

Efficient Operation of SCR/SNCR

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Vintage Year NO_x Allowance Prices by Month of Sale

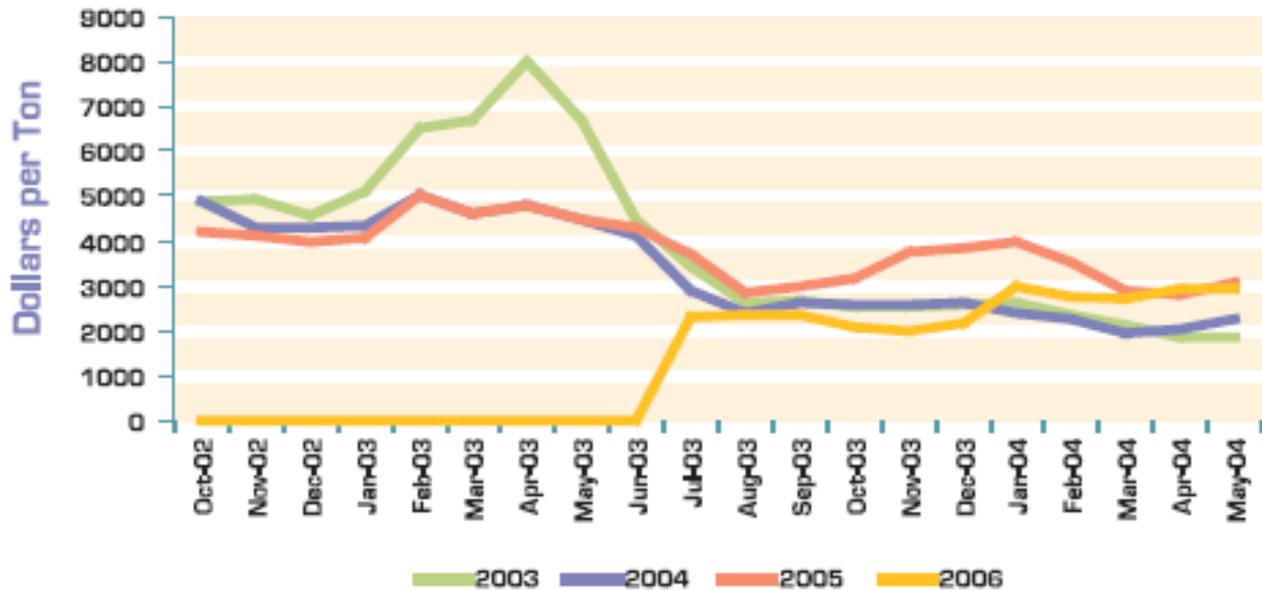


Figure 12

NBP allowance prices have fallen sharply after some early price spikes.

Source: Evolution Markets, LLC and Cantor Environmental Brokerage

NO_x Allowances Current Vintage



Argus Air Daily

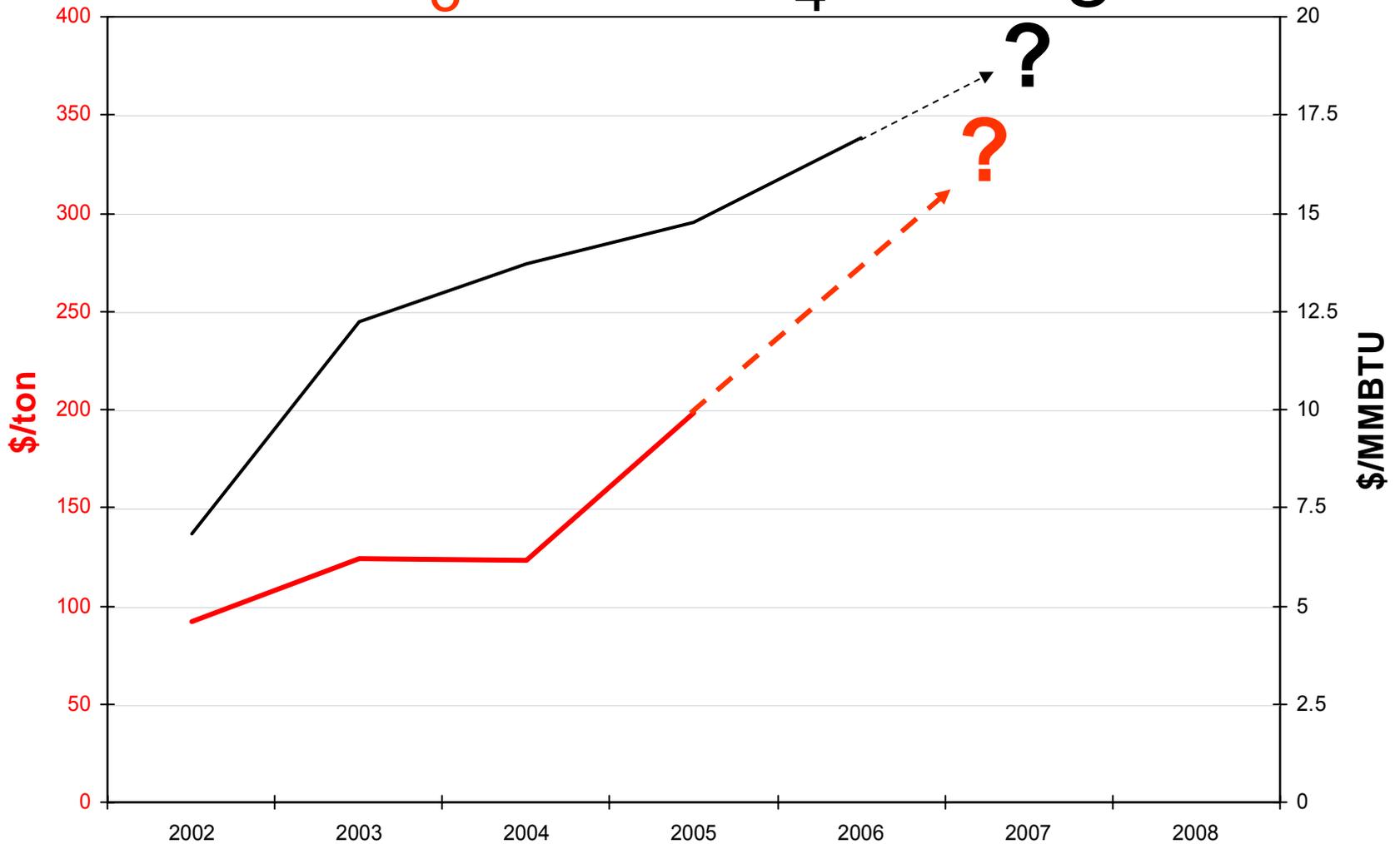
Houston Galveston Area (HGA)

