

# REINHOLD ENVIRONMENTAL<sup>®</sup>



## **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

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IGS Environmental Solutions

# LPA Screen Maintenance

*Critical to SCR Health,  
Yet Often Overlooked*

*Presenter: Andrew Kline*



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# Safety Moment





# EPA

## GNP: Tightening NOx Limits

- Existing SCRs need to maximize efficiency
- New SCRs will likely be required

*In either case, SCRs must be kept clean in order to cost effectively meet new regulations*

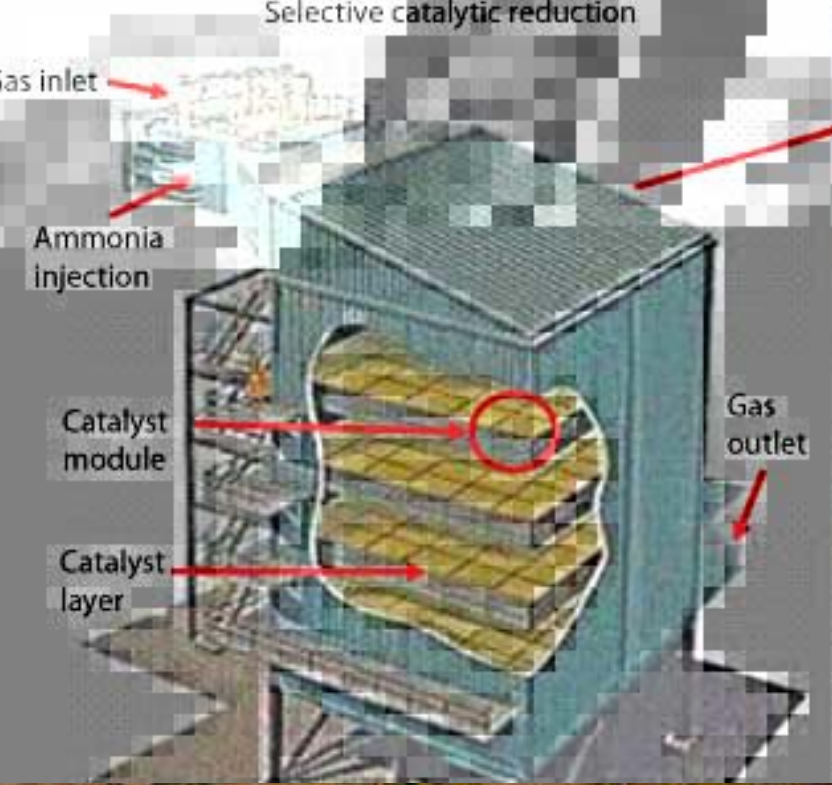


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## Impacts of SCR Buildup

1. DeNOx Reduction
2. Excessive Pressure Drop
3. De-Rating Boiler due to 1 and/or 2
4. Severe Reduction in Catalyst Life
5. Excessive Ammonia Usage
6. Corrosion damage due to Ammonia Slip
7. Forced Outages to Remove Ash
8. Cost of Removing Ash
9. Non-Compliance Penalties





