



**Board of County Commissioners**  
P.O. Box 99 / 200 East 4<sup>th</sup> Street  
Woodbine, Georgia 31569

Contact: John Simpson  
912-467-2754 (cell)  
[jsimpson@capitolresourcesllc.com](mailto:jsimpson@capitolresourcesllc.com)

## FOR IMMEDIATE RELEASE

# Camden County Releases ITAR Compliant Flight Safety Analysis for Spaceport Camden

**WOODBINE, Ga. – October 3, 2019** – The Camden County Board of Commissioners has been working diligently to determine a way to increase transparency about the project's licensing information without complicating the agency's ongoing review or releasing sensitive or export-controlled information that cannot lawfully be shared with the public. Pursuant to those goals, the County initiated the development of a publicly releasable report, prepared by The Aerospace Corporation, that describes the project's flight safety analysis.

"We heard from Camden County residents that they wanted to better understand how Spaceport Camden could satisfy the FAA's safety criteria. This report shows that Spaceport Camden cannot not only meet those requirements, but significantly exceeds them," said Board of County Commission Chairman, Jimmy Starline.

Certain data used in a flight safety analysis are controlled from public release by the International Traffic in Arms Regulations (ITAR), the Missile Technology Control Regime (MTCR) and other statutes. Prior to the release of report, Camden County received guidance from the Department of Defense Office of Prepublication and Security Review to clear these issues.

The Aerospace Corporation is a nonprofit corporation that operates a Federally Funded Research and Development Center for the United States Air Force and the intelligence community and supports all national security space programs. "The Aerospace Corporation is the gold standard for flight safety analysis," said Commission Vice-Chairman, Gary Blount. "Their work for the Department of Defense and NASA make some of their methodologies a sensitive national security issue but they are the best at what they do. I am glad we were able to clear the national security hurdles and make this information available to the public."

There are two primary risk factors that are analyzed in a flight safety analysis: collective risk to all the population in the vicinity of a launch, also referred to as expected casualty ( $E_c$ ), and individual risk ( $P_{Ind}$ ) which is the risk to any one person in a government defined area (grid square).  $P_{Ind}$  is not typically required for a spaceport license application but is required for every launch license issued for an actual launch.

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STEVE L. HOWARD  
County Administrator

JOHN S. MYERS  
County Attorney

LANNIE BRANT  
Commissioner, District 1

CHUCK CLARK  
Commissioner, District 2

JIMMY STARLINE  
Commissioner, District 3

GARY BLOUNT  
Commissioner, District 4

BEN CASEY  
Commissioner, District 5

The collective risk is quantified in terms of the expected number of casualties for a launch mission, given certain assumptions related to the type of rocket, the trajectory flown, assumed weather and winds, anticipated / potential population in the vicinity, and many other factors, as provided by FAA regulations and generally practiced in the industry. Hundreds of thousands of launch failures are modeled as part of the flight safety analysis to calculate the various risk probabilities.

A concerted effort was made to accurately and conservatively model the design features of the representative rockets and the population in the spaceport vicinity. In addition to the local census data and specific global population density databases required to be used by federal regulation, Camden County added 380 campers, visitors and staff to Cumberland Island (CI), reflecting very conservative (and unlikely) assumptions that every campground was filled to capacity, the island contained the maximum number of visitors (300) allowed by law, and the island and its facilities were fully staffed. Further, 5350 launch spectators were added to viewing locations in and around Camden County. Finally, every habitable structure on Little Cumberland Island (LCI) and north CI near the flight trajectory was assumed to be occupied by a varying number of persons. It was further assumed that every population group in the databases used for the analysis, and citizens of Camden County, including the additional populations just described, were all outside and unsheltered, for every launch failure modeled in the analysis. Additionally, the launch vehicle was assumed to have a 5% failure probability for each stage of flight (ascent, second stage to orbit and first stage landing return, therefore 15% total failure rate). This total failure rate assumption is 50% higher than the rate required by FAA regulations.

The FAA specifies the acceptable level of cumulative risk for a launch to be less than 1 in 10,000 casualties ( $1 \times 10^{-4}$ ) to one significant figure. This means that estimates of  $E_c$  are either rounded down or up to one significant figure when evaluated. Therefore, an estimated  $E_c$  of 1.49 per 10,000 passes the FAA requirement. The Spaceport Camden flight safety analysis of the medium-large launcher's 100-degree reference trajectory demonstrates that it has less than 1.49 expected casualties in 10,000 over all phases of flight assuming up to 5 persons per habitable structure on LCI and north CI, and the numerous other visitors and viewers in the Camden region. If only the outbound launch operation (combined 1st stage and 2nd stage, with no first stage return to landing pad) is considered, then  $E_c$  remain less than 1.49 in 10,000 even assuming 10 persons per LCI/CI habitable structure and the additional populations. The results are shown in the table below.

