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As with any NASA mission that relies on a radioisotope power system, the Mars Science Laboratory has undergone a comprehensive multi-agency environmental review, including public meetings and open comment periods, as part of NASA’s compliance with the National Environmental Policy Act. Additionally, the mission will not launch until formal approval is received from the Office of the President.

Like previous generations of this type of electrical-power generator, the MMRTG is built with several layers of protective material designed to contain its plutonium dioxide fuel in a wide range of potential accidents, verified through impact testing. Each MMRTG carries eight individually shielded general purpose heat source modules (compared to 18 modules in the previous generation). The thickness of the protective graphite material in the center of the modules and between the shells of each module in the MMRTG has been increased by 20 percent over previous modules.

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Extensive technical analysis of the planned launch of the Mars Science Laboratory, including review of all similar past expendable rocket launches, has been conducted by NASA, the U.S. Department of Energy (which provides the MMRTG), and external experts. This work has determined that the chances of any launch accident are small (3.3 percent), and the chances of an accident of the type that would release plutonium are about ten times smaller.

In the event of a launch accident, it is unlikely that any plutonium would be released or that anyone would be exposed to nuclear material. The type of plutonium used in a radioisotope power system is different from the material used in weapons, and cannot explode like a bomb. It is manufactured in a ceramic form that does not become a significant health hazard unless it becomes broken into very fine pieces or vaporized and then inhaled or swallowed. Those people who might be exposed in a Mars Science Laboratory launch accident would receive an average dose of 5-10 millirem, equal to about a week of background radiation. The average American receives 360 millirem of radiation each year from natural sources, such as radon and cosmic rays.

Key Facts: Mars Science Laboratory

Launch Period: November 25 – December 18, 2011
Mass of Rover: 1,950 pounds (890 kilograms)
Launch Vehicle: Atlas V 541 from Cape Canaveral Air Force Station, FL
Arrival at Mars: August 6-20, 2012

Website for more information: mars.jpl.nasa.gov/msl

More information on radioisotope space power systems: www.ne.doe.gov/space/neSpace2d.html

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NASA, several other federal agencies, the State of Florida and the local governments surrounding Kennedy Space Center are preparing in advance to respond to any launch accident through specific communication procedures, the use of advanced environmental sensors around the launch area, rehearsal of coordinated response to various launch scenarios, and informational briefings to local communities and emergency responders. In the case of a launch accident, related alerts could include precautionary measures such as directions for people to stay indoors for a limited duration.

A comparison of potential radiation exposures (calculated using effective whole-body dose in millirem). Source: Health Physics Society