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DEPARTMENT OF ENVIRONMENTAL PROTECTION

Office of Waste, Air, Radiation & Remediation

Air Permitting of Sources at Natural gas Production, Compression and Processing Facilities

MARAMA 2015 SCIENCE MEETING

JULY 29-30, 2015

RICHMOND, VIRGINIA

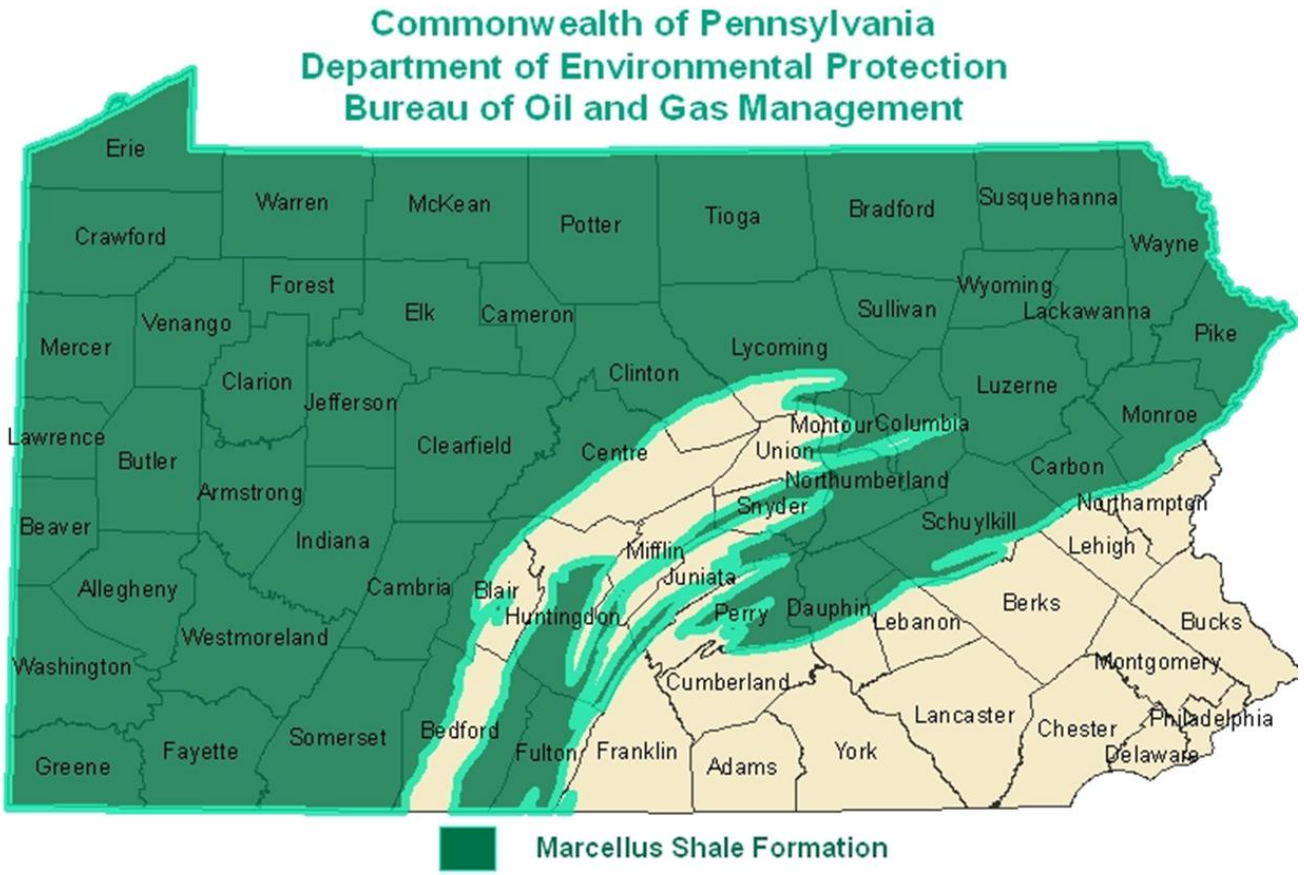
Tom Wolf, Governor

John Quigley, Secretary

Overview of Presentation

- Major air pollution sources from natural gas industries.
- Pennsylvania DEP Air Quality permitting process.
- Category No. 38 of Exemption criteria for sources at natural gas well sites.
- General Plan Approval and/or General Operating Permit (GP-5) for sources at natural gas compression and processing sites.
- Analysis of GP-5 Engine emissions data

Marcellus Shale Area



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Major Pollutants from stationary sources

- Nitrogen Oxides – NO_X
  * Contributes to Ozone production.
- Carbon Monoxide – CO
- Volatile Organic Compounds – VOC
- Hazardous Air Pollutants – HAP
  - Methanol
  - Benzene
- Greenhouse gases-
  - Methane
  - Carbon Dioxide – CO2

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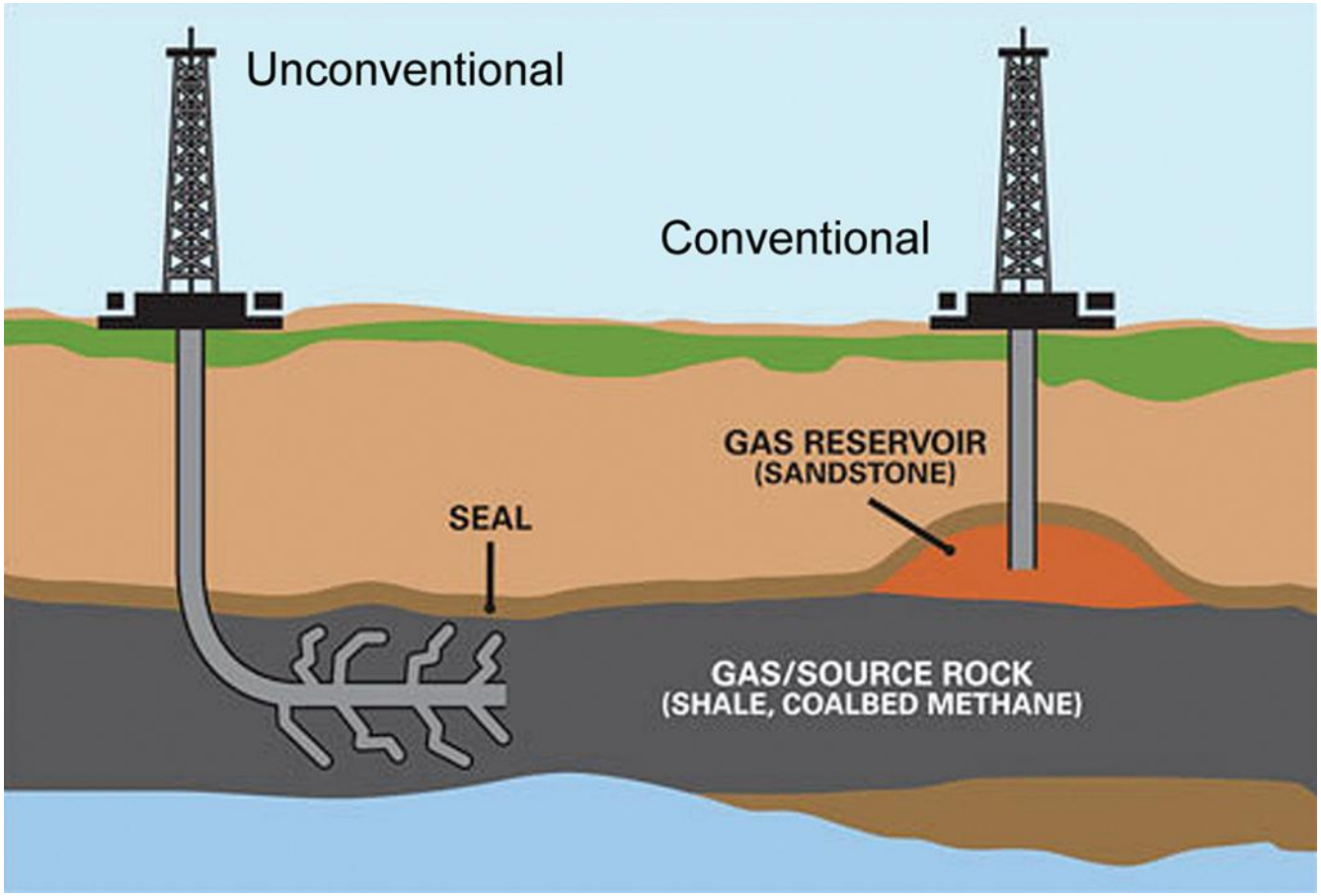
Pennsylvania Air Permitting Process

