PrairieIslandISFSIPEm Resource

From: Chesnutt, Samuel [Samuel.Chesnutt@xenuclear.com]
Sent: Thursday, July 24, 2014 6:15 PM
To: Longmire, Pamela
Cc: Eckholt, Gene F.; Baumann, Michael F.; Pickens, Terry A; Nelson, Oley; Morrison, Tim; Murphy, Martin C.
Subject: RE: Fuels AMP for Prairie Island ISFSI LRA
Attachments: draft revised AMP-PI markup_7-24-2014.docx

Dr. Longmire,

Overall, the proposed AMP you provided this morning is well written and in agreement with our discussions. We have reviewed the AMP and re-formatted it to show how it will appear in our revised Aging Management Plan; we have also included a number of proposed changes as shown in the attachment and as explained below.

Please review the attached version of the draft revised AMP and provide this to your reviewers. This version includes the following changes:

1. All changes are marked with track changes
2. Changes other than editorial are explained in a comment balloon
3. Changed formatting and section numbering for consistency with the LRA Appendix A Aging Management Program document
4. Added introductory section consistent with the LRA Appendix A Aging Management Program document
5. Clarified the April 2013 date in Section 3.1
6. Clarified that Elements 3 and 4 "should meet the guidance" of ISG-24, consistent with Element 6
7. Clarified "NDE" in the first Assessment description consistent with Tuesday's telephone call
8. Probably the most significant change is that we revised Assessment #3 and deleted Assessment #4 to be consistent with the 40 year period of the renewed license
   - any activities beyond the requested 40 year period will be addressed in future licensing actions
9. Changed "renewal period" in Assessment 2 to "period of extended operations" for consistency with NUREG-1927 terminology
10. Clarified Element 6 to include performance criteria in the HDRP "or alternative program"
11. Included a number of editorial changes for capitalization, punctuation, TM superscripts, sentence structure, etc.

This version of the AMP is still going through management reviews and I will let you know if we have further changes, but we wanted to get this to you today. If you or your reviewers have questions, or if you think another telephone call would be useful, please let me know.

We want to thank you and your reviewers for the timely revision to this draft AMP, and for your consideration of the attached changes.

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-----Original Message-----
From: Longmire, Pamela [mailto:Pamela.Longmire@nrc.gov]
Sent: Thursday, July 24, 2014 8:30 AM
To: Chesnutt, Samuel; Eckholt, Gene F.; PrairieIslandISFSIHearing Resource
Subject: Fuels AMP <A E>

Please find attached the draft revised fuel performance AMP.

Hearing Identifier: Prairie_Island_ISFSI_Public
Email Number: 75

Mail Envelope Properties (2fb676b776e74532818234bbc390b19a)

Subject: RE: Fuels AMP for Prairie Island ISFSI LRA
Sent Date: 7/24/2014 6:14:54 PM
Received Date: 7/24/2014 6:14:56 PM
From: Chesnutt, Samuel

Created By: Samuel.Chesnutt@xenuclear.com

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Files	**Size**	**Date & Time**
MESSAGE	2611	7/24/2014 6:14:56 PM
draft revised AMP-PI markup_7-24-2014.docx	42900	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

A3.0 HIGH BURNUP FUEL MONITORING PROGRAM

The Prairie Island ISFSI provides for long-term dry fuel interim storage for high burnup spent fuel assemblies, i.e., fuel assemblies with discharge burnups greater than 45 GWD/MTU, until such time that the spent fuel assemblies may be shipped off-site for final disposition. The cask system presently utilized at the Prairie Island ISFSI for the storage of high burnup spent fuel is the Transnuclear TN-40HT which has a 40 fuel assembly capacity and is designed for outdoor storage.

The Aging Management Review of the high burnup fuel spent fuel assemblies in a dry inert environment did not identify any aging effects/mechanisms that could lead to a loss of intended function. However, it is recognized that there has been relatively little operating experience, to date, with dry storage of high burnup fuel. Reference A5.8 provides a listing of a significant amount of scientific analysis examining the long term performance of high burnup spent fuel. These analyses provide a sound foundation for the technical basis that long term storage of high burnup fuel, i.e., greater than 20 years, may be performed safely and in compliance with regulations. However, it is also recognized that scientific analysis is not a complete substitute for confirmatory operating experience. Therefore, the purpose of the High Burnup Fuel Monitoring Program is to confirm that the high burnup fuel assemblies' intended function(s) are maintained during the period of extended operations.

A description of the High Burnup Fuel Monitoring Program is provided below. Although the program is a confirmatory program, the description below uses each attribute of an effective AMP as described in NUREG-1927 for the renewal of a site-specific Part 72 license to the extent possible.

