

# Frequently Asked Questions About NONROAD2008

## What is NONROAD2008?

NONROAD2008 is major update of the NONROAD model and it supersedes all previous versions of this model, most recently NONROAD2005. It calculates past, present, and future emission inventories (i.e., tons of pollutant) for all nonroad equipment categories except commercial marine, locomotives, and aircraft. Fuel types included in the model are: gasoline, diesel, compressed natural gas, and liquefied petroleum gas. The model estimates exhaust and evaporative hydrocarbons (HC), carbon monoxide (CO), oxides of nitrogen (NO<sub>x</sub>), particulate matter (PM), sulfur dioxide (SO<sub>2</sub>), and carbon dioxide (CO<sub>2</sub>). The user may select a specific geographic area (i.e., national, state, or county) and time period (i.e., annual, monthly, seasonal, or daily) for analysis.

## What are the differences between NONROAD2005 and NONROAD2008?

The main difference between NONROAD2005 and NONROAD2008 is that NONROAD2008 accounts for the emission reductions associated with two rules finalized in 2008:

- Diesel recreational marine standards in the Loco/Marine final rule, (Federal Register Vol 73, No. 88, page 25098, May 6, 2008).
- Small SI and SI Recreational Marine final rule (Federal Register Vol 73, No. 196, page 59034, October 8, 2008).

NONROAD2008 is actually the same version of the model that was used for the Small SI & SI Recreational Marine final rule, and thus is included in the docket materials for that rule. However, in that context it is referred to as NONROAD2005d. That model version, now called NONROAD2008, includes the following changes and enhancements relative to the previous public release version, which was NONROAD2005a:

**General model revisions:**

- Added the ability to specifically model the effects of ethanol blends on fuel tank and hose permeation losses.
- Two input fields have been added to the option file and the graphical user interface (GUI) to allow users to specify ethanol blend market share and volume percent ethanol in the blend. These inputs are required to properly model permeation emissions from fuel tanks and hoses with ethanol blends.
- Enhanced model operation when using daily temperature & RVP inputs so that this feature can be used in an annual model run and apply the proper amount of equipment activity to the corresponding temperatures and RVP. Previously this feature could only be used with a seasonal or monthly model run.
- Technology type names have been revised and expanded for certain equipment types to provide more specificity, especially in recreational vehicles (snowmobiles, ATVs, and off-road motorcycles) and diesel recreational marine engines.
- New technology types were added for recreational marine engines and small SI engines for the new levels of control required by the recent rulemakings.
- Minor housekeeping tweaks that do not affect any calculations: Adds SCC's 2260008005 and 2268008005 to code in case any users choose to add populations for these 2-stroke and CNG airport support equipment (which are not in NONROAD's default populations). Delete 2285002005 (locomotives) from the core model Fortran code since it is unused by NONROAD. Increased number of allowed deterioration factors from 100 to 120.

**Revisions for Small SI Engines:**

- Revised fuel tank and hose permeation emission factors based on EPA and industry test data (and small revisions to tank sizes).
- Added new fuel tank diffusion losses to the diurnal emission estimates.
- Updated or corrected exhaust emission factors and deterioration rates, and technology-type sales fractions for Phase 2 engines.
- Added hot soak and running loss inputs for handheld equipment.
- Corrected snowblower technology types to include 4-stroke engines;
- Corrected running loss emission factors for Class 1 snowblowers to account for cold weather applications.
- Added Phase 3 controls for small SI engines as specified in the fall 2008 final rule.

**Revisions for Recreation Marine SI Engines:**

- Revised brake-specific fuel consumption factors.
- Revised PM emission factors for 2-stroke technology engines.
- Revised fuel tank and hose permeation emission factors and temperature effects.
- Added hot soak and running loss emission estimates for recreational marine engines.
- Updated modeling inputs for high performance (greater than 600 hp) sterndrive and inboard (SD/I) engines.
- Added controls for SI recreational marine engines as specified in the fall 2008 final rule.

**Revisions for Recreation Marine Diesel (CI) Engines:**

- Added controls for CI recreational marine engines as specified in the spring 2008 final rule.

## **What are the differences in emission inventory results between NONROAD2005 and NONROAD2008?**

Since the main difference between NONROAD2008 and NONROAD2005 is the accounting for new exhaust and evaporative emission controls, the newer version predicts substantially less HC and CO, and somewhat less NO<sub>x</sub> and PM emissions than NONROAD2005 with use of comparable scenario inputs. The comparison depends greatly on pollutant, equipment type, year evaluated, and fuel choice (how much ethanol is in the gasoline). For a detailed comparison of nationwide inventories differences, see “EPA NONROAD Model Updates of 2008” April 2009 International Emission Inventory Conference presentation of changes from NONROAD2005, available on the NONROAD model web site: <http://www.epa.gov/otaq/nonrdmdl.htm>.

