



Retrofitting Existing Sootblowing Systems To Use a Lower Pressure Steam Source

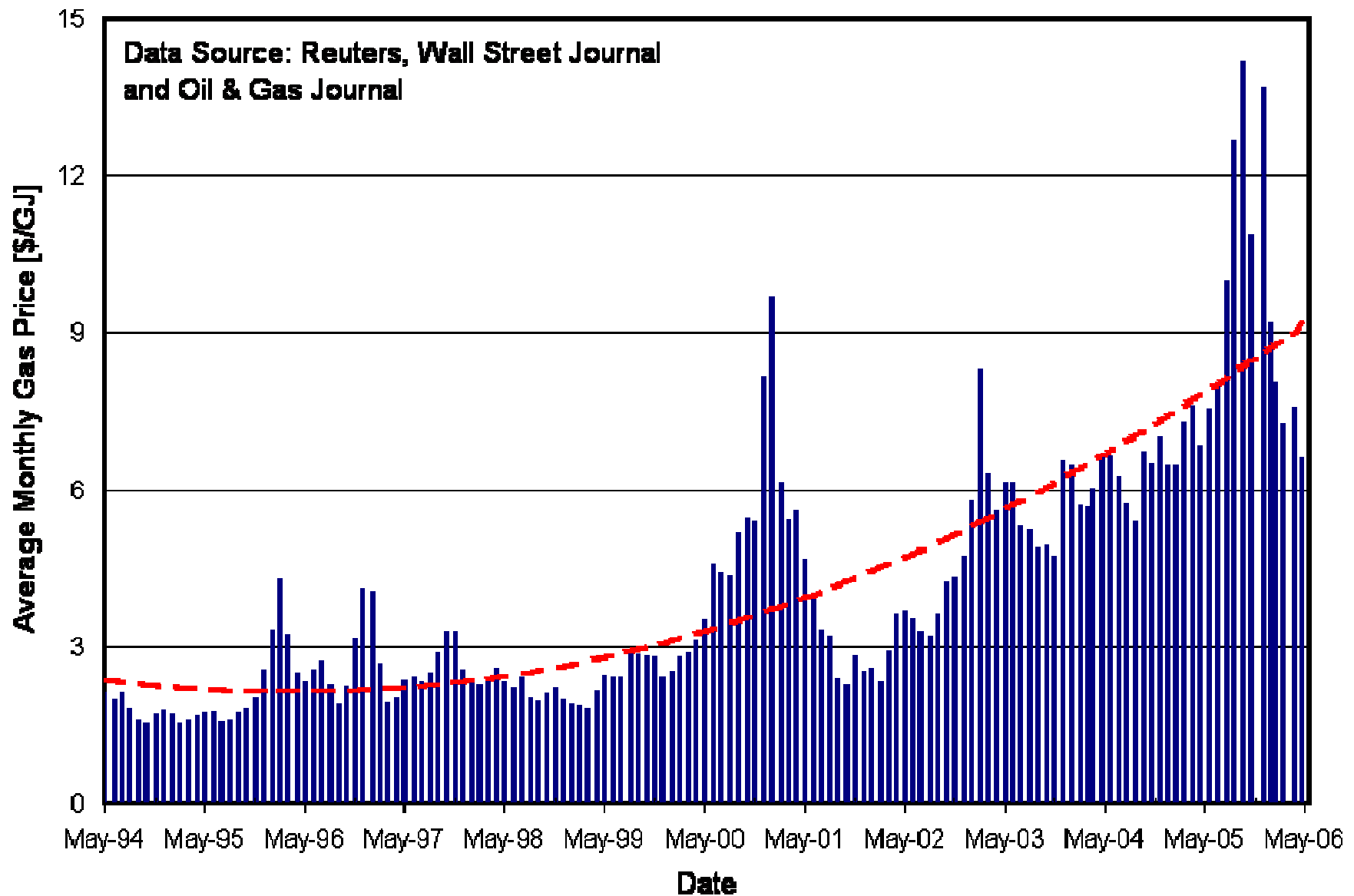
Alarick Tavares and Paul Vollmer
Diamond Power International

2007 TAPPI Lake States

Presentation Outline

- **Introduction – Project Benefits**
- **Traditional Sootblowing Systems**
- **Engineering a System to Use A Lower Pressure Steam Source**
- **Cleaning With A Lower Pressure Source - Case Study**
- **Conclusions**

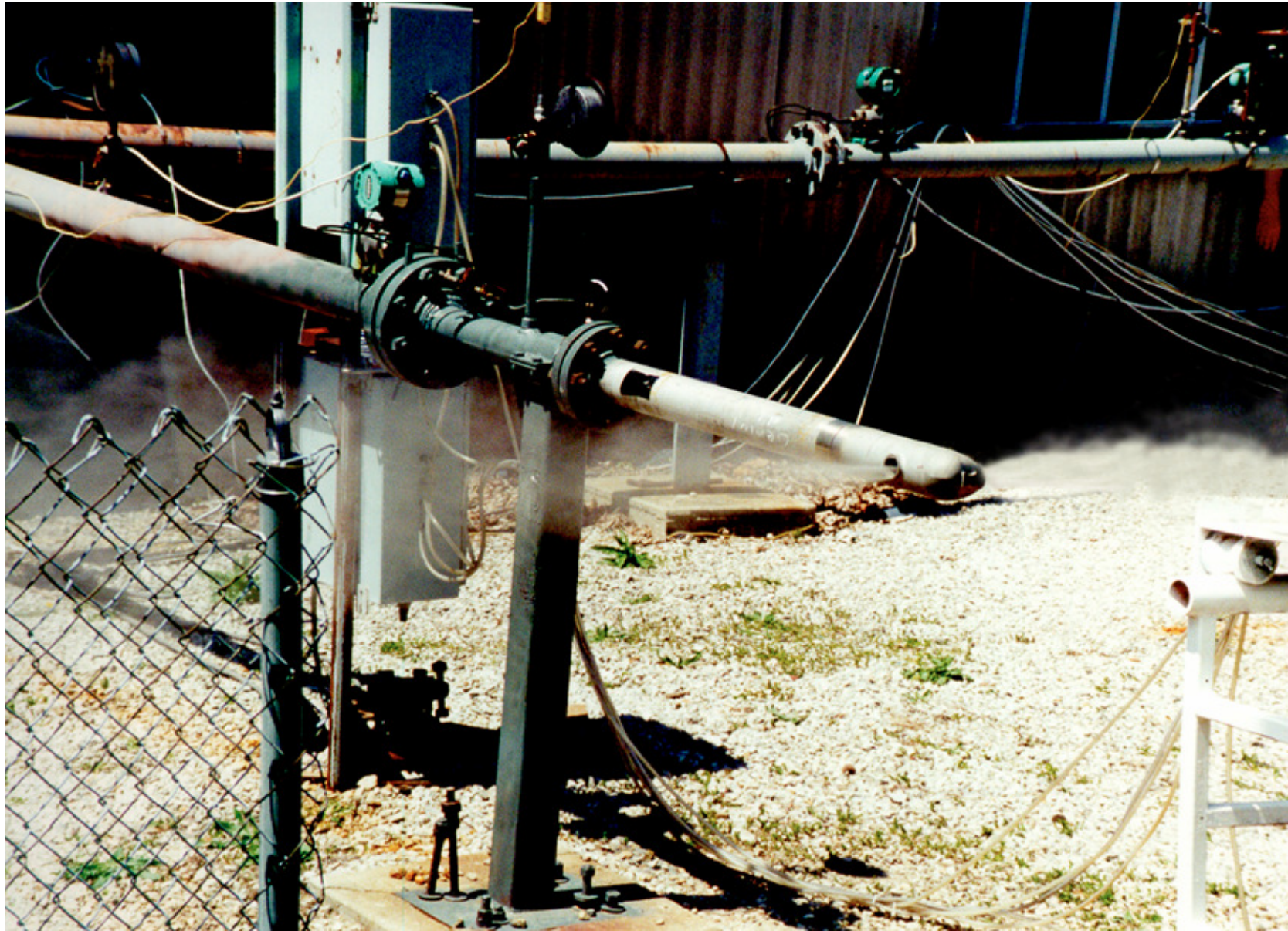
Introduction – Henry Hub Monthly Price



Introduction – Benefits

- **Energy Costs are Rising**
- **Currently Use High Pressure Steam**
 - Expensive Steam Source
- **With This Technology:**
 - Take High Pressure Steam and Generate Power
 - Use Lower Pressure, Cheaper Steam

