



Materials & Fuels Complex (MFC) Introduction

July 2020

Changing the World's Energy Future

Doug Crawford



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MeV

Modeling • Experimentation • Validation

SUMMER SCHOOL

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Idaho National Laboratory

July 29, 2020

12:15 MDT

INL's Three Main Facility Areas

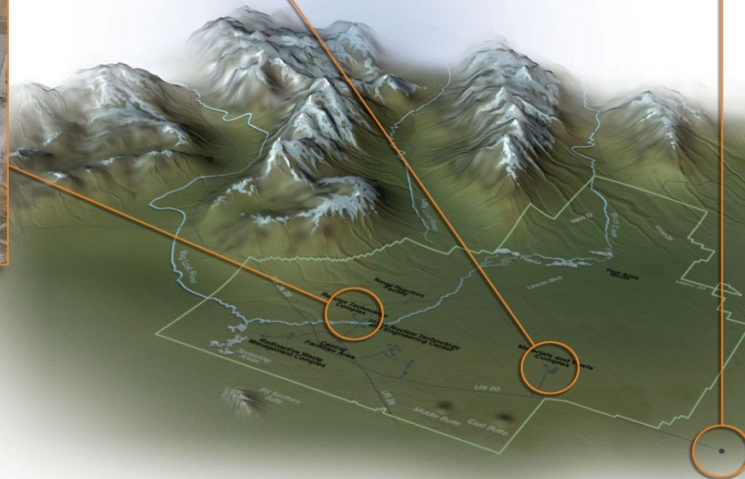
Advanced Test Reactor Complex



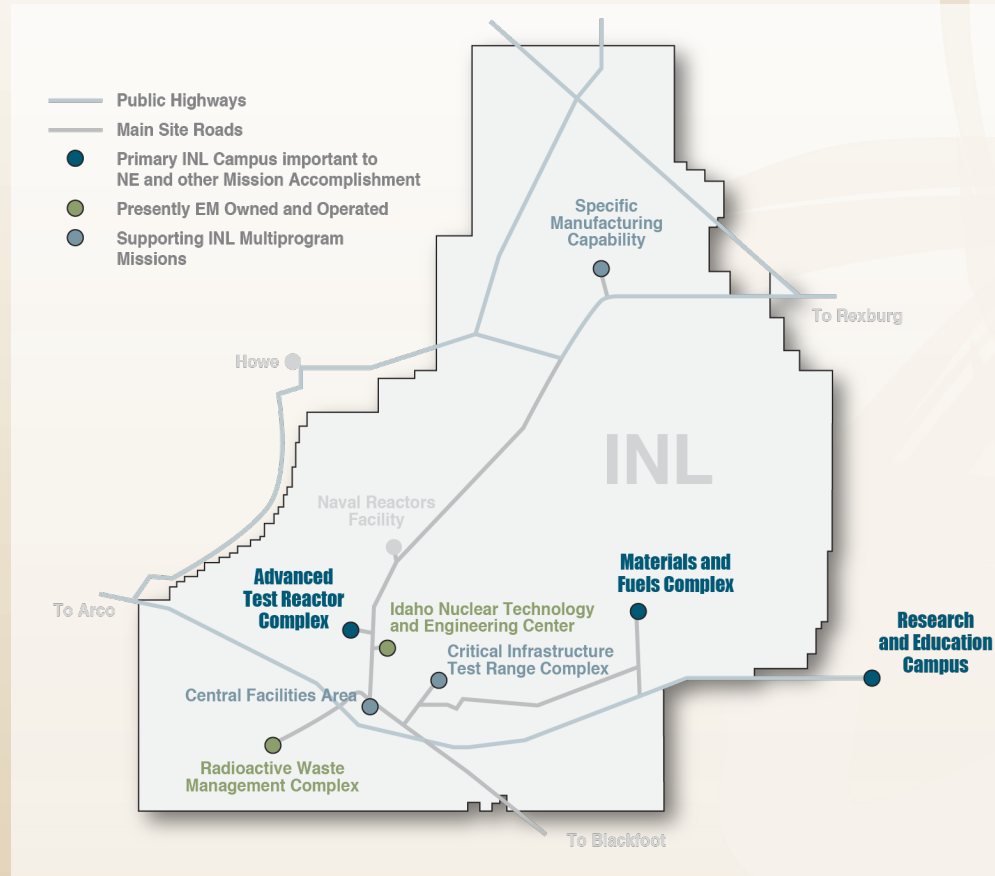
Materials and Fuels Complex



Research and Education Campus

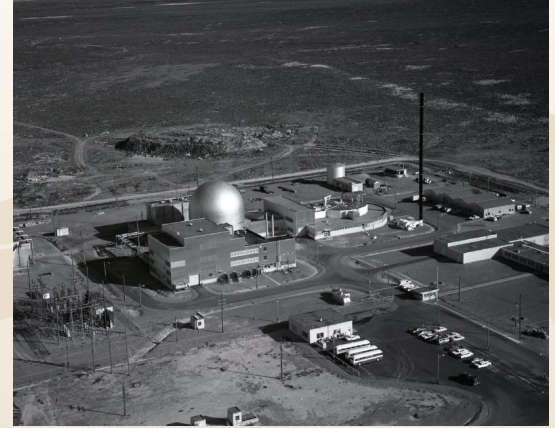


Idaho National Laboratory Site



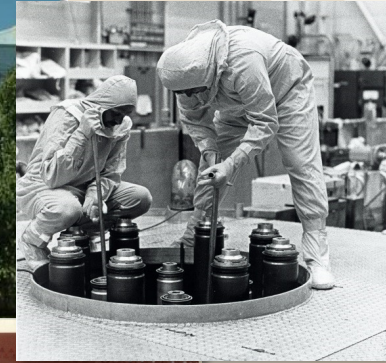
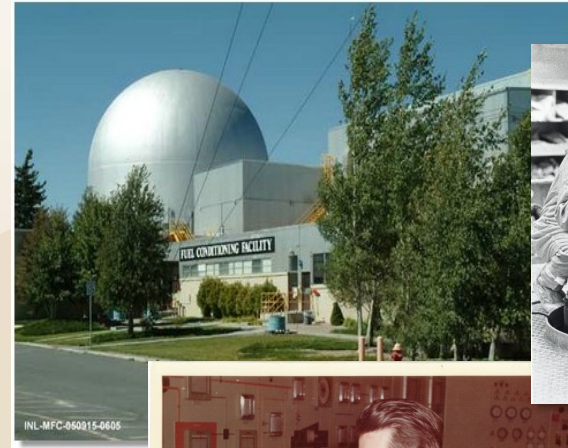
MFC history

- Begins with EBR-I
 - ANL's first Idaho location
 - EBR-I
 - ZPR-3, AFSR
 - BORAX
- Transition to EBR-II site
 - TREAT
 - Analytical Laboratory
 - EBR-II, FCF
 - ZPPR, AFSR
 - FASB
 - HFEF
 - FMF
 - SSPSF
- Transition to the INL
 - IMCL



MFC's history of nuclear energy R&D

