

TOXECON™ Demonstration

We Energies' Presque Isle Power Plant

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Project Partners

- We Energies
- DOE NETL
- Cummins & Barnard, Inc.
- ADA-ES
- EPRI



TOXECON™ Demonstration

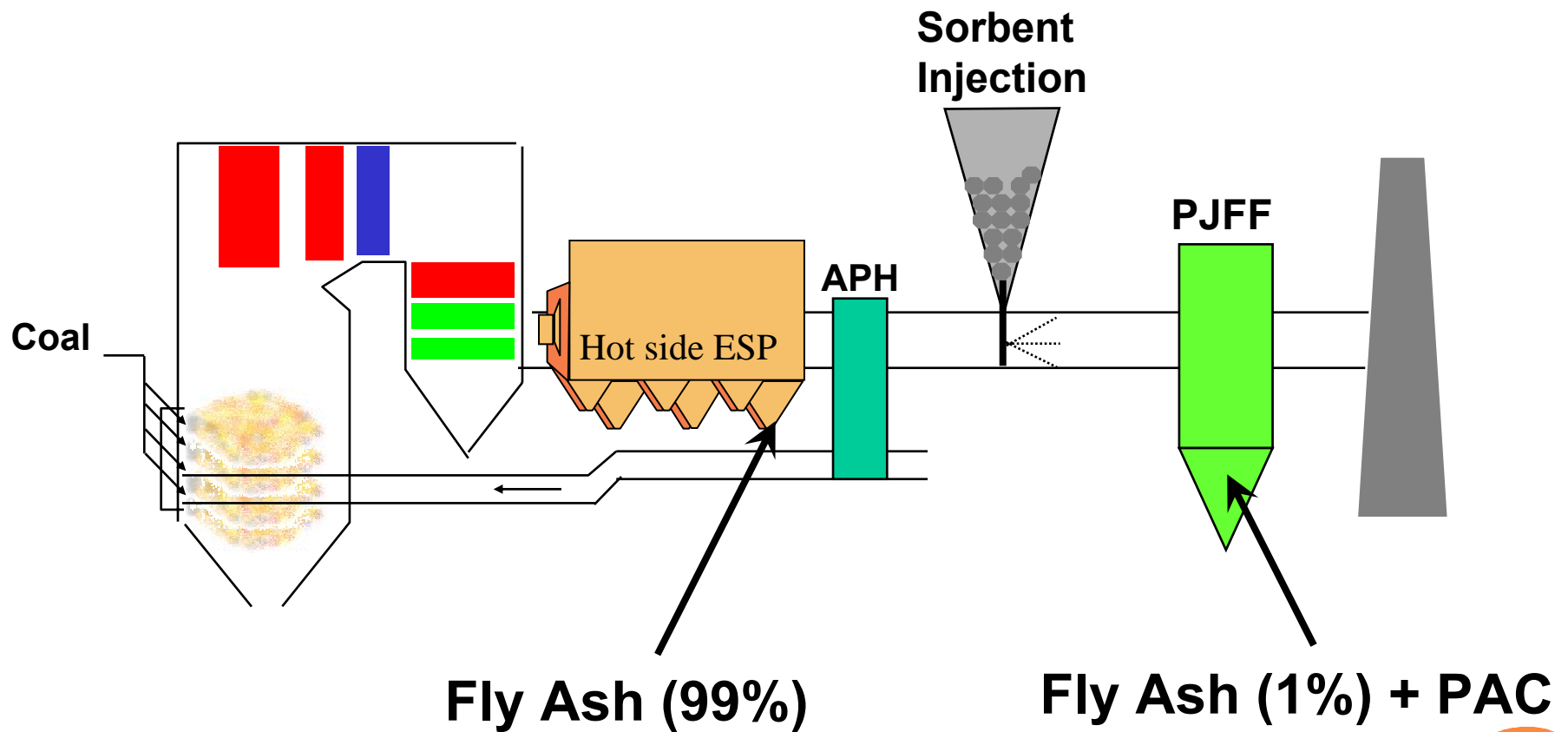
- **Presque Isle Power Plant, Marquette MI**
 - **Units 7-9 (270 MW)**
 - **PRB Coal**
 - **2004 Hg emissions- 85 lb**
 - **(Units 1-6 16-lb)**
- **\$53.3M**
 - **\$24.9M DOE**
 - **\$28.5M We Energies**
- **Goals:90% Hg Control**
 - * **SO₂ ⇒ 70%**
 - * **NO_x ⇒ 30%**