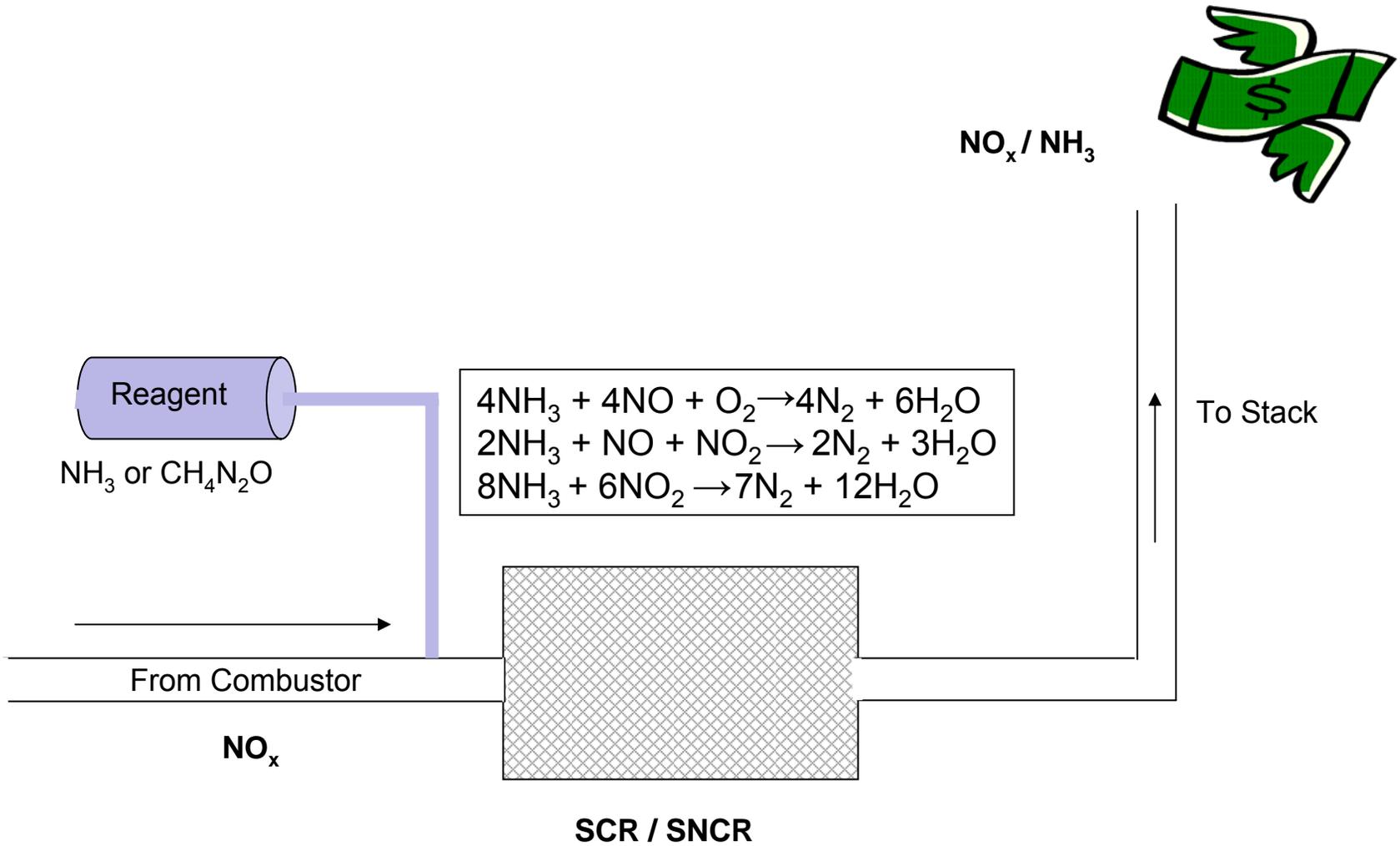
NO_x

- As of April 26, 2006

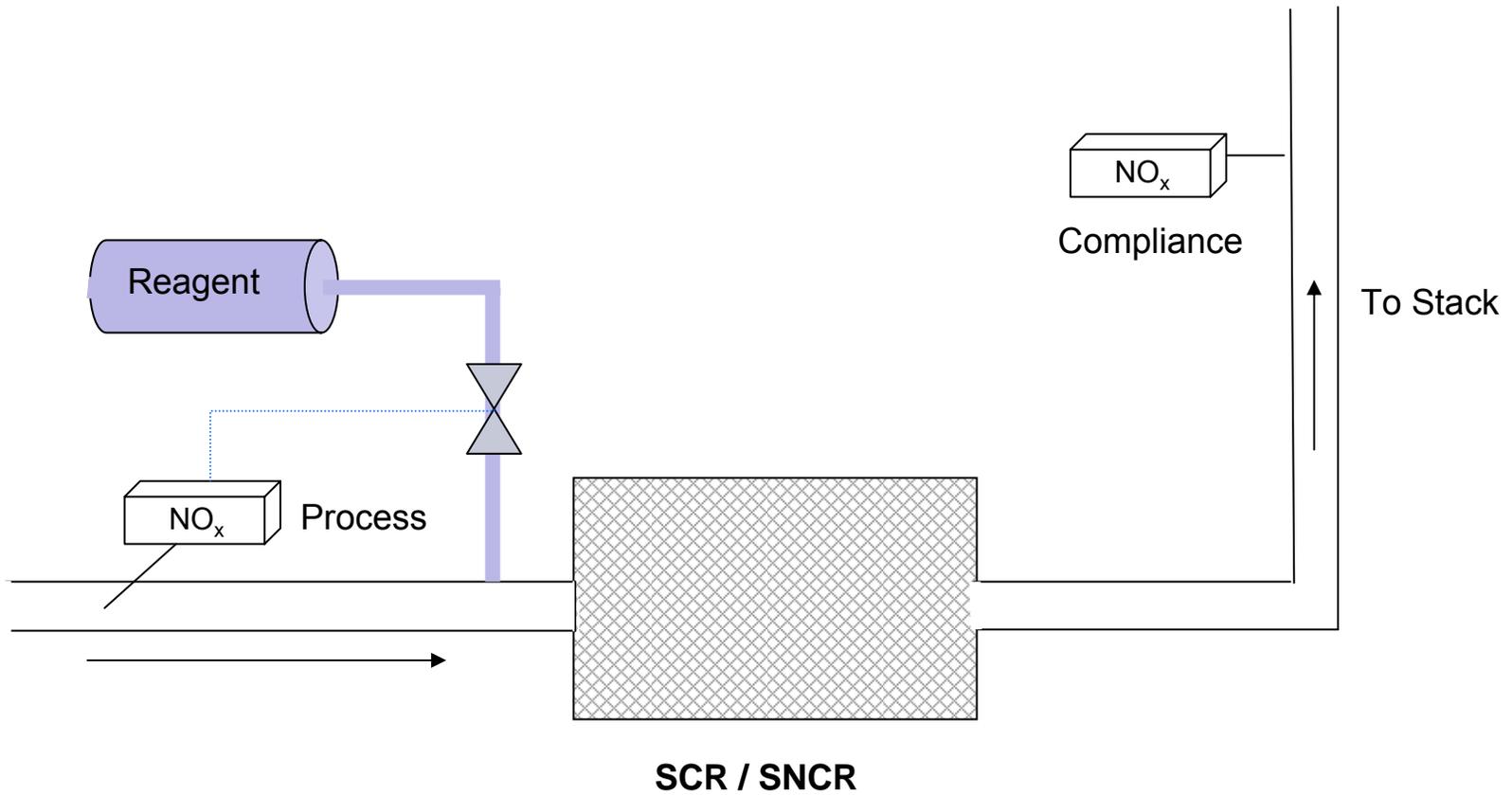
Vintage	Bid	Ask
2006	\$650	\$800
2007	\$2,900	\$3,500
2008	\$49,000	\$60,000

