2012

Code for High Power Rocketry

Tripoli Rocketry Association

This High Power Rocketry Safety Code is the product of many years of effort on behalf of the hobby by those who care about it and whose prime interest is safety. It is not a perfect standard, but adequate. This minimum requirement, if followed, will preserve the hobby in a safe environment for all who participate and for spectators. Tripoli's Prefectures and other launch sponsors should be aware that wisdom should dictate what is safe and what is not at each launch site. With this standard as the minimum, it will be your responsibility to regulate your own launches within reason. You should be cautious not to over-restrict the activity. Our members, who sometimes travel great distances to attend launches, will expect this Safety Code to be the national standard at Tripoli certified and insured launches.

The major portion of this Safety Code is based on NFPA 1127. The rest of the Code (Appendix B) is the additional rules approved by the Tripoli Board of Directors over the past several years.

Chapter 1 – General Requirements

1-1 Scope

1-1.1 This code shall apply to the design, construction, limitation of propellant mass and power, and reliability of all high power rocket motors and motor components produced commercially for sale to or for use by the certified user for education, recreation and sporting competition.

1-1.2 This code also shall apply to the design and construction of high power rocket vehicles propelled by the high power rocket motors specified in 1-1.1.

1-1.3 This code shall apply to the conduct of launch operations of high power rocket vehicles specified in 1-1.2.

1-1.4 This code shall not apply to the design, construction, production, manufacture, fabrication, maintenance, launching, flight, test, operation, use, or activity in connection with a high power rocket motor when carried out or engaged in by:

(a) The government of the United States of America;

(b) Any state or local government;

(c) Any college or university; or

(d) Any individual, firm, partnership, joint venture, corporation, or other business entity engaged, as a licensed for profit business, in research, development, production, testing, maintenance, or supply of high power rockets, high power rocket motors, high power rocket propellant chemicals, or high power rocket components or parts for ultimate sale to qualified users in conformance with this code, or in connection with contracts with the federal or state governments or with

commercial space transportation vehicle contractors or operating firms.

1-1.5 This code shall not apply to the design, construction, fabrication, production, manufacture, maintenance, launching, flight, test, operation, or use of rocket-propelled model aircraft that sustain their mass against the force of gravity by aerodynamic lifting surfaces during the entire duration of their flight in the air. However, this code shall apply to rocket motors and motor reload components used in such devices.

1-1.6 This code shall not apply to model rockets whose power and weight do not exceed the limits established in NFPA 1122, *Code for Model Rocketry*.

1-2 Purpose

1-2.1 The purpose of this code shall be to ensure the availability of high power rocket motors and components that meet standards of safety and reliability stated here in to certified users.

1-2.2 The purpose of this code shall be to establish guidelines for reasonably safe operation of high power rockets to protect the user and the public.

1-3 Definitions For the purposes of this code, the following terms shall be defined as stated in this section.

Aero Model. A miniature, unmanned replica of a flying device, which includes the category of high power rocket, as defined in Section 1-3.

Arm. Rendering of an igniter from a safe (no energy) to a ready-to-fire condition.

Authority Having Jurisdiction. The organization, office, or individual responsible for approving equipment, an installation, or a procedure.

Certified. Approved or endorsed authoritatively.

Certified High Power Rocket Motor. A commercially made high power rocket motor that has been tested by a nationally recognized testing organization that is acceptable to the authority having jurisdiction and found to meet the requirements set forth in this code.

Certified User. An individual, distributor, or seller who has been tested to otherwise examined by a nationally recognized organization that is acceptable to the authority having jurisdiction and found to be qualified to purchase, possess, and use high power rocket motors.

Code. A document containing only mandatory provisions using the word "shall" to indicate requirements and in a form generally suitable for adoption into law. Explanatory material may be included only in the form of fine-print notes, in footnotes, or in an appendix.

Commercial Manufacturer. Any individual, firm, partnership, joint venture, corporation, or other business entity engaged as a licensed business in research, development, production, preparation, testing, maintenance, or supply of rockets, rocket motors, rocket propellant chemicals, rocket propellant, delay or ejection, or rocket components or parts.

Complex High Power Rocket. A high power rocket that is multi-staged or propelled by a cluster of rocket motors intended for simultaneous ignition at launch or in the air.