- Step 1 – Permit Exemption Criteria
  - If the applicant meets the requirements, they are exempt from permitting requirements
- Step 2 – Request for determination (RFD)
  - Applicant may request exemption from permitting requirements (Decision given within 30 days)
- Step 3 – General Plan Approval / Operating Permit (GP)
  - must meet all applicable requirements in the permit
  - authorization given within 30 days
- Step 4 – Case by case plan approval and operating permit
  - May take up to 180 days
  - Requirements are determined for the specific case
  - Requirements in the applicable GP becomes baseline for the plan approval requirements

Pennsylvania Air Permitting Process

Sources at Natural Gas Production facilities
Category No. 38 Exemption Criteria

Unconventional / Conventional



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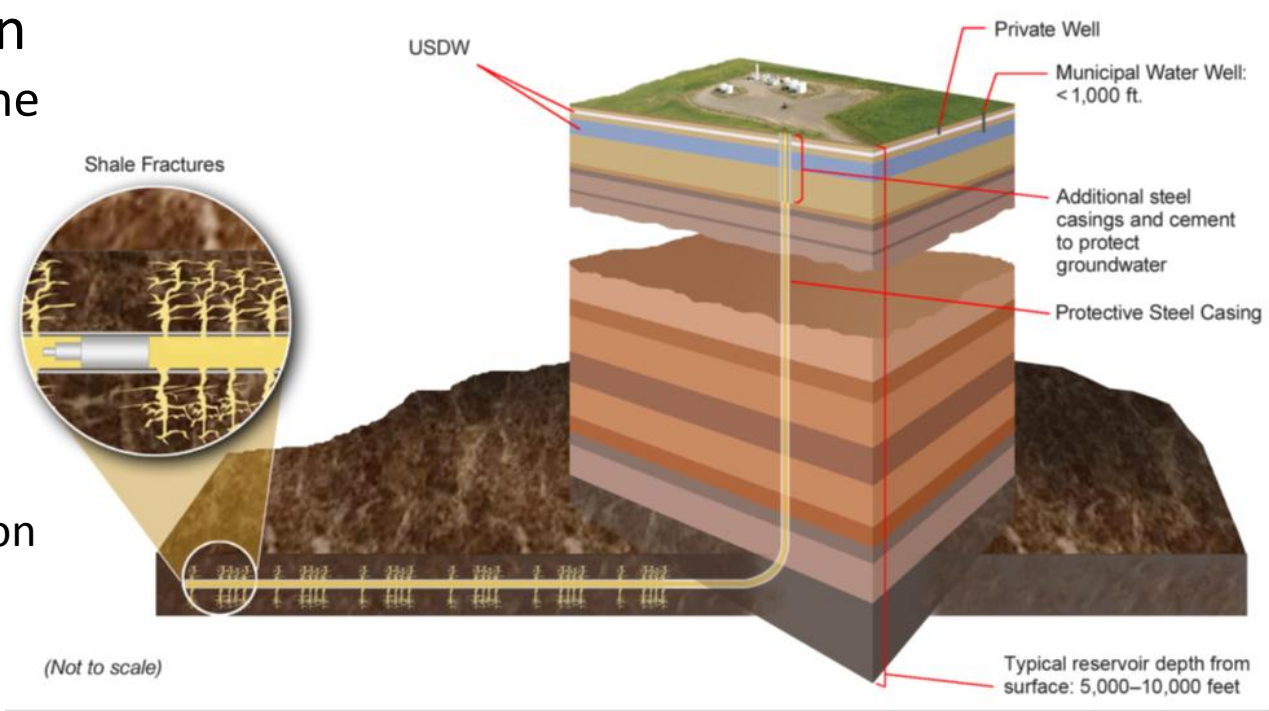
Natural Gas Well

- Well Drilling
- Well Completion
  - * Perforating the well
  - * Hydraulic Fracturing
  - * Flowback
    - Reduced Emission Completion



