REINHOLD ENVIRONMENTAL ®

2024 Reinhold/PCUG Round Table Presentation

Hosted by LG&E/KU and Co-hosted by Southern Co. and TVA

in The Marriott Resort Lexington Griffin Gate Hotel, Lexington, KY on June 24-25, 2024

SCR Troubleshooting and AIG Testing

Reinhold

Round Table 2024

6/25/2024

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Where to start?

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Gas Profile Survey

Operating Characteristics of the SCR

Types of Mixing Systems

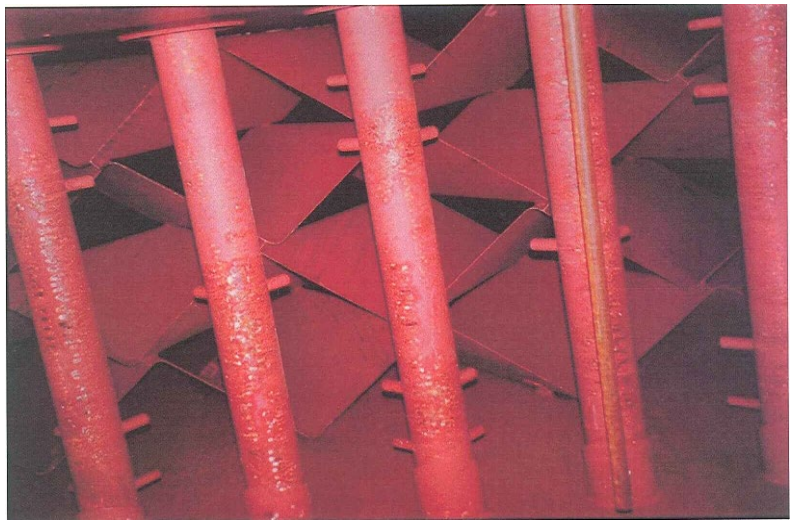
Straight Line – Devices straighten flow, intensive grid to match NOx profile

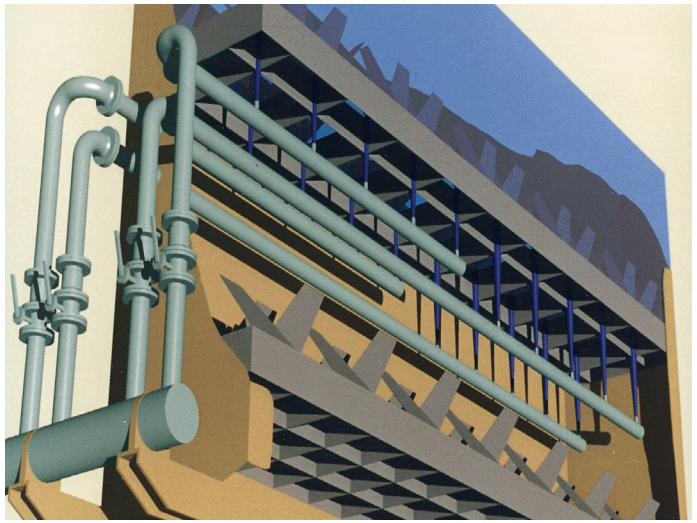
Shifting Mixers – Devices alternately shift gases horizontally and vertically, NH_3 injected through one or more multi-nozzled header.

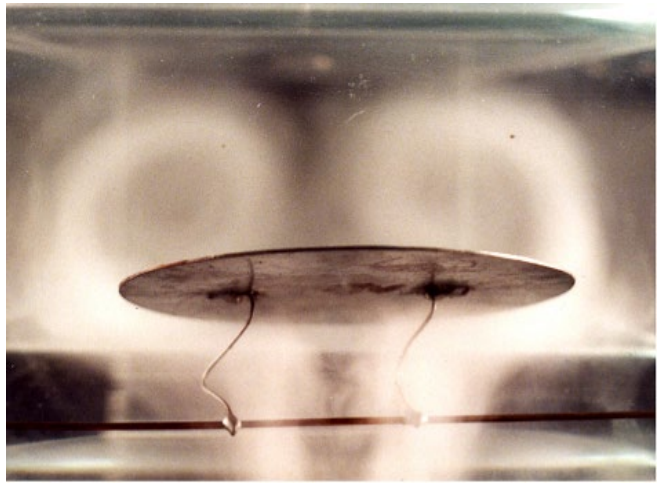
Zonal Mixers - Devices divide duct into zones with intensive mixing, NH_3 adjusted for each zone.