TOXECON™ Configuration

Presque Isle Power Plant

TOXECON™



TOXECON Design Basis

- Results from pilot- and full-scale tests funded by NETL and EPRI
 - Pilot-scale proof of concept tests by EPRI
 - NETL, Phase I-funded full-Scale Hg Control Tests –Plant Gaston COHPAC* - equipped Unit
 - Year-long test at Plant Gaston-COHPAC operated in TOXECON configuration

*Compact Hybrid Particulate Collector



Project Goals

- **Achieve at least 90% mercury removal (85→8.5 lb).**
- **Increase collection efficiency of PM, especially during upset conditions.**
- **Demonstrate mercury CEMs as a reliable mercury measuring system.**
- **Successfully integrate the entire system so that all subsystems are operating at peak performance.**
- **Determine viability of sorbent injection for SO₂ and NO_x control.**
- **Recover at least 90% of mercury captured in the PJBH ash.**
- **Minimize waste disposal with a target of 100% utilization.**



Anticipated Benefits of TOXECON™ Project at PPIP

Pollutant	Annual Emission Reduction
Mercury	~77 pounds
Particulate Matter	32 tons
SO ₂	4,020 tons*
NO _x	1,470 tons*

Multi-pollutant aspect of TOXECON may reduce the release of all pollutants at the Presque Isle Power Plant to very low levels.

*** *Potential reductions***



Project Tasks-Outline, Schedule

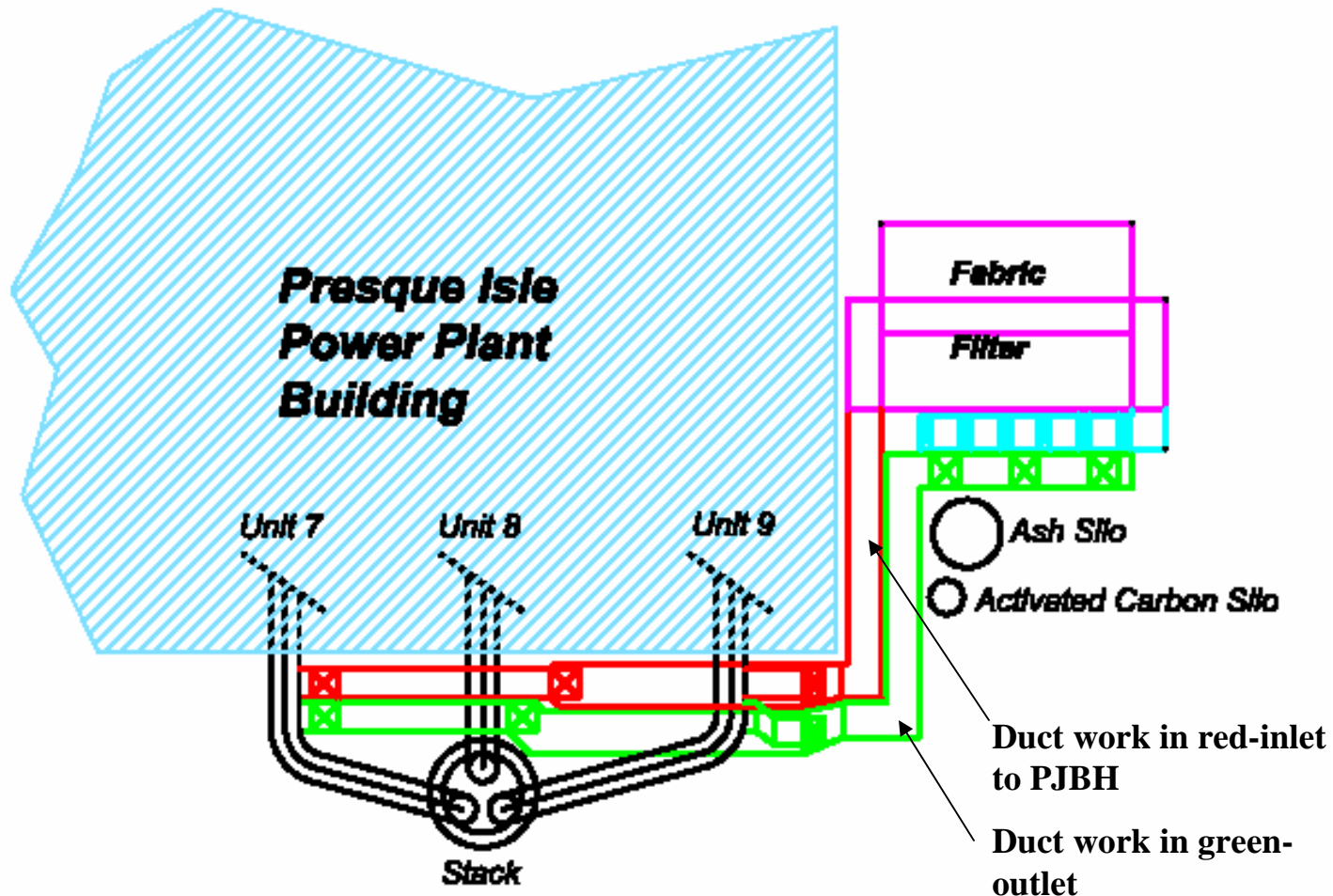
- Pre-award (Feb '03 to Feb '04)
 - Project Management Plan
 - NEPA
- Design & Construction (Mar '04-Jan '06)
 - Tie in-existing plant systems (controls, flue gas duct work, booster fans)
 - Equipment Procurement
 - Construction
 - Start-up
- Demonstration (Jan '06-Mar '09)
 - Mercury Optimization Jan '06–Dec '06
 - SO₂/NO_x/Ash- 2007

