

## §415.111

propellants, explosives, and toxic materials; and

(2) A drawing of the launch vehicle that identifies:

(i) Each stage, including strap-on motors;

(ii) Physical dimensions and weight;

(iii) Location of all safety critical systems, including any flight termination hardware, tracking aids, or telemetry systems;

(iv) Location of all major launch vehicle control systems, propulsion systems, pressure vessels, and any other hardware that contains potential hazardous energy or hazardous material; and

(v) For an unguided suborbital launch vehicle, the location of the rocket's center of pressure in relation to its center of gravity for the entire flight profile.

(c) *Payload description.* An applicant must include or reference documentation previously filed with the FAA that contains the payload information required by §415.59 for any payload or class of payload.

(d) *Trajectory.* An applicant must provide two drawings depicting trajectory information. An applicant must file additional trajectory information as part of the flight safety analysis data required by §415.115.

(1) One drawing must depict the proposed nominal flight profile with downrange depicted on the abscissa and altitude depicted on the ordinate axis. The nominal flight profile must be labeled to show each planned staging event and its time after liftoff from launch through orbital insertion or final impact; and

(2) The second drawing must depict instantaneous impact point ground traces for each of the nominal trajectory, the three-sigma left lateral trajectory and the three-sigma right lateral trajectory determined under §417.207 of this chapter. The trajectories must be depicted on a latitude/longitude grid, and the grid must include the outlines of any continents and islands.

(e) *Staging events.* An applicant must provide a table of nominal and  $\pm$  three-sigma times for each major staging event and must describe each event, in-

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cluding the predicted impact point and dispersion of each spent stage.

(f) *Vehicle performance graphs.* An applicant must provide graphs of the nominal and  $\pm$  three-sigma values as a function of time after liftoff for the following launch vehicle performance parameters: thrust, altitude, velocity, instantaneous impact point arc-range measured from the launch point, and present position arc-range measured from the launch point.

### §415.111 Launch operator organization.

An applicant's safety review document must contain organizational charts and a description that shows that the launch operator's organization satisfies the requirements of §417.103 of this chapter. An applicant's safety review document must also identify all persons with whom the applicant has contracted to provide safety-related goods or services for the launch of the launch vehicle.

### §415.113 Launch personnel certification program.

(a) A safety review document must describe how the applicant will satisfy the personnel certification program requirements of §417.105 of this chapter and identify by position those individuals who implement the program.

(b) An applicant's safety review document must contain a copy of its documentation that demonstrates how the launch operator implements the personnel certification program.

(c) An applicant's safety review document must contain a table listing each hazardous operation or safety critical task that certified personnel must perform. For each task, the table must identify by position the individual who reviews personnel qualifications and certifies personnel for performing the task.

### §415.115 Flight safety.

(a) *Flight safety analysis.* An applicant's safety review document must describe each analysis method employed to meet the flight safety analysis requirements of part 417, subpart C, of this chapter. An applicant's safety review document must demonstrate how each analysis method satisfies the

flight safety analysis requirements of part 417, subpart C, of this chapter. An applicant's safety review document must contain analysis products and other data that demonstrate the applicant's ability to meet the public risk criteria of §417.107 of this chapter and to establish launch safety rules as required by §417.113 of this chapter. An applicant's flight safety analysis must satisfy the following requirements:

(1) An applicant must file the proposed flight safety analysis methodology and the preliminary flight safety analysis products no later than 18 months for any orbital or guided sub-orbital launch vehicle, and nine months for any unguided suborbital launch vehicle, prior to bringing any launch vehicle to the proposed launch site.

(2) For a launch operator license, an applicant must file flight safety analysis products that account for the range of launch vehicles and flight trajectories applied for, or the worst case vehicle and trajectory under which flight will be attempted, no later than 6 months before the applicant brings any launch vehicle to the proposed launch site. For a launch specific license, an applicant must file flight safety analysis products that account for the actual flight conditions, no later than 6 months before the applicant brings any launch vehicle to the proposed launch site.

(3) The flight safety analysis performed by an applicant must be completed as required by subpart C of part 417 of this chapter. An applicant may identify those portions of the analysis that it expects to refine as the first proposed flight date approaches. An applicant must identify any analysis product subject to change, describe what needs to be done to finalize the product, and identify when before flight it will be finalized. If a license allows more than one launch, an applicant must demonstrate the applicability of the analysis methods to each of the proposed launches and identify any expected differences in the flight safety analysis methods among the proposed launches. Once licensed, a launch operator must perform a flight safety analysis for each launch using final launch vehicle performance and

other data as required by subpart C of part 417 of this chapter and using the analysis methods approved by the FAA through the licensing process.

(b) *Radionuclides.* An applicant's safety review document must identify the type and quantity of any radionuclide on a launch vehicle or payload. For each radionuclide, an applicant must include a reference list of all documentation addressing the safety of its intended use and describe all approvals by the Nuclear Regulatory Commission for launch processing. An applicant must provide radionuclide information to the FAA at the pre-application consultation as required by §415.105. The FAA will evaluate launch of any radionuclide on a case-by-case basis, and issue an approval if the FAA finds that the launch is consistent with public health and safety.

(c) *Flight safety plan.* An applicant's safety review document must contain a flight safety plan that satisfies §417.111(b) of this chapter. The plan need not be restricted to public safety related issues and may combine other flight safety issues as well, such as employee safety, so as to be all-inclusive.

(d) *Natural and triggered lightning.* For any orbital or guided suborbital expendable launch vehicle, an applicant must demonstrate that it will satisfy the flight commit criteria of §417.113(c) of this chapter and appendix G of part 417 of this chapter for natural and triggered lightning. If an applicant's safety review document states that any flight commit criterion that is otherwise required by appendix G of part 417 of this chapter does not apply to a proposed launch or series of launches, the applicant's safety review document must demonstrate that the criterion does not apply.

#### §415.117 Ground safety.

(a) *General.* An applicant's safety review document must include a ground safety analysis report, and a ground safety plan for its launch processing and post-flight operations as required by this section, §417.109 of this chapter, and subpart E of part 417 of this chapter when launching from a launch point in the United States. Launch processing and post-launch operations at a launch point outside the United