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Emergency Engines
The Basics and Lessons Learned

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Agenda

- Introduction
- The Rules
- Rule Applicability
- Lessons Learned

The Rules

National Emissions Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines

- RICE MACT (NESHAP)
- 40 CFR Part 63 Subpart ZZZZ (40 CFR 63.6580-63.6675)
- Both Compression Ignition and Spark Ignition
- New, existing, and reconstructed engines

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The Rules

Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

- NSPS IIII
- 40 CFR Part 60 Subpart IIII (40 CFR 60.4200-4219)
- New Compression Engines

Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

- NSPS JJJJ
- 40 CFR Part 60 Subpart JJJJ (40 CFR 60.4230-4248)
- New Spark Engines

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Applicability

- Major or Area Source
  - Combined HAPs ≥ 25 tpy and Maximum Individual HAP ≥ 10 tpy
- Compression or Spark Engine
- New or Existing Engine
- Emergency or Non-Emergency

Dates to Know

- NSPS IIII – CI ICE
  - Ordered after 7/11/05 and manufactured after 4/1/06
- NSPS JJJJ – SI ICE
  - Ordered after 6/12/06 and manufactured after, depending on engine type, 7/1/07, 1/1/08, 7/1/08, 1/1/09
- MACT ZZZZ – All RICE
  - Existing or new source provisions depend on if the engine was constructed (i.e., contracted to be installed "on site") before or after 6/12/06

    (12/19/02 for major source RICE > 500 hp)

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Applicability Tools

- EPA Applicability Tools
  - RICE NESHAP - https://www.epa.gov/stationary-engines/implementation-tools-neshap-reciprocating-internal-combustion-engines
  - NSPS IIII – https://www.epa.gov/stationary-engines/implementation-tools-nsps-compression-ignition-internal-combustion-engines
  - NSPS JJJJ - https://www.epa.gov/stationary-engines/implementation-tools-nsps-spark-ignition-internal-combustion-engines
- Trinity Flowcharts
- GM Engine Applicability Chart

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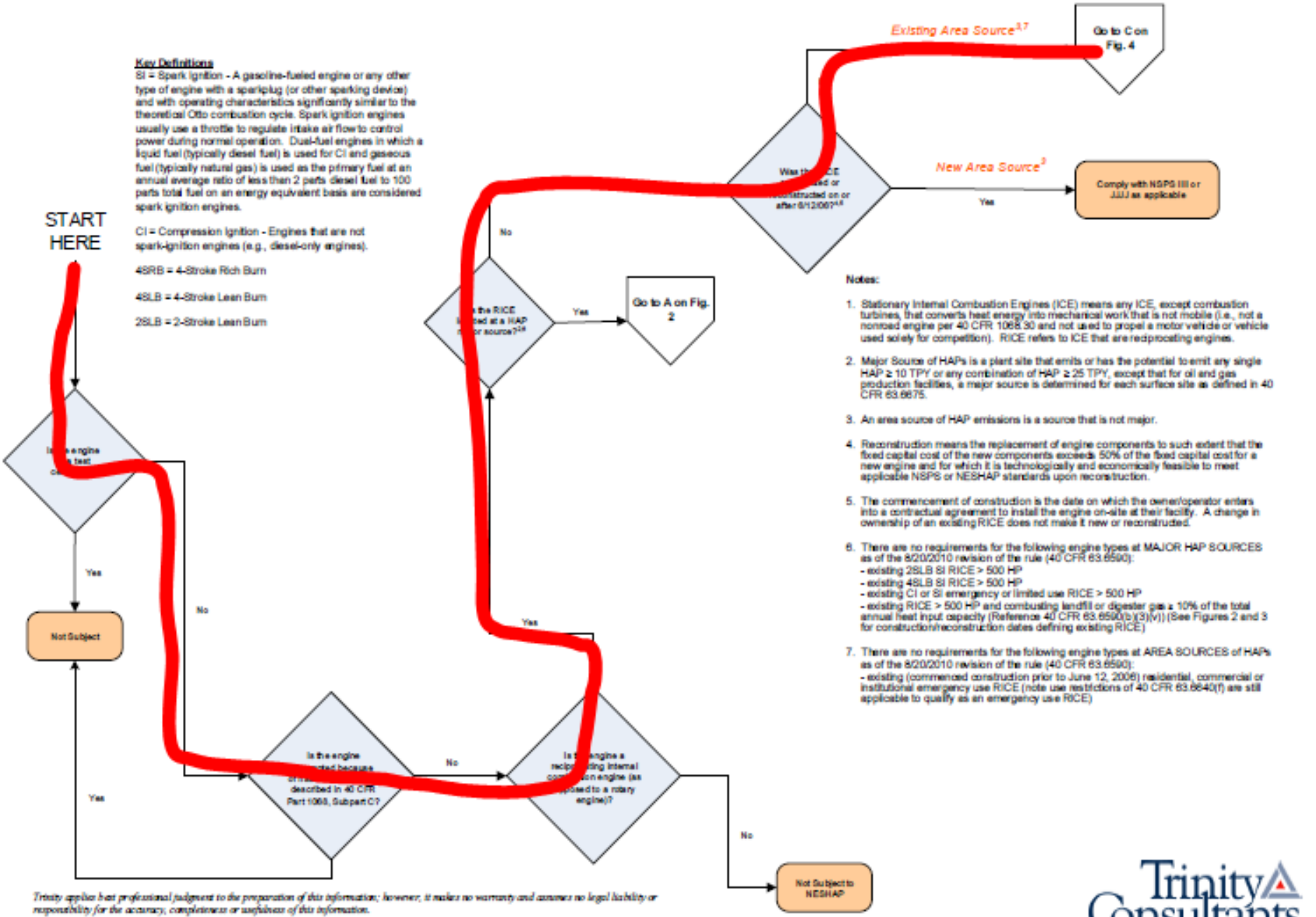
Applicability Flowchart for 40 CFR 63 ZZZZ (RICE[1] MACT)

