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Craver, Patti

From: Balsam, Briana *NRC*
Sent: Tuesday, April 10, 2012 2:18 PM
To: Julie Crocker
Cc: Logan, Dennis; Egan, Joseph; Smith, Maxwell; Susco, Jeremy
Subject: RE: Pilgrim - A few clarification questions
Attachments: NRC Responses to NMFS Questions on Pilgrim_4-10-12.pdf; Pilgrim 2010 Entrainment Monitoring Report.pdf; Pilgrim 2010 Impingement Monitoring Report.pdf

Julie,

I attached our partial responses to your questions as well as the 2010 impingement and entrainment monitoring reports for Pilgrim, which my responses reference.

The questions that I have yet to answer concern the thermal plume. I am still tracking down the reference that the NRC used in the SEIS to be able to provide you with a more complete description of the plume. I have noted those items for which I still owe you an answer in the attached document.

Briana

 Briana A. Balsam
 Biologist

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From: Julie Crocker [mailto:julie.crocker@noaa.gov]
Sent: Monday, April 09, 2012 3:51 PM
To: Balsam, Briana; Logan, Dennis
Subject: Pilgrim - A few clarification questions

NOAA

Hi Briana and Dennis -

As we continue to work on the Pilgrim consultation, several questions have come up that I am hoping you can answer or help point me to sources of this information. If it is easier to talk through this over the phone, let me know. I am around tomorrow afternoon and most of the day Wednesday. Most of these questions seek to clarify our understanding of information you have provided to date.

1. Are there any in-water acoustic impacts of the Pilgrim facility? Have any in-water measurements of underwater noise been taken here or at similar plants? The EIS states that "noise has not been found to be a problem at operating plants and is not expected to be a problem at any plant during the license renewal term. The staff has not identified any new and significant information during its independent review of the PNPS ER, the site visit, the scoping process, evaluation of other available information, or consideration of public comments. Therefore, the staff concludes that there would be no impacts of noise during the license renewal term beyond those discussed in the GEIS." This statement makes it unclear whether there is underwater noise

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associated with Pilgrim, but it would not rise to the level of being a concern, or whether there is not actually any underwater noise associated with operations. Could you clarify?

2. The dimensions of the thermal plume appear to be described in terms of delta T. Is the 1C delta T the extent change that is detectable? We are trying to use the size of the thermal plume as part of the description of the action area.

3. Section 4.1.3 discusses the 1974 thermal plume study that characterized the surface plume. It states, "For example, water with a delta T of 3C (37.4F) covered approximately 216 acres (ac) in August when the ambient temperature was 17.0C (62.6F), but only 14 ac in November when the ambient temperature was 8.5C (47.3F)." The first part of that sentence is confusing, do you mean that the 216 acre area had water that was 3C greater than ambient or 37.4F greater than ambient or something else?? Also, can you provide the description of the size of the area that had a delta T of 1C at the surface (later text in the EIS describes that area for the bottom)?

4. I also have a question about this statement -- "At the bottom, similar to the surface, the smallest temperature increment measured (1C or 33.8F) covered the largest area (up to 1.2 ac), and water with higher temperatures relative to ambient covered much smaller areas. For example, the highest delta T measured, 9C (48.2F), covered less than 0.13 ac of the bottom" (in 4.1.3) Did that heated area (1.2 acres) have temperatures that were 1C above ambient or 33.8F above ambient, because those would be two very different scenarios!

5. Thermal backwash - Can you describe the size of the plume? The EIS says it is thin and only lasts a few hours but can you describe how far from the discharge canal it extends and its temperature profile (e.g., the size of area with delta T of 3C, 1C etc.)

3. Have there been any jellyfish (leatherback turtle prey) impinged or entrained at Pilgrim? I do not see any listed on table 4-3 on the EIS but it is not clear to me if that table includes invertebrates. Is there a list of the invertebrates that have been impinged or entrained? If it is in the EIS I am having trouble finding it.

4. Zooplankton -- As you know, right whales feed on copepods (mostly *Calanus* spp.). The EIS states, "Entrainment of phytoplankton and zooplankton has not been found to be a problem at operating nuclear power plants and is not expected to be a problem during the license renewal term." Does this mean that no zooplankton is entrained at Pilgrim? And if it is entrained, are there estimates of the annual loss? Also, the EIS refers to studies to characterize the zooplankton in the area conducted in the 1970s (2.2.5.3.3). Have there been similar studies carried out since Pilgrim became operational? Could you clarify what evidence was reviewed to make this determination.... "However, based upon the review conducted by the NRC staff, there is no evidence that the operation of the PNPS cooling system has had an impact on phytoplankton or zooplankton communities, or any resultant effects on the aquatic food web, in Cape Cod Bay." (from 4.8.1 Cumulative Impacts)

5. Crabs - The EIS states that cancer crabs (*Cancer* spp.) were the second most impinged invertebrate. Can you provide information on the number of crabs impinged per year?

6. Atlantic herring: The EIS states, "and based on the 2005 Pilgrim monitoring data, the loss to the stock due to entrainment by PNPS appears to be significantly less than 1 percent (Normandeau 2006a)." Was an actual percentage provided in Normandeau 2006a?