High Power Rocket Flier (HPR Flier). A TRA member or a member of an approved, insured rocketry organization that is 18 years old or older.

High Power Rocket. A rocket vehicle: That is propelled by a single rocket motor having a total impulse of more than 160 Newton-seconds or an installed total impulse of more than 320 Newton-seconds and no more than 40,960 Newton-seconds of installed total impulse, or That weighs more than 1500 g (53 oz), or That is propelled by a combination of model rocket motors having more than a total of 125 g (4.4 oz) of propellant weight; That contains any single motor with an average thrust of more than 80 Newtons, and That contains a recovery device for returning it safely to the ground so it can be flown again. That is made of paper, wood, fiberglass, or plastic with the minimum amount of metallic parts necessary for airframe integrity dependent upon the installed total impulse, and whose primary use is for purposes of education, recreation, and sporting activities.

High Power Rocket Motor. A rocket motor that has more than 160 Newton-seconds of total impulse or an average thrust of greater than 80 Newton-seconds and that otherwise meets the other requirements set forth in this code. Additional classification definitions for 'sparky' motors are defined in NFPA 1125:

1. The propellant of a high power rocket motor shall contain no metal particles larger than 150 microns (100 mesh), except for titanium (Ti) sponge.

2. No Ti sponge particles shall be used that are larger than 12 microns (8 mesh).

3. No more than 12 percent by weight of Ti sponge shall be used. The manufacturer shall provide instructions detailing additional operating hazards with motors using Ti sponge.

Installed Total Impulse. The sum of the total impulse of all rocket motors installed in a rocket and intended to be ignited during the launching and flight of that rocket.

Launch Director (LD): A Tripoli Level 2 or Level 3 member who has overall administrative responsibility for the launch.

Launch Site. The primary parcel of land from which launch activities are conducted and all adjacent parcels which are owned by the same property owner, or other property owners, and who have granted permission for Tripoli Rocket Launch activities to be conducted on their property. This includes the High Power Launch Area, Model Rocket Launch Area and Preparation Area.

High Power Launch Area. An area or areas designated by the Launch Director or Range Safety Officer from which certified high power rockets are launched or certified motors are static tested.

Model Rocket Launch Area. An area or areas designated by the Launch Director or Range Safety Officer from which certified model rockets are launched.

Preparation Area. An area designated by the Launch Director or Range Safety Officer in which rocket motors, or electronic components for rockets are prepared for launching or static testing.

Liquid Propellant Rocket Motor. A rocket motor that contains a fuel and an oxidizer in liquid form or in a combined monopropellant liquid form as a single chemical and that derives its force or thrust from the combustion thereof.

Model Rocket. A model rocket is a rocket that (1) weighs no more than 1500 g (53 oz), including propellant, and is propelled by a model rocket motor. It has structural parts made of paper, wood, or breakable plastic, it has a means for returning it to the ground so it can be flown again; and its primary use is for purposes of education, recreation, and sporting competition.

Model Rocket Flier: A flier that is flying model rockets.

Model Rocket Motor. A commercially made rocket motor that has been tested and classified by a nationally recognized testing organization as a Model Rocket Motor.

Module. A pyrotechnic component of a loadable or reload- able rocket motor in which its chemical composition is pre-loaded into a finished assembly that does not necessitate mixing of ingredients by the user.

Motor Reloading Kit. A package designed and produced by a commercial manufacturer that contains all of the components and parts necessary to reload and reuse a non-expendable model rocket motor casing specifically designed and manufactured to use these components and parts. These components and parts normally include propellant module(s), a new rocket motor nozzle, new insulation components, prepackaged delay and ejection modules, an electric igniter, and the parts necessary to seal the casing during operation.

Named Insured: Individuals that are not Tripoli Members but are members of groups that have been submitted to, and approved by the Tripoli Insurance Liaison.

Parking Area. An area designated by the RSO where spectators park their vehicles.

Participants. Persons that are either:

- **HPR Fliers**.
- **Model Rocket Fliers**.
- **Invited Guests** of fliers.
- **Spectators**. General population of non-fliers, and non-invited guests.

Prepping Area. An area designated by the RSO where high power rocket and high power rocket motors are prepared for launch.

