

REINHOLD ENVIRONMENTAL[®]



2023 Reinhold/PCUG Round Table Presentation

Cohosted by Duke Energy and Vistra in The Westin Hotel,
Cincinnati, OH on June 26-27, 2023

All presentations posted on this website are copyrighted by **REINHOLD ENVIRONMENTAL[®]** (RE). Any unauthorized attempts to print, to download, to modify, to incorporate into other presentations, to link to other websites or to obtain copies for any other uses than the training of attendees to RE Conferences is expressly prohibited unless approved in writing by RE or the original presenter. RE does not assume any liability for the accuracy or contents of any materials in this library which were presented and/or created by persons who were not employees or subcontractors of RE.

Ammonia Injection System Tuning to Maintain Emission Controls

(SCR Tuning & Trouble Shooting)

Reinhold

Round Table 2023

6/27/2023

Darren Hanby

(740) 891-8571

dchanby@gmail.com

dchanby@aep.com

- *The opinions and recommendations expressed herein and in any associated presentation are those of the author who is solely responsible for its content and are not those of American Electric Power Company.*

Where to start?

G P S

as

profile

survey

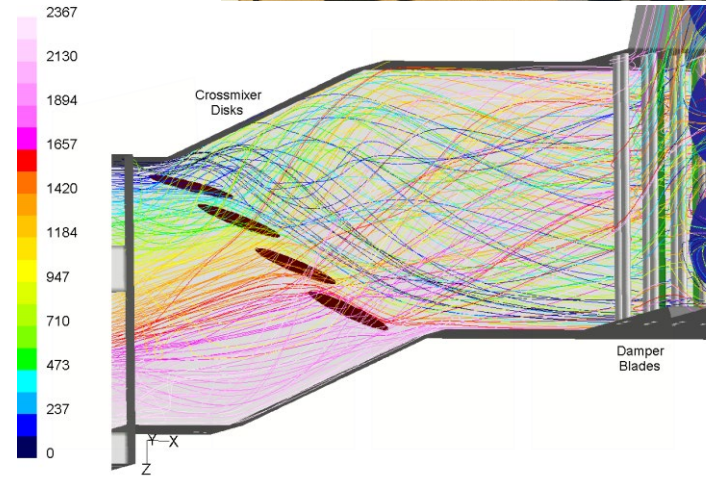
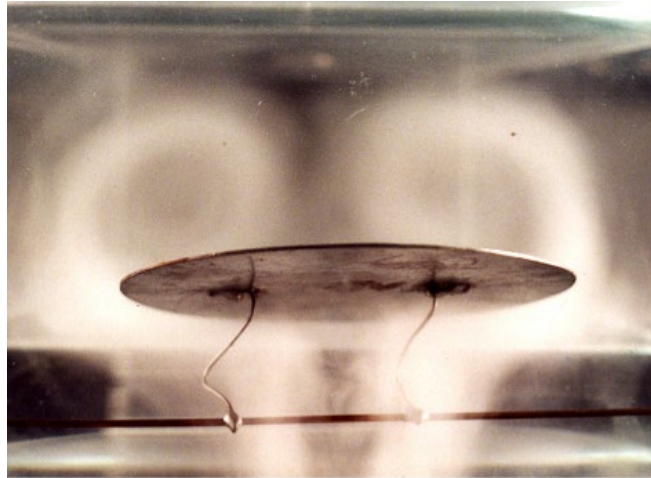
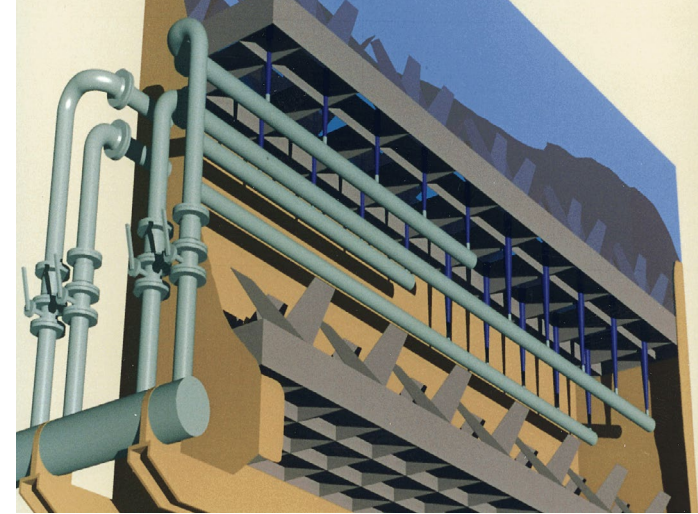
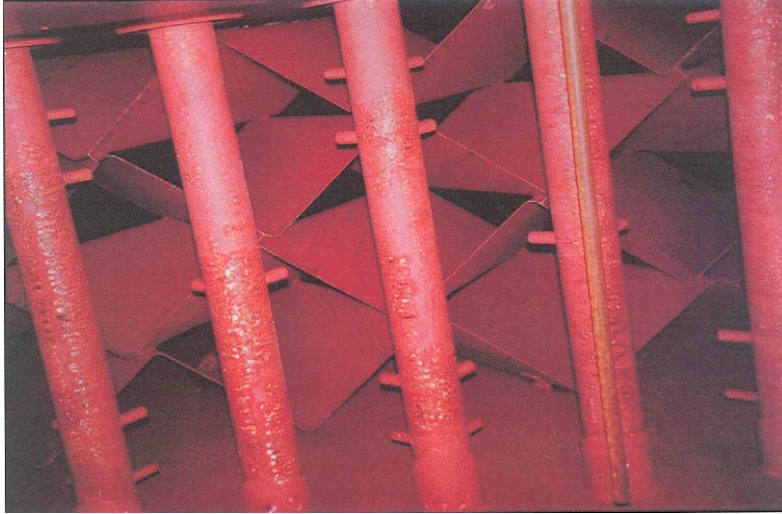
Gas Profile Survey