Project Milestones

- FONSI (Finding of No Significant Impact) issued September, 2003
- Fabric Filter vendor selected August, 2004
- First unit tie in scheduled for November, 2005
 - All units serviced by TOXECON - January 2006
- Public Design Document Issued July, 2005
- Pre-operation testing work
 - Sorbent screening tests, April 2005
 - Mercury CEM launched commercially in May 2005
 - Thermo Electron's Mercury Freedom System



Schematic of TOXECON Layout





Ductwork Before



New TOXECON-Related Ductwork



New Duct work in place



PIPP Duct Installation



TOXECON Baghouse



Aerial View-TOXECON Baghouse



New TOXECON ID Fan-Baghouse



Public Design Document

- Purpose - to provide non-proprietary design information (DOE requirement)
- Includes
 - Technology Overview
 - Design Basis
 - Costs

Equipment Costs

TOXECON™ and Balance-of-Plant Equipment and Installation Costs Presque Isle Power Plant Units 7, 8, and 9	
Budget Item Description	Cost
Baghouse	
Baghouse Supply and Erection	\$10,000,000
Equipment	
Electrical Equipment	\$600,000
Controls (Including Enclosure)	\$425,000
Air Compressor/Dryer	\$140,000
ID Booster Fans	\$1,200,000
Ash System	\$650,000
PAC System	\$700,000
Dampers	\$650,000
Expansion Joints	\$100,000
Ductwork and Structural Steel	\$3,100,000
Erection	
Construction Supervision and Indirects	\$2,400,000
Foundations	\$1,550,000
Electrical Installation	\$1,200,000
Mechanical and Structural Installation	\$7,500,000
Other	
Engineering Costs (A/E and Utility)	\$3,930,000
Mercury Continuous Emissions Monitors (2)	\$300,000
TOTAL (excludes testing program costs)	\$34,445,000



