Stationary RICE NESHAP

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RICE NESHAP – Overview

- 40 CFR part 63 subpart ZZZZ

- Regulates emissions from stationary reciprocating internal combustion engines (RICE) at both major and area sources of hazardous air pollutants
  - All sizes of engines are covered
  - Estimate more than 1 million stationary RICE in U.S.

- Typical applications include:
  - Power generation (including emergency backup power)
  - Oil and gas production and transmission
  - Pumping water (wastewater, irrigation, fire suppression)
  - Industrial process (compressors, rock crushers, welders)

Acronyms

- CI: compression ignition (diesel)
- SI: spark ignition (gas [natural gas, landfill gas, gasoline, propane, etc.])
  - 2SLB: 2-stroke lean burn
  - 4SLB: 4-stroke lean burn
  - 4SRB: 4-stroke rich burn
  - LFG/DG: landfill gas/digester gas

- Notes:
  - 2-stroke: power cycle completed in 1 revolution of crankshaft
  - 4-stroke: power cycle completed in 2 revolutions of crankshaft
  - Lean burn: higher air/fuel ratio (fuel-lean)
  - Rich burn: lower air/fuel ratio (fuel-rich)

Stationary vs. Nonroad

- Stationary means not used in a motor vehicle and not a nonroad engine
  - Nonroad engines are:
    - Self-propelled (tractors, bulldozers)
    - Propelled while performing their function (lawnmowers)
    - Portable or transportable (has wheels, skids, carrying handles, dolly, trailer, or platform)
      - Portable nonroad becomes stationary if it stays in one location for more than 12 months (shorter time period if seasonal source)

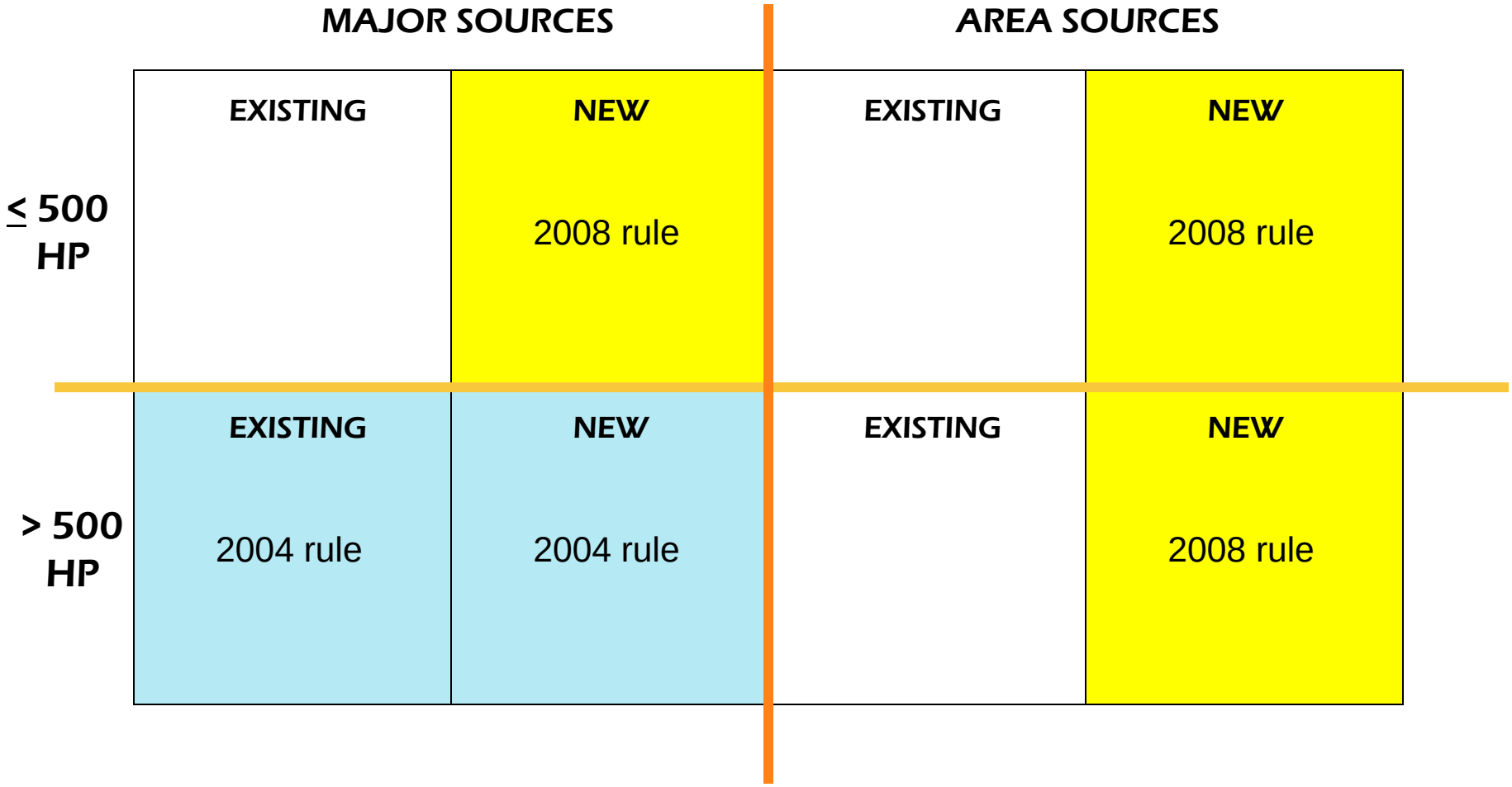
VS.

