

# PS Memo 11-1

**To: Stationary Sources Program, Local Agencies, and Regulated Community**

**From: Jennifer Mattox & Jacob Sebesta, Colorado Air Pollution Control Division**

**Date: January 27, 2011**

**RE: Guidance on State-wide RICE requirements**

## Introduction

Through revisions to Colorado Air Quality Control Commission (“AQCC” or “Commission”) Regulation No. 7, Control of Ozone via Ozone Precursors (Emissions of Volatile Organic Compounds and Nitrogen Oxides), the AQCC has adopted several regulatory sections involving the control and/or emissions standards related to natural gas-fired Reciprocating Internal Combustion Engines (RICE).

This memorandum clarifies the application of these sections of AQCC Regulation No. 7 to RICE based on location and installation date. Specifically, this memo addresses the following issues:

- The definition of New and Existing engines under the regulatory requirements;
- Horsepower clarification for state-wide regulatory applicability;
- Modification and impact on state-wide regulatory applicability;
- Application of regulatory requirements to state-wide “overlap” engines that meet both definitions under the regulation; and
- Other considerations for installation and operation of controls to satisfy requirements of AQCC Regulation No. 7.

The table below provides a short summary of applicability of AQCC Regulation No. 7 as it applies to RICE:

<b>Engine rated at greater than 500hp that commenced construction (in Colorado) or was modified or reconstructed:</b>	<b>Prior to 7/1/2007</b>	<b>Between 7/1/2007 and 2/1/2009</b>	<b>Between 2/1/2009 and 7/1/2010</b>	<b>After 7/1/2010</b>
Section XVII.E.2 (New/modified/reconstructed)	Does Not Apply	2.0 g/hp-hr NO <sub>x</sub> , 4.0 g/hp-hr CO and 1.0 g/hp-hr VOC Emission Standards Apply	2.0 g/hp-hr NO <sub>x</sub> , 4.0 g/hp-hr CO and 1.0 g/hp-hr VOC Emission Standards Apply	1.0 g/hp-hr NO <sub>x</sub> , 2.0 g/hp-hr CO and 0.7 g/hp-hr VOC Emission Standards Apply
Section XVII.E.3 (Existing)	Emission Control Device Requirements Apply	Emission Control Device Requirements Apply	Does Not Apply	Does Not Apply

RICE LOCATED IN THE OZONE NONATTAINMENT AREA

In March of 2004, the Division proposed and the Commission adopted AQCC Regulation No. 7, §XVI, “Control of Emissions from Stationary and Portable Engines in the 8-hour Ozone Control Area.” §XVI.A requires the following:

XVI.A Requirements for new and existing engines.

XVI.A.1 The owner or operator of any natural gas-fired stationary or portable reciprocating internal combustion engine with a *manufacturer's design rate greater than 500 horsepower* commencing operations in the 8-hour Ozone Control Area on or after June 1, 2004 shall employ air pollution control technology to control emissions, as provided in Section XVI.B. [Emphasis added]

XVI.A.2 Any existing natural gas-fired stationary or portable reciprocating internal combustion engine with a *manufacturer's design rate greater than 500 horsepower*, which existing engine was operating in the 8-hour Ozone Control Area prior to June 1, 2004, shall employ air pollution control technology on and after May 1, 2005, as provided in Section XVI.B. [Emphasis added]

AQCC Regulation No. 7, §XVI.C.4 provided an “off-ramp” for engines which owners/operators demonstrated that the cost to control would exceed \$5,000 per ton of VOC controlled. Owners/Operators requesting this exemption were required to submit all documentation no later than May 1, 2005.

STATE-WIDE RICE REGULATIONS

➤ **NEW, MODIFIED, OR RELOCATED RICE EMISSION REQUIREMENTS**

On December 17, 2006, the Commission adopted regulations related to New, Modified, or Relocated RICE under AQCC Regulation No. 7, §XVII.E.2:

XVII.E.2.a Except as provided in Section XVII.E.2.b. below, the owner or operator on any natural gas fired reciprocating internal combustion engine that is *either constructed or relocated* to the state of Colorado from another state, on or after the date listed in the table below shall operate and maintain each engine according to the manufacturer’s written instructions or procedures to the extent practicable and consistent with technological limitations and good engineering and maintenance practices over the entire life of the engine so that it achieves the emission standards required in Section XVII.E.2.b. Table 1 below.