NH₃ and CH₄ Pricing

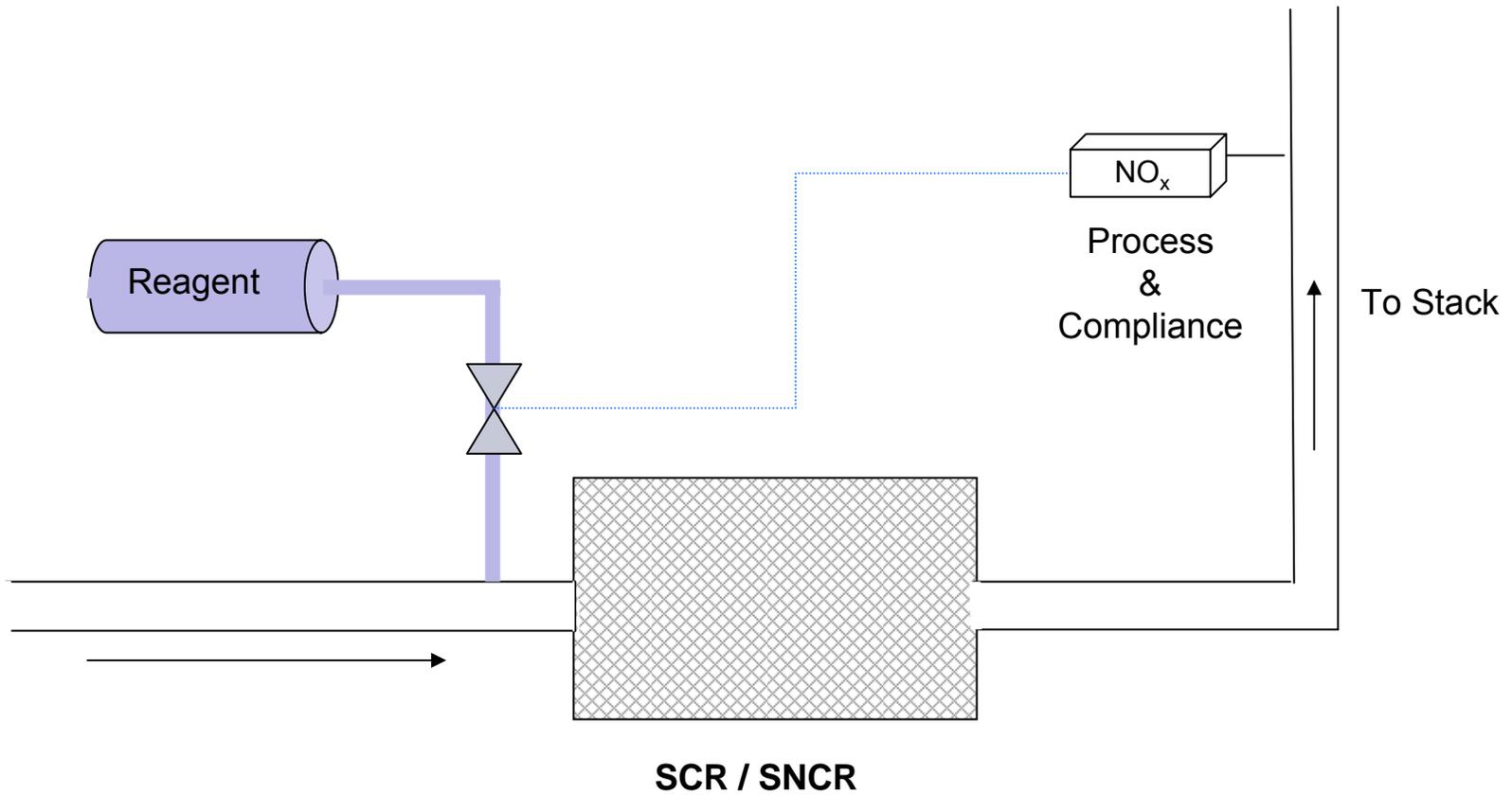




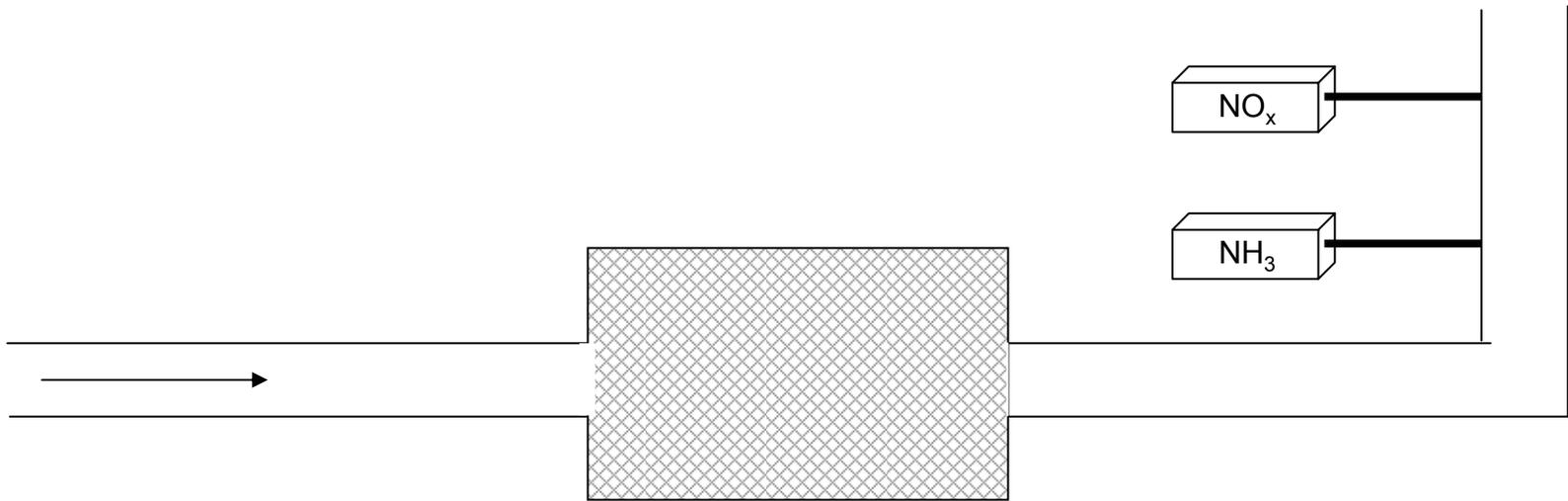
Feed Forward Control

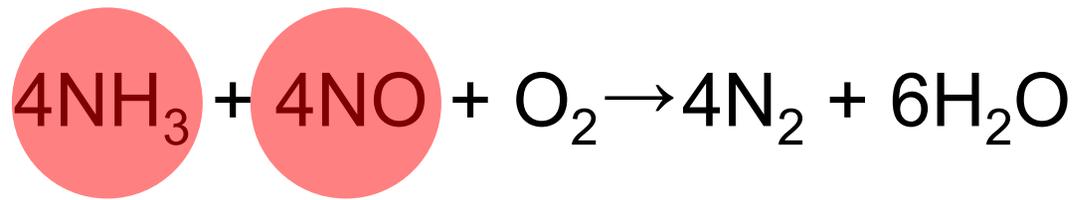


Feed Backward Control

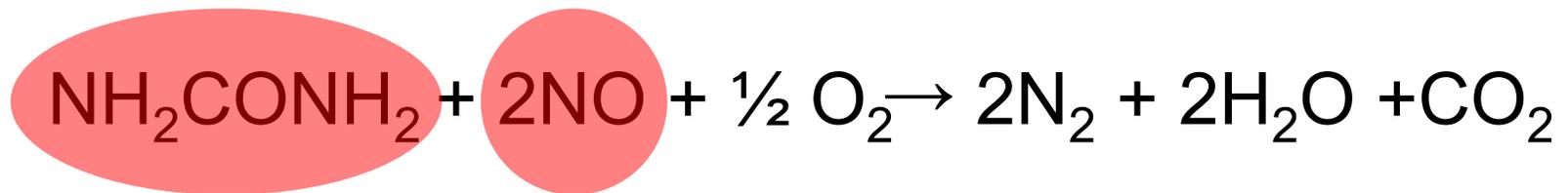


Regulatory Monitoring