# Solid Fuel SCR Buildup



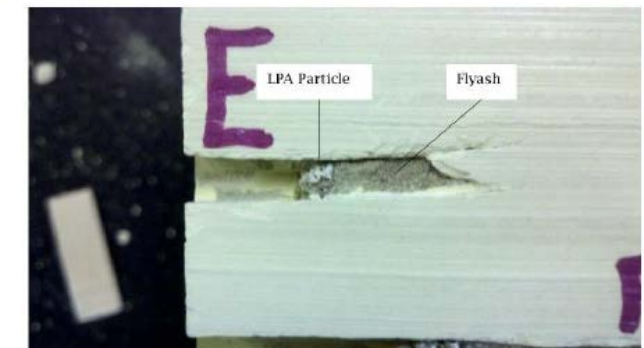
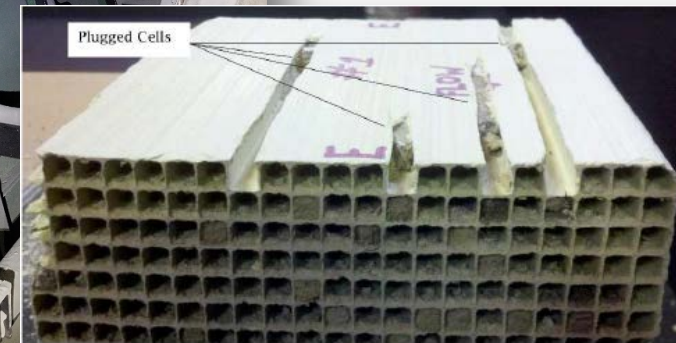
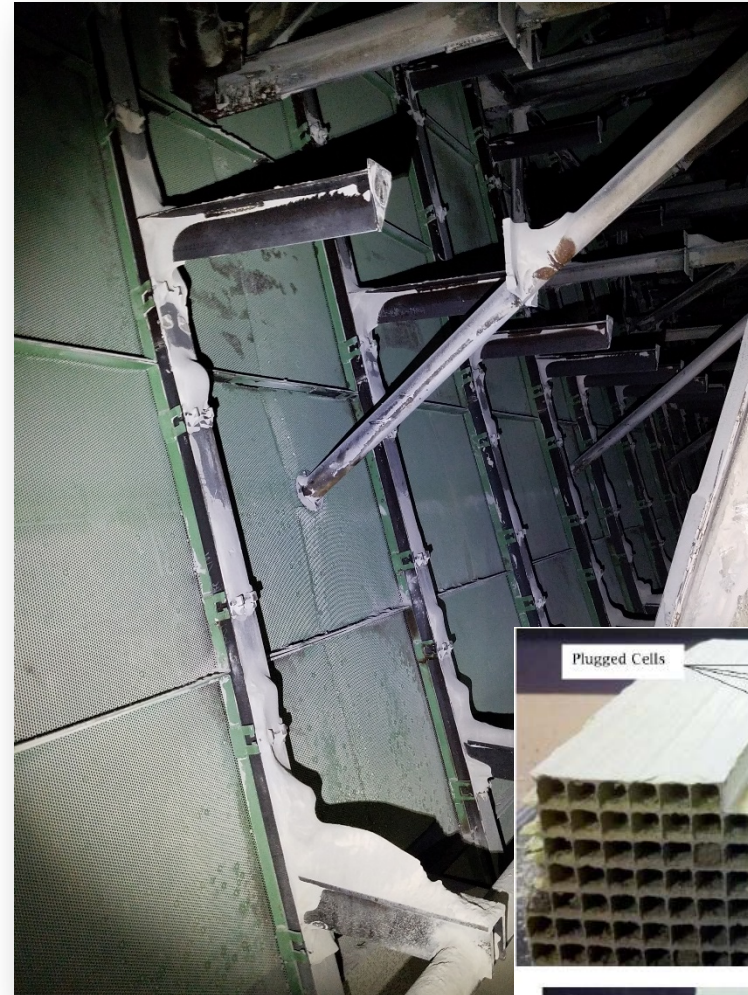
## Coal Fired SCR Buildup Root Causes:

1. LPA Present in SCR
2. Gas Flow Distribution
3. Ash Flow Distribution
4. Inadequate Outage Maintenance Procedures



## Elimination of SCR Buildup:

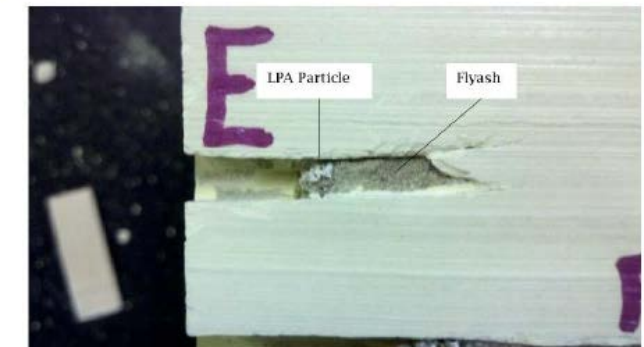
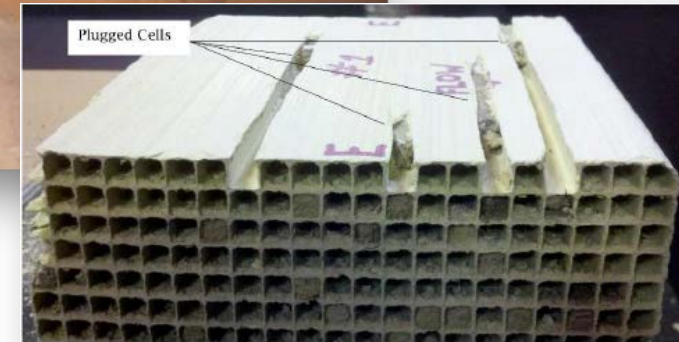
- **LPA Screens to Prevent LPA from Reaching SCR**
- Air Cannons to Address Ash Flow and Gas Flow Distribution Issues
- Proper Catalyst and Sonic Horns to Improve Overall Ash Capacity
- CatFlow Screens to Protect Catalyst and Enhance Online Cleaning
- Proper Outage Procedures  
*10% Buildup Is No Longer Acceptable to Effectively Meet Compliance!*



