EERC Technology… Putting Research into Practice

Field Testing of Activated Carbon Injection Options for Mercury Control at TXU's Big Brown Station

Project Kickoff Meeting

DOE NETL Headquarters – Morgantown, West Virginia

John H. Pavlish
Energy & Environmental Research Center
April 19, 2005

Agenda for Kick-Off Meeting

Time	Topic	Presenter
1:00	**Welcome and Introductions**	**Sara Pletcher (DOE/NETL)**
1:15	**Overview of TXU**	**Bob Wiemuth (TXU)**
1:30	**Project Overview and Scope** *Project Background* *Project Objectives* *Project Tasks* *Test Matrix*	**John Pavlish (EERC)**
2:15	**Project Schedule**	**John Pavlish (EERC)**
2:30	**Project Team**	**John Pavlish (EERC)**
2:45	**Budget and Funding** *Overall Budget* *Cost Sharing* *In-kind Costs*	**John Pavlish (EERC)**
3:00	**Reporting** *Routine Reporting* *Technical Data Reporting*	**John Pavlish (EERC)**
3:15	**Closing Remarks and Discussion**	**Sara Pletcher (DOE/NETL)**

Project Overview

DOE/NETL Phase II Mercury Control Projects

Project Title	Lead Company	Preliminary Test Schedule*	Host Utility	Test Location	Coal Rank	PM	FGD
Evaluation of Sorbent Injection for Mercury Control	ADA-ES	3/04 - 6/04	Sunflower Electric	Holcomb	PRB/Bit. Blend	FF	SDA
		8/04 - 11/04	AmerenUE	Meramec	PRB	ESP	---
		8/05 - 11/05	AEP	Conesville	Bit.	ESP	Wet FGD
		4/05 - 7/05	Detroit Edison	Monroe 4	PRB/Bit. Blend	ESP	---
Demonstration of Amended Silicates for Mercury Control	Amended Silicates	3/05 - 4/05	Cinergy	Miami Fort 6	Bit.	ESP	---
Sorbent Injection for Small ESP Mercury Control	URS Group	3/04 & 9/04 - 10/04	Southern	Yates 1	Bit.	ESP	Wet FGD
			Southern	Yates 2	Bit.	ESP w/ NH3/SO3	---
Pilot Testing of Mercury Oxidation Catalysts for Upstream of Wet FGD Systems	URS Group	6/04 - 7/05	TXU	Monticello 3	TX Lignite	ESP	Wet FGD
		2/05 - 3/06	Southern	Yates	Bit.	ESP	Wet FGD
Evaluation of MerCAP for Power Plant Mercury Control	URS Group	2/04 - 8/04	Great River Energy	Stanton 10	ND Lignite	FF	SDA
		1/05 - 6/05	Southern	Yates 1	Bit.	ESP	Wet FGD
Enhancing Carbon Reactivity in Mercury Control in Lignite-Fired Systems	UNDEERC	4/04 - 6/04	Basin Electric	Leland Olds 1	ND Lignite	ESP	---
		9/04 - 10/04	Great River Energy	Stanton 10	ND Lignite	FF	SDA
		4/05 - 6/05	Basin Electric	Antelope Valley 1	ND Lignite	FF	SDA
		4/04 - 5/04	Great River Energy	Stanton 1	ND Lignite	ESP	---
Mercury Oxidation Upstream of an ESP and Wet FGD	UNDEERC	6/05 - 8/05	Minnkota Power	Milton R. Young 2	ND Lignite	ESP	Wet FGD
		8/05 - 9/05	TXU	Monticello 3	TX Lignite	ESP	Wet FGD
Advanced Utility Mercury-Sorbent Field-Testing Program	Sorbent Technolgies	1/05 - 4/05	Duke	Buck	Bit.	Hot ESP	---
		6/04 - 9/04	Detroit Edison	St. Clair	Bit./PRB blend	ESP	---
Low-Cost Options for Moderate Levels of Mercury Control	ADA-ES	TBD	MidAmerican	Louisa 1	PRB	Hot ESP	---
		TBD	Entergy	Independence 1	PRB	ESP	---
		TBD	AEP	Gavin	Bit	ESP	Wet FGD
		TBD	MidAmerican	Council Bluffs 2	PRB	Hot ESP	---
Field Demonstration of Enhanced Sorbent Injection for Mercury Control	ALSTOM	TBD	Basin Electric	Leland Olds 1	ND Lignite	ESP	---
		TBD	Reliant Energy	Portland	Bit.	ESP	---
		TBD	PacifiCorp	Dave Johnston	PRB	ESP	---
Demonstration of Integrated Approach to Mercury Control	GE-EERC	TBD	TVA	John Sevier	Bit.	ESP	---
Brominated Sorbents for Cold-Side ESPs, Hot-Side ESPs, and Fly Ash Use in Concrete	Sorbent Technolgies	TBD	Mid-West Generation	Crawford 7	Subbituminous	ESP	---
		TBD	Progress Energy	Lee 1	Bit	ESP	---
		TBD	Mid-West Generation**	Will County	Subbituminous	Hot ESP	---
Field Testing of Activated Carbon Injection Options for Mercury Control	UNDEERC	TBD	TXU	Big Brown	TX Lignite or TX Lignite/Sub-bit. Blend	COHPAC	---
Field Testing of a Wet FGD Additive for Enhanced Mercury Control	URS Group	TBD	Southern	Yates 1	Bit.	ESP	Wet FGD
		TBD	AEP	Conesville	Bit.	ESP	Wet FGD
		TBD	TXU	Monticello 3	Lignite	---	---

Project Background

Texas Lignite–Mercury Challenge

- Texas lignite is among the U.S. coals with the highest mercury content.
- Texas lignite, in particular, can emit relatively high levels of Hg, with up to 80% Hg^0.
- Month-long monitoring by the EERC has shown an unusually high degree of variability in mercury concentrations.
- High mercury concentration and variability coupled with very low Cl levels in the flue gas make control of Hg from plants burning TX lignite perhaps the most difficult of any coal type burned within the United States.
- Lignite coals are also distinguished by much higher Ca contents. Unique to TX lignite coal are relatively higher Fe and Se concentrations

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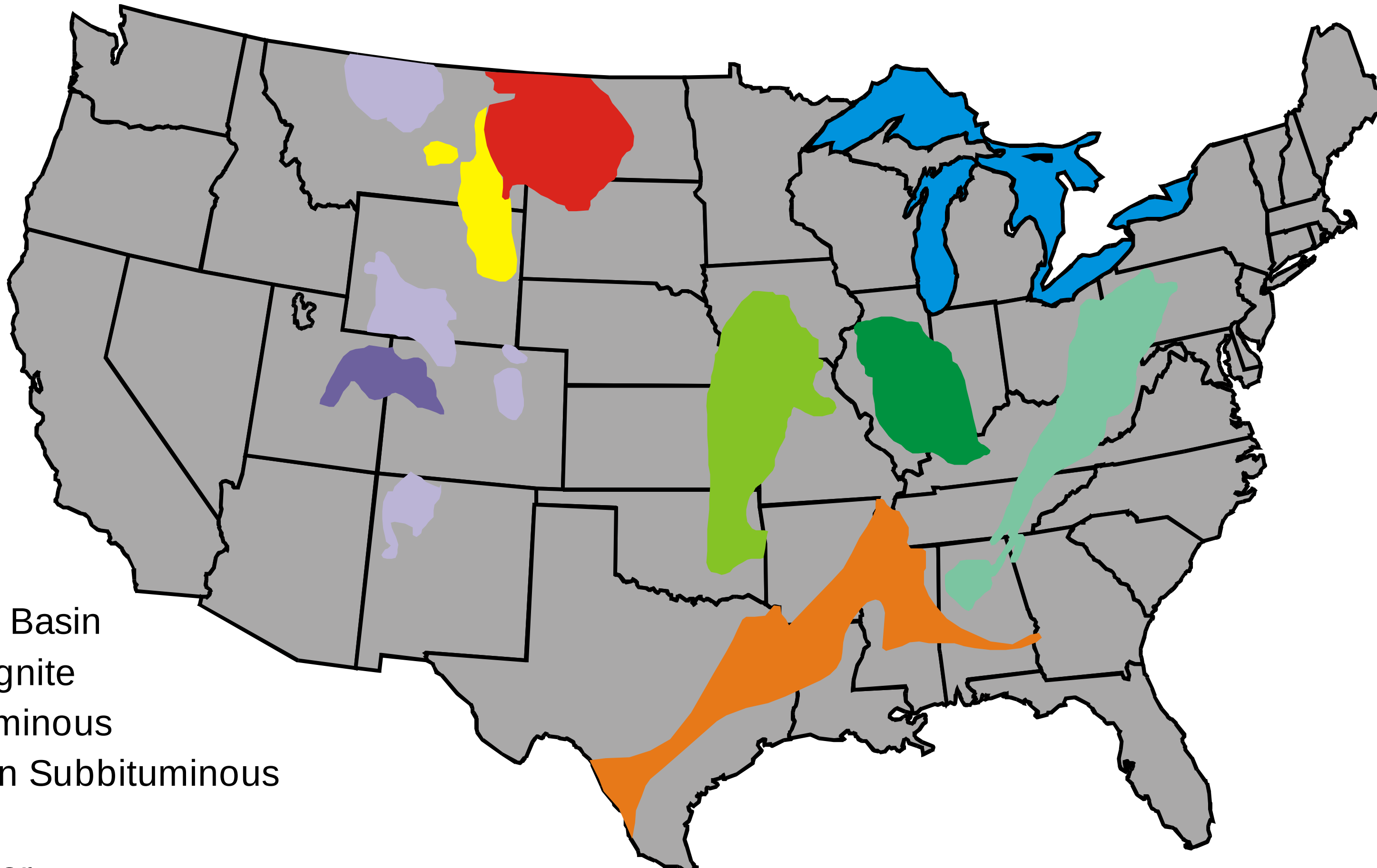
Map of Coal Basin



Powder River Basin
Gulf Coast Lignite
Western Bituminous
Other Western Subbituminous
Appalachian
Eastern Interior
Western Interior
Fort Union Lignite