Nozzle Testing Facility

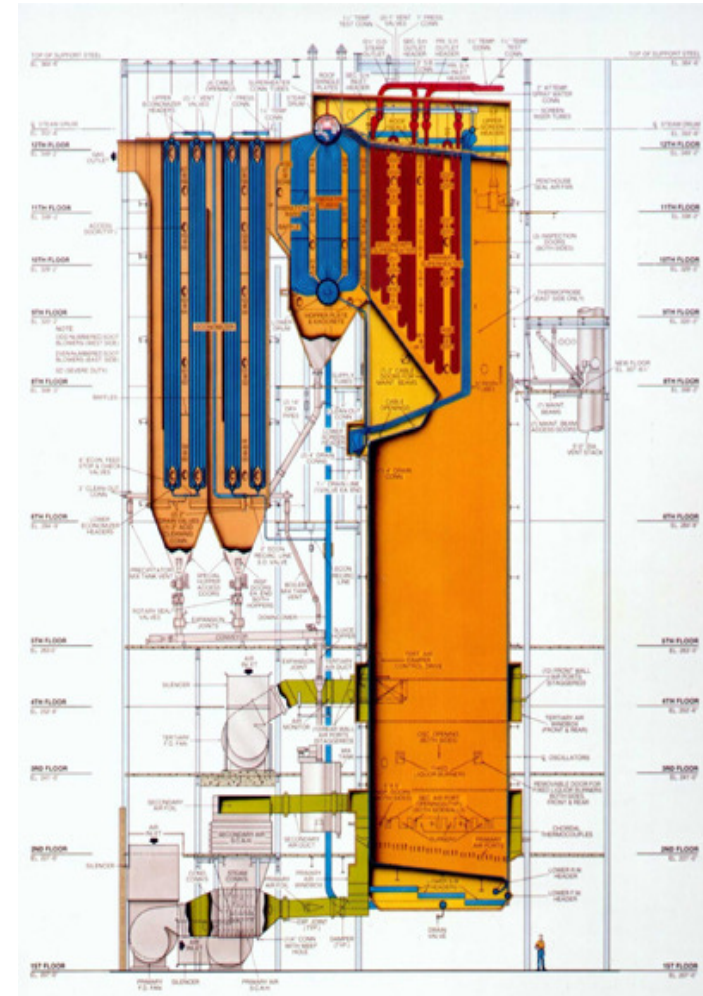


Presentation Outline

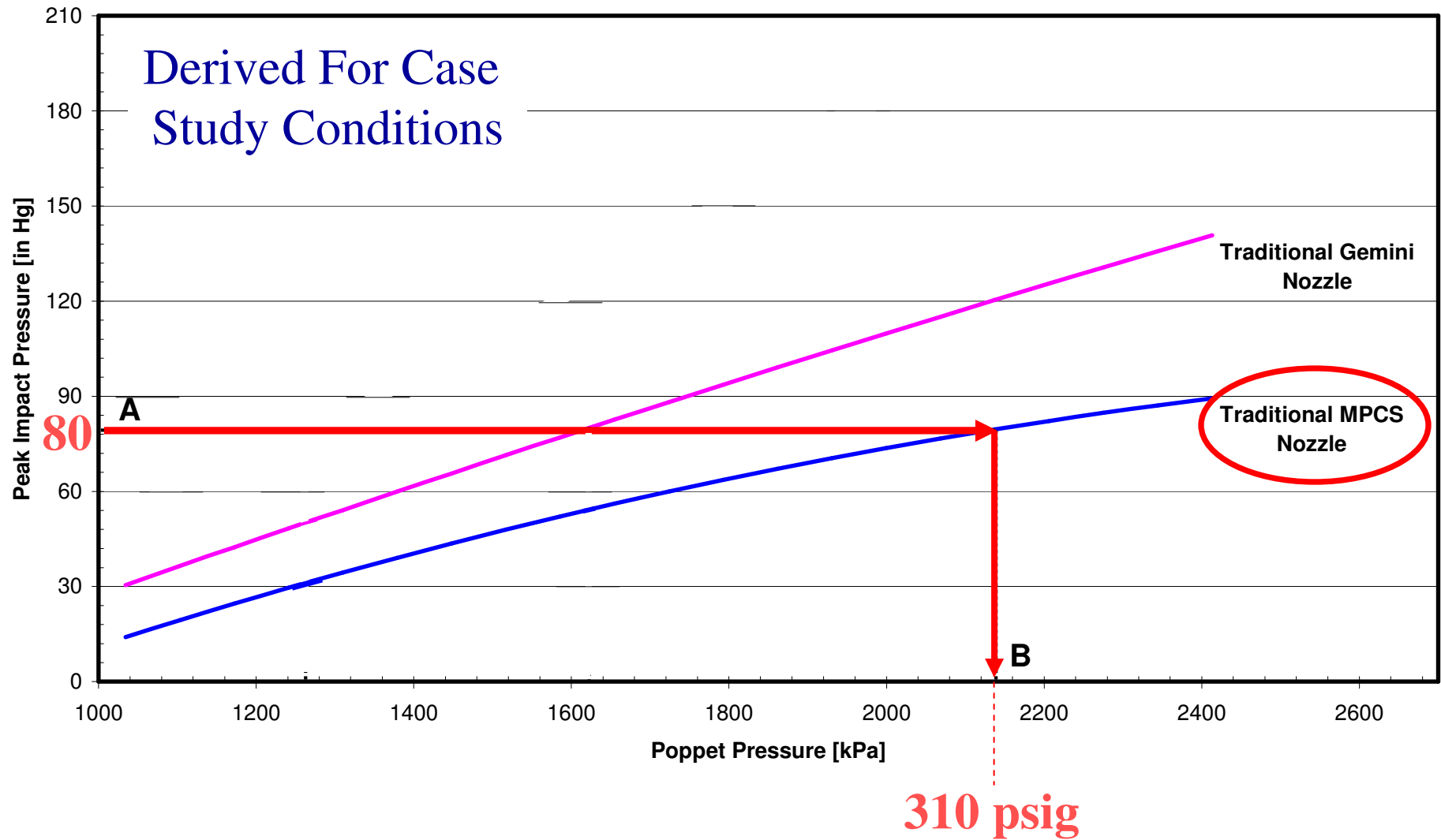
- Introduction – Project Benefits
- **Traditional Sootblowing Systems**
- Engineering a System to Use A Lower Pressure Steam Source
- Cleaning With A Lower Pressure Source - Case Study
- Conclusions

Typical Sootblowing System - Today

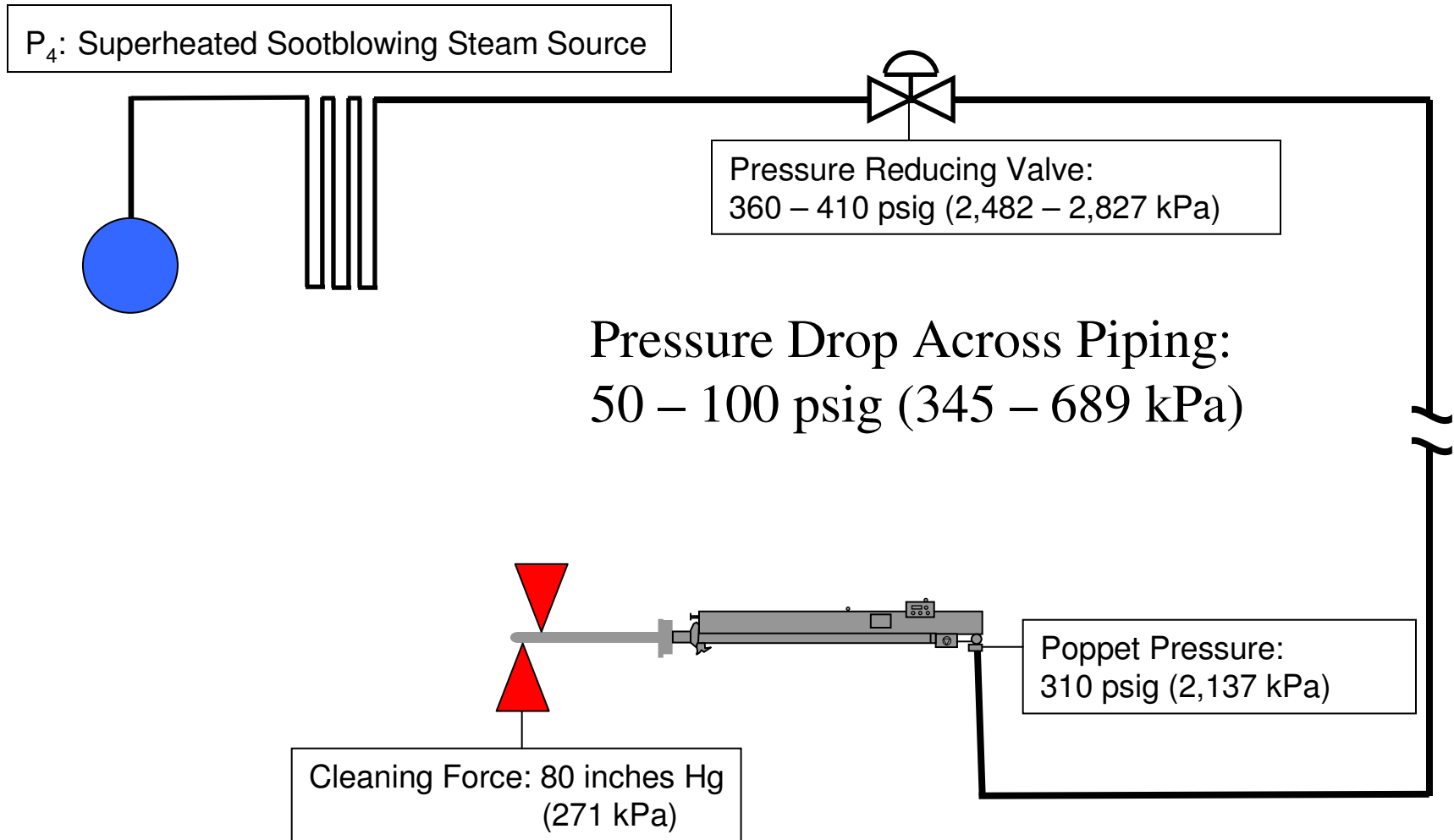
- 86 IK 600 Sootblowers with 1" MPCS Nozzles
- Cleaning Force: 271 kPa
80 [in Hg]



