

NRR-PMDAPem Resource

From: Distel, David J:(GenCo-Nuc) <David.Distel@exeloncorp.com>
Sent: Friday, February 10, 2017 10:40 AM
To: Hughey, John
Cc: Sanchez, Javier Francisco:(GenCo-Nuc); Seo, Timothy P:(GenCo-Nuc); Mokkaapati, Sailaja:(GenCo-Nuc); Pierson, Steven E:(GenCo-Nuc)
Subject: [External_Sender] RE: BOP Reviewer Questions/Observations for Braidwood
Attachments: BWD FLEX Responses for NRC Questions Rev.1.docx

John – The attached file provides the Braidwood Station responses to the FLEX FIP NRC acceptance review call follow-up questions.

Please let us know if any additional information is needed.

Thanks.
Dave Distel

From: Hughey, John [mailto:John.Hughey@nrc.gov]
Sent: Monday, January 23, 2017 2:05 PM
To: Distel, David J:(GenCo-Nuc)
Subject: [EXTERNAL] RE: BOP Reviewer Questions/Observations for Braidwood

Hi Dave,

Also looking for an ETA on the e-mail addressing the BOP questions below that were summed up in or Braidwood Acceptance call on 1/12/2017 as – a description of the low and medium head pump use for SFP make-up.

Per our Braidwood acceptance call on 1/12/2017, we are also expecting follow-up on the items below:

- Email with a clear statement of the particular hoses/cables Alternative to NEI 12-06 that Braidwood is requesting.
- Email with description of how and what procedures direct the initiation of SFP makeup within 2.72 hours for worst case shutdown heat load in SFP. [FIP Section 2.4.6]
- Email addressing provision of timely makeup when the reactor head is removed with fuel in the core and boiling can occur quite rapidly. [FIP Section 2.16]

Regards,
John

John Hughey
Mitigation Strategies & SFP Instrumentation
Project Manager, NRR/JLD/JOMB
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From: Hughey, John

Sent: Friday, January 06, 2017 3:41 PM

To: Distel, David J:(GenCo-Nuc) (David.Distel@exeloncorp.com) <David.Distel@exeloncorp.com>

Subject: BOP Reviewer Questions/Observations for Braidwood

Dave,

We have a few information requests/observations from our BOP reviewer ahead of the Braidwood acceptance call next week:

- 1) Please post the FIP calc references and issued FSGs on the Braidwood ePortal, similar to Byron. Many of the calcs already posted for Byron are applicable to Braidwood, but we are not sure if this is universally true. In addition, please post the final Braidwood FSGs.
- 2) Please spend a few minutes to discuss the SFP strategy during the acceptance review teleconference or in writing (whichever is easier). Specifically, please address the use of the low-head and medium head portable pumps to provide make-up and spray flow.
 - o FIP Section 2.4.4.2 seems to indicate that the Low-Head and Medium FLEX pumps need to be used in conjunction to provide makeup/spray to the SFP and SG make-up.
 - o FIP Section 2.4.7 seems to indicate that only the Low-Head FLEX pump is needed to deliver the makeup/spray to the SFP.
 - o FIP Figure 12 seems to indicate that both FIP Section 2.4.4.2 and 2.4.7 are correct.
- 3) The NRC staff will document the use of the installed SFP pump as an alternative in the Braidwood SE, similar to Byron. The other alternative identified for Byron for SFP spray may or may not be applicable for Braidwood, depending on how the medium/low head FLEX pumps are used.

Thanks,

John

John Hughey

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Email Number: 3419

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Subject: [External_Sender] RE: BOP Reviewer Questions/Observations for Braidwood
Sent Date: 2/10/2017 10:40:01 AM
Received Date: 2/10/2017 10:41:41 AM
From: Distel, David J:(GenCo-Nuc)

Created By: David.Distel@exeloncorp.com

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Tracking Status: None

"Hughey, John" <John.Hughey@nrc.gov>

Tracking Status: None

Post Office: exchm-omf-24.exelonds.com

| Files | Size | Date & Time |
|---|-------------|------------------------|
| MESSAGE | 4249 | 2/10/2017 10:41:41 AM |
| BWD FLEX Responses for NRC Questions Rev.1.docx | | 20703 |

Options

Priority: Standard

Return Notification: No

Reply Requested: No

Sensitivity: Normal

Expiration Date:

Recipients Received:

1. FIP Section 2.4.7 – Provide an email response to NRC clarifying use of both the low head and medium head FLEX pumps for SFP makeup.

Response:

The primary method to makeup to the SFP is described in section 2.4.7.1 of Braidwood FIP. The safety related OA Refueling Water Purification Pump will be used as the primary method for Spent Fuel Pool cooling and makeup.