Propellant. The material(s) utilized in a rocket motor that produce thrust by the discharge of a working fluid generated by combustion, decomposition, change of state, or other operation of such material contained, carried, or stored with- in said rocket motor.

Range Safety Officer (RSO). A Level 2 or three HPR Flier whose responsibility and duty during the operation of high power rockets is to confirm a rocket's compliance with the applicable provisions of this code, be confident that the rocket will fly in a safe manner, designate the areas of the launch site, and oversee the safety of all spectators and participants..

Recovery Area. An area designated by the RSO for the intended recovery of high power rockets.

Rocket. A device that ascends into the air without use of aerodynamic lifting forces acting against gravity and that is propelled by one or more rocket motors.

Rocket Engine. See definition of rocket motor.

Rocket Motor. A device, or combination of devices, that provides the necessary force or thrust to cause a rocket to move. The force or thrust shall be created by the discharge of gas generated by combustion, decomposition, change of state, or other discharge of materials contained, carried, or stored solely within said rocket motor or rocket and not dependent upon the outside environment for reaction mass.

- ***High Power Rocket Motor.*** A rocket motor that has more than 160 N-sec but no more than 40,960 N-sec of total impulse, or that produces an average thrust of greater than 80 N or that contains greater than 62.5 g (2.2 oz) of propellant.

- ***Hybrid Rocket Motor.*** A rocket motor that utilizes a fuel and an oxidizer in different physical states (solid, liquid, or gaseous).

- ***Model Rocket Motor.*** A rocket motor that has a total impulse of no greater than 160 N-sec, an average thrust of no greater than 80 N, and a propellant weight of no greater than 62.5 g (2.2 oz).

- ***Reloadable Rocket Motor.*** A rocket motor that has been designed and manufactured so that the user can load, reload, and reuse the pressure-containing body or casing using the parts and components of a motor reloading kit.

- ***Solid-Propellant Rocket Motor.*** A rocket motor that contains a fuel and an oxidizer in solid form and whose force or thrust is produced by the combustion of the fuel and oxidizer.

Rocket Vehicle. See definition of rocket.

Sanctioned Launch. Also called ***Insured Launch***. Any launch of a rocket that meets ***ALL*** of the following constraints:

1. Responsible person of launch shall be member of Tripoli in good standing.
2. Follows the appropriate Tripoli Safety Code.
3. Legal. All AHJ (e.g. FAA waiver) requirements/regulations met and any required permits secured.
4. Landowner permission.

Shall. Indicates a mandatory requirement.

Should. Indicates a recommendation or that which is advised but not required.

Solid Propellant Rocket Motor. A rocket motor containing a fuel and oxidizer in solid form and deriving its force or thrust from the combustion thereof.

Spectator. A nonparticipant whose primary purpose is to view a high power rocket launch.

Spectator Area. An area designated where spectators view a high power rocket launch.

Structural Parts. The load-bearing parts of a rocket, specifically the nose cone, body tube, and fins.

Tripoli (TRA). Tripoli Rocketry Association, inc.

Chapter 2 – Requirements for High Power Rocket Construction and Operation

2-1 User Certification A person shall operate or fly a high power rocket only if that person is a certified user. A person shall only operate or fly a high power rocket with total impulse within or below their certification level.

2-2 Operating Clearances. A person shall fly a high power rocket only in compliance with:

a. This code;

b. *Federal Aviation Administration Regulations*, Part 101 (Section 307,72 Statute 749, Title 49 United States Code, Section 1348, "Airspace Control and Facilities," Federal Aviation Act of 1958); and

c. Other applicable federal, state, and local laws, rules, regulations, statutes, and ordinances.

d. Landowner permission.

2-3 Preflight inspection. A person shall fly a high power rocket only if it has been inspected and approved for operation immediately prior to flight by a RSO. The RSO shall confirm the rocket's compliance with the applicable provisions of this code and be confident that the rocket will fly in a safe manner.

2-4 High Power Rocket Motors and Components

2-4.1 A person shall use only commercially manufactured, certified high power rocket motors or motor reloading kits or components.