- EBR-II and FCF were built and operated by Argonne National Laboratory to demonstrate the potential for breeder reactors.
- In February of 1958, the US AEC authorized nearly \$30 million to construct the facility.
 - Operated from September 1961 through September 1994 (full power in 1964)
 - Demonstrated a closed fuel cycle
 - Transitioned to irradiation testing mission
 - Transitioned to the Operational Reliability Transient test program
 - Demonstrated reliable efficient generation of electric power (for ANL facilities and NRTS/INEL grid)
 - Demonstrated principles of inherent safety



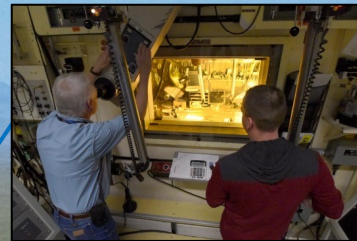
MATERIALS & FUELS COMPLEX FACILITY OVERVIEW



MATERIALS & FUELS COMPLEX FACILITY OVERVIEW



Transient Testing



Post-Irradiation Examination



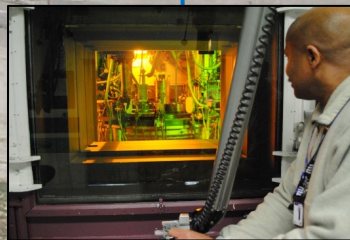
Space Nuclear Power & Isotope Technologies



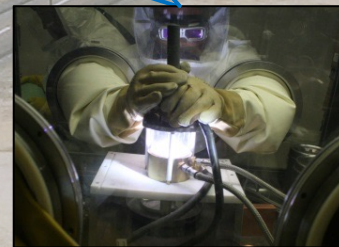
Characterization & Advanced Post-Irradiation Examination



