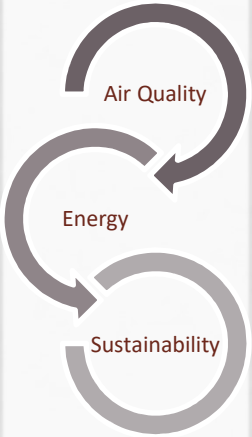
State of New Jersey
Department of Environmental Protection

DIVISION OF AIR QUALITY

AIR QUALITY, ENERGY, AND SUSTAINABILITY

NJDEP REGULATORY UPDATE

DECEMBER 6, 2018



Frank Steitz, Director

PRESENTATION OUTLINE

- Recent Rule Making
  - $PM_{2.5}$ Precursors
  - Permit Exemptions
  - Air Toxics
- Revisions to Technical Manuals 1002 & 1003
- Formaldehyde Emissions from ICE

PM 2.5 EPA RULE MAKING

EPA Actions	Daily	Annual
October 17, 2006 (*)	35 µg/m^3	15 µg/m^3
May 16, 2008 (Promulgation of Federal $PM_{2.5}$ NSR regulations for the 35 µg/m^3 (daily) and the 15 µg/m^3 (annual) standards)	13 Counties in non-attainment.	8 Counties in attainment

PM 2.5 EPA RULE MAKING

EPA Actions	Daily	Annual
January 15, 2013	35 µg/m^3	12 µg/m^3
August 13, 2013 (EPA re-designation of New Jersey for the 15 µg/m^3 and 35 µg/m^3 standards)	None	Entire State was designated in attainment
January 15, 2015 (EPA designation for the 12 µg/m^3	None	Entire State was designated in attainment

PM 2.5 & PRECURSOR EMISSIONS

- PM2.5 is emitted in two ways:
  - Primary - PM 2.5 discharged directly; and
  - Secondary- PM 2.5 emissions are formed downwind when precursor gases are transformed to fine particulates
- Combustion sources emit both primary PM2.5 emissions and PM2.5 precursors.

SO_2 AS PRECURSOR

	Federal Rule	New Jersey
SO_2	Always a precursor (May 16, 2008 FR)	N.J.A.C. 7:27-8, 18 and 22 were revised to include major source threshold and modification trigger for SO_2 as $PM_{2.5}$ precursor

NO_X AS PRECURSOR (*)

	Federal Rule	New Jersey
NOx	"presumed in" precursor. States may submit demonstration that NOx emissions in a specific area do not contribute significantly to ambient $PM_{2.5}$ concentrations (May 16, 2008 FR)	N.J.A.C. 7:27-8, 18 and 22 are revised to include major source threshold and modification trigger for NOx as $PM_{2.5}$ precursor

(*) NOx is also a precursor of ozone. NJ rule requires that permit applicant would need to secure NOx offsets only once based on the more stringent ratios of the two.

VOC & AMMONIA AS PRECURSOR

	Federal Rule	New Jersey
VOC and Ammonia	"Presumed out" precursors. States may submit demonstration that VOC and/or Ammonia emissions in a specific area contribute significantly to ambient PM2.5 concentrations (May 16, 2008 FR)	Entire New Jersey is designated in attainment. In New Jersey's re-designation request and maintenance SIP, VOC and Ammonia emission data provided that showed insignificant to ambient $PM_{2.5}$ concentrations. (December 2012 SIP and May 3, 2013 Submittal to EPA)

PM 2.5 & PRECURSOR NEW JERSEY RULE MAKING

- New Jersey Rule Amendments N.J.A.C. 7:27-8, 18, 21 & 22
  - Proposed March 20, 2017 (49 NJR 515)
  - Adopted November 6, 2017 (49 NJR 3511)
  - Submitted to EPA for inclusion in SIP December 14, 2017
  - Waiting for final EPA SIP approval

RESILIENCY, AIR TOXICS & EXEMPTIONS (RATE) RULEMAKING

- Amendments to N.J.A.C. 7:27-8, 17, 21 & 22
- Resulting from Department's Experiences after Super Strom Sandy
  - Exemptions from Permitting for Emergency Activities
  - Exemptions from Permitting for Portable and Temporary Activities
- Updates to Air Toxic Permitting
  - Updates 20 Year Old Provisions

RESILIENCY - DEFINITIONS

- "Emergency management activity" means an activity to mitigate against, prepare for, respond to, and recover from threatened or actual natural disasters, acts of terrorism, or other man-made disasters.
- "Portable" means not attached to a permanent foundation, and designed and capable of being carried or moved from one location to another by means of wheels, skids, carrying handles, dolly, trailer, platform, or similar device.