RICE NESHAP: 2004

	MAJOR SOURCES		AREA SOURCES	
	EXISTING	NEW	EXISTING	NEW
≤ 500 HP				
	EXISTING	NEW	EXISTING	NEW
> 500 HP	2004 rule	2004 rule		

Covered engines > 500 HP located at major sources

RICE NESHAP: 2008



Added new engines ≤ 500 HP located at major sources, plus all new engines at area sources

RICE NESHAP: 2010

	MAJOR SOURCES		AREA SOURCES	
	EXISTING	**NEW**	**EXISTING**	**NEW**
≤ 500 HP	2010 rules	2008 rule	2010 rules	2008 rule
	EXISTING	**NEW**	**EXISTING**	**NEW**
> 500 HP	2004 rule 2010 rule (non-emergency CI)	2004 rule	2010 rules	2008 rule

Added existing engines ≤ 500 HP located at major sources, all existing engines at area sources, and existing non-emergency CI engines >500 HP at major sources

RICE NESHAP Applicability

- Engines >500 HP at major source
  - Existing if constructed before December 19, 2002
  - New if constructed on or after December 19, 2002
  - Reconstructed if reconstruction began after December 19, 2002
- Engines ≤500 HP located at major source of HAP, and engines of all HP located at an area source of HAP
  - Existing if constructed before June 12, 2006
  - New if constructed on or after June 12, 2006
  - Reconstructed if reconstruction began after June 12, 2006

- Existing emergency engines located at residential, institutional, or commercial area sources are not covered
  - Engine must meet subpart ZZZZ definition of emergency engine

Emission Standards – Existing RICE Located at Major Sources

HP	Engine Subcategory					
	Non-emergency					Emergency
	CI	SI 2SLB	SI 4SLB	SI 4SRB	SI LFG/DG	
<100	Work practice standards					Work practice standards
100-300	230 ppm CO	225 ppm CO	47 ppm CO	10.3 ppm CH_2O	177 ppm CO	
300-500	49 ppm CO or 70% CO reduction					
>500	23 ppm CO or 70% CO reduction	No standards (2004 rule)	No standards (2004 rule)	350 ppb CH_2O or 76% CH_2O reduction (2004 rule)	No standards (2004 rule)	No standards (2004 rule)

Limits in yellow are expected to require emissions control retrofit

Note: Existing limited use engines >500 HP at major sources do not have to meet any emission standards. Existing black start engines ≤500 HP at major sources must meet work practice standards.

Emission Standards – Existing RICE Located at Area Sources

HP	Engine Subcategory					
	Non-emergency					Emergency or Black start
	CI	SI 2SLB	SI 4SLB	SI 4SRB	SI LFG/DG	
≤300	Mgmt practice standards	Mgmt practice standards	Mgmt practice standards	Mgmt practice standards	Mgmt practice standards	Mgmt practice standards
300–500	49 ppm CO or 70% CO reduction*					
>500	23 ppm CO or 70% CO reduction*		47 ppm CO or 93% CO reduction**	2.7 ppm CH_2O or 76% CH_2O reduction**		

Limits in yellow are expected to require emissions control retrofit

*Except engines in rural Alaska
**If engine used >24 hrs/yr

Emission Standards – New RICE Located at Major Sources

HP	Engine Subcategory					
	Non-emergency					Emergency
	CI	SI 2SLB	SI 4SLB	SI 4SRB	SI LFG/DG	
≤250	Comply with CI NSPS	Comply with SI NSPS	Comply with SI NSPS	Comply with SI NSPS	Comply with SI NSPS	Comply with CI/SI NSPS
250–500			14 ppm CH_2O or 93% CO reduction (also comply with SI NSPS)			
>500	580 ppb CH_2O or 70% CO reduction (also comply with CI NSPS)	12 ppm CH_2O or 58% CO reduction (also comply with SI NSPS)		350 ppb CH_2O or 76% CH_2O reduction (also comply with SI NSPS)	No standards (also comply with SI NSPS)	No standards (also comply with CI/SI NSPS)

Limits in yellow are expected to require emissions control retrofit

Notes: New limited use engines >500 HP at major sources do not have to meet any emission standards under the NESHAP. New engines may also be subject to the NSPS.