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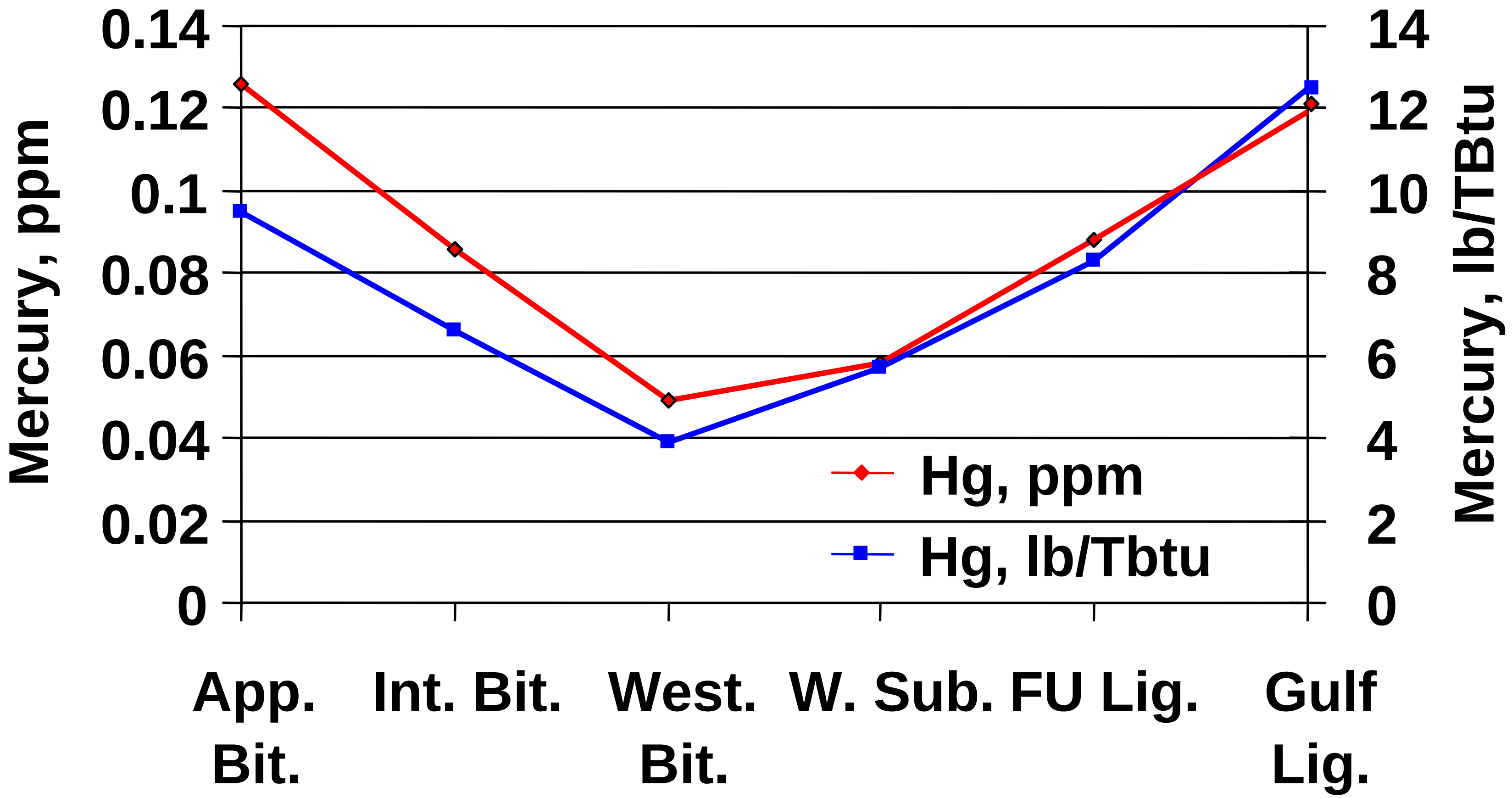
Comparison of Average Mercury Concentrations in Coal



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Results of ICR Coal Analysis by Region

Reported on Dry Basis

Region and Rank	No. of Samples	Hg, ppm	Cl, ppm	S, %	Ash, %	Btu/lb	Moisture, %	Hg, lb/TBtu
Appalachian Bituminous	19,530	0.126	948	1.67	11.65	13,275	2.5	9.5
Interior Bituminous	3763	0.086	1348	2.45	10.43	13,001	6.6	6.6
Western Bituminous	1471	0.049	215	0.57	10.51	12,614	4.2	3.9
Western Subbituminous	7989	0.068	124	0.48	7.92	11,971	19.4	5.7
Fort Union Lignite	424	0.088	139	1.15	13.37	10,585	37.3	8.3
Gulf Coast Lignite	623	0.119	221	1.39	23.56	9646	34.5	12.5

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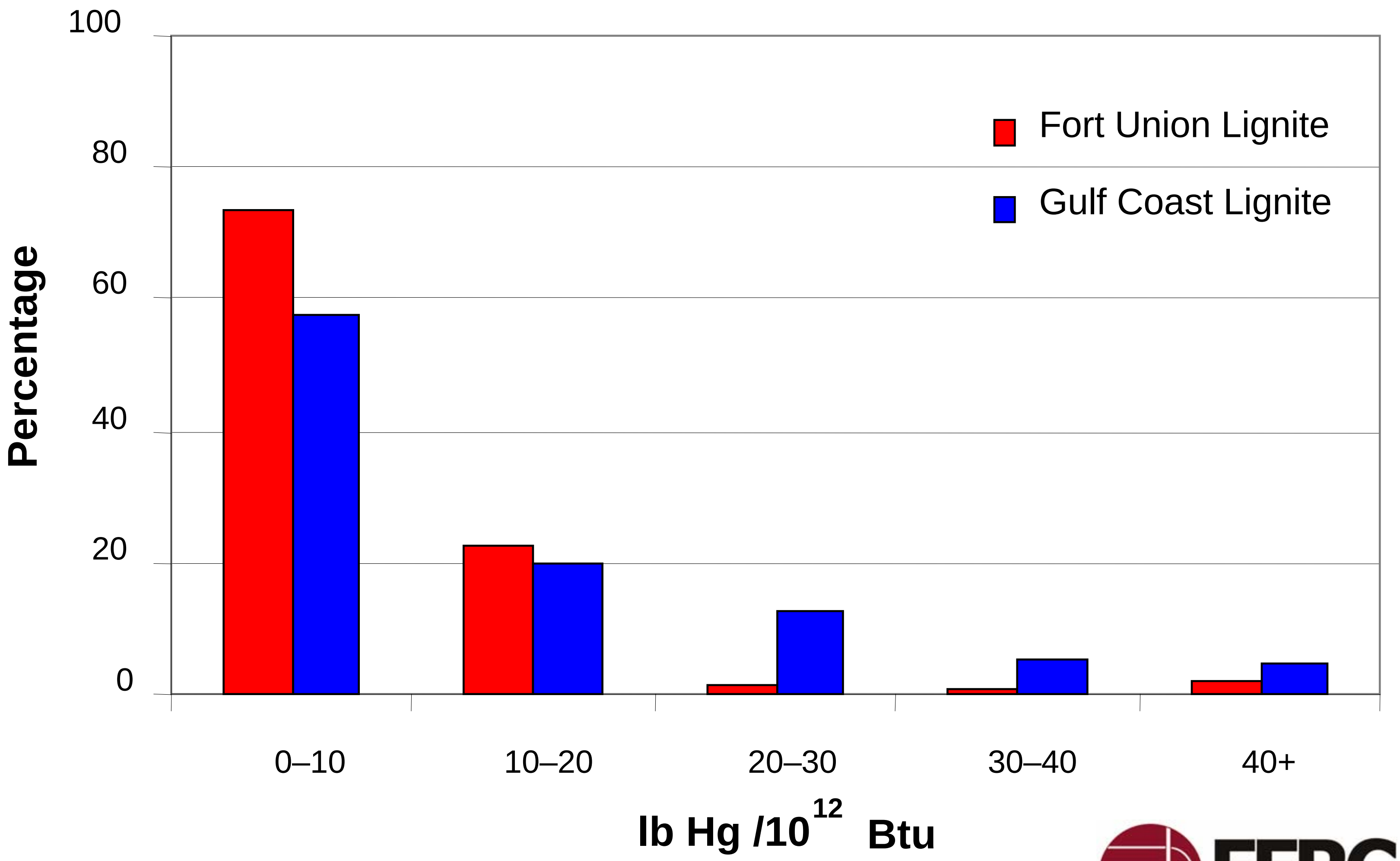
Fort Union Lignite Compared to Gulf Coast Lignite *



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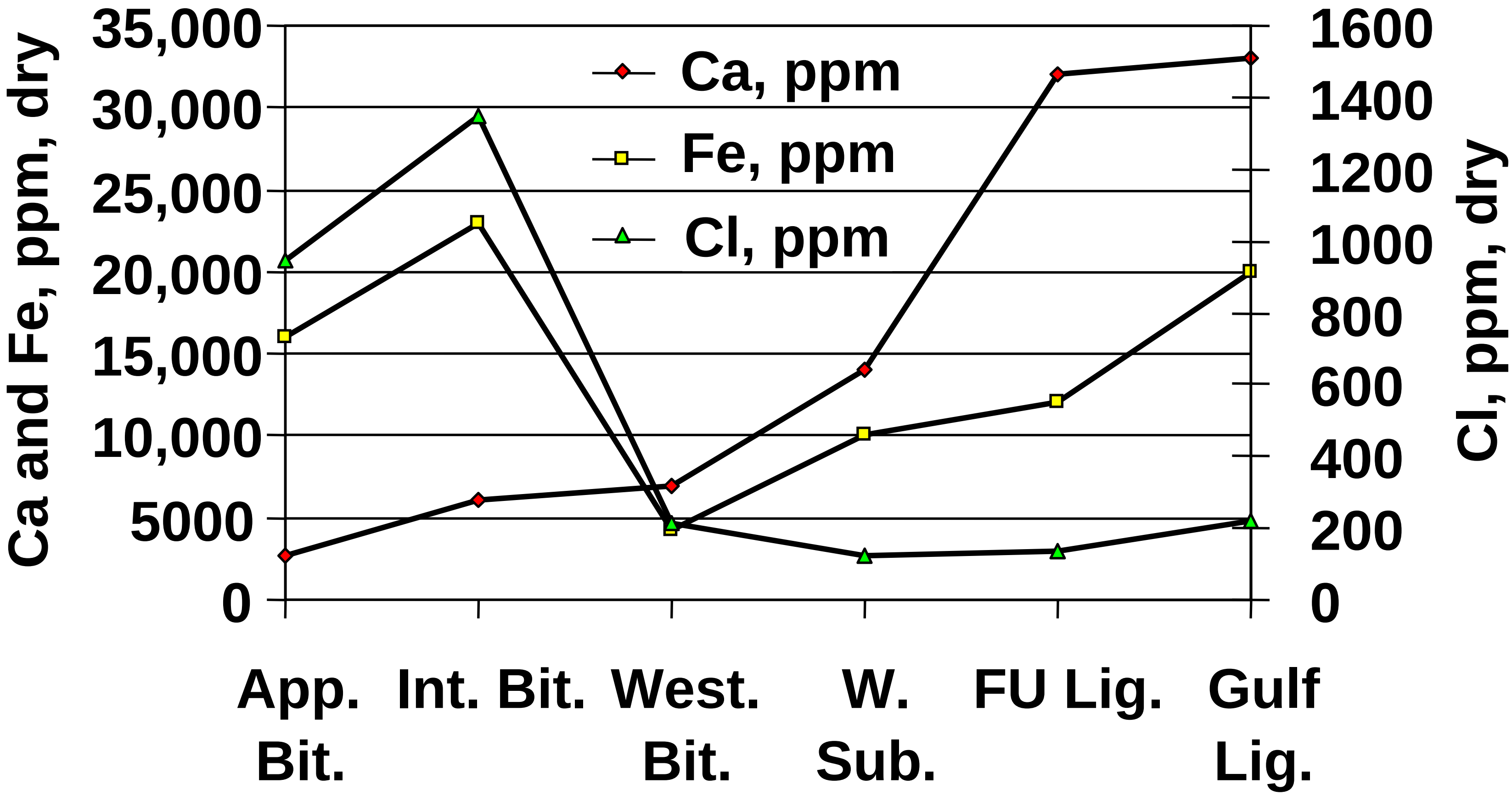
*** Based on ICR Data**

Comparison of Average Coal Characteristics



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Pilot-Scale Testing

- March 2004 – the EERC conducted pilot-scale testing to evaluate the effectiveness of ACI upstream of an FF operated at an air-to-cloth ratio (A/C) of 12, combusting 70% TX lignite–30% subbituminous—the same A/C at which Big Brown operates.