EXEMPTIONS FOR EMERGENCY MANAGEMENT ACTIVITIES

- Exempt from permitting: portable equipment used for emergency management activities
  - N.J.A.C. 7:27-8.2(d)17
  - Does not exempt equipment used for incineration/open burning
  - Does not include equipment located on site for more than 90 consecutive days
- Removal of 500 hours restriction for burning fuel oil during curtailment of natural gas supply

EXEMPTIONS FOR LOW-EMITTING TEMPORARY AND PORTABLE EQUIPMENT FROM PERMITTING

- Construction, Repair, & Maintenance (CRM)
  - N.J.A.C. 7:27-8.2(d)15 & 16
- Rental facilities (testing/maint/demo only)
  - N.J.A.C. 7:27-8.2(d)18
- Portable hard drive and paper shredders
  - N.J.A.C. 7:27-8.2(d)19
- Excavation and transfer of oil/sediment directly into vehicle
  - N.J.A.C. 7:27-8.2(d)20
- Baling/conveying of glass, plastic, cans, cardboard, and paper
  - N.J.A.C. 7:27-8.2(d)21

PERMIT EXEMPTION FOR CRM

- CRM Equipment
  - Portable
  - Limited to 1 year
- Equipment used to temporarily replace commercial fuel burning equipment
  - Portable
  - Located on site no longer than 90 days
  - Max rated heat input ≥ 1 MMBTU/HR
  - Stationary reciprocating engine w/max rated power output ≥ 37 kW
  - Below State of the Art (SOTA) thresholds
  - Notification to Enforcement
    - Prior to operation
    - Within 30 days after operation ceases

USE OF EMERGENCY GENERATOR FOR CRM

- Emergency generators used during infrequent non-emergency power disruptions
  - Power disruption that results from CRM
  - Limited to 30 days in any calendar year, not including normal testing and maintenance

AIR TOXICS

- Updated reporting thresholds to incorporate most recent science and technology
- Consolidated all reporting thresholds to N.J.A.C. 7:27-17
  - Move from N.J.A.C. 7:27-8 & 22
  - Updated N.J.A.C. 7:27-21 to reference N.J.A.C. 7:27-17

NEW REPORTING THRESHOLD VALUES

- List of HAP remains same
- Reporting Thresholds
  - ~65% decreased
    - Benzene: 400 lbs/yr to 6 lbs/yr (petroleum products)
    - Formaldehyde: 400 lbs/yr to 3.5 lbs/yr (ICE)
  - ~20% increased
    - Acetonitrile: 800 lbs/yr to 2,000 lbs/yr (synthetic rubber prod)
    - Phenol: 20 lbs/yr to 2,000 lbs/yr (resin prod)
    - Vinyl acetate: 200 lbs/yr to 2,000 lbs/yr (PVC prod)
- 11 TXS – two reporting thresholds (0.01 lbs/hr & lbs/yr)
- No change in SOTA thresholds

CONSOLIDATION OF REPORTING THRESHOLDS TO N.J.A.C. 7:27-17

- Applicability and application requirements still reside in N.J.A.C. 7:27-8 and 22
- Operating permits (N.J.A.C. 7:27-22)
  - New or modified filed on or after 2/12/18
  - Renewals (no mods) with expiration date on or after 2/12/21
- Preconstruction permits (N.J.A.C. 7:27-8)
  - New or modified only filed on or after 2/12/18
  - GP/GOP risk assessment done as part of development
- Emission Statement (N.J.A.C. 7:27-21)
  - Starting with 2018 emissions (reported in 2019)

RESILIENCY, AIR TOXICS & EXEMPTIONS (RATE) RULEMAKING

- New Jersey Rule Amendments N.J.A.C. 7:27-8, 17, 21 & 22
  - Proposed August 7, 2017(49 NJR 2373(a))
  - Adopted January 16, 2018 (50 NJR 454(a))
  - Submitted to EPA for inclusion in SIP August 23, 2018
  - Waiting for final EPA SIP approval