## Understanding LPA Buildup:

- A small amount of LPA can cause massive fly ash piling
- Changes in parameters can cause LPA formation including:
  - *Coal Type*
  - *Changes in Combustion*
  - *Cycled Loading*
  - *Fuel Additives*

*It is not uncommon for a plant to develop LPA after a seemingly insignificant process change, all SCRs must be defended against it.*



# LPA Screen Maintenance is Critical – Yet Often Overlooked!

## LPA SCREENS ARE LIKE BRAKE PADS, YOU NEED TO CHANGE THEM BEFORE THEY FAIL!!!

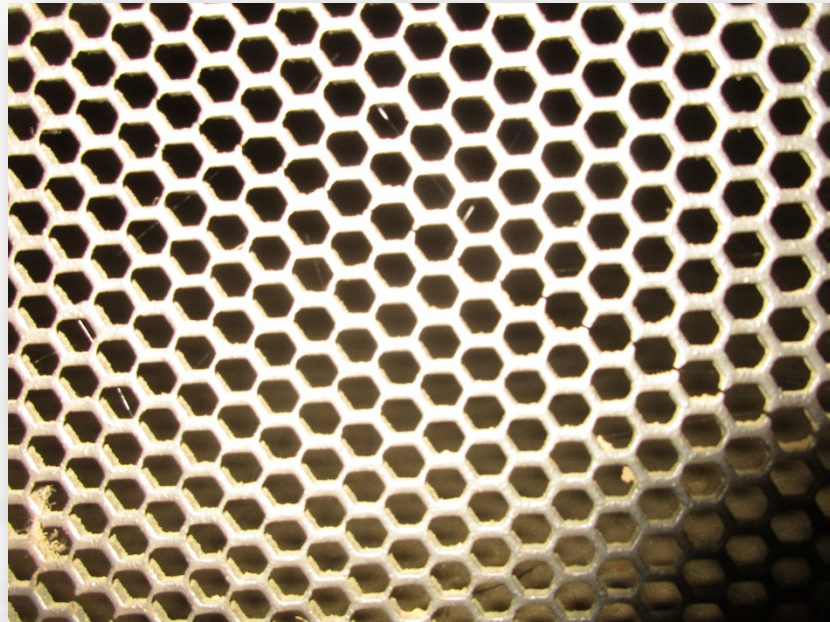
- *Typical LPA Screen Panel Life 4-6 Years*
- *Replace Worn Panels Prior to Failure*
- *When Panels Begin to Fail, they Fail Quickly!*
- *Having 15-20% Spare Panels in Stock Allows for Maintenance during Short Outages*

***Developing and implementing an Inspection and Maintenance plan to fit your specific application is the key to reliable SCR protection.***



# LPA Screen Maintenance is Critical – Yet Often Overlooked!

**LPA SCREENS ARE LIKE BRAKE PADS, YOU NEED TO CHANGE THEM BEFORE THEY FAIL!!!**



*Early Signs of Wear*



*Early Stages of Failure*



*Severe Failure*

**Regular Qualified Inspection is Critical to Protect the SCR Between Outages**



## Example Maintenance Strategies:

- **Screen Replacement Schedule**
- **Inspection & Partial Replacement**
- **Inspection & Refurbishment**
- **System Upgrades & Retrofits**

*There are Pros and Cons of each method; it is important to determine which plan is right for your facility and application.*