2-4.2 No person shall dismantle, reload, or alter a single- use high power rocket motor. No person shall alter the components of a reloadable high power rocket motor or use the contents of a reloadable rocket motor reloading kit for a purpose other than those specified by the manufacturer.

2-5 Rocket Construction. A high power rocket shall be constructed in such a manner and with suitable materials to withstand the operating stresses and retain structural integrity under conditions expected or known to be encountered in flight.

2-6 Rocket Airframe Materials. A high power rocket vehicle intended to be propelled by one or more high power rocket motors shall be constructed using lightweight materials such as paper, wood, rubber, plastic, fiberglass, or when necessary ductile metal so that the rocket conforms to the other requirements of this code.

2-7 Stability. A person intending to operate a high power rocket shall determine its stability before flight. This person shall provide documentation of the location of the center of pressure and the center of gravity of the high power rocket to the RSO if the RSO requests same.

2-8 Weight and Power Limits

2-8.1 A person intending to operate a high power rocket will ensure that it weighs less than the rocket motor manufacturer's recommended maximum liftoff weight for the rocket motor(s) used for the flight. This person shall present documented proof of compliance with this requirement if it is requested by the RSO during preflight inspections.

2-8.2 A person shall not install in a high power rocket a rocket motor or combination of rocket motors that will produce more the 40,960 Newton-seconds of total impulse. (4.45 Newtons equals 1.0 lb.).

2-9 Recovery

2-9.1 A rocket shall be launched only if it contains an recovery system that is designed to return all parts of the rocket to the ground intact and at a landing speed at which the rocket does not present a hazard.

2-9.2 A person preparing the high power rocket for flight shall install only flame-resistant recovery wadding if wadding is necessary by the design of the rocket.

2-9.3 A person shall not attempt to catch a high power rocket as it approaches the ground.

2-9.4 A person shall not attempt to retrieve a high power rocket from a place that is hazardous to people. The person flying the rocket shall attempt as soon as practicable to notify the utility company or other appropriate authority if the high power rocket becomes entangled in a power line.

2-9.5 Increased descent rates for rocket activities conducted at the Black Rock Desert venue are acceptable if needed to insure a controlled descent to remain inside the FAA approved Dispersion Area.

2-9.6 Rockets with more than 2560ns of total impulse must use electronic recovery mechanisms.

2-10 Payloads

2-10.1 A person shall not install or incorporate in a high power rocket a payload that is intended to be flammable or explosive or to cause harm.

2-10.2 A person shall not fly a vertebrate animal in a high power rocket.

2-11 Launching Devices

2-11.1 A person operating a high power rocket shall launch it from a stable device that provides rigid guidance until the rocket has reached a speed adequate to ensure a safe flight path.

2-11.2 The person launching the high power rocket shall ensure that the launcher incorporates a blast deflector device if necessary to prevent the rocket motor exhaust from impinging directly on flammable materials.

2-11.3 A launching device shall not be used to launch a high power rocket at an angle more than twenty degrees (20°) from vertical.

2-11.4 A person operating a high power rocket shall place the end of the launch rod or rail above eye level or cap it to prevent accidental eye injury. A person shall store a launch rod or rail so it is capped, cased, or left in a condition where it cannot cause injury.

2-11.5 A rocket shall be pointed away from the spectator area and other groups of people during and after installation of the ignition device.

2-11.6 Firing circuits shall not be armed with the rocket in other than a launching position.

2-12 Ignition Systems

2-12.1 A person launching a high power rocket shall use an ignition system that is remotely controlled, electrically operated, and contains a launching switch that will return to "off" when released.

2-12.2 The ignition system shall contain a removable safety interlock device in series with the launch switch.

2-12.3 The launch system and igniter combination shall be designed, installed, and operated so the liftoff off the rocket shall occur within three seconds of actuation of the launch system. If the rocket is propelled by a cluster for rocket motors designed to be ignited simultaneously, the person operating the rocket shall install an ignition scheme that has either been previously tested or has a demonstrated capability of igniting all rocket motors intended for launch ignition within one second following ignition system activation.

2-12.4 A person shall install an ignition device in a high power rocket motor at the launcher or within the area designated by the RSO. The rocket shall be pointed in a safe direction during and after installation of the ignition device.

2-12.5 No firing circuits shall be armed with the rocket in other than a launching position.