At stoichiometric 1 mole of ammonia reacts with 1 mole of nitric oxide



At stoichiometric 1 mole of urea reacts with 2 moles of nitric oxide

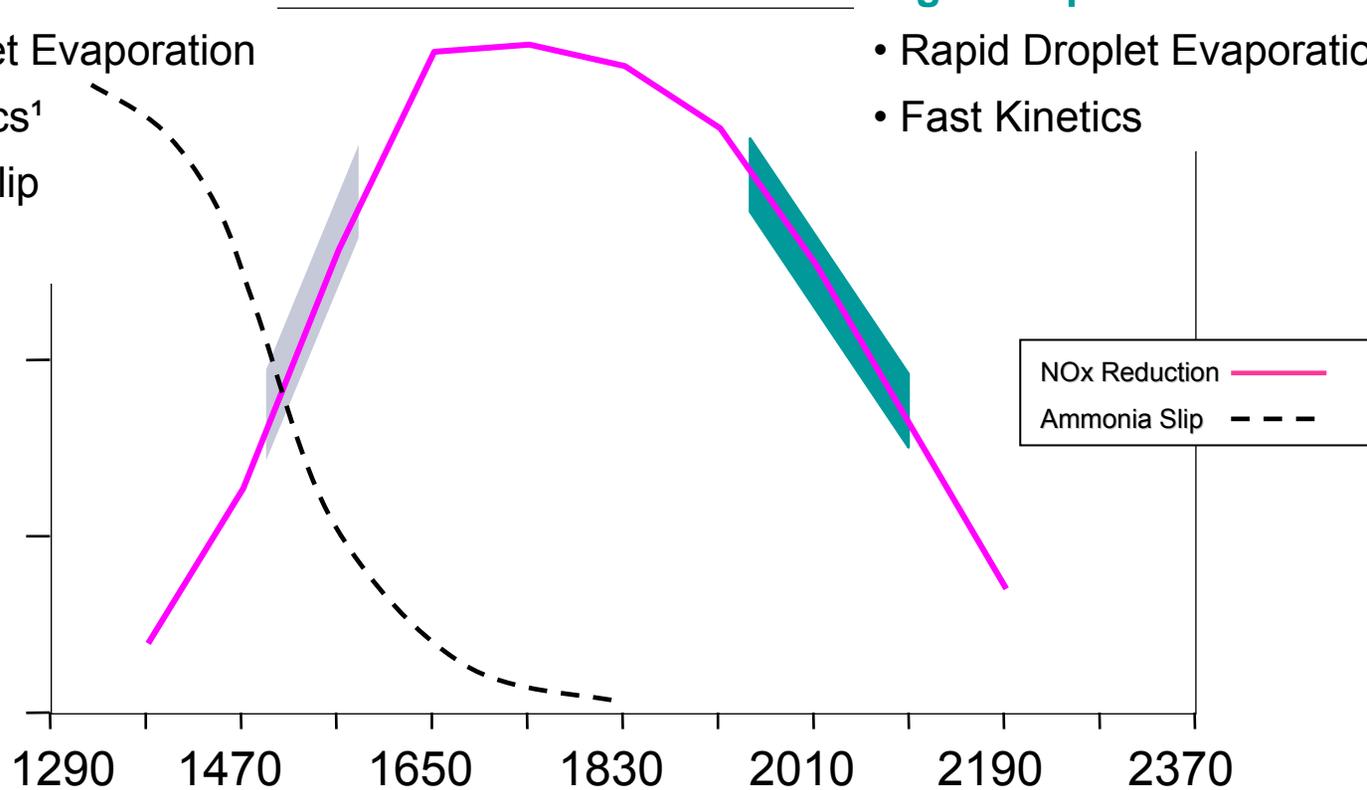
SNCR

Low Temperatures

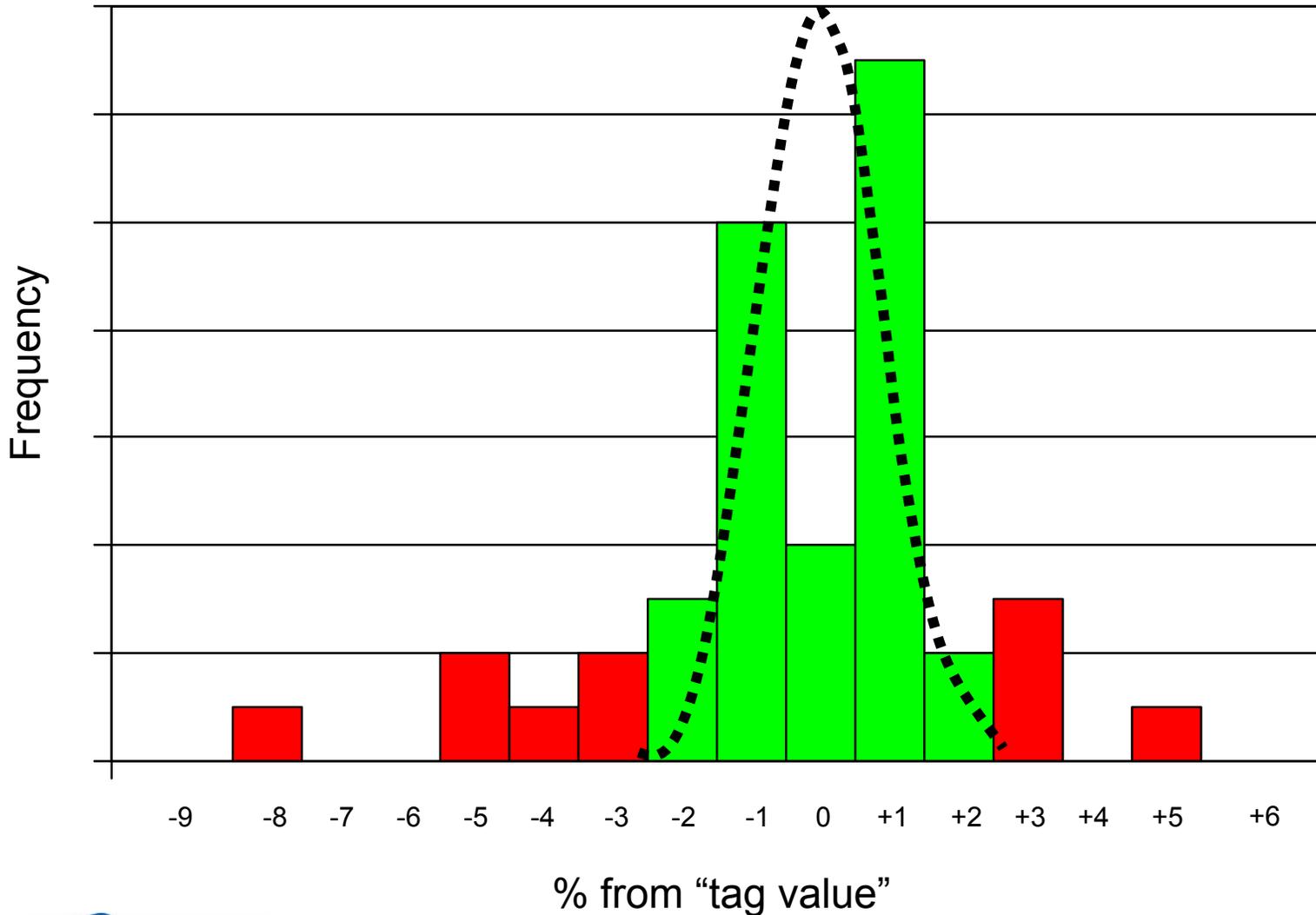
- Slow Droplet Evaporation
- Slow Kinetics¹
- Ammonia Slip

High Temperatures