## Proactive Screen Replacement Based on Schedule:

- Panels are replaced at regular intervals based on time or run time regardless of condition
- Most Conservative Approach, very Reliable Long Term SCR Protection
- Requires Least Amount of Maintenance and Inspections
- Case Study:
  - *700MW x 4 Units in Southeast*
  - *LPA Screens Originally Installed in 2010*
  - *Proactive Replacement at Regular Intervals*
  - *LPA Present in System, but has not reached SCR*



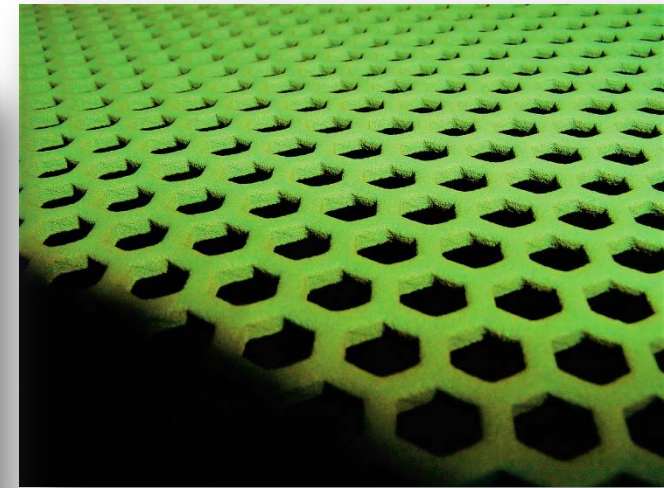
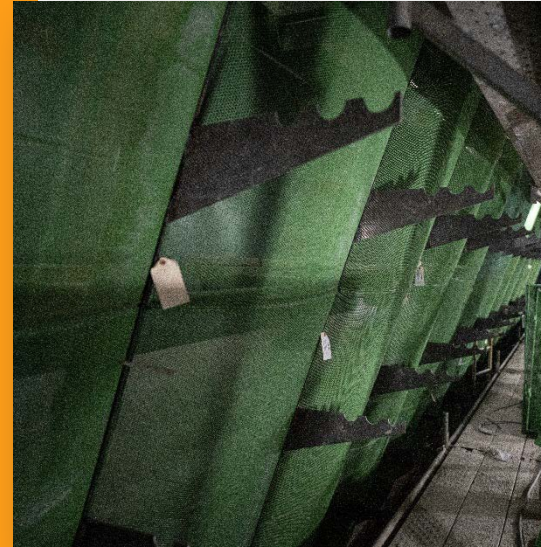
## Regular Inspection & Proactive Replacement:

- **LPA Screens Regularly Inspected for Wear**
- **To be effective, screens must be replaced as soon as wear is identified**
- **Requires qualified inspectors and sufficient spare panels to be kept on hand to replace worn panels when identified.**
- **Detailed Screen Condition Mapping Required**
- **Case Study:**
  - *625MW x 2 Units in Wester US*
  - *Inspect Each Outage*
  - *15% Spare Panels Kept on Hand, Typically utilize most on each cycle*
  - *LPA Present in System, but has not reached SCR*



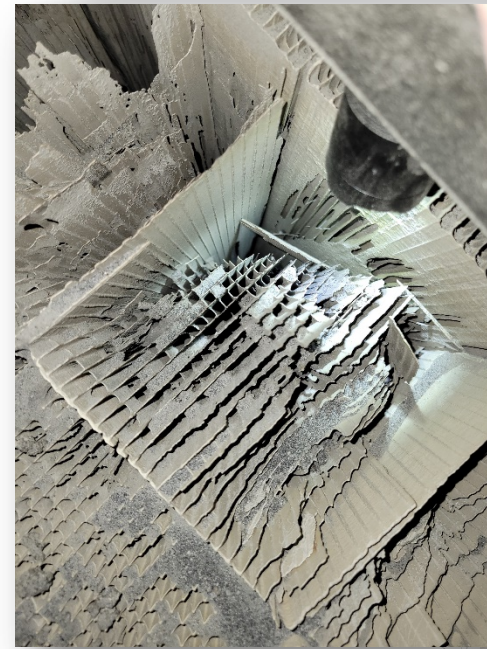
## Regular Inspection & Proactive Replacement + Refurbishment:

