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INL Operations Improvements of Nuclear Enabled Missions for NASA - Presentation

May 2022

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Changing the World's Energy Future

Idaho National Laboratory

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Mars Exploratory Rovers

- INL delivered 16 Light Weight Radioisotope Heater Units (2003 launches)
- 10CFR830 required a new approach to nuclear safety at KSC
  - Established a HazCat III non-reactor nuclear facility
  - Documented Safety Analysis (DSA) approved by DOE-HQ
  - Unreviewed Safety Question (USQ) process evaluated any operational change
- Lesson Learned:
  Need qualified USQ evaluators on-hand to evaluate changes

MER Integration at KSC (courtesy of NASA)

New Horizons

- INL fueled, tested, and delivered a GPHS-RTG (2006 launch)
- RTG process flow required multiple nuclear facilities
  - RTG stored in RTGF
  - Hot-fit check in PHSF before fairing encapsulation
  - Final integration at Vertical Integration Facility
  - Transport between facilities
- DSA concurrence by USAF, NASA-KSC, APL, United Space Alliance with approval from DOE-HQ
- Established short term nuclear facilities based on RTG location reduced USQ demand

Integration of the GPHS-RTG to NH spacecraft at KSC (courtesy of JHUAPL)

- INL assigned cognizant person acting in concert with Launch System Integration Manager responsible for New Horizons nuclear operations
- INL assigned USQ evaluators on-site during day and night shift nuclear operations

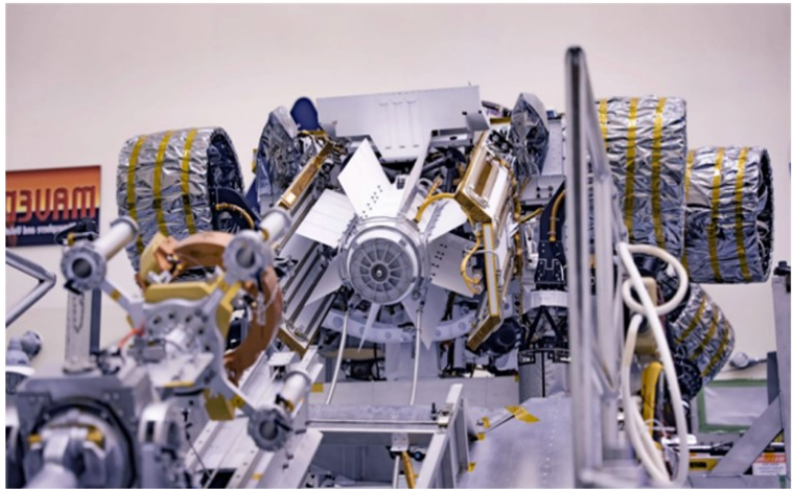
Mars Science Laboratory

- INL fueled, tested, and delivered a MMRTG (2011 launch)
- Similar multi-facility process flow as New Horizons
- Similar DSA approval strategy; Concurrence by USAF, NASA-KSC, and ULA and approved by DOE-HQ
- Introduced nuclear safety concepts early in Ground Operations Working Group
- Improved procedure flow and flexibility by smaller compartmentalized procedures vs larger front to back procedures
- Added MMRTG system design agency to quickly provide technical support

Hot-fit Check of the MMRTG to Curiosity at PHSF, KSC (courtesy of NASA)

Mars 2020

- INL fueled, tested, and delivered a MMRTG (2020 launch)
- Similar multi-facility process flow as MSL and New Horizons
- Similar DSA approval strategy; Concurrence by USAF, NASA-KSC, and ULA but approved by DOE-ID
- Improved equipment reliability
- Improved Readiness Assessment preparation by instituting an internal Management Review
- Streamlined MMRTG end item data package creation



Hot-fit Check of the MMRTG to Perseverance at PHSF, KSC (courtesy of NASA)

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