OKLO INC.

Recycling Facility Material Categorization

December 12, 2023

Agenda

Brief introduction to Oklo Inc. (Oklo) and the Oklo recycling facility (Open)

Presentation on material flow through the Oklo fuel recycling facility process (Closed)

Review of regulatory background and precedent (Closed)

Presentation of preliminary disposition of spent nuclear material at the Oklo recycling facility (Closed)

Considerations of other material categorization schemes (Closed)

Summary and open discussion (Closed)

Open portion

Meeting purpose

Present the technical details of Oklo's fuel recycling facility

Present regulatory background for material categorization

Obtain NRC staff feedback on proposed material categorization for the recycling facility

Solicit NRC staff feedback on items requiring further engagement related to material categorization, prior to physical protection and material control and accounting (MC&A) engagements

ARPA-E support

This engagement is supported by Oklo's work with the Advanced Research Project Agency-Energy (ARPA-E) OPEN-2021 program.

Oklo and Argonne National Lab's work under this program is specifically related to developing key technologies that support the commercialization and licensing of pyroprocessing-based recycling, for the production of advanced reactor fuel.

The outputs of this work scope includes sensors and accompanying digital modeling, that will support a robust facility MC&A program.

Introduction to Oklo

Oklo product development

Oklo will serve as owner and operator of its power plants; the product is MWh.

Oklo is focused on fast reactors partially because of their ability to reuse fuel.

Used fuel opportunity

Current HALEU sources are limited:

>Downblending used EBR-II fuel → awarded to Oklo in 2020
>
>Domestic fresh HALEU → Centrus-Oklo Letter of Intent in 2021 followed by a Memorandum of Understanding in 2023
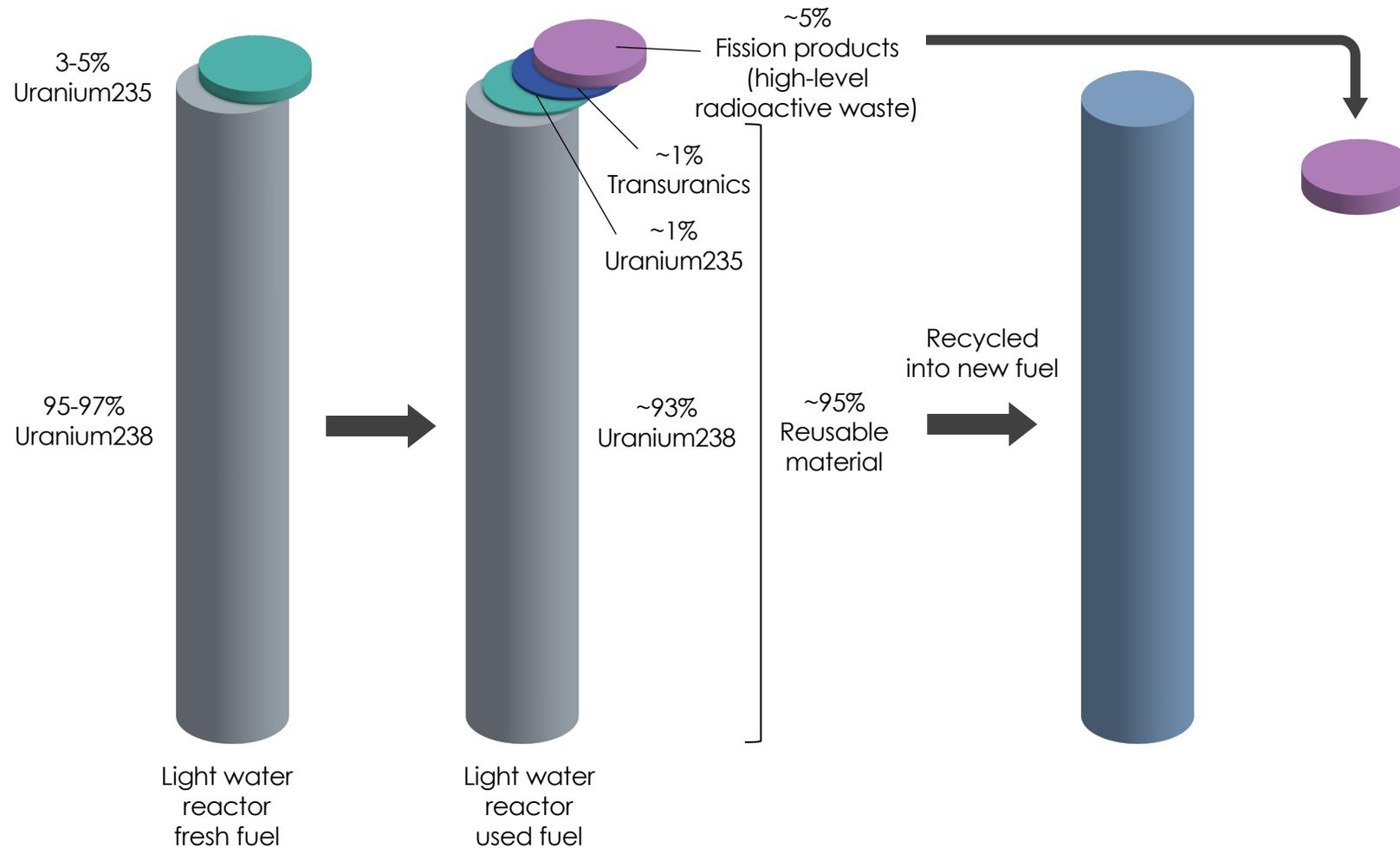
The U.S. has produced 90,000+ tons of used oxide fuel

>This fuel contains >90% of the original energy content
>
>This could power the entire U.S for >100 years

Given limited availability, recycling will be a key source of fuel enabling Oklo to deploy reactors at scale.

