

# NMSS ACTIVITIES ON ATF AND INCREASED ENRICHMENT

FCSE CER Presentation  
By Marilyn Diaz  
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# ITEMS TO DISCUSS

Background

Major Accomplishments

NMSS Activities and Updates

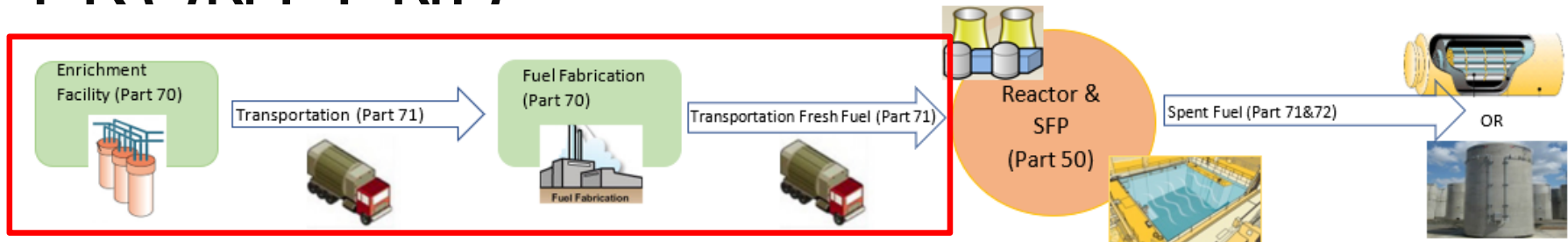
Licensing Critical Path

Conclusion

# BACKGROUND

- Accident Tolerant Fuel (ATF) is a set of new technologies that have the potential to enhance safety at U.S. nuclear power plants by offering better performance during normal operation, transient conditions, and accident scenarios.
- The nuclear industry is working to deploy batch loads of accident tolerant fuel designs in the operating nuclear reactors by late 2023.
- The NRC staff is taking steps to make agency licensing processes more efficient and effective to enable timely licensing/certification.
- ATF Project Plan – Document available in ADAMS (ML18261A414).
- Office of Nuclear Material Safety and Safeguards (NMSS) is responsible for the oversight of the front-end and back-end of the fuel cycle.

# ATF REGULATORY ACTIONS – FRONT END



## ○ LWR Fuel Types

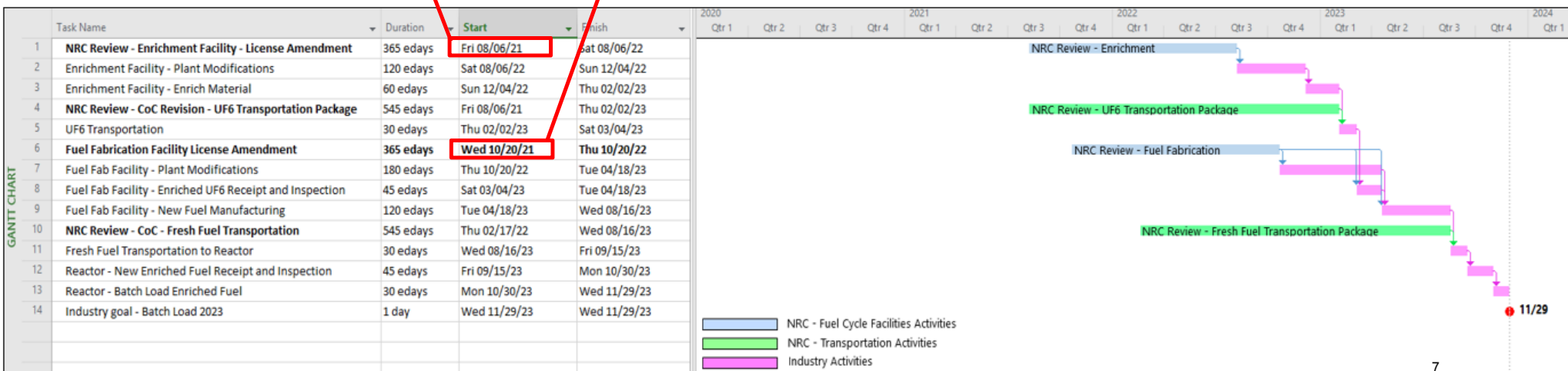
- Conventional uranium oxide ( $\text{UO}_2$ )–Zr clad fuel (up to 5% enrichment(E))
- Conventional  $\text{UO}_2$ –Zr clad fuel (up to 10%)
- ATF –  $\text{UO}_2$  fuel with different cladding
- ATF –  $\text{UO}_2$  fuel with different cladding (up to 10%)
- ATF – Non- $\text{UO}_2$  fuel with different cladding
- ATF – Non- $\text{UO}_2$  fuel with different cladding ( $10\% < E < 20\%$ )