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Table 5. Spaceport Camden Medium-Large  $E_C$  Results ( $\times 10^{-4}$ )

Camden County with Added Population			Expected Casualty (/10,000)				
Persons per CI/LCI Structure	CI Campers & Visitors	Launch Viewers	Stage 1 Ascent	Stage 1 Return	Stage 2	Launch Only*	Total All Phases
0	0	0	0.013	0.001	0.01	0.02	0.02
0	0	5350	0.036	0.02	0.01	0.05	0.07
0	380	0	0.053	0.17	0.01	0.06	0.23
2	0	0	0.27	0.18	0.01	0.28	0.46
2	380	5350	0.36	0.37	0.01	0.37	0.74 **
4	380	5350	0.61	0.55	0.01	0.62	1.17
5	380	5350	0.77	0.64	0.01	0.78	1.42
6	380	5350	0.90	0.73	0.01	0.91	1.64
8	380	5350	1.17	0.91	0.01	1.18	2.09
10	380	5350	1.44	1.09	0.01	1.45	2.54

\* No Stage 1 Return  
 \*\* Reference Case

As an additional consideration for operations at Spaceport Camden, an assessment of a small launch vehicle was also performed. No return flight was modeled as all current small launch vehicles are expendable, but the analysis included a higher 10% failure probability per stage of flight. Results indicate that even when assuming the largest surrounding population scenario outlined earlier, and up to 40 people per LCI/CI habitable structure the expected casualty remains less than the FAA requirement of 1.49 in 10,000.

Table 7. Small Launch Vehicle Risk Results

Camden County with Added Population			Expected Casualty (/10,000)		
Persons per CI/LCI Structure	CI Campers & Visitors	Launch Viewers	Stage 1	Stage 2	Total
0	0	0	0.001	0.01	0.01
0	0	5350	0.014	0.01	0.02
0	380	0	0.016	0.01	0.03
2	0	0	0.068	0.01	0.08
2	380	5350	0.098	0.01	0.11
10	380	5350	0.37	0.01	0.38
20	380	5350	0.71	0.01	0.72
40	380	5350	1.39	0.01	1.40
100-degree azimuth trajectory			Individual risk = $0.10 \times 10^{-6}$		

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While typically not required for a Launch Site Operator License (LSOL) application, The Aerospace Corporation calculated the Individual Risk ( $P_{ind}$ ) results for the largest rocket proposed for Spaceport Camden, a medium-large launch vehicle. The FAA requirement for  $P_{ind}$  is less than 1 in a million to one significant figure (so less than 1.49 per million). This FAA requirement is two orders of magnitude more stringent than the cumulative risk ( $E_c$ ) requirement discussed earlier. The individual risk for a representative medium-large launcher on 100-degree azimuth trajectory from Spaceport Camden was calculated to be 0.50 per million on ascent (launch) and 0.66 per million on return (landing) flight.

“Camden County spent a considerable amount of time and resources to make this Flight Safety Analysis available to the public. The report proves definitively that we can launch a wide range of launch vehicles from Spaceport Camden with more than 2000 people on Little Cumberland Island and Cumberland Island,” added Chairman Starline.

A full version of The Aerospace Corporation Flight Safety Analysis is available online at: <https://issuu.com/camdencountyvoc/docs/vtr-2019-01516?fr=sZiAxMDMzODE2Ng>.

**More about Spaceport Camden:** Our Vision is to develop a successful world class spaceport through a public-private partnership that establishes Camden County as the Commercial Space Center of the United States. Our Mission is to create the premier spaceport strategically positioned to provide economic diversity with a competitive advantage for the space sector, Camden County, the State of Georgia and the United States of America. For more information, please view our website at [www.SpaceportCamden.us](http://www.SpaceportCamden.us).

**More about The Aerospace Corporation:** The Aerospace Corporation is a national nonprofit corporation that operates a federally funded research and development center and has approximately 4,000 employees. With major locations in El Segundo, Calif., Albuquerque, N.M., Colorado Springs, Colo., and the Washington, D.C., region, Aerospace addresses complex problems across the space enterprise and other areas of national significance through agility, innovation, and objective technical leadership. For more information, visit [www.aerospace.org](http://www.aerospace.org), or follow [@AerospaceCorp](https://twitter.com/AerospaceCorp) on Twitter.

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