http://www.youtube.com/watch?v=YemKzEPugpk&feature=player_embedded

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Marcellus Shale Operations

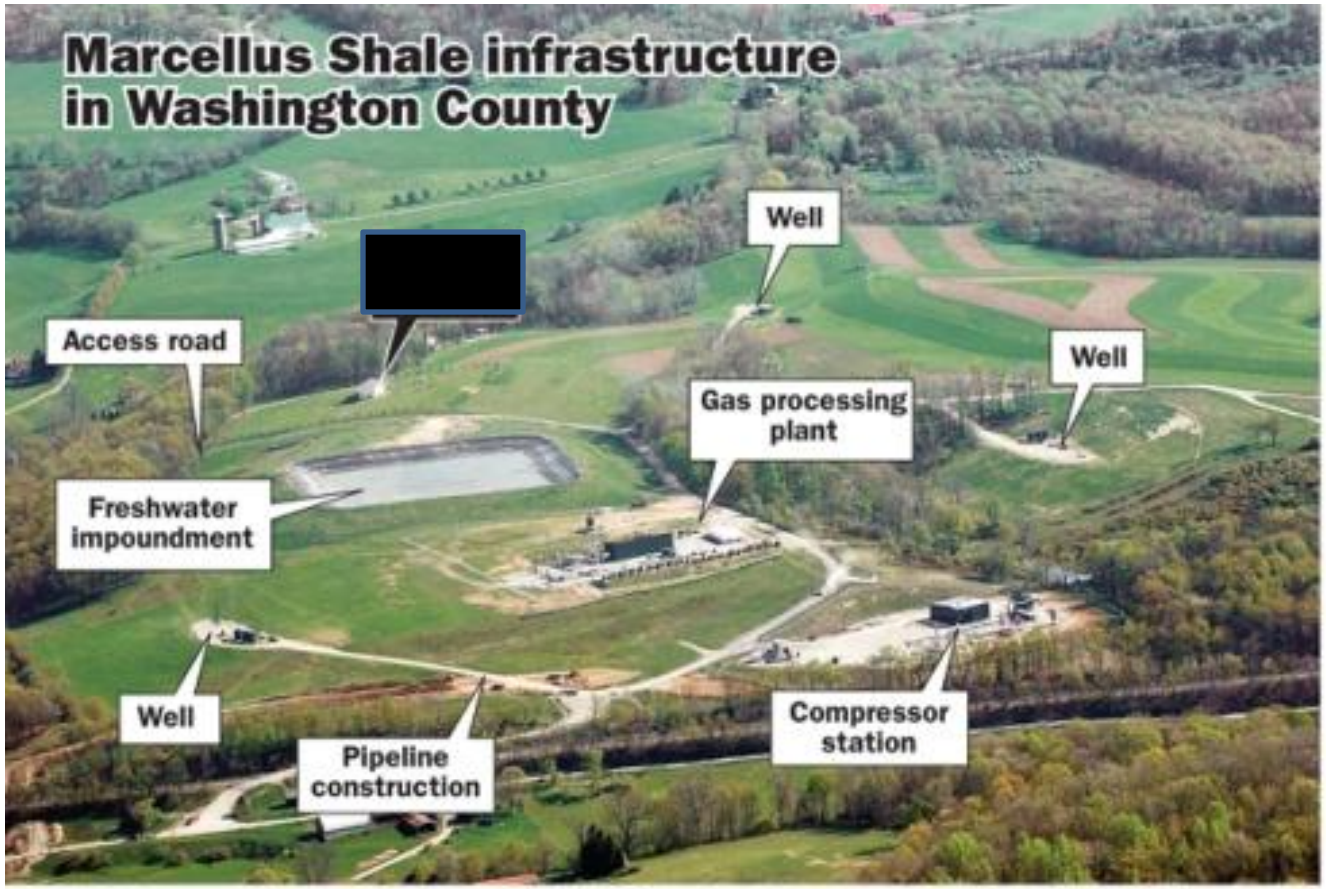

PHOTO COURTESY OF MARCELLUS-SHALE.US

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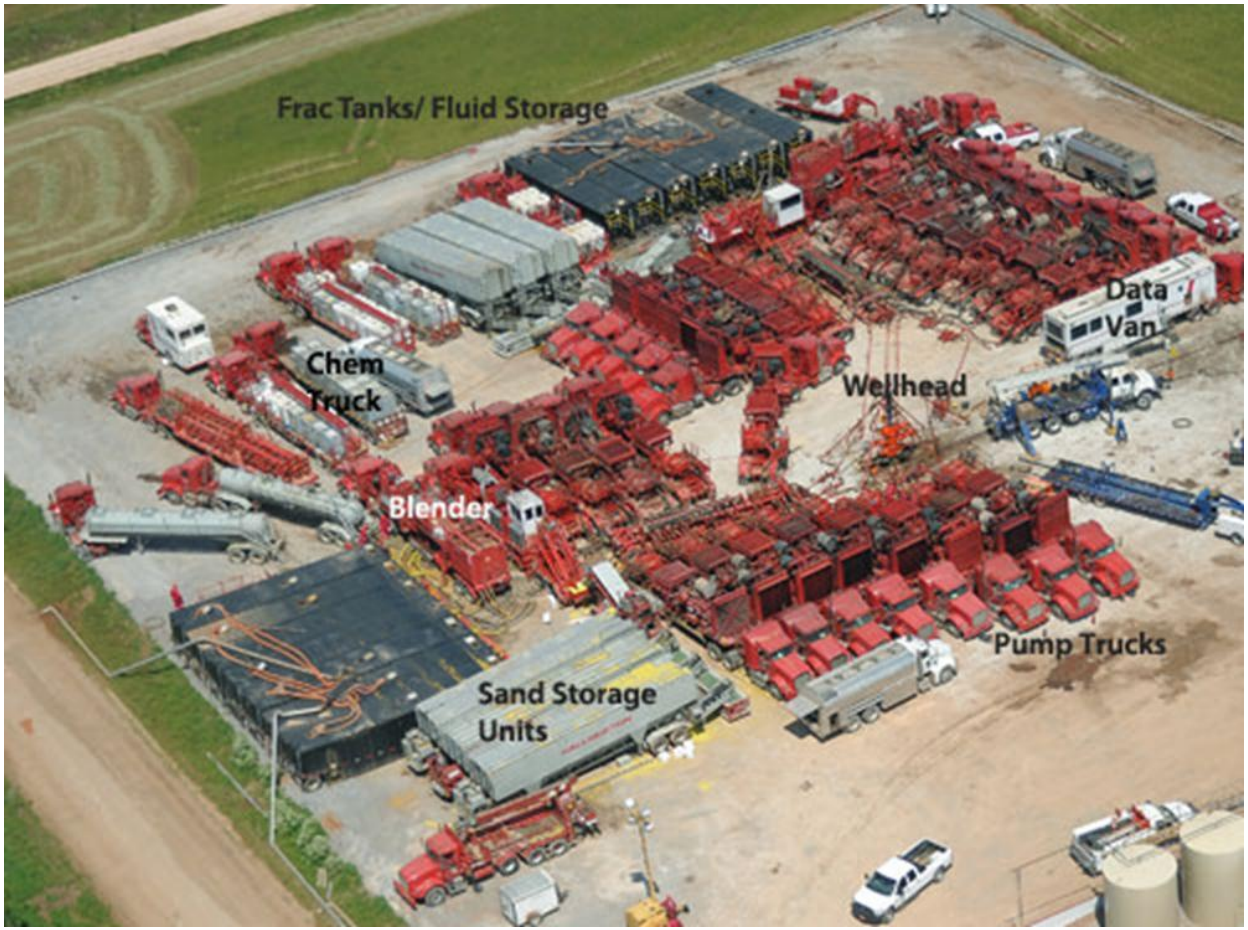
Hydraulic fracturing



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Producing Well Pad

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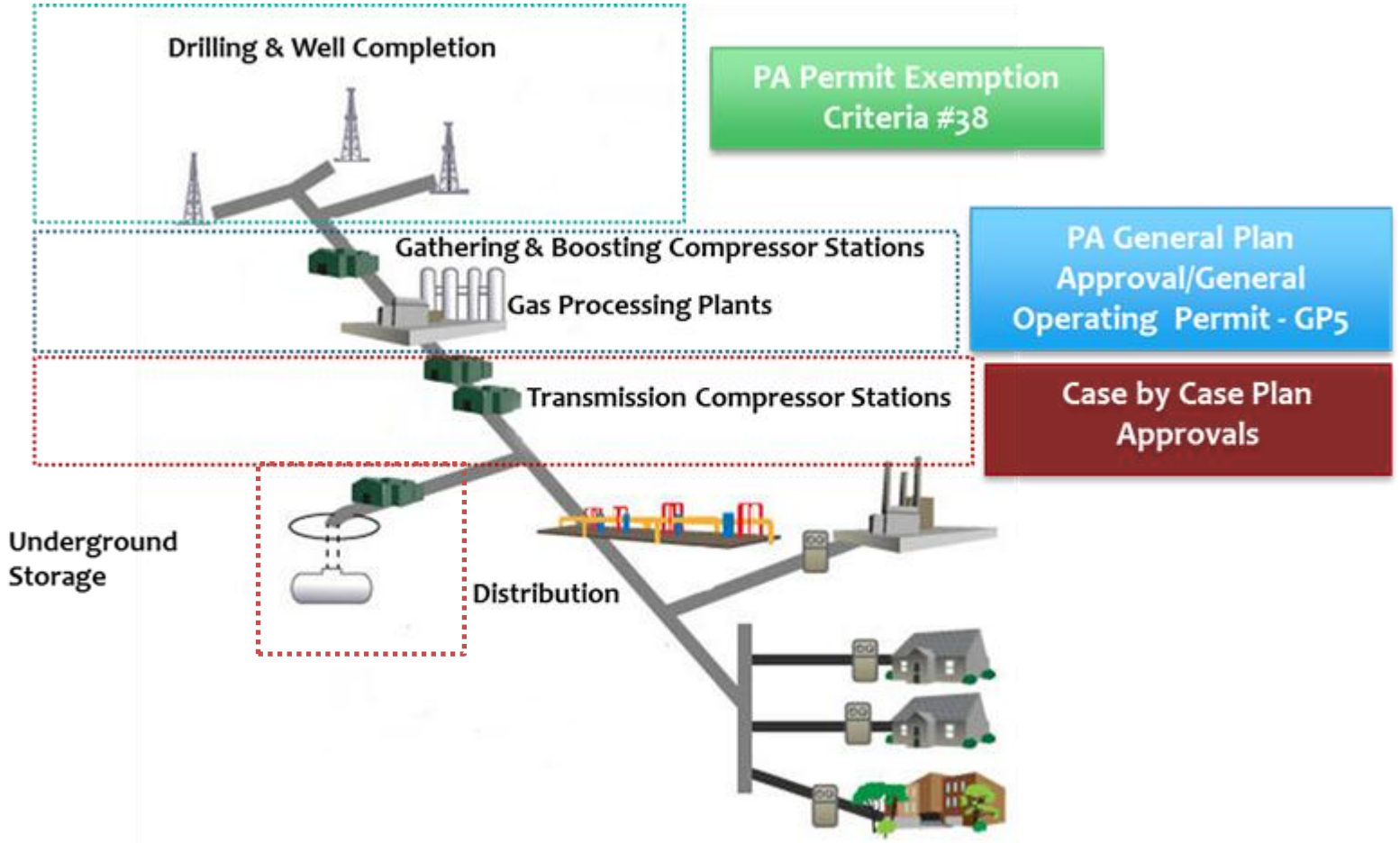
Category No. 38 Exemption Criteria

On August 10, 2013, DEP issued final permit exemption criteria for the following:

- conventional wells;
- unconventional wells;
- wellheads; and
- all other associated equipment such as non-road engines, storage vessels/tanks, and flaring activities.

Where Exemption Category No. 38 may be applicable?



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Category No. 38 Exemption Criteria

- Sources located at the natural gas well sites are exempt from permitting requirements only if the owner or operator meets all applicable requirements established in the Category No. 38 Exemption Criteria.
- While a source may be exempt from permitting requirements, the owner or operator of the source must still comply with all applicable federal and state laws and regulations.

Category No. 38 Exemption Criteria

- The owner or operator of sources not meeting the Category No. 38 exemption criteria may submit a Request for Determination (RFD) Form or Plan Approval Application to the appropriate DEP Regional Program Manager.

Category No. 38 Exemption Criteria

Sources	Exemption Eligibility Criteria
Flowback	• Reduced Emission Completions (Green Completions) are required under 40 CFR Part 60, Subpart OOOO.
Fugitive Leaks	• The entire well pad/facility is subject to a leak detection and repair (LDAR) program using a FLIR camera or other DEP- approved detection devices. • Initial inspection within 60 days after a well is put into production. • LDAR inspections must be conducted annually thereafter. • Leaks must be repaired within 15 day unless the facility shutdowns or ordering of replacement parts are necessary for repair of the leaks. • Leaks are considered repaired using either of the following criteria: -the methane (CH4) concentration is 2.5% or less and a VOC concentration of 500 PPM or less; --no visible leak is detected using an optical imaging camera; or --other DEP-approved detection methods.

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Category No. 38 Exemption Criteria

Sources	Exemption Eligibility Criteria
Storage Tanks/Storage Vessels or other Equipment (e.g. truck load-out)	• Limit facility wide total VOC emissions to less than 2.7 tons per year. • If not, install controls capable of achieving VOC emission reduction of 95% or greater. • Owners or operators of storage tanks/storage vessels must comply with the Subpart OOOO requirements.
Non-road Engines	• Non-road engines are subject to the Tier 1-Tier 4 requirements specified in 40 CFR Part 89.
Flaring Activities	• Enclosed combustion device including an enclosed flare must be used for all permanent flaring operations. • Flaring operations must be designed and operated in accordance with 40 CFR § 60.18.
Stationary IC Engines	• Combined facility NOx emissions must be less than 100 lbs/hr, 1000 lbs/day, 2.75 tons per ozone season, and 6.6 tons per year on a 12-month rolling basis.

