Worldwide Pollution Control Association

IL Regional Technical Seminar

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power generation group

Wet FGD Lessons Learned - Design

by

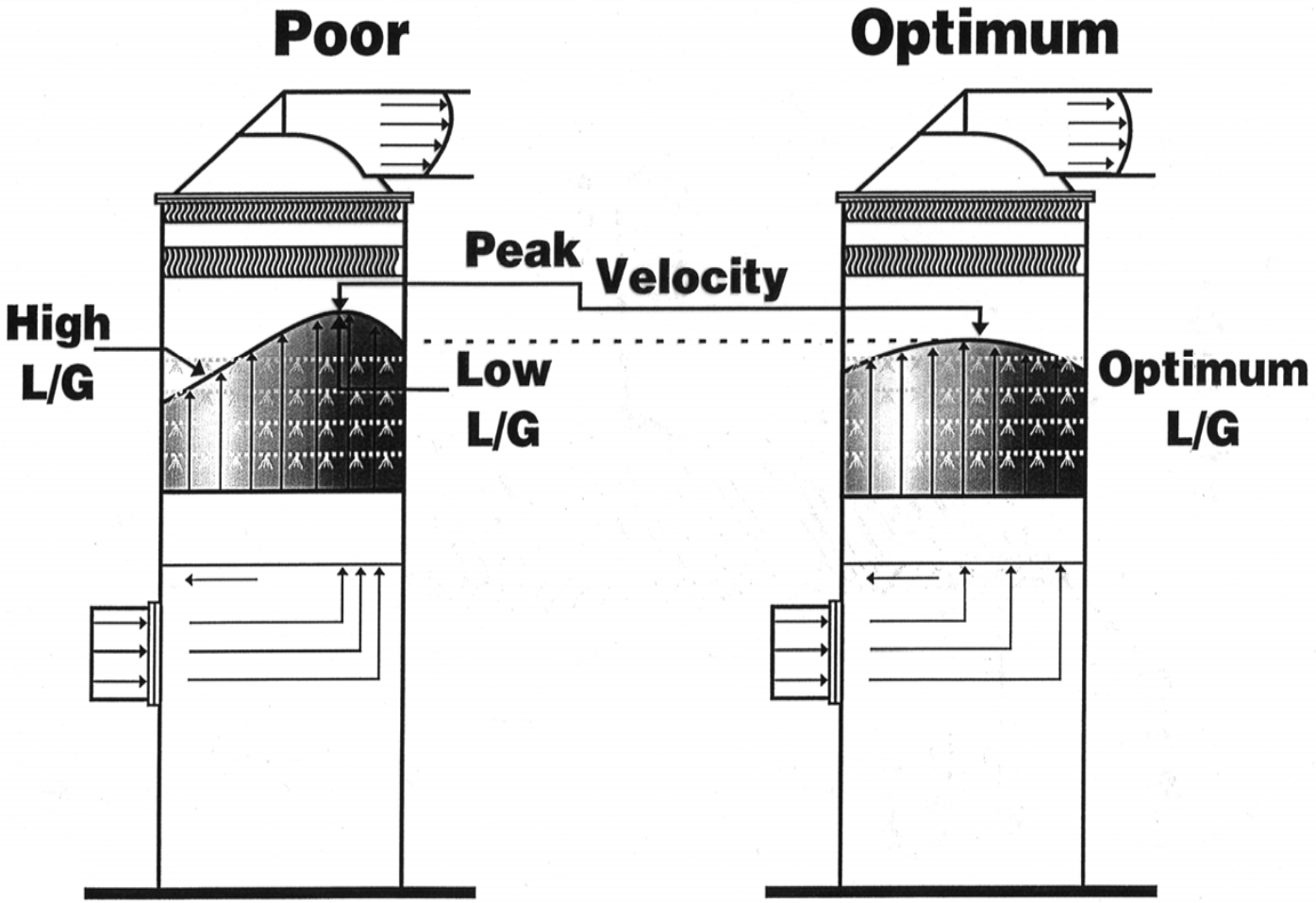
Greg Bielawski

WPCA Regional Seminar
Springfield, Illinois
August 4, 2010

Yesterday: Multiple Absorbers per Boiler: Many dampers & many more pumps

Today: Single Absorber per Boiler

Importance of Gas Flow Distribution



Packed Towers No Longer Used

Excellent contactor,
but big plugage problems

B&W Absorber Gas Inlet with Tray

Spiral Nozzle:
Excellent Drop Size, but Not Suitable

Hollow Cone Spray Nozzle

FRP Spray Headers

FRP Can be done right, but there must be a stringent spec….