REVISIONS TO TECHNICAL MANUALS

- Technical Manuals
  - 1002 – Guidance on Preparing an Air Quality Modeling Protocol
  - 1003 – Guidance on Preparing a Risk Assessment for Air Contaminant Emissions
- Stakeholder process started in October 2017
- Published notice in the March 19, 2018 New Jersey Register requesting public comments
- Final updated Technical Manuals available beginning on December 3, 2018 at https://www.state.nj.us/dep/aqpp/techman.html

TECHNICAL MANUAL 1002

- National Ambient Air Quality Standards updated
- Model selection information revised to be consistent with revised 40 CFR Part 51, Appendix W, Guideline on Air Quality Models
- Updated background air quality information and guidance provided
- Improved meteorological data section with meteorological station details
- Special modeling considerations included
- Risk assessment modeling guidance
- NOx to NO2 conversion ratio

TECHNICAL MANUAL 1003

- Risk screening worksheet revised to be consistent with
  - Current air quality models
  - Recent meteorological data
- Procedure for facility-wide risk assessment outlined
- Deletions made
  - Applicability for having to conduct a risk assessment
  - Comprehensive risk assessments

PERMIT ISSUES
FORMALDEHYDE EMISSIONS

- Total VOC includes Formaldehyde
- Testing Challenges – Test Methods
- Formaldehyde Emissions are largely from Incomplete Combustion of Gaseous Fuels in Spark Ignited Engines
  - Natural Gas
  - Landfill Gas
  - Bio Gas
- Health Risk Issues

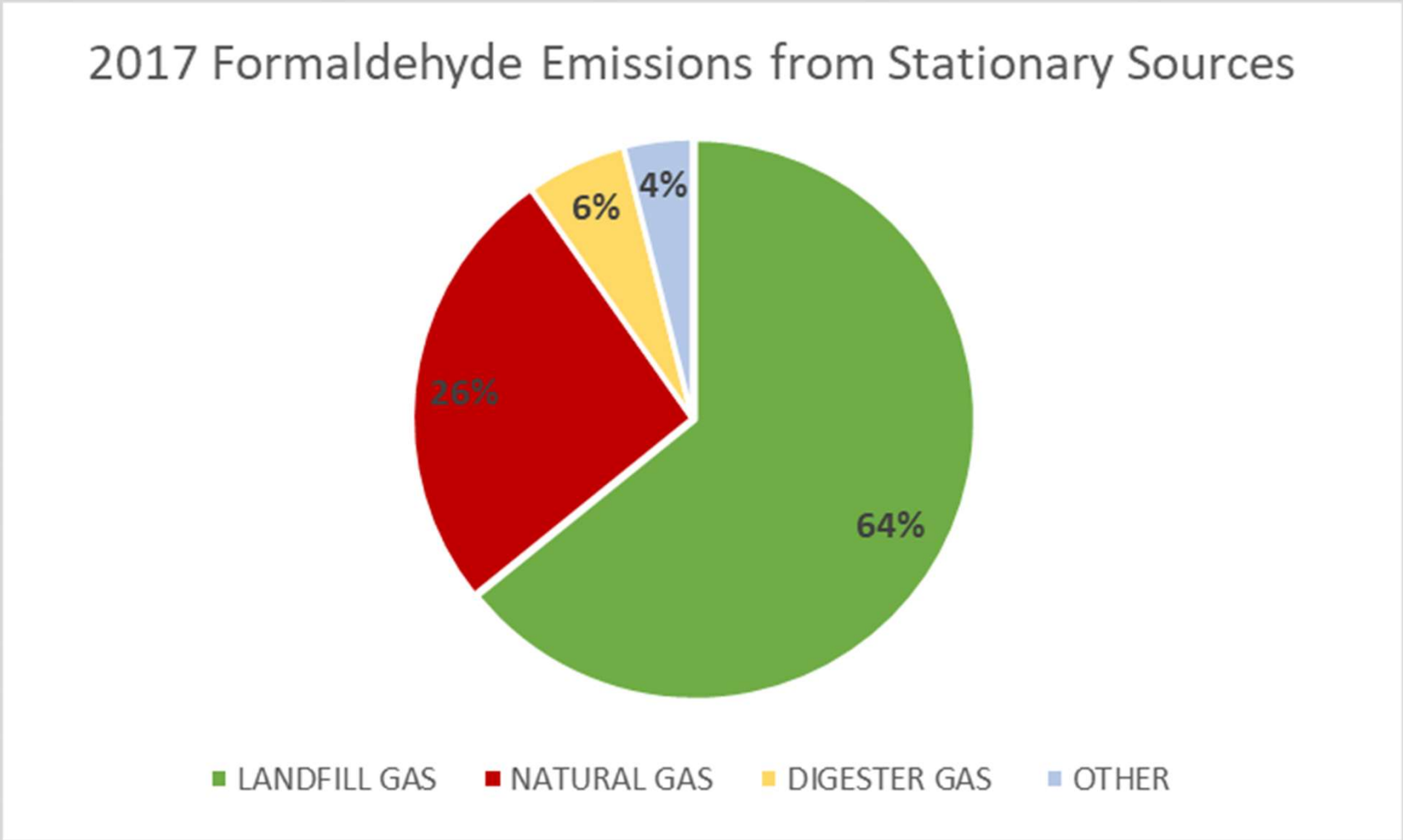
FORMALDEHYDE (HCHO)