Operating Characteristics of the SCR

Types of Mixing Systems

- Straight Line - Devices straighten flow, intensive grid to match NO_x profile
- Shifting Mixers - Devices alternately shift gases horizontally and vertically, NH₃ injected through one or more multi-nozzled header.
- Zonal Mixers - Devices divide duct into zones with intensive mixing, NH₃ adjusted for each zone.
- Vortex Mixers - Devices create vortices throughout duct, NH₃ injected into a vortex device.

Types of Mixing



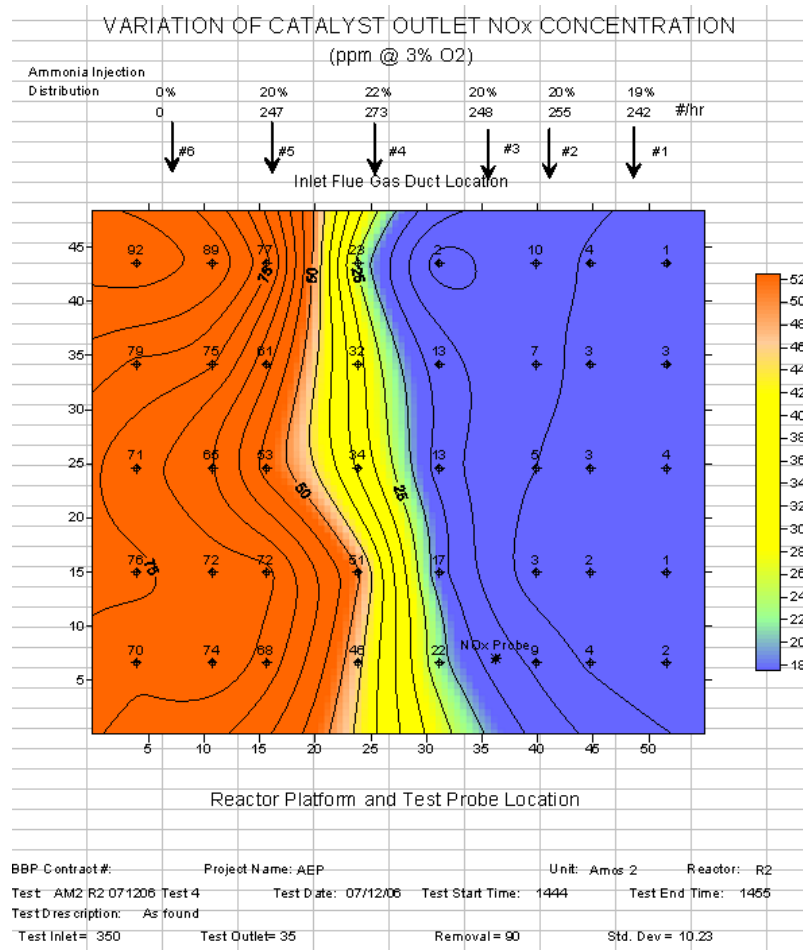
Gas Profile Survey

Operating Characteristics of the SCR

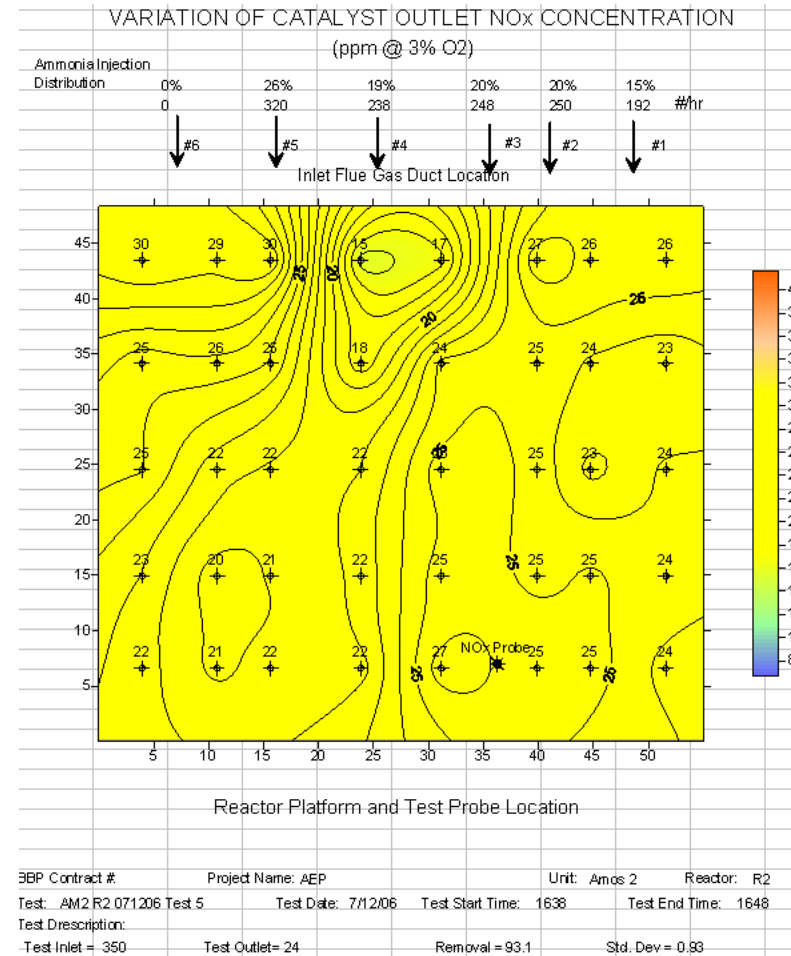
Residual Outlet NO_x Profile

SCR Distributions

Does it Look Like This



Look Like This