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Compliance Demonstrations

- The owner or operator is required to demonstrate compliance with all Category No. 38 Exemption Criteria using any generally accepted model or calculation methodology by submitting a Compliance Demonstration Report (CDR) to the Department.

- The CDR must be submitted to the appropriate DEP Regional Office within 180 days after the "well completion" (as defined in 40 CFR § 60.5430) or installation of an air contamination source.

Category No. 38 Compliance Demonstration Criteria

Exemption Criteria	Compliance Demonstration Documentation (Details provided in the DEP Compliance Demonstration Instructions)
Well drilling, completion and work-over activities	• The owner or operator must provide 24-hr advance notice to appropriate DEP Regional Office prior to commencement of each well completion • The notice must include the following: Contact info, Name of well site, County, Township, API Well No., Latitude/Longitude, Planned date of flowback • Details of the Reduced Emissions Completion (duration of flowback, combustion, venting, or photograph of well containing REC with date)

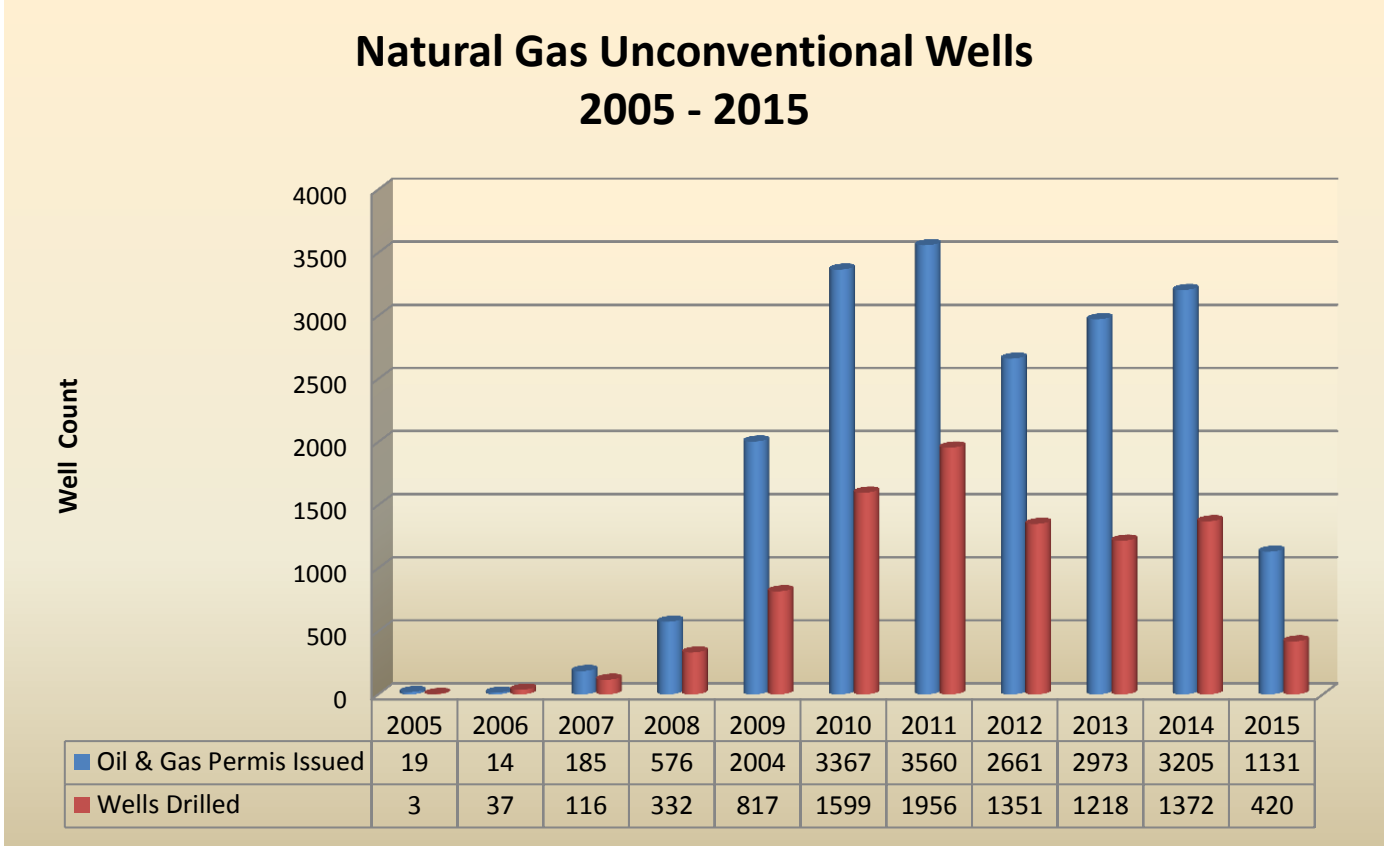
Category No. 38 Compliance Demonstration Criteria

Exemption Criteria	Compliance Demonstration Documentation (Details provided in the DEP Compliance Demonstration Instructions)
Fugitive Leaks	• Report containing equipment or component, date of leak detection, detection method, visual image. • Repairs not completed within 15 days with reasons and scheduled dates of repairs. • List of equipment or components that could not be repaired and reason.
Storage Tanks/Storage Vessels or other Equipment (e.g. truck load-out)	• Identification of storage vessel. • Calculate VOC emissions using EPA TANKS, ProMax, API E&P Tanks, HYSIM HYSIS etc. • Performance test results to demonstrate 95% or greater VOC reduction efficiency. • For Truck load-out, copy of MACT-level annual leak test results or NSPS-level annual test results or alternate test results as approved by the Department.

Category No. 38 Compliance Demonstration Criteria

Exemption Criteria	Compliance Demonstration Documentation (Details provided in the DEP Compliance Demonstration Instructions)
VOC and HAP Emission Thresholds	• Calculations for VOC and HAP emissions using generally accepted models/calculations, including vendor data, direct measurement, EPA emission factors, or modeling programs.
Flaring Activities	• Manufacturer's certifications, spec sheet etc. showing permanent flares are enclosed.
Stationary IC Engines	• Calculations for NOx emissions using generally accepted calculations, vendors data, test data from identical source, or EPA emission factors.

Natural Gas Unconventional Wells



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Oil & Gas Permis Issued	19	14	185	576	2004	3367	3560	2661	2973	3205	1131
Wells Drilled	3	37	116	332	817	1599	1956	1351	1218	1372	420

2015 data estimated is from 1/1/2015 through 6/30/2015 only.

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Office of Waste, Air, Radiation & Remediation

Sources at Natural Gas Compression and Processing facilities
BAQ-GPA/GP-5

Tom Wolf, Governor

John Quigley, Secretary

GP-5 General Information

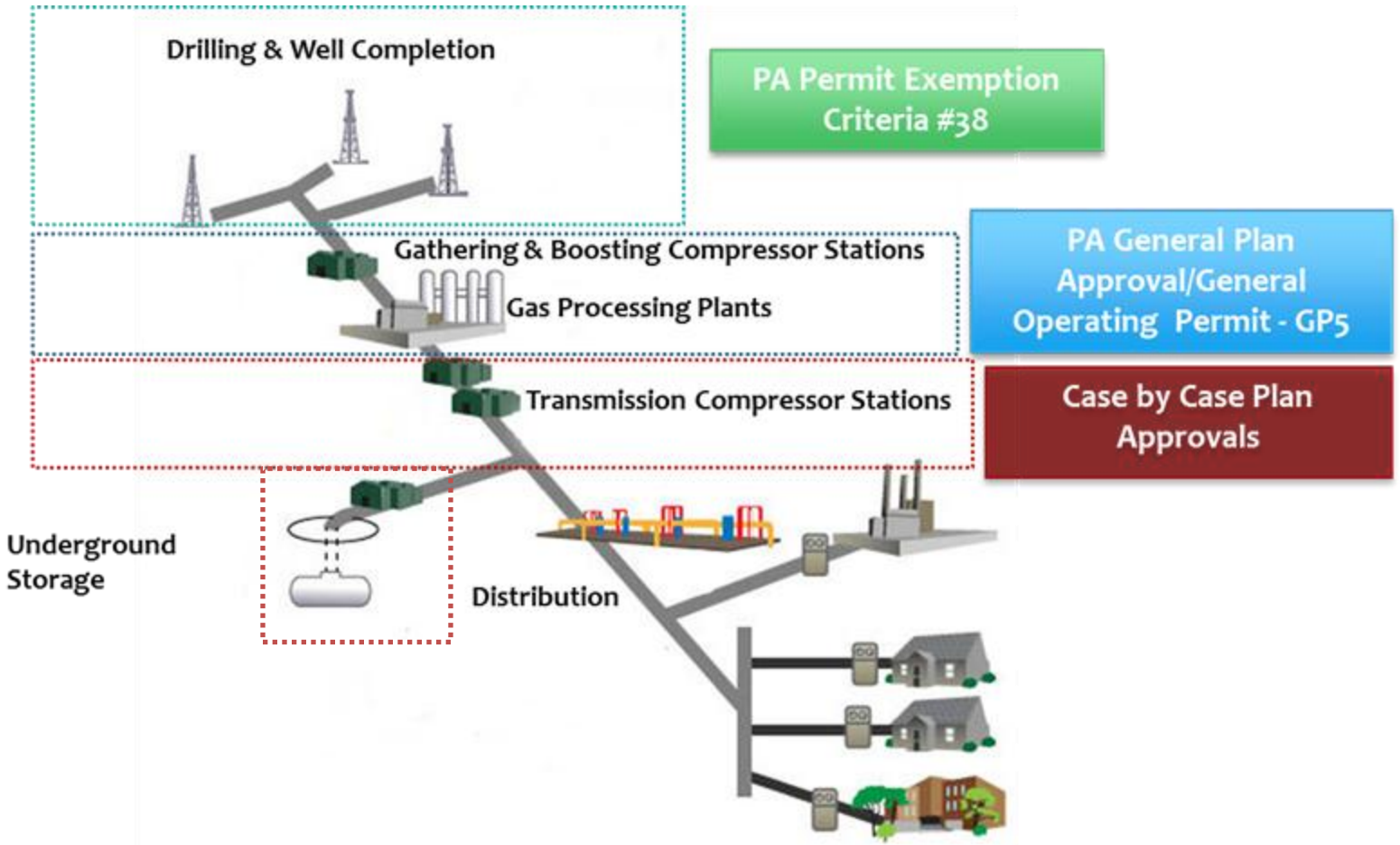
- BAQ-GPA/GP-5 is the General Plan Approval and/or General Operating Permit for sources located at natural gas compression and/or processing facilities. The current GP-5 became effective on January 16, 2015.