There are 2 alternate methods to makeup to SFP. They are described below:

- a. From Lake (UHS) to Low Head Flex Pump (LHFP) to Spent Fuel Pool (SFP) using SFP make up fill hose through the Medium Head Flex Pump (MHFP) suction manifold (not using MHFP) as shown in Figure 12 “Medium Head FLEX Pump Layout”.
- b. If RWST level is > 20%, lineup can be from RWST to MHFP suction manifold. From the MHFP suction manifold using the MHFP to the SFP.
 - If RWST level is < 20%, SFP makeup is initiated using Ultimate Heat Sink (UHS).

Above two (2) lineups are described in procedure 0BwFSG-11. This procedure has been posted in the eportal.

2. FIP Section 2.18.6 – Provide an email response clarifying the final hose and cable alternate approach that has been used for the Braidwood site for N and N+1 hoses and cables.

Response:

Braidwood FLEX Implementation Plan (FIP) describes two methods in section 2.18.6 under “Basis for the alternative approach”. Both methods satisfy requirements outlined in NEI 12-06. Braidwood is utilizing method 1.

Per Method 1 BWD stored/staged additional hose or cable equivalent to 10% of the total length of each type/size of hose or cable necessary for the “N” capability. For each type/size of hose or cable needed for the “N” capability, at least one (1) spare of the longest single section/length was provided.

3. FIP Section 2.4.6 – Provide an email response clarifying the time available to deploy FLEX SFP makeup equipment. Describe proper procedural steps and time sequences needed to accomplish makeup and clearly describe the available time margin based on these steps.

Response:

At Braidwood FLEX SFP makeup equipment will be deployed during outage and non-outage conditions.

Complete steps required to deploy are described in 0BwFSG-05, which include following:

- Dispatch personnel to transport FLEX Diesel Generator and Cable Trailer to the designated areas

- Evaluate Travel Path
- Initiate alignment of FLEX equipment (Flex Diesel Generators and Flex Pumps) per 1/2BwFSG-5
- Transport and route equipment and hoses to the Fuel Handling Building and set up for Alternate SFP fill method

Procedure 1/2BwCA 0.0 requires starting makeup when SFP level reaches 420' elevation (this is approximately 20' of water above top of the fuel).

Deployment during outage conditions is discussed below:

During outage conditions, time to boil with full core offload is 2.72 hours. Per 0BwFSG-05, deployment of FLEX SFP makeup equipment starts on the onset of the ELAP conditions and FLEX SFP makeup hose must be routed within 2.72 hours. Per calculation, BRW-13-0222-M, it takes 9.8 hours for level to reach 420' elevation (from normal operating level – approx. 424'6"). As a result, the available time margin from hose deployment time to start of makeup is 7.08 hours (9.8hrs – 2.72hrs), during outage conditions. This is considered reasonable based on significant resources available onsite during outage conditions.

Deployment during non-outage conditions is discussed below:

During online conditions, time to boil is 10.94 hours. Per 0BwFSG-05, deployment of FLEX SFP makeup equipment starts on the onset of the ELAP conditions and FLEX SFP makeup hose must be routed within 10.94 hours during non-outage conditions. Per calculation, BRW-13-0222-M, it takes 24.8 hours for level to reach 420' elevation (from normal operating level- approx. 424'6"). As a result, available time margin from hose deployment time to start of makeup is 13.86 hours (24.8 hrs – 10.94hrs), during non-outage conditions. Deployment of all hoses and connections in Fuel Handling Building (FHB) for alternate SFP fill strategy has been validated and can be completed in less than one hour.

Procedures have been posted in the eportal.

4. FIP Section 2.16 – Shutdown and Refueling Modes discussion states that if an ELAP/LUHS occurs then boiling in the core “occurs rapidly”. This appears to be a significant time dependent constraint. Therefore, provide an email response defining when makeup is required and describing how this timeline has been validated to show that sufficient time is available. Describe how compliance with NEI Paper AOP #4 is achieved.

Response:

Time to boil in the worst case scenario is when the head is lifted off the reactor and an ELAP occurs. The term rapidly is stated because it is the worst case condition if an ELAP occurs during the scheduled outage.

Procedure OU-AP-104 “SHUTDOWN SAFETY MANAGEMENT PROGRAM BYRON BRAIDWOOD” Attachment 10 contains the Time to Boil curves in relation to time after shutdown for various plant conditions. Procedure OU-AA-103 “SHUTDOWN SAFETY MANAGEMENT PROGRAM” Attachment 4 provides the direction as to when pre-staging of the FLEX equipment is required based on time to boil.

Actions for addressing ELAP conditions during the outage are contained in 1/2BwOA ELEC-8 "LOSS OF ALL AC POWER WHILE ON SHUTDOWN COOLING UNIT 1/2". This procedure is based on the generic industry guidance of PWROG ARG-4.

The OU-AA-103 procedure provides direction to outage management to implement staging of N+1 FLEX equipment as needed in support of 1/2BwOA ELEC-8 to address ELAP conditions during the core offloading period, if required, based on Att-4 of OU-AA-103.

Procedures have been posted in the eportal.