- Utilizes IGS Two-Stage Cladding
- Top Coat Provides Wear Indication, allowing fast inspection
- Top coat can be refurbished/applied in Situ or in the field
- Maximizes LPA Screen Asset Life
- Case Study:
  - *500MW PC Unit in Midwest*
  - *Originally Installed with Two-Stage Cladding*
  - *Allowed for Easy Inspection*
  - *After 5 Years, IGS Refurbished the Full System in Situ, extending System Life*
  - *LPA Present in System, but has not reached SCR*



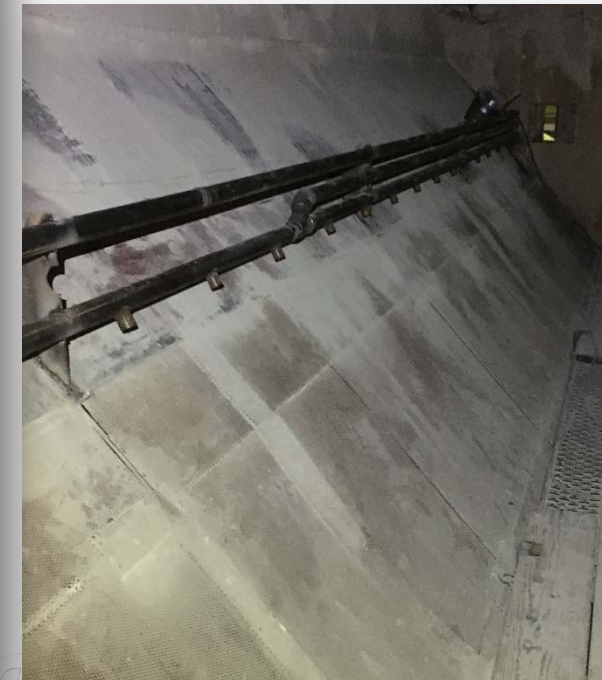
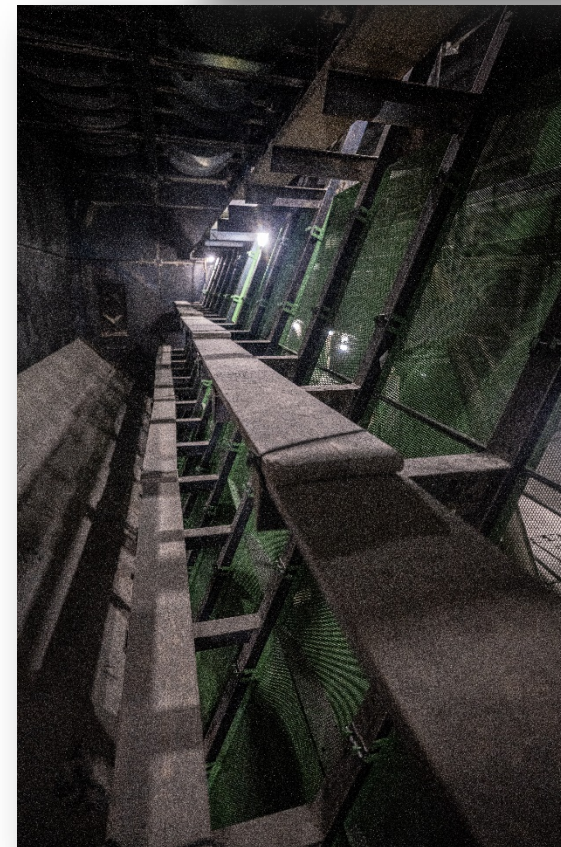
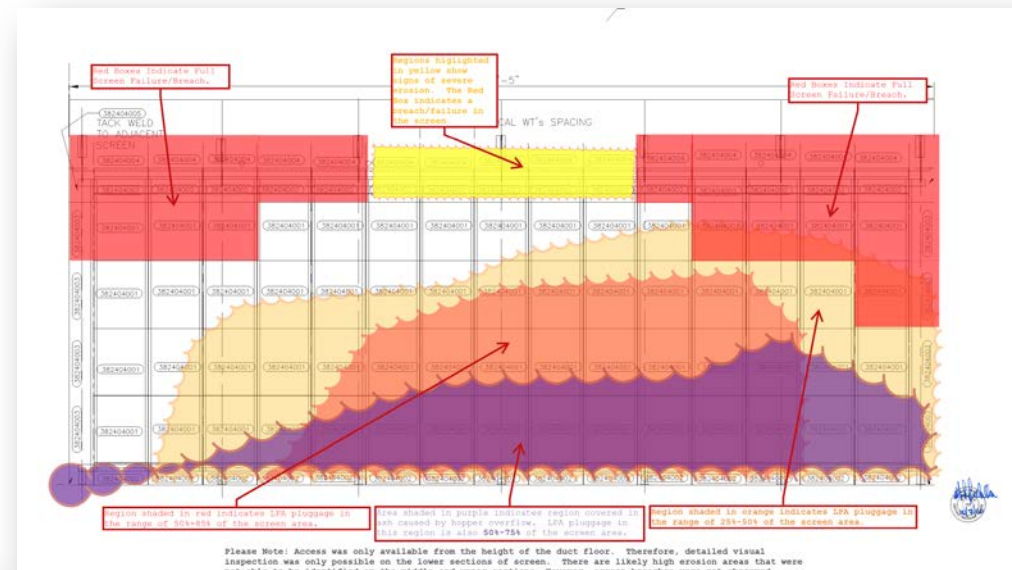
## System Upgrades & Retrofits:

