

# Mercury Reduction Route Map and Summary

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# 1. Define the problem

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## New Mandate

The Supreme Court ruling on June 29, 2015 creates a challenge and an opportunity for the supplier industry to demonstrate that mercury control is cost effective. The original target was to reduce utility emissions from 50 tons/yr to 5 or less. We will explore how this can be done and the lowest cost route to do so.

# I A. Define the problem- Applications and Contaminants

The problems	Further investigation
<b>Application</b>	
• Utility boiler	What are mercury emissions in other countries
• Industrial boiler	How many plants switching to NG
• Waste to Energy	Gasify WTE as reburn fuel for coal fired boilers and then remove mercury
• Cement	How many plants are going to be removing mercury in the U.S. and other countries
<b>Contaminant</b>	
• elemental Hg	How good is AC on the elemental segment
• Oxidized Hg	Lots of good info showing high removal at low cost but need to tabulate the performance of newest sorbents
• Particulate Hg	Will EPA or other agencies start regulating particulate mercury
• total Hg	Not included in U.S. CEMS measurement requirements

# IB. Define the problem – Removal Requirements

Industry segment	Additional information needed
Utility MATS, and Chinese	MATS remanded to review cost. Mcilvaine will provide support data for low cost mercury reduction. China and other countries are following the U.S. Lead. We need to report more on the Chinese requirement for limits as low as 3 ug/Nm <sup>3</sup> for certain areas
Industrial Boiler MACT	How are industrial plants complying? What is EU program?
Cement plants	How are cement plants complying. The large raw mercury quantities at some plants will be a focus
Waste to energy	There are mercury removal requirements throughout the world. Need more specifics on emission limits in some countries
Water limits	Germany and some U.S. states have limits on power plant mercury in water discharge. Need further documentation
Ambient air requirements	Particulate mercury falls close to the plant but gaseous mercury can travel thousands of miles. Ambient air quantities need to be assessed

# 2A. Provide Solutions - Process

## i. Particulate Type

- 1. Electrostatic Precipitator-dry -what is capture efficiency with ACI w/o SO<sub>3</sub> conditioning
- 2. Electrostatic Precipitator-wet- Does tail end WESP capture mercury
- 3. Fabric Filter- how much better is this device than a ESP

## ii. FGD Process

- 1. Wet limestone- how efficient on oxidized and elemental mercury? Re-emissions
- 2. Spray dryer – w/o ACI and where is ACI injected
- 3. Circulating dry scrubber- is this any better than a spray drier for Hg removal?
- 4. Dry sorbent injection- what is the cost and efficiency of combined SO<sub>2</sub> and Hg removal

## iii. Capture Mechanism

- 1. Bromine- inject with fuel or elsewhere? How efficient? What about corrosion?
- 2. Chlorine- natural Cl in the coal or additions? What about PVC pellets for BTU and Cl
- 3. Activated carbon- latest increases in performance need to be quantified
- 4. Non carbon sorbent– kaolin, bentonite and other sorbents need consideration
- 5. Membrane– downstream module can boost efficiency but by how much?
- 6. Gold amalgamation- Is this a practical alternative to the membrane module?

## iv. Selection Criteria

- 1. Efficiency – Each approach needs to consider efficiency and cost for final increments
- 2. Performance- Can reliability be maintained with boiler and fuel variations
- 3. Maintenance- plugging, explosions, and corrosion ?
- 4. Cost- need accurate estimates for the range of efficiencies and various combinations of equipment

# 2B. Solution - components

## i. Capture device

- 1. activated carbon injection systems---how much storage? How to inject evenly, cost?
- 2. halogen slurry injection systems- where? How? corrosion?
- 3. liquid bromine injection- where, how safety?
- 4. advanced SCR catalyst- cost increase? oxidation %?
- 5. post scrubber membrane—cost and potential to move past 90% overall efficiency

## ii. Monitoring

- 1. Continuous emissions monitor- how reliable and what is annual cost?
- 2. Sorbent trap- how much labor and what about particulate mercury?