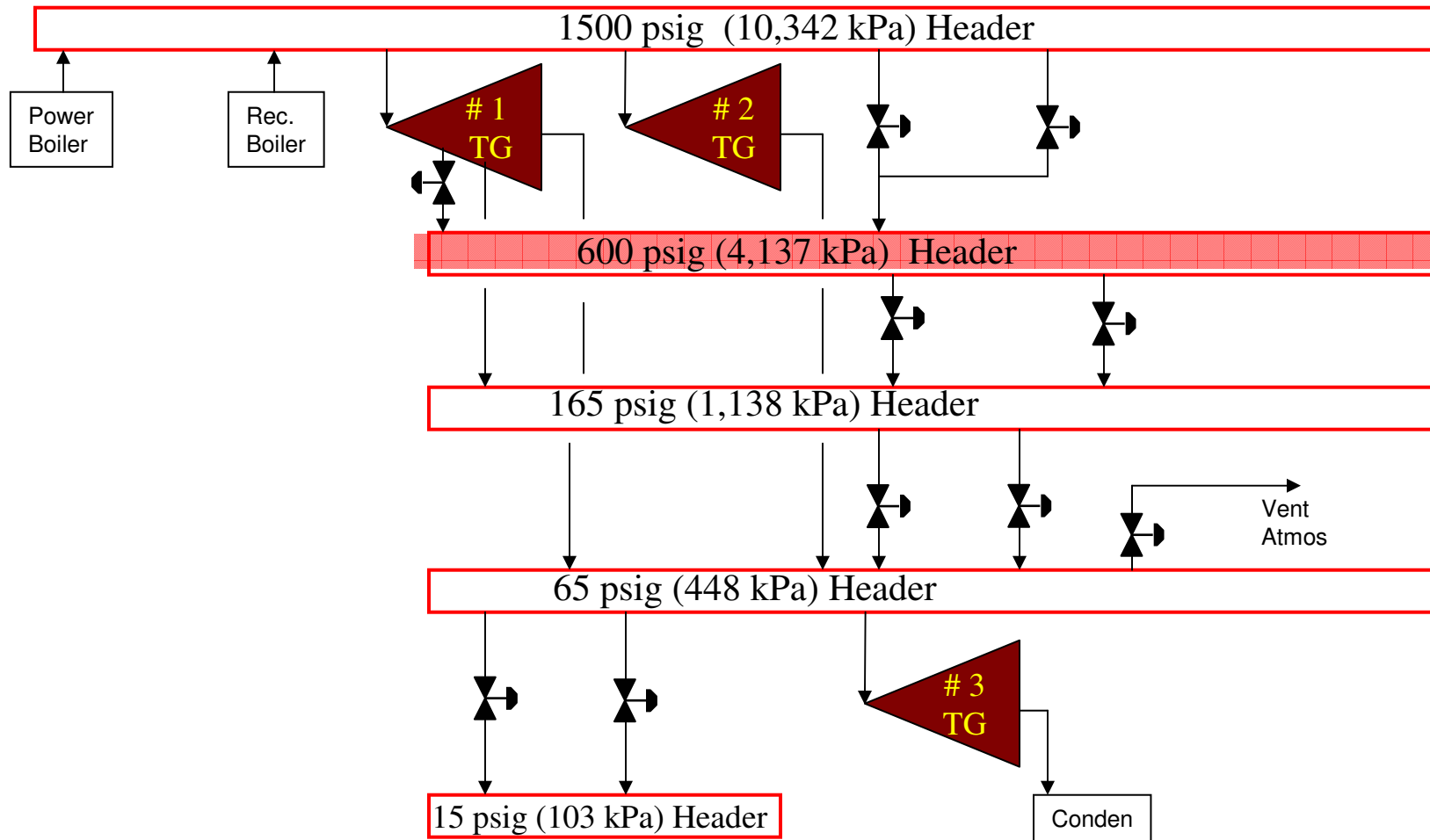
Nozzle Performance Curve



Typical Sootblowing System - Today



Lower Pressure Steam Source



Presentation Outline

- Introduction – Project Benefits
- Traditional Sootblowing Systems
- **Engineering a System to Use A Lower Pressure Steam Source**
- Cleaning With A Lower Pressure Source - Case Study
- Conclusions

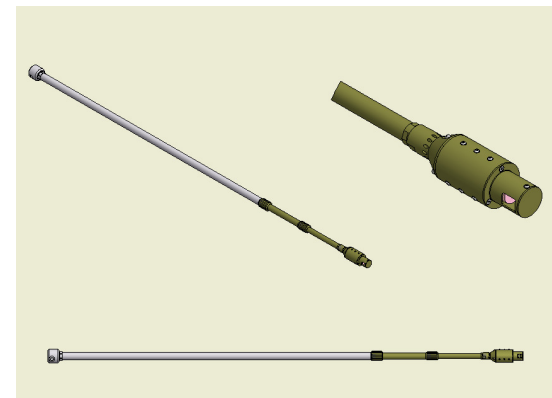
Recovery Boiler Cleaning Evaluation

Objective

- **Identify Problems**
 - Fouling Areas and Areas of Over-Cleaning
- **Optimize Cleaning**

Overview

- **Assess Current Cleaning Performance**
 - Operating Data
 - Images
- 90° Viewing Angle**
- Retractable**