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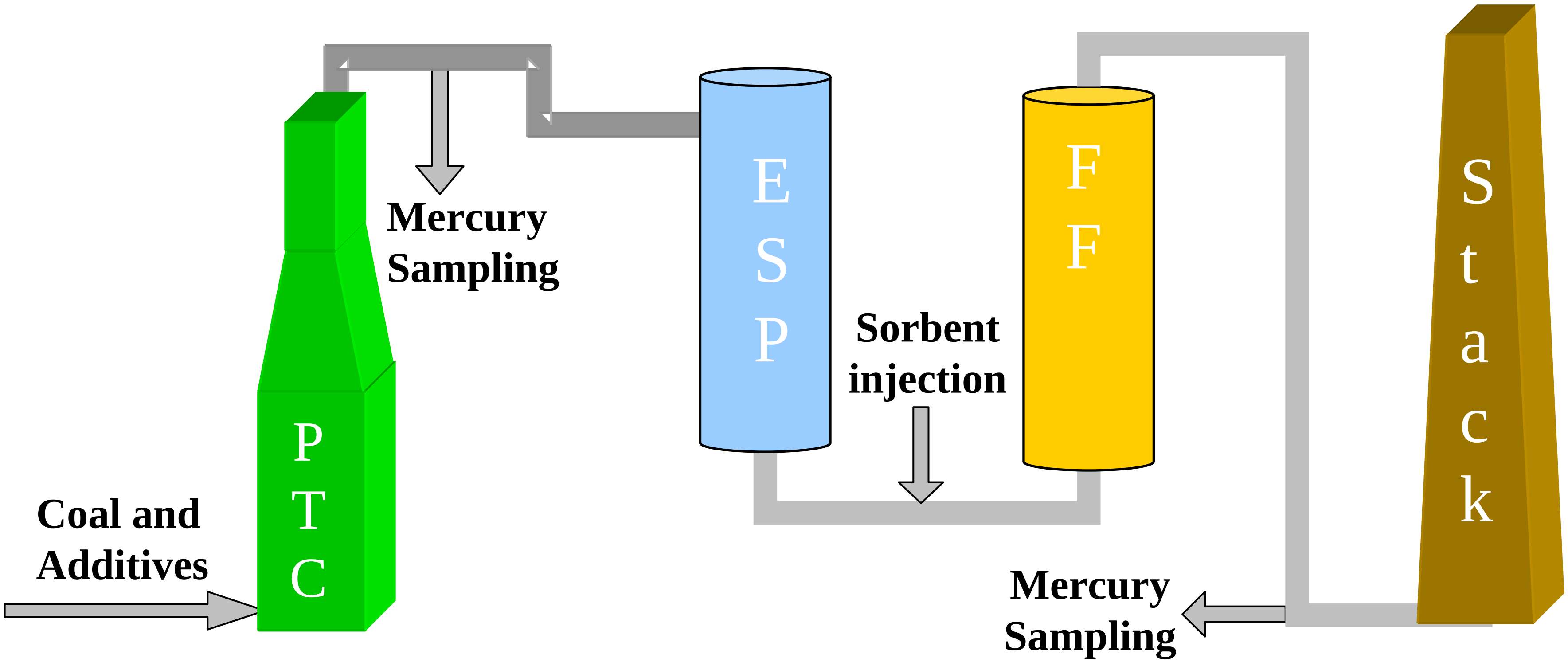
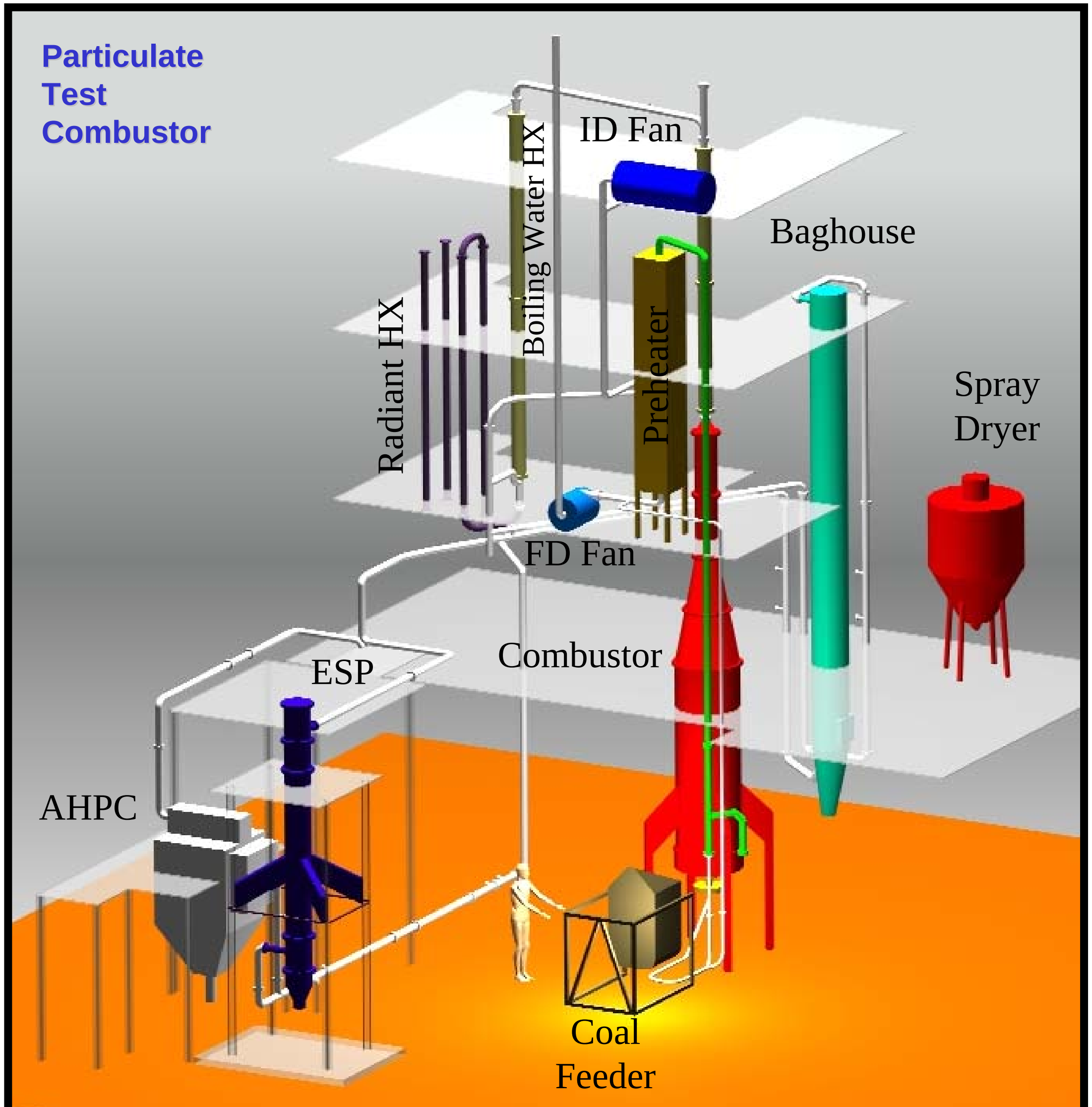
Pilot-Scale Mercury Control Configuration



TOXECON™ Pilot-Scale Configuration



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Pilot-Scale Test Parameters

Coal:	**70% TX Lignite–30% PRB Blend**
ESP Inlet Temperature:	177°C, (350°F)
ESP Outlet/FF Inlet Temperature:	177°C, (350°F)
FF Outlet Temperature:	177°C, (350°F)
Filtration Velocity:	12 ft/min
ESP:	4mA, 40-60 kV
Bag Type:	1 Ryton® bag
Sorbents:	1) Norit FGD 2) Norit FGD + Additive 3) EERC-Treated
Additives:	NaCl and $CaCl_2$

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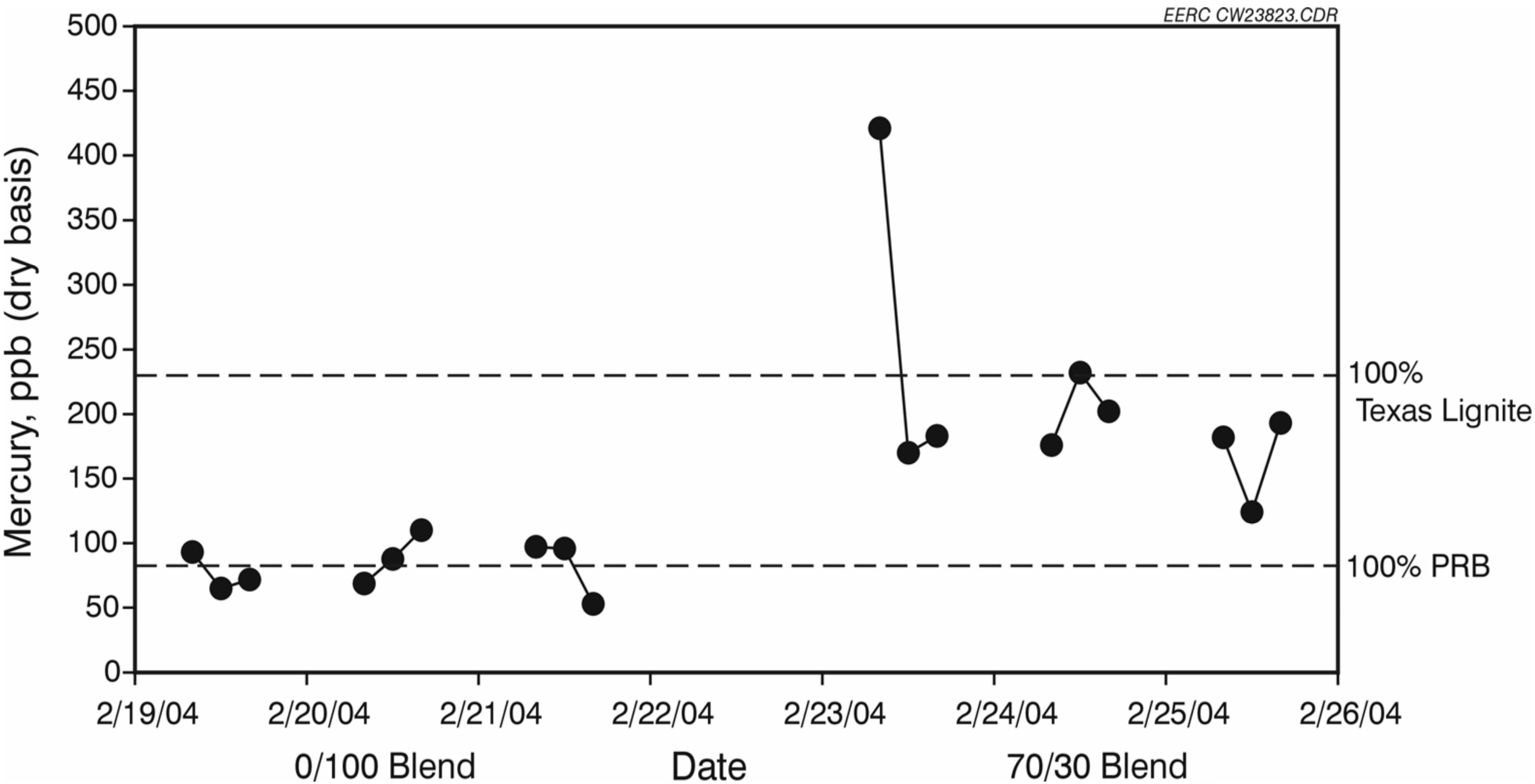
Pilot Tests: Typical Coal Analyses

