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# The Importance of Measurement

$NH_3$

$NO_x$

$SO_3$

$PM$

&

# The Best Available Measurement Technology

# Why Do We Measure

## PM

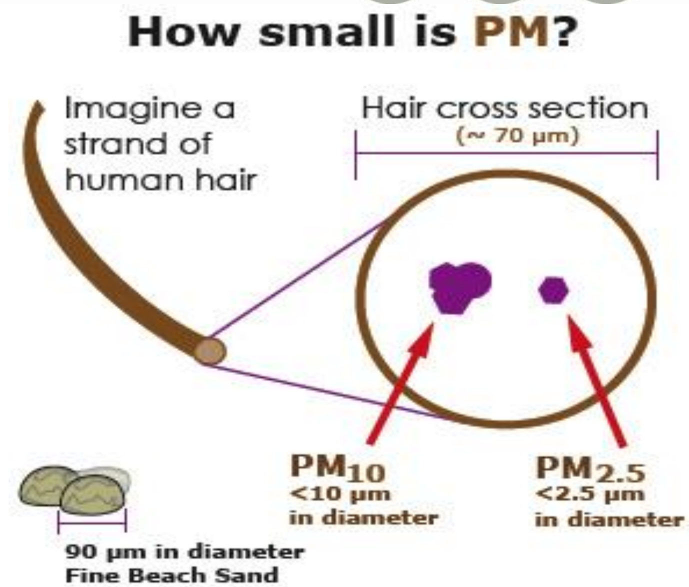
The health risk is the top of the list, which is obvious for fine particulate matter.

Other reasons we need to increase the resolution and analyze real time are;

Ability to quantify increase in PM emissions with sorbent injection for pollutant control

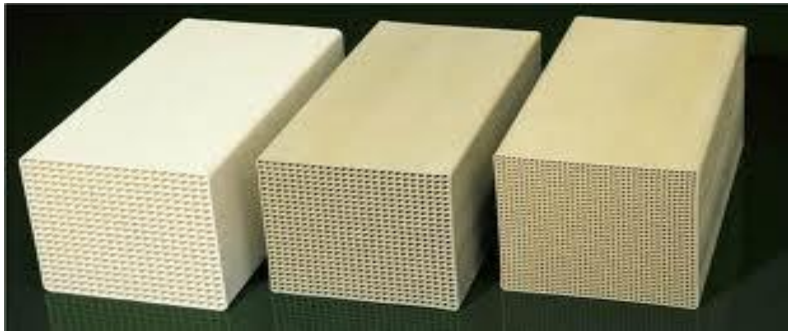
Calibrate opacity monitors to allow units to understand relationship between mass emission and % opacity

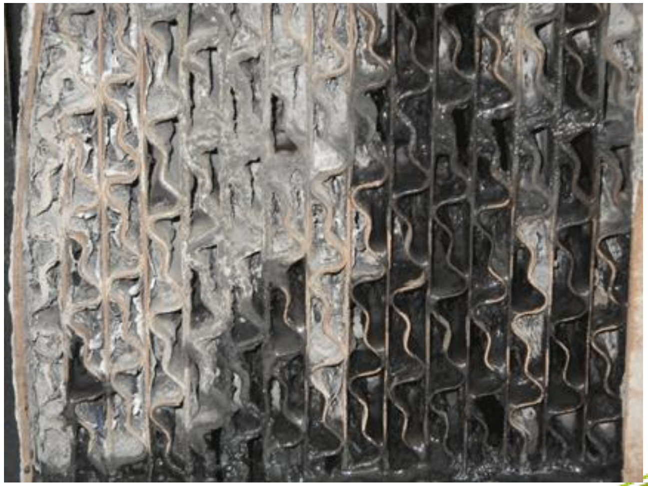
Reductions in PM has caused an increase in the uncertainty of the mass measurements and therefore less confidence in the accuracy




# Why Do We Measure

## Ammonia





Must be uniformly distributed at the correct concentration for optimum $NO_x$ reduction

In combination with $SO_3$ It forms ABS and plugs air heater baskets

Ammonia slip is something that must be measured well if SCR's are to perform at maximum efficiency

Areas of high ammonia must be identified and controlled without effecting $NO_x$ reduction

Ammonia can be used to combine with $SO_3$ to form ammonia sulfide (a harmless powder), if monitored in real-time with $SO_3$

# Why Do We Measure

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## $SO_3$

- To Quantify the Problem
- Forms acid mist causing Blue Plume
- Reduces the efficiency of activated carbon for mercury capture
- Corrodes equipment
- $SO_3$ with ammonia forms ABS and plugs the air heater
- Continuous measurement allows for the optimization of sorbent injection
- We need to monitor the impact of the SCR on SO3 formation