- Rapid Droplet Evaporation
- Fast Kinetics

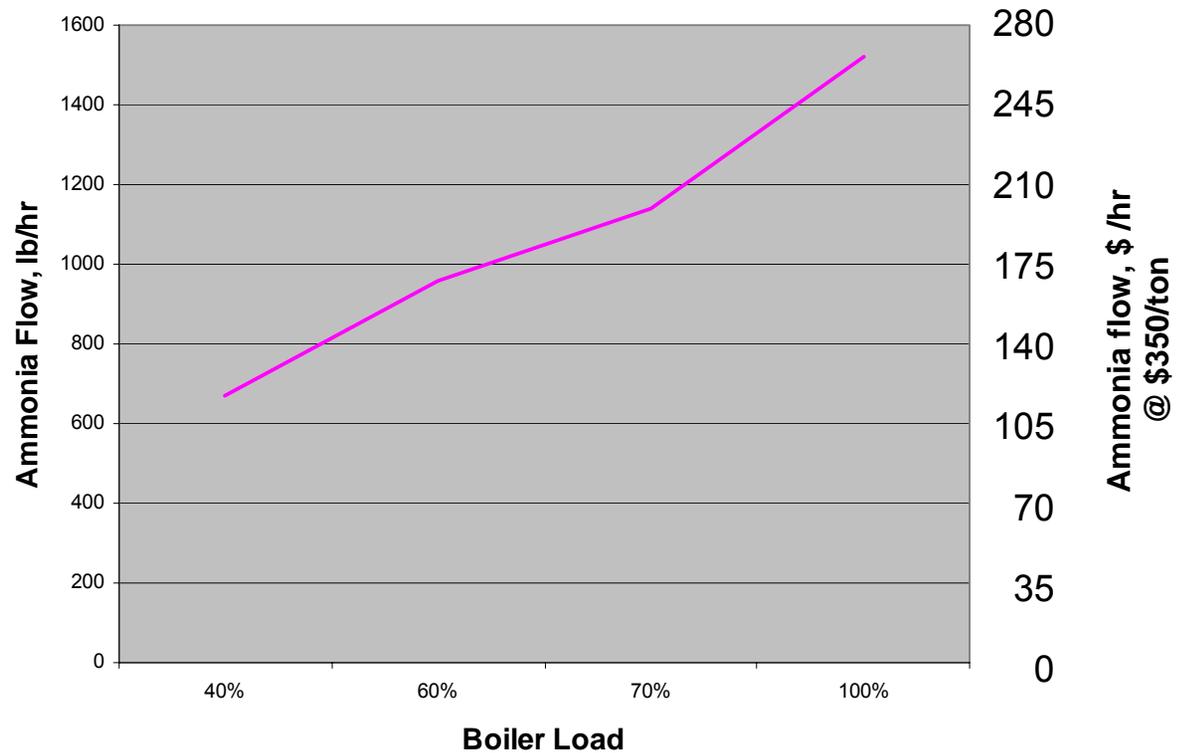


Most Recent EPA Gas Audit of 42 NO_x Protocol Standards from 14 Vendors



Ammonia Consumption

Anhydrous Ammonia Consumption 750MW Boiler, 90% DeNOx



HITACHI POWER SYSTEMS AMERICA

What Does This Mean To You?