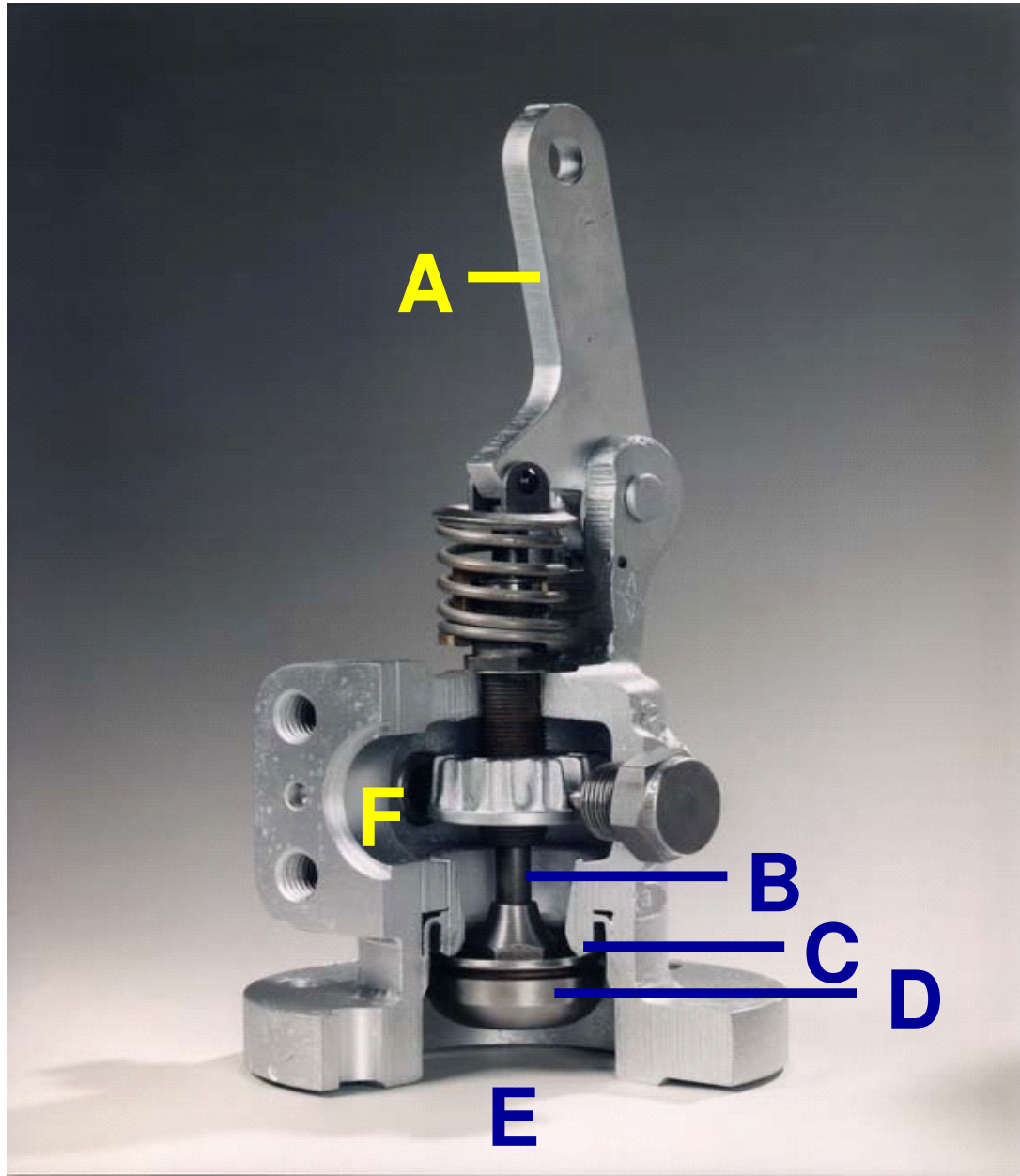
Recovery Boiler Cleaning Evaluation

Images Are From a 90° Viewing Angle Camera

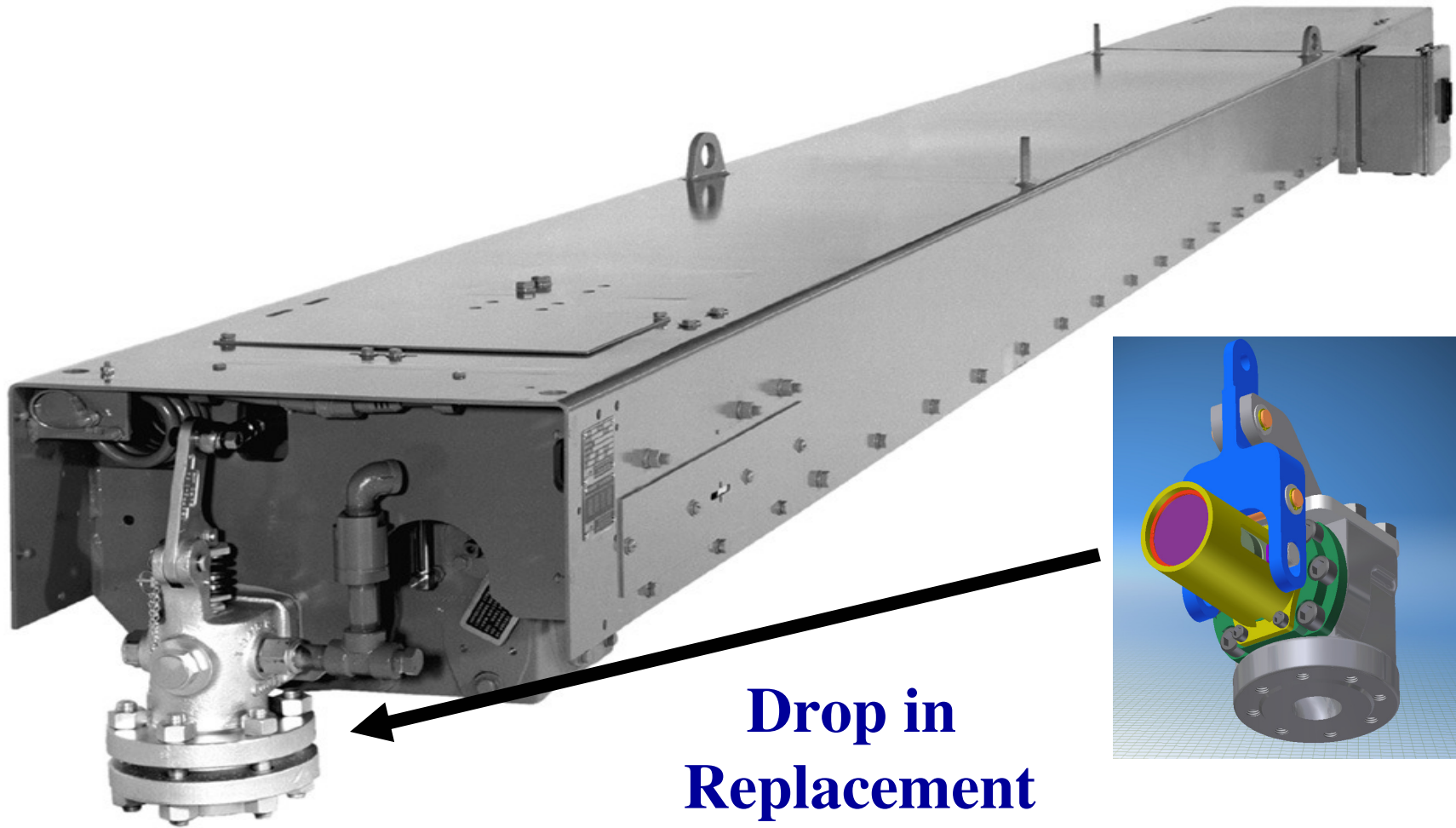


Looking Down at a Sootblower Operating in the Superheater

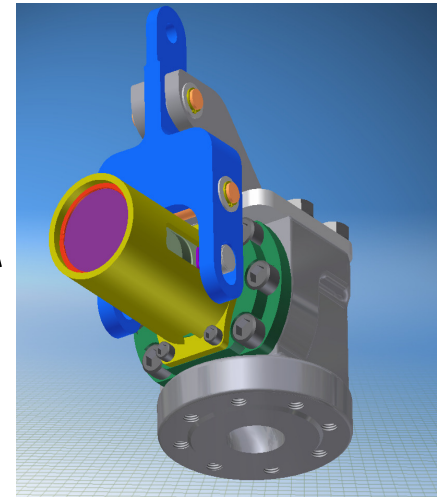
Traditional Poppet Valve



Install Low Loss Poppet Valve



**Drop in
Replacement**



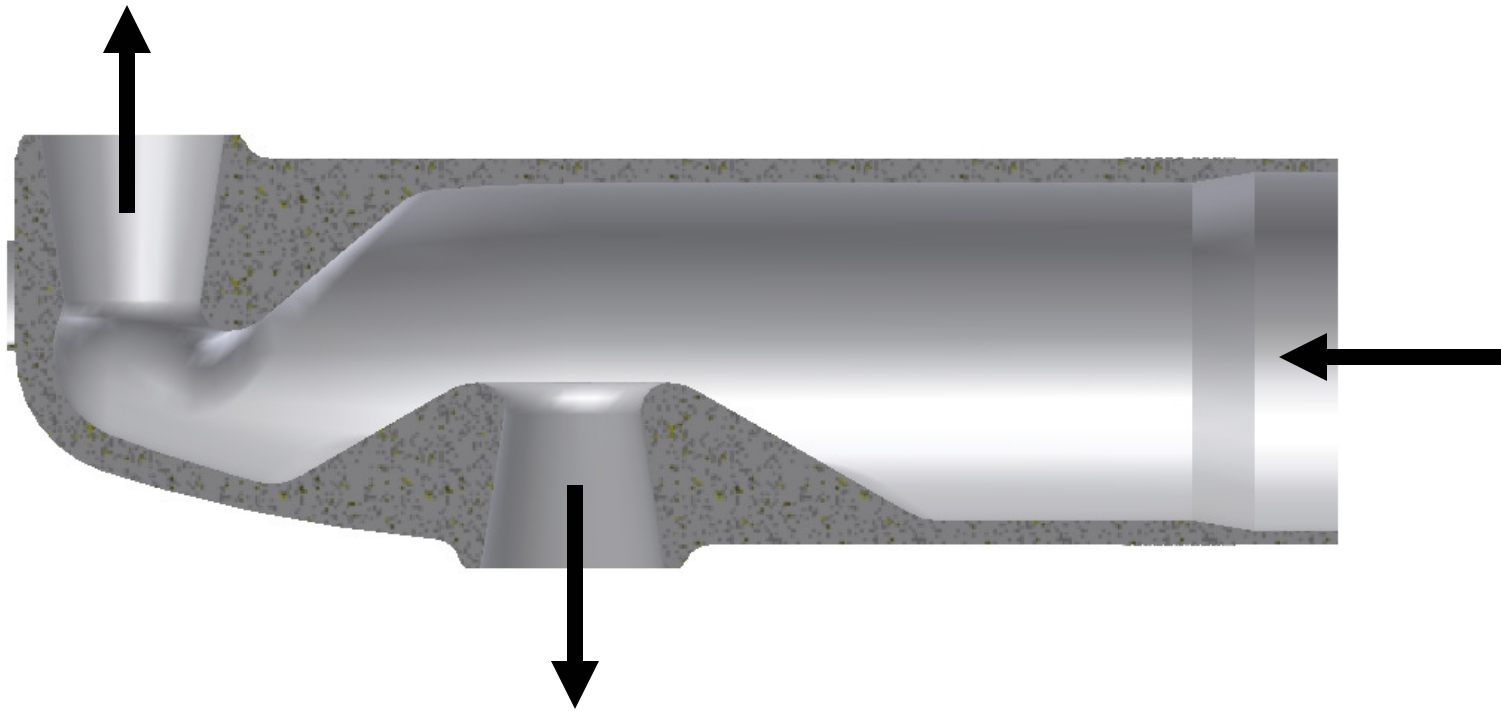
May Have to Change Feed Tube

**We May Have to
Change the
