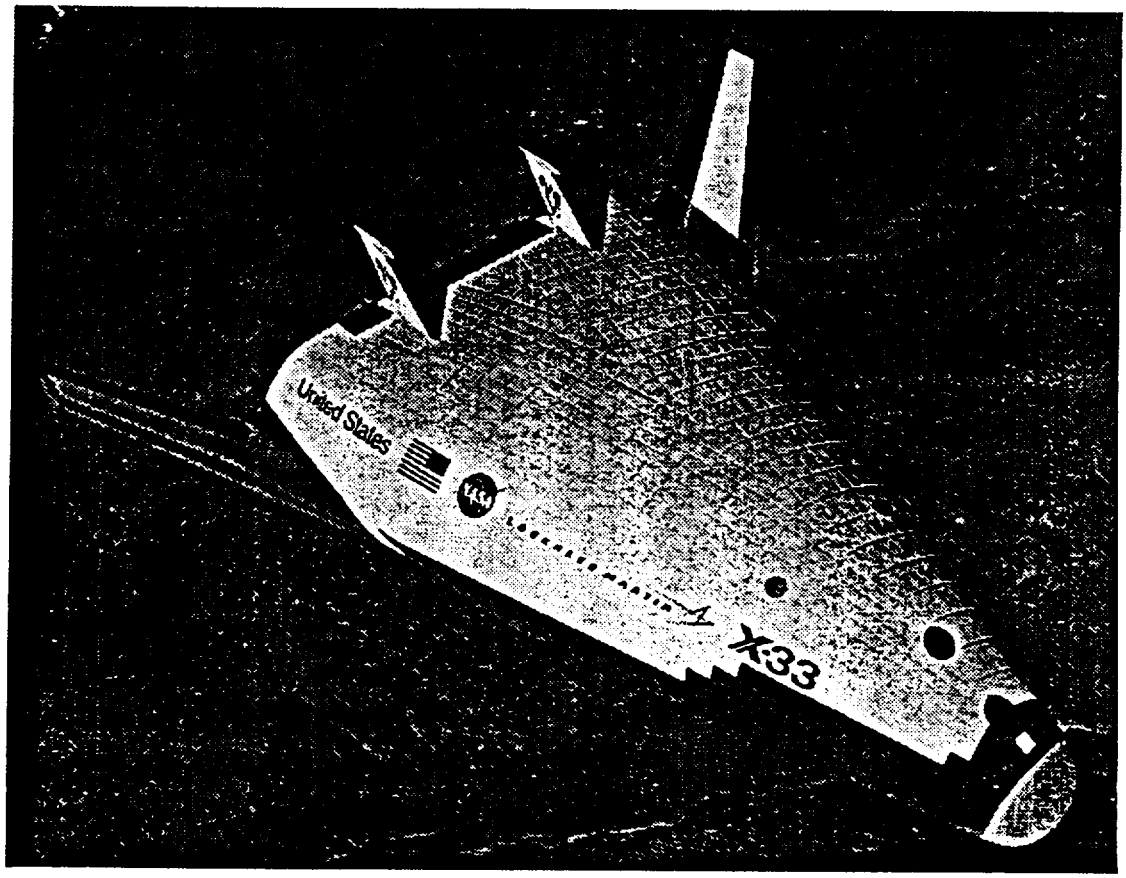
National Aeronautics and
Space Administration

