TABLE 1 TO § 1042.104—NO\textsubscript{X} EMISSION STANDARDS FOR CATEGORY 3 ENGINES (g/kW-hr)

<table>
<thead>
<tr>
<th>Emission standards</th>
<th>Model year</th>
<th>Maximum in-use engine speed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Less than 130 RPM</td>
</tr>
<tr>
<td>Tier 1</td>
<td>2004–2010*</td>
<td>17.0</td>
</tr>
<tr>
<td>Tier 2</td>
<td>2011–2015</td>
<td>14.4</td>
</tr>
<tr>
<td>Tier 3</td>
<td>2016 and later</td>
<td>3.4</td>
</tr>
</tbody>
</table>

* Applicable standards are calculated from n (maximum in-use engine speed, in RPM, as specified in § 1042.140). Round the standards to one decimal place.

(3) The HC standard for Tier 2 and later engines is 2.0 g/kW-hr. This standard applies as follows:

(i) Alcohol-fueled engines must comply with HC standards based on THCE emissions.

(ii) Natural gas-fueled engines must comply with HC standards based on NMHC emissions.

(iii) Diesel-fueled and all other engines not described in paragraph (a)(3)(i) or (ii) of this section must comply with HC standards based on THC emissions.

(4) The CO standard for Tier 2 and later engines is 5.0 g/kW-hr.

(b) Averaging, banking, and trading. Category 3 engines are not eligible for participation in the averaging, banking, and trading (ABT) program as described in subpart H of this part.

(c) Mode caps. Measured NO\textsubscript{X} emissions may not exceed the cap specified in this paragraph (c) for any applicable duty-cycle test modes with power greater than 10 percent maximum engine power. Calculate the mode cap by multiplying the applicable NO\textsubscript{X} standard by 1.5 and rounding to the nearest 0.1 g/kW-hr. Note that mode caps do not apply for pollutants other than NO\textsubscript{X} and do not apply for any modes of operation outside of the applicable duty cycles in §1042.505. Category 3 engines are not subject to not-to-exceed standards.

(d) Useful life. Your engines must meet the exhaust emission standards of this section over their full useful life, expressed as a period in years or hours of engine operation, whichever comes first.

(1) The minimum useful life value is 3 years or 10,000 hours of operation.

(2) Specify a longer useful life in hours for an engine family under either of two conditions:

(i) If you design, advertise, or market your engine to operate longer than the minimum useful life (your recommended hours until rebuild indicates a longer design life).

(ii) If your basic mechanical warranty is longer than the minimum useful life.

(e) Applicability for testing. The duty-cycle emission standards in this section apply to all testing performed according to the procedures in §1042.505, including certification, production-line, and in-use testing. See paragraph (g) of this section for standards that apply for certain other test procedures, such as some production-line testing.

(f) Domestic engines. Engines installed on vessels excluded from 40 CFR part 1043 because they operate only domestically may not be certified for use with residual fuels.

(g) Alternate installed-engine standards. NO\textsubscript{X} emissions may not exceed the standard specified in this paragraph (g) for test of engines installed on vessels when you are unable to operate the engine at the test points for the specified duty cycle, and you approximate these points consistent with the specifications of section 6 of Appendix 8 to the NO\textsubscript{X} Technical Code (incorporated by reference in §1042.910). Calculate the alternate installed-engine standard by multiplying the applicable NO\textsubscript{X} standard by 1.1 and rounding to the nearest 0.1 g/kW-hr.

[75 FR 22997, Apr. 30, 2010]
§ 1042.110 Recording reductant use and other diagnostic functions.

(a) Engines equipped with SCR systems using a reductant other than the engine’s fuel must meet the following requirements:

(1) The diagnostic system must monitor reductant quality and tank levels and alert operators to the need to refill the reductant tank before it is empty, or to replace the reductant if it does not meet your concentration specifications. Unless we approve other alerts, use a malfunction-indicator light (MIL) and an audible alarm. You do not need to separately monitor reductant quality if you include an exhaust NO\textsubscript{X} sensor (or other sensor) that allows you to determine inadequate reductant quality. However, tank level must be monitored in all cases.

(2) The onboard computer log must record in nonvolatile computer memory all incidents of engine operation with inadequate reductant injection or reductant quality. Use good engineering judgment to ensure that the operator can readily access the information to submit the report required by §1042.660. For example, you may meet this requirement by documenting the incident in a text file that can be downloaded or printed by the operator.

(3) SCR systems must also conform to the provisions of paragraph (d) of this section if they are equipped with on-off controls as allowed under §1042.115(g).

(b) If you determine your emission controls have failure modes that may reasonably be expected to affect safety, equip the engines with diagnostic features that will alert the operator to such failures. Use good engineering judgment to alert the operator before the failure occurs.

(c) You may equip your engine with other diagnostic features. If you do, they must be designed to allow us to read and interpret the codes. Note that §§1042.115 and 1042.205 require that you provide us any information needed to read, record, and interpret all the information broadcast by an engine’s on-board computers and electronic control units.

(d) For Category 3 engines equipped with on-off NO\textsubscript{X} controls (as allowed by §1042.115(g)), you must also equip your engine to continuously monitor NO\textsubscript{X} concentrations in the exhaust. See §1042.650 to determine if this requirement applies for a given Category 1 or Category 2 engine. Use good engineering judgment to alert operators if measured NO\textsubscript{X} concentrations indicate malfunctioning emission controls. Record any such operation in nonvolatile computer memory. You are not required to monitor NO\textsubscript{X} concentrations during operation for which the emission controls may be disabled under §1042.115(g).

For the purpose of this paragraph (d), “malfunctioning emission controls” means any condition in which the measured NO\textsubscript{X} concentration exceeds the highest value expected when the engine is in compliance with the installed engine standard of §1042.104(g). Use good engineering judgment to determine these expected values during production-line testing of the engine using linear interpolation between test points and accounting for the degree to which the cycle-weighted emissions of the engine are below the standard. You may also use additional intermediate test points measured during the production-line test.