Emission Standards – New RICE Located at Area Sources

- Meet Stationary Engine NSPS
  - CI: part 60 subpart IIII
  - SI: part 60 subpart JJJJ

Why do some engines at area sources have more stringent requirements than similar engines at major sources?

HAP Emission Controls

- CI and SI lean burn engines
  - Oxidation catalyst
    - Estimated capital cost:
      - CI: $27.4*HP – $939
      - SI 4SLB: $12.8*HP + $3,069
    - Estimated annual cost:
      - CI: $4.99*HP + $480
      - SI 4SLB: $1.81*HP + $3,442
- SI 4SRB engines
  - Non-selective catalytic reduction (3-way catalyst)
    - Estimated capital cost: $24.9*HP + $13,118
    - Estimated annual cost: $4.77*HP + $5,679

Emergency Engine Requirements

- No limits on hours of operation for emergency service
- Maintenance checks & readiness testing limited to 100 hrs/yr
  - If engine is >500 HP, located at a major source, and installed prior to June 12, 2006, there is no limit on maintenance/testing hours
- 50 hrs/yr allowed for non-emergencies
  - Counts as part of the 100 hr/yr maintenance & testing limit
- Engine cannot be used for peak shaving or as part of financial arrangement with another entity, except 15 of the 50 non-emergency hrs/yr can be used for demand response in emergency situations (e.g., imminent blackout)
  - Engines that are >500 HP, located at a major source, and installed prior to June 12, 2006 do not have the allowance for 15 hours of demand response

Compliance Requirements

Engine Subcategory	Compliance Requirements
•Existing non-emergency CI ≥100 HP at major source •Existing non-emergency SI 100-500 HP at major source •Existing non-emergency CI >300 HP at area source •Existing non-emergency SI >500 HP at area source that are 4SLB or 4SRB and are used >24 hours/year	•Initial emission performance test •Subsequent performance testing every 8,760 hours of operation or 3 years for engines >500 HP (5 years if limited use) •Operating limitations – catalyst pressure drop and inlet temperature for engines >500 HP •Notifications •Semiannual compliance reports (annual if limited use) Existing non-emergency CI >300 HP: •Ultra low sulfur diesel (except rural Alaska) •Crankcase emission control requirements

Compliance Requirements

Engine Subcategory	Compliance Requirements
Existing engines: •<100 HP at major source •Emergency/black start ≤500 HP at major source •Emergency/black start at area source •Non-emergency CI ≤300 HP at area source •Non-emergency SI ≤500 HP at area source •Non-emergency SI 2SLB >500 HP at area source •Non-emergency SI LFG/DG >500 HP at area source •Non-emergency SI >500 HP at area source that are 4SLB or 4SRB and are used ≤24 hours/year	•Change oil/filter, inspect air cleaner or spark plugs, hoses/belts on prescribed schedule •Operate/maintain engine & control device per manufacturer's instructions or owner-developed maintenance plan •May use oil analysis program instead of prescribed oil change frequency •Emergency engines must have hour meter and record hours of operation •Keep records of maintenance •Notifications not required

Compliance Requirements

Engine Subcategory	Compliance Requirements
•Existing/new non-emergency 4SRB >500 HP at major source •New non-emergency SI 2SLB >500 HP at major source •New non-emergency SI 4SLB >250 HP at major source •New non-emergency CI>500 HP at major source	•Initial emission performance test •Subsequent performance testing semiannually (can reduce frequency to annual)* •Operating limitations – catalyst pressure drop and inlet temperature •Notifications •Semiannual compliance reports

*Subsequent testing required for 4SRB engine complying with CH2O % reduction only if engine is ≥5,000 HP

Compliance Requirements

Engine Subcategory	Compliance Requirements
•New emergency/limited use >500 HP at major source	•Initial notification only
•New non-emergency LFG/DG >500 HP at major source	•Initial notification •Monitor/record fuel usage daily •Annual report of fuel usage

Notifications and Reporting

- Notifications
  - applicability [120 days after effective date] or construction/reconstruction
  - actual startup [15 days after actual startup]
  - performance test [60 days prior to test]
  - initial notification of compliance [60 days after compliance demonstrated]
- Compliance reports are semiannual or annual depending on engine
- With one exception, notifications/reports generally required only for engines subject to numeric CO or formaldehyde limits)
  - Initial notification only for new engines >500 HP at major sources that are emergency, limited use, or LFG/DG