## iii. Re-emissions Prevention

- 1. chemicals-which chemicals are most cost effective in preventing re-emission
- 2. activated carbon- efficiency plus potential to limit mercury in sludge

## iv. Wastewater Treatment

- 1. Physical-chemical- How much mercury can be eliminated with chemicals and separation
- 2. Biological- success and cost of membrane bio reactors and wet lands
- 3. Zero liquid discharge- What happens to mercury in ZLD
  - a. thermal evaporation---one ZLD option
  - b. pressure evaporation- another ZLD option
  - c. flue gas drying – flue gas used to dry sludge directly in line
  - d. sidestream spray drier- used to dry sludge but does it emit mercury

# Detailed issues and Answers



# IC 1- MATS (Supreme Court decision is probably not going to have impact)

- The Supreme Court in a 5-4 split ruling rejected the Environmental Protection Agency's MATS rules governing toxic air pollutants including mercury. But since the rule was remanded to the State courts rather than invalidated it remains in effect. The likelihood of invalidation due to faulty cost logic is very unlikely. So the EPA cost justification will probably hold up.
- Justice Scalia, writing for the court's majority, said "The agency must consider cost—including, most importantly, cost of compliance—before deciding whether regulation is appropriate and necessary." "It is not rational, never mind 'appropriate,' to impose billions of dollars in economic costs in return for a few dollars in health or environmental benefits. Statutory context supports this reading."
- The E.P.A. had argued that it was not required to take costs into account when it made the initial determination to regulate. But the agency added that it had done so later in setting emissions standards and that, in any event, the benefits far outweighed the cost. The two sides had very different understandings of the costs and benefits involved. Industry groups said the government had imposed annual costs of \$9.6 billion to achieve about \$6 million in benefits. The agency said the costs yielded tens of billions of dollars in benefits.
- There is a good possibility that there will be little change in the market. "Given the fact that the E.P.A. has already done a detailed cost benefit analysis justifying the rule, and the fact that the majority of the affected industries have already invested heavily in compliance, there is a good chance that the D.C. Circuit will allow the rule to remain on the books" while the agency makes its revisions, said Patrick Parenteau, an expert on environmental law at Vermont Law School.
- If the rule is stricken during the re-write period, the largest and most immediate negative impact would be the loss of sales of activated carbon and other chemicals to aid in the mercury capture. There will be negative impacts on suppliers of trona and lime. This rule could delay revenues by several years. On the other hand, most of the equipment to capture the air toxics has already been installed. Also there are State regulations which require mercury reduction as well as limits on other pollutants. These lessen the impact.

# IC 1 MATS

## [Regulatory Initiatives facing US Power Plants, presented at AFS Hot Gas Filter Session by Tom Hart, American Electric Power](#)

The Hot Gas Decisions session at AFS May 2015 zeroed in on key issues and options relative to selection and operation of filters and precipitators to capture a range of pollutants

## [MATS Compliance Choices Webinar - Hot Topic Hour January 29, 2015](#)

Speakers at the Hot Topic Hour provided recent data which shows that improved activated carbon and absorbents will allow plants to meet MATS emission limits with lower amounts of consumables

## [MATS Compliance Choices for Particulate Control by Michael James Widico, KC Cottrell - Hot Topic Hour January 29, 2015](#)

Mike Widico addressed the particulate aspects of MATS

## [Converting to Natural Gas for MATs Compliance by R. Gifford Broderick, Combustion Components Associates - Hot Topic Hour August 7, 2014](#)

Giff Broderick addressed the option of converting to natural gas-firing in an existing

# IC 3 Industrial Boiler Mact

## [Boiler MACT Compliance Overview by Bill Liegois, Stanley Consultants - Hot Topic Hour March 21, 2013](#)

An overview of the engineering approach and critical considerations needed to evaluate, select and implement a solution for the Industrial Boiler MACT.

## [Industrial Boiler MACT Cost Analyses for Coal and Liquid Units by Amy Marshall, URS - Hot Topic Hour March 21, 2013](#)

An estimate of the initial capital cost of complying with the Industrial Boiler MACT for coal, biomass, liquid and process gas boilers and process heaters that will be subject to emission limits under the rule.

