

**San Joaquin Valley
Unified Air Pollution Control District**

Determination of Injection Timing Retard for Diesel I.C. Engines

Approved by: _____ <i>Signed</i> _____ Seyed Sadredin Director of Permit Services	Date: _____ 8/14/96 _____
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Purpose: To establish the criteria that will be used by the District in determining the extent by which injection timing is retarded for the purpose of compliance with District Rules and Regulations.

I. Background:

Rule 2280 section 5.3 states that diesel engines must meet certain NO_x emission limits, or the timing shall be retarded 4 degrees from manufacturer's standard timing. During the rule development process, it was known that some engines would not be able to meet certain registration requirements, including timing retard, and therefore would not qualify for Registration.

Timing retardation is also a Best Available Control Technology (BACT) requirement for emergency diesel I.C. engines, if they do not meet the specified NO_x emission limit as listed in the District's BACT Clearinghouse. Diesel engines powering emergency fire pumps may be excused from the timing retard requirement if it voids the Underwriters Laboratory (UL) fire pump certification for the unit.

II. Manufacturer's Standard Timing

Manufacturer's standard timing has been shown to be different for each manufacturer and specific model. Each manufacturer sets the timing for each engine based on operating parameters specific to that model. Typical manufacturer settings for the start time of fuel injection appear to be in the range of 20 to 28 degrees BTDC (Before Top Dead Center) in engines not retarded for NO_x control or other performance factors. For the purposes of this policy, "standard timing" shall refer to the typical timing setting for a given class or category of engine prior to tuning for NO_x control (i.e. engine timing before field or manufacturer retardation for NO_x control). Data regarding the manufacturer's standard timing for specific engine classes and models is often not available for engines which have been designed with some injection timing retardation built-in for the purposes of NO_x control or other performance factors. In the absence of verifiable case specific data, 20 degrees BTDC will be used by the District as the manufacturer's standard timing.

III. Criteria For Determining The Level Of Injection Timing Retard

In order to verify that an engines injection timing has been retarded 4 degrees, it must be shown that the timing is set at a minimum of 4 degrees below the manufacturer's standard timing for that engine. Compliance with this requirement can be established as follows:

Option 1: The owner/operator provides documentation that the timing has been set at 4 degrees below the factory setting for the engine. The factory timing setting is not necessarily the same as the manufacturer's standard timing setting. Written verification of the factory set timing, along with documentation that the engine timing has been retarded by 4 degrees (see attached form) must be submitted.

Option 2: The owner/operator provides documentation from the manufacturer that the above Option 1 is not technologically feasible, and that the timing is set at 4 degrees below the manufacturer's standard timing of the engine. Written verification of the manufacturer's standard timing of the engine prior to tuning for NO_x control, along with documentation that the timing has been retarded by 4 degrees (see attached form) must be submitted.

Option 3: If the owner/operator provides documentation from the manufacturer that the above Option 1 is not technologically feasible, and if information regarding the manufacturer's standard timing is not available, it will be assumed that the standard timing is 20 degrees BTDC, and the engine timing will be required to be set at 16 degrees BTDC or less. For engines that use this option, documentation regarding its timing setting must be submitted, and a condition should be added to the Authority to Construct, Permit to Operate, or Registration as follows:

The diesel engine shall be operated with an initial injection timing setting of 16 degrees BTDC (Before Top Dead Center) or less.

IC ENGINE TIMING CERTIFICATION FORM

ENGINE DESCRIPTION (To be completed by the applicant)

Source Name: _____ Contact: _____
Address: _____ Phone: () _____
City: _____ State: _____ Zip: _____
Engine Mfg: _____ Mfg. Date: _____
Model No: _____ Company/ID No: _____
Location/ Address/Bldg No. _____
Portable Equipment Registration or Permit No: (From APCD) _____

ENGINE CERTIFICATION (To be completed by the mechanic)

Service Date: _____

Engine Serial No. _____ Rating: _____ BHP (Max. Continuous)

Manufacturer's Standard Timing: _____ degrees

Actual timing (before retard): _____ degrees

Timing After Retarding: _____ degrees

Retard Timing Setting can be confirmed:

- Visually. It can be observed (how?) _____
- Internally. It is not visible without teardown.
- Other (describe): _____

Retarding setting procedure performed according to:

- Engine Manufacturer's procedure (Identify procedure No.): _____
- Custom procedure (attach full description).
- Other (describe): _____

Mechanic's Name (print): _____

Signature: _____

Employer or Business Name: _____

Address: _____ Phone: () _____

City: _____ State: _____ Zip: _____