

# Nitric Acid Manufacturing: NO<sub>x</sub>, NH<sub>3</sub> & GHG Monitoring

## CURRENT US EPA REQUIREMENTS

### New Source Performance Standards

40 CFR 60 Subpart G Standards of Performance for Nitric Acid Plants

<http://frwebgate.access.gpo.gov/cgi-bin/get-cfr.cgi?TITLE=40&PART=60&SUBPART=G&TYPE=PDF>

### Mandatory Reporting of Greenhouse Gases Rule

40 CFR 98 Subpart V-Nitric Acid Production

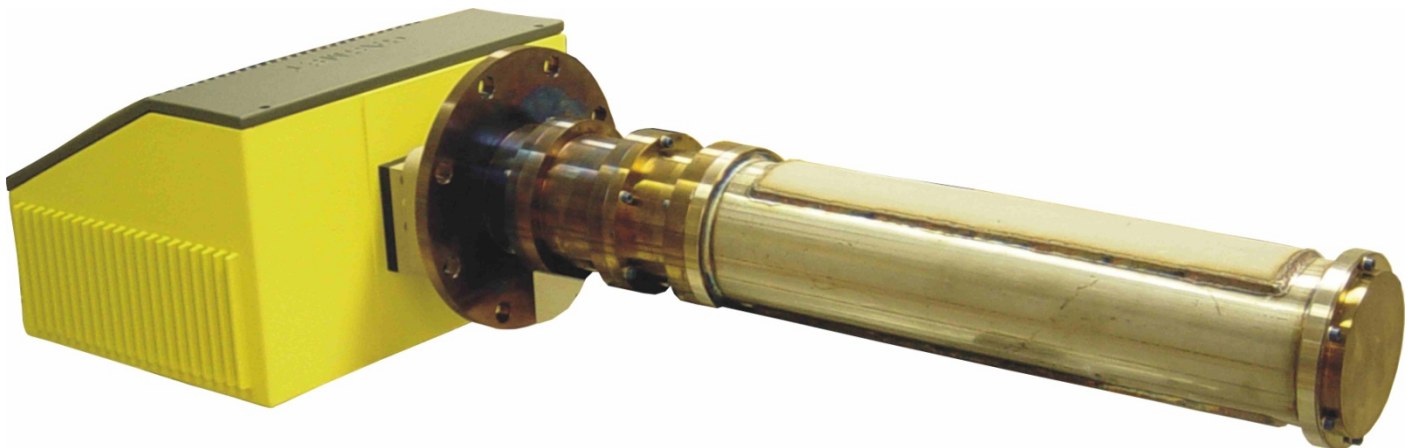
<http://www.epa.gov/climatechange/emissions/ghgrulemaking.html>

<http://www.epa.gov/climatechange/emissions/downloads/infosheets/nitricacidproduction.pdf>

<http://www.epa.gov/climatechange/emissions/downloads/checklists/nitricacidproduction.pdf>

## The Solution: Gasmeter™ IS-6000

### IN-SITU, MULTICOMPONENT FTIR GAS ANALYZING SYSTEM



#### Typical application

H <sub>2</sub> O	0-5	Vol-%
CO <sub>2</sub>	0-1000	ppm
NO	<b>0-50</b>	ppm
NO <sub>2</sub>	<b>0-50</b>	ppm
N <sub>2</sub> O	0-2000	ppm
NH <sub>3</sub>	0-25	ppm

The **Gasmeter™** FTIR InSitu Continuous Emission Monitoring System (CEMs pictured above) or our extractive FTIR CEMS and Portable systems (pictured bottom of next page) provide **CURRENT AND FUTURE** solutions for your monitoring requirements. All Gasmeter-USA CEMs are real-time simultaneous multi-component gas analyzing systems capable of meeting all your Clean Air Act or Process Monitoring requirements.

Gasmeter-USA CEMs and Portable FTIR gas analyzing systems are compliant with **EPA**, **ASTM** and the Ammonium Nitrate / Nitric Acid Producers Group (**ANNA**) / Climate Action Reserve: **Nitric Acid Project Protocol**. See

[http://www.climateactionreserve.org/wp-content/uploads/2009/12/Nitric\\_Acid\\_Production\\_Project\\_Protocol\\_Version\\_1.0.pdf](http://www.climateactionreserve.org/wp-content/uploads/2009/12/Nitric_Acid_Production_Project_Protocol_Version_1.0.pdf)

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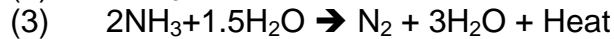
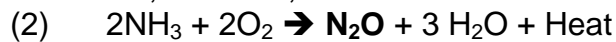
WEB: [www.gasmeter.fi](http://www.gasmeter.fi)  
VAT NO: FI19526395

**Process:**

NO is an intermediate product in manufacturing of nitric acid. NO is a reaction product of NH<sub>3</sub> in catalytic (Pt/Rh) reaction:



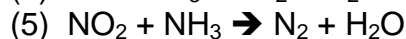
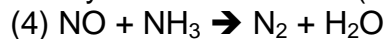
There are, however, undesirable side reactions:



At the final stage NO reacts with H<sub>2</sub>O to form Nitric acid.

**Emissions:**

Some part of NO does not react with H<sub>2</sub>O to form nitric acid, and remains present at the tail gas. **NO** and **NO<sub>2</sub>** in the tail gas are typically reduced to N<sub>2</sub> by Selective Catalytic Reduction unit (SCR):



**Measurements:**

There are three main purposes for tail gas (emissions) measurement:

1. Emissions monitoring,
  - a. EPA NSPS and GHG
2. Process Optimization
  - a. Controlling ammonia feed to SCR &
  - b. N<sub>2</sub>O measurement indicates the amount of undesirable side reaction #(2)

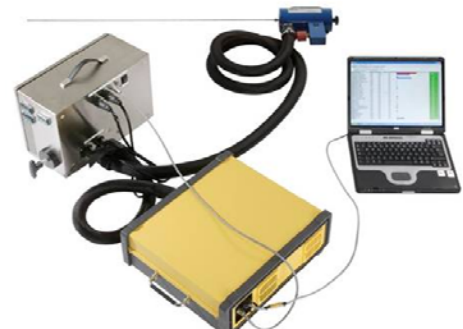
In addition to emissions monitoring and controlling of DeNO<sub>x</sub> system, measurement with the **Gasmeter™** FTIR gas analyzer gives valuable data for controlling the ammonia oxidation reaction itself. Ammonia as raw material is 90% of total cost of nitric acid manufacturing, and therefore optimal process conditions are vital.

**Application Example**

El Dorado Nitrogen (Baytown, Texas, USA) has been using **Gasmeter™** analyzer since early 2003 for stack emission compliance monitoring and process optimization. The **Gasmeter-USA™** FXS system is measuring NO, NO<sub>2</sub> and NH<sub>3</sub> for continuous emissions monitoring purpose. The response of **Gasmeter™** system is fast enough to allow feedback control of ammonia injection into the SCR. El Dorado Nitrogen is also using measured N<sub>2</sub>O levels of stack gas to monitoring the efficiency and fine tuning of original ammonia oxidation efficiency in the ammonia converter and for GHG reporting requirements.



Gasmeter FCX CEMs



Gasmeter-USA Dx4000-RM Reference Method Portable System

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