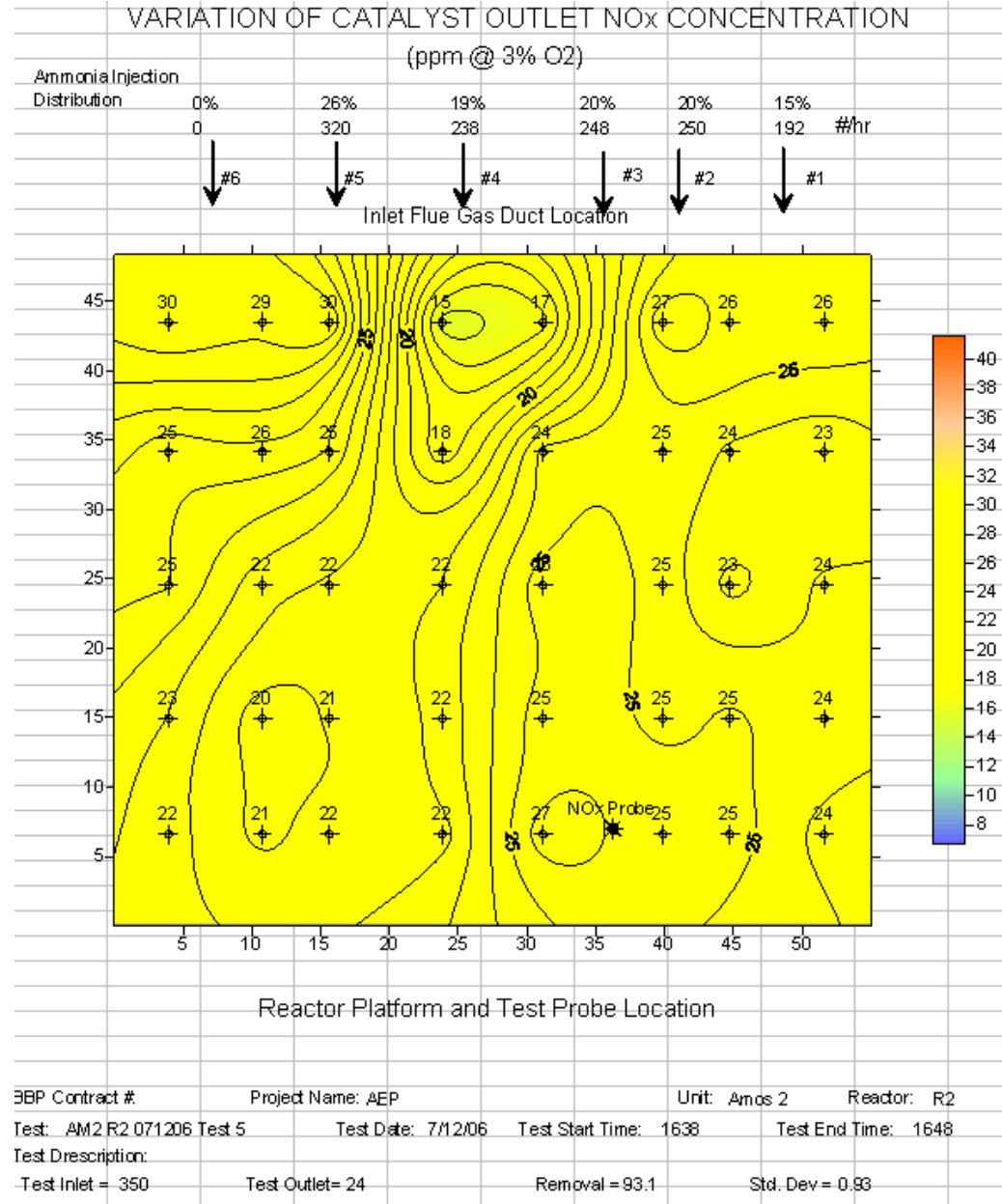
Gas Profile Survey

Operating Characteristics of the SCR

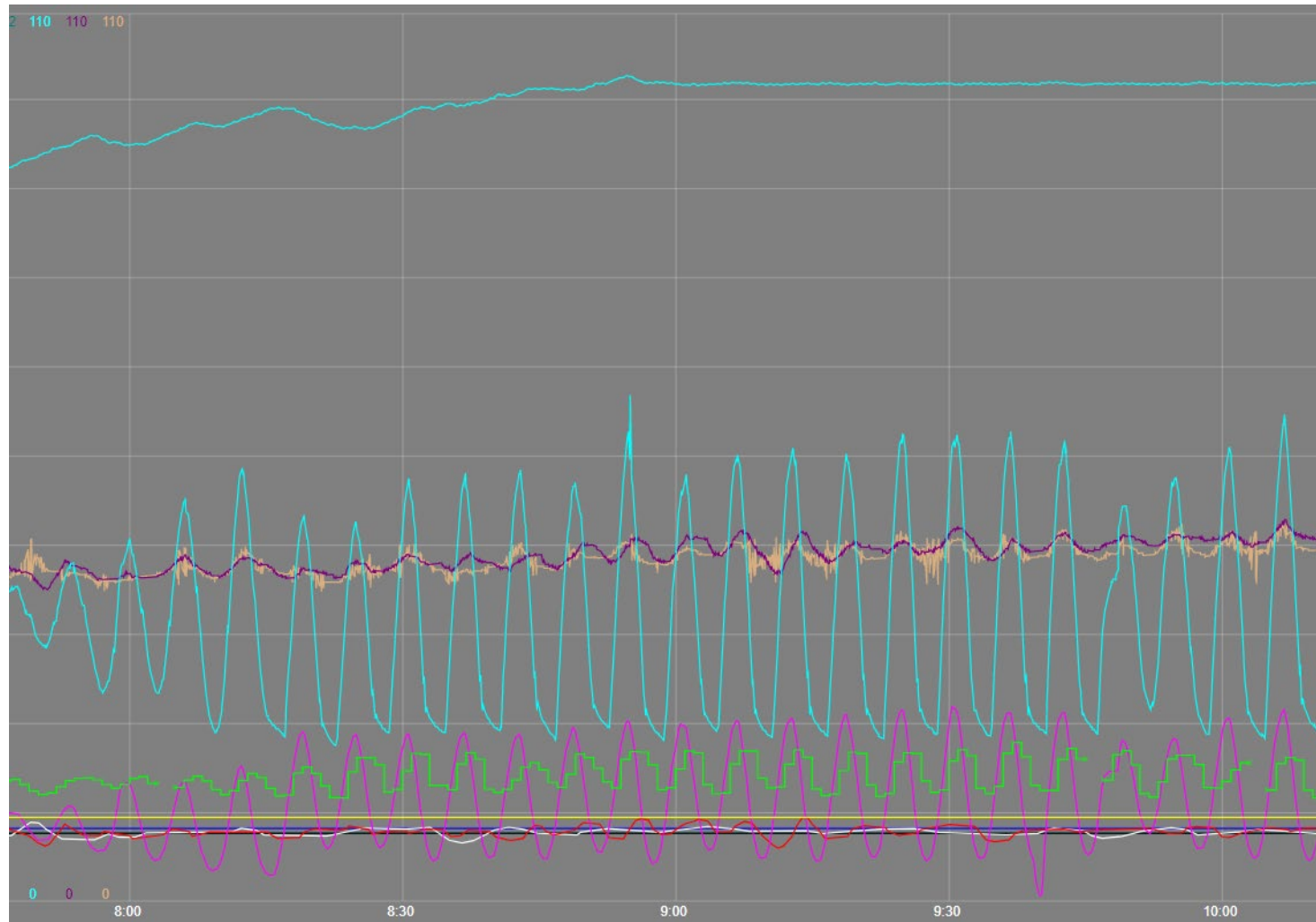
Residual Outlet NO_x Profile

Outlet NO_x Control

Outlet NOx Monitor



Controls



Gas Profile Survey

Operating Characteristics of the SCR

Residual Outlet NO_x Profile

Outlet NO_x Control

Expected Unit Loading

Duct and AH Arrangement

Available NH₃ Indication and Location

Furnace NO_x

What is NH₃ System Balancing?

- Adjusting the NH₃ injection so that the NH₃ profile in the SCR matches the NOx profile sent to the SCR from the steam generator.
- This is accomplished by measuring the residual outlet NOx of the SCR, then adjusting the NH₃ injection valves until the residual outlet NOx is as even as possible

Why Balance Your NH₃ Injection?

- Achieve best NH₃ to NO_x ratio possible
- This gives highest potential for removal of NO_x
- Most efficient use of NH₃ to meet target NO_x levels
- Lowest amount of NH₃ slip
- Most room for control swings
- Assists with trouble shooting down the road

Know Your SCR System Before You Start

What are the strengths and weaknesses of the SCR system?

Does the NO_x to the SCR have a consistent profile?

How much flexibility is there to make adjustments?

Is there adequate coverage with test ports?

Are the sample [probes](#) in good condition?

How finely tuned are the controls?

Where's the closest restroom and what is the approximate time to get there?