# 1C vii China NZE rule

## China mercury reduction drivers are complex

- All new-built power plants and more and more existing power plants are required to meet the emission limits so called 50/35/5 for NO<sub>x</sub>, SO<sub>2</sub> and dust respectively, or Near Zero Emission. Note, here 5mg/Nm<sup>3</sup> is only for dust, that means it is not including the condensable particles. Many of these same plants must meet mercury levels of 3 ug/m<sup>3</sup>
- At present, 50/35/5 is not an official emission standard, it is on the basis of emission of combustion gas turbine. The purpose is to avoid replacing coal plants with natural gas boilers.
- Zhejiang, Shandong, Jiangsu, Shanxi, Hebei and Guangdong provinces have already asked the power plants in the provinces to meet the requirement of Near Zero Emission.
- Most of these province are located very close to Beijing and have substantial consumption of coal, such as Hebei Province and Shanxi Province. Other provinces are located in the Yangtze River Delta and Pearl River Delta.
- Another dimension concerns the coal industry. Some electric group are very active on the NZE, because they have very close relation with the coal mining groups, e.g Guo Hua Electric Group, which is directly belong to the Shenhua Energy, a big coal mining group in China.
- Guo Huan Electric Group plans that 48 units of total 61 units in active service with a, total of 34800MW will meet the NZE at the end of 2017.
- The Zhenheng Group, the biggest electric group in Zhejiang Province is planning to complete the retrofit of all his units with the capacities above 600MW and 300MW before the end of 2016 and 2017 respectively.

# IC vii Mercury in Mandarin ( English summary of CBI presentation)

## [China Can Remove Mercury at Low Cost Thanks to U.S. Developments 中国能以低成本除汞得益于美国的技术发展](#)

In order to meet tough regulations in the U.S. technology developers have made great strides in creating low cost routes to achieve mercury removal from power plant exhausts. The cost is especially low if the plant already has a scrubber. China is installing scrubbers on nearly all its plants. As a result China can remove mercury with just a few percent increase in its air pollution control investment and operating cost. There have been some very significant recent breakthroughs which need to be communicated to the Chinese policy makers. To this end Mcilvaine conducted a webinar in Mandarin Chinese with two FGD experts . A presentation on removal technology was made by Bobby Chen of CBI Shaw. Questions and discussion was provided by Shiaw Tseng of Graymont. This presentation in Mandarin is available as a recording in the Mcilvaine Global Decisions Orchard and on Youtube.

# Ic vii Mercury in Mandarin presentation by CBI ( Chinese)

## Subject: 中国能以低成本除汞得益于美国的技术发展

中国能以低成本除汞得益于美国的技术发展 为了满足美国关于火电厂烟气排放严格的规定，以低成本工艺去除火电厂烟气中的汞，技术研发已经取得了长足进步。如果火电厂已有洗涤塔，那么除汞的成本特别的低。中国现在几乎所有的火电厂正在安装洗涤塔，因此，中国火电厂可以稍微增加空气污染控制的投资及运作成本，就可以去除烟气中的汞。现在已经有一些非常显著的最新突破需要与中国的决策者交流，为此Mcilvaine公司上周用中文与FGD方面的两个专家进行了网络研讨会。CBI Shaw集团陈博比先生做了关于去除汞的技术介绍，问题及讨论由Graymont公司曾孝群先生提供。这个录制中文演示文稿可以在Mcilvaine公司全球决策果园及Youtube上获得。 Mcilvaine公司全球决策果园链接：

<http://home.mcilvainecompany.com/index.php/component/content/article?id=573>

YouTube链接: <http://youtu.be/ldq33k5UWTs> 在火电厂烟气排放规定之前，美国火电厂每年排放45359 Kg的汞，到2016年，汞的排放将每年减少超过36287Kg。中国运行的燃煤锅炉4倍于美国，运行的水泥厂5倍于美国，因此中国在减少汞排放的潜力上，更加显著于美国。汞是在全世界漫游的，巴西金矿排放的汞已经被在北极发现踪迹。所以这是一个全球性问题，需要一个全球性的解决方案。中国已表明愿意花费大量资金来改善环境，当可以用低成本及便于实现明确的减少，因此他们利用这个机会是合适的。关于火电厂空气质量改善的技术突破的更多信

# I C viii Mercury regulations in other countries

- EU relies on coal plant scrubbers and has water limits but more stringent regulations are under consideration
- Most countries have mercury limits on waste incinerators
- Mining emissions can generate large quantities of mercury and there are some limits

# ID1 Re-emissions

## [Mercury Re-emission Re-examined - a Thermodynamic Model to Follow by Steve Feeney, Babcock & Wilcox Power Generation Group - Hot Topic Hour February 26, 2015](#)

Steve described a program whereby B&W can supply an inorganic sulfide for economic prevention of re-emission.

## [Mercury Abatement and Survey of FGD Liquors and Dissolved Metals Concentrations in FGD Wastewater by Jonathan Allen, Allen Analytics - Hot Topic Hour April 10, 2014](#)

Information regarding Mercury Abatement, FGD Liquors and Dissolved Metals Concentrations in FGD Wastewater. There is a big difference in selenium and mercury concentration in the scrubbing liquor which has to be process rather than fuel related.