- Custom Panels Can be Built to fit Most LPA Screens to improve erosion resistance
- System Retrofits may be needed to achieve desired screen life
- Case Study:
  - *650MW PC Unit in Mid-Atlantic*
  - *Lack of LPA Maintenance threatened to Shut the Plant Down!*
  - *Partial System Replacement to Retrofit LPA Screen, while minimizing cost*
  - *Eliminated SCB Failures due to*



## Additional Considerations:

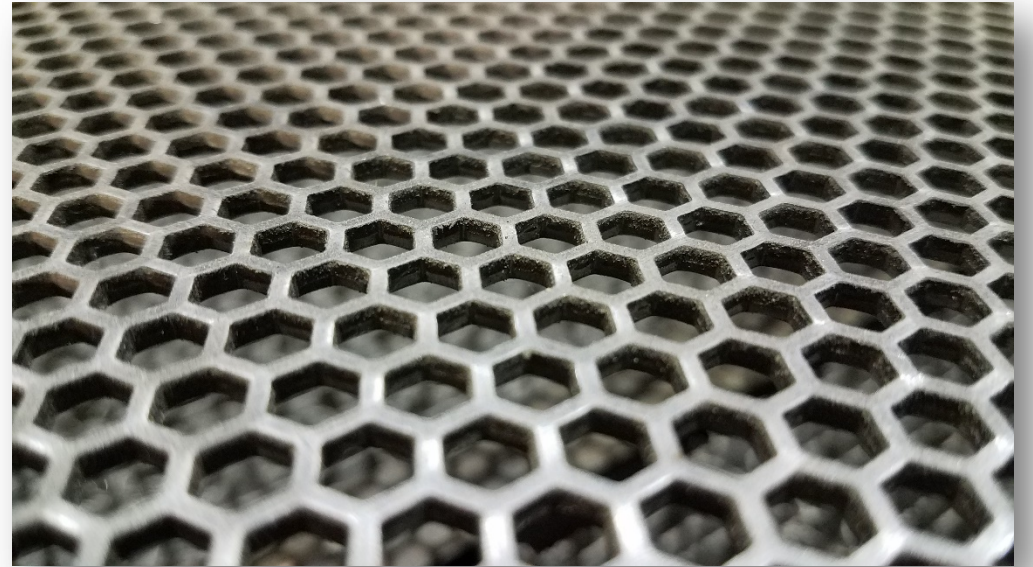
- Evacuation of Ash Hoppers Is Important
- Reliable Cleaning System will Improve Performance
- Occasional Manual Cleaning may be Necessary
- Keep Wear/Replacement Maps to Track Inspections over time
- Built in Scaffold Brackets allow Quick Maintenance



## Last Line of Defense:

- CatFlow Catalyst Screens Provide a Last Line of Defense – If LPA reaches the SCR, it will be kept out of the Catalyst Modules
- Simultaneously provide enhancements to the online cleaning systems due to material selection

*10% Buildup Is No Longer Acceptable to Effectively Meet Compliance!*



# QUESTIONS & DISCUSSION

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