- Colorless, flammable gas.
- Commonly known for its long-term carcinogenic effects (lung and nasopharyngeal cancer).
- Short-term effects include respiratory symptoms (coughing, chest pains).

<u>Sources</u>

Power plants, Manufacturing facilities, Incinerators, and other fuel combustion sources.

FORMALDEHYDE STATIONARY SOURCE EMISSIONS IN NEW JERSEY



STACK TESTING METHODS

- **NMHC/NMNEHC** – EPA Methods 25A and 18, or one or more of the Alternative Methods for these sources (ALT-066, ALT-078, ALT-096, ALT-097 and/or ALT-106).

- **Formaldehyde** – EPA Method 323 or Method 320. Note that EPA Method 316 is **not acceptable**, as it is specific to the Mineral Wool and Wool Fiberglass Industries.

- VOC (lb/hr) = NMHC/NMNEHC + HCHO

NATURAL GAS ENGINE STACK TEST FORMALDEHYDE EMISSIONS RATES

Fuel	Engine Type	Max Permitted Heat Input (MMbtu/hr)	HCHO (lb/MMbtu)	HCHO (lb/MMscf)	VOC (adjusted for HCHO) lb/MMbtu	Percent HCHO
NG	2-Stroke Lean Burn	20.3	0.104	106.08	1.651	6%
NG	2-StrokeLean Burn	20.3	0.100	102.00	0.395	25%
NG	2-Stroke Lean Burn	20.3	0.081	82.62	0.588	14%
NG	4-Stroke Lean Burn	18	0.033	33.66	0.095	35%
NG	4-Stroke Lean Burn	18	0.032	32.64	0.032	100%
NG	4-Stroke Lean Burn	18	0.025	25.50	0.241	10%
NG	4-Stroke Lean Burn	18	0.036	36.72	0.176	20%
NG	4-Stroke Lean Burn	18	0.039	39.78	0.039	100%
NG	4-Stroke Lean Burn	18	0.041	41.82	0.041	100%
NG	4-Stroke Lean Burn	18	0.042	42.84	0.042	100%
NG	4-Stroke Lean Burn	18	0.038	38.76	0.038	100%

LANDFILL GAS ENGINE STACK TEST FORMALDEHYDE EMISSIONS RATES

Fuel	Engine Type	Max Permitted Heat Input (MMbtu/hr)	HCHO (lb/MMbtu)	HCHO (lb/MMscf)	VOC (adjusted for HCHO) lb/MMbtu	Percent HCHO
LFG	4-Stroke Lean Burn	16.54	.061	34.16	.094	65%
LFG	4-Stroke Lean Burn	16.54	.027	15.12	.054	50%
LFG	4-Stroke Lean Burn	16.54	.002	1.12	.033	6%
LFG	4-Stroke Lean Burn	16.1	.071	39.76	.158	45%
LFG	4-Stroke Lean Burn	16.1	.072	40.32	.128	56%
LFG	4-Stroke Lean Burn	16.1	.076	42.56	.077	99%
LFG	4-Stroke Lean Burn	16.1	.066	36.96	.067	99%
LFG	4-Stroke Lean Burn	16.1	.064	35.80	.121	53%
LFG	4-Stroke Lean Burn	16.1	.065	36.40	.066	98%
LFG	4-Stroke Lean Burn	16.63	.099	55.44	.134	74%
LFG	4-Stroke Lean Burn	16.63	.113	63.28	.172	66%
LFG	4-Stroke Lean Burn	16.63	.103	57.68	.140	74%