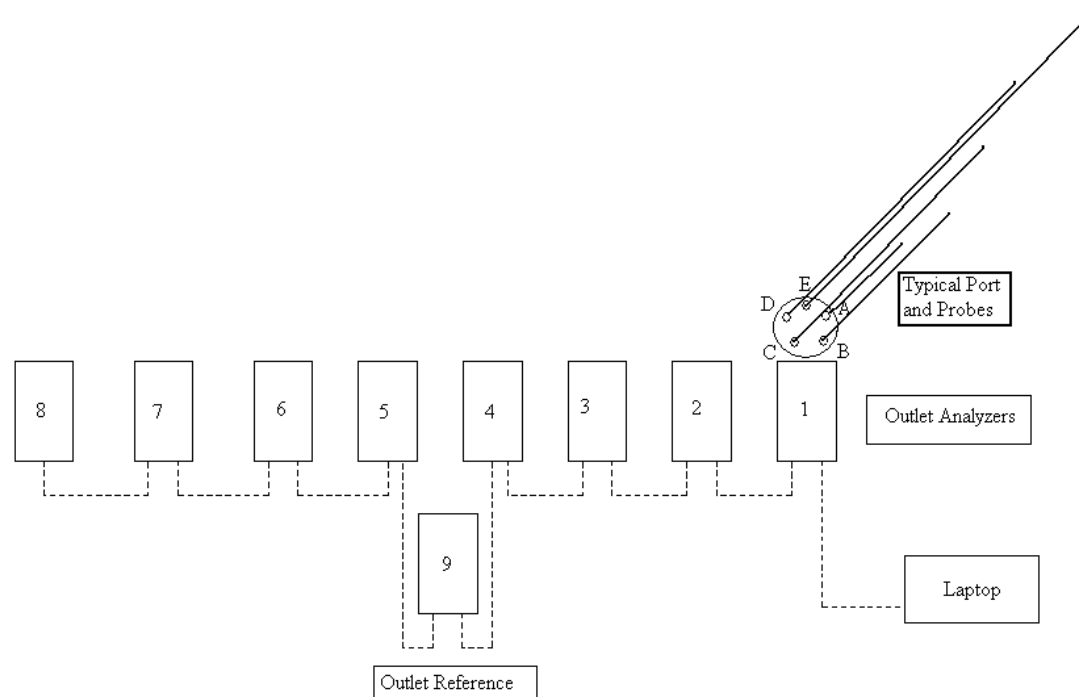
Typical Setup

One analyzer per port, plus one reference analyzer per grid (9 analyzers for largest reactors when doing outlet only)

