

## PMFermiCOLPEm Resource

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**From:** Misenhimer, David  
**Sent:** Thursday, October 23, 2014 12:47 PM  
**To:** Keegan, Michael  
**Cc:** Misenhimer, David; Muniz, Adrian; FermiCOL Resource  
**Subject:** FW: Fermi 3 COL Application - Questions

Fermi OI call (Public Teleconference)

Thursday, October 23, 2014

This meeting is scheduled for the NRC to discuss with DTE Electric Company the open items that remain in the review of their Fermi 3 COL application.

NRC staff is asked to convene in the designated NRC room.

Applicant and the Public are requested to use the following call-in:

Teleconference number: **888-560-4208**  
Participant passcode: **62272**

Agenda Items\*:

**1. License Condition (1-1) from SE Chapter 1:**

Pursuant to the AEA and 10 CFR Parts 30 and 70, to receive, possess, and use, before Commission finding under 10 CFR 52.103(g), in amounts not exceeding those specified in **10 CFR 30.72**, any byproduct or special nuclear material that is (1) in unsealed form; (2) on foils or plated surfaces, or (3) sealed in glass, for sample analysis or instrument calibration or other activity associated with radioactive apparatus or components;

Was changed to:

**DTE**, pursuant to the Act and 10 CFR Parts 30 and 70, to receive, possess, and use, before a Commission finding under 10 CFR 52.103(g), in amounts not exceeding those specified in **10 CFR 30.35(d) and 10 CFR 70.25(d) required for establishing decommissioning financial assurance**, any byproduct or special nuclear material that is (1) in unsealed form; (2) on foils or plated surfaces, or (3) sealed in glass, for sample analysis or instrument calibration or other activity associated with radioactive apparatus or components;

\*These agenda items will be updated, as needed, prior to the teleconference.

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**From:** Misenhimer, David  
**Sent:** Wednesday, October 22, 2014 5:20 PM  
**To:** 'mkeeganj@comcast.net'  
**Cc:** Lodge, Terry; Kamps, Kevin  
**Subject:** RE: Fermi 3 COL Application - Questions

Mr. Keegan,

Please use the following:

Phone: 888-560-4208  
Passcode: 62272

Dave

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**From:** [mkeeganj@comcast.net](mailto:mkeeganj@comcast.net) [<mailto:mkeeganj@comcast.net>]  
**Sent:** Wednesday, October 22, 2014 4:49 PM  
**To:** Misenhimer, David  
**Cc:** mkeeganj; Lodge, Terry; Kamps, Kevin  
**Subject:** Re: Fermi 3 COL Application - Questions

Dear Mr. Misenhimer,

Thank you for the partial documents on my questions. I look forward to remaining documentation. Could you please provide the phone and code numbers, ML#s for the Fermi 3 Open Items meeting scheduled for tomorrow.

Thank you  
Michael J. Keegan  
Don't Waste Michigan / Fermi 3 Intervenor

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**From:** "David Misenhimer" <[David.Misenhimer@nrc.gov](mailto:David.Misenhimer@nrc.gov)>  
**To:** "mkeeganj" <[mkeeganj@comcast.net](mailto:mkeeganj@comcast.net)>  
**Cc:** "S., David" <[dahvidi@hotmail.com](mailto:dahvidi@hotmail.com)>, "David Misenhimer" <[David.Misenhimer@nrc.gov](mailto:David.Misenhimer@nrc.gov)>, "Adrian Muniz" <[Adrian.Muniz@nrc.gov](mailto:Adrian.Muniz@nrc.gov)>, "FermiCOL Resource" <[FermiCOL.Resource@nrc.gov](mailto:FermiCOL.Resource@nrc.gov)>, "Alexandra Burja" <[Alexandra.Burja@nrc.gov](mailto:Alexandra.Burja@nrc.gov)>  
**Sent:** Wednesday, October 22, 2014 3:54:11 PM  
**Subject:** Fermi 3 COL Application - Questions

Mr. Keegan,

I have provided below responses to some of the questions you raised in an Fermi 3 COL open items call.

Responses to additional questions you raised will be forthcoming.

David Misenhimer

**David Misenhimer, P.E.**  
Project Manager  
Office of New Reactors (NRO)  
Division of New Reactor Licensing (DNRL)  
Projects Branch (LB3)  
U.S. Nuclear Regulatory Commission  
Two White Flint 6-C28  
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[David.Misenhimer@NRC.gov](mailto:David.Misenhimer@NRC.gov) (email)

**Fermi 3 COLA Questions from Mr. Keegan:**

**1. Will the fuel be enriched?**

Yes. The physics of light water reactors (LWRs), which include the boiling and pressurized water reactors (BWRs and PWRs) used for commercial electricity generation in the United States, requires enriched fuel.