2-12.6 A rocket motor shall not be ignited by any of the following:

a. A switch that uses mercury.
b. "Pull wires" that disconnect or complete a circuit.
c. "Pressure roller" switches

2-13 Launch Site

2-13.1 A person shall launch a high power rocket only in an outdoor area where tall trees, power lines, and buildings will not present a hazard, in the opinion of the RSO, to the safe flight operation of a high power rocket.

2-13.2 The minimum dimensions of the launch site shall be the **greater** of the following:

a. Not less than one-half the maximum altitude expected, calculated, or simulated, or as granted by an FAA waiver or other AHJs.

b. 457 m (1500 ft) or twice the minimum spectator and participant distance specified in ***Safe distance Table*** whichever is greater, for any rocket that is flown

c. For a circular area, the minimum launch site dimension shall be the diameter in meters (feet).

d. For a rectangular, the minimum launch site dimension shall be the shortest side in meters (feet).

2-13.3 The flying field (launch site) shall be at least as large as that stated in ***Launch Site Dimension Table***.

2-13.4 As an alternative to the launch site dimensions, the size of the launch site shall be established as no less than one-half the maximum altitude expected, calculated, simulated, or granted (by FAA waiver/authority having jurisdiction) for the particular flight in question. In no case shall the minimum launch site dimension be less than 1500 ft (457 m).

2-13.5 In no case shall the minimum site dimension be less than one-half the estimated maximum altitude of the high power rocket.

2-13.6 Fire suppression devices and first aid kits shall be located at the launch site during the launch of a high power rocket.

2-13.7 All operations at the launch site shall occur only with landowner permission.

2-14 Launcher Location

2-14.1 The launch site shall contain no occupied buildings or public highways on which traffic flow exceeds ten (10) vehicles per hour.

2-14.2 The area that encircles a launch pad shal1 be cleared of brown grass, dry weeds, and other easy-to-burn materials for a diameter equal to at least that specified in the ***Clear Distances Table.***

2-14.3 The person intending to launch a high power rocket shall locate the launcher more than 1500 ft (457 m) from any occupied building or public highway on which traffic exceeds ten vehicles per hour.

2-15 Safe Distances

2-15.1 No person shall be closer to the launch of a high power rocket than the person

actually launching the rocket and those authorized by the RSO.

2-15.2 All spectators shall remain within an area determined by the RSO and shall remain behind the RSO and the person launching the rocket.

2-15.3 A person shall not be closer to the launch of a high power rocket than the applicable minimum safe distance set forth in the ***Safe Distance Table***.

2-16 Launch Operations

2-16.1 A person shall not ignite and launch a high power rocket horizontally, at a target, or so the rocket's flight path goes into clouds or beyond the boundaries of the flying field (launch site).

2-16.2 A person shall not launch a high power rocket if the surface wind at the launcher is more than twenty (20) mph (32km/hr).

2-16.3 A person shall not operate a high power rocket in a manner that is hazardous to aircraft.

2-16.4 No range activity shall be conducted when a thunderstorm has been sighted within ten miles or less of the launch site or if audible thunder or lightning is present.

2-17 Launch Control

2-17.1 A person shall launch a high power rocket only with the immediate knowledge, permission, and attention of the RSO.

2-17.2 All persons in the launching, prepping, spectator and parking areas during a countdown and launch shall be standing and facing the launcher if requested to do so by the RSO. *Exception: Those individuals who have mobility restrictions.*

2-17.3 The person launching a high power rocket shall precede the launch with a five-second countdown audible throughout the launching, spectator, and parking areas. This countdown shall be given by the person launching the rocket, the RSO, or other flying site operating personnel.

2-17.4 No person shall approach a high power rocket that has misfired until the safety interlock has been removed or the battery has been disconnected from the ignition system, one minute has passed, and the RSO has given permission for only a single person to approach the misfired rocket to inspect it.

2-17.5 Smoking or open flames shall not be permitted in the launching area, prepping area, or twenty-five feet (25 ft/7.6 m) of any high power rocket motors, motor reloading kits, or pyrotechnic modules.

2-17.6 A system shall be provided that permits the RSO to immediately warn all participants and spectators of rocket flight event anomalies that present a hazard to them.

