

NASA Radioisotope Power Systems Needs

Pu-238 Supply and Production Panel

1981

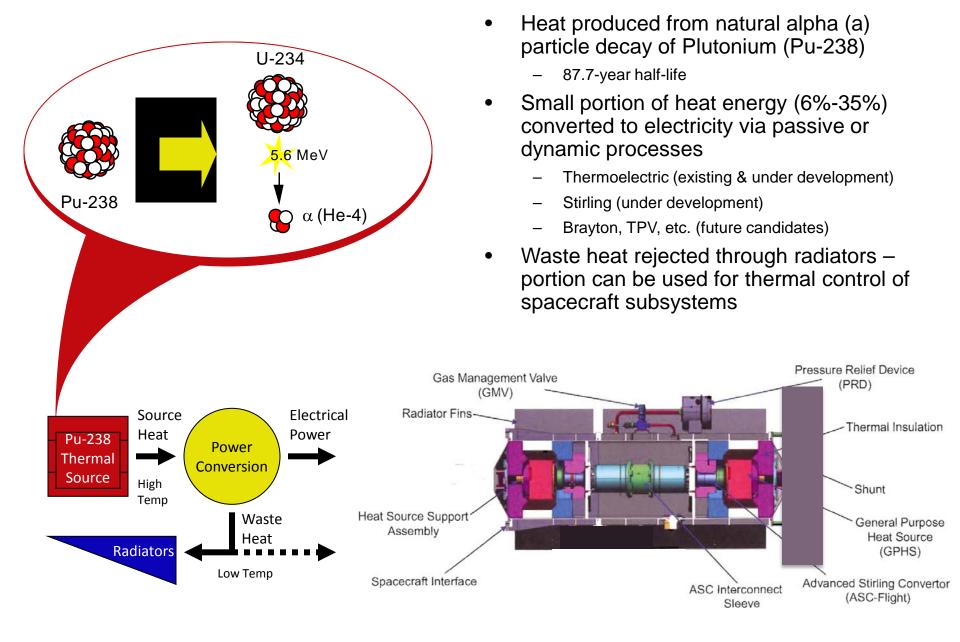
1991

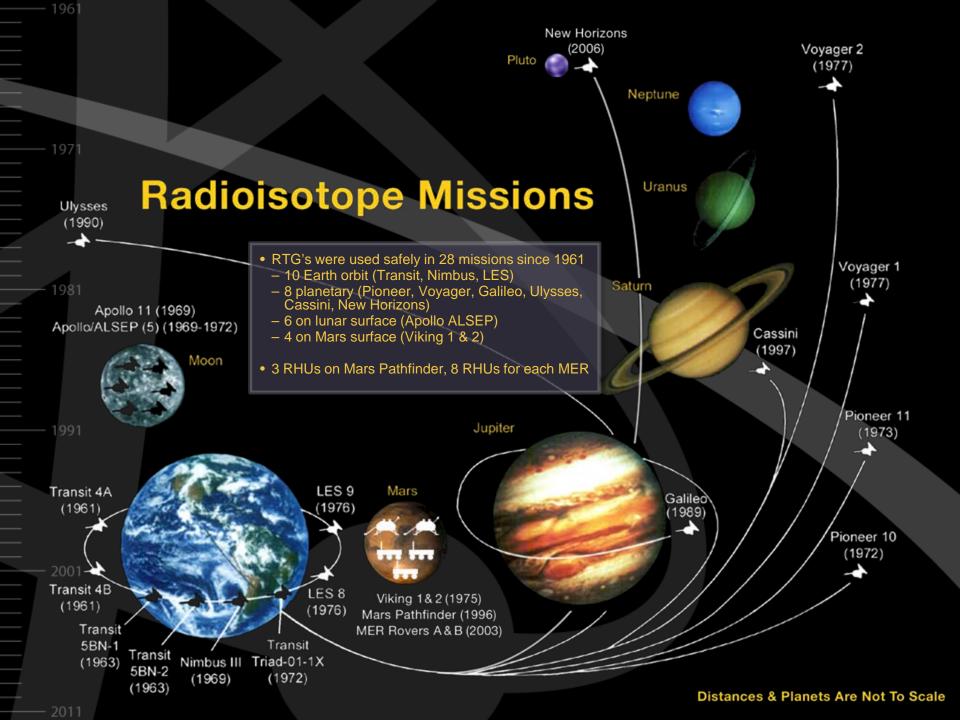


Leonard A. Dudzinski **Program Executive** NASA Headquarters



Radioisotope Power Systems (RPS)





RPS-related Decadal Studies

Mission Name	Mission Type	Mission Class
lo Observer Concept Study	Orbiter	Flagship
Mercury Lander Mission	Lander	Flagship
Neptune-Triton-Kuiper Belt Objects Mission Concept Study	Orbiter	Flagship
Titan Saturn System Mission - Orbiter	Orbiter	Flagship
Saturn Ring Observer Concept Study	Orbiter	Flagship
Enceladus Flyby & Sample Return Concept Studies	Orbiter (with sample return)	Flagship
Enceladus Orbiter Concept Study	Orbiter	Flagship
Titan Lake Probe Concept Study	Lander (with relay)	Flagship
Trojan Tour Concept Study	Orbiter	Flagship
Uranus and Neptune Orbiter and Probe Concept Studies	Orbiter	Flagship
Jupiter Europa Orbiter (component of EJSM) Concept Study	Orbiter	Flagship
Titan Saturn System Mission - Mongolfier	Aerial System	Flagship
Mars Polar Climate - Discovery/NF Lander	Lander	New Frontiers
Mars Polar Climate - New Frontiers Rover	Rover	New Frontiers
Lunar Geophysical Network Concept Study	Lander	New Frontiers
Lunar Polar Volatiles Explorer Mission Concept Study	Rover	New Frontiers
Saturn Atmospheric Entry Probe Mission Concept Study	Probe (with flyby relay)	New Frontiers
Chiron Orbiter Mission Concept Study	Orbiter	New Frontiers