XVII.E.2.b. Actual emissions from natural gas fired reciprocating internal combustion engines shall not exceed the emission performance standards in Table 1 below as expressed in units of grams per horsepower-hour:

Table 1				
Maximum Engine HP	Construction or Relocation Date	Emission Standard in g/hp-hr		
		NOx	CO	VOC

< 100 HP	ANY	N/A	N/A	N/A
100≤HP<500	On or After January 1, 2008	2.0	4.0	1.0
	January 1, 2011	1.0	2.0	0.7
≥ 500 HP	On or After July 1, 2007	2.0	4.0	1.0
	July 1, 2010	1.0	2.0	0.7

AQCC Regulation No. 7, XVII.E.2 was effective February 1, 2007. The Division explained in AQCC Regulation No. 7 Statement of Basis for revisions proposed December 16, 2006 pertaining to the applicability of this section:

1. Emission standards only apply to new or relocated engines based on the dates and maximum horsepower as listed in the table above.
2. These requirements **do not apply** to RICE that relocated into the state or were constructed prior to the trigger dates listed in the Table. Compliance with AQCC Regulation No. 7 is independent of the APEN and permit requirements of AQCC Regulation No. 3. In other words, the applicability date is the date on which the RICE is relocated or constructed, NOT permit issuance date.

The **construction or relocation date** used to determine applicability in Table 1 is the earliest date of physical onsite construction, or the date the subject engine is actually placed on location at the facility within the State of Colorado (NOT the order date, date of permit issuance, or any date during pre-construction site preparation). For example, a RICE with a maximum engine horsepower of 400 is placed on site on November 30, 2010; if the engine is not subject to another NSPS, MACT, or BACT standard, it is subject to the emission performance standards in Table 1.

The regulatory requirements for new, modified or relocated RICE in this section include an emission standard, NOT a specific control technology requirement. RICE can meet these emission standards either by combustion/manufacture design or by using an after-market/add-on emission control device. Conversely, AQCC Regulation No. 7, §XVII.E.3 requires existing RICE affected by the regulation to use a specific add-on control device as detailed below.

➤ **EXISTING RICE CONTROL REQUIREMENTS**

On December 12, 2008, the Commission adopted XVII.E.3 (effective February 1, 2009), expanding the control requirements for existing RICE that had previously only applied within the 8-hour Ozone Control Area/Ozone Non-Attainment Area to apply state-wide:

XVII.E.3. *Existing* Natural Gas Fired Reciprocating Internal Combustion Engines [emphasis added]

XVII.E.3.a. Rich Burn Reciprocating Internal Combustion Engines

XVII.E.3.a.(i) Except as provided in Section XVII.E.3.a.(ii), all rich burn reciprocating internal combustion engines with a *manufacturer's name plate design rate greater than 500 horsepower* shall install and operate both a non-selective catalyst reduction and an air fuel controller by July 1, 2010. A rich burn reciprocating internal combustion engine is one with a normal exhaust oxygen concentration of less than 2% by volume. [emphasis added]

XVII.E.3.a.(ii) ***Any rich burn reciprocating internal combustion engine constructed or modified before February 1, 2009***, for which the owner or operator demonstrates to the Division that retrofit technology cannot be installed at a cost of less than \$ 5,000 per ton of combined volatile organic compound and nitrogen oxides emission reductions (this value shall be adjusted for future applications according to the current day consumer price index) is exempt complying with Section XVII.E.3.a. Installation costs and the best information available for determining control efficiency shall be considered in determining such costs. In order to qualify for such exemption, the owner or operator must submit an application making such a demonstration, together with all supporting documents, to the Division by August 1, 2009. [emphasis added]

XVII.E.3.b. Lean Burn Reciprocating Internal Combustion Engines

XVII.E.3.b.(i) Except as provided in Section XVII.E.3.b.(ii), all lean burn reciprocating internal combustion engines with a *manufacturer's nameplate design rate greater than 500 horsepower* shall install and operate an oxidation catalyst by July 1, 2010. A lean burn reciprocating internal combustion engine is one with a normal exhaust oxygen concentration of 2% by volume, or greater. [emphasis added]

XVII.E.3.b.(ii) ***Any lean burn reciprocating internal combustion engine constructed or modified before February 1, 2009***, for which the owner or operator demonstrates to the Division that retrofit technology cannot be installed at a cost of less than \$ 5,000 per ton of volatile organic compound emission reduction (this value shall be adjusted for future applications according to the current day consumer price index) is exempt complying with Section XVII.E.3.b.(i). Installation costs and the best information available for determining control efficiency shall be considered in determining such costs. In order to qualify for such exemption, the owner or operator must submit an application making such a demonstration, together with all supporting documents, to the Division by August 1, 2009. [emphasis added]

Under both §XVII.E.3.a (ii) & §XVII.E.3.b (ii), the regulatory language defines **existing RICE** as *those constructed or modified before February 1, 2009*. As noted above, AQCC Regulation No. 7, §XVII.E.3 requires existing RICE use a specific add-on control device, NOT meet an emission control standard.

