

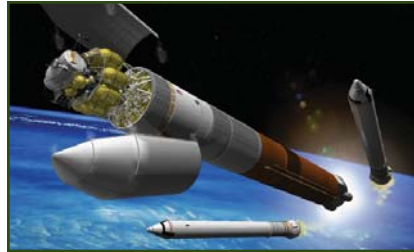
MISSION SAFETY AND ENGINEERING ANALYSIS

Assessing All Aspects of Launch Safety

The Florida office of A-P-T Research, Inc. (APT-FL, formerly known as RTI-Florida) is a small commercial research organization that serves government and industry clients in the U.S. and abroad. APT-FL conducts R&D and provides support services in advanced technologies, systems safety, space access, and public policy. Areas of focus include aerospace technology and launch safety. Our parent organization, A-P-T Research, was established in 1990.

Flight Safety Systems

APT-FL developed a prototype Flight Control Officer advisory system for NASA. It is a rule-based expert system that provides graphics displays and voice messages of launch vehicle status, including observed and predicted anomalies. APT-FL also assisted in developing a vehicle attitude advisory system for the U.S. Air Force to enhance situational awareness during the Titan Cassini mission's early flight phase.



training on launch operations support and risk estimation. Several training courses on debris modeling and risk analysis were conducted for FAA/AST and the U.S. Air Force. We also provided flight control officer training to the Brazilian government. APT-FL trained Transport Canada on launch site inspection activities, facility certification, vehicle operations, and conformance to license requirements. We are ready to support technical training activities for any customer.

Range Safety Systems

APT-FL uses ArcView GIS as its primary tool to generate range safety visualiza-

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Certification and Licensing Support

In collaboration with the Federal Aviation Administration's Office of Commercial Space Transportation (FAA/AST), APT-FL conducted a Congressionally mandated analysis in support of the Oklahoma Spaceport operating Reusable Launch Vehicles (RLVs). Additionally, APT-FL has assessed commercial launch vehicle safety and operations, payload safety assessments, on-orbit and re-entry risk assessments, and launch vehicle public safety analyses.

Training

APT-FL provides on-site and off-site

tions for the Air Force. APT-FL is currently exploring methods for enhanced productivity through further automation of range safety analysis processes.

Federal Launch Site Assessments

APT-FL has published commercial launch site safety assessments identifying policies, procedures, and organizations associated with commercial space operations' safety activities for the Eastern Range, Western Range, Wallops Flight Facility, White Sands Missile Range, and Kwajalein Missile Range. FAA/AST hired APT-FL to perform these studies and document each range's support capabilities and safety operations as they pertain to commercial space activities.

Capabilities

APT-FL has been collaborating with clients for more than 20 years on space systems. To ensure sound safety practices, APT-FL's engineers analyze potential hazards, develop operational criteria, and provide decision support tools.

APT-FL has the ability and experience to assess all aspects of launch safety including ground operations, vehicle processing, flight operations, mission plans, and launch site issues. To assist clients with flight safety, we analyze failure scenarios, develop automated support systems, provide training to analysts and operators, and improve safety procedures.

APT-FL is an aerospace industry innovator in developing risk assessment tools, such as explosive yield predictions, fragmentation models, debris casualty area estimates, structure penetration models, population models, and traffic models for air, land, and sea going craft.

Other capabilities include trajectory analysis (including simulation and optimization), overflight risk analysis (ascent, re-entry, ELVs, RLVs, and long duration balloons), telemetry analysis, finite-state modeling, and Geographic Information System (GIS) customization.

Commercial Launch Industry

Working with FAA/AST, APT-FL has developed federal regulations governing the licensing of commercial launches, reviewing launch site and launch operator license applications, and monitoring compliance. APT-FL is helping the industry develop common federal standards for launch vehicle ground processing and flight safety requirements. Also, APT-FL conducted launch site safety assessments for sites at Kodiak Island, Alaska; Transport Canada at Churchill, Canada; and for a proposed site in the State of Hawaii.

Nuclear Safety Analysis

APT-FL provided engineering and technical support for the Independent Nuclear Safety Review Panels on the Galileo, Cassini, and the Mars Pathfinder missions. APT-FL's analyses were used to evaluate safety issues for the launch of payloads with large quantities of nuclear material and to assist in preventing release of radioactive hazards.

Risk Analysis

APT-FL developed the Aurora and Horizons software suites to provide the U.S. Air Force with estimated hit probabilities and expected casualties for launch area and overflight. FAA/AST is evaluating this software to provide risk estimates for facilities near commercial launch sites. To provide enhanced estimates for the explosive behavior of impacting solid propellant fuels after a launch vehicle failure, APT-FL develops engineering models. To that end, APT-FL organized a detonability test program and calibrated a computer simulation model. APT-FL can now process simulations for various impact conditions to produce an explosive yield model for use in performing risk analyses. APT-FL also uses its risk analysis capabilities to aid the U.S. Air Force in establishing launch danger areas at Cape Canaveral Air Station. Using advanced GIS technologies, APT-FL integrates launch vehicle trajectory analysis and risk modeling. These applications include contour and color mapping to facilitate quick visual interpretation of the overflight risk, reduce analysis time, and increase overall confidence in risk assessment.



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