Figure 1 – Applicability



Notes:

1. Stationary Internal Combustion Engines (ICE) means any ICE, except combustion turbines, that converts heat energy into mechanical work that is not mobile (i.e., not a nonroad engine per 40 CFR 1068.30 and not used to propel a motor vehicle or vehicle used solely for competition). RICE refers to ICE that are reciprocating engines.
2. Major Source of HAPs is a plant site that emits or has the potential to emit any single HAP ≥ 10 TPY or any combination of HAP ≥ 25 TPY, except that for oil and gas production facilities, a major source is determined for each surface site as defined in 40 CFR 63.6675.
3. An area source of HAP emissions is a source that is not major.
4. Reconstruction means the replacement of engine components to such extent that the fixed capital cost of the new components exceeds 50% of the fixed capital cost for a new engine and for which it is technologically and economically feasible to meet applicable NSPS or NESHAP standards upon reconstruction.
5. The commencement of construction is the date on which the owner/operator enters into a contractual agreement to install the engine on-site at their facility. A change in ownership of an existing RICE does not make it new or reconstructed.
6. There are no requirements for the following engine types at MAJOR HAP SOURCES as of the 8/20/2010 revision of the rule (40 CFR 63.6590):
   - existing 2SLB SI RICE > 500 HP
   - existing 4SLB SI RICE > 500 HP
   - existing CI or SI emergency or limited use RICE > 500 HP
   - existing RICE > 500 HP and combusting landfill or digester gas ≥ 10% of the total annual heat input capacity (Reference 40 CFR 63.6590(b)(3)(v)) (See Figures 2 and 3 for construction/reconstruction dates defining existing RICE)
7. There are no requirements for the following engine types at AREA SOURCES of HAPs as of the 8/20/2010 revision of the rule (40 CFR 63.6590):
   - existing (commenced construction prior to June 12, 2006) residential, commercial or institutional emergency use RICE (note use restrictions of 40 CFR 63.6640(f) are still applicable to qualify as an emergency use RICE)