#### HORSEPOWER DETERMINATION

The sections of AQCC Regulation 7 applicable to natural gas-fired RICE describe horsepower of a RICE in terms of manufacturer's design rate (under §XVI.A), maximum horsepower (under §XVII.E.2), and nameplate horsepower (under § XVII.E.3). Based upon information provided to the Division from engine manufacturers and previous application of RICE requirements in the 8-hour Ozone Control Area/Ozone Non-Attainment Area, the Division considers nameplate horsepower, maximum horsepower and manufacturer's design rate horsepower to be synonymous and interchangeable. Consequently, owner/operators should use the nameplate horsepower for determining applicability of the natural gas-fired RICE sections of AQCC Regulation No. 7. The de-rating of engine horsepower for site conditions such as elevation is *not allowed* for purposes of determining the applicability of the AQCC Regulation No. 7 engine emission standards and control requirements discussed in this memorandum.

## MODIFICATION CONSIDERATIONS

The subject of what constitutes an equipment modification is potentially complex, and therefore a full discussion of what constitutes a modification is not included in this memo. This memo instead clarifies the timing of a modification and the applicability of the regulations pertaining to natural gas-fired RICE within the context of AQCC Regulation No. 7.

Under AQCC Regulation No. 7 §XVII.E.3.a (ii) & §XVII.E.3.b (ii), the regulatory language defines existing RICE as *those constructed or modified before February 1, 2009*. Based upon this applicability date, any RICE modified after this date will be subject to the new/relocated requirements under XVII.E.2. This interpretation is consistent with the Division's statement of basis for revisions to Regulation No. 7 adopted December 12, 2008, which states:

“Regulation Number 7 is currently unclear on whether or not existing sources that are modified become subject to new source requirements. This revision clarifies that existing sources that are modified are subject to the Regulation Number 3, Part B, and Section II.D. requirements and are considered to be a new source for the purposes of Regulation Number 7.”

## DETERMINING WHETHER ONE OR BOTH STATE-WIDE RICE REQUIREMENTS APPLY

### **A) RICE qualifying as new or relocated**

RICE is defined solely as new, modified or relocated if it is constructed/relocated into Colorado on or after the dates listed in Table 1 above with the corresponding maximum horsepower levels. In this instance, the RICE would be required to meet the emission standards (either via combustion design/manufacturer's standards or after-market control) upon start-up in the state of Colorado.

### **B) Existing RICE**

RICE with a manufacturer nameplate horsepower rating greater than 500 hp that commenced construction prior to February 1, 2009 construction/relocation date contained in Table 1 are considered as existing RICE and are required to install emissions control technology required by Section XVII.E.3 by July 1, 2010.

### **C) NEW/Existing RICE, “Overlap Engines”**

RICE can be both “new” and “existing” under current state regulations for control of ozone precursors if the following conditions are met:

- If the RICE is greater than or equal to 500 HP and was constructed or relocated into the state *on or after July 1, 2007 AND*
- The RICE was constructed prior to February 1, 2009.

Under this scenario, BOTH the emission standards in Table 1 and control requirements contained in Section XVII.E.3 would apply to this type of engine. The Division considers these RICE “Overlap engines,” subject to both requirements under §XVII.E.2 and §XVII.E.3. Presumably, engines equipped with the controls required under §XVII.E.3, will also meet the emission standards under §XVII.E.2 without additional modification to the engine.

Please note that if your RICE is subject to an emissions control requirement or emission standard under 40 CFR Part 63 Subpart ZZZZ Maximum Achievable Control Technology (MACT), or 40 CFR Part 60 New Source Performance Standards (NSPS), or BACT, the RICE is exempt from the state-wide RICE requirements

contained in Regulation 7, Sections XVII.E.2 and XVII.E.3. This exemption is contained in Regulation 7, Section XVII.B.4.