Alloy Spray Headers

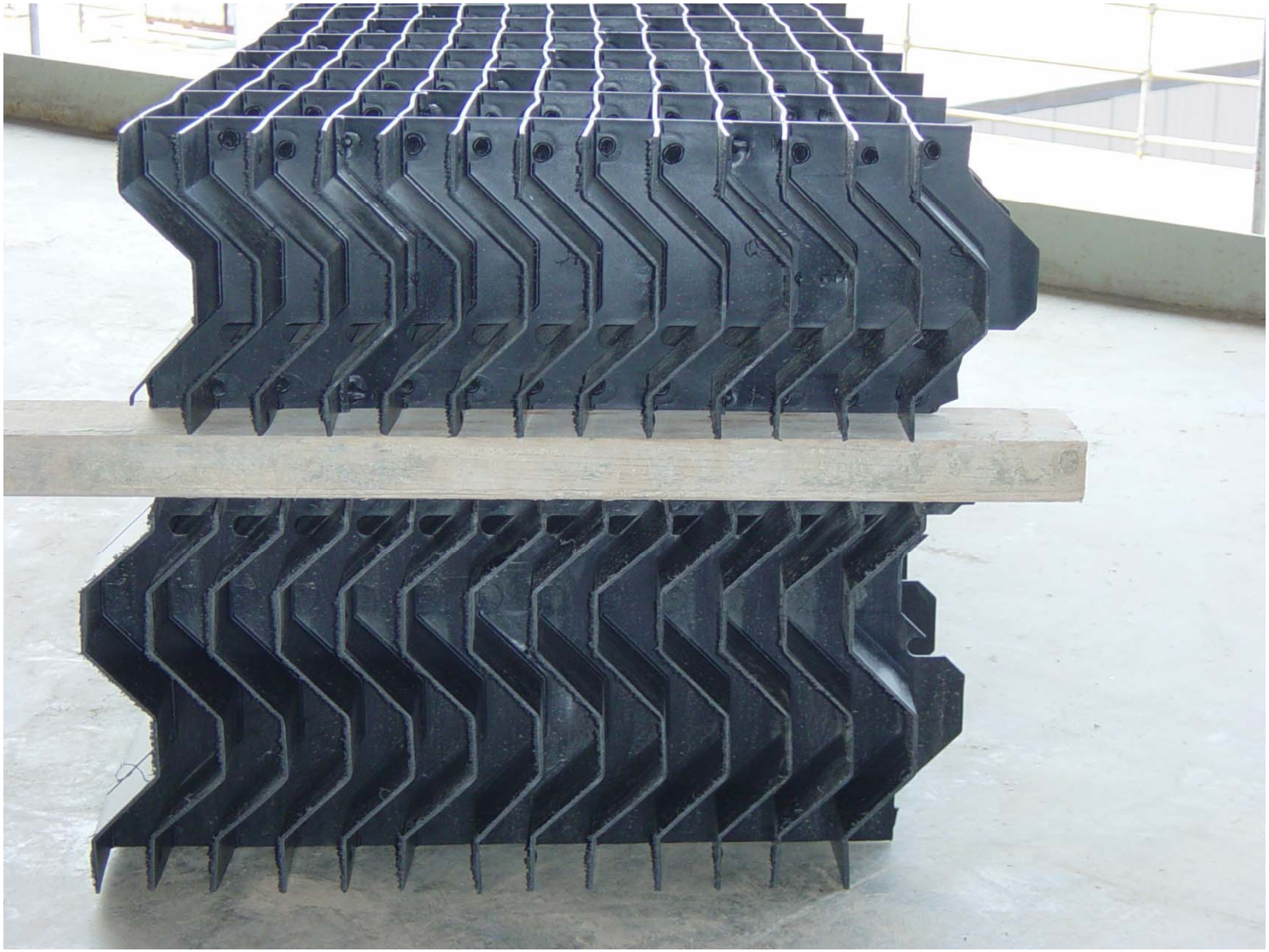
Rubber lining blockage: Common problem with Rubber-Lined Pipe