- The GP-5 is applicable only to non-major facilities.

- The actual emissions from all sources and associated air pollution control equipment must not equal or exceed any of the following thresholds on a 12-month rolling sum basis:

NO_X – 100 tons	CO – 100 tons
SO_2 – 100 tons,	PM_{10} – 100 tons,
$PM_{2.5}$ – 100 tons	VOCs – 50 tons
Single HAP – 10 tons	Total HAPs – 25 tons

Where BAQ-GPA/GP-5 is applicable?



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How the Minor source General Permit works?

- Compliance with minor source permit limits is based on the facility's **actual** emissions.
- Actual emissions must not exceed any of the major facility thresholds on a 12-month rolling basis.
- Individual sources cannot exceed any source specific emission limitation specified in GP-5.

Air pollution sources authorized under GP-5

- **Natural Gas Compressor Stations**
  - Natural gas fired engines, natural gas fired simple cycle turbines, dehydrators, storage tanks, pneumatic controllers, reciprocating and centrifugal compressors and equipment leaks.

- **Natural Gas Processing Plants**
  - Dehydrators, fractionation units, equipment including depropanizers, sweetening units, natural gas fired engines used in the refrigerator cycle, pneumatic controllers and equipment leaks.

GP-5 Terms and Conditions

GP-5 terms and conditions include the following requirements:

- Municipal notification
- Annual compliance certification
- Source specific emission limits and other requirements
- Performance testing
- Notification, recordkeeping and reporting
- Work practice and monitoring
- Malfunction reporting
- Applicable federal requirements

GP-5 Terms and Conditions

- The terms and conditions cannot be modified in the authorization to use GP-5.
- Specific BAT emission limits established for gas engines and gas turbines.
- Requirements included to document operations below major source thresholds (every month).
- Testing requirements and verification of the emission rates required every 2500 hours of operations.
- LDAR program required over entire compressor station.

GP-5 Terms and Conditions

The owner or operator must:

- Notify the local municipality prior to submitting application.
- Submit annual compliance certifications to DEP signed by a responsible official no later than March 1st each year.
- Submit performance test results for each applicable source.
- Submit notifications and report malfunctions to DEP in accordance with GP-5 conditions.

GP-5 Terms and Conditions

The owner or operator must also:

- Report annual emissions data to the DEP by March 1st each year.
- Maintain records of work practice and monitoring.
- Maintain all records for at least five years.

GP-5 Compliance Certification

- The owner or operator of the facility must submit a Compliance Certification Form to the DEP by no later March 1st each year for the previous year.

- The Compliance Certification Form must be signed by a "responsible official" (defined in 25 Pa. Code §121.1) as to truth, accuracy, and completeness as required under 25 Pa. Code §127.402(d). The form must be postmarked or hand-delivered to the appropriate regional office, no later than March 1st.

GP-5 Compliance Certification

- The compliance certification must include:
  - The identification of each term or condition of the GP-5 that is the basis of the certification.
  - The compliance status.
  - The methods used for determining the compliance status of the source, currently and over the reporting period.
- For compliance certification purposes, the owner or operator of the facility must complete the Compliance Certification Form along with Table-1 which includes a noncompliance description and corrective actions.

Equipment Leaks

- Applicable Regulations include: 25 Pa. Code § 127.1 & 40 CFR Part 63 Subpart HH and Part 60 Subpart KKK.

- Applicability: Valves, Piping, Pumps, Flanges, Seals, Loading Arms, Dehydrators, Storage Tanks.

- Audible, visual, and olfactory inspections for leak detections performed on a monthly basis.

- Leak detection monitoring required using Forward Looking Infrared (FLIR) cameras or other leak detection monitoring devices approved by the Department.

- The leak detection monitoring devices must, at a minimum, be used on a quarterly basis.

Equipment Leaks

- Any leaks detected must be repaired as expeditiously as practicable, but no later than 15 days unless facility shutdowns or ordering of replacement parts are necessary for repair of the leaks.

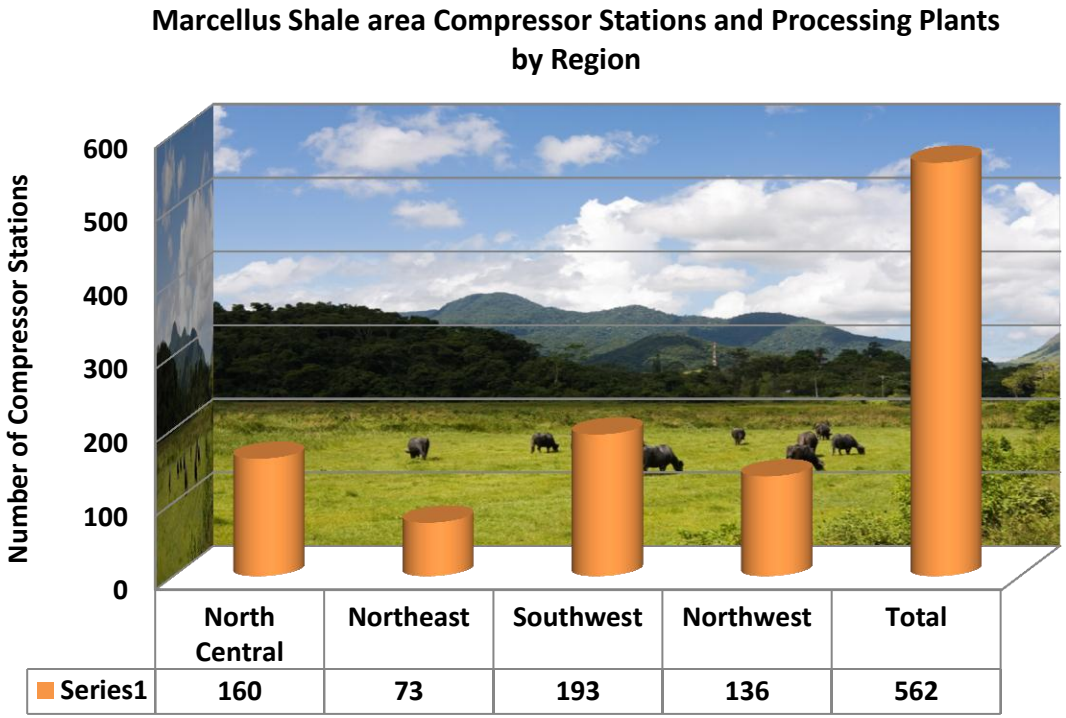
- Leaks detected and repaired must be recorded and the records maintained at the site.

Emission Inventory Submittals

- By March 1st each year, the owner or operator must submit a source report to the Department for the preceding calendar year.

- The source report must include emissions from all sources at natural gas compression and processing facilities. The emissions from leaks including methane emissions must also be included in the report.