All analyzers "daisy chained" and connected to a laptop

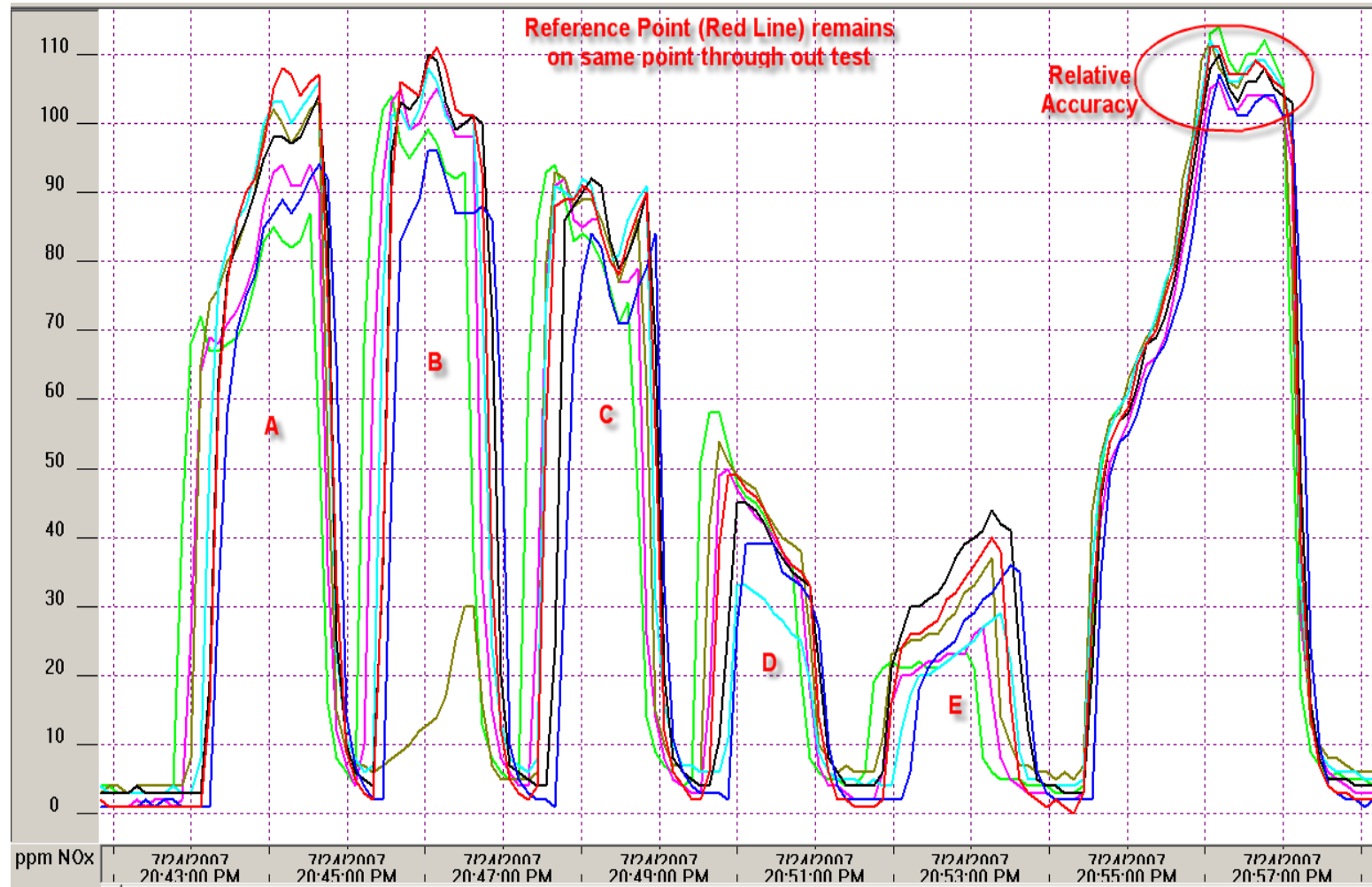
6 segments for each test

- 1 segment for each of the 5 probe depths
- A relative accuracy test at the end

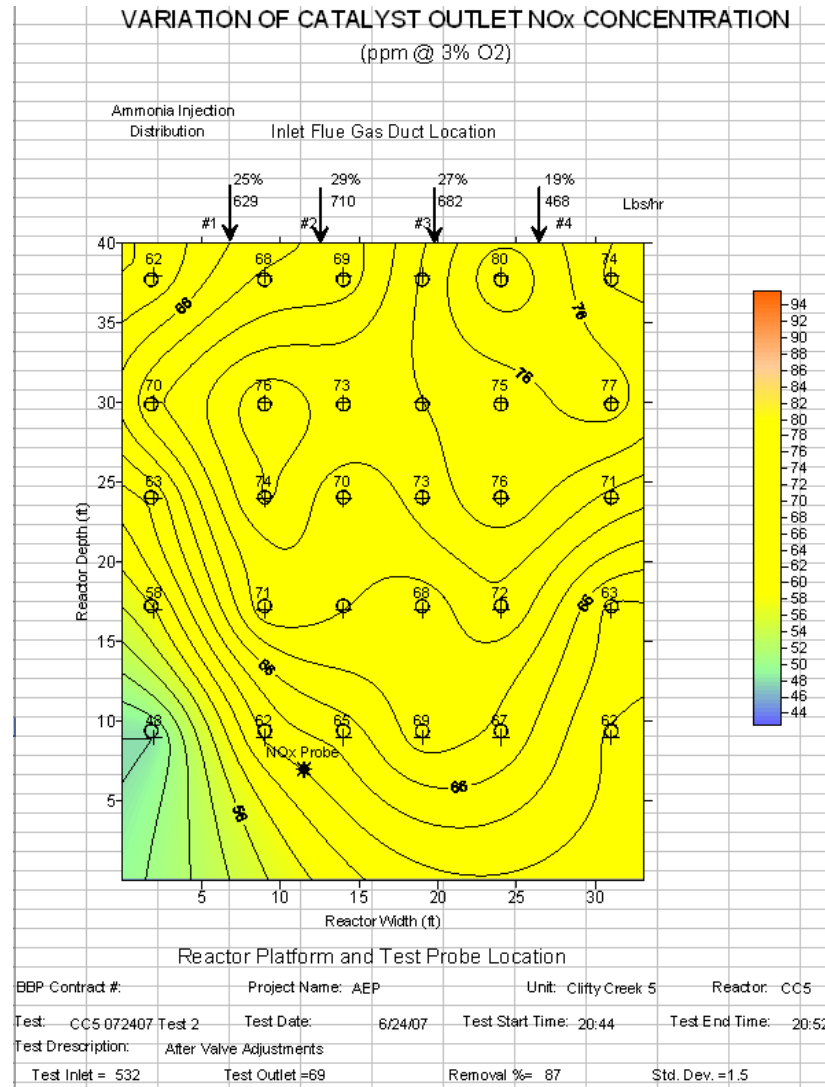




Reference and Relative Accuracy



The Result



Basic Parameters to Look at

Outlet NOX

CEMS

Slip Ind.

Nozzle Flows

Basic Parameters to Look at

Outlet NOX CEMS Slip Ind. Nozzle Flows