- Assume
 - 750 megawatt unit
 - 90% NO_x removal
 - Feed rate of NH₃ = 1500# / hour
 - A 3% error in calibration \cong 400,000# “wasted” annually
 - @ \$350/ton =



What Does This Mean To You?

- Assume
 - 750 megawatt unit
 - 0.6 #/mmBTU NOx limit
 - 54 tons NOx (allowances) /day
 - A 3% error in calibration \approx 1.6 allowances
 - @ \$2,600/allowance =



What's On The Horizon?

US EPA Protocol Gas Verification Program



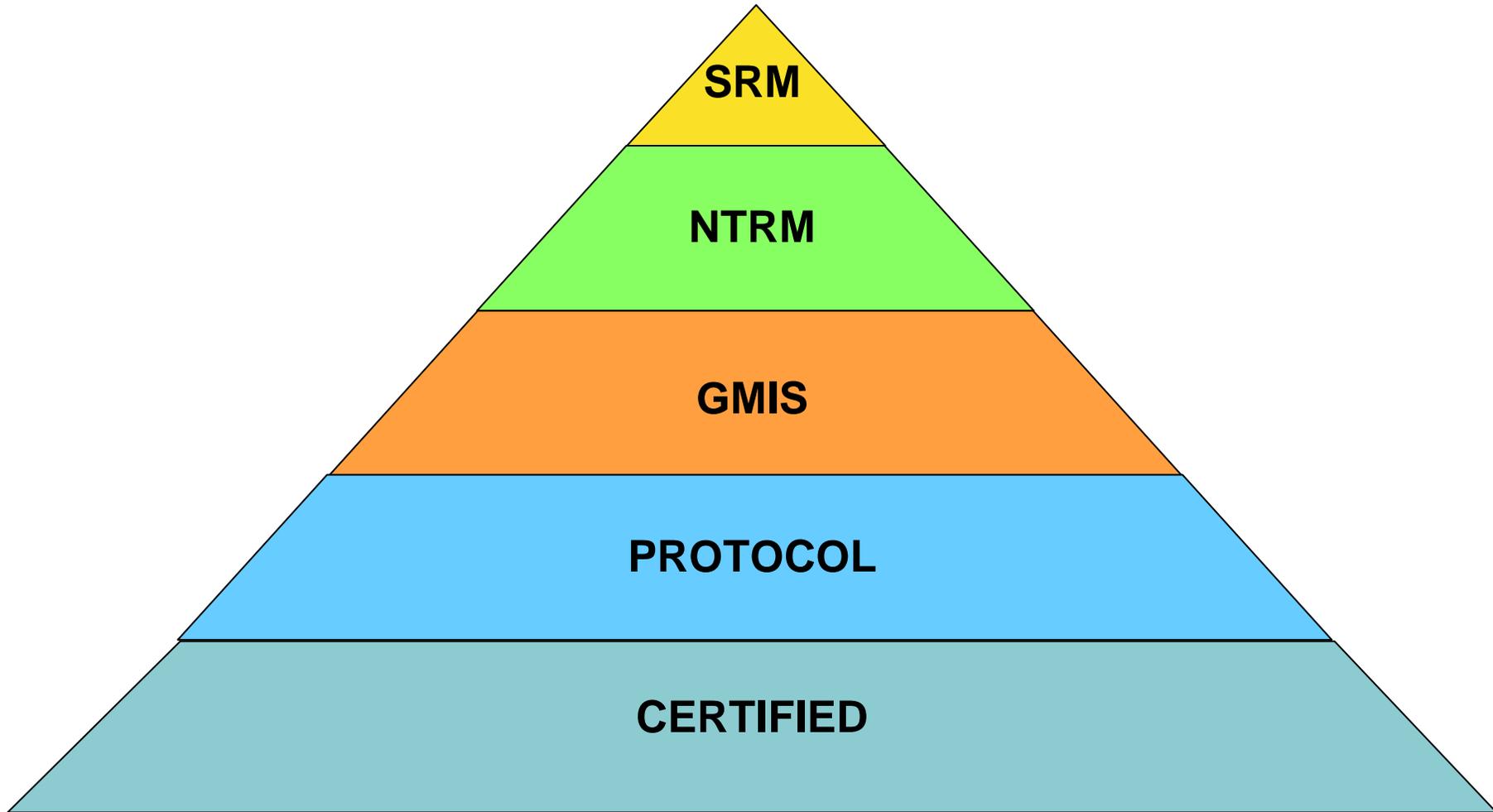
What is known about the program?

- NIST (National Institute for Standards and Testing) will be performing the testing and reviewing the paperwork.
- The importance of having NIST do the program is that they are mandated to do the most accurate measurements of all entities. NIST analyzes the gases from which all protocols **must** be traced from.

Protocol Gas Traceability

- SRM (Standard Reference Material)
 - Produced under NIST contract
 - Sold by NIST
- NTRM (NIST Traceable Reference Material)
 - Produced by specialty gas vendors
 - Analyzed & certified by NIST
- GMIS (Gas Manufacturer's Internal Standard)
 - Produced by specialty gas vendors
 - Analyzed & certified by specialty gas vendor

US EPA Protocol Gas



What is known about the program?

- In 2006 NIST will still be testing “easy” gases the lowest is 50ppm NO_x and 50ppm SO_2
- Industry tests have shown significant differences in quality as the NO_x and SO_2 part per million levels decrease.

What is known about program? (cont)

- This is the last test that EPA will pay for. EPA has committed \$100,000 for acquiring the samples and NIST's analysis of 40 cylinders.
- The next test will be funded by the gas manufacturers.
- EPA is writing regulatory language that will create mandatory participation. If a company does not participate, they will not be allowed to sell EPA protocol gas.

Part 58 (ambient) Proposed Rulemaking (1/17/06)

provide national uniformity in this assessment and reporting of data quality for all networks, specific assessment and reporting procedures are prescribed in detail in sections 3, 4, and 5 of this appendix. On the other hand, the selection and extent of the quality assurance and quality control activities used by a monitoring organization depend on a number of local factors such as field and laboratory conditions, the objectives for monitoring, the level of data quality needed, the expertise of assigned personnel, the cost of control procedures, pollutant concentration levels, etc. Therefore, quality system requirements in section 2 of this appendix are specified in general terms to allow each monitoring organization to develop a quality system that is most efficient and effective for its own circumstances while achieving the data quality objectives required for the SLAMS sites.