Analytical Laboratories

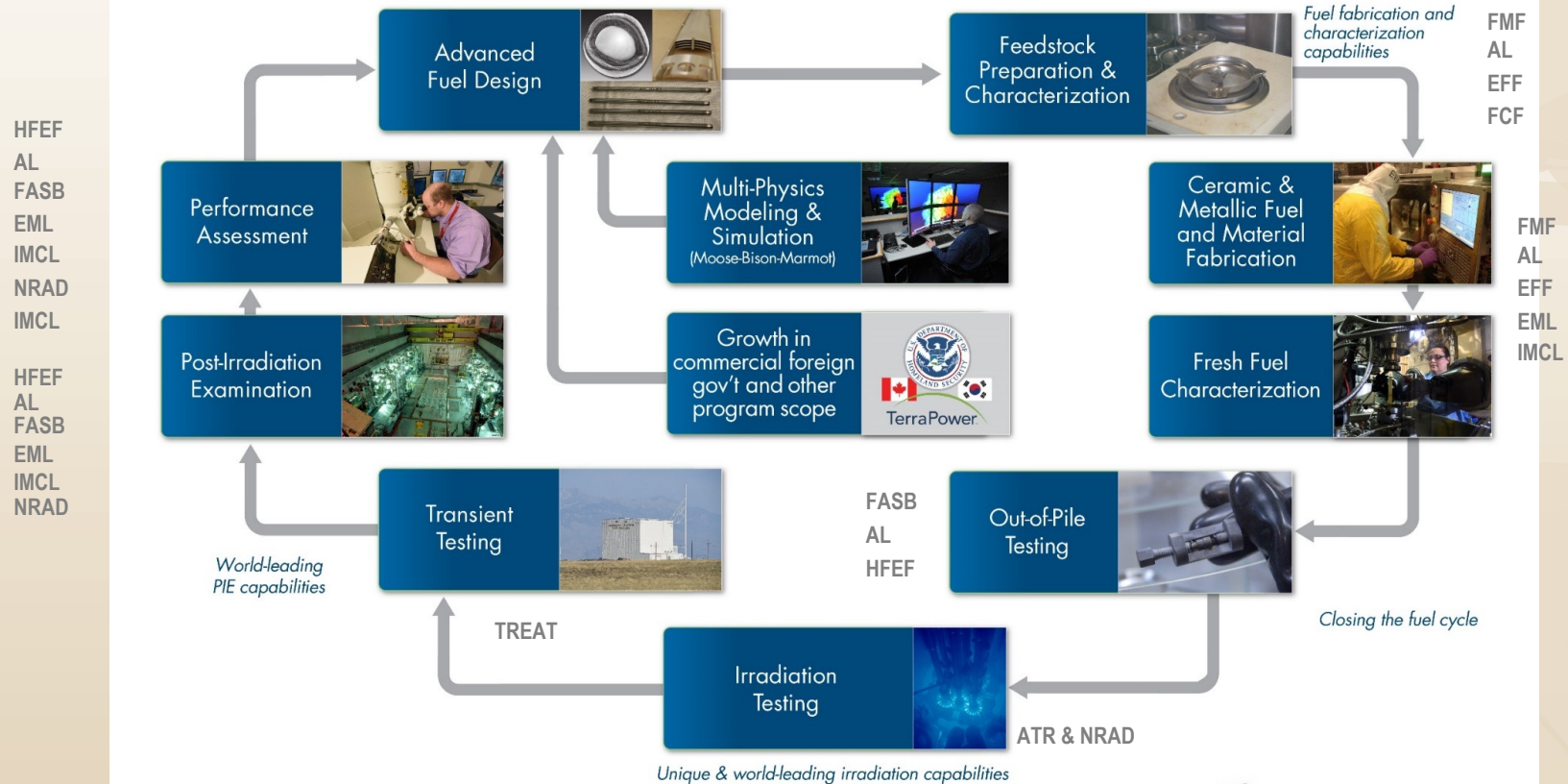


Fuel Reprocessing



Fuel Fabrication

Nuclear Fuel Development and Qualification Activities



MFC facilities aligned with mission

Fuel Fabrication & Nuclear Material Management

- Fuel Manufacturing Facility
- Zero Power Physics Reactor
- Experimental Fuels Facility
- Fuels and Applied Science Bldg
- Advanced Fuels Facility
- Manufacturing Development Laboratory

