

KERN COUNTY AIR POLLUTION CONTROL DISTRICT

RULE 431 – PROPELLANT COMBUSTION AND ROCKET TESTING

(Adopted 01/24/2007)

I. Applicability

Rule 431 shall apply to open-air rocket propellant combustion operations conducted on rocket test stands.

II. Definitions

- A. Hybrid Rocket Motor - Rocket type where prior to ignition the oxidizer may be either a liquid or a gas. The solid fuel typically consists of a polymeric rubber grain with a center perforation. The liquid or gas oxidizers are typically supplied to the solid fuel grain via a fuel injection system.
- B. Permissible Burn Day - Days designated as permissible burn days by the California Air Resources Board (ARB) based on the meteorological criteria for the Mojave Desert Air Basin at section 80311 of Title 17 of the California Code of Regulations, Subchapter 2, Smoke Management Guidelines for Agricultural and Prescribed Burning.
- C. Permitted Test Stand - Any rocket test stand with a valid permit to operate issued by the Kern County Air Pollution Control District (District).
- D. Receptor - The closest downwind person not associated with testing or the property fence line, whichever is closest.
- E. Rocket - A device consisting of a combustion chamber in which materials referred to as propellants, providing both fuel and oxidizer for combustion, are burned. Products of combustion escape through the nozzle, providing thrust.
- F. Rocket Engine - Rocket type where prior to ignition the propellants may be in either in a liquid or gaseous state and are typically supplied via a fuel injection system.
- G. Rocket Test Plan - Document specifying designated testing conditions and information as described in Section V.
- H. Rocket Test Stand - Any open-air ground-based structure used for testing of rocket propellant combustion or apparatus
- I. Solid Rocket Motor - Rocket type where prior to ignition the propellants are in a solid state.

III. Exemptions

The provisions of this Rule shall not apply to:

- A. Rocket propellant combustion during rocket test stand operations with a total consumed or combusted propellant mass of 75 lbs. or less.
- B. Emergency destruction/disposal of propellant by qualified bomb squad or explosive ordinance disposal groups
- C. Combustion of rocket propellants outside of the rocket body for purposes of fire training or for purposes of disposal by combustion under an approved burn plan.
- D. Rocket propulsion systems that do not require the combustion of propellants for operation.
- E. Rocket propellants comprised primarily of liquid fuels as approved by the District Air Pollution Control Officer (APCO). Exempt liquid fuels include, but not limited to the following:
 - 1) RP-1 (kerosene) and liquid oxygen (LOX),
 - 2) Liquid hydrogen and LOX,

- 3) Isopropyl alcohol (IPA) and LOX, and
- 4) Nitrogen tetroxide and hydrazine.

IV. General Requirements

- A. Without a Rocket Test Plan - Combustion of rocket propellants at a permitted rocket test stand may be conducted without a Rocket Test Plan, if conditions in Sections IV.A.1 and IV.A.2 are met.
 - 1. Rocket propellant mass must be less than or equal to 500 lbs. for a solid rocket motor or hybrid rocket motor, and less than or equal to 1000 lbs. for a rocket engine.
 - 2. The ARB has designated the day as a permissible burn day.
- B. Prior to Approval of a Rocket Test Plan – before APCO approval of Rocket Test Plan, combustion of rocket propellants at a permitted test stand may be conducted in accordance with rules, regulations, and policies in effect before the adoption of this rule for up to 180 days after rule promulgation, or until approval or disapproval of submitted plan, which ever is sooner.
- C. With a Rocket Test Plan - Combustion of rocket propellants at a permitted test stand may be conducted when there is an APCO approved Rocket Test Plan, if the meteorological conditions in the approved Rocket Test Plan are met, as required in Section V.

V. Rocket Test Plan

The rocket test stand operator shall submit a rocket testing plan to the District every two years for rocket test stand operations, where any individual solid rocket motor or hybrid rocket exceeds a mass of 500 lbs. of propellant, or for any rocket engine that exceeds a mass of 1000 lbs. of propellant. Rocket testing plans must contain, at a minimum, the following information (V.H, V.I, V.J, and V.K are not required if facility has an approved AB2588 Plan):

- A. Company name and project name (program name);
- B. Identification of responsible personnel, including telephone contacts;
- C. Detailed description of testing area including location of test stand(s), size of test area (acres) and plot plan of the site;
- D. Maximum number of each rocket type (solid, liquid or hybrid) and amount of propellants to be used each year of the plan;
- E. Air quality impact analysis for the rocket with the maximum particulate matter emissions expected to be tested on the test stand(s);
- F. Description of monitoring to be conducted during testing; and
- G. Description of the minimum record keeping and reporting to be conducted.
- H. Identification and location to nearest receptor downwind of the test stand;
- I. Toxic risk analysis conducted on the highest yearly estimated toxic emissions to be tested on test stand(s);
- J. Identification of those meteorological conditions under which propellant testing will cause insignificant risk to the nearest receptor;
- K. Identification meteorological conditions that were used in the toxic risk an analysis;

VI. Recordkeeping Requirements

Owner or Operator of rocket motor, solid rocket propellant, or any equipment subject to this rule shall maintain records specified in Section VI.A and VI.B for at least five years and shall make those records available to the District upon request.

- A. Without a Rocket Test Plan –
Documentation for all rocket propellant combustion tests subject to Section IV.A shall be kept on-site or at the operator's nearest place of business and shall include the following:
 - a. Net mass and type of propellant burned
 - b. Wind Direction and Speed
 - c. Date and time of test or combustion
 - d. Location of test or combustion
- B. With a Rocket Test Plan –
Documentation for all rocket propellant combustion tests shall be kept on-site or at the operator's nearest place of business specified in the Rocket Testing Plan and shall include the following:
 - a. Net mass and type of propellant burned
 - b. Wind Direction and Speed
 - c. Date and time of test or combustion
 - d. Location of test or combustion

VII. Compliance Schedule

A. New Sources

1. Owners or Operators of any rocket test stand capable and intending to test rockets with a propellant mass of 75 lbs or greater and without a valid Permit to Operate (PTO) or an Authority to Construct (ATC) shall apply for an ATC within 90 days from the adoption of this Rule.
2. Owners or Operators that are not required to comply with Section IV.B and choosing to operate without a Rocket Test Plan shall comply with the guidelines under Section IV.A of this Rule.
3. Owners or Operators intending to operate with a Rocket Test Plan shall submit a Rocket Test Plan to the District during initial permitting of the rocket test stand. The Rocket Test Plan shall be updated every two years, or Test Plan shall be updated as necessary to document changes in test procedure prior to enacting said changes, or District shall be notified every two years there have been not any changes to Rocket Test Plan.

B. Existing Sources

1. Owners or Operators that are not required to comply with Section IV.B and choosing to operate without a Rocket Test Plan shall comply with the guidelines under Section IV.A of this Rule within 90 days of rule promulgation.
2. Owners or Operators intending to operate with a Rocket Test Plan shall submit a Rocket Test Plan to the District within 180 days of rule promulgation. The Rocket Test Plan shall be in effect from the date of approval by the APCO. The Rocket Test Plan shall be updated every two years, or Test Plan shall be updated as necessary to document changes in test procedure prior to enacting said changes, or District shall be notified every two years there have been not any changes to Rocket Test Plan.
3. Owners or operators with valid PTO(s) shall, within 90 days of rule promulgation, notify the District in writing of PTO(s) subject to this rule.
4. Owners or operators with valid ATC(s) or ATC applications in process shall, within 30 days of rule promulgation, notify the District in writing of ATC(s) or ATC applications subject to this rule.