## **Does NONROAD2008 reflect all of EPA’s final nonroad engine emission standards to date?**

Yes. The model now accounts for the provisions of the Small SI and SI Recreational Marine final rule (Federal Register Vol 73, No. 196, page 59034, October 8, 2008), as well as the diesel recreational marine standards in the Loco/Marine final rule, (Federal Register Vol 73, No. 88, page 25098, May 6, 2008).

## **Can the option files used for previous versions of the model be used for NONROAD2008?**

If you wish to properly model the effects of ethanol gasoline blends on permeation emissions, then you must create new Option files that include the two new lines that specify ethanol blend market share and volume percent ethanol in the blend. If you open an older option file in the GUI, you will get a warning that there is a problem with the ethanol blend inputs; you can take care of this by entering appropriate values in the Scenario: Options form. If you are only modeling exhaust emissions, or just diesel fueled equipment, or there is no ethanol in your gasoline, then Option files created with NONROAD2005 can be used with NONROAD2008. Option files from model versions earlier than NONROAD2005 are not compatible with NONROAD2005 or NONROAD2008.

## **Have the technical reports and User’s Guide for NONROAD2008 been updated?**

For this limited release of NONROAD2008 the Users Guide and technical reports have not yet been updated. Details of the changes and the basis of those changes from NONROAD2005 can be found in the technical documentation for (a) the 2008 Small SI and SI Recreational Marine FRM (RIA and docket memos) and (b) the 2008 Loco/Marine FRM. The User’s Guide and technical reports were updated for NONROAD2005. These documents can be downloaded from the NONROAD model web site: <http://www.epa.gov/otaq/nonrdmdl.htm>.

## What is EPA's policy guidance on the use of NONROAD2005 for SIP and conformity purposes?

NONROAD2008 is a significant update of the NONROAD model and should be used in analyses to meet any regulatory requirements that call for the development of new nonroad inventories.

## Should I use NONROAD2008 or NMIM2008?

NMIM2008 (the National Mobile Inventory Model) is a consolidated emissions modeling system for EPA's MOBILE6.2 and NONROAD2008 models. It generates county inventories using MOBILE6.2 and NONROAD2008 at scales ranging from individual counties to the nation. Its primary improvement over NONROAD2008 is the inclusion of all the required county temperature and fuel property data for the nation in a single database. In addition to the pollutants produced by NONROAD2008, NMIM2008 produces inventories for gaseous hazardous air pollutants (HAPs), polyaromatic hydrocarbons (PAHs), metals, dioxins, and furans.

Since NMIM2008 incorporates NONROAD2008, the common pollutant inventories produced by each (i.e., HC, CO, CO<sub>2</sub>, NO<sub>x</sub>, PM, and SO<sub>2</sub>) will be the same, provided the same inputs are used. NMIM2008 will need to be used if toxic inventories are required. NONROAD2008 must be used if equipment populations or fuel consumption estimates are required, or if output by model year is required.

## How can I calculate emission benefits from the retrofit of nonroad engines?

There are two types of retrofit programs that are possible: 1) fleetwide programs, in which a specified fraction of certain categories of engines are retrofitted, or, 2) fleet-specific programs, in which a specific number of engines of a known fleet are retrofitted. The recommended method to model the effects of nonroad engine retrofits is to use NMIM2008, since it can properly model both fleetwide and fleet-specific retrofit programs. NMIM2008 can be downloaded from the NMIM model web site at: <http://www.epa.gov/otaq/nmim.htm>.

Some limited retrofit modeling capability is now also available with NONROAD2008, as it was in NONROAD2005. Chapter 6 of the NONROAD2005 user's guide provides more information regarding the calculation of retrofit benefits and the limitations of using NONROAD for this purpose. It can be downloaded from the NONROAD model web site at: <http://www.epa.gov/otaq/nonrdmdl.htm>.

EPA has released a retrofit guidance document, titled, "Diesel Retrofits: Quantifying and Using Their Benefits in SIPs and Conformity." This document has been posted on the web at <http://www.epa.gov/otaq/stateresources/transconf/policy.htm#retrofit>.

## **What additional changes are currently underway or being considered for the next version of the NONROAD model?**

Work is underway to transform NONROAD into a database driven java application for incorporation into the MOVES model, so that modeling of nonroad equipment and onroad vehicles can be accomplished using the same comprehensive model. For more information on MOVES, see <http://www.epa.gov/otaq/models.htm>.

## **How can I receive assistance if I have questions about NONROAD2008?**

Please send an email with your question to [nonroad@epa.gov](mailto:nonroad@epa.gov) or write to:

U.S. Environmental Protection Agency  
Assessment and Standards Division  
Air Quality and Modeling Center  
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Ann Arbor, MI 48105