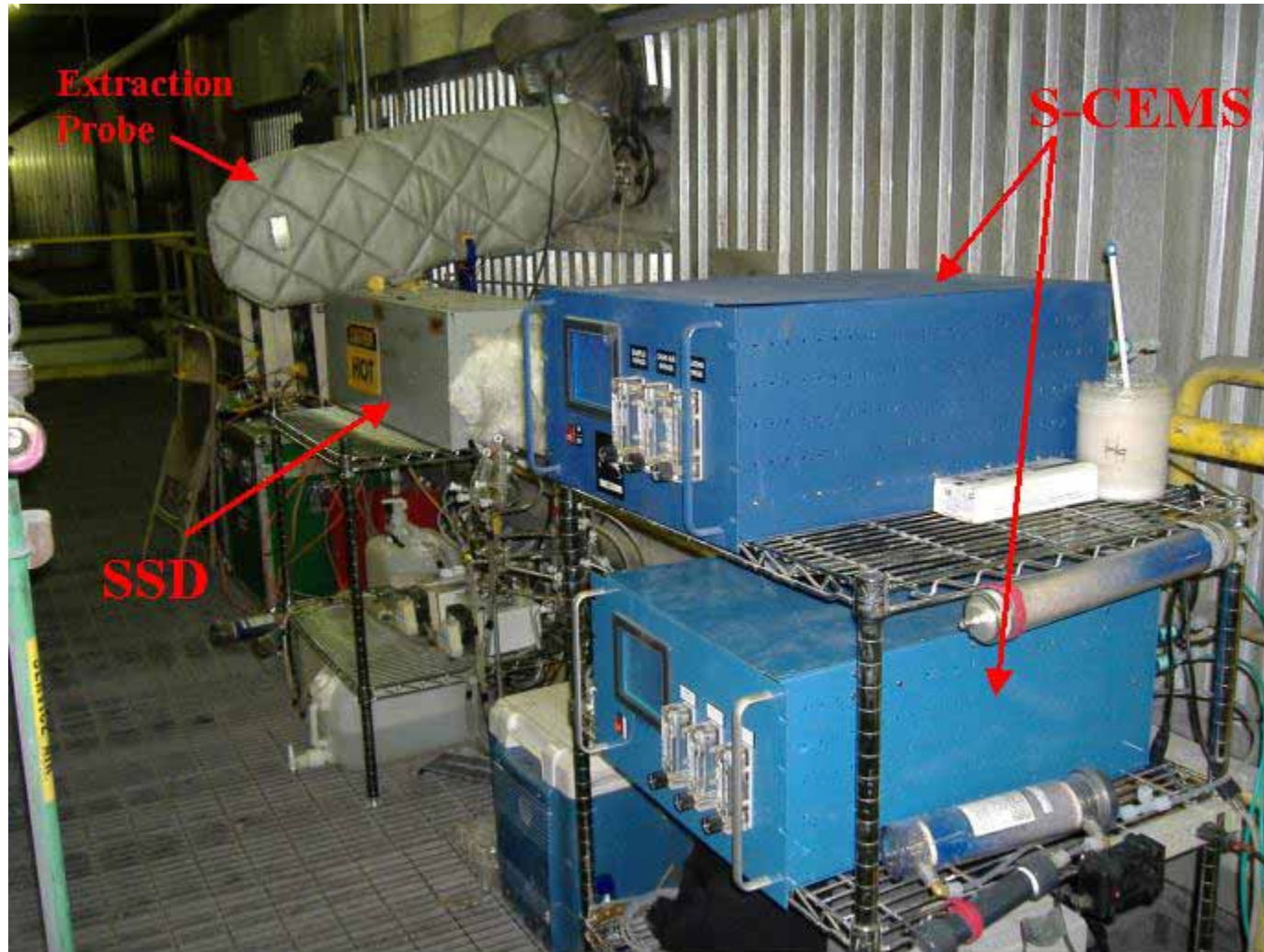
Temperature Issues

- Inlet temperature to PJBH (350 – 370°F)
- Concern
 - Performance of activated carbons
 - Bag life
- Options being evaluated
 - Air heater modifications
 - Spray cooling
 - Alternative sorbents