2-18 Participation

2-18.1 Only HPR Fliers shall be allowed in the High Power Launch Area.

2-18.1.1 **Exception:** Non-HPR Fliers are allowed in the High Power Launch Area if escorted by a HPR Flier. A HPR Flier may escort and be accompanied by not more than two (2) non-HPR fliers in the High Power Launch Area. The HPR flier escort is required to monitor the actions of the escorted non-HPR fliers, and the escort is fully responsible for those actions and for the safety of those escorted.

2-18.2 Children younger than 18 years of age may conduct flights from the Model Rocket Launch Area under the direction of a HPR Flier.

2-18.3 Spectators, who are not invited guests, shall confine themselves to the spectator area(s) as designated by the RSO and shall not be present in the High Power Launch Area or Model Rocket Launch Area at any time.

2-18.4 Attendance by Invited Guests and Spectators

2-18.4.1 Fliers shall be responsible for the conduct of their invited guests.

2-18.4.2 An invited guest may be permitted in the Model Rocket Launch Area and preparation areas upon approval of the RSO but shall not be present at the High Power launch area.

2-18.4.3 Spectators, who are not invited guests, shall confine themselves to the spectator areas as designated by the RSO and shall not be present in the High Power Launch Area, or Model Rocket Launch Area.

Chapter 3 - High Power Solid Propellant Rocket Motor Testing and Certification

3-1 Certification Requirement. A high power rocket motor type or motor reloading kit offered for sale, exposed for sale, sold, used, or made available shall be examined and tested by the authority having jurisdiction to determine whether or not the type complies with all requirements and tests detailed in the Tripoli Motor Testing requirements (or other recognized certification authorities).

3-2 List of certified High Power Rocket Motors. The authority having jurisdiction shall maintain a current and complete list of all those high power rocket motor types and motor reloading kits that are certified as complying with their requirements and tests and shall make copies of this list available to citizens and public safety officials who request it.

Chapter 4 - High Power Rocket Motor User Certification

4-1 Sales Only to Certified Users. A high power solid propellant rocket motor or motor reloading kit shall be sold to, shipped to, stored by, and used only by certified users.

4-2 User Certification Provisions

A person who is a certified user shall meet the following minimum provisions.

(a) The person shall be at least 18 years of age and shall provide proof of age upon applying for certification.

(b) The person shall show a level of knowledge and competence acceptable to the certifying organization in handling, storing, and using a high power solid propellant rocket motor and high power rockets.

Chapter 5 - Prohibited Activities

The following activities shall be prohibited by this code:

5-1 The use of a high power rocket or high power rocket motor as a weapon against a target.

5-2 Tampering with a high power rocket motor, motor reloading kit, or module in any manner or degree that is contrary to the purpose for which said high power rocket motor or motor reloading kit is designed and intended to be used.

5-3 The sale, offering for sale, exposing for sale, or otherwise making available a rocket motor or motor reloading kit that does not comply with the requirements herein and has not been certified in accordance with Chapter 3. With the following exceptions:

5-3.1 *This prohibition shall not be construed as prohibiting the transfer of rocket motors or motor reloading kits to a certifying authority for the purpose of testing for certification.*

5-3.2 *This prohibition shall not be construed as prohibiting the transfer, sale, offering for sale, exposing for sale, or otherwise making available model rocket motors, motor reloading kits, or modules complying with NFPA 1122, Code for Model Rocketry.*

5-4 The operation, discharge, or activation of a high power rocket contrary to the provisions of Federal Aviation Administration regulations, or other applicable federal, state, and local laws, rules, regulations, statutes, and ordinances.

5-5 The sale, offering for sale, exposing for sale, making, or using of fuse, wick, or other ignition devices intended to be activated by a hand-held flame for the purpose of starting or igniting a high power rocket motor.

5-6 Reloading any expendable, disposable solid propellant high power rocket motor with any material once said motor has been operated; or reloading any reloadable, non-expendable solid propellant high power rocket motor with any material or by any means not specifically provided or recommended by the manufacturer.