Compressor Stations and Processing Plants



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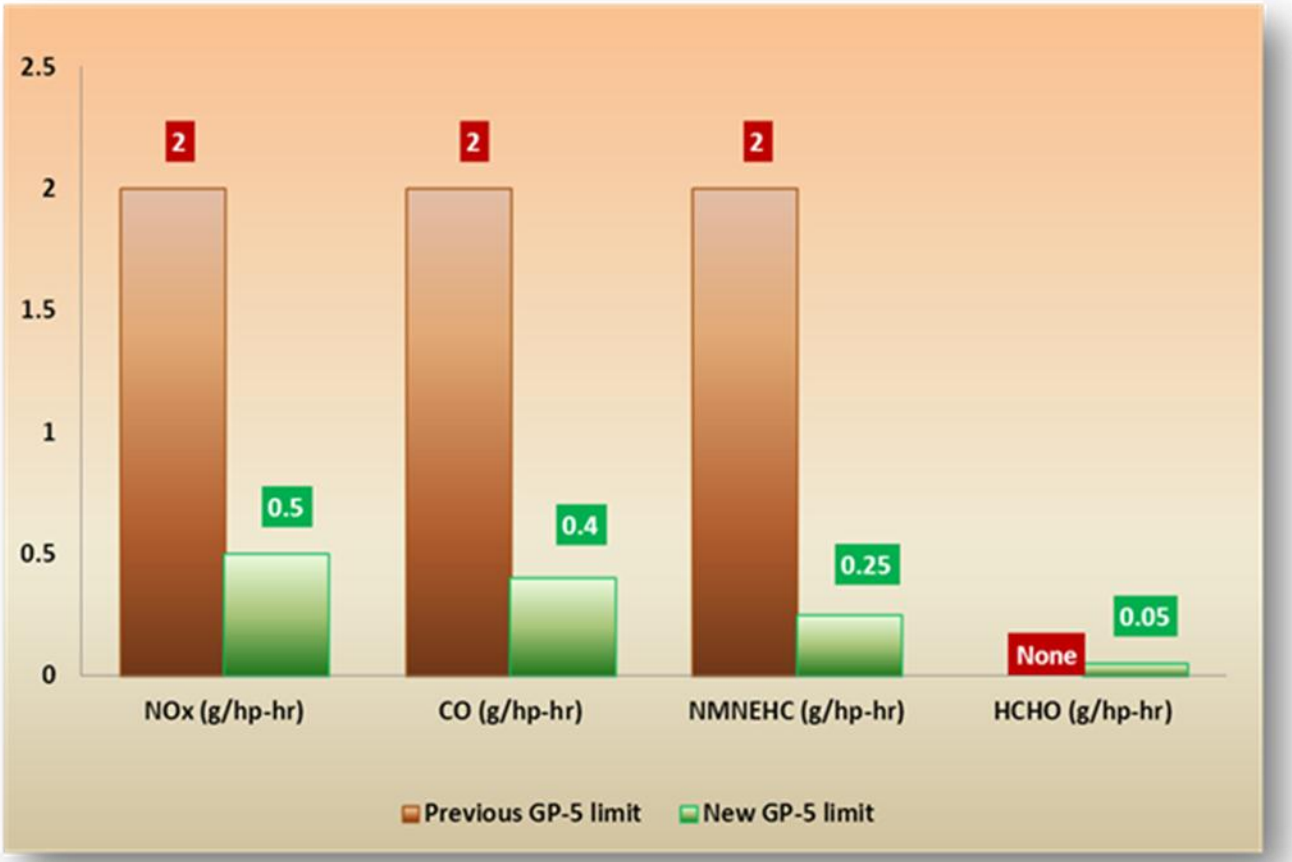
GP-5: Lean Burn Engines > 500 HP



75% to 87% reduction in emission limits from previous GP-5

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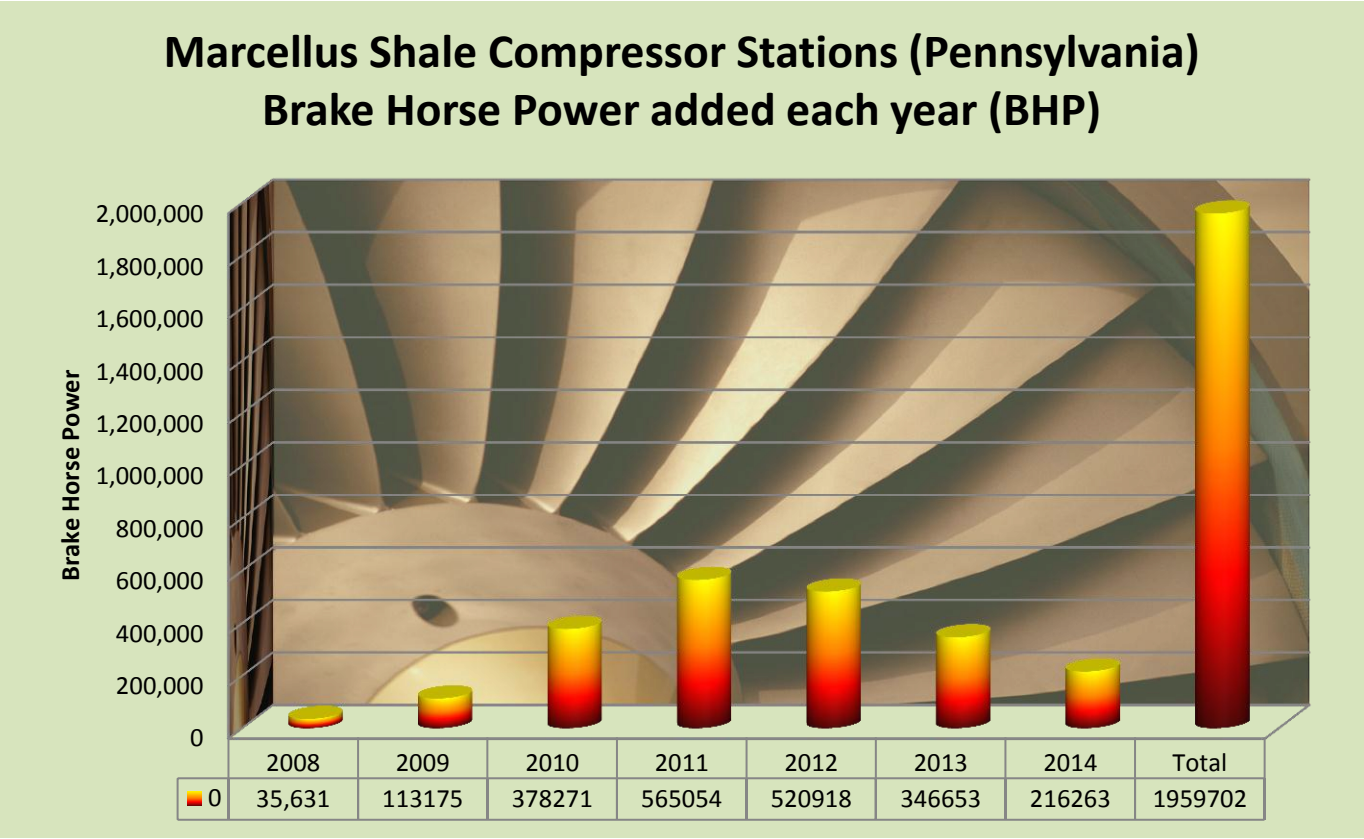
BHP of Engines Authorized in Marcellus Region



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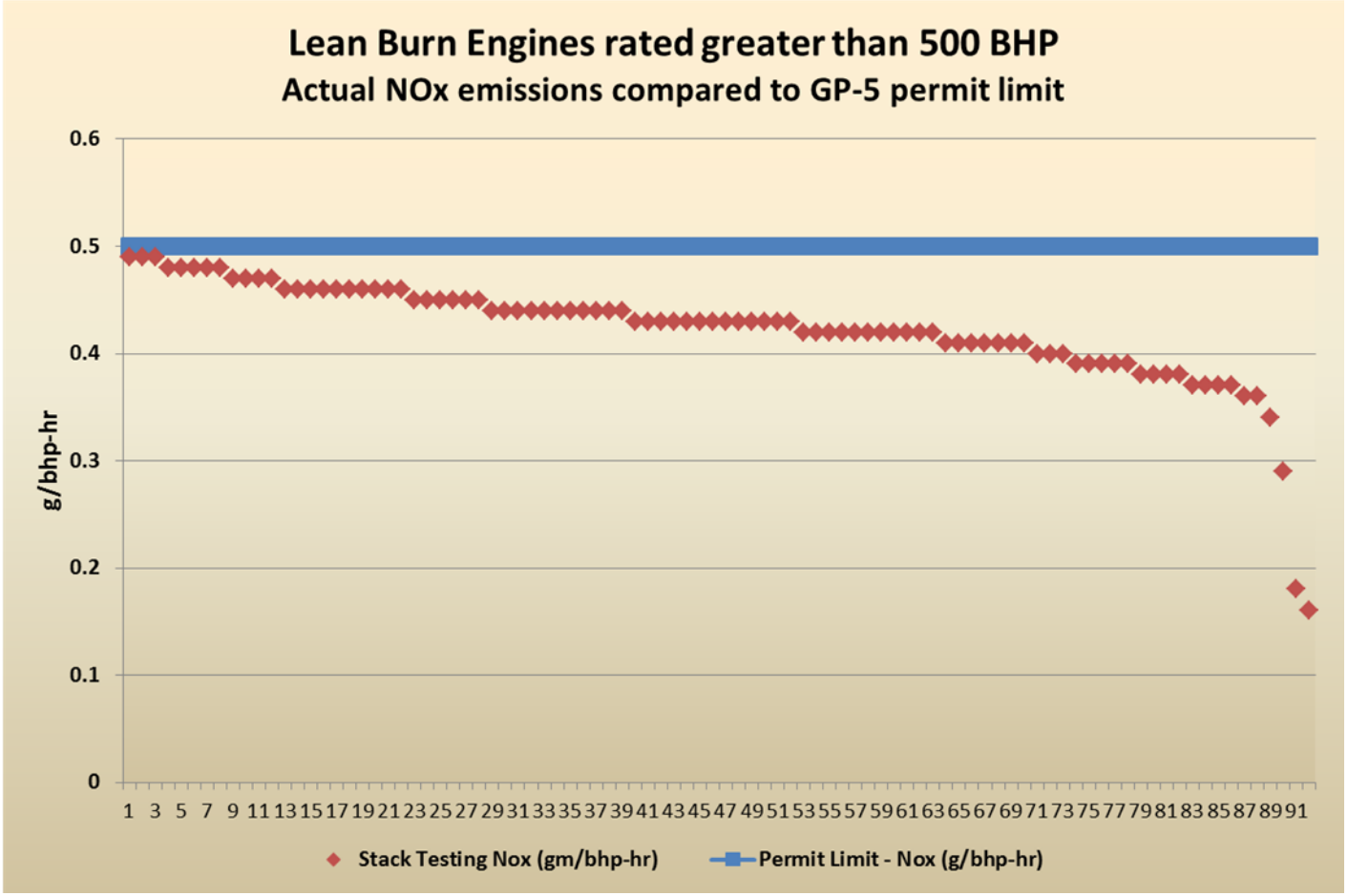
Actual emissions - NO_X