	TX Lignite	PRB	Computed 70–30 Blend
Proximate Analysis	***Moisture Free, %***	***Moisture Free, %***	***Moisture Free, %***
Volatile Matter	47.84	47.64	47.78
Fixed Carbon	34.87	45.37	38.02
Ash	17.28	6.99	14.20
Ultimate Analysis	***Moisture Free, %***	***Moisture Free, %***	***Moisture Free, %***
Hydrogen	4.54	4.75	4.60
Carbon	59.05	67.26	61.52
Nitrogen	1.32	1.19	1.28
Sulfur	1.09	0.56	0.93
Oxygen	16.72	19.24	17.47
Ash	17.28	6.99	14.20
Heat Value, *Btu/lb*	10,126	11,189	10,445
Mercury in Coal, µg/g	0.251	0.0714	0.197
Chlorine in Coal, µg/g	21.9	8.2	17.8
Selenium, µg/g	6.8	1.5	5.2

Coal Mercury, Big Brown Full-Scale



Coal Analysis for Big Brown at Full-Scale, 70% Lignite–30% PRB Blend

Date	2/23/2004			2/24/2004			2/25/2004			Average	Std. Dev.
Mercury, ppm (dry)	0.421	0.170	0.183	0.176	0.232	0.202	0.182	0.124	0.193	0.209	0.084
Chlorine, ppm (dry)	24.1	22.3	21.6	21.8	18.7	17.5	19.6	19.1	20.2	20.5	2.1
Short Proximate Analysis											
Moisture, %	31.0	31.3	31.2	31.1	30.5	31.5	31.6	31.5	31.4	31.2	0.3
Ash, %	11.0	11.6	9.7	9.8	9.4	8.1	10.2	10.5	11.6	10.2	1.1
Sulfur, %	1.4	0.7	0.8	0.6	0.7	0.6	0.7	0.7	0.7	0.8	0.2
Heating Value, Btu/lb	7528	7265	7483	7531	7694	7664	7440	7302	7101	7445	193
Ultimate Analysis											
Hydrogen, %	6.7	6.7	6.6	6.4	6.8	6.8	6.5	6.6	6.3	6.6	0.2
Carbon, %	39.1	41.7	39.1	39.4	44.1	40.0	37.8	41.1	36.4	39.9	2.2
Nitrogen, %	0.9	0.9	0.8	0.8	0.9	0.8	0.8	0.9	0.7	0.8	0.1
Sulfur, %	1.4	0.7	0.8	0.6	0.7	0.6	0.7	0.7	0.7	0.8	0.2
Oxygen, %	41.1	38.4	43.1	42.9	38.1	43.6	44.0	40.3	44.2	41.7	2.4
F_d, dscf/10^6 Btu	8784	9783	8620	8557	9784	8648	8305	9438	8306	8914	595
Sulfur (dry), %	1.97	1.03	1.09	0.89	1.01	0.93	1.02	1.04	1.08	1.12	0.33
Heating Value (dry), Btu/lb	10,910	10,575	10,876	10,930	11,071	11,188	10,877	10,660	10,351	10,827	257

* Results are on an as-received basis, except where noted.

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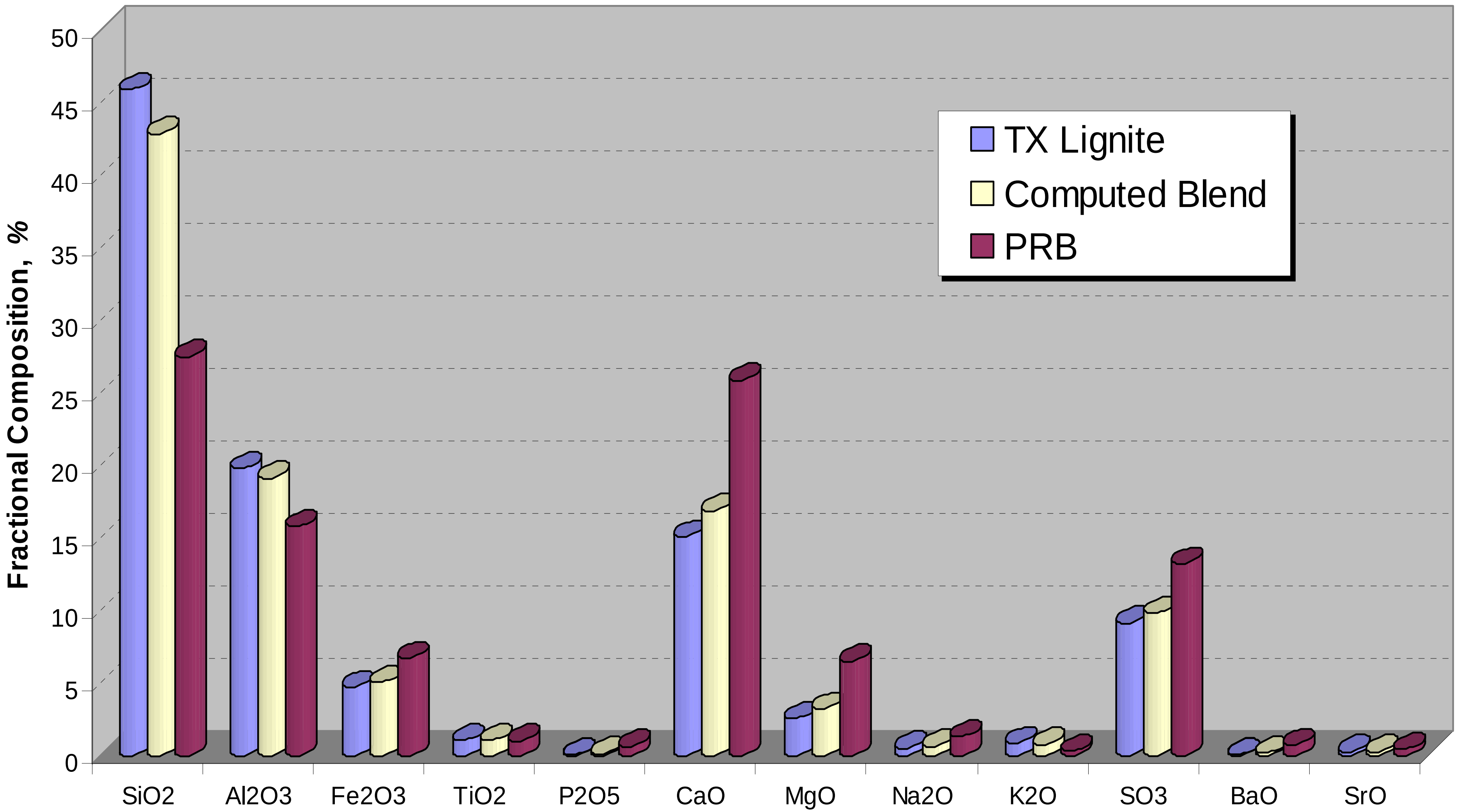
Coal Analysis for Big Brown at Full-Scale, 100 % Lignite

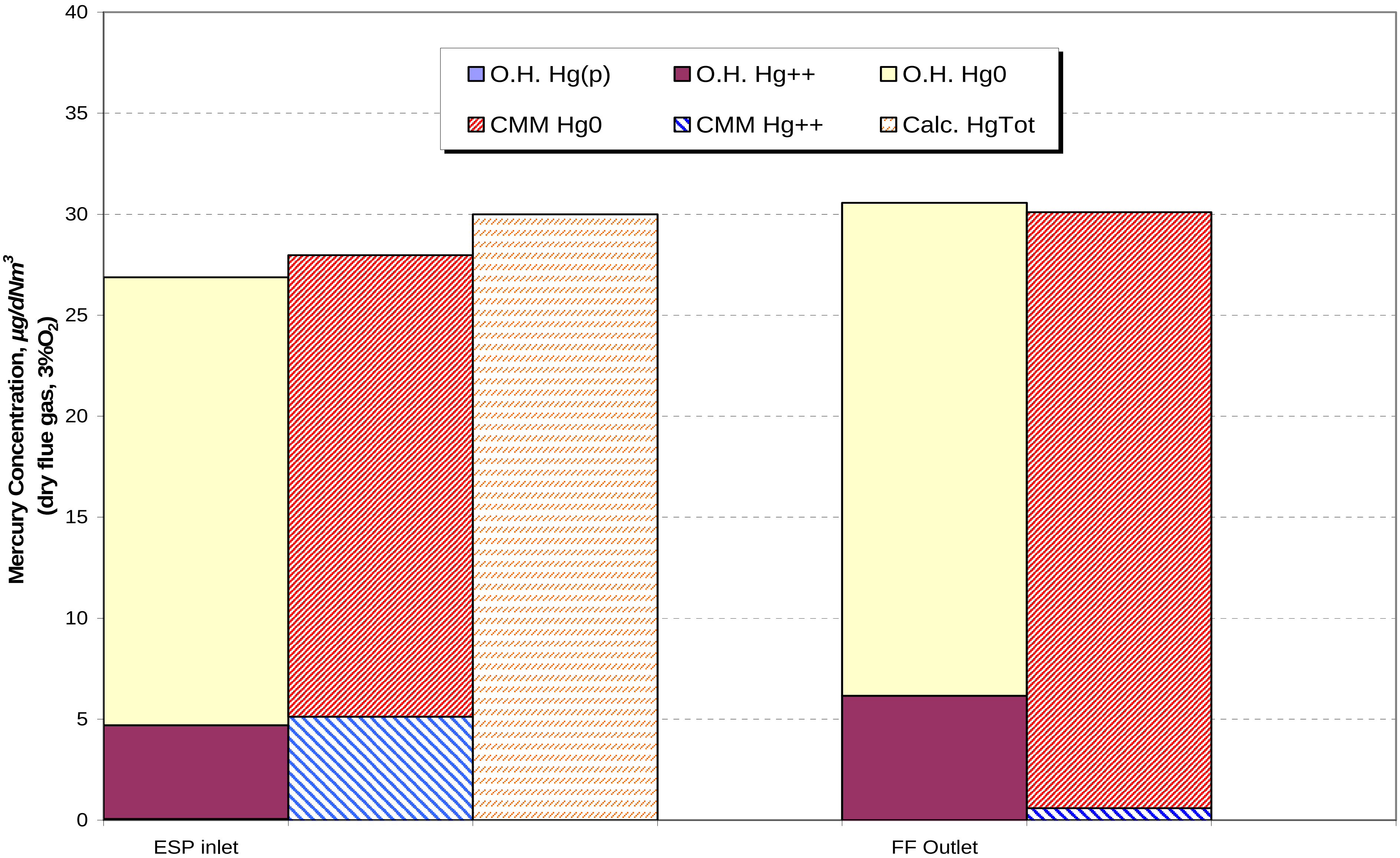
	Sample 1	Sample 2	Sample 3	Average	Std. Dev.
Mercury, ppm (dry)	0.170	0.308	0.212	0.230	0.071
Chlorine, ppm (dry)	37.1	17.8	18.4	24.4	11.0
Short Proximate Analysis					
Moisture, %	28.3	28.6	29.4	28.8	0.6
Ash, %	9.7	9.4	12.0	10.4	1.4
Sulfur, %	1.2	0.8	0.6	0.9	0.3
Heating Value, Btu/lb	7749	7837	7369	7652	249
Ultimate Analysis					
Hydrogen, %	6.4	6.6	6.4	6.5	0.1
Carbon, %	41.7	42.2	39.5	41.2	1.4
Nitrogen, %	1.0	0.9	0.8	0.9	0.1
Sulfur, %	1.2	0.8	0.6	0.9	0.3
Oxygen, %	39.9	40.1	40.6	40.2	0.4
F_d, dscf/10^6 Btu	8994	9022	8882	8966	74
Sulfur (dry), %	1.73	1.05	0.89	1.22	0.4
Heating value (dry), Btu/lb	10,808	10,975	10,438	10,740	275

* Results are on an as-received basis, except where noted.