Check Outlet NOx
Sampling System for
Leak or Pluggage

Basic Parameters to Look at

Outlet NOX

CEMS

Slip Ind.

Nozzle Flows

Check for sampler
heater or analyzer
problems

Basic Parameters to Look at

Outlet NOX CEMS Slip Ind. **Nozzle Flows**

Nozzle plugged away
from outlet analyzer

Basic Parameters to Look at

Outlet NOX CEMS Slip Ind. **Nozzle Flows**

Nozzle plugged near
the outlet analyzer
(prompt Attention)

Communications Strategy



Summary

Questions?

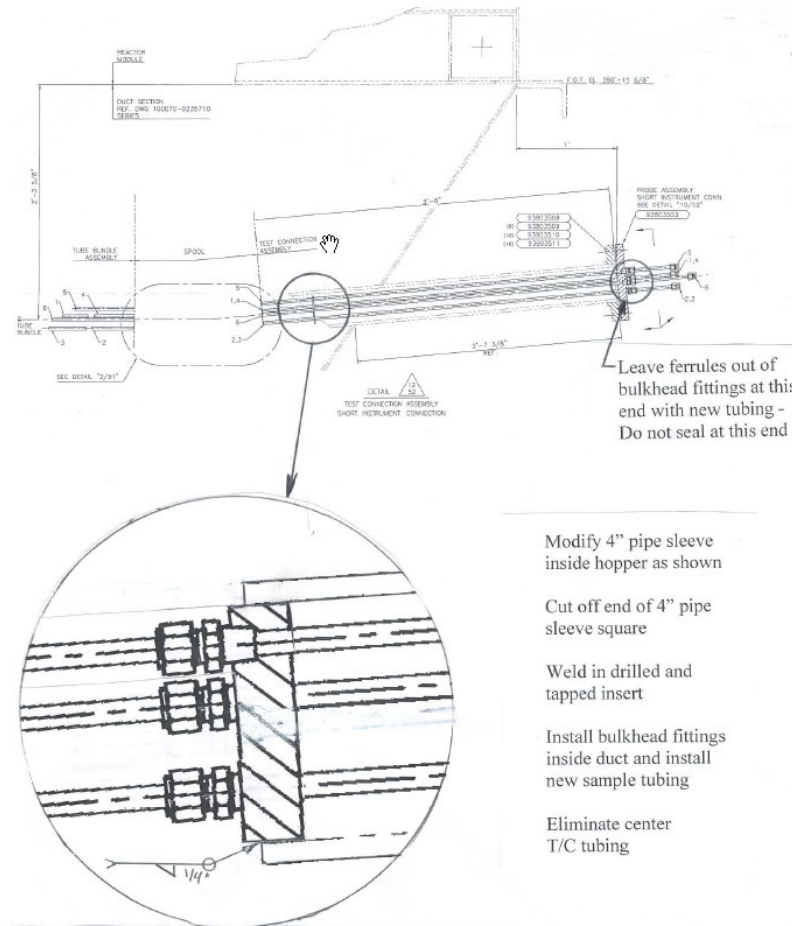
Probe Corrosion

[Back](#)



Probe Repair

[Back](#)



Modify 4" pipe sleeve
inside hopper as shown

Cut off end of 4" pipe
sleeve square

Weld in drilled and
tapped insert

Install bulkhead fittings
inside duct and install
new sample tubing

Eliminate center
T/C tubing

Outlet NOx sample grid repair utilizing existing 4" pipe sleeves

JDB 12/02/05