

10 November 2017

Permit and Emissions Review Denton Energy Center

Diane Fischer, Michael Fisher,
Mike Rinkol and Paul Lee

BUILDING A WORLD OF DIFFERENCE®



BLACK & VEATCH

About Black & Veatch



11,000+
Professionals

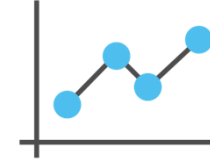
110+ offices

Six continents

7,000 active projects
worldwide.



\$3.2 Billion
in revenue in 2016.



1915
Year Established





Agenda

- Overview of Assignment and Conclusions
- Permitting Process
- DEC and Red Gate Facility and Emission Rates Comparison
- DEC Emissions Validation



Overview of Assignment and Conclusions

Michael Fisher
Project Manager



Black & Veatch Contracted as Independent Review

Project Description	Denton Energy Center (DEC) – twelve (12) reciprocating internal combustion engines (RICE) used for peaking purposes.
	Wärtsilä is RICE manufacturer, and Burns & McDonnell is the engineer and constructor.
Community Involvement	Surrounding community has concerns with permit application and permit process.
Assignment	Denton Municipal Electric (DME) retained Black & Veatch to perform independent analysis of permit process and application.
	DME requested that we compare the DEC to Red Gate.



Independent Engineering Consultant Review Conclusions

- The DEC permit application was filed correctly
 - DEC permit is valid and filed in accordance with EPA and TCEQ requirements

DEC Permit

Permitted as a peaking unit in an ozone non-attainment area

Minor Source

Standard Permit designation

3,200 hours per year - limit on number of hours each unit may operate



Independent Engineering Consultant Review Conc. (cont'd)

Black & Veatch has no concerns with the DEC project meeting the emissions limits in its permit

DEC has enhanced emissions control package

Emissions testing performed by a third party agency using procedures approved by the EPA and TCEQ, with witness by TCEQ and Black & Veatch

Industry Standard is for Emission Performance to be backed by contractual guarantee from engine manufacturer