## [Redox is Low Cost Solution to Re-emissions by Bobby Chen, CB&I - EUEC Conference - Hot Topic Hour April 10, 2014](#)

CB&I is continuing to optimize its mercury reduction technology and is validating the cost effectiveness of a new re-emissions treatment chemical - Redox.

## [EES KLeeNscrub is working well at Great River Energy \(GRE\) to Prevent Mercury Re-emissions by Jared Pozarnsky, Great River Energy - EUEC Conference 2014 - Hot Topic Hour April 10, 2014](#)

This scrubber additive prevents re-emissions and creates solids which are easily separated from the FGD wastewater. GRE is successfully operating a system with this chemical at its Bismarck, ND plant. Addition of CaBr in the scrubber improves overall efficiency.



# Idii Wastewater treatment

These presentations cover ZLD but MBR, wet lands and physical treatment are options

[The CoLD Crystallization Process by William Shaw, Veolia - Hot Topic Hour August 15, 2013.](#)

New approaches to evaporator system design, especially the recently patented CoLD<sup>®</sup> crystallization technology.

[Wastewater Treatment and Xero Liquid Discharge Technologies: Overview and New Developments by Gordon Maller, URS Corp. - Hot Topic Hour August 15, 2013](#)

Gordon discussed the non thermal ZLD process. This process would seem to be ideal in conjunction with the hot catalytic filter with DSI and is therefore being displayed on the hot gas filter website

[FGD Wastewater Treatment Evaluation by Paul Chu, EPRI - Hot Topic Hour August 15, 2013](#)

Paul presented the work EPRI has been doing to evaluate wastewater treatment options.

[The Wastewater Spray Dryer, "The Simple Solution to Zero Liquid Discharge" by Norikazu Inaba, Advatech - Hot Topic Hour August 15, 2013](#)

MHI has developed low CAPEX/OPEX technology for truly achieving zero liquid discharge (ZLD) from wet FGD to meet the stringent effluent limits

# 2Ai 1 Particulate Decisions impact mercury emissions

## [MATS Agenda by Bob McIlvaine, McIlvaine Company - Hot Topic Hour January 29, 2015](#)

Bob provided an overview of the whole MATS decision making process using the GdPS™ Concept

## [MATS Compliance Choices Webinar - Hot Topic Hour January 29, 2015](#)

Speakers at the Hot Topic Hour provided recent data which shows that improved activated carbon and absorbents will allow plants to meet MATS emission limits with lower amounts of consumables.

## 2A ii FGD process

Mcilvaine has separate summaries and route maps on 2 main FGD options. Both summaries explore the mercury removal option. Here are the links

[Dry Scrubbing](#)

[Wet Calcium FGD](#)

# 2A iii 1 Bromine

**Calcium bromide is an easily delivered and safe slurry to inject with fuel**

**[Chemtura can supply Bromine in all Forms and advise on Most Efficient Delivery Methods - by John Lehmkuhler, - Hot Topic Hour April 10, 2014](#)**

Chemtura can supply bromine as calcium bromide or in many other forms. The company works with clients from inception through continuing operational support. Setting up calcium bromide systems is relatively easy but there is no reason to over-design and invest more than necessary or to under-design and create operational problems. Chemtura is conducting tests which show the impact of bromine in the gas and scrubbing liquor on the materials with which it may come in contact. The quantity of bromine added can vary to compensate for changes in the process e.g., changes in fuels or deterioration of the catalyst. Since activated carbon is quite expensive it makes sense to utilize bromine with the fuel to supplement the carbon under upset conditions.

**[Treatment Chemical Case Studies by Bruce Keiser, Nalco. - Hot Topic Hour April 10, 2014](#)**

Nalco offers chemicals to solve the mercury emission problem for coal-fired boilers. One chemical is designed to inject in the boiler, another is injected in the scrubber and a third in the wastewater. The chemical quantities can be varied in order to compensate for process variables. For example the SCR does a better job of oxidizing mercury when the catalyst is new than later in the campaign. As the oxidation potential deteriorates the quantity of chemicals can be increased

# 2A iii 1 Bromine corrosion impacts

Can concentrate in scrubber if there is not enough bleed in scrubber recycle

[Bromine Corrosion impact on Scrubber needs Investigation by Gary Blythe and John Grocki, URS - EUEC Conference 2014 - Hot Topic Hour April 10, 2014](#)