Used fuel composition

3-5% Uranium235

95-97% Uranium238

Light water reactor fresh fuel

~5% Fission products (high-level radioactive waste)

~1% Transuranics

~1% Uranium235

~93% Uranium238

Light water reactor used fuel

~95% Reusable material

Recycled into new fuel

Values in wt%, without including O

Market drivers

Oklo reactors are capable of operating on transuranic bearing fuel (U/TRU).

U/TRU is projected to be significantly cheaper than fresh HALEU.

Customer demand has accelerated Oklo's need to ensure adequate, economical fuel supply chains.

Oklo used fuel recycling

Oklo is now developing and seeking to license, thereafter to build and operate, a recycling facility for supply of U/TRU.

Oklo is deploying this recycling facility to implement an economical, vertically-integrated front-end fuel source for its upcoming reactor fleet, however it also provides for implementing a responsible back-end.

This recycling facility can unlock additional fuel supply chains, in the near- and mid-term.
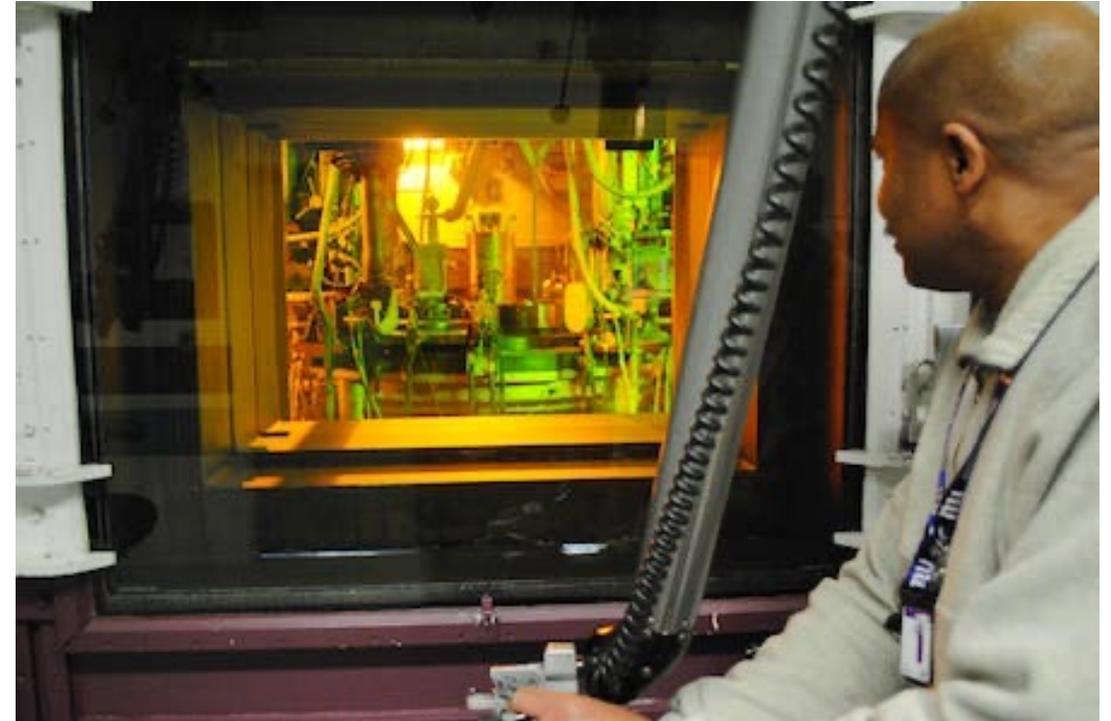
Pyroprocessing

Oklo will be using pyroprocessing-based technology (as opposed to aqueous-based).

Employing electrorefining for used nuclear fuel reconditioning was technology originally developed by Argonne in the 1960s.

Electrorefining-based used fuel recycling is actively being used at INL (Fuel Conditioning Facility) to recover used EBR-II fuel.

FCF Operations
(Credit: INL)

Overview of parameters (1 of 2)

An electrorefining-based pyroprocessing recycling facility looks considerably different from a PUREX reprocessing site.