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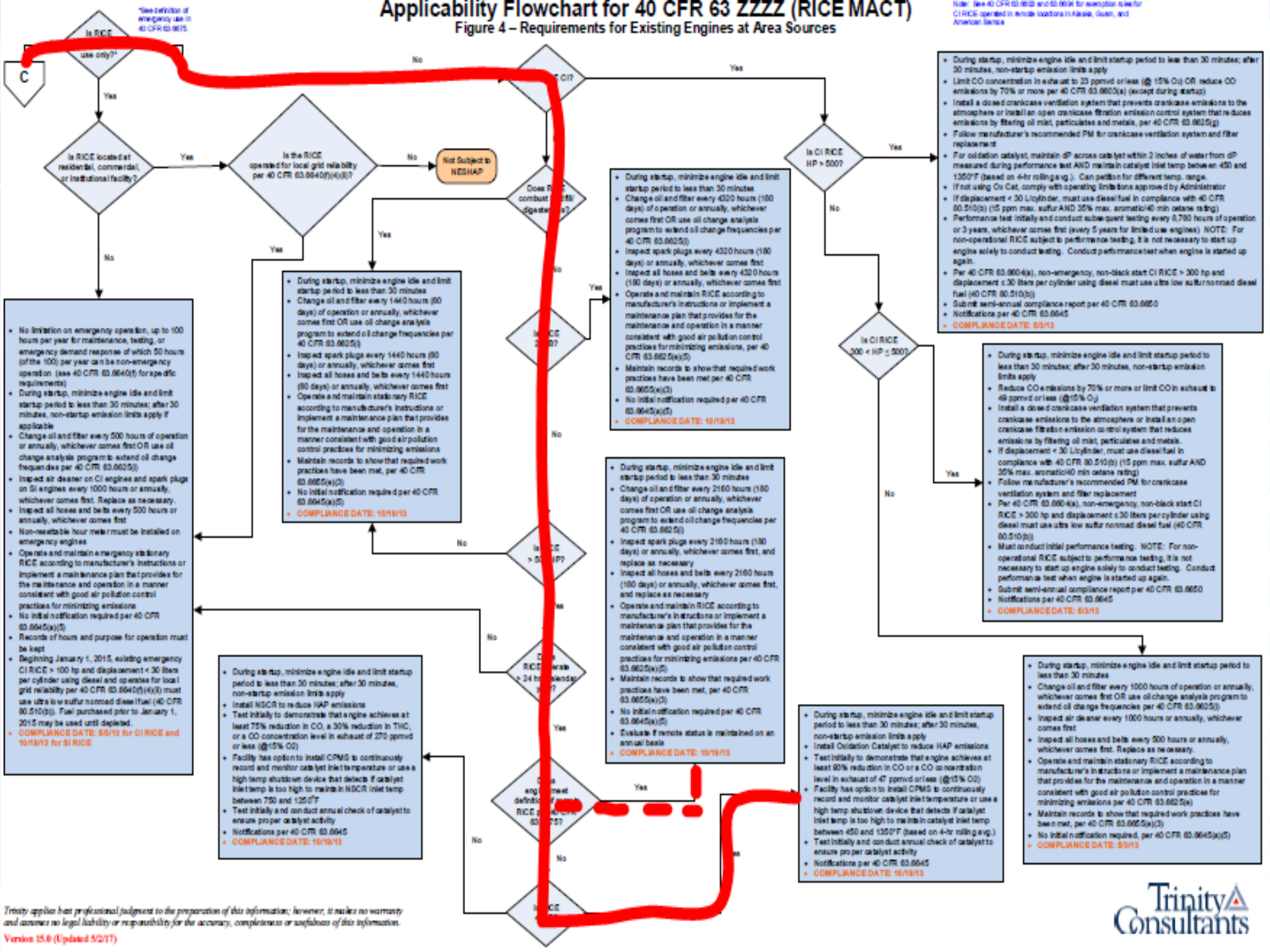
Applicability Flowchart for 40 CFR 63 ZZZZ (RICE MACT)

Figure 4 – Requirements for Existing Engines at Area Sources



Version 15.0 (Updated 5/2/17)

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Emergency Engine Rule Applicability

Major / Area	Compression / Spark	HP Rating	Date of Install	New / Existing	RICE MACT	NSPS IIII	NSPS JJJJ
Area	Compression	any	before 6/12/06	Existing	affected source with applicable requirements	NA	NA
Area	Compression	any	after 6/12/06	New	affected source, with no requirements	applicable requirements	NA
Area	Spark	>25 HP	after 6/12/06 but manufactured before 1/1/09	New	affected source, with no requirements (donut hole)	NA	NA
Area	Spark	any	after 6/12/06 but manufactured after 1/1/09	New	affected source, with no requirements	NA	applicable requirements
Major	Compression	>500 HP	before 12/19/02	Existing	affected source with no requirements	NA	NA
Major	Compression	>500 HP	after 12/19/02	New	affected source where only requirement is the initial notification	applicable requirements	NA
Major	Compression	<=500 HP	before 6/12/06	Existing	affected source with applicable requirements	NA	NA
Major	Compression	<=500 HP	after 6/12/06	New	affected source with no requirements	applicable requirements	NA
Major	Spark	>500 HP	before 12/19/02	Existing	affected source with no requirements	NA	NA
Major	Spark	>500 HP	after 12/19/02	New	affected source where only requirement is the initial notification	NA	applicable requirements
Major	Spark	<=500 HP	before 6/12/06	Existing	affected source with applicable requirements	NA	NA
Major	Spark	<=500 HP	after 6/12/06	New	affected source with no requirements	NA	applicable requirements