A3.1 AMP Element 1: Scope of the Program

Fuel Stored in a TN-40HT Cask~~,"~~ is limited to an assembly average burnup ~~to~~ of 60 GWd/MTU (note that the nominal burnup value is lower to account for uncertainties). The cladding materials for the Prairie Island high burnup fuel are Zircaloy-4 and Zirlo™, and the fuel is stored in a dry helium environment. High burnup fuel was first ~~loaded~~ placed into dry storage in a TN-40 HT cask ~~into the TN-40HT~~ on April 4, 2013.

The High Burnup Fuel Monitoring Program relies upon the joint Electric Power Research Institute (EPRI) and Department of Energy (DOE) "High Burnup Dry Storage Cask Research and Development Project" (HDRP) or an alternative program meeting the guidance in Interim Staff Guidance (ISG) 24, Reference A5.10, ~~-~~as a surrogate program to monitor the condition of high burnup spent fuel assemblies in dry storage.

The HDRP is a program designed to collect data from a spent nuclear fuel storage system containing high burnup fuel in a dry helium environment. The program entails loading and storing a TN-32 bolted lid cask (the Research Project Cask) at Dominion Virginia Power's North Anna Power Station with intact high burnup spent nuclear fuel (with nominal burnups ranging between 53 GWd/MTU and 58 GWd/MTU). The fuel assemblies to be used in the program include four different kinds of cladding (Zircaloy-4, low-tin Zircaloy-4, Zirlo™, and M5™). The Research Project Cask is to be licensed to the temperature limits contained in ISG-11, Reference A5.11, and loaded such that the fuel cladding temperature is as close to the limit as practicable. Aging effects will be determined for material/environment combinations per ISG-24 Rev. 0 or the "High Burnup Dry Storage Cask Research and Development Project" (HDRP).

Comment [SWC1]: Included introductory statement from NSPM's Draft AMP

Comment [SWC2]: For correctness – the in-service date for placing the cask on the concrete pad is April 4; if the intent is to specify when fuel was first loaded into the cask (while still in the SFP), then the date should be March 25.

A3.2 AMP Element 2: Preventive Actions

The High Burnup Fuel Monitoring Program consists of condition monitoring to confirm there is no degradation of a high burnup fuel assembly that would result in a loss of intended function(s). Other than the initial design limits placed on loading operations, no preventive or mitigating attributes are associated with these activities.

During the initial loading operations of the TN-40HT casks, the design and ISFSI Technical Specifications (TS) require that the fuel be stored in a dry inert environment. TS 3.1.1, "Cask Cavity Vacuum Drying," demonstrates that the cask cavity is dry by maintaining a cavity absolute pressure less than or equal to 10 mbar for a 30 minute period with the cask isolated from the vacuum pump. TS 3.1.2, "Cask Helium Backfill Pressure," requires that the cask then be backfilled with helium. These two TS requirements ensure that the high burnup fuel is stored in an inert environment thus preventing cladding degradation due to oxidation mechanisms. TS 3.1.2 also requires that the helium environment be established within 34 hours of commencing cask draining. This time requirement ensures that the peak cladding temperature remains below 752°F (i.e., the temperature specified in ISG-11), thus mitigating degradation due to cladding creep.

A3.3 AMP Element 3: Parameters Monitored/ Inspected

Either the surveillance demonstration program as described in the HDRP or an alternative program should meet~~ing~~ the ~~requirements~~ guidance of ISG-24, Rev. 0.

Comment [SWC3]: Changed "requirements" to "guidance" per 7-22 discussion

A3.4 AMP Element 4: Detection of Aging Effects

Either the surveillance demonstration program as described in the HDRP or an alternative program should meet~~ing~~ the guidance ~~requirements~~ of ISG-24, Rev. 0.

Comment [SWC4]: Changed "requirements" to "guidance" per 7-22 discussion

A3.5 AMP Element 5: Monitoring & Trending

As information/data from a fuel performance surveillance demonstration program becomes available, ~~the licensee~~NSPM will monitor, evaluate, and trend the information via ~~their~~ its Operating Experience Program and/or the Corrective Action Program to determine what actions should be taken to manage fuel and cladding performance, if any.

Similarly, ~~the licensee~~NSPM will use its Operating Experience Program and/or Corrective Action Program to determine what actions should be taken if it receives information/ data from other sources than the demonstration program on fuel performance

Formal evaluations of the aggregate feedback from the HDRP and other sources of information will be performed at the specific points in time during the period of extended operation delineated in the table below. These evaluations will include an assessment of the continued ability of the high burnup fuel assemblies to continue to perform their intended function(s) at each point.