Sorbent Screening Tests

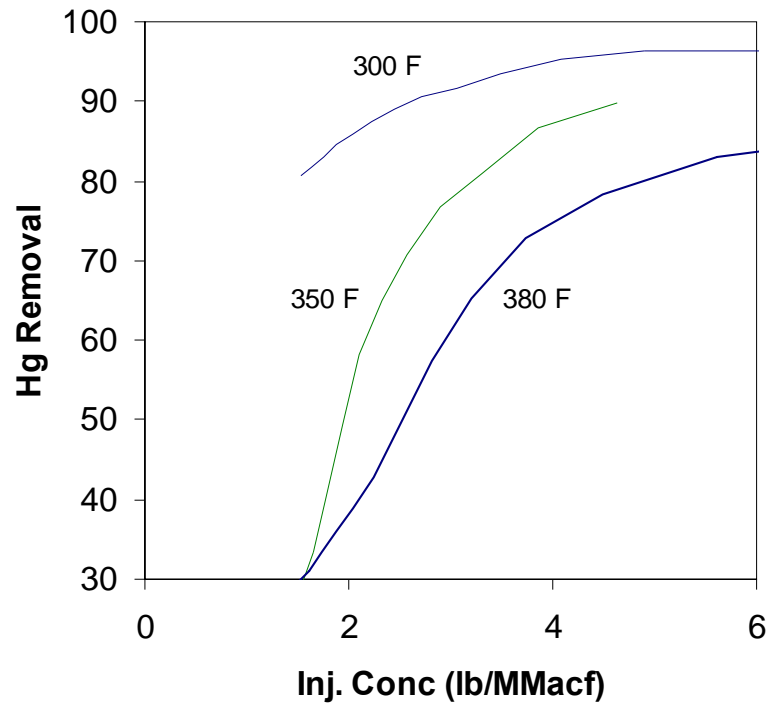
- Evaluated standard and treated activated carbons at three different temperatures (300, 350 and 370°F)
- Evaluated seven experimental sorbents

Sorbent Screening Tests

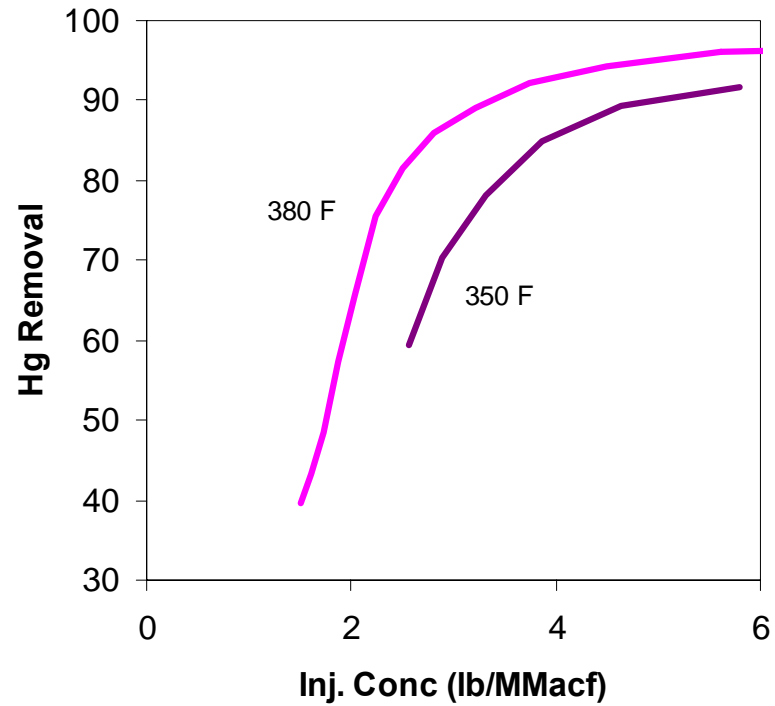


Temperature Effect

Darco Hg



Darco Hg-LH



Test Bags

- Evaluating alternative fabric designs
- Test fabrics will be installed for start-up
 - High perm PPS fabrics
 - Lower pressure drop
 - Dual density
 - High efficiency, lower pressure drop
 - P84
 - High temperature fabric
 - Kermel
 - New fabric

Mercury CEM

- Partnership between ADA-ES and Thermo Electron to field validate new Mercury CEM components
- First tests February, 2004
- Commercial system launched May 2005
- Installed at PIPP June, 2005



Conclusions

- DOE's CCPI demonstrations provide key support for the commercialization of new technologies
 - CCPI provides mechanism to evaluate strategic design components
- Preliminary full-scale testing essential for establishing design basis and reducing risk
- First commercial mercury control system will be operational this year