# NMSS MAJOR ACCOMPLISHMENTS - LICENSING

- Issued a letter of authorization to Global Nuclear Fuels for shipment of lead test assemblies in the RAJ II package.
- Issued a letter of authorization to Westinghouse for one shipment of two types of ATF pellet designs, each in different lead test assemblies in the Traveller package.
- Issued a certificate of compliance to Framatome authorizing transport of ATF assemblies in the MAP-12/MAP-13 packages.
- Approved a license amendment to URENCO Louisiana Energy Services (LES) to modify their validation report to allow the use of MCNP 6 to perform criticality safety calculations in August 2019.

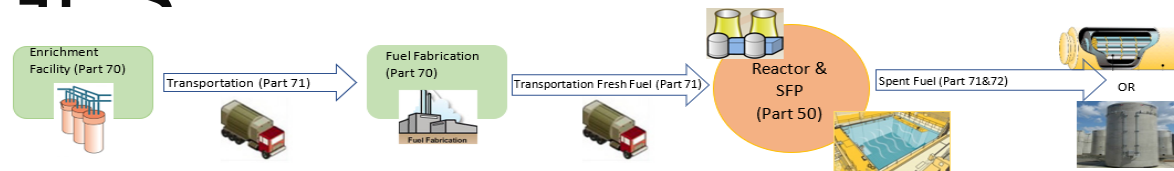
# NMSS ACTIVITIES AND UPDATES

- Nuclear industry is now considering the development of ATF and conventional fuel concepts with higher enrichment.
  - High assay low enriched uranium (HALEU) =  $5\% < E < 20\%$
- NRC developed the high burnup and increased enrichment (HBU+IE) project plan.
  - Document available in ADAMS (ML19242E192).
  - Public Meeting on September 12, 2019.
- In early September, NRC sent a letter to the Nuclear Energy Institute that identifies NMSS licensing critical path to support industry's goal of ATF deployment in 2023.
  - Document available in ADAMS (ML19235A265).
- Currently reviewing an application from GE-Hitachi for transport of irradiated ATF in the GE-2000 package. The review is expected to be



Note: All durations for industry's activities are estimated. Start to Finish dates were selected using industry's published goal for ATF deployment (2023 – fall reactor outage) and going backwards for the steps needed to support deployment date.

# CHALLENGES



## ○ Fuel Cycle Facilities

- All commercial fuel cycle facilities are licensed to produce up to 5% enriched material.
- NRC is not aware of plans to enrich material above 5%.

## ○ UF6 Transportation

- Existing UF6 transportation packages are approved for up to 5% enrichment.
- 10 CFR 71.55 limit to 5% enrichment – water intrusion analysis.



# CONCLUSION

- NRC staff believes the current regulatory framework is adequate for the licensing of ATF and ATF with high burn up and increased enrichment fuel designs.
- NRC identified regulatory actions critical path based on available information. Letter sent to NEI request feedback on critical path.
- To improve the efficiency of regulatory efforts, the NRC encourages NMSS licensees, certificate holders and applicants to engage in pre-application discussions and/or share any plans for submittals or licensing strategy.