5-7 Selling or conveying a high power rocket motor or motor reloading kit to a user who is not a certified user. *This prohibition shall not be construed as prohibiting the transfer of a single high power rocket motor or motor reloading kit for the purpose of user certification.*

5-8 Possession, storage, or use of a high power rocket motor or motor reloading kit by any person who is not a certified user. *This prohibition shall not be construed as prohibiting the possession, storage, or use of a single high power rocket motor or motor reloading kit for the purpose of user certification.*

5-9 Persons participating in the prepping or launching of high power rockets, including spectators in the prepping areas, that have consumed alcohol, narcotics, medication, or drugs that could affect judgment, movement, or stability.

Chapter 6 - Referenced Publications

The following documents or portions thereof are referenced within this code. The edition indicated for each reference is the current edition as of the date of the NFPA issuance of this document.

6-1 NFPA Publications. National Fire Protection Association, I Batterymarch Park, *P.O. Box 9101, Quincy, MA 02269-9101*

NFPA 1122, *Code for Model Rocketry*.

NFPA 1125, *Code for the Manufacture of Model Rocket Motors*.

NFPA 1127, *Code for High Power Rocketry*

6-2 Government Publications. Superintendent of Documents, U.S. Government Printing Office, Washington DC 20402.

Federal Aviation Administration Regulations, from the Code of Federal Regulations. Federal

Hazardous Substances Act, from the United States Code (re. Airspace Control)

6-3 TRA Publications. Tripoli Rocketry Association, Inc., P. O. Box 87, Bellevue NE 68005.

Articles of Incorporation and Bylaws

High Power Rocketry Safety Code

Tripoli Motor Testing Committee (TMT), Testing Policies

Distance Tables

Area that must be cleared of flammable materials around launcher.

Clear Distance Table			
Installed Total Impulse (N-sec)	**Equivalent Motor Type**	**Minimum Clear Distance (m)**	**Minimum Clear Distance (feet)**
0.01 – 160.0	**G or Smaller**	**0**	**0**
160.01 - 320.00	**H**	**15**	**50**
320.01 - 640.00	**I**	**15**	**50**
640.01 - 1280.00	**J**	**15**	**50**
1280.01 - 2560.00	**K**	**23**	**75**
2560.01 - 5120.00	**L**	**30**	**100**
5120.01 - 10240.00	**M**	**38**	**125**
10240.01 - 20480.00	**N**	**38**	**125**
20480.01 - 40960.00	**O**	**38**	**125**

Note: *For a high power rocket using a motor(s) with titanium sponge, the minimum clear distance shall be multiplied by a factor of 1.5.*

Defines minimum personnel distance from launcher.

Safe Distance Table			
Installed Total Impulse (N-sec)	**Equivalent Motor Type**	**Minimum Personnel Distance (feet/meter)**	**Minimum Personnel Distance - Complex (feet/meter)**
160.01 - 320.00	H	100/31	200/61
320.01 - 640.00	I	100/31	200/61
640.01 - 1280.00	J	100/31	200/61
1280.01 - 2560.00	K	200/61	300/92
2560.01 - 5120.00	L	300/92	500/153
5120.01 - 10240.00	M	500/153	1000/305
10240.01 - 20480.00	N	1000/305	1500/457
20480.01 - 40960.00	O	1500/457	2000/610

Defines minimum size of launch site.

LAUNCH SITE DIMENSIONS			
Installed Total Impulse (N-sec)	**Equivalent Motor Type**	**Minimum Site Distance (feet/meter)**	**Equivalent Distance (mile/km)**
160.01 - 320.00	H	1,500/457	.28/46
320.01 - 640.00	I	2,500/762	.50/.76
640.01 - 1280.00	J	5,280/1610	1.00/1.61
1280.01 - 2560.00	K	5,280/1610	1.00/1.61
2560.01 - 5120.00	L	10,560/3219	2.00/3.22
5120.01 - 10240.00	M	15,480/4719	3.00/4.71
10240.01 - 20480.00	N	21,120/6438	4.00/6.43
20480.01 - 40960.00	O	26,400/8047	5.00/8.05

Note 1: For a circular area, the minimum launch site dimension is the diameter in feet; for a rectangular area, it is the shortest side in feet.

