This is an example of a Class 3 FAA/AST submittal package.

It is ONLY a guideline. It will not guarantee either acceptance or approval by the FAA. Your project may require more or less information based upon the complexity or goals of your intended flight.

As mentioned previously, if you can tell more with less and still be complete, please do it. The FAA/AST will appreciate your efforts. The key is to speak to each of the information requirements of 101.29 as specifically as you can.

If you choose to generate your own aerodynamic data and 3-sigma 6 degree of freedom dispersion plots, be sure to attach a file providing aero data in tabular form. See the Class 3 write-up for specifics.
No certificate may be issued unless a completed application form has been received (14 C.F.R. 91, 101, and 105).

**APPLICATION FOR CERTIFICATE OF WAIVER OR AUTHORIZATION**

**INSTRUCTIONS**

Submit this application in triplicate (3) to any FAA Flight Standards district office.

Applicants requesting a Certificate of Waiver or Authorization for an aviation event must complete all the applicable items on this form and attach a properly marked 7.5 series Topographic Quadrangle Map(s), published by the U.S. Geological Survey (scale 1:24,000), of the proposed operating area. The map(s) must include scale depictions of the flightlines, showlines, race courses, and the location of the air event control point, Police dispatch, ambulance, and fire fighting equipment. The applicant may also wish to submit photographs and scale diagrams as supplemental material to assist in the FAA’s evaluation of a particular site.

Application for a Certificate of Waiver or Authorization must be submitted 45 days prior to the requested date of the event.

Applicants requesting a Certificate of Waiver or Authorization for activities other than an aviation event will complete items 1 through 10 only and the certification, item 17, on the reverse.

1. Name of organization
   Tripoli Rocketry Association

2. Name of responsible person
   John Doe

3. Permanent mailing address
   House number and street or route number: 222 22nd Avenue SW
   City: Anywhere
   State and ZIP code: State 99999
   Telephone No.: 999-999-9999

4. State whether the applicant or any of its principal officers/owners has an application for waiver pending at any other office of the FAA.
   None

5. State whether the applicant or any of its principal officers/owners has ever had its application for waiver denied, or whether the FAA has ever withdrawn a waiver from the applicant or any of its principal officers/owners.
   None

6. FAR section and number to be waived
   101.25 (b)6 Controlled airspace/operating limitations

7. Detailed description of proposed operation (Attach supplement if needed)
   Launching of Class 3 unmanned rocket into controlled airspace.
   To be launched during concurrent FLY HIGH event at Black Rock, NV. Requesting event organizers to administer launch control duties.
   Supplemental information attached.

8. Area of operation (Location, altitudes, etc.)
   Black Rock, NV - 40 deg 48.5N, 119deg 09W 3615' MSL

9a. Beginning (Date and hour)
    09/10/2000  08:00:00

9b. Ending (Date and hour)
    09/15/2000  20:00:00

10. Aircraft make and model (a)
    Pilot’s Name (b)
    Certificate number and rating (c)
    Home address (Street, City, State) (d)

FAA Form 7711-2 (8-08) Supersedes Previous Edition
11. The air event will be sponsored by:

12. Permanent mailing address | House number and street or route number | City | State and ZIP code | Telephone No.

13. Policing (Describe provisions to be made for policing the event)

14. Emergency facilities (Mark all that will be available at time and place of an event)

- Physician
- Fire truck
- Ambulance
- Crash wagon
- Other - Specify

15. Air Traffic control (Describe method of controlling traffic, including provision for arrival and departure of scheduled aircraft)

16. Schedule of Events (include arrival and departure of scheduled aircraft and other periods the airport may be open)

<table>
<thead>
<tr>
<th>Hour (a)</th>
<th>Date (b)</th>
<th>Event (c)</th>
</tr>
</thead>
</table>

If sufficient space is not available, the entire schedule of events may be submitted on separate sheets, in the order and manner indicated above.

Please Read

The undersigned applicant accepts full responsibility for the strict observance of the terms of the Certificate of Waiver or Authorization, and understands that the authorization contained in such certificate will be strictly limited to the above described operation.

17. Certification - I CERTIFY that the foregoing statements are true.

Date: 05/15/2000

Signature of Applicant

Remarks:

Tripoli Rocketry Association Safety Code and Research Rules to be followed throughout launch event.
Supplemental Information for Line 5, FAA Form 7711-2:

Description of All Major Rocket Systems

**Propulsion**

a. Ammonium Perchlorate Composite Propellant (APCP) – 80% solids; 10% Al

b. 67 inches of characterized propellant in 5.015” diameter Bates grains; phenolic liner and casting tubes; bonded to liner with epoxy; RTV on inside diameter of grains.

c. Kn: 397-585  
   Web: 1.73”  
   Mass: 72.261 lbs  
   Max Pc: 497.3 psi  
   Burn Time: 12.26 min  
   Vol Loading: 82.8%  
   Prop Length: 67”  
   Motor Class: P5168  
   Deivered ISP: 219

   From BurnSim v3.0.0.119

d. Motor is 72” long, 6” dia, .1875” wall DOM 6065 T6 Al tubing; graphite nozzle in Al carrier. Nozzle and closure retained by Al rings fastened with 10-32 FH machine screws.

**Airframe**

a. Fincan is 72” motor (DOM tubing) coupled to 24” G10 avionics/parachute bay.

b. 5:1 ratio 30” long G10 conical nosecone - 4” Al tip. 6.0” dia, 126 “ overall length.

c. Fins are .125” (uncanted) hexagonal design with 1” beveled leading and trailing edges

d. Fins are located 108” from nose tip.