Examples:

**QUESTION:**

*Does a RICE with a manufacturer's name plate design rate greater than 500 HP and existing before February 1, 2009, that is operating either a non-selective catalyst reduction and AFR or an oxidation catalyst, and is meeting the emission standards of 2.0 g/hp-hr NOx, 4.0 g/hp-hr CO and 1.0 g/hp-hr VOC, have to meet any other emission standards?*

**RESPONSE:** If this RICE was constructed/relocated into Colorado prior to July 1, 2007, only the control requirements under §XVII.E.3 apply. The emissions standards and the control requirements will apply *only if the RICE qualifies as an Overlap engine, meaning it was constructed or relocated into the state after July 1, 2007 but prior to February 1, 2009.*

**QUESTION:**

*Does a RICE with a manufacturer's name plate design rate greater than 500 HP and existing before February 1, 2009, that is operating either a non-selective catalyst reduction and AFR or an oxidation catalyst and is not meeting the emission standards of 2.0 g/hp-hr NOx, 4.0 g/hp-hr CO and 1.0 g/hp-hr VOC, have to further control to meet those emission standards?*

**RESPONSE:** The emission standards must be met for those engines qualifying as new, modified and/or relocated as set forth in XVII.E.2, in addition to any permit conditions and/or Federal requirements. Therefore, further controls would be required if the engine is an “overlap engine” not meeting the prescribed emission standards under §XVII.E.2. *However*, if the RICE is subject to an emissions control requirement under 40 CFR Part 63 Maximum Achievable Control Technology (MACT) or 40 CFR Part 60 New Source Performance Standards (NSPS), or BACT, the RICE is not subject to the requirements of Regulation No. 7, §XVII.

**QUESTION:**

*Does a RICE with a manufacturer's name plate design rate greater than 500 HP and existing before February 1, 2009, that is not operating controls, have to meet the emission standard of 2.0 g/hp-hr NOx, 4.0 g/hp-hr CO and 1.0 g/hp-hr VOC, or 95% reduction of NOx and 50% reduction of VOC?*

**RESPONSE:** RICE qualifying under XVII.E.3 must be controlled. Engines do not need to meet emissions standards per Table 1 unless they qualify as a new, modified or relocated engine per XVII.E.2. See Table 1 for the effective dates.

**OTHER CONSIDERATIONS FOR INSTALLATION AND OPERATION OF CONTROLS UNDER AQCC REGULATION NO. 7**

➤ **What do owners/operators need to do for RICE subject to §XVII.E.2?**

Owners/Operators of natural gas-fired RICE subject to §XVII.E.2 shall “operate and maintain each engine according to the manufacturer’s written instructions or procedures to the extent practicable and consistent with technological limitations and good engineering and maintenance practices over the entire life of the engine so that it achieves the emission standards required.”

The Division interprets this requirement to mean that:

1. Owners/Operators must be able to demonstrate compliance with the applicable emissions standards. This may include testing and manufacturer's certifications.
2. Good engineering and maintenance practices will be based on individual circumstances. Owners/Operators should refer to the Division's General Operation and Maintenance Plan for RICE for minimum monitoring, maintenance and record keeping requirements.

➤ **What do owners/operators need to do for RICE subject to §XVII.E.3?**

Owners/Operators of natural gas-fired RICE subject to §XVII.E.3 shall install and operate the specified catalytic control device. Owners/Operators of rich burn engines subject to §XVII.E.3.a must also install and operate an air-fuel ratio controller. While the Regulation does not specifically identify maintenance practices, the Division's expectation of operation is consistent with the Division's General Operation and Maintenance Plan for RICE, and commensurate with the requirement under § XVII.B.1.a that all air pollution control equipment required by Section XVII "shall be operated and maintained pursuant to manufacturer specifications or equivalent to the extent practicable, and consistent with technological limitations and good engineering and maintenance practices." Good engineering and maintenance practices will be based on individual circumstances. Owners/Operators should refer to the Division's General Operation and Maintenance Plan for RICE for minimum monitoring, maintenance and record keeping requirements.

Additionally, Owners/Operators of natural gas-fired RICE subject to §XVII.E.3 must file an APEN reflecting the installation of a control to satisfy the requirements of §XVII.E.3.

➤ **What if the engine meets the applicability requirements for 40 C.F.R. Part 60, Subpart JJJJ (New Source Performance Standard for Stationary Spark-Ignition Internal Combustion Engines) or 40 C.F.R. Part 63, Subpart ZZZZ (National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines)?**

According to Regulation No. 7, Section XVII.B.4, engines that are subject to an emissions control requirement under MACT, BACT, or NSPS are not subject to Section XVII. Therefore, the engine must meet more than just the applicability section of the NSPS or NESHAP/MACT. There must be an emission control requirement, such as an emission standard or control technology requirement to exempt the engine from compliance with Section XVII.

For further clarification or questions regarding application of Regulation No. 7 to RICE, please refer to the Oil and Gas website at <http://www.cdphe.state.co.us/ap/oilgas.html> or contact a member of the Oil & Gas Team at (303) 692-3150.