# Why Do We Measure

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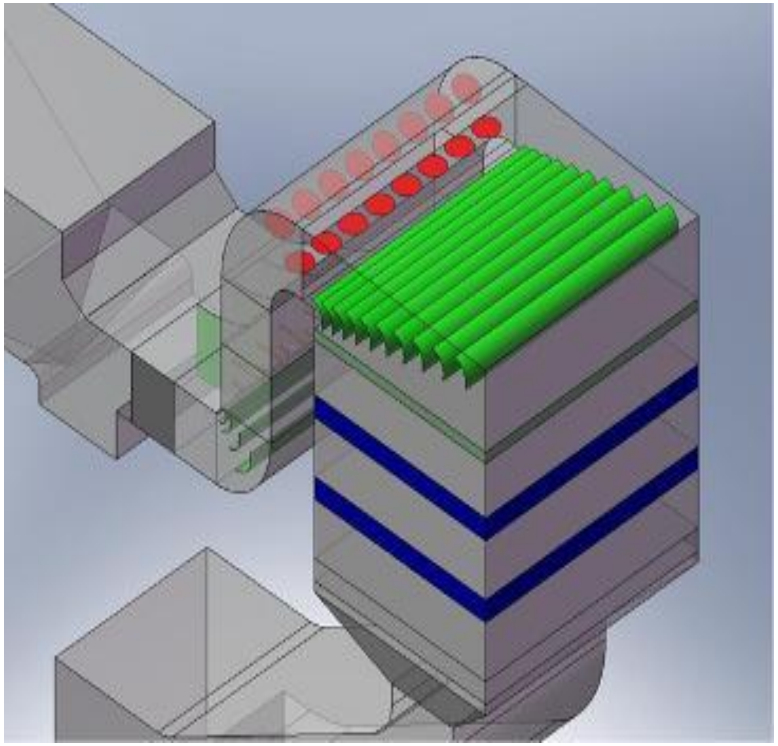
## $NO_x$

SCR's are going to be pushed to operate at maximum efficiency year round

$NO_x$ must be reduced in the 90% plus range

The $NO_x$ profile at the exit to the SCR must be monitored to ensure uniformity

Continuous $NO_x$ measurement from the SCR exit will allow on the fly tuning to ensure continuous maximum $NO_x$ removal



# How Do We Measure

## PM

Traditional method 5 and 17 are not sensitive enough to measure the small increases that could occur from the addition of a sorbent

PM CEMs and opacity monitors are only as good as their calibration

Precise mass emission measurements, made on a real time basis, by trained people

Utilizing equipment like the **TEOM probe** to ensure accuracy

# How Do We Measure

## Ammonia

Ammonia is currently not measured well

The most utilized methods are indirect and are subject to sampling issues

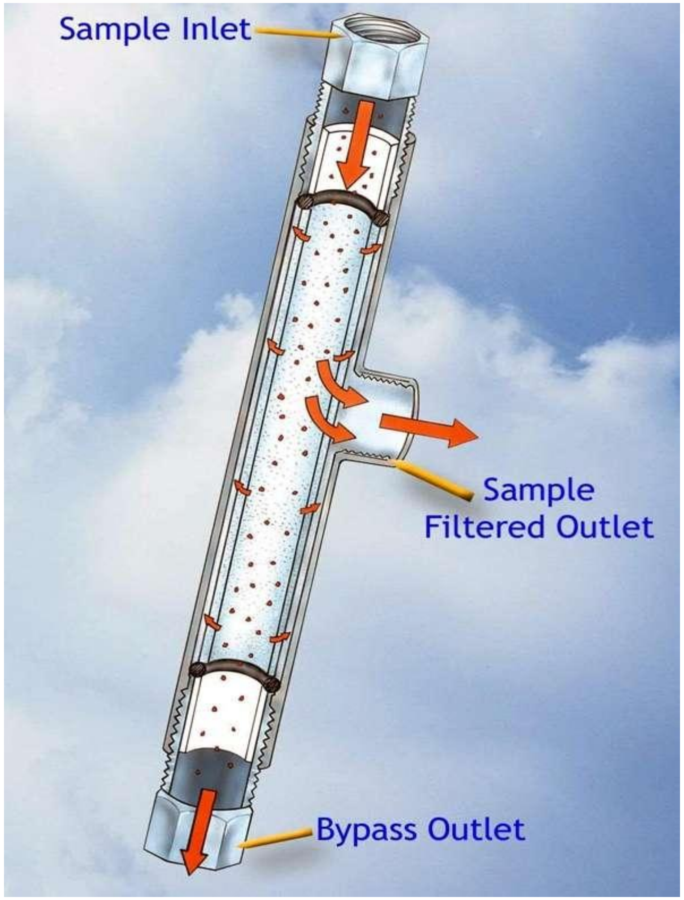
The monitors available are difficult to keep operational

