Global Nuclear Fuel

# GE ATF Program

**NRC Commissioners Briefing**

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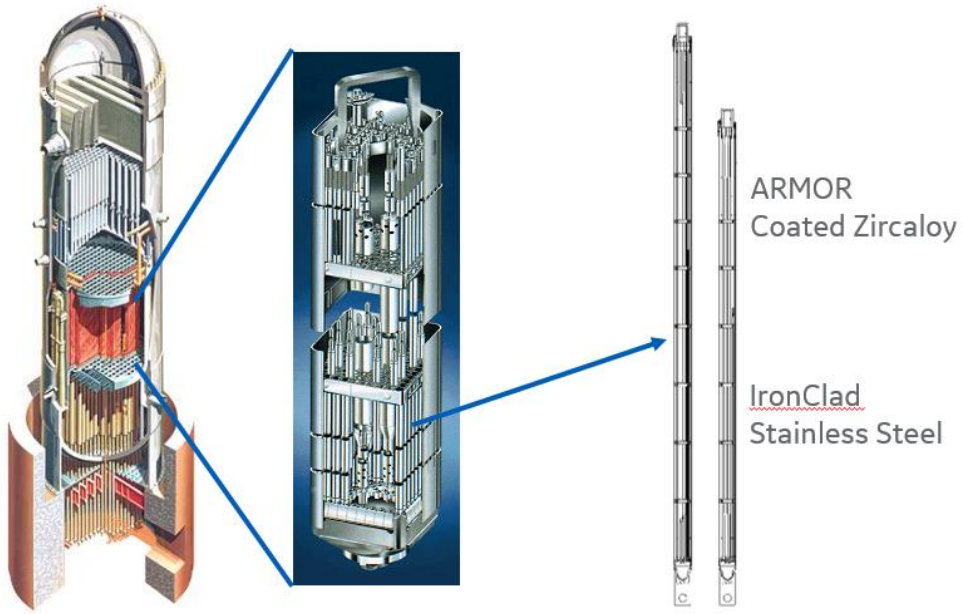
LWR Fuel Product Director

# GE ATF Program Overview

## Technologies Being Developed




| ARMOR Coated Zircaloy-2 | IronClad Monolithic FeCrAl | Higher Enrichment / High Burn Up | Ceramics Research |
|---|---|---|---|

## Program Development Goals

### Safety

**Temperature**

*Stability of fuel rods at higher temperatures*

**Oxidation**

*Provide a step-change in oxidation resistance*

### Durability

**Fretting Resistance**

*Increased resistance of fuel cladding to debris fretting*

### Economics

**Fuel Cycle Economics**

*Enabling sustained economic performance through minimizing cost and improving efficiency*

## Core Team

Department of Energy · GE Research · GE GNF · Oak Ridge National Lab · Los Alamos National Lab · Idaho National Lab · Constellation · Southern Nuclear · Alleima

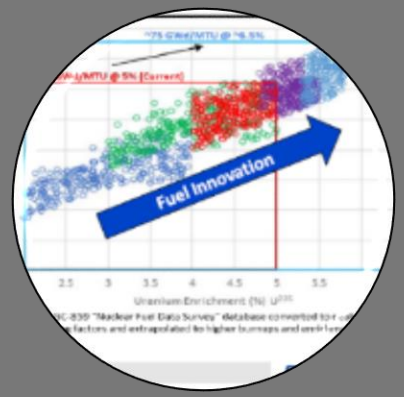
# GE ATF Program

## ARMOR

- Abrasion Resistant More Oxidation Resistant
- Coated fuel rods
- Resists high temperature oxidation
- Mitigates debris fretting
- Protects against normal corrosion
- Thermal limits margin

## IronClad

- Iron Chrome Aluminum (FeCrAl) based alloy
- Alternative to zircalloy cladding
- Fret Resistant
- Substantial hydrogen reduction