Feed Tube in Each
Sootblower**

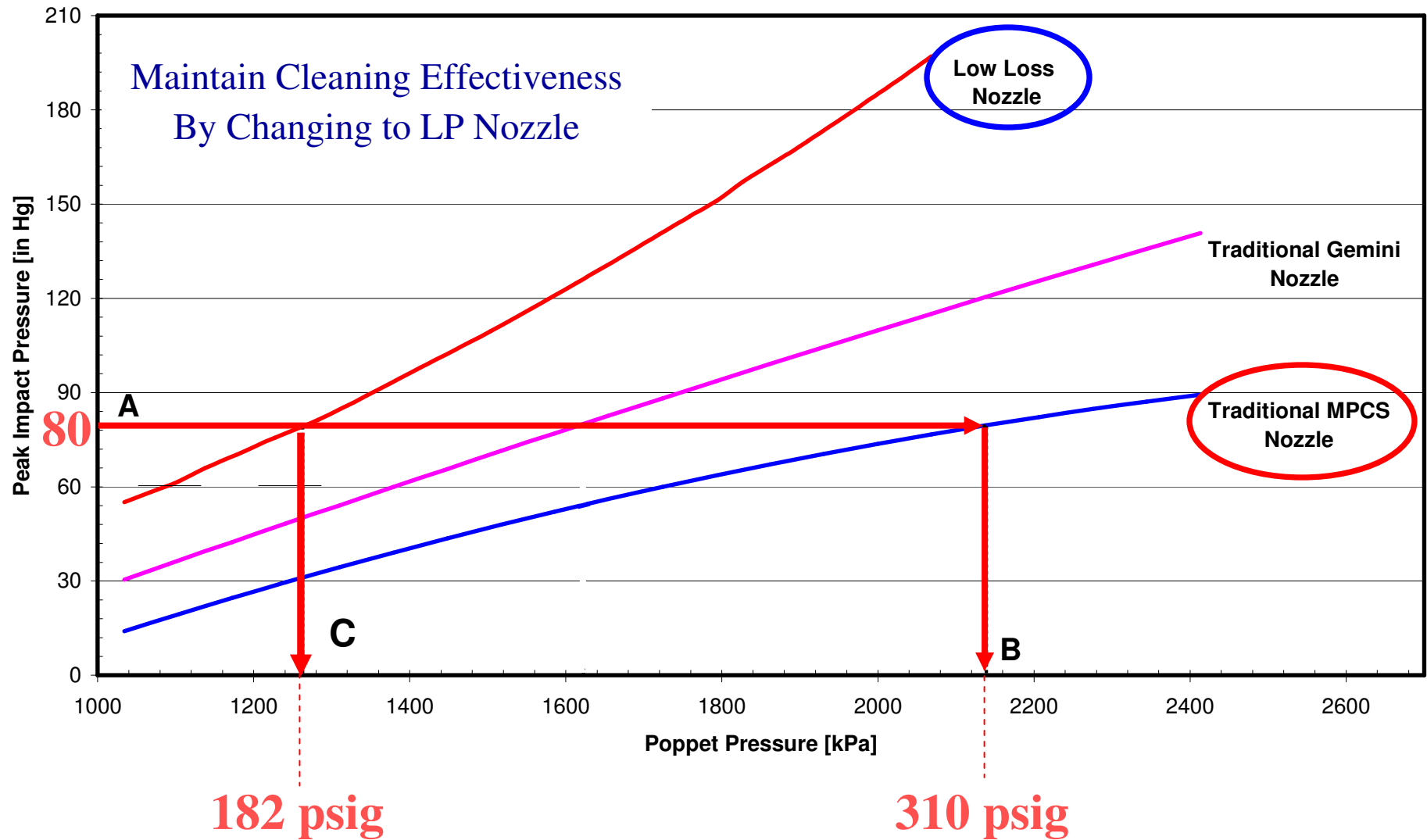
**Drop in
Replacement**



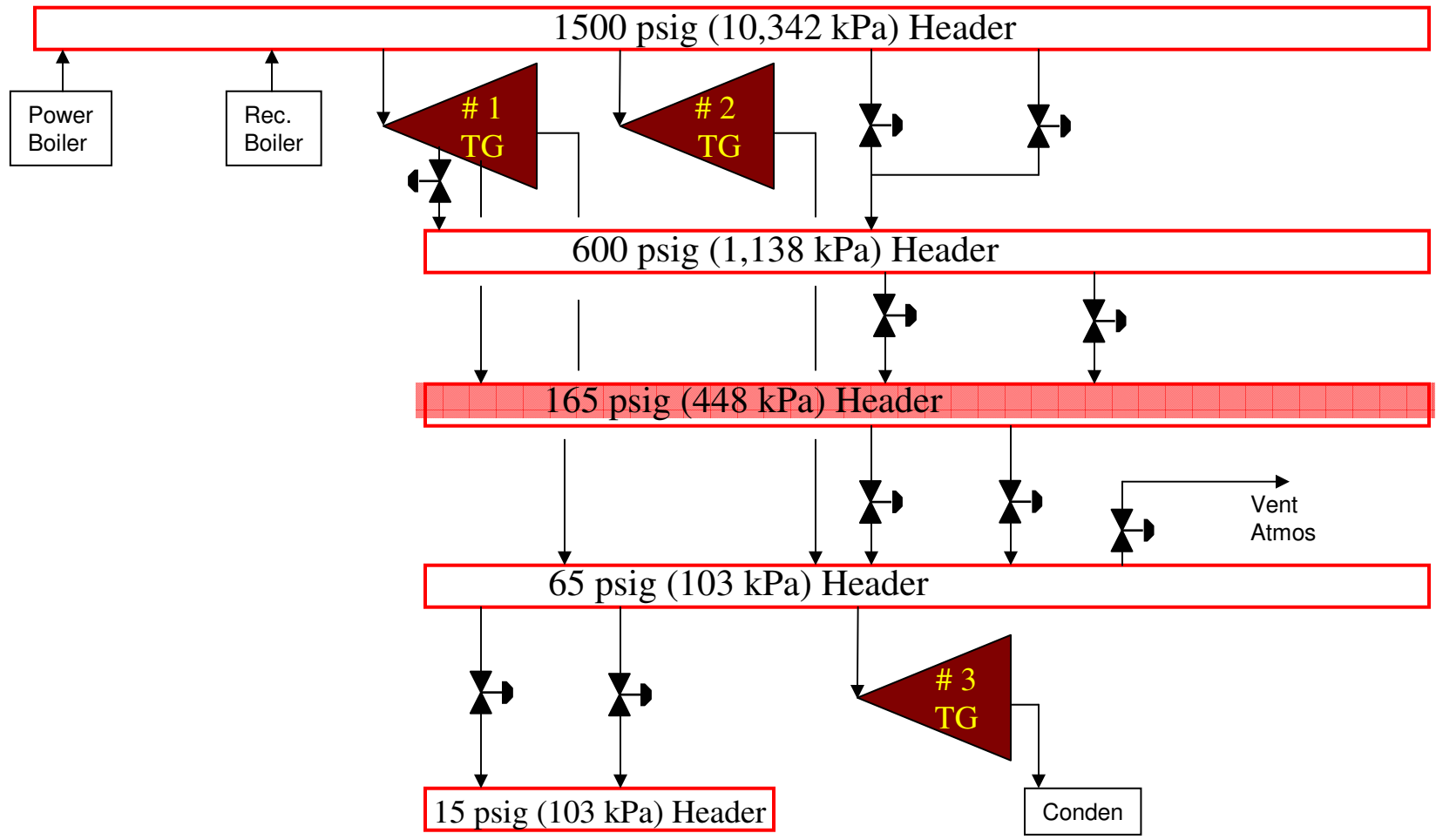
Low Pressure Nozzle



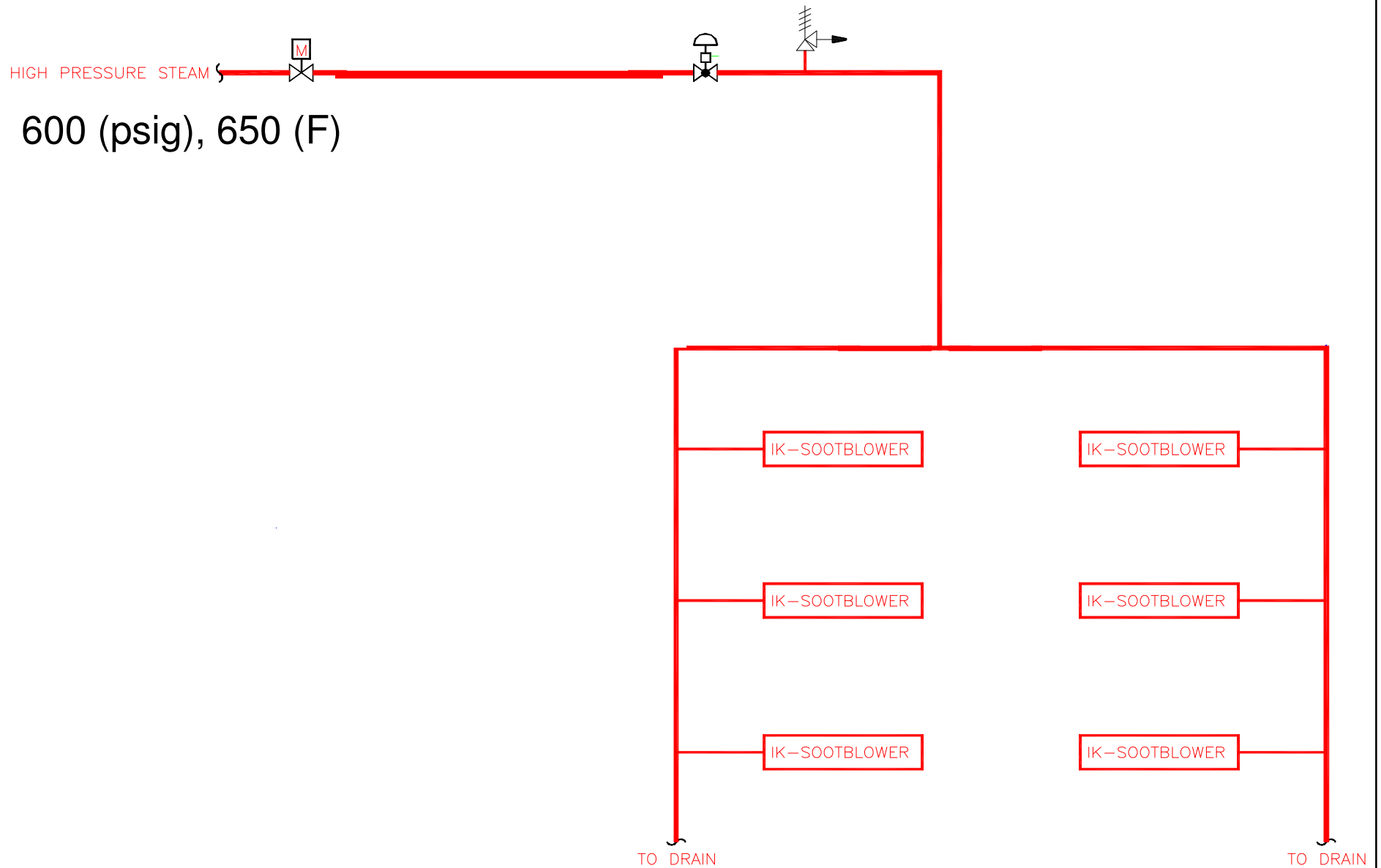
Change to Low Pressure Nozzle



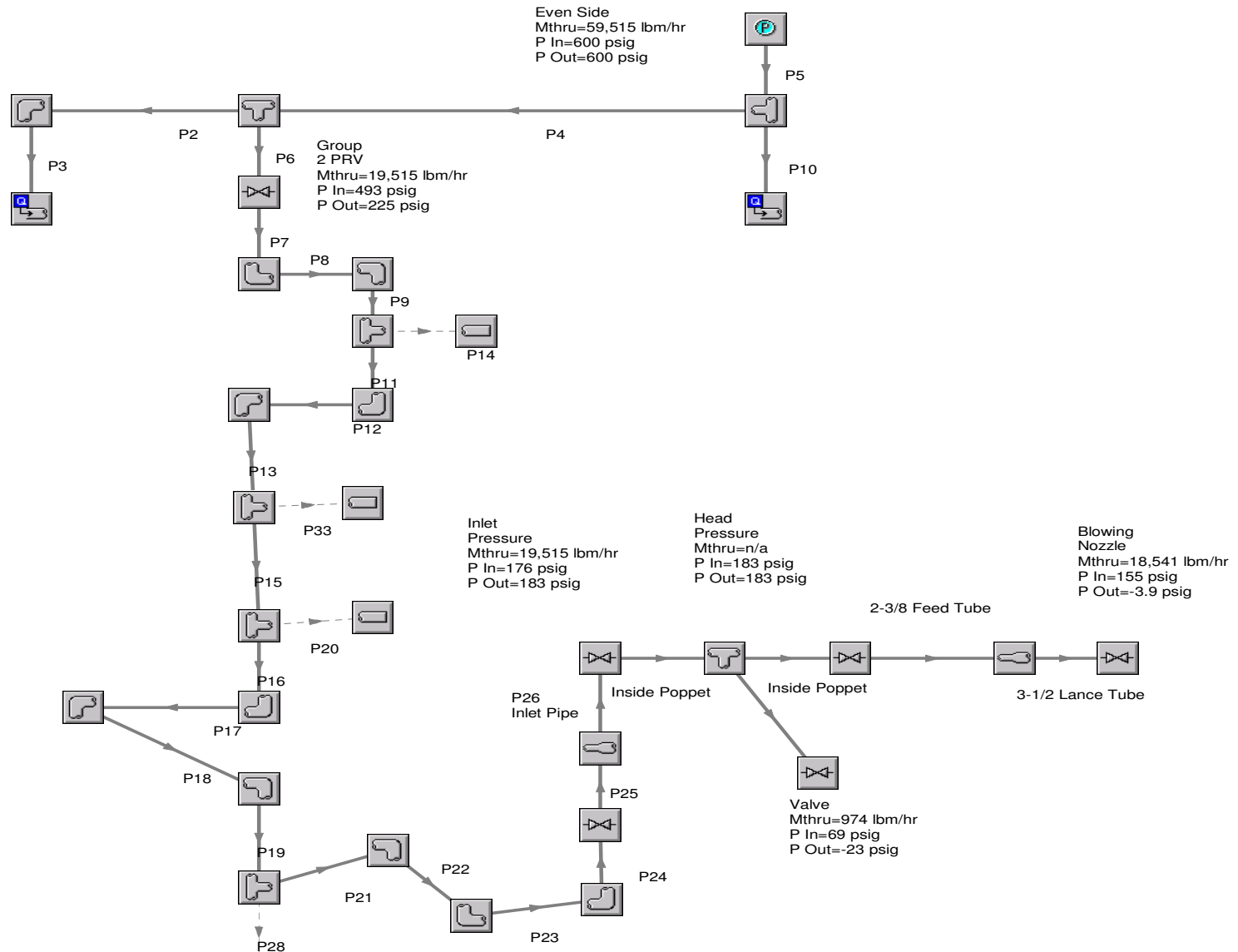
Lower Pressure Steam Source



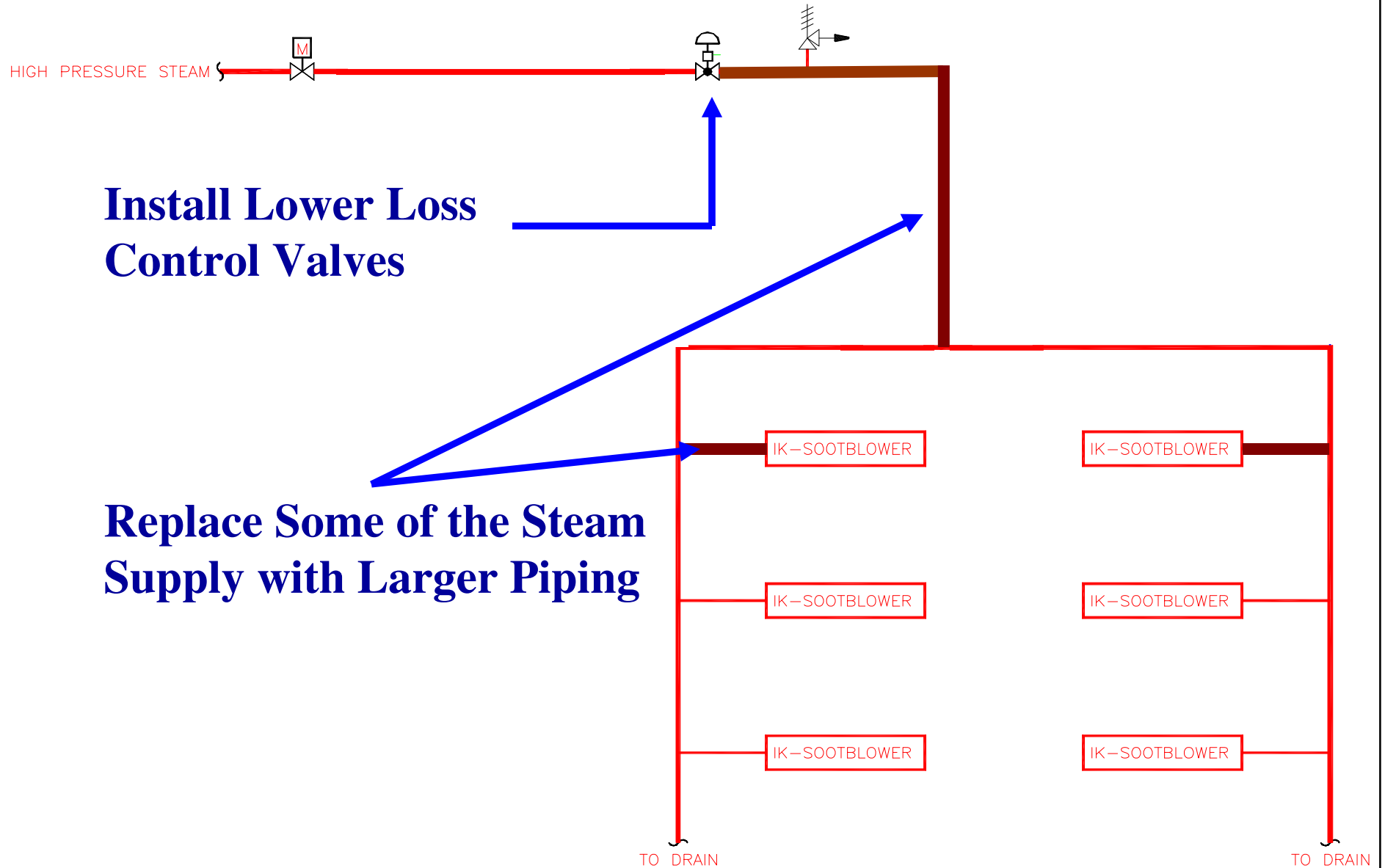
Typical Sootblowing System - Today



Piping Analysis – Identify Losses