Toll Gate	Year*	Assessment
1	2028	Evaluate information obtained from the HDRP loading and initial period of storage along with other available sources of information. If the HDRP NDE (i.e., cask gas sampling, temperature data) has not been obtained at this point and no other information is available then NSPM has to provide evidence to the NRC that no more than 1% of the HBF has failed.
2	2038	Evaluate, if available, information obtained from the destructive (DE) and non-destructive (NDE) examination of the fuel placed into storage in the HDRP along with other available sources of information. If the aggregate of this information confirms the ability of the high burnup fuel assemblies to continue to perform intended function(s) for the remainder of the ~~renewal~~ period of extended operations, subsequent assessments may be cancelled. If the HDRP DE of the fuel has not been examined at this point and no other information is available then NSPM has to provide evidence to the NRC by opening a cask or single effects surrogate experiments that the fuel performance ~~fuel performance~~ acceptance criteria 1-4 in element 6 continue to be met.
3	2048	Evaluate any other new information. ~~If the aggregate of this information confirms ability of the high burnup fuel assemblies to continue to perform intended function(s) for the remainder of the renewal period, subsequent assessments may be cancelled. If the information is inconclusive, move the next assessment forward 5 years~~
~~4~~	~~2058~~	~~Evaluate any other new information.~~

* Assessments are due by April 4 of the year identified in the table

Comment [SWC5]: Clarification based on 7-22 discussion

Comment [SWC6]: Deleted statements about subsequent assessments – these would be beyond the 40 year PEO; also deleted Assessment 4 in 2058 for same reason.

The above assessments are not, by definition, stopping points. No particular action, unless noted in this AMP, other than performing an assessment is required to continue cask operation. To proceed, an assessment of aggregated available operating experience (both domestic and international), including data from monitoring and inspection programs, NRC-generated communications, and other information will be performed. The evaluation will include an assessment of the ability of the high burnup fuel assemblies to continue to perform their intended function(s).

A3.6 AMP Element 6: Acceptance Criteria

- The HDRP or any other demonstration used to provide fuel performance data should meet the acceptance criteria guidance of ISG-24 Rev 0.

- If any of the following fuel performance criteria are exceeded in the ~~HBDP~~ HDRP or alternative program, a corrective action is required[1]:
    1. Cladding Creep: total creep strain extrapolated to the total approved storage duration based on the best fit to the data, accounting for initial condition uncertainty shall be less than 1%
    2. Hydrogen – maximum hydrogen content of the cover gas over the approved storage period shall be extrapolated from the gas measurements to be less than 5%
    3. Drying – The moisture content in the cask , accounting for measurement uncertainty, shall indicate no greater than one liter of residual water after the drying process is complete
    4. Fuel rod breach – fission gas analysis shall not indicate more than 1% of the fuel rod cladding breaches

A3.7 AMP Element 7: Corrective Actions

The NSPM Corrective Action Program commensurate with 10 CFR 50 Appendix B will be followed.

In addition, at each of the assessments in AMP Section 5, the impact of the aggregate feedback will be assessed and actions taken when warranted. These evaluations will address any lessons learned and take appropriate corrective actions, including:

- Perform repairs or replacements
- Modify this confirmatory program in a timely manner
- Adjust age-related degradation monitoring and inspection programs (e.g., scope, 0frequency)
- ~~actions~~ Actions to prevent reoccurrence
- An evaluation of the DCSS to perform it's safety and retrievability functions
- Evaluation of the effect of the corrective actions on this component to other safety components.

A3.8 AMP Element~~s~~ 8: Confirmation Process

The confirmation process is part of the NSPM Corrective Action Program and ensures that the corrective actions taken are adequate and appropriate, have been completed, and are effective. The focus of the confirmation process is on the follow-up actions that must be taken to verify effective implementation of corrective actions. The measure of effectiveness is in terms of correcting the adverse condition and precluding repetition of significant conditions adverse to quality. Procedures include provisions for timely evaluation of adverse conditions and implementation of any corrective actions required, including root cause evaluations and prevention of recurrence where appropriate. These procedures provide for tracking, coordinating, monitoring, reviewing, verifying, validating, and approving corrective actions, to ensure effective corrective actions are taken.

A3.9 AMP Element~~s~~ 9: Administrative Controls

The NSPM Quality Assurance Program, associated formal review and approval processes, and administrative controls applicable to this program and Aging

[1] While it is not a fuel performance criteria, the spatial distribution and time history of the temperature must be known to evaluate the relationship between the performance of the rods in the HDRP and the HBF rod behavior expected in the TN-40HT cask.

Management Activities, are implemented in accordance with the requirements of the NSPM Quality Assurance Topical Report and 10 CFR Part 50, Appendix B. The administrative controls that govern AMAs at PINGP are established in accordance with the PINGP Administrative Control Program and associated Fleet Procedures.

A3.10 AMP Element 10: Operating Experience

Surrogate surveillance demonstration programs with storage conditions and fuel types similar to those in the dry storage system that satisfies the ISG-24 acceptance criteria are a viable method to obtain operating experience. NSPM intends to rely on the information from the HDRP with similar types of HBU fuel. The HDRP is viable as a surrogate surveillance program. Additional data/research to assess fuel performance from both domestic and international sources that ~~a~~ are relevant to the fuel in the NSPM casks will also be used.