Mist Eliminator Upgrade

Original Mist Eliminator Design

New Modern Mist Eliminator Design

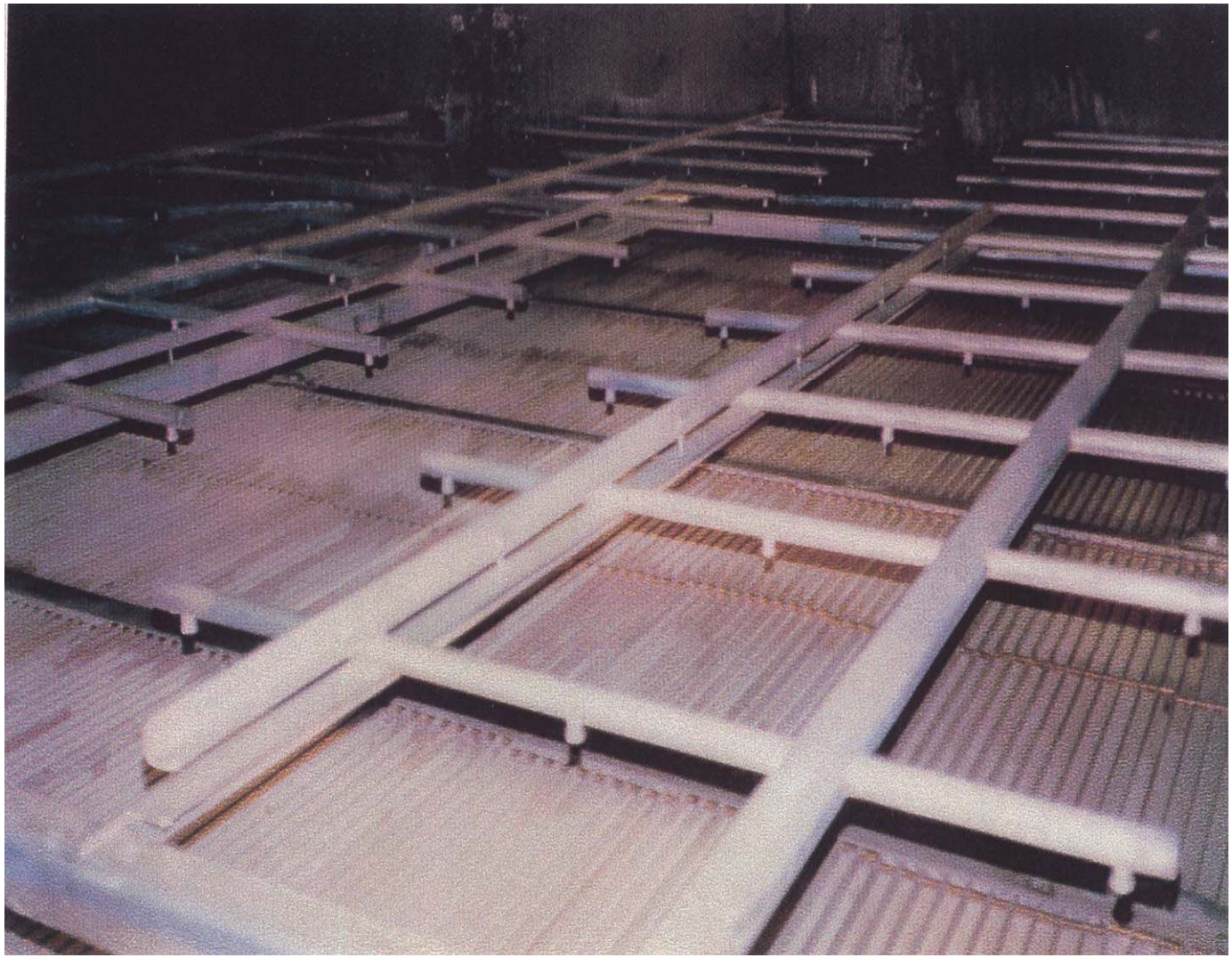
Typical Lower & Upper Mist Eliminator



Mist Eliminator Wash System

ME Wash Strainer

Top of Mist Eliminator with Wash Header



Wet FGD Absorber Fire

Absorber Pump with FRP Pipe
(Note Supports)