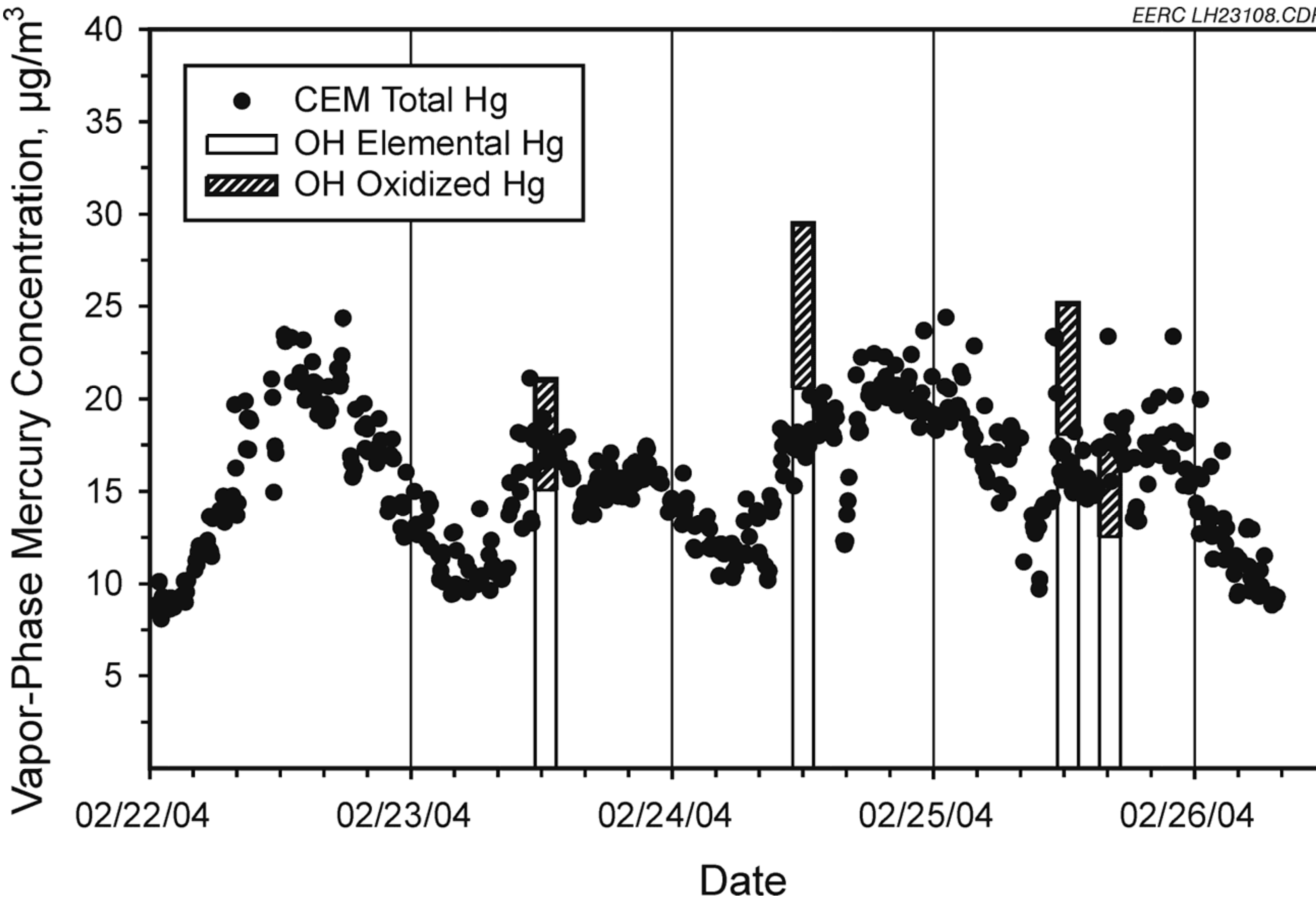
Ash Analysis of Fuels and Blend



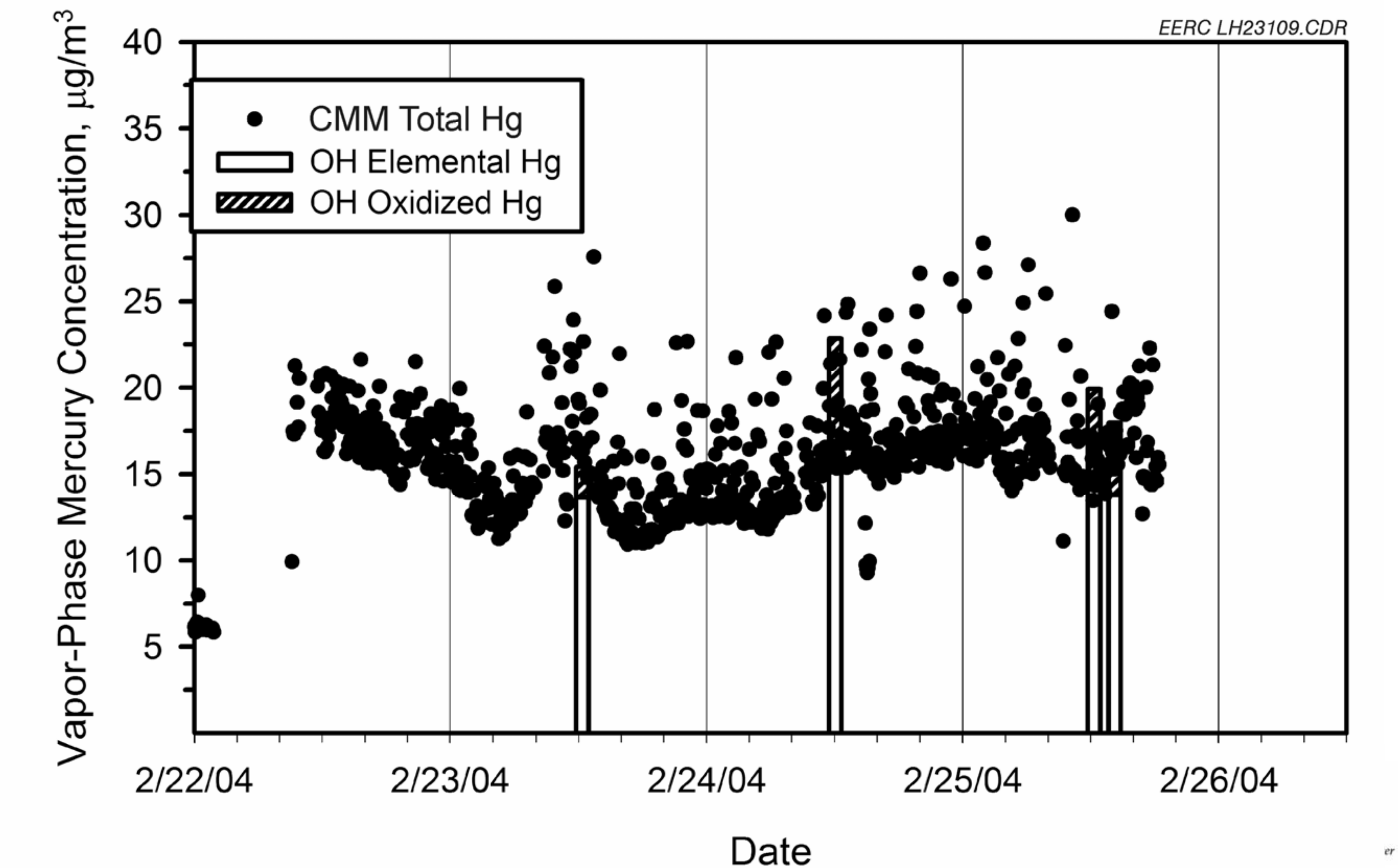
Pilot-Scale Mercury Emissions Speciation 70 % TX Lignite–30 % PRB Blend



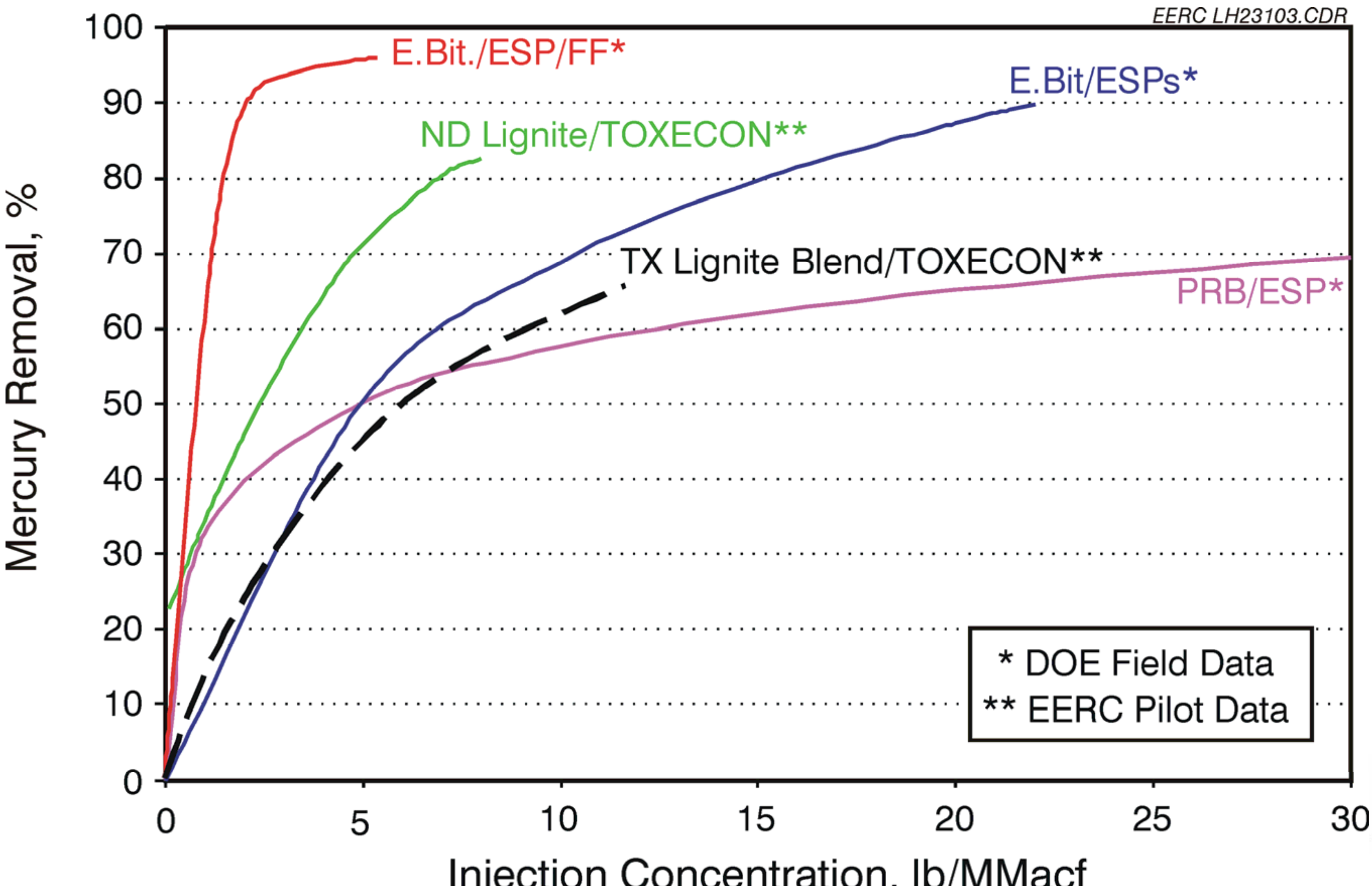
Full Scale Comparison of OH and CMM Data at the FF Inlet for 70% TX Lignite–30% PRB



