulfur trioxide, mercury) on the multimedia fate and amount of the target chemical as well as other hazardous air pollutants in all power plant waste streams.	12/31/2009	Technical Update

## Future Year Products

Product Title & Description	Planned Completion Date	Product Type
<b>Multimedia Impacts of New/Refined Control Technologies:</b> This report will summarize research to characterize multimedia discharges to air, water, and land resulting from changes to control technologies (e.g. for sulfur dioxides, nitrogen oxides, mercury). Potential issues will be identified and initial multimedia approaches will be developed.	2010	Technical Update
<b>Multimedia Impacts of Distributed Generation Technologies:</b> This report will summarize multimedia environmental impacts from chemicals produced during manufacture or use of distributed generation equipment, including fuel cells, photovoltaic cells, and distributed diesel engines.	2011	Technical Update

## P59.005 PISCES Database (100807)

### Issue

Companies need to know the chemical characteristics of waste streams released from power plants to comply with environmental regulations, design pollution control devices, and estimate impacts. Companies also need to compare emissions from plants with different configurations to make decisions on plant construction and inform fuel purchasing decisions.

### Description

The Power Plant Integrated Systems Chemical Emissions Studies (PISCES) Database is a comprehensive, multimedia online database containing information on the concentration and fate of chemical substances in power plant process and discharge streams. All of the data entered into the PISCES Database are critically reviewed and quality ranked. This project provides easily accessible data of known quality that can be used for many purposes, including Toxics Release Inventory (TRI) reporting, permitting, design of environmental controls, and fate and transport evaluation. Continued addition of new data provides for an up-to-date and comprehensive set of data on solid, liquid, and gas process streams at power plants.

### Value

- Provides data to respond to regulatory requirements
- Informs pollution control design and fuel purchasing decisions for power plants

### How to Apply Results

The PISCES database is web based and is available online 24 hours per day. The desired data can be retrieved and used by member company personnel (e.g., environmental affairs and plant design and operations personnel) for a variety of purposes, including meeting regulatory needs and designing or enhancing plant operations. EPRI provides specific information access assistance to members if needed.

### 2009 Products

Product Title & Description	Planned Completion Date	Product Type
<b>PISCES Database:</b> The PISCES online database contains chemical measurements and plant configurations for hundreds of individual power generation facilities. Measurements from PISCES field studies and other organizations are reviewed for quality and entered into the database. Improvements to the search capabilities and software platform are completed as needed.	12/31/2009	Software

### Future Year Products

Product Title & Description	Planned Completion Date	Product Type
<b>PISCES Database:</b> Work will continue on PISCES Database upgrades, data entry, and maintenance.	2010	Software

## P59.006 TRI Technical Needs (100809)

### Issue

Power plant owners must report emissions of specific compounds to state and federal regulators. This process can be very labor intensive, as environmental department staff must spend many hours in compiling, analyzing, and reporting the required data. It is also necessary to maintain records of regulatory reporting and to defend assumptions made in estimating emissions if questions are raised by regulators.

### Description

This project assists companies in responding to EPA's Toxics Release Inventory (TRI) reporting requirements. The project provides technical approaches, software, emission factors, and data evaluation to reduce reporting costs and improve release estimates. EPRI's Land Release Estimating and Recordkeeping—TRI at Power Plants (LARK-TRIPP) software helps users estimate chemical substance releases. It is updated to reflect changes in EPA's TRI program and changes to power generation and pollutant control technologies.

- Ammonia is used in several flue gas treatment processes, and releases must be reported as a TRI chemical. The estimation of releases must take into account all technology and environmental impacts on multimedia distribution of the chemical.

### Value

- Provides rigorous and credible estimation techniques and emission factors.
- Reduces costs for preparing TRI reports and other emissions reports. One member estimated annual savings of \$500,000 from the use of EPRI's LARK-TRIPP software versus manual methods of preparing TRI reports.
- Standardizes industry approach to emissions estimation, thus improving acceptability to regulators.

### How to Apply Results

The LARK-TRIPP software for TRI reporting can be implemented by environmental department staff or plant engineers on a Windows-based workstation. Data from plant operations (e.g., coal burned, hours of operation) are entered into the software. The resulting estimates are uploaded directly into EPA's Toxics Release Inventory—Made Easy (TRI-ME) reporting software, avoiding the need for manual data entry. Training and support are provided as part of the project to help staff learn and use the program. An ammonia estimation model will be provided as part of the LARK-TRIPP program and documentation.

### 2009 Products

Product Title & Description	Planned Completion Date	Product Type
<b>LARK-TRIPP:</b> LARK-TRIPP is a single-user software program for a Windows computer, providing the user a means to estimate power plant releases of toxic chemicals for use in EPA's TRI program. The software incorporates PISCES emission factors and other data, providing consistency in reporting. Program output may be uploaded directly into EPA's TRI-ME reporting software, avoiding the labor of manual data entry.	9/30/2009	Software
<b>Ammonia Estimation Model:</b> This report will summarize a methodology to estimate ammonia manufactured in power plant processes, including water treatment, flue gas treatment (e.g., selective catalytic reduction), and flue gas conditioning, as well as the releases of ammonia to air, water, and land. These estimates can be used to calculate data needed for TRI reporting.	9/30/2009	Technical Update

### Future Year Products

Product Title & Description	Planned Completion Date	Product Type
<b>LARK-TRIPP:</b> LARK-TRIPP will be updated to reflect changes in EPA's TRI program and improvements recommended by software users.	2010	Software
<b>Emission Factors Handbook Updates:</b> The <i>Emission Factors Handbook</i> will be revised as appropriate to reflect changing configurations of power plant pollution control devices	2010	Technical Update