## Higher Enrichment/Higher Burnup

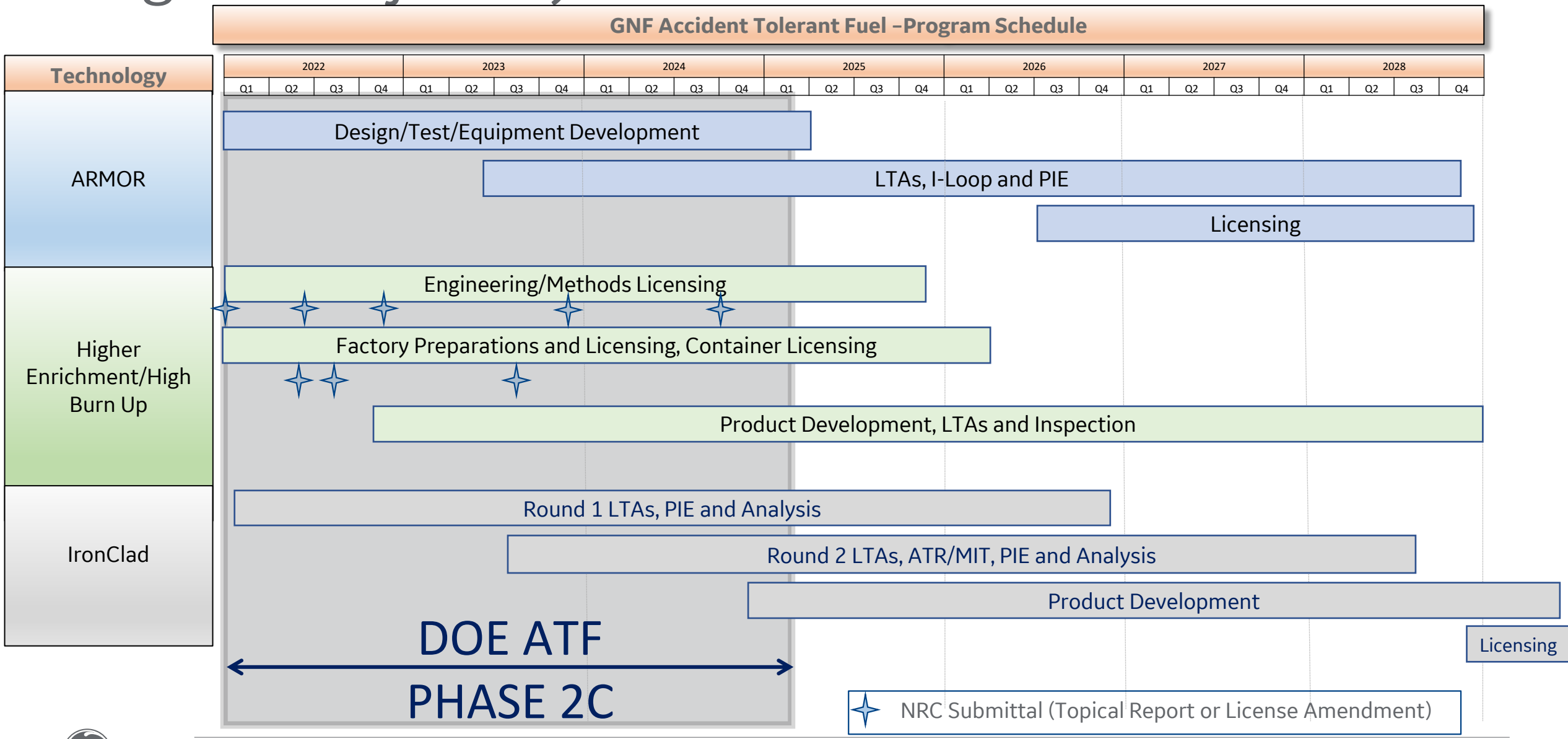
- Fuel Cycle Economics, lower batch fractions, less back end/disposal waste
- Longer cycles between refueling outages
- Offsets potential added costs of ATF safety benefit technologies

## Other Technology

- Channel coatings, ceramic matrix composite
- Alternate ceramics for fuel
- Methodology improvements

**2018: Hatch Lead Test Assemblies (ARMOR, IronClad)**
**2019: Clinton Lead Test Assemblies (ARMOR, IronClad)**

# Program Trajectory



# National Laboratory Collaboration

## Post Irradiation Examination (PIE)

**Oak Ridge National Lab**

Hatch ARMOR PIE-COMPLETE

Hatch IronClad PIE (in-process)

*Clinton IronClad PIE (2023, 2024 2026)**

*Limerick High Burn Up PIE (2026)**

**Idaho National Lab**

ARMOR (ATF-2/PWR Chemistry PIE)-COMPLETE

IronClad ATR-2 PIE (in-process)

## Advanced Research

**Los Alamos National Lab**

Advanced fuel ceramics

Sintering process development

Characterization of thermal properties

**Nuclear Energy Advanced Modeling and Simulation (NEAMS)**

IronClad: Advanced Modelling and Simulation to accelerate material property development

**Future transport needs*

# Acknowledgements

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