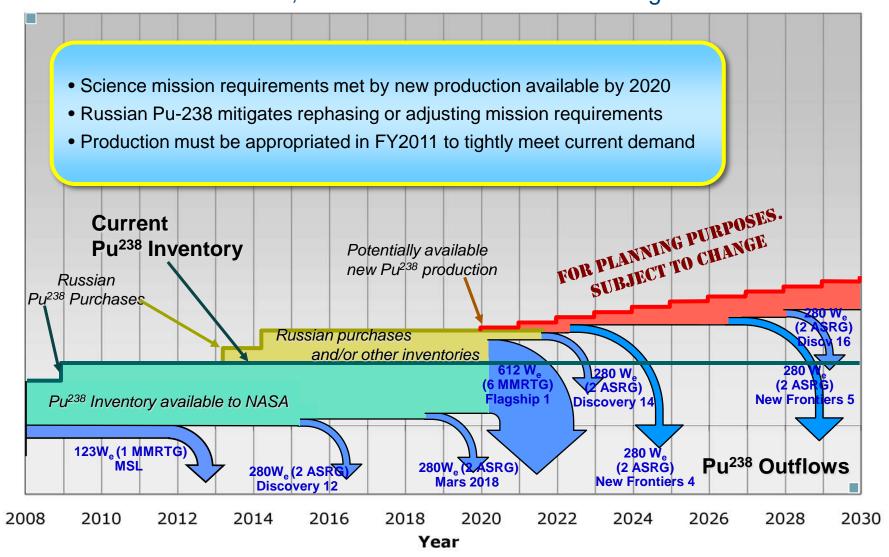
Radioisotope Power Systems Applications in Near Term Planetary Missions

1971 SMD RPS Mission Planning Set (as of November 30, 2010)

Flagship Mars New Frontiers Lunar Discovery/Scout Other	Projected Launch Year	Power Reqmnt (W _e)	RPS Type	Pu-238 Usage (kg)	
Mars Science Lab	2011	100	1 MMRTG	3.5	In Development
Juno (New Frontiers 2)	2011		No RPS Requirement		
Discovery 2010	2015	250	2 ASRG	1.8	In Development
Solar Probe	2020		Directed non-RPS		
New Frontiers 3	2016		Directed non-RPS		
Mars 2018	2018	2 AS	RG Potential / RHU pot	ential	In Discussion
Lunar Network 1	2018	TBD	TBD	TBD	Under Study
Discovery 13	2018		No RPS Option		
Outer Planets Flagship 1	2020-23/24	600-850	6 MMRTG	21.6	Under Study
New Frontiers 4	2022	250	2 ASRG	1.8	

Plutonium Supply vs Potential NASA Demand

November 30, 2010 SMD RPS Mission Planning Set



Pu-238 Domestic Production Status

 Currently, NASA relies on existing domestic and Russian Pu-238 inventories, which is insufficient to sustain long-term deep space exploration.

- DOE committed to supporting JEO with existing inventories
- US Pu-238 Start-up Plan completed by DOE with NASA coordination, and delivered to Congress in June 2010
 - Plan states NASA and DOE equally share the cost
 - Still need a passed DOE budget & initiative for FY11
 - Total Estimated Cost (NASA and DOE) is \$75M-\$90M over 6 years
- Senate version of DOE FY11 Appropriations recognized importance of restarting domestic Pu-238 to NASA missions, but provided no funding
- NASA Authorization Act of 2010 authorized NASA to fund DOE efforts in Pu-238
 Production under a reimbursable agreement. NASA does not have an Appropriation yet.
- NASA and DOE are working to develop a cost-sharing arrangement consistent with Congressional direction
- Until Congress acts, NASA and DOE cannot proceed



ENERGY

Start-up Plan for

Plutonium-238

Production for Radioisotope Power

Systems

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Current NASA Action on Pu-238 Restart

- National Aeronautics and Space Administration Authorization Act of 2010, section 806 levies the following action on NASA:
 - (b) IN GENERAL.—The Administrator shall, in coordination with the Secretary of Energy, pursue a joint approach beginning in fiscal year 2011 towards restarting and sustaining the domestic production of radioisotope thermoelectric generator material for deep space and other science and exploration missions.
 - (c) REPORT.—Within 120 days after the date of enactment of this Act, the Administrator and the Secretary of Energy shall submit a joint report to the appropriate committees of Congress on coordinated agreements, planned implementation, and anticipated schedule, production quantities, and mission applications under this section.

A joint NASA-DOE response is drafted and is expected to be delivered to Congress in February, 2011.

ACADEMIES

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Bottom Line

• ²³⁸Pu is essential for space exploration "Unless and until a new source of Pu-238 is established, the restricted supply Pu-238 will increasingly limit both the quality and quantity of U.S. space science in many mission areas, and continued U.S. leadership in these areas will be at risk"



National Research Council report: "Radioisotope Power Systems: An Imperative for Maintaining U.S. Leadership in Space Exploration", 2009

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RADIOISOTOPE POWER SYSTEMS
The Day of Reckoning
Has Arrived