FORMALDEHYDE CONTROL TECHNOLOGIES FOR ENGINES

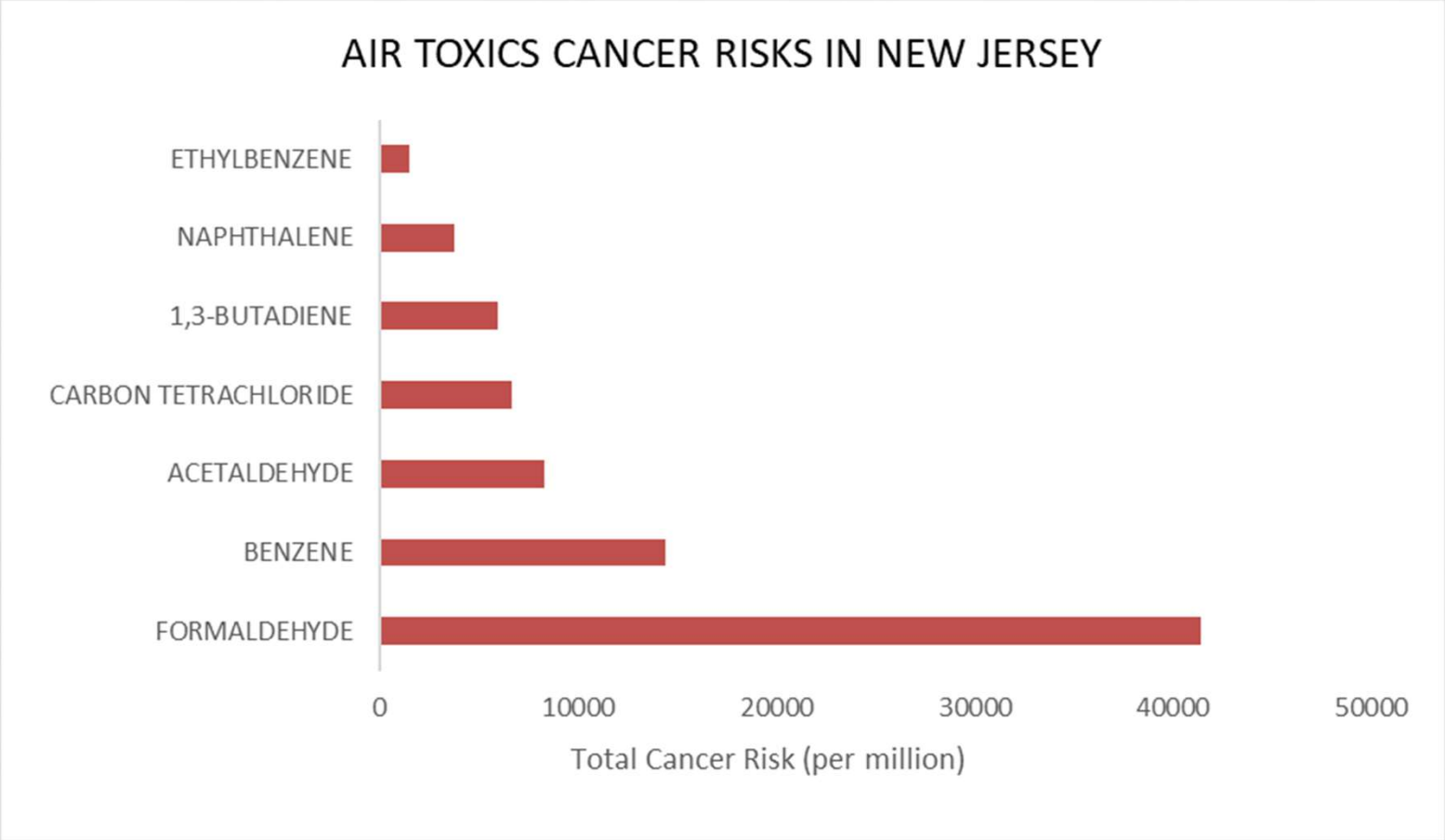
- Incomplete combustion of fuel gives rise to Products of Incomplete Combustion (PIC)
- Gas Quality directly impacts combustion
  - Pre-combustion cleanup of siloxane gases imperative to complete combustion of landfill gas
- Oxidation Catalyst is highly effective at reducing PIC