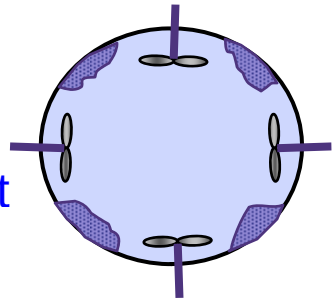
Absorber Pump Gearbox Failures: Gearboxes likely need water cooling

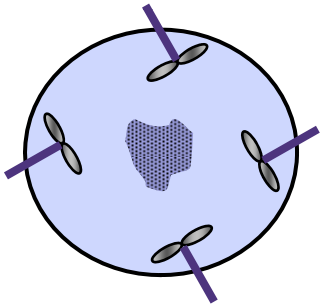
Absorber Mixer Design

Mixers must be distributed around the tank, not clustered

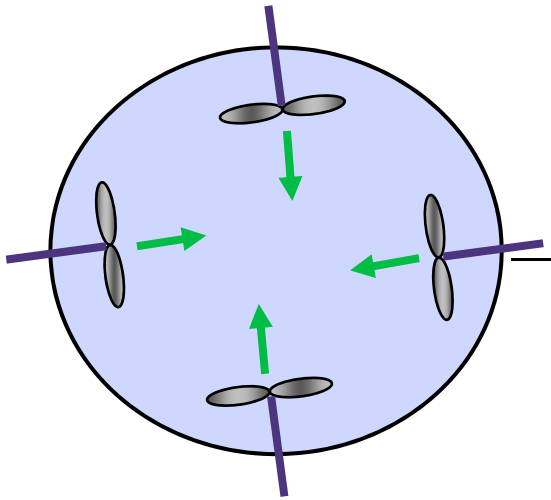
installation angle $\beta = f(d_1, d_2, n_2, q,$ quantity of agitators)