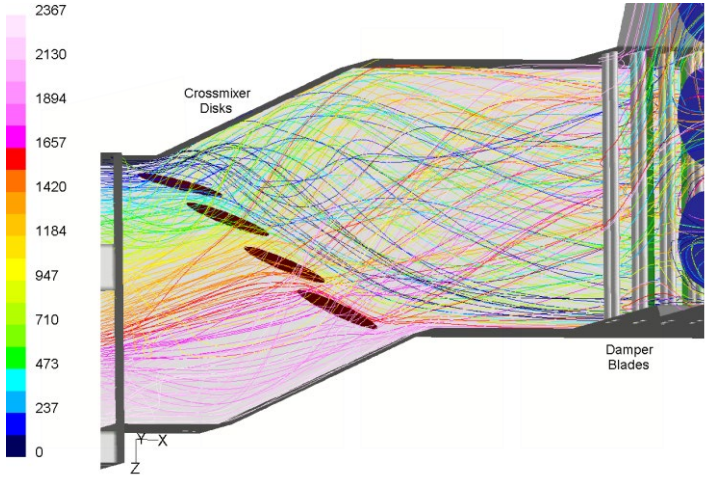
Vortex Mixers - Devices create vortices throughout duct, NH_3 injected into a vortex device.

Types of Mixing









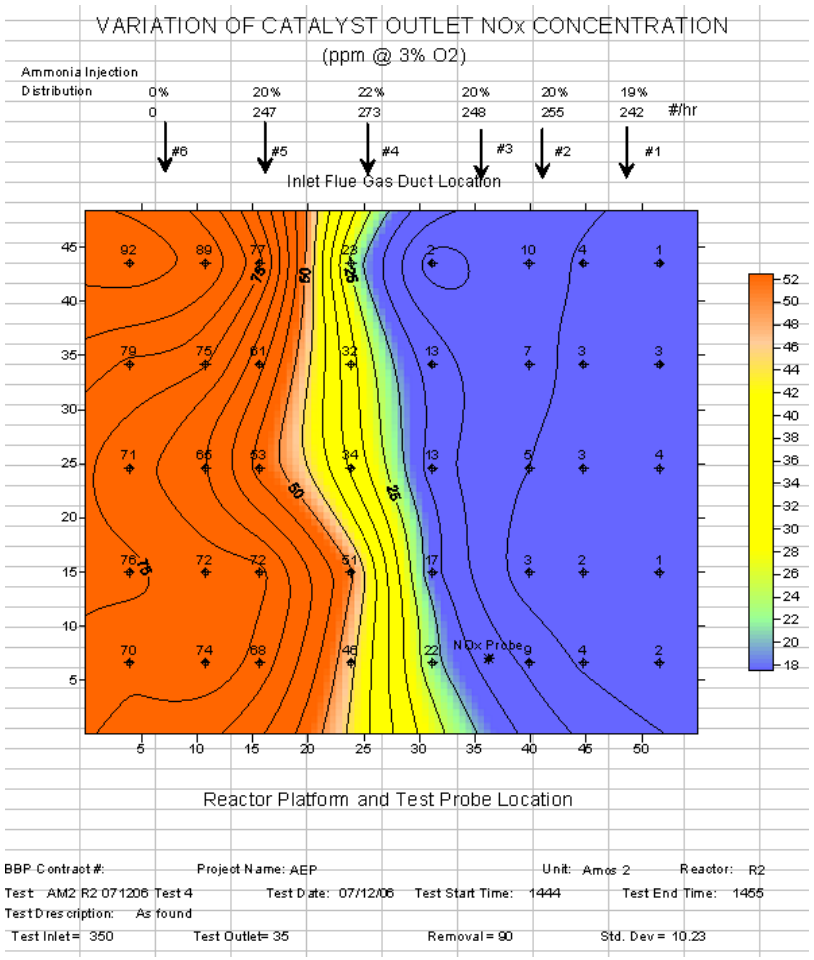
Gas Profile Survey

Operating Characteristics of the SCR

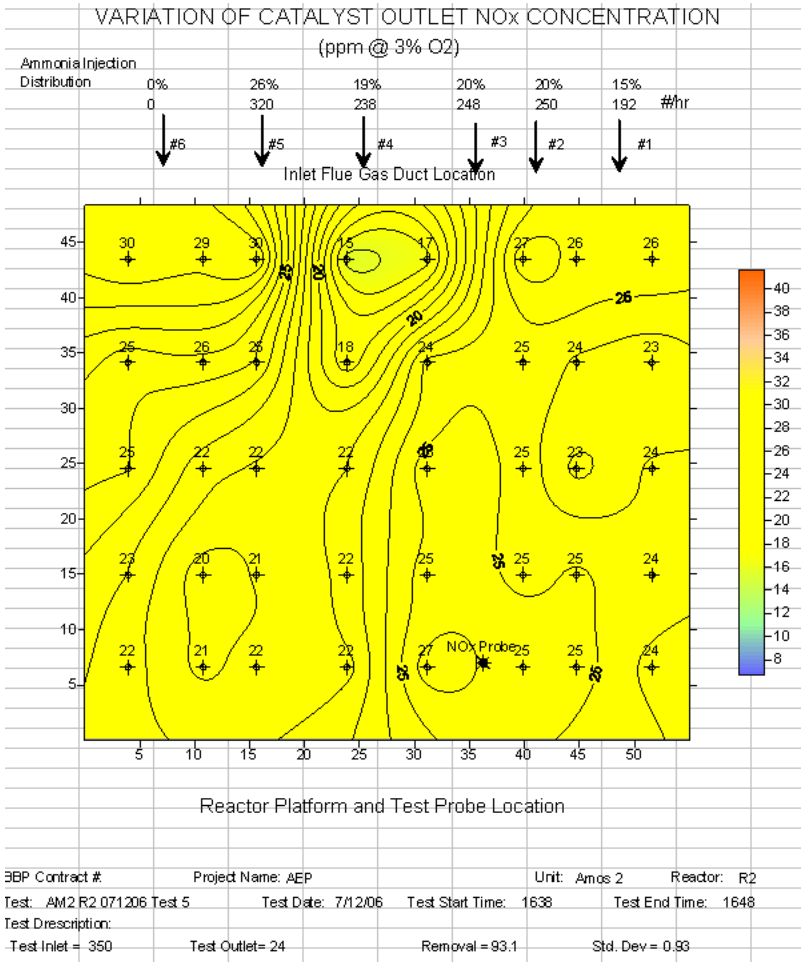
Residual Outlet NOx Profile

SCR Distributions

Does it Look Like This



Look Like This

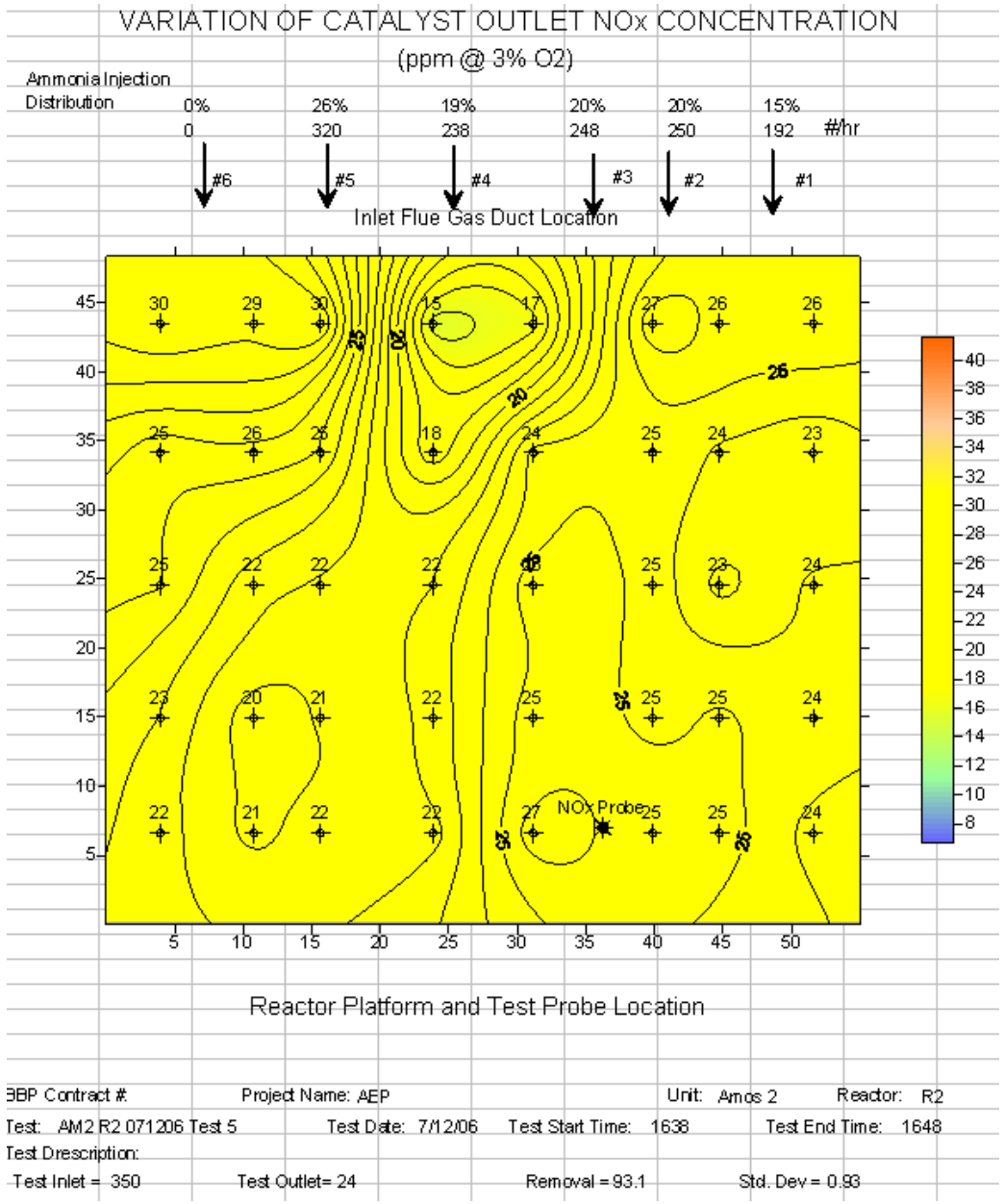