~Has 1/4th the footprint (per throughput)

~Has 1/6th the staff (per throughput)

Uses smaller-batch operations

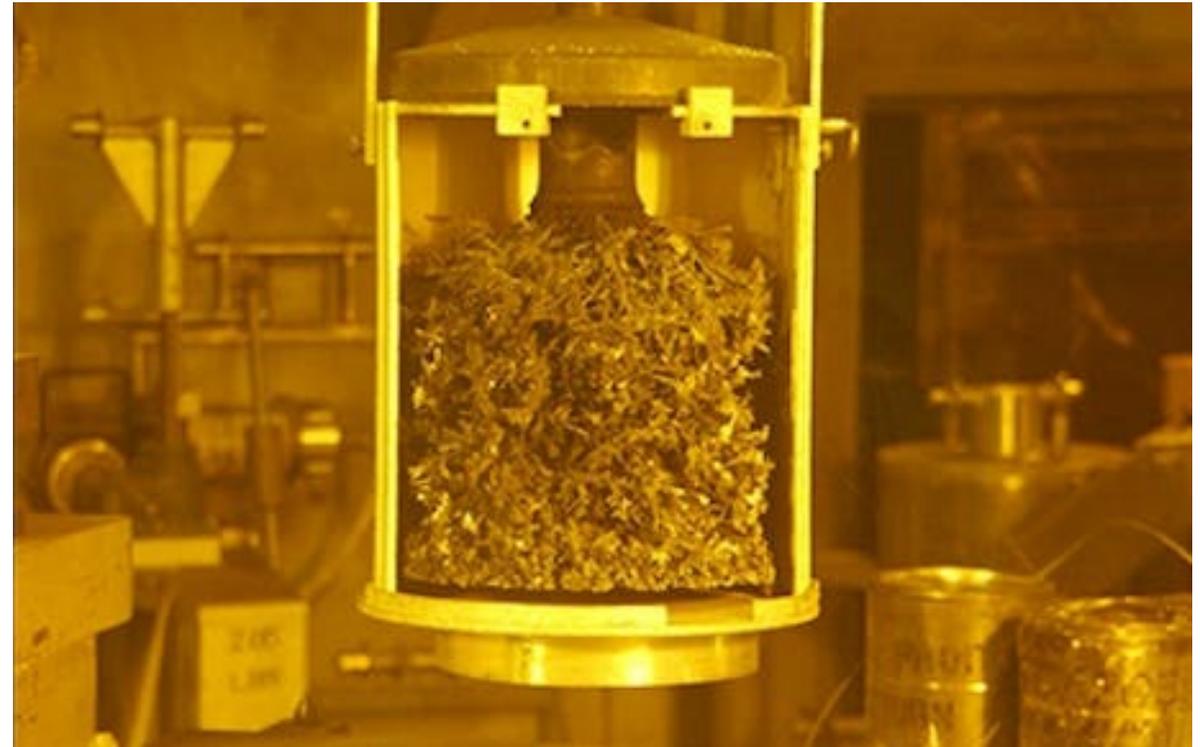Has an absence of large-scale liquid waste streams

Overview of parameters (2 of 2)

The electrorefining process is controlled to prevent a separated Pu stream; rather, the major and minor actinides remain mixed together.

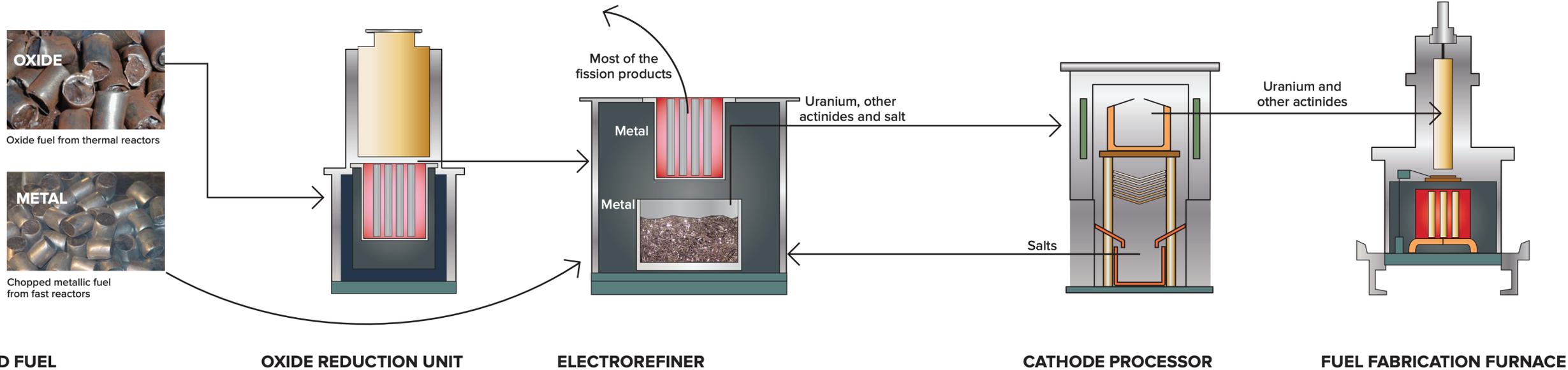It is also not possible to separate isotopes of any element.

Oklo is utilizing a "safeguards by design" approach.

Deposited actinides
(Credit: INL)

Pyroprocessing

(Credit: ANL)

Conclusion of public portion