OXIDATION CATALYSIS OF NG ENGINES

Engine	CO Emissions (lb/hr)	Average CO Emissions (lb/hr)	HCHO Emissions (lb/hr)	Average HCHO emissions (lb/hr)	Heat input (MMbtu/hr)
Engine 1 (oxidation catalyst)	.13	.15	.024	.030	17.5
Engine 2 (oxidation catalyst)	.17		.026		16.1
Engine 3 (oxidation catalyst)	.07		.019		16.7
Engine 4 (oxidation catalyst)	.24		.049		17.1
Engine 5 (no catalyst)	7.31	7.08	.71	.72	18.1
Engine 6 (no catalyst)	6.94		.74		17.1
Engine 7 (no catalyst)	7.03		.75		16.8
Engine 8 (no catalyst)	7.03		.69		16.9

Data from 8 4-Stroke Lean Burn NG Engines at a New Jersey natural gas processing facility; 4 of the engines have been equipped with oxidation catalysis. The results demonstrate a 98% reduction in CO emissions, and a 96% reduction in HCHO emissions.

RISKS OF FORMALDEHYDE EMISSIONS IN NEW JERSEY



1. Based on data from the EPA 2011 NATA: Assessment Results available at <https://www.epa.gov/national-air-toxics-assessment/2011-nata-assessment-results#modeled>. Diesel PM may pose a greater level of cancer risk in New Jersey than formaldehyde, however, the cancer-specific risks of Diesel PM have not been evaluated in the 2011 NATA.

RE: Formaldehyde Emissions for Internal Combustion Engines
Program Interest #:
Permit Activity #:
NJID #:

Dear Permittee,

After consulting with our Federal Environmental Protection Agency counterparts, the Department determined that volatile organic compounds(VOC) and formaldehyde emissions emitted from internal combustion(IC) engines that combust gaseous fuels to include biogas, landfill gas, and natural gas have been underreported. Formaldehyde is a component of VOC emissions and must be property quantified for inclusion in the VOC emission limit established in approved air permits for these sources and any source test to determine compliance with established limits.

This letter serves as a notification that if your current approved air permit does not include formaldehyde in the VOC allowable, you must submit an administratively complete permit modification with the appropriate allowable limit expressed in mass emissions (lb/hr) as soon as possible, but no later than ninety (90 days) prior to the expiration date of your current permit. Please note that pursuant to New Jersey Administrative Codes 7:27-8 and 7:27-22 et. seq., emissions for all contaminants that are above reporting threshold must be included in any permit application.

The test methods typically used to quantify VOC emissions from IC engines do not measure or include formaldehyde. It is for this reason that effective immediately, upon submitting a test protocol in accordance with the terms of the air permit for IC engines that combust gaseous fuels, formaldehyde testing will be required to ensure that all VOC emissions are properly quantified pursuant to New Jersey Administrative Code 7:27-16.22 et. seq.

If you have any questions regarding this matter, please feel free to contact Kenneth Ratzman of the Bureau of Stationary Sources for questions regarding air permitting at 609-292-0834 or Michael Klein of the Emission Measurement Section for questions regarding source testing at 609-984-3443.

Sincerely,

Richelle B. Wormley, Director
Division of Air Enforcement

Francis Steitz, Director
Division of Air Quality

USEFUL WEBPAGES

- NJDEP - http://www.nj.gov/dep/
- Air Regulations - http://www.nj.gov/dep/aqm/
- Air Permitting - http://www.state.nj.us/dep/aqpp/
- Evaluation & Planning - http://www.nj.gov/dep/baqp/

QUESTIONS?

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