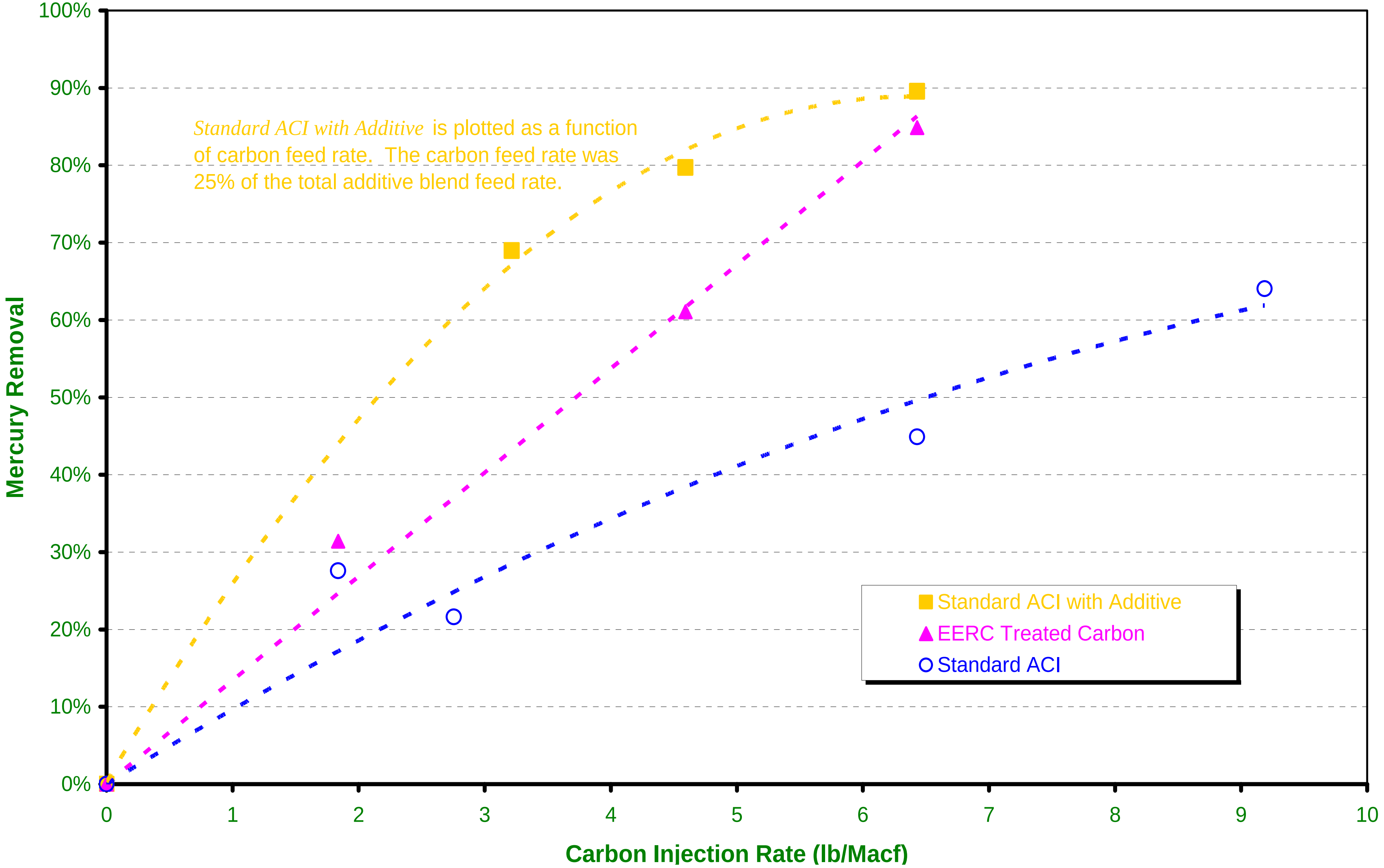
Full Scale Comparison of OH and CMM data at the FF Outlet for 70 % TX Lignite–30 % PRB



Comparison of EERC Pilot-Scale to Full-Scale DOE Data



Mercury Removal as a Function of Carbon Injection Rate (based on pilot-scale data)



TXU Pilot-Scale Test Key Conclusions

- A high degree of variability in mercury content and mercury capture potential was observed even within relatively small and consistent samples of Texas lignite.
- Baseline mercury speciation for the 70% lignite–30% PRB blend was 83% elemental, 17% oxidized, and 0% particulate bound mercury. For the lignite-only condition, the speciation was 81% elemental, 19% oxidized, and 0% particulate-bound mercury. Thus, the blend did not appear to change the speciation significantly.
- The capture across the ESP and FF without the use of ACI or SEA was 21% and 10%, respectively. This compares to 20% for the ESP and 15% for the FF, as measured at Big Brown.
- For ACI, lower-than-expected collection efficiency was observed throughout test matrix—high carbon injection rates required to obtain 60%–70%. Three to four times as much AC is needed to achieve similar levels of control as compared to other coals.
- Removal by AC appears to be even more difficult than with ND lignites.
- Lowering the flue gas temperature significantly improved mercury collection efficiency.
- Halogens did enhance oxidation, but not mercury capture *(counterintuitive).*
- Alternative options, such as chemically-treated sorbents and additives used in conjunction with AC, showed great potential to enhance mercury removal, requiring smaller amounts of AC.

Project Scope

Overall Project Objectives

- Investigate the long-term feasibility of cost-effective mercury removal from Texas lignite at TXU's Big Brown Steam Electric Station using activated carbon injection, with and without additives.
- Two identical 600-MW units, each equipped with two parallel sets of electrostatic precipitators (ESPs) and COHPAC baghouses allows for injection of AC (and possible additives) with simultaneous comparison of untreated flue gas on the opposing set.

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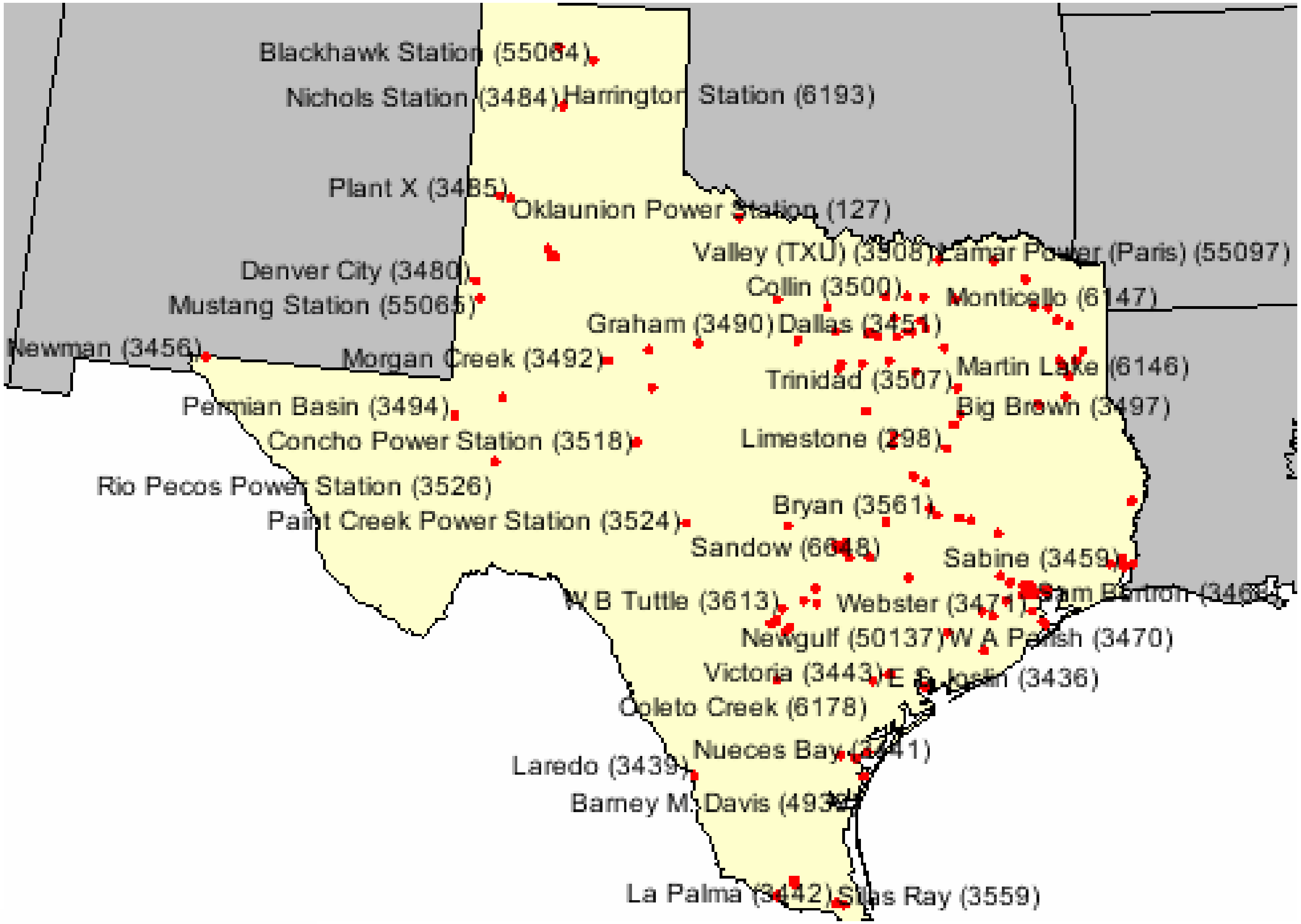
Big Brown Power Station, Fairfield, TX

Big Brown Station near Fairfield, Texas



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Source: U.S. Environmental Protection Agency at http://cfpub.epa.gov/gdm/

Big Brown Power Station, Fairfield, TX

Big Brown Power Station, Fairfield, TX

Big Brown Specifications

- Plant capacity: Approximately 1200 MW, two 600-MW units
- Boiler type: Tangentially fired with eight coal feeders per unit
- Typical fuel: 70% TX lignite–30% PRB blend
- SO_2 control: None
- NO_x control: Low-NO_x burners
- PM control: COHPAC™ configuration on each of the A and B sides of the unit. Each side has two ESPs (in parallel) followed by four baghouses (two per side) operating at an A/C ratio of 12:1 and operated in parallel. Each ESP has two fields, two rows, and a total of eight hoppers (two hoppers per box); each baghouse has eight hoppers.