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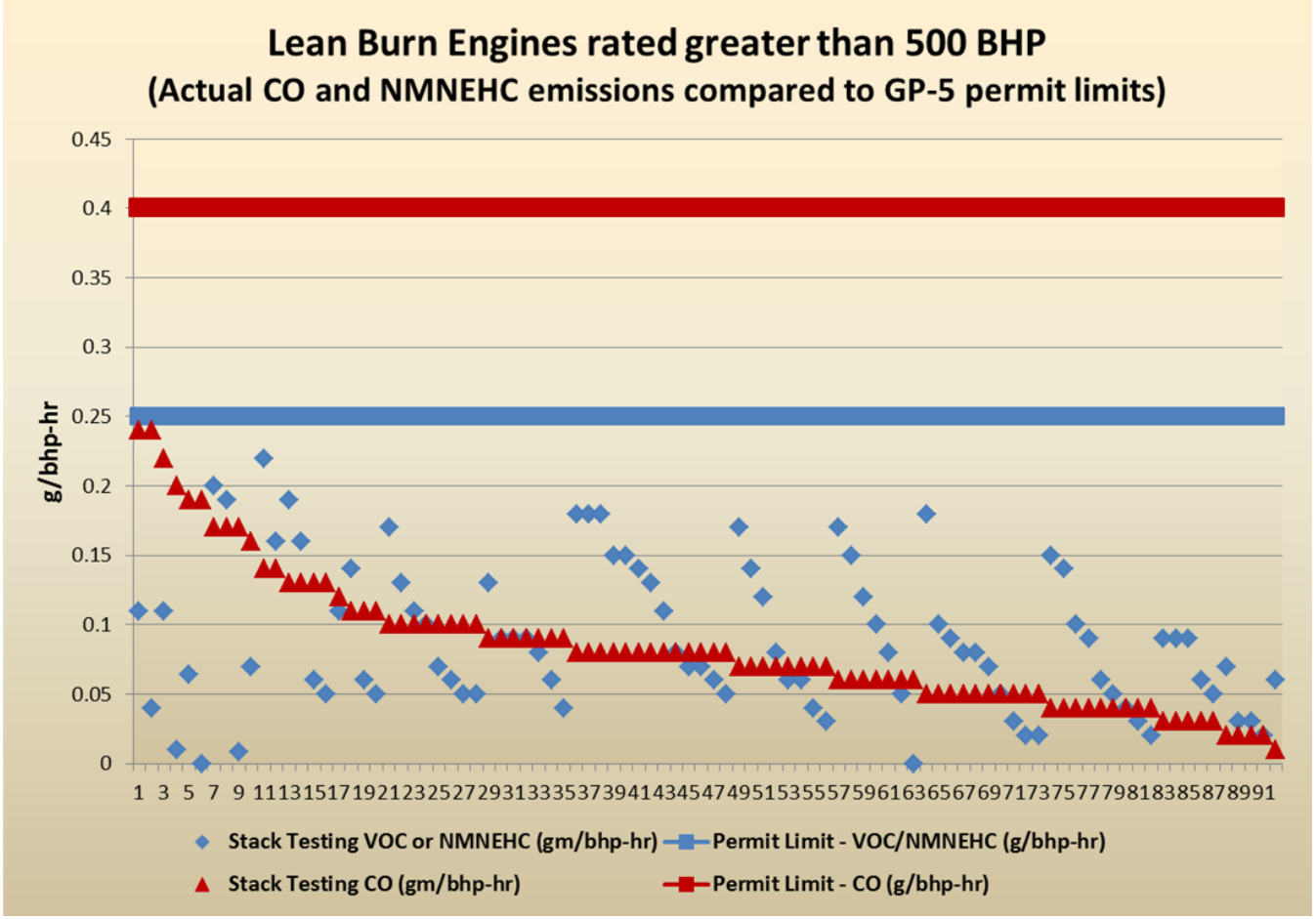
Actual emissions - CO, VOC



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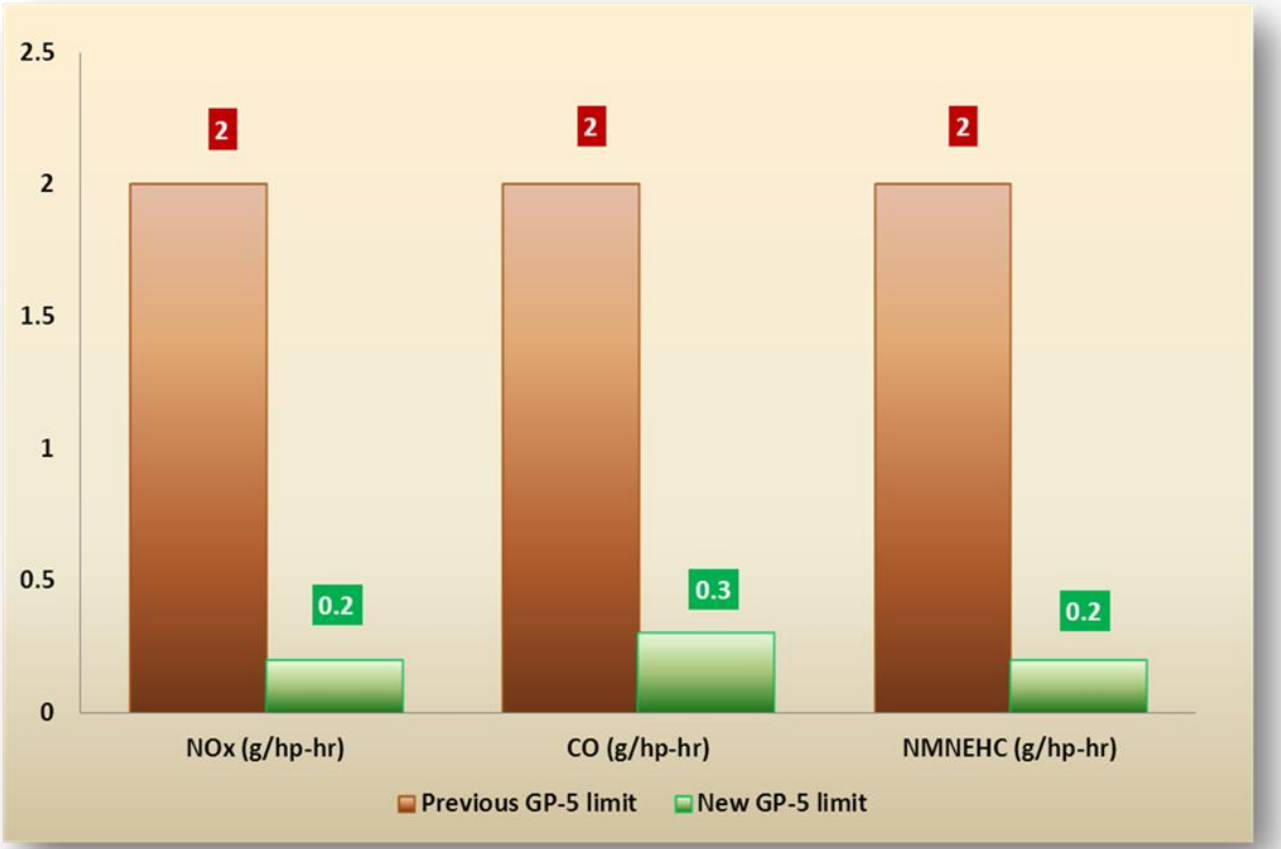
GP-5: Rich Burn Engines > 500 HP