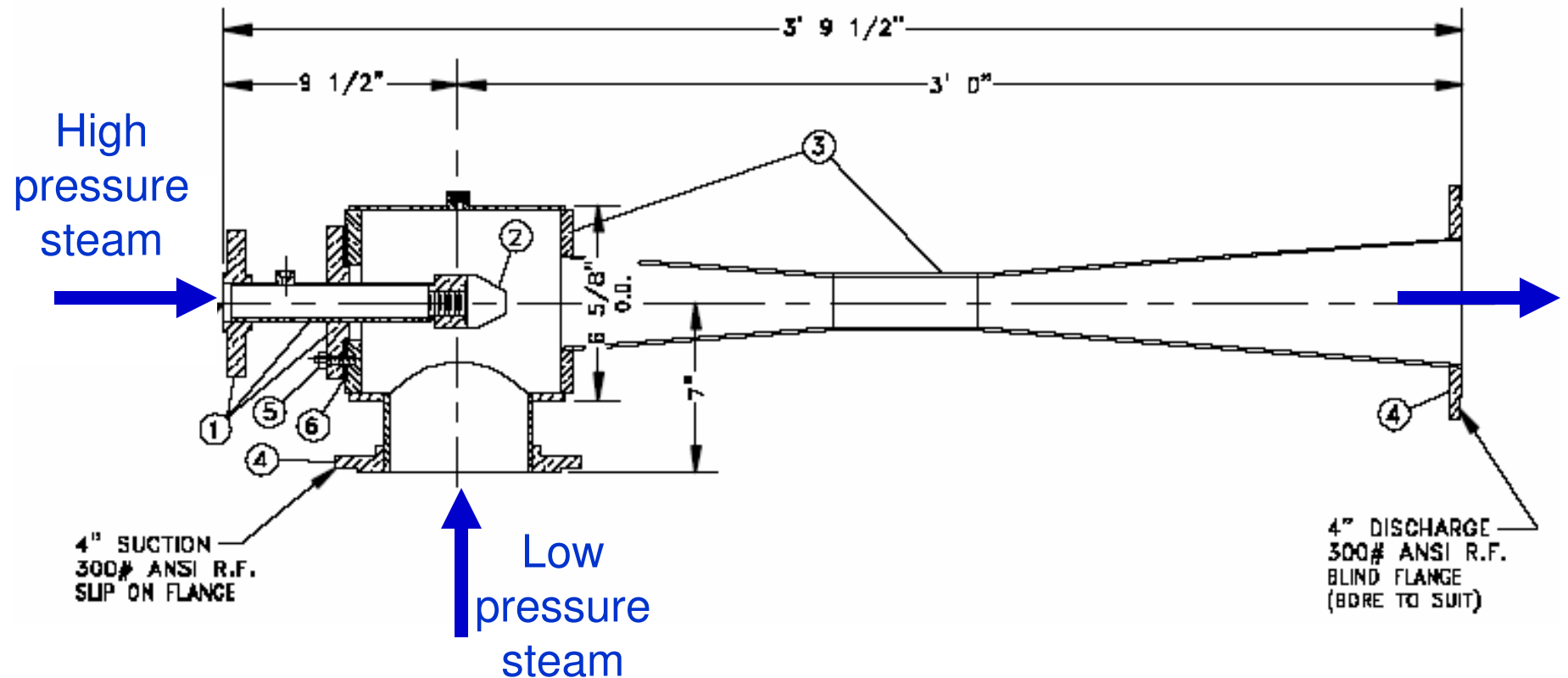
Sootblowing System – Reduce Losses



Final Component – System Boost

- **Since the Header Pressure is Close to the Sootblower Poppet Pressure, We Need a Slight Boost to Overcome Valve and Piping Losses**

Final Component – System Boost



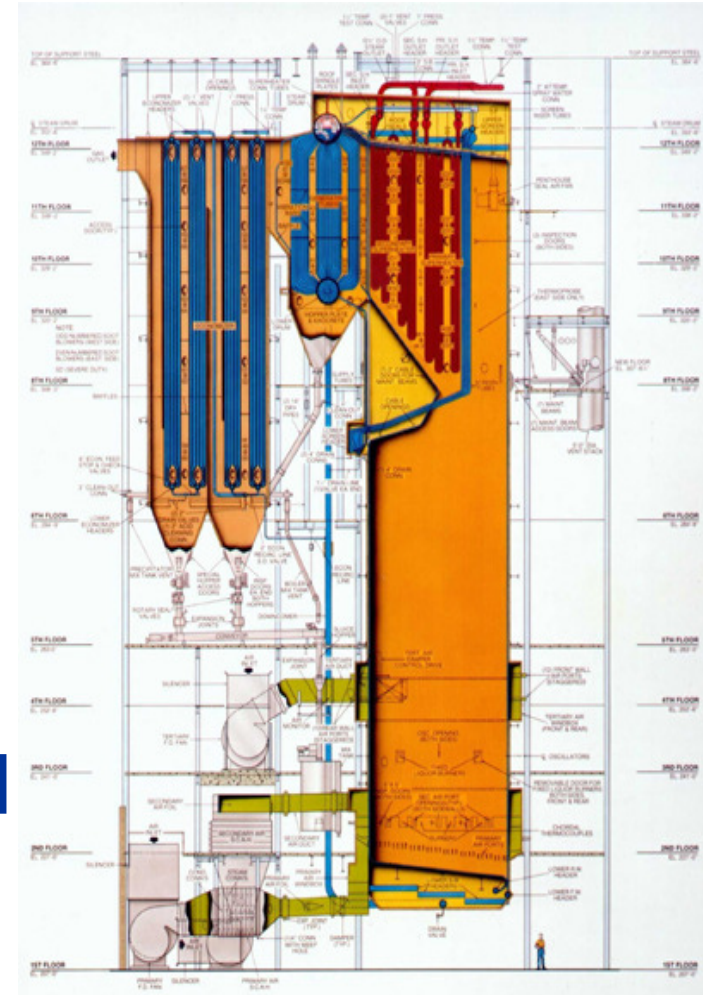
This will be achieved by using some high pressure steam and mixing it with the turbine extract (low pressure) steam in a **thermocompressor**.