Gas Profile Survey

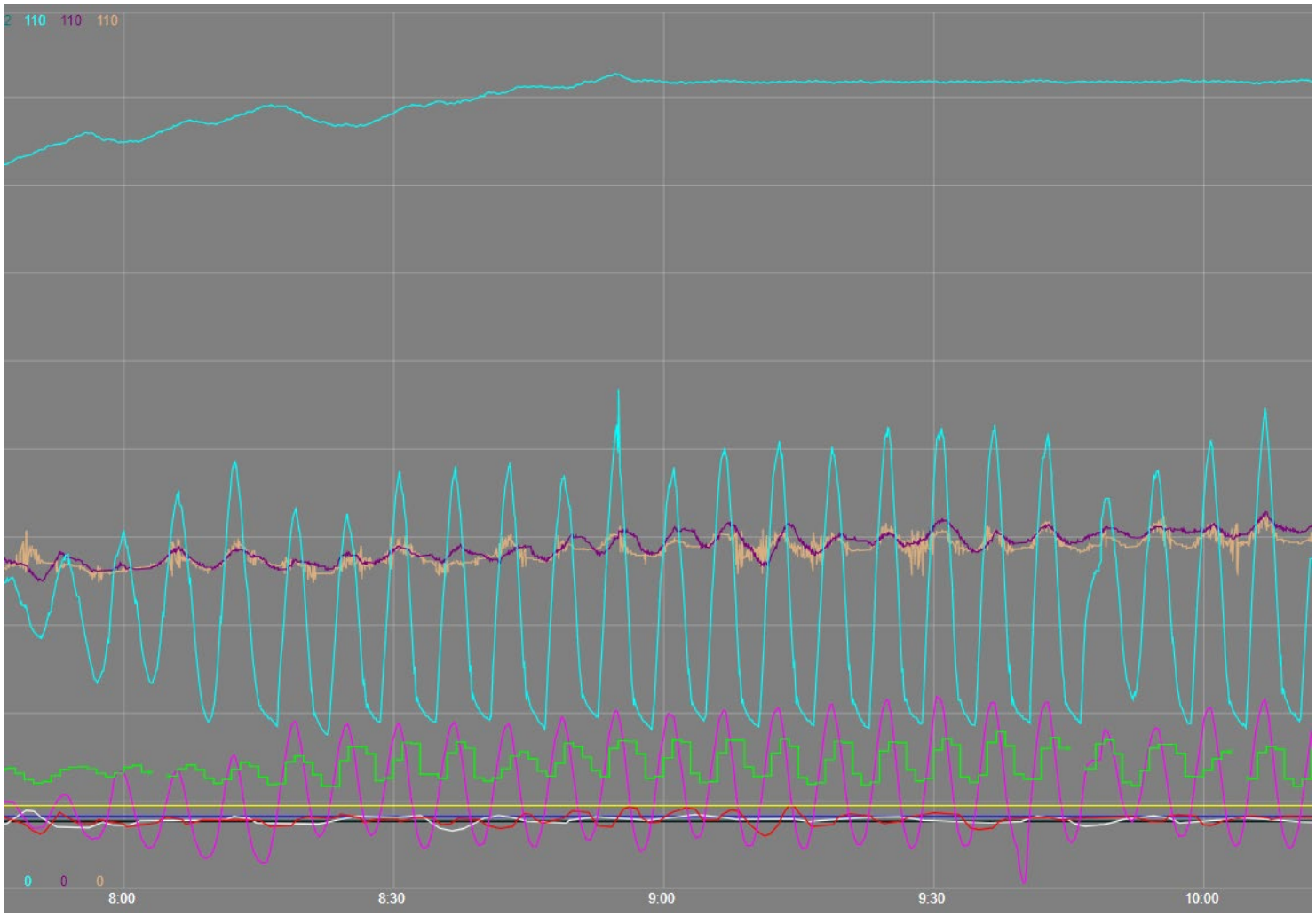
Operating Characteristics of the SCR

- Residual Outlet NOx Profile
- Outlet NOx Control

Outlet NOx Monitor



Controls



Gas Profile Survey

Operating Characteristics of the SCR

- Residual Outlet NOx Profile
- Outlet NOx Control
- Expected Unit Loading
- Duct and AH Arrangement
- Available NH_3 Indication and Location
- Furnace NOx

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)

Most Effective Troubleshooting Procedure

Get to Know the People

Favor the Field

Relate Don’t Berate

Don’t go Looking for Feathers

What is NH_3 System Balancing?

- Adjusting the NH_3 injection so that the NH_3 profile in the SCR matches the NOx profile sent to the SCR from the combustion source.

- This is accomplished by measuring the residual outlet NOx of the SCR, then adjusting the NH_3 injection valves until the residual outlet NOx is as even as possible.

Why Balance Your NH_3 Injection?

- Achieve best NH_3 to NOx ratio possible
- This gives highest potential for removal of NOx
- Most efficient use of NH_3 to meet target NOx levels
- Lowest amount of NH_3 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 NOx 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?