ß = 0
deposits at the vessel wall





ß = too large
deposits in the centre

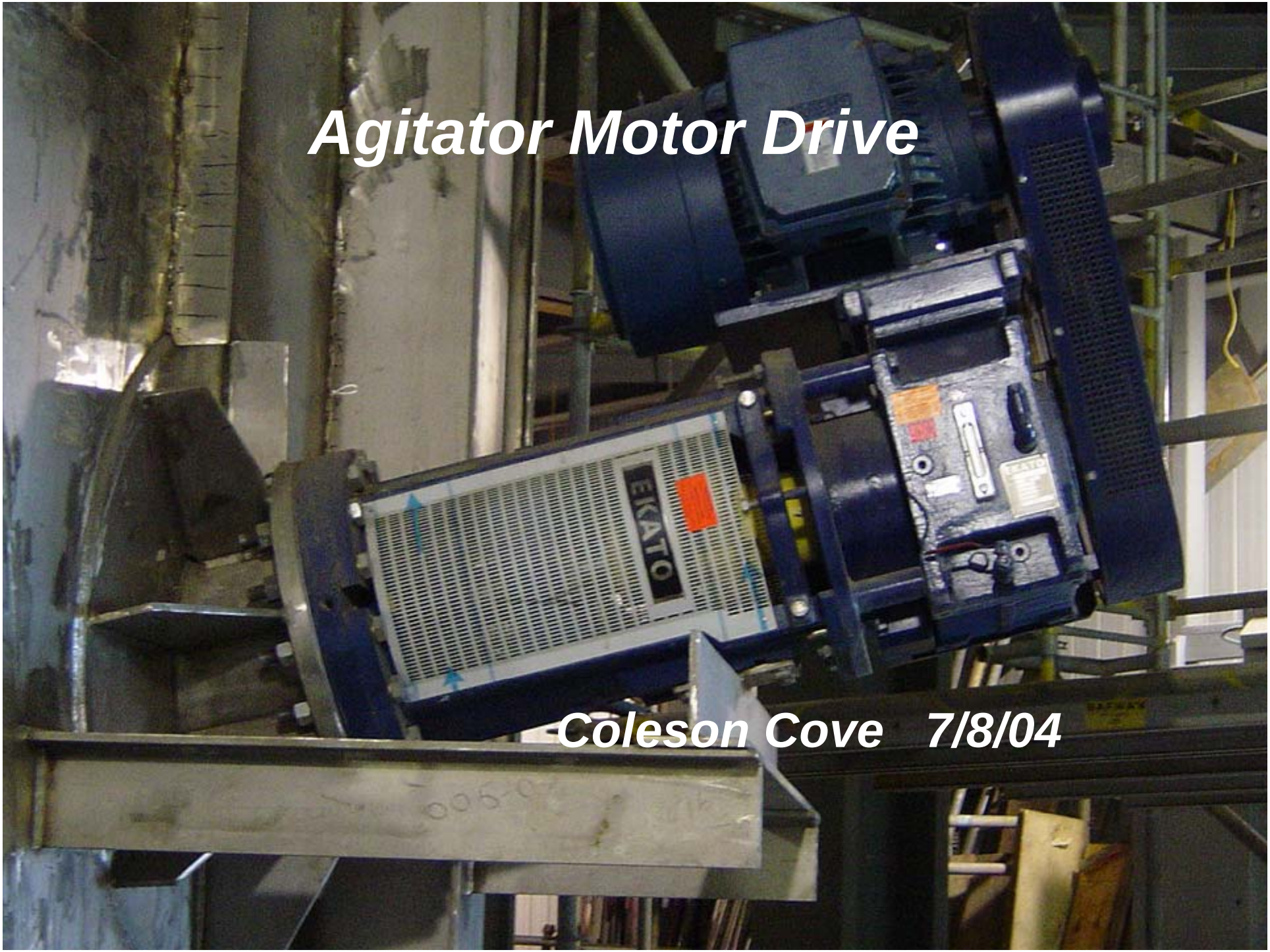


ß = optimal
no deposits

Source: Ekato

Mixer on Absorber Shell: Outboard Support Needed

Source: Alstom Unit at Centralia

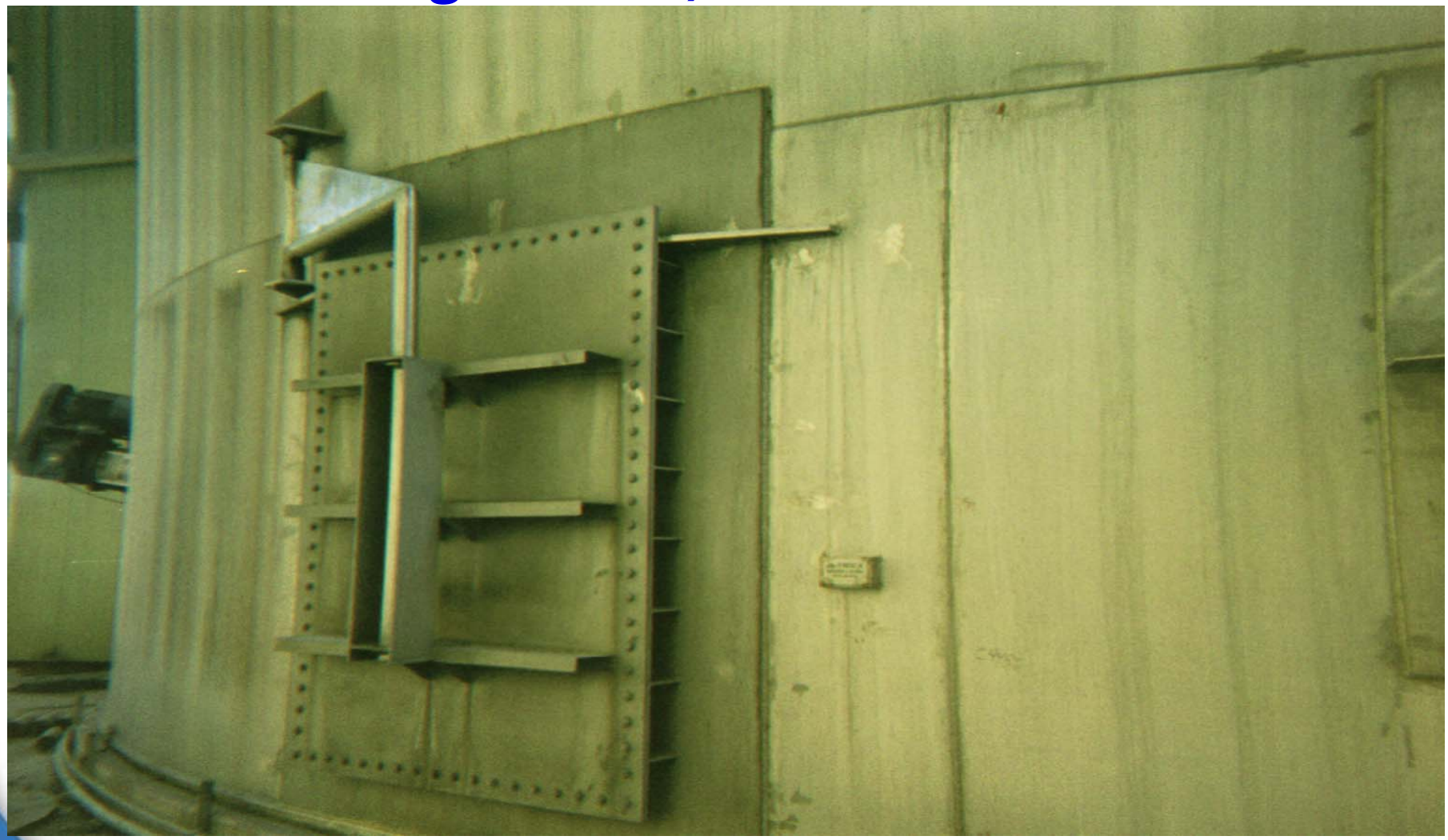


Agitator Motor Drive

Coleson Cove 7/8/04

Erosion of Alloy Mixer Blade
(Two-Year Outage Inspection)

Absorber Tank Access Door Need Big Doors; Must be to Code



Source: Alstom Unit at Centralia

WFGD Operations & Maintenance

by

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Estimated Plant WFGD Operations per Shift

Operator shift super	1x (shared)
Control room operator	1x
Field operators	
AQCS	2x
Electrical	1x (shared)
Lab tech	1 per shift (for 2 shifts – shared)
Maintenance	shared with boiler

Total Dedicated Personnel: 3

Total Shared Personnel: 3+

Typical Absorber Maintenance Activities

Activity Description	Frequency	Estimated Labor Manhours	Equipment On/Off	AQCS On/Off
ABSORBER				
Inspect alloy parts	**1 per year**	**24**	**off**	**off**
Inspect/repair internal piping	**1 per year**	**24**	**off**	**off**
Inspect/clean nozzles	**1 per year**	**24**	**off**	**off**
Inspect/clean mist eliminators	**1 per year**	**24**	**off**	**off**
Inspect/clean flow distributors	**1 per year**	**24**	**off**	**off**
Inspect/replace man way gaskets	**1 per year**	**24**	**off**	**off**
Inspect fasteners	**1 per year**	**24**	**off**	**off**

List continues for many pages:
Contact gtbielawski@babcock.com for complete set

Estimated Maintenance Costs for the Wet FGD System

Estimated annual maintenance manhours for the Wet FGD: ~6,900 hours

Estimated annual spare parts/materials cost for the Wet FGD: ~$515,000

Notes:

The above maintenance activities, frequency, and estimated labor values are typical and may vary dependent on equipment suppliers.

Total maintenance costs may vary in the industry from plant to plant.