Presentation Outline

- Introduction – Project Benefits
- Traditional Sootblowing Systems
- Engineering a System to Use A Lower Pressure Steam Source
- **Cleaning With A Lower Pressure Source - Case Study**
- Conclusions

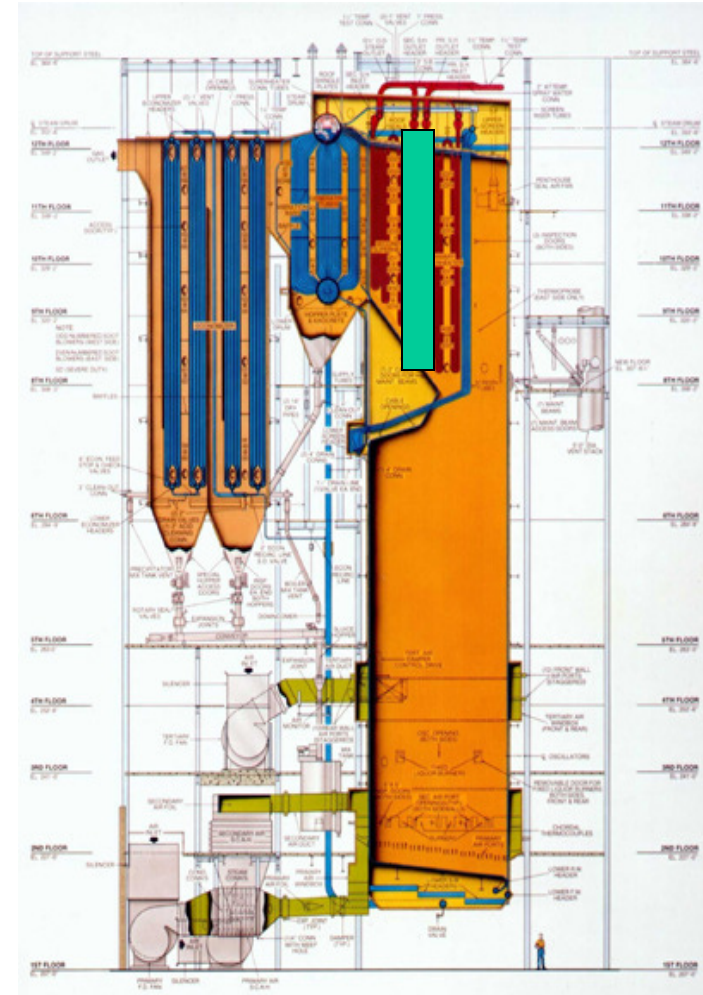
Case Study

- **86 IK 525 Sootblowers with 1" MPCS Nozzles**
 - Superheater: 56
 - Generating Bank: 16
 - Economizer: 14
- **Cleaning Force: 80 – 100 ["Hg]**



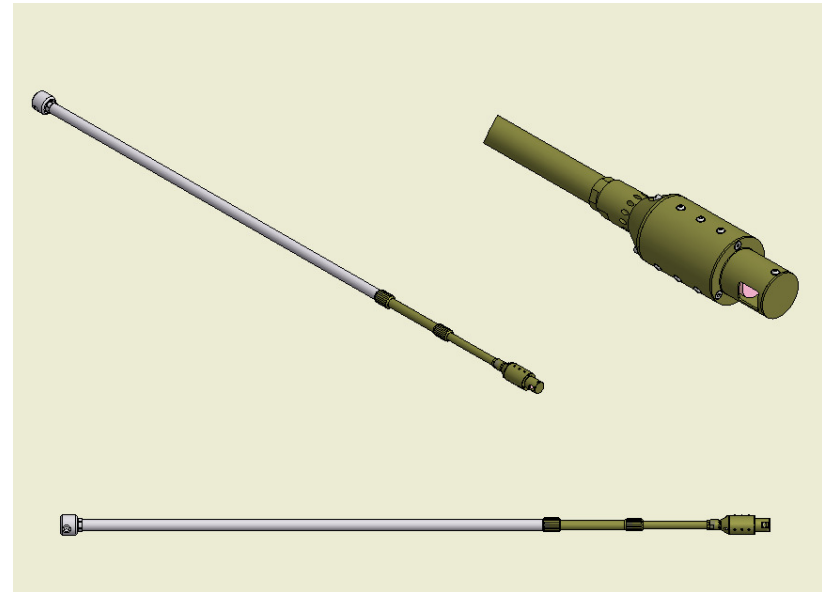
Case Study

- **12 Sootblowers in Lane**
 - Six on Each Side
- **Sootblowers on One-Side Left With Existing Equipment**
- **Sootblowers on Opposite Side Equipped With Low Loss Components**
- **Allows Continually Evaluation**