Post-Irradiation Examination

- Hot Fuel Examination Facility
- Neutron Radiography Reactor
- Mock-up Shop

Analytical Research Laboratories

- Analytical Laboratory
- Radiochemistry Laboratory

Space Nuclear Power & Isotope Technologies

- Space and Security Power Systems Facility
- 751, 772, 796
- RSTSF – INTEC
- 1634 - INTEC

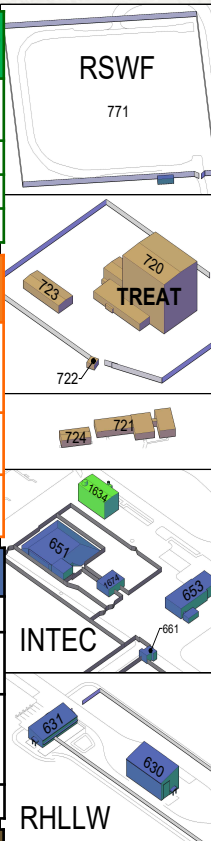
Characterization & Advanced PIE

- Irradiated Materials Characterization Laboratory
- Electron Microscopy Laboratory
- Sample Preparation Laboratory (future)

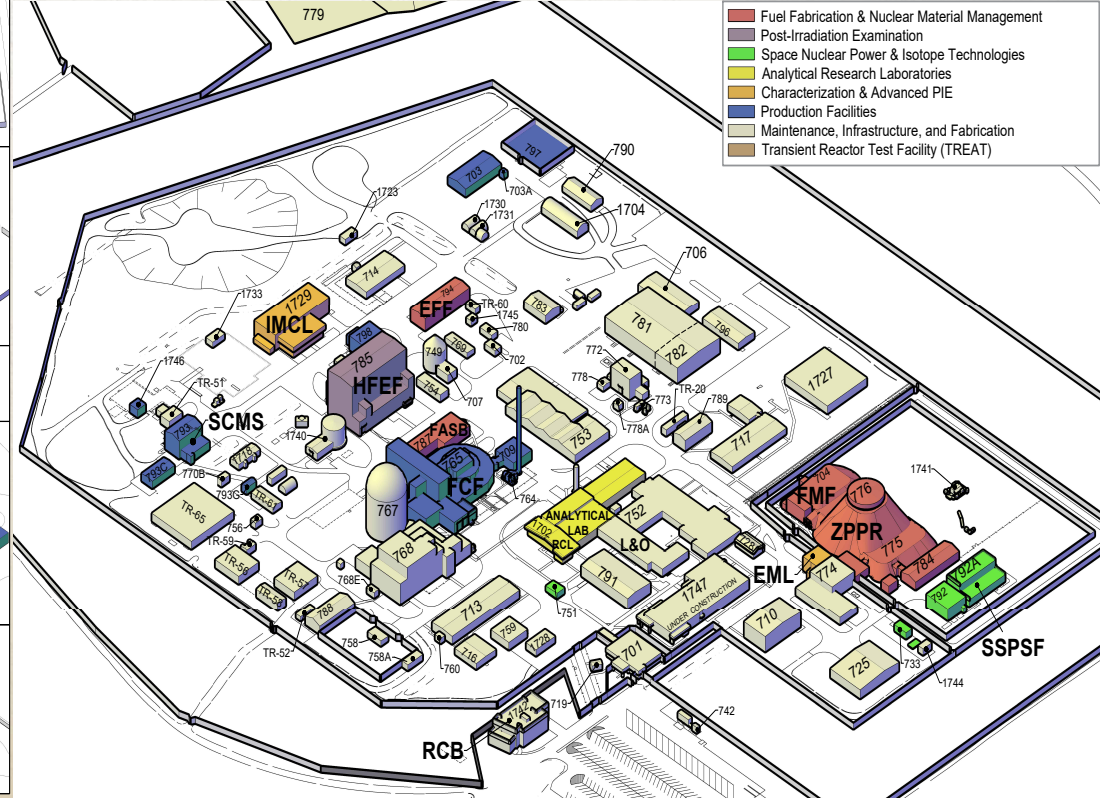
Production Facilities

- Fuel Conditioning Facility
- Treatment, Storage & Disposal Facilities
- Remote-Handled Low-Level Waste Disposal Facility
- INTEC

Transient Reactor Test Facility



Materials & Fuels Complex



Alignment of researchers, facility management, and technical staff around the mission has improved research outcomes and operations.