Startup, Shutdown, Malfunction: Response to Court Decision

- Emission standards apply during shutdowns and malfunctions
- Startup and idling time must be kept to 30 minutes or less, after which, normal standards apply
- Also applies to engines covered by 2004 and 2008 RICE NESHAP

Key Dates

- Initial applicability notifications for engines subject to 2010 amendments were due by:
  - August 31, 2010 for existing CI RICE
  - February 16, 2011 for existing SI RICE
- Compliance dates:
  - June 15, 2007
    - Existing RICE >500 HP at major sources (except non-emergency CI >500 HP at major sources)
  - May 3, 2013
    - Existing CI RICE (except emergency CI >500 HP at major sources
  - October 19, 2013
    - Existing SI RICE ≤500 HP at major sources and all HP at area sources
  - Upon startup for new engines

RICE NESHAP – Next Steps

- Petitions for reconsideration and review
  - 15 hours for emergency demand response
  - Requirements for existing non-emergency SI engines >500 HP at area sources
  - Emission limits for existing non-emergency SI engines ≤500 HP at major sources
- Implementation materials
  - http://www.epa.gov/ttn/atw/rice/ricepg.html#IMP
    - Example notifications
    - Example compliance reports
    - Applicability flow chart
    - Summary table with applicable requirements
    - Implementation software

Stationary CI Engine NSPS

- 40 CFR part 60 subpart IIII
- Affects new, modified, and reconstructed stationary CI engines
- Initially promulgated on July 11, 2006
- Amendments signed June 8, 2011

Who is Subject to the CI NSPS?

- Manufacturers of 2007 model year or later stationary CI engines <30 liters/cylinder displacement
  - Model years differ for fire pump engines

- Owners/operators of engines
  - constructed (ordered) after 7/11/2005 and manufactured after 4/1/2006 (7/1/2006 for fire pump engines)
  - modified/reconstructed after 7/11/2005

Emission Standards

- Phased in over several years and have Tiers with increasing levels of stringency
- Output-based, units of g/KW-hr (g/HP-hr)
- Pollutants: NOx, PM, CO, NMHC
- Smoke standards as a %
- SOx reduced through use of low sulfur fuel
- Modeled after EPA's standards for nonroad and marine engines

CI Engine NSPS – Compliance

- Engine manufacturers must certify 2007 model year and later engines with a displacement <30 liters/cylinder
  - Certification = EPA Certificate of Conformity
- Owner/operator complies by:
  - Purchasing certified engine
  - Install, configure, operate and maintain engine per manufacturer's instructions or manufacturer-approved procedures
  - Owner/operator performance testing not required

Stationary SI Engine NSPS

- 40 CFR part 60 subpart IIII
- Affects new, modified, and reconstructed stationary SI engines
- Initially promulgated on January 18, 2008
- Amendments signed June 8, 2011

Who is Subject to the SI NSPS?

- Manufacturers of stationary SI engines:
  - ≤25 HP and manufactured on/after 7/1/2008
  - >25 HP, gasoline or rich burn LPG, manufactured on/after 7/1/2008 (on/after 1/1/2009 for emergency engines)
  - voluntarily certified engines manufactured on/after
    - 7/1/2007 >500 HP (except lean burn 500≤HP<1,350)
    - 1/1/2008 lean burn 500≤HP<1,350
    - 7/1/2008 <500 HP
    - 1/1/2009 emergency engines

Who is Subject to the SI NSPS? (cont'd)

Owners/operators of engines:

- constructed after 6/12/2006 and
  - >500 HP manufactured on/after 7/1/2007 (except lean burn 500≤HP<1,350)
  - lean burn 500≤HP<1,350 manufactured on/after 1/1/2008
  - <500 HP manufactured on/after 7/1/2008
  - emergency >25 HP manufactured on/after 1/1/2008
- modified/reconstructed after 6/12/2006

Emission Standards

- Phased in over several years and have Tiers with increasing levels of stringency
- Output-based, units of g/KW-hr (g/HP-hr)
- ppmvd@15% O_2 standards for some engines
- Pollutants: NOx, CO, VOC
- Sulfur limit on gasoline
- Some standards modeled after EPA's standards for nonroad SI engines

SI Engine NSPS – Compliance

- Engine manufacturers must certify engines ≤25 HP, gasoline engines, and rich burn LPG engines
- Engine manufacturers can elect to certify other engines
- Owner/operator complies by either:
  - If certified engine, install, configure, operate and maintain engine per manufacturer's instructions or manufacturer-approved procedures
  - If uncertified, conduct performance test (requirements vary depending on engine size)

Contact Information

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