2. Quality System Requirements.
A quality system is the means by which an organization manages the quality of the monitoring information it produces in a systematic, organized manner. It provides a framework for planning, implementing, assessing and reporting work performed by an organization and for carrying out required quality assurance and quality control activities.

2.1 Quality Management Plans and Quality Assurance Project Plans. All monitoring organizations must develop a quality system that is described and approved in quality management plans (QMP) and quality assurance project plans (QAPP) to ensure that the monitoring results:

- (a) Meet a well-defined need, use, or purpose;
- (b) Provide data of adequate quality for the intended monitoring objectives;
- (c) Satisfy stakeholder expectations;
- (d) Comply with applicable standards specifications;
- (e) Comply with statutory (and other) requirements of society; and
- (f) Reflect consideration of cost and economics.

2.1.1 The QMP describes the quality system in terms of the organizational structure, functional responsibilities of management and staff, lines of authority, and required interfaces for those planning, implementing, assessing and reporting activities involving environmental data operations (EDO). The QMP must be suitably documented in accordance with EPA requirements (reference 2 of this appendix), and approved by the appropriate Regional Administrator, or Regional Administrator's designee. The quality system will be reviewed during the systems audits described in section 2.6 of this appendix. Organizations that implement long-term monitoring programs with EPA funds should have a separate QMP document. Smaller organizations or organizations that do infrequent work with EPA funds may combine the QMP with the QAPP based on negotiations with the funding agency. Additional guidance on this process can be found in reference 10 of this appendix. Approval of the recipient's QMP by the appropriate Regional Administrator, or the

Regional Administrator's designee, may allow delegation of the authority to review and approve QAPP to the recipient, based on adequacy of quality assurance procedures described and documented in the QMP. The QAPP will be reviewed by EPA during systems audits or circumstances related to data quality.

2.1.2 The QAPP is a formal document describing, in sufficient detail, the quality system that must be implemented to ensure that the results of work performed will satisfy the stated objectives. The quality assurance policy of the EPA requires every EDO to have written and approved QAPP prior to the start of the EDO. It is the responsibility of the monitoring organization to adhere to this policy. The QAPP must be suitably documented in accordance with EPA requirements (reference 3 of this appendix).

2.1.3 The monitoring organizations' quality system must have adequate resources both in personnel and funding to plan, implement, assess and report on the achievement of the requirements of this appendix and its approved QAPP.

2.2 Independence of Quality Assurance. The monitoring organization must provide for a quality assurance management function; that aspect of the overall management system of the organization that determines and implements the quality policy defined in a monitoring organization's QMP. Quality management includes strategic planning, allocation of resources and other systematic planning activities (e.g. planning, implementation, assessing and reporting) pertaining to the quality system. The quality assurance management function must have sufficient technical expertise and management authority to conduct independent oversight and assure the implementation of the organization's quality system relative to the Ambient Air Quality Monitoring Program and should be organizationally independent of environmental data generation activities.

2.3 Data Quality Performance Requirements.

2.3.1 Data Quality Objectives. Data quality objectives (DQO) or the results of other systematic planning processes are statements that define the appropriate type of data to collect and specify the tolerable levels of potential decision errors that will be used as a basis for establishing the quality and quantity of data needed to support the objectives of the SLAMS stations. DQO will be developed by EPA to support the primary SLAMS objectives for each criteria pollutant as they are developed they will be added to the regulation. DQO or the results of other systematic planning processes for PSD or other monitoring will be the responsibility of the monitoring organizations. The quality of the conclusions made from data interpretation can be affected by population uncertainty (spatial or temporal uncertainty) and measurement uncertainty (uncertainty associated with collecting, analyzing, reducing and reporting concentration data).

This appendix focuses on assessing and controlling measurement uncertainty.

2.3.1.1 Measurement Uncertainty for Automated and Manual PM_{2.5} Methods. The goal for acceptable measurement uncertainty

is defined as 10 percent coefficient of variation (CV) for total precision and ± 10 percent for total bias.

2.3.1.2 Measurement Uncertainty for Automated Ozone Methods. The goal for acceptable measurement uncertainty is defined for precision as an upper 90 percent confidence limit for the coefficient variation (CV) of 7 percent and for bias as an upper 95 percent confidence limit for the absolute bias of 7 percent.

2.3.1.3 Measurement Uncertainty for PM_{10-2.5} Methods. The goal for acceptable measurement uncertainty is defined for precision as an upper 90 percent confidence limit for the coefficient variation (CV) of 15 percent and for bias as an upper 95 percent confidence limit for the absolute bias of 15 percent.

2.4 National Performance Evaluation Programs. Monitoring plans or QAPP shall provide for the implementation of a program of independent and adequate audits of all monitors providing data for SLAMS and PSD including the provision of adequate resources for such audit programs. A monitoring plan (or QAPP) which provides for monitoring organization participation in EPA's National Performance Audit Program (NPAP) and the PM Performance Evaluation Program (PEP) program and which indicates the consent of the monitoring organization for EPA to apply an appropriate portion of the grant funds, which EPA would otherwise award to the monitoring organization for monitoring activities, will be deemed by EPA to meet this requirement. For clarification and to participate, monitoring organizations should contact either the appropriate EPA Regional Quality Assurance (QA) Coordinator at the appropriate EPA Regional Office location, or the NPEP Coordinator, Emissions Monitoring and Analysis Division (ID205-02), U.S. Environmental Protection Agency, Research Triangle Park, NC 27711.

2.5 Technical Systems Audit Program. Technical systems audits of each ambient air monitoring organization shall be conducted at least every 3 years by the appropriate EPA Regional Office and reported to the AQCS. Systems audit programs are described in reference 10 of this appendix. For further instructions, monitoring organizations should contact the appropriate EPA Regional QA Coordinator.

2.6 Gaseous and Flow Rate Audit Standards.

2.6.1 Gaseous pollutant concentration standards (permeation devices or cylinders of compressed gas) used to obtain test concentrations for carbon monoxide (CO), sulfur dioxide (SO₂), nitric oxide (NO), and nitrogen dioxide (NO₂) must be traceable to either a National Institute of Standards and Technology (NIST) Traceable Reference Material (NTRM) or a NIST-certified Gas Manufacturer's Internal Standard (GMIS), certified in accordance with one of the procedures given in reference 4 of this appendix. Vendors advertising certification with the procedures provided in reference 4 of this appendix and distributing gasses as "EPA Protocol Gas" must participate in the EPA Protocol Gas Verification Program or not use "EPA" in any form of advertising.

2.6.2 Test concentrations for ozone (O₃) must be obtained in accordance with (b)

Gaseous pollutant concentration standards (permeation devices or cylinders of compressed gas) used to obtain test concentrations for CO, SO₂, NO, and NO₂ must be traceable to either a National Institute of Standards and Technology (NIST) Traceable Reference Material (NTRM) or a NIST-certified Gas Manufacturer's Internal Standard (GMIS), certified in accordance with one of the procedures given in reference 4 of this appendix. Vendors advertising certification with the procedures provided in reference 4 of this appendix and distributing gasses as "EPA Protocol Gas" must participate in the EPA Protocol Gas Verification Program or not use "EPA" in any form of advertising.