Bromine can accumulate in the scrubber recycle. Confirmation of the accumulation was determined in a study at Lower Colorado River Authority (LCRA). John Grocki advised the attendees that there are big variations even between units at the same plant. There is a range of concentrations which can be of concern. Bromine and Chlorine cannot be treated the same and the combination has a different impact than either one independently. So whether there will be corrosion and which material is best to protect against it is based on the concentrations of both halogens. In addition to the scrubber itself, the injection of halogens in the fuel can have impacts on the air heater and ductwork

[EMO+HL, Total MATS Compliance Solution, by Bobby I.T. Chen, CB and I - Hot Topic Hour August 1, 2013](#)

Discussed bromine injection (EMO) as the answer for mercury reduction from plants burning the full range of fuels.

# 2A 111-3 Activated Carbon

Most applications will be for upstream injection but can also be used in scrubber

[Mercury Measure and Capture: PAC Injection in the WFGD by David Mazyck, Carbonxt - Hot Topic Hour March 5, 2015](#)

Dave explained how non brominated PAC can be injected prior to the scrubber or in the recirculating slurry to provide high levels of mercury capture and prevention of re-emissions

[On the Doorstep of MATS Compliance: Status and Options by Sheila Glesmann, ADA-CS - Hot Topic Hour February 26, 2015](#)

Sheila provided an overview of mercury control options along with some insights relative to the operation of activated carbon systems.

[Activated Carbon in Challenging Flue Gas Environments by Martin O'Brien, Calgon Carbon - Hot Topic Hour January 29, 2015](#)

Martin O'Brien addressed three problems which have been solved with unique activated carbon designs.

[Innovative, One-Step Production of Albemarle's Concrete-Friendly Activated Carbon by Behrooz Ghorishi, Albemarle - Hot Topic Hour August 2, 2012](#)

Using a concrete-friendly activated carbon.

# 2Aiii 4 Non AC sorbents

bentonite, kaolin and unburned carbon are other options

## [Mercury Sorbent Options by Steve Baloga - Hot Topic Hour July 31, 2014](#)

Steve Baloga of Novinda showed the economic advantages of amended silicates (bentonite). He also introduced a new product specifically designed to increase mercury oxidation in the flue gas and prevent re-emission in wet scrubbers

## [Strategy for Low-Cost Mercury Control: Using Native Unburned Carbon by Sterling Gray, URS Corp. - Hot Topic Hour July 31, 2014](#)

Sterling Gray of URS showed how the use of SBS to reduce SO<sub>3</sub> leads to inherent mercury capture by the unburned carbon in the flyash.

## [Cylenchar additive is effective on both oxidized and elemental mercury according to SRI tests](#)

- In a gas stream carrying a 1,000µg/M<sup>3</sup> total mercury and at least 34µg/M<sup>3</sup> of elemental mercury, CyCurex<sup>®</sup> was easily able to reduce the total mercury concentration by >90%, and it was able to deal with >75% of the elemental mercury within 1.1 to 2.2 seconds exposure

## [BASF has Three Successful Trials of Unique Mercury Sorbent by Fabien Rioult, Ph.D., BASF - EUCC Conference 2014 - Hot Topic Hour April 10, 2014](#)

The kaolin-based sorbent is readily available and cost effective.

# 2bi 1 Activated carbon injection systems

## [Power Plants - Automated Systems for Sorbent Handling & Liquefying by Jeff Doherty, Semi-Bulk Systems - Hot Topic Hour February 26, 2015](#)

Jeff described the injection system using a venturi ejector principle to introduce the PAC to the recirculating scrubber slurry.

## [UCC Dry Sorbent Injection HCl Removal by Jon Norman, United Conveyor - Hot Topic Hour July 18, 2013](#)

Results of HCl removal tests using Dry Sorbent Injection.

## [ACI Material Handling Gen 3 by Keith Day, Nol-Tec - Hot Topic Hour June 20, 2013](#)

Discussion of Gen 3 Material Handling for ACI systems

## [Power Plants - FGD Limestone Slurry Processes w/Pulverized Limestone and DSI Processes to Scrubber and/or In-Furnace Treatments by Charles Alack - Hot Topic Hour June 20, 2013](#)

Charles discussed Dry Sorbent Handling and Injection into the Scrubber and/or Direct into the Furnace for Hg and SO<sub>2</sub> Removal.



