June 18, 2012

MEMORANDUM TO: Kimyata Morgan-Butler, Acting Chief
Generic Communications Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

FROM: Blake A. Purnell, Project Manager ***/RA/***
Generic Communications Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

SUBJECT: SUMMARY OF MAY 1, 2012, TELECONFERENCE WITH PERFORMANCE CONTRACTING, INC., REGARDING LARGE FLUME TESTING FOR POINT BEACH NUCLEAR PLANT

On May 1, 2012, U.S. Nuclear Regulatory Commission (NRC) staff held a teleconference with representatives of Performance Contracting, Incorporated (PCI) and Alden Research Laboratory to discuss challenges that Alden has encountered using its Large Flume Test Protocol (LFTP) for emergency core cooling system strainer testing for Point Beach Nuclear Plant. Specifically, Alden has found it difficult to create turbulence in its scaled-down test flume that appropriately simulates plant conditions and is proposing an alternate approach that was presented at this meeting. The NRC staff's review of the LFTP can be found in the Agencywide Document Access and Management System (ADAMS) under Accession No. ML120480092. This teleconference was closed to the public due to the proprietary nature of the discussions.

By letter (ADAMS Accession No. ML12107A443) dated April 11, 2012, PCI provided an advanced copy of its presentation. The NRC staff reviewed the presentation and emailed comments (ADAMS Accession No. ML121280518) to PCI on April 17, 2012, and asked that PCI be prepared to address these comments during the meeting. On April 30, 2012, PCI provided a revised presentation and a response to the comments for use during the teleconference (ADAMS Accession Nos. ML121280537 and ML121280515). The presentation and comments contain proprietary material and are not publicly available.

The discussion focused on how transport of debris in a linear flume is affected by turbulence. Alden described its attempts to create turbulence in the flume at levels that are similar to those predicted in the plant. The NRC staff stated that matching the turbulence levels is needed to ensure that transport of suspended debris during testing will be similar to that which would occur in the plant. However, even when structures were added to the flume to increase the turbulence, it was significantly less than the predicted plant turbulence. The NRC staff had previously agreed that if flume turbulence could not be generated to the same levels that are predicted to be present in the plant then alternative methods to ensure transport would be considered on a plant specific basis.

PCI/Alden presented an example to justify a flume design that did not have turbulence similar to plant conditions. PCI/Alden intended to compensate for the deficit in turbulent kinetic energy by increasing the flume bulk velocity. Alden stated that the turbulence in the flume, even when enhanced by turbulence generators, was significantly lower than the predicted plant turbulence. The NRC staff stated that when it accepted the use of the LFTP it thought the use of alternative methods was intended to make up small differences between plant and flume turbulence values that might occur on an infrequent basis. The staff expressed its concern that alternative methods would be used much more broadly than the staff had envisioned, based on the magnitude of the turbulence deficit and the expected range of variation among pressurized-water reactor designs and test flume configurations. The staff was also concerned that the magnitude of difference between the plant and flume turbulence levels would significantly affect the transport of suspended debris.

The NRC staff stated that the potential for the resuspension of debris was not accounted for in the information presented. PCI/Alden agreed to research this area and provide additional information to the staff at a future date. The staff also stated its concern that Alden's idealized model may not accurately reflect the flow conditions near the floor of the flume and that these conditions could have a significant impact on resuspension and transport.

The NRC staff stated that the evaluation provided in the submittal did not seem to accurately model debris transport based on staff observations and research of experiments intended to demonstrate how various materials transport. For example, the staff has observed some fraction of very fine debris to settle and some fraction of larger debris to transport when neither outcome would have been predicted by Alden's model. The staff did not agree that the submittal accurately demonstrated that turbulence would not have an impact on transport. The transport metrics for the debris types (i.e., fine fiber and particulate) that are most influenced by turbulence were not evaluated.

Alden stated that the reason very fine particulates and fine fibrous debris (individual fibers) were not analyzed is that this debris is anticipated to transport even in the absence of turbulence. The NRC staff stated that all fine debris is unlikely to transport in a test flume and that numerous cases of the settlement of fine debris have been observed indicating that the model is not realistic. This is one of the key issues with the transport model identified during the call.

The NRC staff stated that one of the ways that the issue could be resolved is to demonstrate the influence of turbulence using a test. Alden agreed to look further into the possibility of demonstrating the influence of turbulence on the fine debris types that are the subject of the NRC staff's concern.

The NRC staff stated that some other methods of increasing turbulence should be considered. Alden stated that the flume width had been increased by 2 and 3 times without attaining adequate turbulence. Alden further stated that the higher turbulence levels in the plant appeared to be caused by flow streams coming together and that alternative methods of increasing flume turbulence were being investigated. Additionally, Alden observed that the flow patterns in the plant are more 3 dimensional versus the more 2 dimensional flows in the flume. The staff expressed its interest in understanding the computational fluid dynamics simulation results for alternate flume configurations in more detail.

During the call, the NRC staff noted that it had previously recommended that PCI/Alden incorporate a level of turbulence that was conservative to account for potential unknowns in the analysis. However, as pointed out by PCI/Alden, the staff had later stated that PCI/Alden's methodology[1] for determining turbulence level was satisfactory. After this teleconference, the staff reviewed past meeting summaries and found PCI/Alden's statements to be correct. The staff agrees that a realistic level of turbulence is adequate for testing, which was why the staff was previously satisfied with the methodology for determining turbulence. However, it will be difficult for the staff to accept a methodology intended to ensure transport by adjusting variables that do not result in realistic turbulence levels without a demonstration that the effects of turbulence on transport for the conditions in question (flow and debris characteristics) are understood and accounted for in the test methodology.

Enclosure: List of Participants

cc: James Bleigh/PCI

[1] PCI Document No. PDT-2010.07.26-1 Rev 1, "Approach Velocity Analysis," prepared by Alden Research Laboratory, Inc., dated September 2010

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ADAMS ACCESSION NUMBER: ML121280509 NRC-001

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DATE	6/15/12	6/18/12	6/18/12

[1] PCI Document No. PDT-2010.07.26-1 Rev 1, "Approach Velocity Analysis," prepared by Alden Research Laboratory, Inc., dated September 2010

List of Participants for May 1, 2012
Phone Call with PCI and Alden

Name	Affiliation
Paul Leonard	Florida Power & Light (FPL)
Tom Kendall	FPL Point Beach
Jim Bleigh	PCI
Patrick Reyes	PCI
Fariba Gartland	AREVA
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Matt Horowitz	Alden Research Laboratory
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Enclosure 1

Memorandum to Kimyata Morgan-Butler from Blake Purnell

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