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Specific Objectives

- Conduct testing to determine if sorbent technology can be applied at Big Brown to achieve a mercury reduction of greater than 55%.
  - Establish values for baseline Hg speciation and removal.
  - Determine effectiveness of injecting AC
  - Determine effectiveness of using AC with an additive
  - Determine effectiveness of a treated AC
- Quantify Hg emissions variability over 1 month period.
- Determine capital and operating costs and assess balance of plant impacts.
  - Determine the impact of sorbents on baghouse cleaning cycle, pressure, etc.

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Scope of Work

- Perform baseline, parametric, and month-long field tests to evaluate effectiveness of several promising mercury control options.
- Identify balance-of-plant impacts
- Perform a preliminary economic evaluation of the commercial application of the most promising technology
- Report results at meetings, conferences, and a final comprehensive report

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Project Tasks for ACI Testing at Big Brown

Task 1 – Testing and Sampling Activities at Big Brown

Subtask 1.1 – Field Sampling Activities

Subtask 1.2 – Data Analysis

Task 2 – Site Planning, Reporting, and Management

Subtask 2.1 – Field Test Planning and Site Preparation

Subtask 2.2 – Program Planning and Management

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Project Activities

Task	Effort
Project Planning	Develop detailed field test and QA/QC plan, finalize site agreements, and have project kickoff meeting for project participants.
Injection Equipment	Design, procure, set up, and test injection and additive systems.
Short-Term Testing	Conduct baseline testing and parametric evaluations and ensure sorbent optimization. Conduct testing using both OH and CMMs.
Longer-Term Testing	Conduct CMM testing for approximately 4–5 weeks (with periodic OH sampling).
Reporting and Project Management	Perform data analysis, project reporting, budget management, presentation development, project review meetings, and final disposition of equipment.

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Targeted Mercury Removals

- Injection would occur after the ESP and prior to the baghouse on Side A of Unit 1 or 2 for a target mercury removal rate of ≥55%.
- Additional short-term parametric testing would be conducted to investigate higher removal rates of up to 70%
- Sustained longer-term removal rates of ≥55%.

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Test Schedule for Big Brown

Week	Activities	OH Sampling
1	Setup and Baseline Sampling	3 Sets[a]
2–4	Parametric Testing	Limited
5–9	Month-Long Testing	3 × 3 Sets[b]

a- Airpreheater Outlet (ESP Inlet), ESP outlet - upstream of injection, FF Outlet

b- ESP outlet - upstream of injection, FF Outlet

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Sorbent Injection Options at Big Brown

For a targeted sustainable Hg removal rate of ≥55%, testing will include:

- A commercially available AC sorbent DARCO Hg
- An AC sorbent (DARCO Hg) enhanced with an additive
- An EERC proprietary chemically-treated AC sorbent

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Parametric Tests

Test No.	Time Frame	Hg Control Technology	Objective – Hg Removal
1	Week 2	Standard ACI	Baseline
2	Week 2	Standard ACI	55%
3	Week 2	Standard ACI	70%
4	Week 2	Standard ACI	Maximum reduction
5	Week 3	ACI with additive	Baseline
6	Week 3	ACI with additive	55%
7	Week 3	ACI with additive	70%
8	Week 3	ACI with additive	Maximum reduction
9	Week 4	Treated ACI	Baseline
10	Week 4	Treated ACI	55%
11	Week 4	Treated ACI	70%
12	Week 4	Treated ACI	Maximum reduction

*Preceded by 1 week of setup and baseline testing.

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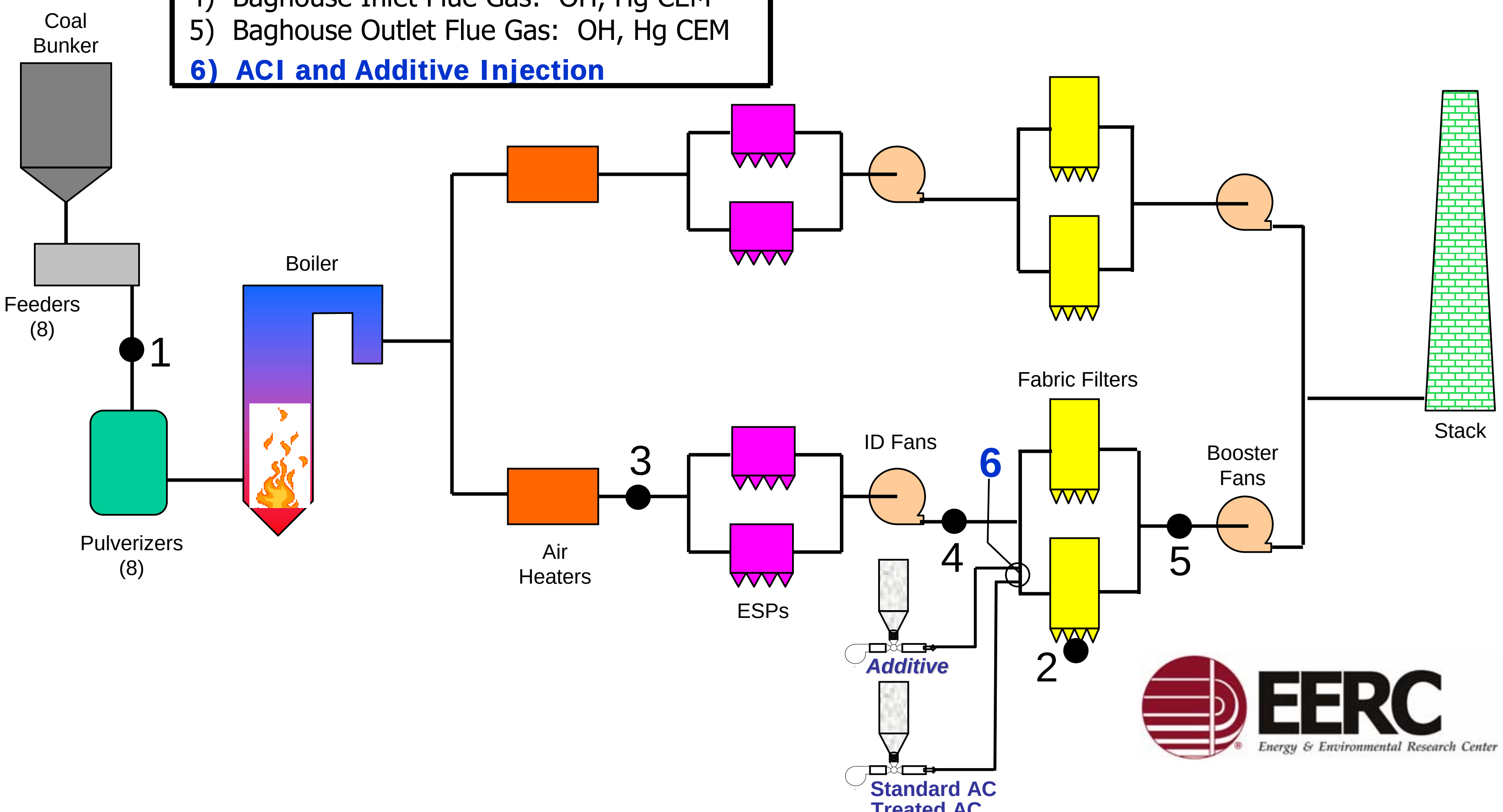
Mercury Control Options for TXU Big Brown Configuration

TXU's Big Brown Unit
Sampling Points
1) Coal: Hg, Cl, Prox./Ult..., BTU
2) Ash: Hg, Cl, LOI, C, Hg Stability
3) Air Heater Outlet Flue Gas: OH, Hg CEM
4) Baghouse Inlet Flue Gas: OH, Hg CEM
5) Baghouse Outlet Flue Gas: OH, Hg CEM
6) ACI and Additive Injection



AC Storage Silo and Control Panel

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AC Injection Equipment

Preliminary ACI Economics

- Preliminary economic costs for Big Brown using ACI are estimated to be less than $10,000 per pound of Hg removed. ***Note, balance-of-plant impacts are not accounted for in this estimate.***
- This assumes ACI rates for 50%–70% removal.
- This cost is approximately in the mid-range of the cost of 0.03–1.903 mils/kWh, which EPA recently estimated for Hg control.

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Preliminary Additive Economics

- Sorbent additives that have been tested to date show great promise for improving Hg capture and reducing cost as compared to standard ACI.
- Those tested to date are much less expensive than AC and, when used in conjunction with ACI, have improved sorbent effectiveness
- Pilot tests indicate a reduction in ACI rates of up to 70%.
- Thus, on this basis, the cost of control is estimated to be over 50% lower as compared to standard ACI.

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Preliminary Treated-AC Economics

- Proprietary EERC pretreated sorbent at pilot-scale tests shows Hg capture rates greater than 80%
- Cost of the pretreated AC is expected to be higher, but the amount required for similar levels of reduction is lower.
- Based on pilot-scale results, the trade-off of lower rates vs. higher cost is expected to result in an overall lower cost compared to standard ACI.