Natural uranium is composed of several isotopes.  $^{235}\text{U}$  is the isotope responsible for the fission chain reactions that generate energy in the reactor. Natural uranium contains only about 0.7 percent  $^{235}\text{U}$  by weight, while the amount of  $^{235}\text{U}$  in low-enriched uranium (LEU) used in commercial reactors in the U.S. has been enriched, or increased, to 3 to 5 weight percent. Enrichment to this level is vital because it provides enough  $^{235}\text{U}$  to sustain energy-producing fission chain reactions.

## 2. What is the enrichment level of the fuel to be utilized at Fermi?

The average initial enrichment of the fuel—that is, the average enrichment of all the fuel upon the first startup of the reactor—will be 2.08 weight percent.<sup>[1]</sup> For all subsequent fuel loadings, the enrichment will be 4.6 weight percent.<sup>[2]</sup> This increase is because the initial core contains all fresh fuel, whereas reload cores contain one-third fresh fuel and two-thirds previously burned fuel. Therefore, the average enrichment during operation will be less than 4.6 weight percent.

In general, the maximum enrichment for commercial nuclear plants is 4.95 weight percent. No U.S. facility is licensed by the NRC for more than 5 weight percent  $^{235}\text{U}$ .

## 3. Will it be MOX fuel?

No. The GE14E fuel to be used at Fermi Unit 3 is uranium dioxide ( $\text{UO}_2$ ) fuel.<sup>[3]</sup>

## 4. Will this be high-burning fuel?

The expected assembly average burnup for Fermi Unit 3 is 46,000 MWd/MTU (megawatt days per metric ton uranium).<sup>[4]</sup> According to the NRC website, anything above 45,000 MWd/MTU is considered high burnup; however, average burnup at operating plants in the United States currently exceeds 45,000 MWd/MTU, so the fuel burnup at Fermi 3 will be on par with the current operating fleet.<sup>[5]</sup>

## 5. How long is the fuel in the reactor?

On average, a fuel assembly will spend a total of three cycles, or six years, in the reactor. The exact length of time depends on where in the core the assembly is located and the exact burnup of the assembly.

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<sup>[1]</sup> GE-Hitachi, *ESBWR Design Control Document Tier 2*, Revision 10, Chapter 1 – “Introduction and General Description of Plant,” p. 1.3-3, April 2014, ADAMS Accession No. ML14100A499.

<sup>[1]</sup> DTE Electric Company, *Fermi 3 Combined License Application – Part 3: Environmental Report*, Revision 2, Chapter 3 – “Plant Description,” p. 3-13, Feb. 2011, ADAMS Accession No. ML110600488.

<sup>[1]</sup> Global Nuclear Fuel, *GE14E Fuel Assembly Mechanical Design Report*, Revision 1, p. 2, September 2010, ADAMS Accession No. ML102770060.

<sup>[1]</sup> See Reference 2.

<sup>[1]</sup> U.S. NRC, “Backgrounder on High Burnup Spent Fuel,” Dec. 2013, Web, <http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/bg-high-burnup-spent-fuel.html>.

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- <sup>[1]</sup> GE-Hitachi, *ESBWR Design Control Document Tier 2*, Revision 10, Chapter 1 – “Introduction and General Description of Plant,” p. 1.3-3, April 2014, ADAMS Accession No. ML14100A499.
- <sup>[2]</sup> DTE Electric Company, *Fermi 3 Combined License Application – Part 3: Environmental Report*, Revision 2, Chapter 3 – “Plant Description,” p. 3-13, Feb. 2011, ADAMS Accession No. ML110600488.
- <sup>[3]</sup> Global Nuclear Fuel, *GE14E Fuel Assembly Mechanical Design Report*, Revision 1, p. 2, September 2010, ADAMS Accession No. ML102770060.
- <sup>[4]</sup> See Reference 2.
- <sup>[5]</sup> U.S. NRC, "Backgrounder on High Burnup Spent Fuel," Dec. 2013, Web, <http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/bg-high-burnup-spent-fuel.html>.

**Hearing Identifier:** Fermi\_COL\_Public  
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**Received Date:** 10/23/2014 12:47:10 PM  
**From:** Misenhimer, David

**Created By:** David.Misenhimer@nrc.gov

**Recipients:**

"Misenhimer, David" <David.Misenhimer@nrc.gov>  
Tracking Status: None  
"Muniz, Adrian" <Adrian.Muniz@nrc.gov>  
Tracking Status: None  
"FermiCOL Resource" <FermiCOL.Resource@nrc.gov>  
Tracking Status: None  
"Keegan, Michael" <mkeeganj@comcast.net>  
Tracking Status: None

**Post Office:** HQCLSTR02.nrc.gov

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