85% to 90% reduction in emission limits from previous GP-5

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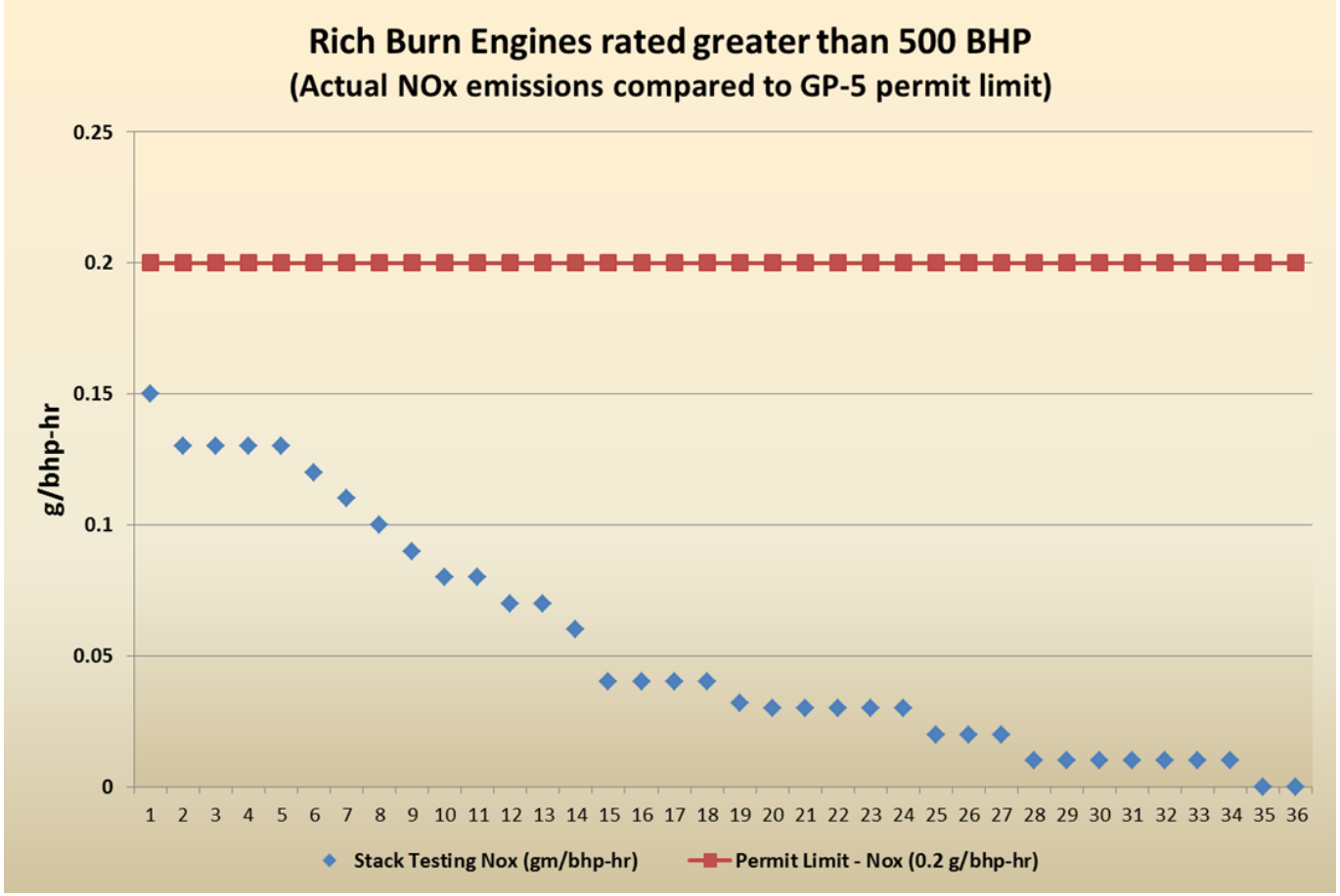
Actual emissions - NOx



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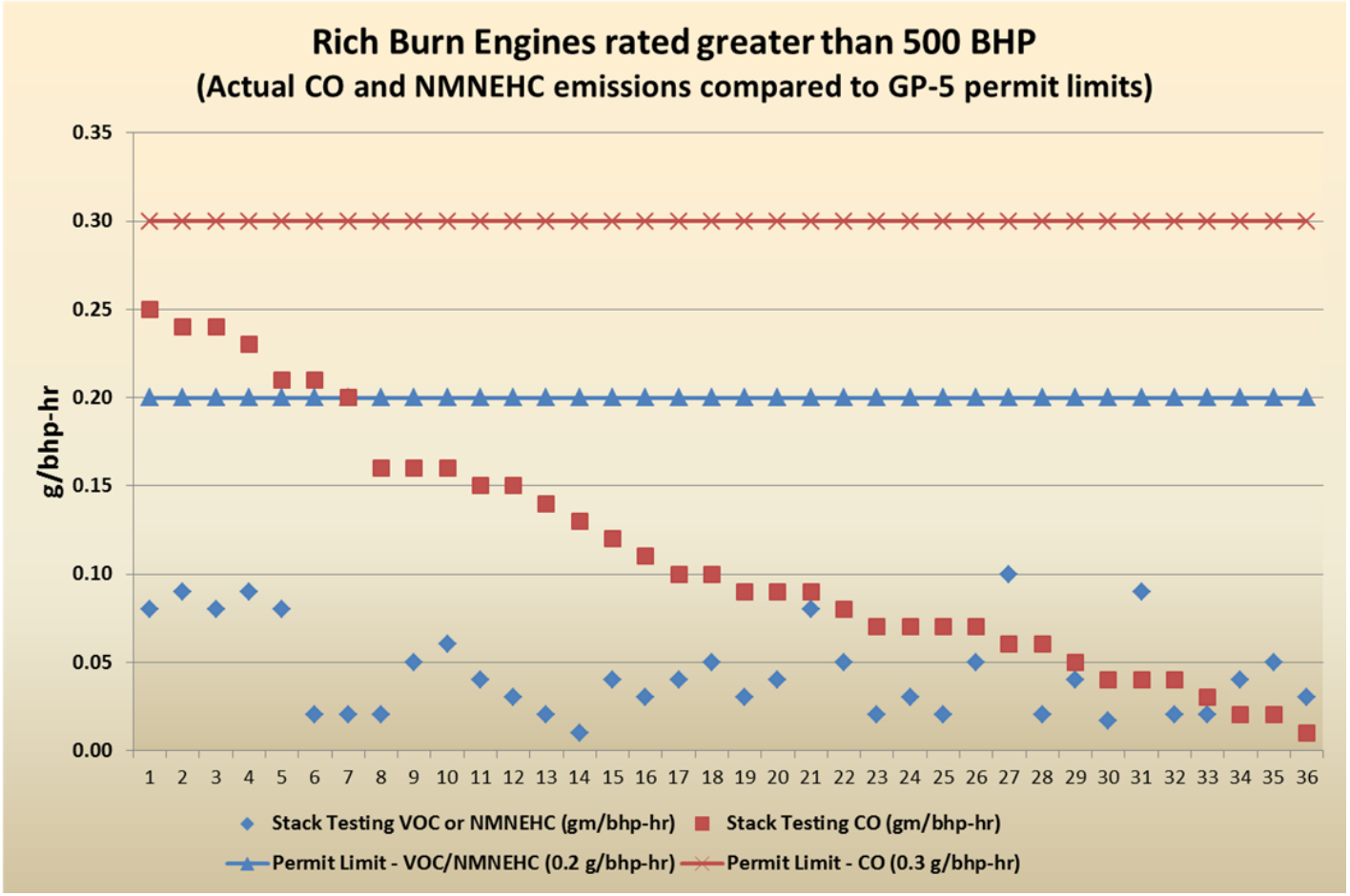
Actual emissions - CO, VOC



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FAQ for implementation of GP-5 and Exemption category No. 38

- The Department has posted a Frequently Asked Questions (FAQ) document concerning the implementation of GP-5 and Category No. 38 Exemption Criteria.

- The FAQ provides a clear explanation of the applicable requirements and answers questions often posed by owners and operators.

Links to GP-5 and FAQ documents

- GP-5 conditions and the application forms may be accessed at:

  http://www.elibrary.dep.state.pa.us/dsweb/View/Collection-9747

- The FAQ document can be found on DEP's website at:

  http://www.dep.state.pa.us/dep/deputate/airwaste/aq/permits/gp.htm

Questions??

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