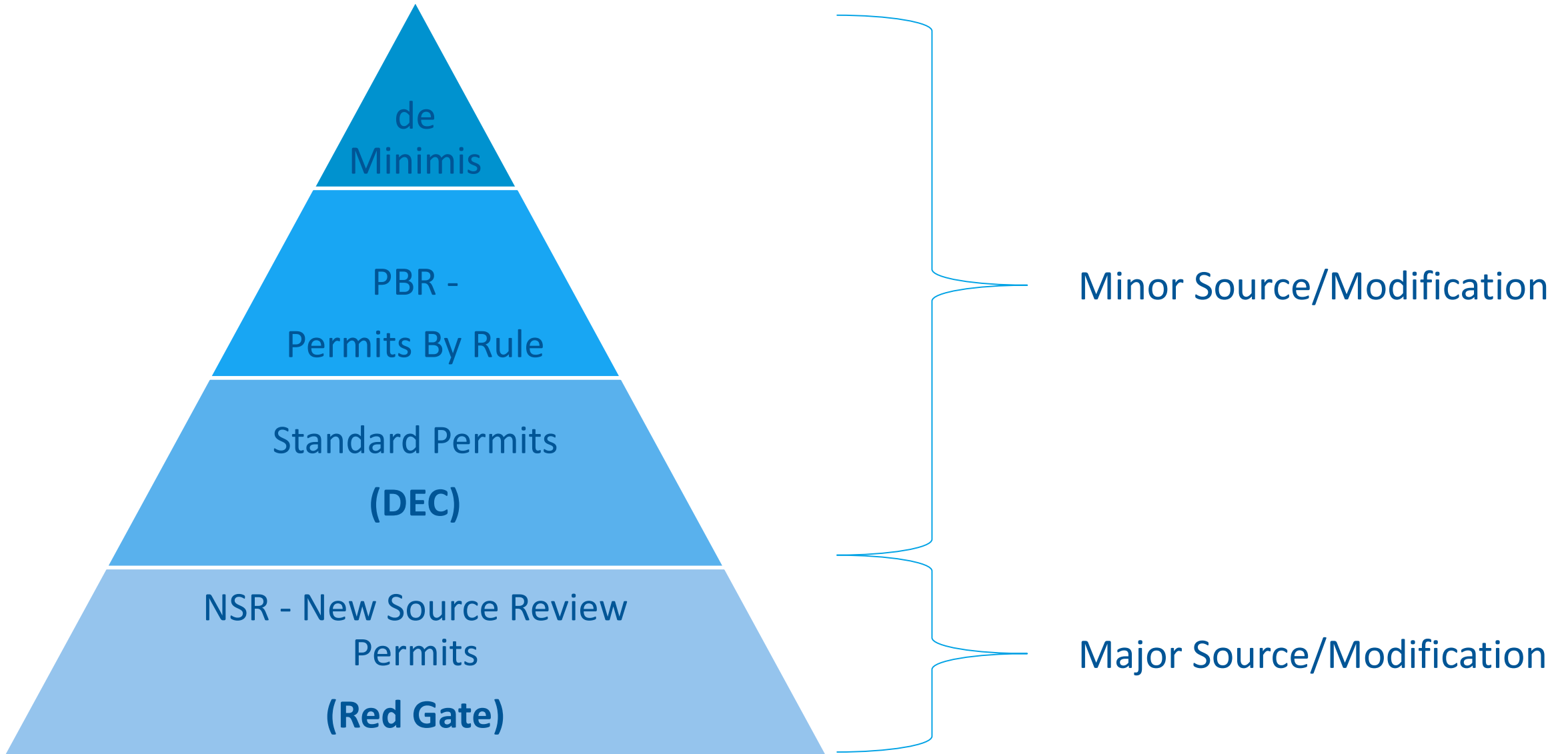
Permitting Process

Mike Rinkol

Environmental Engineer; Permitting Specialist

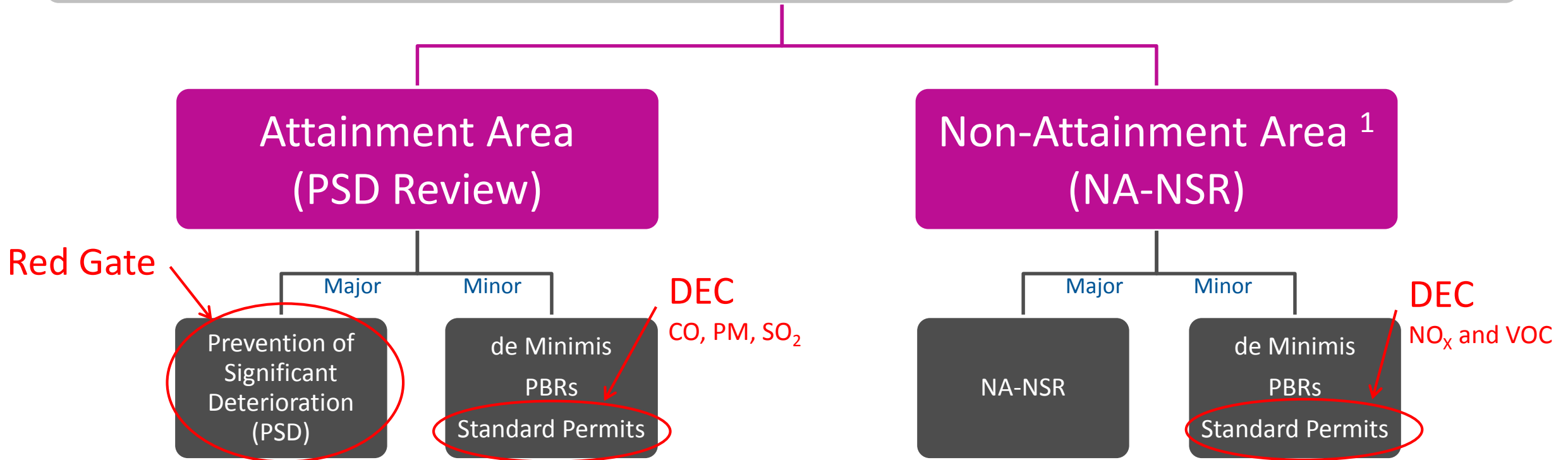


Permitting Hierarchy



Air Permitting

New Source Review



¹ Non-Attainment is an area that has not achieved compliance with the National Ambient Air Quality Standards



DEC and Red Gate Facility and Emission Rates Comparison

Paul Lee
Air Quality Control Engineer



Facility Comparison

Description	DEC	Red Gate
Facility Type	Peaking (3,200 hours)	Baseload (8,760 hours)
Permit Type	Standard Permit	PSD
Control Equipment	Selective Catalytic Reduction - SCR (NO _x) Oxidation Catalyst (CO, VOC)	Selective Catalytic Reduction - SCR (NO _x) Oxidation Catalyst (CO, VOC)



Emission Rates for DEC and Red Gate

- DEC's NO_x, SO₂, VOC, and H₂SO₄ emission rates are noticeably lower
- DEC's CO emission rate is slightly lower

POLLUTANT	DEC	RED GATE	DEC TO RED GATE
	(lb/mmBtu)	(lb/mmBtu)	(% difference)
CO	0.032	0.039	18% lower
NO _x	0.0086	0.030	71% lower
PM	0.021	0.020	5% higher
PM ₁₀	0.021	0.020	5% higher
PM _{2.5}	0.021	0.020	5% higher
SO ₂	0.00059	0.0028	79% lower
VOC	0.013	0.039	67% lower
Lead	--	--	
H ₂ SO ₄	0.000090	0.00043	79% lower
CO ₂ e	117.1	117.1	same

*BOLD value represents higher emission rates.





Control Technologies

- Wärtsilä offers enhanced emissions packages for improved emission control
 - Higher performing SCR and oxidation catalysts
 - DEC utilizes the enhanced emission package
- Emission guarantees are “make-good”





DEC Emissions Validation

Paul Lee

Air Quality Control Engineer





How are DEC Emissions Validated?

- **Validated with Physical Testing**
 - Run Engines
 - Third Party Testing
 - Witnessed by TCEQ
- **Test Results Submitted to TCEQ**
 - Test results must be approved to receive Operating Permit
- **Operations**
 - Has a Continuous Emissions Monitoring System (CEMS) to validate during operation



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