Lessons Learned

- Emission Calculation Cautions
- Emission Factor Concerns
- Stationary vs. Nonroad (temporary units?)
- Emergency Units

1. Emission Calculation Cautions

- Conversions between output (hp) and input (MMBtu) units
  - Do not use 2,544 Btu/hp-hr directly!
  - Engines are not very efficient (30 to 40+ %)
  - It actually takes ~6,000 to 7,000 Btu/hr of fuel heat input to generate 1 hp of mechanical power output
- Improper Fuel Heating Value
  - Lower Heat Value (LHV) is used by manufacturers
  - Higher Heat Value (HHV) is used by EPA
  - The difference, which is the heat lost to water vaporization, is fuel-specific, significant (~10 % for methane NG)

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2. Where Do You Get Emission Factors?

- CEMS or testing
  - Use EPA and State-approved methods
  - Testing is highly credible, but only a snapshot in time
- Vendor-Provided Data
  - Watch for exclusions (e.g., formaldehyde)
- Published “average” factors
  - AP-42, CARB, others
- Compare to any applicable regulations
  - But don’t necessarily use Tier standards to set PTE
    - They apply to the family of engines as an average
    - Tier standards for CO for small engines are very large (10+ X AP-42 factor)

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3a. Stationary vs. Nonroad

- "Nonroad" engines are not "stationary" and are therefore not subject to IIII, JJJJ, and ZZZZ
  - EPA 420-F-02-034 (9/2002) for definition of "stationary"
- Nonroad engine means any ICE that is in or on a piece of equipment that is…
  - Self-propelled; or propelled while functioning; or
  - Portable or transportable
    - Designed to be moved, e.g., on wheels or skids
    - And actually is moved routinely
    - Portability is moot if it remains [in service] at a location (building, structure, facility, or installation)…
      - for more than 12 months…or…
      - for seasonal sources, for the entire season (3 months or more) for at least 2 years

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3b. Back door to a temporary unit exemption?

- There is no exemption for temporary units, but…..
- A temporary engine used for a temporary purpose is not a stationary engine if it does not remain in the location for more than 12 months (and therefore not subject to NSPS or RICE MACT)

3c. Temporary Exemption – Two Big Caveats

- Replacing one temporary engine with another to be used for the same purpose does not restart the 12-month clock

  The 12-month clock applies to the location and purpose, not a particular engine

- An engine to be used temporarily in place of a stationary engine (e.g., while it is being overhauled) is considered a stationary engine

  The location and purpose is stationary even if it consists of more than one engine over time

4a. Emergency Stationary RICE

Any stationary reciprocating internal combustion engine that meets all of the criteria in paragraphs (1) through (3) of this definition. All emergency stationary RICE must comply with the requirements specified in §63.6640(f) in order to be considered emergency stationary RICE. If the engine does not comply with the requirements specified in §63.6640(f), then it is not considered to be an emergency stationary RICE under this subpart.

4a. Emergency Stationary RICE, cont.

(1) The stationary RICE is operated to provide electrical power or mechanical work during an emergency situation. Examples include stationary RICE used to produce power for critical networks or equipment (including power supplied to portions of a facility) when electric power from the local utility (or the normal power source, if the facility runs on its own power production) is interrupted, or stationary RICE used to pump water in the case of fire or flood, etc.

(2) The stationary RICE is operated under limited circumstances for situations not included in paragraph (1) of this definition, as specified in §63.6640(f).

(3) The stationary RICE operates as part of a financial arrangement with another entity in situations not included in paragraph (1) of this definition only as allowed in §63.6640(f)(2)(ii) or (iii) and §63.6640(f)(4)(i) or (ii).

*Note, On May 1, 2015, the U.S. Court of Appeals for the District of Columbia Circuit issued a decision vacating paragraphs 40 CFR 63.6640(f)(2)(ii) through (iii), which was then mandated by the court to be effective on May 4, 2016 upon EPA request.

4b. Emergency Use Requirements

- No time limit on emergency operation
- 100 hours / year for non-emergency operation:
  - Maintenance and readiness checks
- 50 hours / year of the 100 hours /year can be used for:
  For all emergency RICE, any situation except for…
  - Peak shaving
  - Non-emergency demand response
  - Generating income by supplying power to the grid or another entity
- For existing area source emergency RICE, local reliability under specific dispatch conditions, see 6640(f)(4)(ii)
  - EPA has requested a remand for these provisions

Planned maintenance on other equipment other than the engine, must be counted as part of the 50 hours of non-emergency use.

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Questions?

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