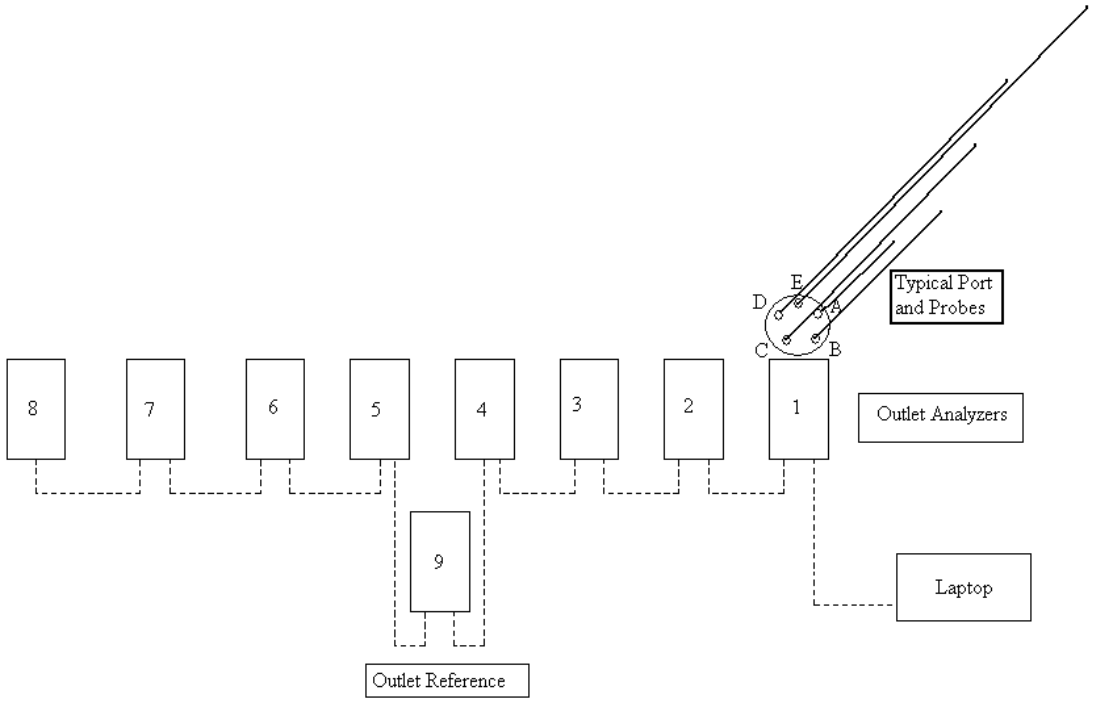
Typical Setup

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

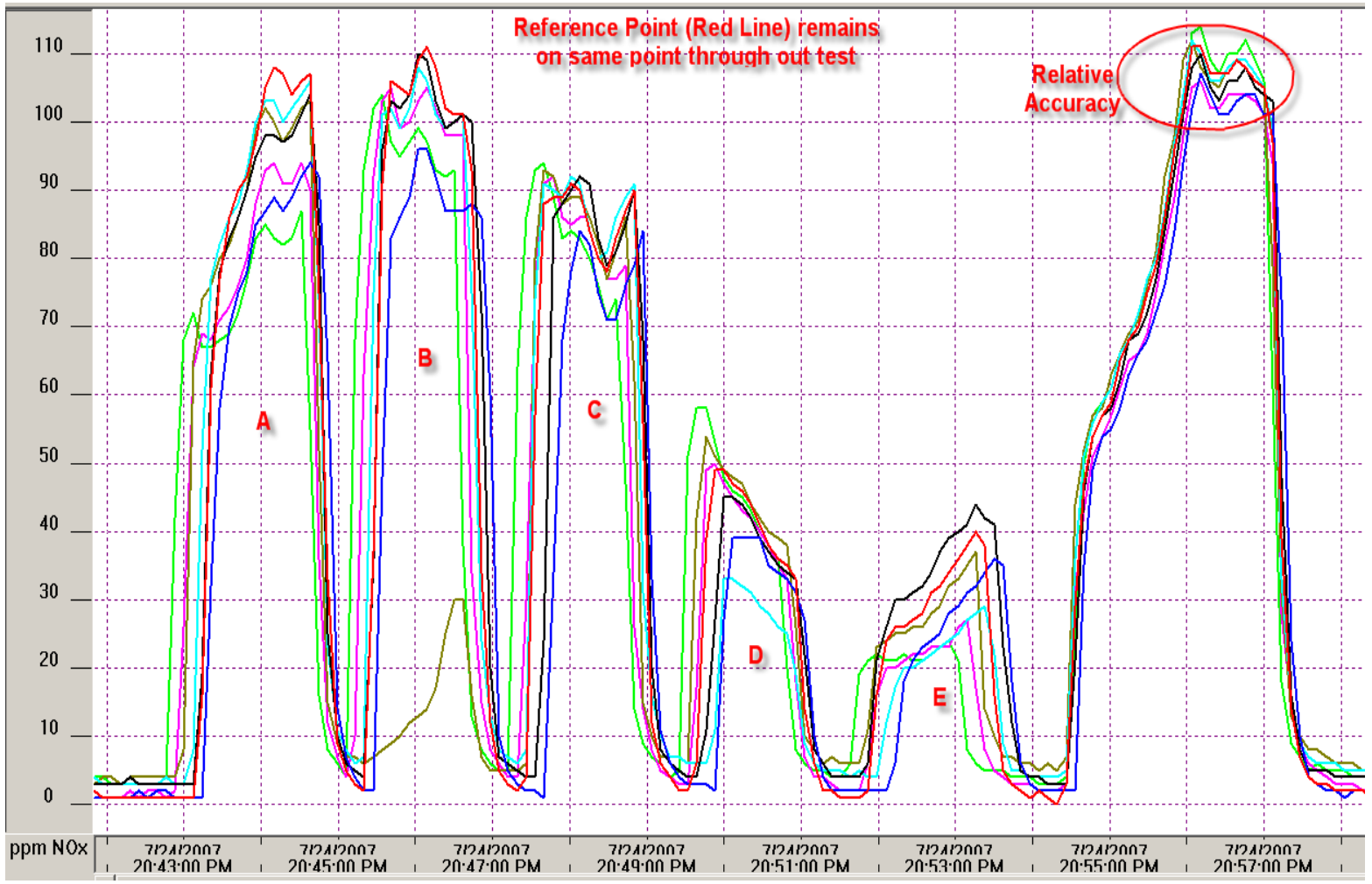
6 segments for each test

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

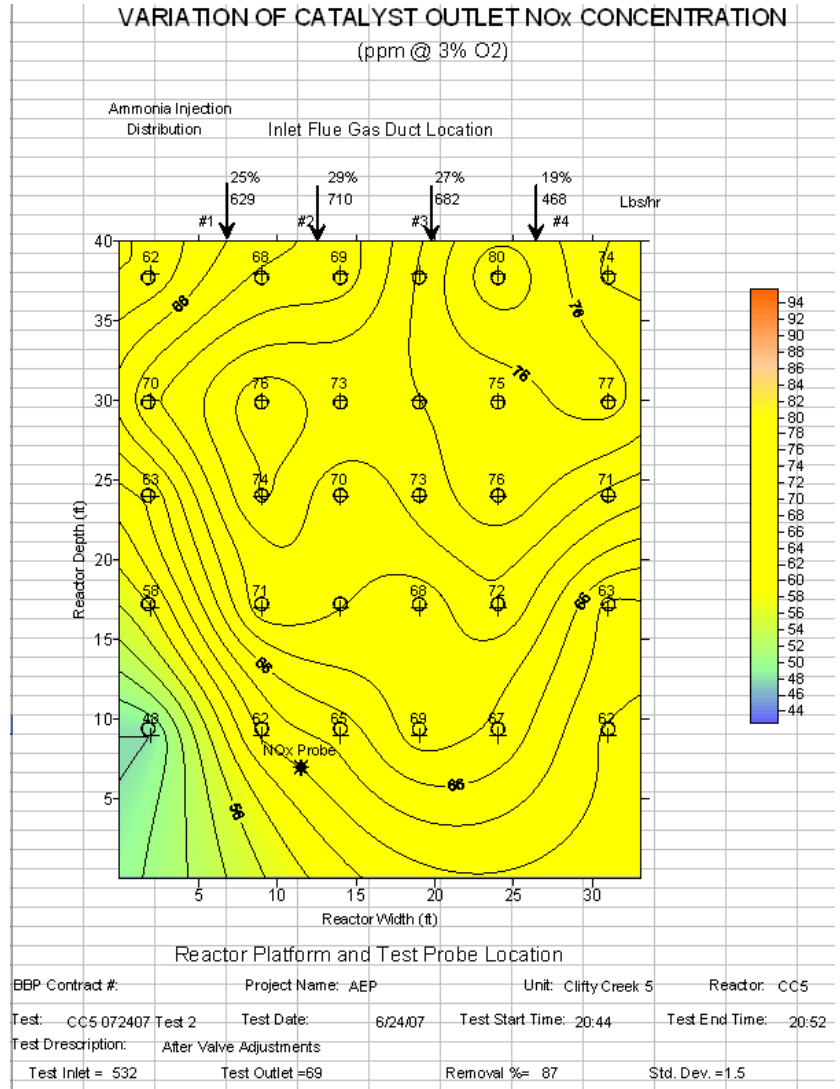



EXIT

Reference and Relative Accuracy



The Result


VARIATION OF CATALYST OUTLET NOx CONCENTRATION
(ppm @ 3% O2)
Ammonia Injection Distribution
Inlet Flue Gas Duct Location
25% 629
29% 710
27% 682
19% 468
Lbs/hr
#1
#2
#3
#4
Reactor Depth (ft)
Reactor Width (ft)
NOx Probe
Reactor Platform and Test Probe Location
BBP Contract #:
Project Name: AEP
Unit: Clifty Creek 5
Reactor: CC5
Test: CC5 072407 Test 2
Test Date: 6/24/07
Test Start Time: 20:44
Test End Time: 20:52
Test Drescription: After Valve Adjustments
Test Inlet = 532
Test Outlet =69
Removal %= 87
Std. Dev. =1.5

