

IRRIGATION ENGINES - AIR REGULATIONS

(For assistance, please contact EHS at (402) 472-4925, or visit our web site at <http://ehs.unl.edu/>)

Scope

This SOP is specific to irrigation engines that are operated at a specific UNL location throughout a single growing season, regardless of whether the engine is designed as a mobile engine (e.g., on a trailer or skids, etc.) or is capable of being moved. Irrigation engines that are portable and which are used at more than one location during a single growing season are beyond the scope of this SOP. This SOP is also limited in scope to engines that are 500 HP or less.

Regulatory Status

An irrigation engine that is operated at a single location throughout a growing season meets the definition of “Stationary Reciprocating Internal Combustion Engine (RICE)” under the regulations implementing the Clean Air Act. The specific regulation(s) applicable to an individual engine depends on the date that the engine was first installed for use or reconstructed.

- National Emission Standards for Hazardous Air Pollutants (NESHAP) for Stationary Reciprocating Internal Combustion Engines (RICE). This regulation applies to engines that are 500 Horsepower (HP) or less and which were first installed at UNL or reconstructed before June 12, 2006.
 - 40 CFR part 63 subpart ZZZZ (40 CFR 63.6580 – 63.6675)
- New Source Performance Standards (NSPS) for Stationary Compression Ignition (CI) Internal Combustion Engines (ICE). This regulation applies to diesel engines that were first installed or reconstructed on or after June 12, 2006.
 - 40 CFR part 60 subpart IIII (40 CFR 60.4200 – 60.4219)
- NSPS for Stationary Spark Ignition (SI) ICE. This regulation applies to gasoline or propane engines that were first installed or reconstructed on or after June 12, 2006.
 - 40 CFR part 60 subpart JJJJ (40 CFR 60.4230 – 60.4248)

Summary of Regulatory Requirements

Table 1 summarizes the NESHAP regulations for engines that are 500 Horsepower (HP) or less and which were first installed at UNL or reconstructed before June 12, 2006. Table 2 summarizes the NSPS regulations for engines that were first installed or reconstructed on or after June 12, 2006.

Table 1

HP	Installed/Reconstructed before June 12, 2006	
	Diesel	Gasoline (or propane)
≤ 300	<p>Operate/maintain per manufacturer's instruction or owner-developed maintenance plan that is consistent with safety and good air pollution control practices for minimizing emissions over life of engine. Keep records of all maintenance for 5 years.</p> <p>Every 500 hrs or annually, whichever comes first</p> <ul style="list-style-type: none"> Inspect hoses/belts, and replace as necessary <p>Every 1,000 hours or annually, whichever comes first</p> <ul style="list-style-type: none"> Change oil/filter* Inspect air cleaner and replace as necessary 	<p>Operate/maintain per manufacturer's instruction or owner-developed maintenance plan that is consistent with safety and good air pollution control practices for minimizing emissions over life of engine. Keep records of all maintenance for 5 years.</p>
≥ 300 and ≤ 500	<p><i>Consult EHS if you have or are considering acquiring an engine of 300 HP or more. An air construction permit may be required prior to installation.</i></p> <p>Operate/maintain per manufacturer's instruction or owner-developed maintenance plan that is consistent with safety and good air pollution control practices for minimizing emissions over life of engine. Keep records of all maintenance for 5 years.</p> <p>Use Ultra Low Sulfur Diesel (ULSD).</p> <p>If the engine is not equipped with a closed crankcase ventilation system, either (1) install a closed crankcase ventilation system that prevents crankcase emissions from being emitted to the atmosphere, or (2) install an open crankcase filtration emission control system that reduces emissions from the crankcase by filtering the exhaust stream to remove oil mist, particulates, and metals. Follow manufacturer's specified maintenance requirements for operating and maintain the open or closed crankcase ventilation systems and replacing the crankcase filters.</p>	<p>Every 1,440 hrs of operation or annually, whichever comes first</p> <ul style="list-style-type: none"> Change oil/filter* Inspect hoses, belts, & spark plugs and replace as necessary

	<p>Limit concentration for CO exhaust to 49 ppmvd at 15% O₂; or reduce CO emissions by 70% or more, which is satisfied either by manufacturer's certification to Tier 3 under 40 CFR part 60, subpart IIII or emission testing.</p> <p>Submit required notifications and recurring reports to regulatory authorities and maintain associated records and adhere to the record retention period of 5 years.</p>	
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Owners/operators must keep records of oil and oil filter change dates, inspection and replacement dates for air filters, hoses and belts, with corresponding hour meter reading. Must include records of other/additional emission related repairs and maintenance performed per manufacturer's instructions or owner developed maintenance plan that is consistent with safety and good air pollution control practices for minimizing emissions. Records must be available for five years.

*An oil analysis program may be used as an alternative to the prescribed oil change frequency in order to extend the specified oil change requirement. The oil analysis must be performed at the same frequency as specified for oil changes. The analysis program must, at a minimum, analyze the following parameters: Total Base or Acid Number, Viscosity, and Percent Water Content. The condemning limits for these parameters are listed in the following table.

Parameter	Condemning Limits
Total Base Number (diesel engines only)	<30% of TBN of oil when new
Total Acid Number (gas/propane engines only)	Increases by more than 3.0 mg of potassium hydroxide per gram from TAN of the oil when new
Viscosity	Changed by more than 20% from viscosity of oil when new
% Water Content (by volume)	>0.5%

If any condemning limit is exceeded, the oil must be changed within 2 days of receiving results of the analysis; if the engine is not in operation when the results are received, the oil must be changed within 2 days or before commencing operation, whichever is later. The owner or operator must keep records of the parameters that are analyzed as part of the program, the results of the analysis, and the oil changes for the engine. The analysis program must be part of the maintenance plan for the engine.

Table 2

HP	Installed/Reconstructed on or after June 12, 2006	
	Diesel	Gasoline (or propane)
ALL	Use Ultra Low Sulfur Diesel (ULSD)	
	<ul style="list-style-type: none">• Purchase an EPA certified engine. Manufacturers are required to meet and certify to current model year emission standards<ul style="list-style-type: none">○ Maintain documentation of certification• Operate & maintain according to manufacturer written instructions over life of engine. (Instructions will include oil/filter changes, etc.)• Keep records of all maintenance. Must be available for 5 years.• Limit each startup/shutdown event to less than 30 minutes	
If the engine is not certified or a certified engine is not operated and maintained in accordance with the manufacturer's written instructions, or if emission-related settings are changed in a way that is not permitted by the manufacturer, then it is the owner/operator's responsibility to demonstrate compliance with EPA emission standards, including initial & follow-up performance testing on the engine. Therefore, it is imperative to purchase only certified engines and to adhere to the manufacturer's written instructions.		

Other Regulatory Considerations

Fuel tanks associated with diesel and gasoline engines that exceed 60 gallons in size require an installation permit issued by the Nebraska State Fire Marshal's Office (SFM).