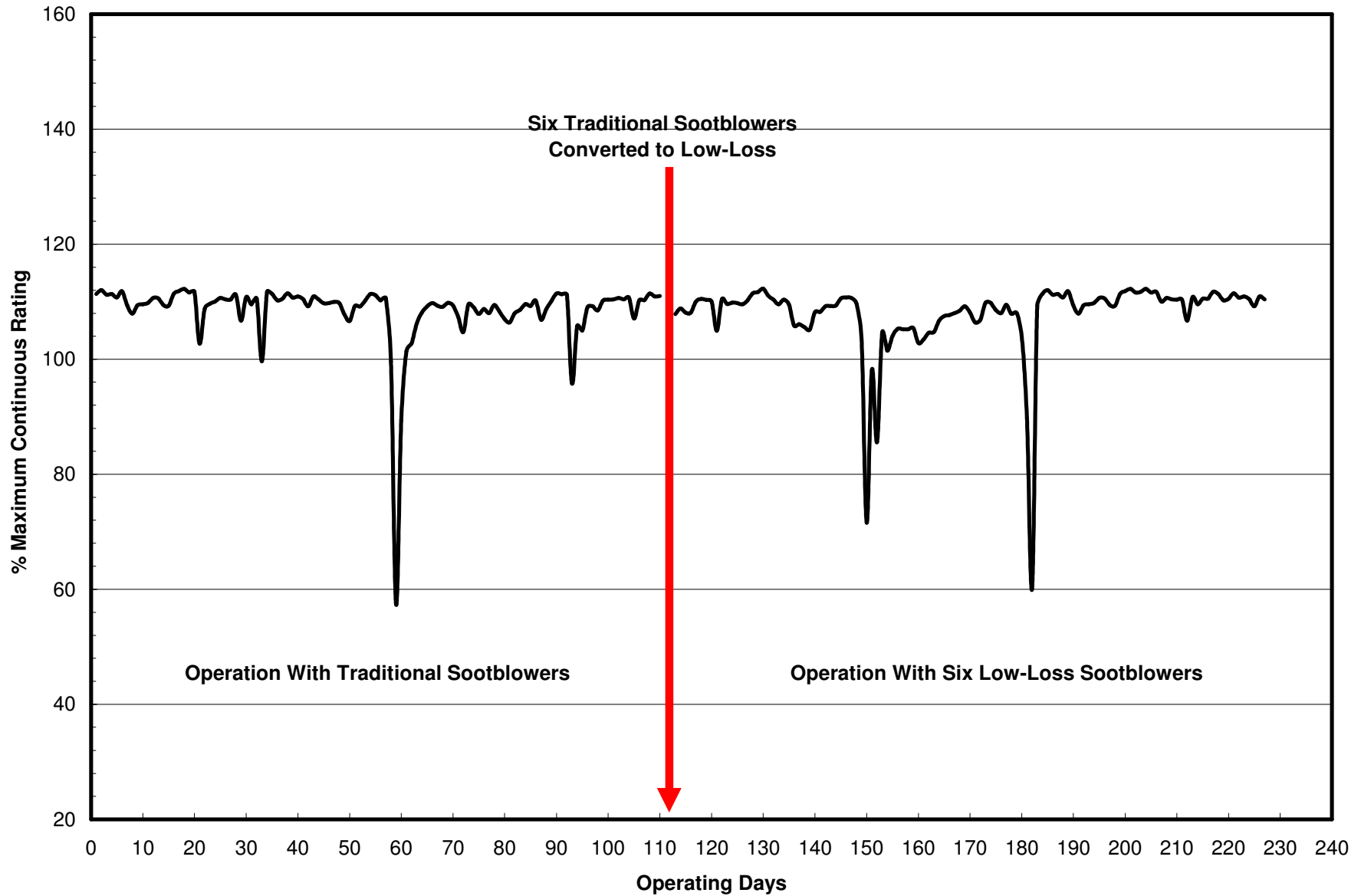


Case Study - Evaluation

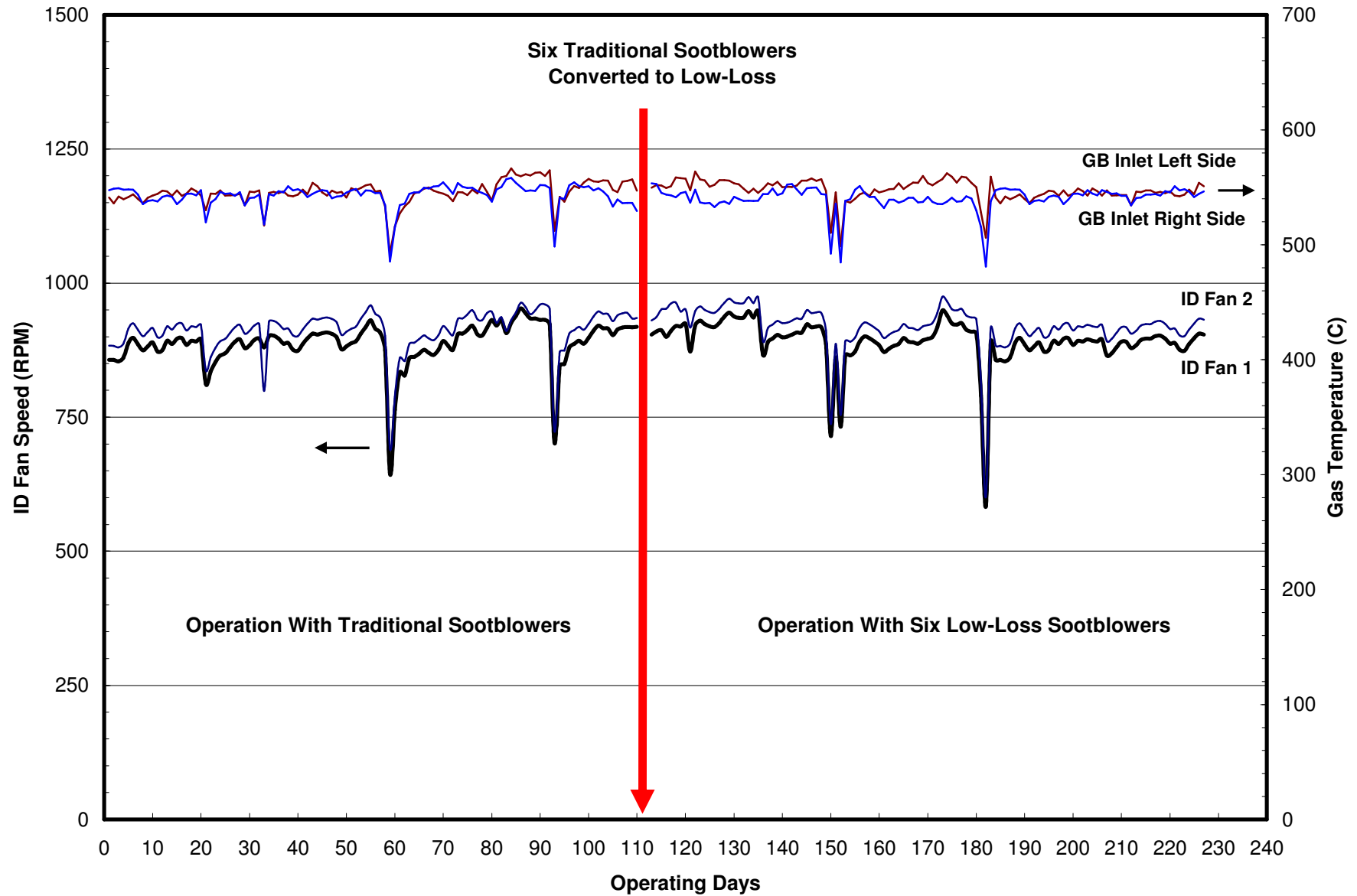
- **Used Mill Instrumentation**
- **Used Infra-Red Cameras**
 - Line-of-Sight
 - Telescoping 90° Viewing
- **Camera Inspection Every 30 to 60 Days**



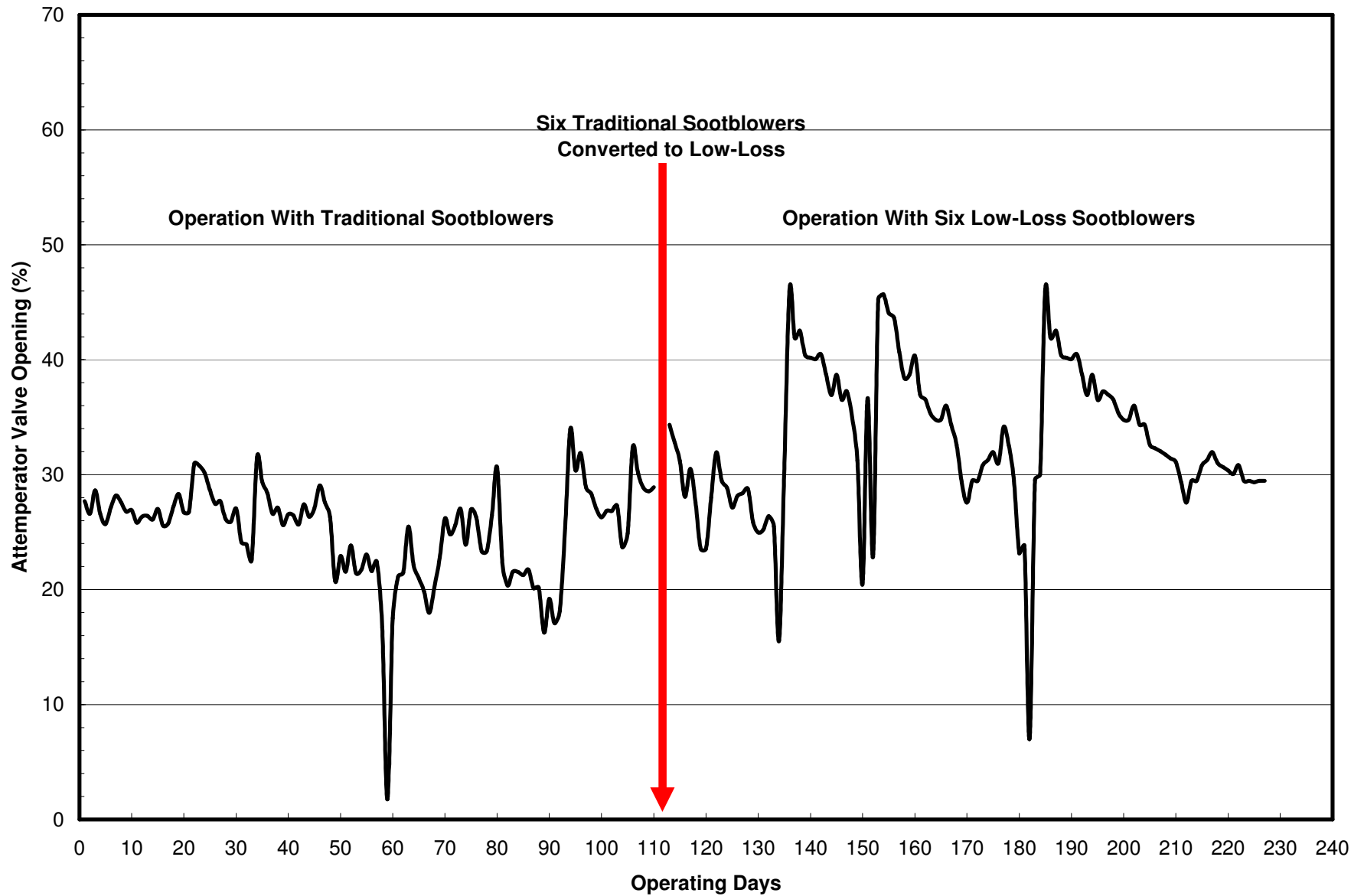
Case Study – Operating Data



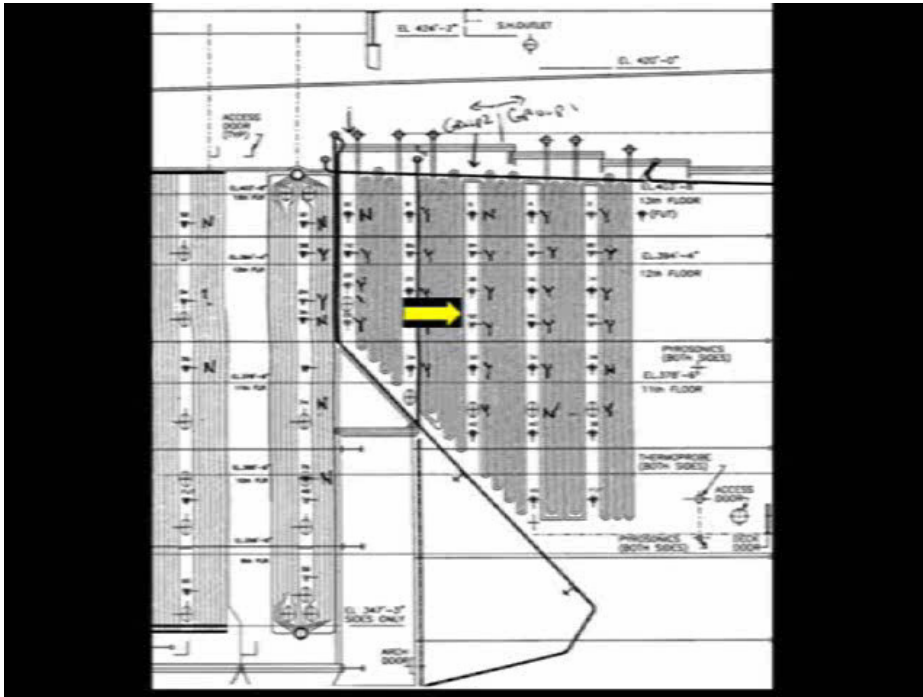
Case Study – Operating Data



Case Study – Operating Data



Case Study – Video Inspection



Before

Nozzles in Use: MPCS



After

Nozzles in Use: Low Pressure

Case Study – Video Inspection



After

Nozzles in Use: Low Pressure



After

Nozzles in Use: MPCS

Conclusions

- **Recovery Boiler Cleaning Demands Can Be Met**

	Traditional Sootblowers	Low-Loss Sootblowers
Supply Pressure	4,137 kPa (600 psig)	1,380 kPa (200 psig)
Poppet Pressure	2,137 kPa (310 psig)	1,138 kPa (165 psig)
Steam Flow	2.9 kg/s (19,200 lbs/hr)	2.1 kg/s (16,491 lbs/hr)

Conclusions

Savings are Site Dependent

- **Saved Steam Can:**
 - **Be Sent to a Turbine**