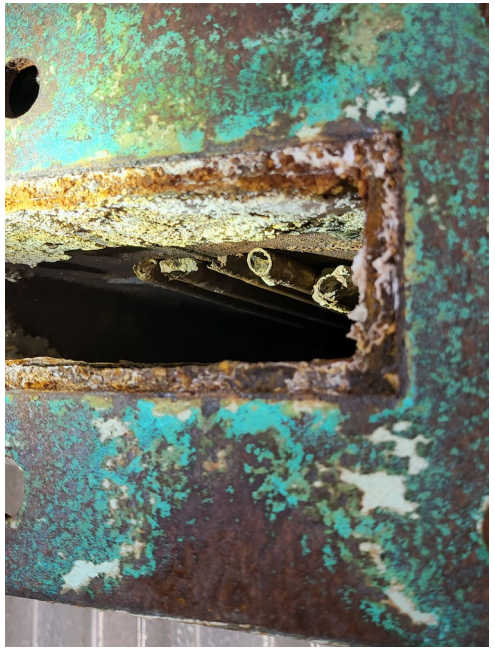
Communications Strategy

Summary

Questions?

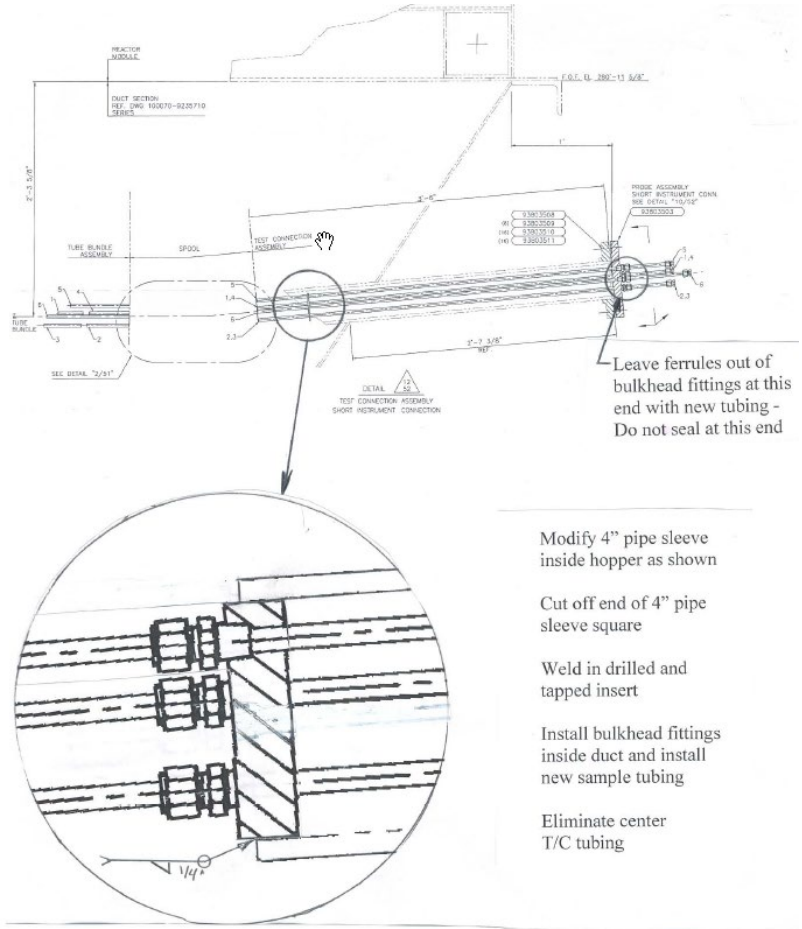
Probe Corrosion

Back



Probe Repair

Back



Outlet NOx sample grid repair utilizing existing 4" pipe sleeves

JDB 12/02/05