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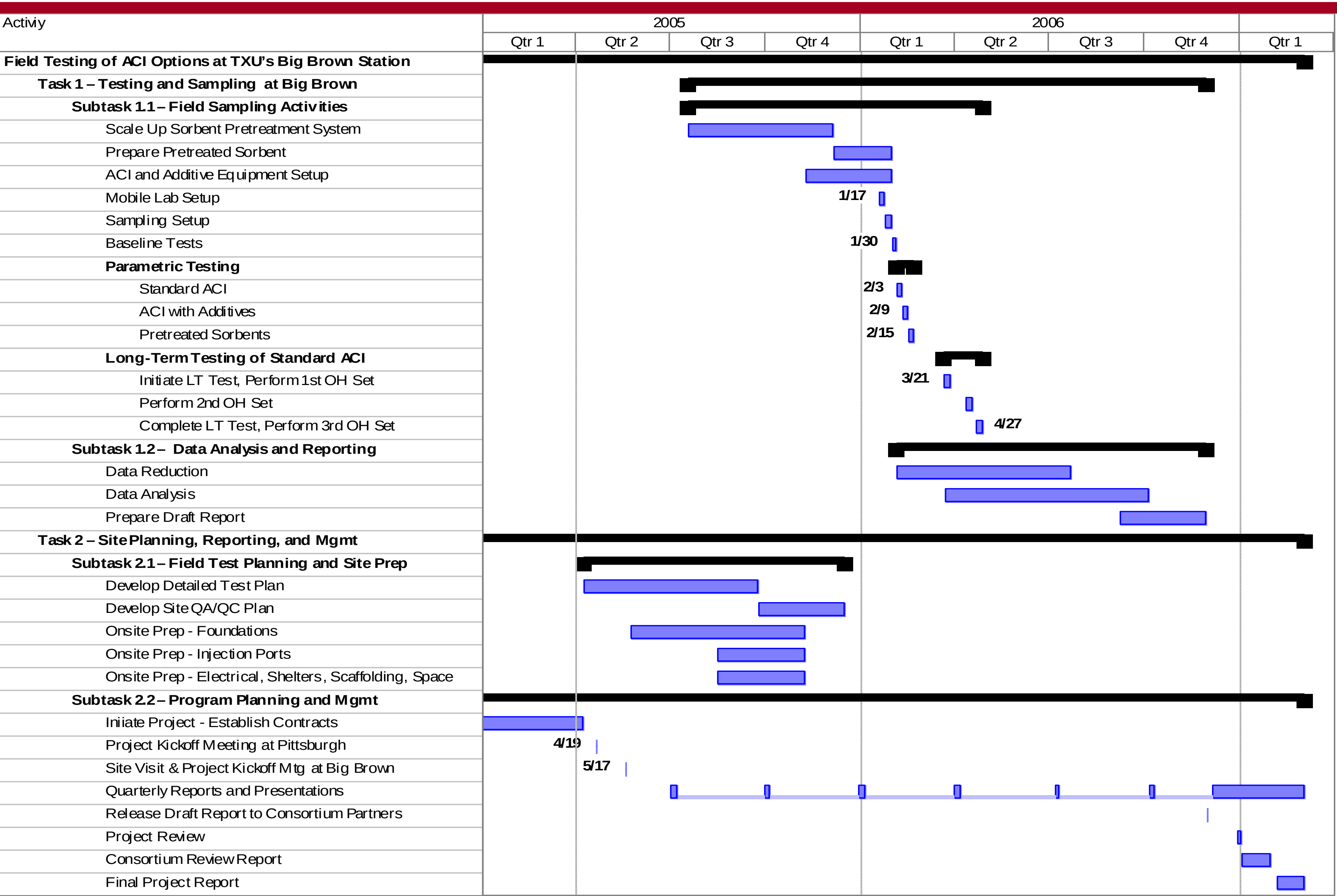
Project Schedule

Project Schedule for ACI Testing at Big Brown

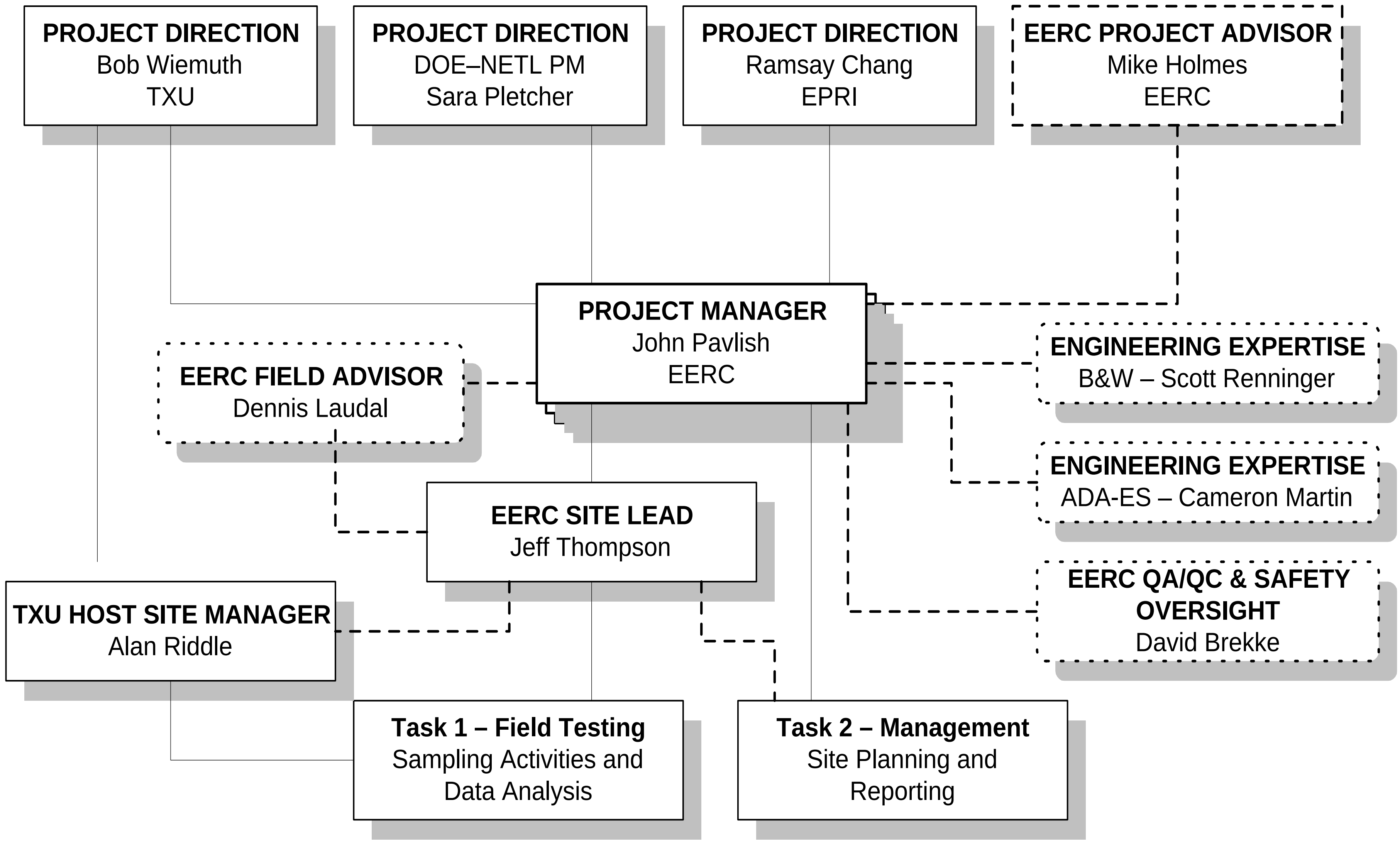


Schedule Milestones

- **2005 Q1:** Complete rescheduling of testing to address DOE's budget timeline.
- **2005 Q2:** Conduct project kickoff meeting at DOE.
- **2005 Q2/Q3:** Conduct combined project kickoff and site visit at TXU Big Brown Station in Fairfield, Texas.
- **2005 Q3:** Develop project test plan with host site.
- **2005 Q3/Q4:** Initiate on-site preparation for baseline testing.
- **2005 Q4:** Begin installation of test equipment and prepare for field testing of AC options.
- **2006 Q1:** Begin field testing of sorbent options.
- **2006 Q2:** Complete field testing and begin data reduction.
- **2006 Q2/Q3:** Perform data reduction and analysis.
- **2006 Q3/Q4:** Initiate draft final report development.
- **2006 Q4:** Submit draft final report for review by project team
- **2007 Q1:** Issue final report.

Project Team

Team Member Contributions to the Project



Team Expertise for this Project

Name	Organization	Management of DOE Programs	Management of Hg- Related Projects	Air Pollution Control	Hg Sampling and Analysis	QA/QC	Mercury Science	Power Plant Operations	Field Test Experience
John Pavlish	EERC	X	X	X	X	X	X	X	X
Mike Holmes	EERC	X	X	X	X		X	X	X
Dennis Laudal	EERC	X	X	X	X	X	X	X	X
Jeff Thompson	EERC		X	X	X	X	X	X	X
Ramsay Chang	EPRI	X	X	X	X	X	X	X	X
Cameron Martin	ADA-ES		X	X	X			X	X
Scott Renninger	B&W	X	X	X	X	X	X	X	X
Bob Wiemuth	TXU	X	X	X	X	X		X	X
Alan Riddle	TXU		X	X	X	X		X	X

Key Personnel

TXU			
Bob Wiemuth	**Host Site Direction**	**(214) 812-8367**	**bob.wiemuth@txu.com**
Alan Riddle	**Host Site Mgr.**	**(903) 389-6056**	**ariddle1@txu.com**
NETL			
Sara Pletcher	**DOE Perf. Monitor**	**(304) 285-4236**	**sara.pletcher@netl.doe.gov**
B&W			
Scott Renninger	**Engineering**	**(330) 860-1878**	**sarenninger@babcock.com**
ADA-ES			
Cameron Martin	**Engineering**	**(303) 734-1727**	**camm@adaes.com**
EERC			
John Pavlish	**Project Manager**	**(701) 777-5268**	**jpavlish@undeerc.org**
Jeff Thompson	**Site Lead**	**(701) 777-5245**	**jthompson@undeerc.org**
David Brekke	**QA/QC**	**(701) 777-5154**	**dbrekke@undeerc.org**

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Project Interest

Members of the Lignite-Based Consortium

NETL

LIGNITE ENERGY COUNCIL

North Dakota Industrial Commission

B&W

a McDermott company

EPRI

ada.es

BASIN ELECTRIC POWER COOPERATIVE
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URS

GREAT RIVER ENERGY℠
A Touchstone Energy® Cooperative

MONTANA-DAKOTA UTILITIES CO.
A Division of MDU Resources Group, Inc.

THE NORTH AMERICAN COAL CORPORATION

TXU

Apogee Scientific

Minnkota Power
MPC COOPERATIVE, INC.

Westmoreland Coal

OTTER TAIL POWER COMPANY

BNI COAL®

SaskPower

Texas Interests

- **Texas Association of Business**
- **The Governor's Clean Coal Technology Council**
- **The Association of Electric Companies of Texas**
- **The Texas Mining and Reclamation Association**
- **The Texas Lignite Coalition**

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Project Budget

Team Member Contributions to the Project

SOURCE	TYPE	IN-KIND COST SHARE	CASH COST SHARE	DOE	TOTAL PROJECT
TXU/EPRI	Cash through EPRI TC credits		$475,000		$475,000
B&W/EPRI	Cash through EPRI TC credits		$18,000		$18,000
ADA-ES	In-kind – discount of sorbent, materials and shipping	$123,210			$123,210
TXU	In-kind – services and material	$75,000			$75,000
EPRI	In-kind – services, travel and overhead	$30,000			$30,000
DOE	Cash			$1,500,000	$1,500,000
	Total	$228,210	$493,000	$1,500,000	$2,221,210
	PERCENT COST SHARE	32.5		67.5	

Data Reduction and Reporting

Data Reduction

Plant operating and technology performance data will be collected and logged carefully such that effectiveness can be accurately assessed relative to both short- and long-term Hg capture/reduction. Data generated throughout the test program will be reduced, interpreted, and summarized to determine overall conclusions related to performance and costs.

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Project Reporting

- Conference calls as needed, or quarterly
- Project review meetings, annually
- Monthly informal updates, conference calls, e-mails, project highlights
- Presentation of results at various conferences
- Detailed site-specific field test plan
- QA/QC plan
- Final report

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