Appendix A

Origin and Development of NFPA 1127

Starting in 1978, the technical progress in solid propellant rocket motors, rocket airframe materials, bonding agents, and construction techniques gave rise to a new form of nonprofessional rocketry based on model rocketry, but using larger and more powerful commercially made solid propellant rocket motors in larger and heavier rocket airframes. This new activity was called high power rocketry. Flying activities now take place throughout the United States in locations where the authority having jurisdiction is permissive of the activity and where the Federal Aviation Administration (FAA) grants waivers to Part 101 of the "Federal Aviation Administration Regulations." After more than two decades of operational experience, safety rules, operational procedures, and other facets of the activity have been worked out and tested. Since 1986, the Tripoli Rocketry Association, Inc., has worked with the National Association of Rocketry, with longtime representation on the NFPA Technical Committee on Pyrotechnics. Both organizations have contributed to the development of national standards.

The code contains instructional guidelines and specific standards for the design, construction, limitation of charge and power, and reliability of all high power rocket motors manufactured for sale to users; for the qualification and certification of users; for the design and construction of high power rockets propelled by these motors; and for the conduct of tests, launchings, and other operations involving rockets so that hazards are minimized.

The NFPA Technical Committee on Pyrotechnics believes that a separate NFPA code for high power rocketry is essential because of significant differences in operations, and to prevent confusion of the two activities in the minds of public safety officials. High power rocket activities should be allowed within the specifications of this code to guide our science-minded citizens safely.

The 1998 edition included a completely revised Chapter 3 that incorporated requirements and safety provisions for hybrid motor technology. The committee also created a table of clearance distances to promote fire safety in the vicinity of the launch pad. Chapter 5 was revised to be consistent with federal regulations for the storage of low explosives (high power rocket motors and motor reloading kits).

The 2002 edition of this code presented a reorganized document in order to correlate this code with NFPA 1122, *Code for Model Rocketry,* and NFPA 1125, *Code for the Manufacture of Model Rocket and High Power Rocket Motors.* Requirements applicable to high power rocket motor manufacturing, motor testing, and certification were moved to NFPA 1125. This document was also revised to comply with NFPA style.

The 2008 edition of this code presents amendments based upon findings outlined in a study by the National Association of Rocketry on the safety of sport rocketry. The revisions herein address improvements to rocket recovery, launch guidance devices, launch site specifications, and spectator clearance distances.

The 2011 edition of this code presents amendments based upon findings outlined in a study by the National Association of Rocketry on the safety of sport rocketry. The revisions herein address improvements to rocket recovery, launch guidance devices, launch site specifications, multiple simultaneous launches, and spectator clearance distances. Removal of ATF and manufacturer specific rules was performed.

Appendix B - Additional Tripoli Rulings

B-1 NFPA 1127 was adopted by the Tripoli Board of Directors as the Tripoli Safety Code. (*Tripoli Report*, April 1994, Tripoli Board Minutes, New Orleans, 21 January 1994, Motion 13.) Since this adoption, the code has gone through some revisions. Such is the way with codes – they are constantly undergoing change to improve and update them when safety prompts, or when the federal regulations change or are reinterpreted. Such was the case at the Committee on Pyrotechnics meeting April 2-5, 1995.

During the first day, the Rocket Caucus met with representatives from the Bureau of Alcohol, Tobacco, and Firearms (ATF). Several changes were made that affect the use and storage of high power rocket motors and reloadable modules. These changes, though pending approval, are already incorporated within this document.

B-2 All Tripoli members who participate in Association activities shall follow the Tripoli Certification Standards.

B-3 In a previous edition of the Handbook (©1987), an exemption was given as follows:

> "No one will be permitted in the launch area between the LCO table and the launch pads except vehicle crew (members) for prepping purposes. Crew photographers, or event photographers, permitted in the launch area will maintain a distance of 75 feet from the launch pad." (*Member's Handbook*, Tripoli Rocketry Association, Inc., Pages 24-25, 4.11.)
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> When this was published, the average motor being used at launches permitted a 75 foot distance more readily than at today's launches. Seventy-five feet is OK for most J and some K launches. However, it will be up to the RSO to determine, in all cases, any distances from the launch of any rocket by photographers.

B-4 Any Board action(s), with regard to safety, made previous to or after publication of this document shall be a part of the Tripoli Safety Code.