The best method for measurement is **FTIR**

The best application is in-situ, cross duct

Geosyntec is working with IMACC and EPRI to demonstrate an analyzer that will measure multiple compounds accurately in real time, to allow active ammonia tuning downstream of an SCR

# How Do We Measure




## $SO_3$

- Best available manual method is **<u>Controlled Condensation</u>**
- The NCASI method 8A does not stress the need for high temperatures enough
- Gas temperature at the condenser coil exit is critical
- Have to understand the different approaches needed when sampling in different locations
- High reactive dust locations the method needs to utilize an inertial gas separation filter
- Low temperature locations must use >10' probes that are heated to >640 deg f to ensure the volatilization of the acid mist
- No QC for the method at the moment

# How Do We Measure

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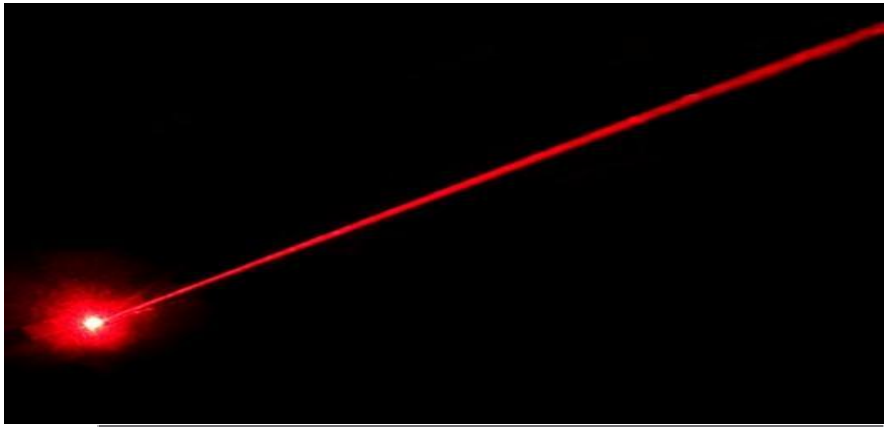

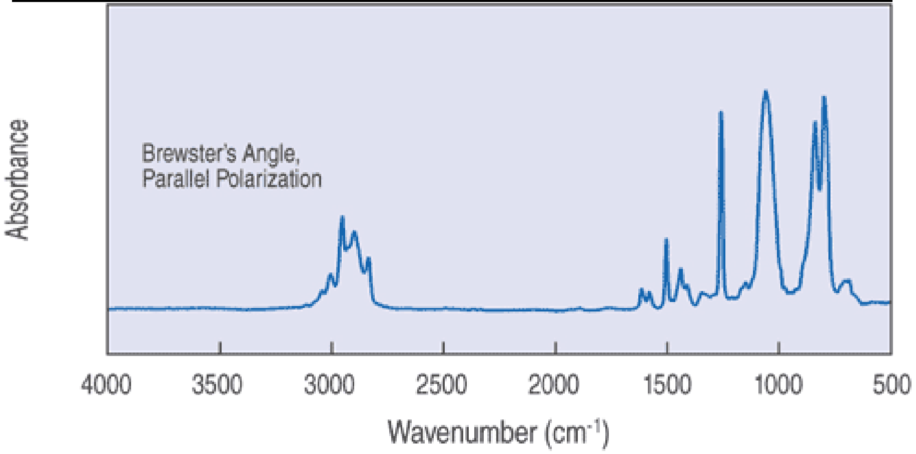


## $SO_3$

Best available continuous method is **<u>FTIR utilizing Quantum Cascade Laser</u>** in-situ, cross duct

This technology has the ability to measure multiple compounds simultaneously in real time

SO3, Ammonia, SO2, and Moisture

Utilizes a reference spectral library for calibration

So no bottled gas needed

# How Do We Measure

## $NO_x$

$NO_x$ must be measured continuously at the exit of the SCR, from a grid so the $NO_x$ profile can be maintained with either a manual or automated feedback to the AIG.

The plant will not have to drop load to control slip but can tune on the fly, which is a necessary tool when operating at 90% plus reduction.

The equipment is well developed but its **deployment** is something that needs to be developed.

This would help in overall management of the efficiency of the unit.