# 2bi4 SCR enhancements

## [MHPSA Hg Oxidation Catalyst by Kyle Nedig, Mitsubishi Hitachi Power Systems Americas - Hot Topic Hour July 31, 2014](#)

Kyle Nedig of MHPS cited high oxidation ratios for a special catalyst which also maintains low conversion of SO<sub>2</sub> to SO<sub>3</sub> but high conversion of Nox to N<sub>2</sub>.

## [Analytical Management of SCR Catalyst Lifetimes and Multipollutant Performance by Balaji Krishnakumar, Niksa Energy Associates - Hot Topic Hour November 29, 2012.](#)

Balaji presented data which will be a good guide on management of catalyst to obtain the desired results

## [Catalyst Management - Considering SCR Mercury Oxidation Co-Benefit by Noel Rosha, IBIDEN Ceram - Hot Topic Hour February 27, 2014](#)

Looking for input from Haldor Topsoe, JM, Cormetech etc but some of this is in our SCR related webinars

[SO<sub>3</sub> Decisions Summary](#) is a separate route map with details on optimizing SCR for mercury, Nox, and acid gases

# 2Bii 1 CEMS issues and options

## [HgCEMS for EGU MATS and PC MACT Compliance by Karl Wilber, Tekran Instruments - Hot Topic Hour April 16, 2015](#)

Mercury CEMS are less expensive than sorbent traps over time. Stack CEMS with additional sample lines can be used for process measurement.

## [CEMS for MACT and MATS Compliance Webinar - Hot Topic Hour April 16, 2015](#)

Testing and monitoring challenges under MATS will be substantial, so will the cost.

## [Measurement Optimization for Plants with Wet Scrubbers by Matthew Pollack, Novinda - Hot Topic Hour April 16, 2015](#)

Measuring mercury prior to the precipitator is challenging but necessary.

## [The Role of Particulates in Mercury Emission Measurements by Philip Dufresne, ALL BLUE - Hot Topic Hour March 5, 2015](#)

Philip discussed particulate impact on mercury emissions.

## [Advantages of Using a Process Hg CEMS by Jeremy Whorton, Thermo Fisher Scientific - Hot Topic Hour - February 26, 2015](#)

Jeremy explained why power plants should consider a process mercury CEMS as well as one for compliance.

# 2Bii 1 CEMS (particulate, process)

## [Mercury CEMS and Sorbent Traps Measurements vary because of Particulate](#)

### [Mercury by Jim Staudt of Andover Technology Partners - Hot Topic Hour May 8, 2014](#)

Jim provided the following comparison between CEMS and Sorbent Traps - Method 30B includes HgP, which results in overestimation of gaseous Hg that may be significant at MATS Hg levels but not enough to impact RATA pass or fail. Differences in HgT up to about  $0.50\mu\text{g}/\text{Nm}^3$  (typically less, but sometimes more) may be explained by HgP when controlling Hg with ACI and/or Br. Will vary somewhat by coal Hg levels, PM emissions, ACI injection, etc. Bromine “interference” should not be a concern except possibly under extremely high furnace Br injection rates and is not a concern for brominated activated carbon.

## [CEMS has advantages by reducing Activated Carbon Expenditures by Heather Bryne, Carbonxt - Hot Topic Hour May 8, 2014](#)

Heather Bryne of Carbonxt explained the complexities in controlling the amount of sorbent needed at any point in time. Fuel and process variations make it highly desirable to continuously measure mercury rather than rely on the delayed information obtained with sorbent traps

# 2B ii 1 Extractive vs in situ, traps, multi metals

## [Durag Mercury CEMS proven in the rugged Cement Applications and have advantages for Coal-fired Power Plants by Rich Hovan, Durag - Hot Topic Hour May 8, 2014](#)

Rich Hovan, Durag, cited the benefits of their extractive system using dual beam photometer and said they are the first to use certified bottled Hg calibration gas bottles.

## [Sorbent Traps vs. Mercury CEMS Webinar - Hot Topic Hour May 8, 2014](#)

The Hot Topic Hour yesterday included an extensive and friendly debate over the results of sorbent traps and mercury CEMS. The differences of opinion were about gaseous mercury measurement.

## [Multi Metals Analyzer can measure Mercury and the Other Toxic Metals by Krag Petterson, Cooper Environmental - Hot Topic Hour May 8, 2014](#)

Krag Petterson, Cooper Environmental showed data demonstrating that the multi-metals analyzer does provide accurate mercury measurements. But it also can measure the other toxic metals. So it is an alternative to the low PM2.5 surrogate option. For a utility with a precipitator which can meet the requirements otherwise this is an attractive option