**Avionics**

a. Loki Research ARTS 2 altimeter (accelerometer-based)

b. RDAS compact Altimeter (accelerometer-based)

c. Missileworks PET2 timer

d. Beeline GPS transmitter

e. Walston RF tracker on both fin can and avionics package

**Recovery**

a. Aerocon 73” cross-form on motor/fin can deployed at apogee (120 fps descent)

b. 36” hemispherical on avionics bay deployed at apogee (120 fps descent)

**Highest Altitude (AGL) and Maximum Range (Ft) Expected to be Reached**

Highest altitude and maximum range simulations were attained using RASAero aerodynamic data and 2007-8 NOAA AM and PM wind data (Reno station) manually input into RS-Pro v1.2.2f4.
### Table 1 - Maximum Expected Altitude/Maximum Range

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Launcher Configuration</th>
<th>Alt (Ft AGL)</th>
<th>Range (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero Winds</td>
<td>0 deg AZM; 0 deg Elev</td>
<td>76,826</td>
<td>255</td>
</tr>
<tr>
<td>Late Sept Winds 7AM</td>
<td>25 deg AZM; 3 deg Elev</td>
<td>73,049</td>
<td>7,264</td>
</tr>
<tr>
<td>Late Sept Winds 4PM</td>
<td>50 deg AZM; 10 deg Elev</td>
<td>72,077</td>
<td>21,056</td>
</tr>
<tr>
<td>“ ” 7AM</td>
<td>65 deg AZM; 3 deg Elev</td>
<td>74,659</td>
<td>15,765 (Parachute recovery)</td>
</tr>
</tbody>
</table>

### Table 2 – Launch Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Nominal Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Launch Tower Ht.</td>
<td>144”</td>
</tr>
<tr>
<td>Launch Site Altitude</td>
<td>3800’</td>
</tr>
<tr>
<td>Landing Site Altitude</td>
<td>3800’</td>
</tr>
<tr>
<td>Temperature</td>
<td>68 deg</td>
</tr>
<tr>
<td>Baro Pressure</td>
<td>29.92 in-Hg</td>
</tr>
<tr>
<td>Latitude</td>
<td>40.485°</td>
</tr>
<tr>
<td>Longitude</td>
<td>119.900°</td>
</tr>
</tbody>
</table>

### Dynamic Stability Characteristics

Static stability characteristics for the rocket at launch and burnout are shown in Table 3. RASAero is used to predict centers of pressure as a function of Mach number. A stable vehicle generally requires a minimum static margin of 1-2 calibers where a caliber is the diameter of the rocket.

### Table 3 - Static Stability Characteristics

<table>
<thead>
<tr>
<th>Mach Number</th>
<th>CP (in)</th>
<th>Static Margin (Calibers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>.10</td>
<td>102.871</td>
<td>3.76</td>
</tr>
<tr>
<td>3.5</td>
<td>90.93</td>
<td>5.65</td>
</tr>
</tbody>
</table>

### Figure 1 – Thrust & Mass Flow vs Time (sec)
Figure 2 – CNa, CP and Drag vs Mach

Figure 3 – CP, CG and Mass vs Mach
Figure 4 – CG and Mass vs Time at BU

Figure 5 – 3-Sigma Dispersion Zero Wind (No Recovery)
Figure 6 – 3–Sigma Dispersion 7AM Black Rock, NV Wind (No Recovery)

Figure 7 – 3–Sigma Dispersion 4PM Wind (With Recovery)
All Nominal Impact Areas within Three Standard Deviations

Dispersion plots for ballistic and recovered impacts have been generated using RASAero aerodynamic rocket data manually input to RS-Pro 6 DOF trajectory simulation.

1-Sigma uncertainties for RS-Pro are as follows:

| Iterations | 1800 |
| Mass Properties | | |
| Mass (%) | 1 |
| Moments of Inertia (%) | 5 |
| Center of Gravity (cm) | 0.1 |
| Aerodynamics | | |
| Co (%) | 18 |
| Cn (%) | 18 |
| Cp (cm) | 0.25 |
| Fin Cant (deg) | 0.2 |
| Propulsion | | |
| Total Inlet Area (%) | 3 |
| Propellant (%) | 1 |
| Thrust Axis (deg) | 0.2 |
| Wind | Direction (deg) | 53.3 |
| | Velocity (m/s) | 17.8 |
| Launch Rail | Azimuth (deg) | 6.5 |
| | Elevation (deg) | 0.25 |
| Failure Likelihood | Ignition (%) | 0 |
| | CATO (%) | 0 |
| | Deployment (%) | 0 |
| | Cluster Failure (%) | 0 |

Figure 6 – 1-Sigma Uncertainties for RS-Pro 6-DOF Dispersion Analysis

Support Equipment

a. Tracking equipment includes RF receivers, GPS receivers, antennae, computers, extra batteries and cabling.

b. FRS radios are used between team members, support personnel and launch organizers.

Safety Procedures

a. Range safety, launch preparation, launch event and post-launch checklists will be used.

b. Two-way communication via FRS radios is critical for communicating activity to event staff. Team members communicate launch prep and launch status to event organizers. Event Launch Control Officer directs sequence of launches and uses event public address system to inform attendees.

Mishap Procedures/Emergency Facilities

a. Local first aid and emergency management available from team support personnel (Family Practice Physician) as well as AHPRA launch Organizers and emergency personnel in Gerlach, NV.

b. Nearest hospital is located in Reno, NV.

KMN 02/10