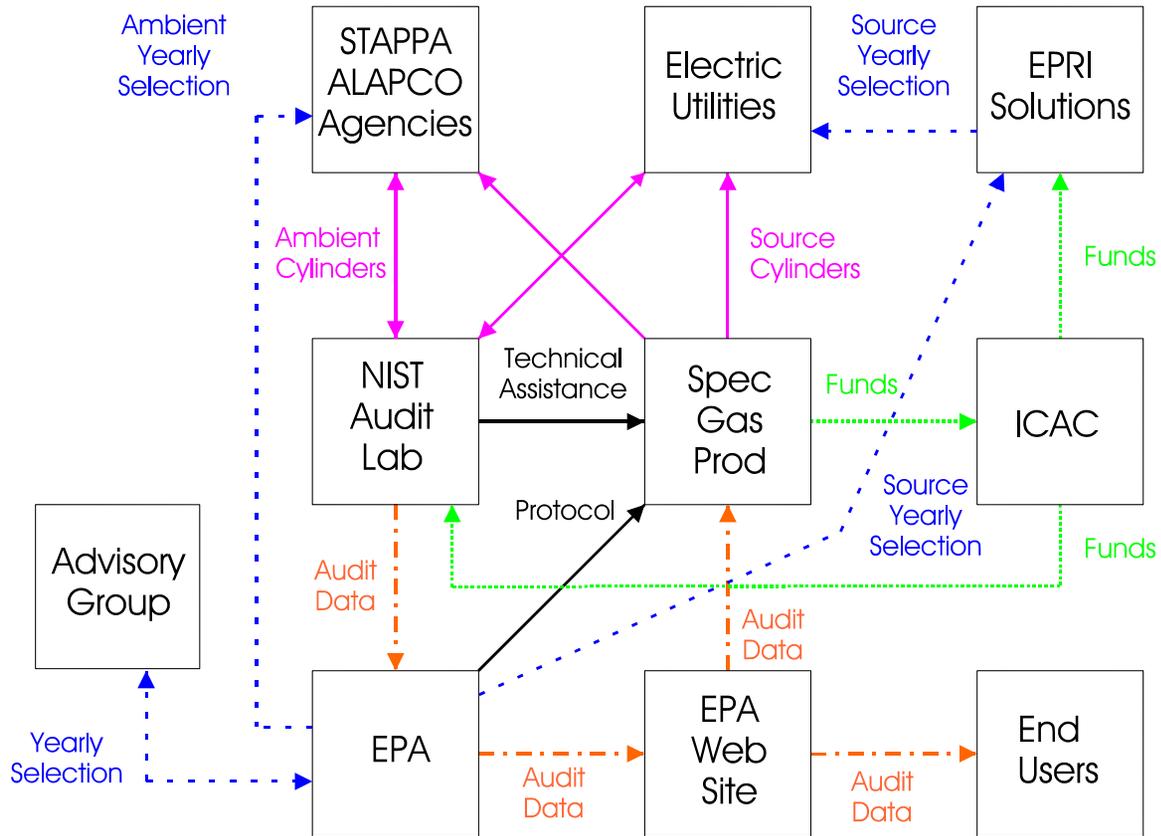
Part 75 (stack)

Proposed Rulemaking (May/June 2006)

Part 75, Appendix A, Section 5.1.4- EPA Protocol Gases:

(a) EPA Protocol ~~g~~Gases must **have a vendor-certified uncertainty (95-percent confidence interval) that must not be greater than 2.0 percent of the certified concentration (tag value) of the gas mixture. The uncertainty must be calculated using the statistical procedures (or equivalent) that are listed in Section** ~~be vendor-certified to be within 2.0 percent of the concentration—specified on the cylinder label (tag value), using the uncertainty calculation—procedure in section 2.1.8 of the “EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards,” September 1997, EPA-600/R-97/121 (EPA Traceability Protocol) or such revised protocol as may be approved by the Administrator. Vendors advertising calibration gas certification with the EPA Traceability Protocol or distributing calibration gases as “EPA Protocol Gas” must participate in the EPA Protocol Gas Verification Program or they cannot use “EPA” in any form of advertising for these products, unless approved by the Administrator.~~

EPA Protocol Gas Verification Program



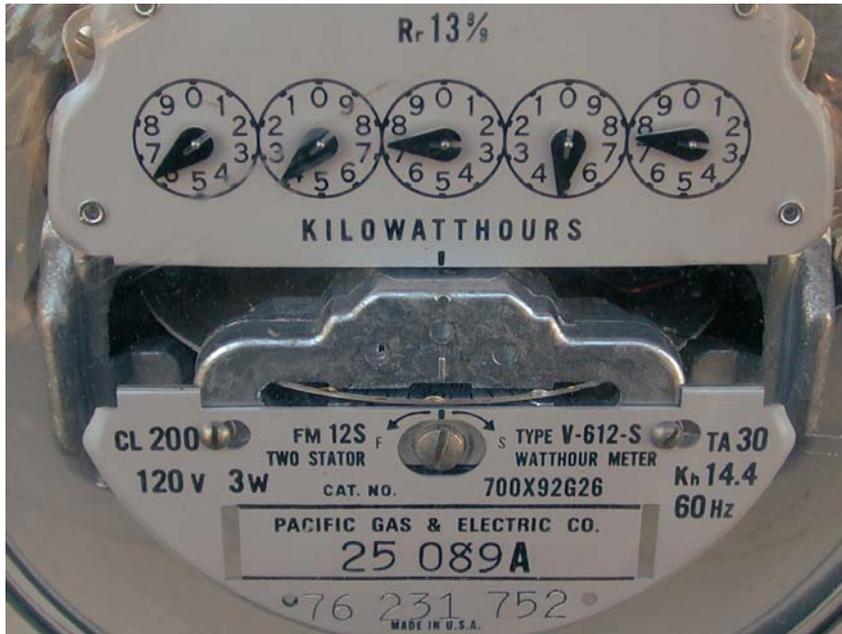
How can you protect yourself until the next blind audit?

- Check your certifications. The Institute of Clean Air Companies (ICAC) has published guidelines. http://www.icac.com/files/public/epa_gas_protocol.pdf
- If the certificate is lacking any of the mandatory items it may not be valid or accurate.
- Check the expiration dates, if expired it is not a valid protocol!
- Buy your US EPA Protocols from companies that concentrate on Specialty gas

In Conclusion

Billing Meters

Consumer



Industry