X-33 Advanced Technology Demonstrator Vehicle Program

FINAL ENVIRONMENTAL IMPACT STATEMENT
Volume I



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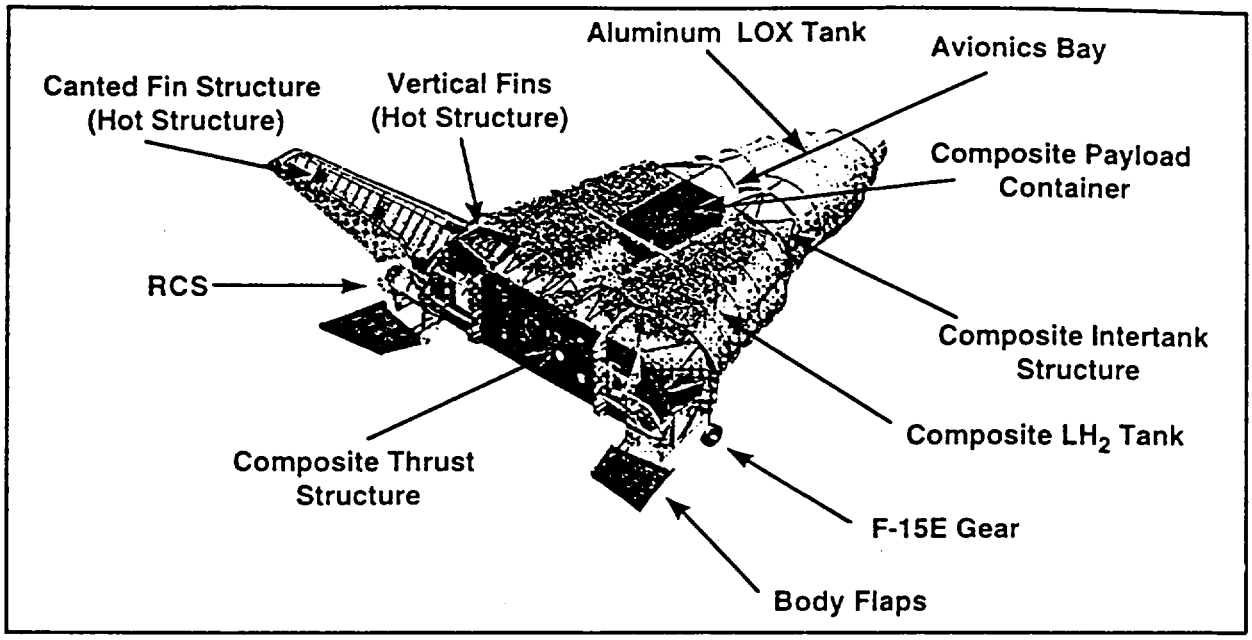

Figure 2-4. Internal Configuration of the X-33.

The spaceplane would use two linear J-2S aerospike engines made by Boeing North American Division and Rocketdyne, shown in Figure 2-5. Linear aerospike engines were developed in the 1970's and have been previously tested on the ground by firing them on engine test stands while secured to the stand and equipped with sensors to record performance and other vital data for the short- and mid-range flights. The main propulsion system (full system of engines and propellant tanks) consists of two J-2S aerospike engines, one aluminum LOX tank in the front, and two LH_2 tanks in the rear for short- and mid-range flights. The vehicle could sustain one engine out at liftoff and still have sufficient power from the remaining engine to continue acceleration and make a safe landing at the intended runway or an abort landing area depending on where the engine out occurred during flight. For the long- range flights an engine out situation could be tolerated approximately 30 seconds after liftoff.

The engine burns liquid hydrogen (LH_2) and liquid oxygen (LOX), releasing only water vapor into the atmosphere. All other fuel sources required to provide energy for onboard computers, the reaction control system, etc., depend on LH_2 and LOX, thereby greatly reducing the toxicity of fuel gases to those of normal, nontoxic constituents of the atmosphere. The engine does not require a "bell nozzle" to channel the hot gases of combustion for directional control of the vehicle. The hot gases expelled by the J-2S engine from the thrust cells would be directed in such a way that the atmosphere provides a natural channeling effect. Elimination of the bell nozzle provides significant weight and size reductions of the overall engine.

2.2.2.2 Alternative Mid-Range Landing Sites

Dugway Proving Ground, Utah

Dugway Proving Ground is located approximately 130 km (80 mi) southwest of Salt Lake City, Utah, near the town of Tooele. Dugway encompasses approximately 324,000 ha (800,000 ac) of the Great Salt Lake Desert. Dugway is part of the U.S. Army Test and Evaluation Command, headquartered at Aberdeen Proving Ground, Maryland.

The airfield within Dugway Proving Ground proposed for landing of the X-33 is called Michael Army Airfield. This airfield as shown in Figure 2-13 is situated on the eastern portion of Dugway. The airfield has a 3,960 m (13,000 ft) long by 61 m (200 ft) wide hard surfaced runway. Immediate surrounding terrain is relatively flat. It is a secure facility with a long history of flight operations. The airspace above Dugway is controlled by Hill Air Force Base which manages and approves use of the Utah Test and Training Range.

If use of Dugway is determined to not meet environmental and/or Program needs or suitability, test objectives for flying the X-33 to the long-range landing site will be modified, and all test flights except those to Silurian Lake or China Lake Naval Air Weapons Station will be conducted to the selected long-range landing site.