

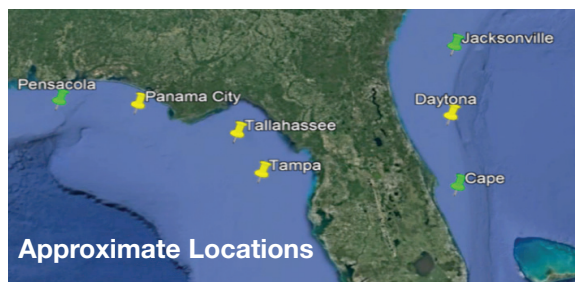
NASA's SpaceX Demo-2 Test Flight: Space Station Departure and Splashdown Criteria

NASA and SpaceX are capable of supporting seven splashdown sites off the coast of Florida for the return of NASA's SpaceX Demo-2 test flight with NASA astronauts Robert Behnken and Douglas Hurley from the International Space Station as part the agency's Commercial Crew Program.

About two days prior to return, NASA and SpaceX teams will select primary and alternate splashdown target locations from the seven possible sites, with additional decision milestones about where Crew Dragon will splashdown taking place prior to the astronauts boarding the spacecraft, during free flight and before Crew Dragon performs a deorbit burn.

Teams will evaluate the forecasted weather conditions at the primary and alternate splashdown sites at each milestone to determine if the sites are "GO" or "NO-GO" for splashdown and recovery.

The seven potential splashdown sites for Demo-2 are: Pensacola, Tampa, Tallahassee, Panama City, Cape Canaveral, Daytona and Jacksonville.



Selecting the Return Location

Splashdown locations are selected using defined priorities starting with selecting a station departure date and time with the maximum number of return opportunities in geographically diverse locations to protect for weather changes. Teams also prioritize locations which require the shortest amount of time between undocking and splashdown based on orbital mechanics, and splashdown opportunities that occur in daylight hours.



Crew Dragon has the capability to execute a unique series of orbit-lowering maneuvers using its Draco thrusters to line up its ground track for each primary location and maintain the capability to change to alternate sites in free-flight as weather constraints dictate.

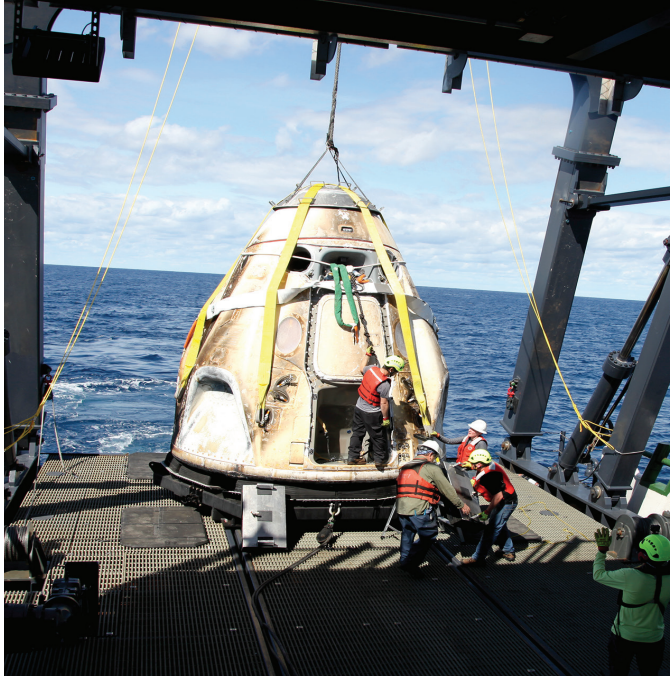
Return Decision Milestones

Pre-Departure (1 to 2 days prior to approximate departure)

SpaceX and NASA will jointly make the decision to depart 48 hours prior to splashdown based on the status of the primary and alternate splashdown sites.

6 hours before undocking

NASA and SpaceX make a decision on primary splashdown target.



2.5 hours before undocking

SpaceX will monitor changes to conditions until 2.5 hours prior to the scheduled undocking, when a determination to proceed with departure will be made. If conditions are marginal and exceed the accepted criteria, a joint recommendation by SpaceX and NASA will be made whether to proceed with undocking.

Undocking

NASA and SpaceX will make the final decision to proceed after the astronauts are ready inside Crew Dragon just before undocking.

Free Flight

Crew Dragon will proceed with departure phasing burns as planned even if conditions are marginal or NO-GO at any upcoming supported landing site and exceed the accepted criteria. Given the splashdown site may be 24 hours or more away and weather can change, Crew Dragon will always proceed with departure phase burns to preserve the supported splashdown opportunity.

Wave-off

If conditions remain NO-GO at the supported splashdown site, SpaceX and NASA will jointly make a decision to “wave-off.” In a wave-off scenario, Crew Dragon will remain in orbit for the next landing attempt 24-48 hours later.

5 hours before Deorbit (6 hours before Splashdown)

If conditions at the splashdown site are marginal and exceed the accepted criteria, SpaceX and NASA will jointly make a decision about whether to proceed with deorbit.

Crew Dragon Claw Separation (1 hour, 20 minutes before Splashdown)

SpaceX will monitor changes to conditions through the decision to proceed with the deorbit burn (30 minutes before claw separation prep), when a final determination to proceed with deorbit will be made. The claw is located on Crew Dragon’s trunk, connecting thermal control, power, and avionics system components located on the trunk to the capsule.

Recovery Criteria

The weather criteria for recovery for this demonstration mission is as follows.

- **Wind Speed:** No greater than 15 ft/sec
- **Wave Period & Significant Wave Height:** Driven by wave height and wave period relationship; in general, when wave height and wave period are the same, the condition is no-go. No greater than 7 degrees wave slope.
- **Rain:** < 25% probability of 25 dBz in protected boundary
- **Lightning:** No less than 10 miles and no greater than 25% probability of lightning in protected boundary
- **Helicopter Start & Hover Test:** Pass-Fail test to confirm operational capability
- **Helicopter Operational Limits:** Vessel limits will apply on motion (pitch, roll), cloud visibility, cloud ceiling and lightning
 - **Vessel Pitch, Roll:** No greater than 4 degrees
 - **Ceiling:** No less than 500 feet
 - **Visibility:** No less than ½ mile for day and 1 mile for night

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