7. sand lance - Has there been an assessment of the effects of removal of sand lance like there is for some of the other fish species (i.e., less than 1% of the population or similar types of conclusions?).

Thank you!

Julie

--
Julie Crocker
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NRC Responses to NMFS's Questions on Pilgrim

April 10, 2012

Note: A number of answers refer to the following studies, which are being provided to NMFS with these responses:

1. Normandeau Associates, Inc. 2011. Ichthyoplankton Entrainment Monitoring at Pilgrim Nuclear Power Station, January – December 2010. Submitted to Entergy Nuclear. April 27, 2011. 323 p.
2. Normandeau Associates, Inc. 2011. Impingement of Organisms on the Intake Screens at Pilgrim Nuclear Power Station, January – December 2010. Submitted to Entergy Nuclear. April 22, 2011. 35 p.

1. Are there any in-water acoustic impacts of the Pilgrim facility? Have any in-water measurements of underwater noise been taken here or at similar plants?

The NRC is unaware of any studies of underwater noise at Pilgrim or any other nuclear facility or evidence that nuclear facilities might cause elevated underground noise levels.

The EIS states that "noise has not been found to be a problem at operating plants and is not expected to be a problem at any plant during the license renewal term. The staff has not identified any new and significant information during its independent review of the PNPS ER, the site visit, the scoping process, evaluation of other available information, or consideration of public comments. Therefore, the staff concludes that there would be no impacts of noise during the license renewal term beyond those discussed in the GEIS." This statement makes it unclear whether there is underwater noise associated with Pilgrim, but it would not rise to the level of being a concern, or whether there is not actually any underwater noise associated with operations. Could you clarify?

NRC evaluates above-ground noise as it relates to humans. The text that you reference in the Pilgrim supplemental environmental impact statement (SEIS) is based on Section 4.3.7 of the generic environmental impact statement (GEIS), which discusses noise impacts as a human health issue. For issues that the NRC concluded generically in the GEIS, the NRC does not repeat the analysis in the SEIS. You can access the discussion of noise in the GEIS on the NRC's public website: <http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1437/>. During the NRC's review of Pilgrim, the staff did not find any new and significant information that would call into question the GEIS's conclusion, which is SMALL for all nuclear facilities. Click on "Volume 1, Main Report."

2. The dimensions of the thermal plume appear to be described in terms of delta T. Is the 1C delta T the extent change that is detectable? We are trying to use the size of the thermal plume as part of the description of the action area.

[answer forthcoming]

3. Section 4.1.3 discusses the 1974 thermal plume study that characterized the surface plume. It states, "For example, water with a delta T of 3C (37.4F) covered approximately 216 acres (ac) in August when the ambient temperature was 17.0C (62.6F), but only 14 ac in November when the ambient temperature was 8.5C (47.3F)." The first part of that sentence is confusing, do you mean that the 216 acre area had water that was 3C greater than ambient or 37.4F greater than ambient or something else??

The sentence you reference contains a temperature conversion error. The corrected sentence should read:

For example, water with a delta T of 3°C (delta T of 5.4°F 37.4°F) covered approximately 216 acres (ac) in August when the ambient temperature was 17.0°C (62.6°F), but only 14 ac in November when the ambient temperature was 8.5°C (47.3°F).

Also, can you provide the description of the size of the area that had a delta T of 1C at the surface (later text in the EIS describes that area for the bottom)?

[answer forthcoming]

4. I also have a question about this statement -- "At the bottom, similar to the surface, the smallest temperature increment measured (1C or 33.8F) covered the largest area (up to 1.2 ac), and water with higher temperatures relative to ambient covered much smaller areas. For example, the highest delta T measured, 9C (48.2F), covered less than 0.13 ac of the bottom" (in 4.1.3) Did that heated area (1.2 acres) have temperatures that were 1C above ambient or 33.8F above ambient, because those would be two very different scenarios!

The 1.2-ac area had temperatures 1°C (1.8°F) above ambient temperatures. It appears that the temperature units were converted assuming a temperature rather than a change in temperature.

5. Thermal backwash - Can you describe the size of the plume? The EIS says it is thin and only lasts a few hours but can you describe how far from the discharge canal it extends and its temperature profile (e.g., the size of area with delta T of 3C, 1C etc.)

[answer forthcoming]

3. Have there been any jellyfish (leatherback turtle prey) impinged or entrained at Pilgrim? I do not see any listed on table 4-3 on the EIS but it is not clear to me if that table includes invertebrates. Is there a list of the invertebrates that have been impinged or entrained? If it is in the EIS I am having trouble finding it.

The 2010 Normandeau impingement report indicates that Pilgrim impinged 744 jellyfish (Phylum Cnidaria) in 1981 and 940 jellyfish in 1983 based on extrapolated totals (see Table 9). However, no jellyfish have appeared in impingement samples since 1983.

4. Zooplankton -- As you know, right whales feed on copepods (mostly Calanus spp.). The EIS states, "Entrainment of phytoplankton and zooplankton has not been found to be a problem at operating nuclear power plants and is not expected to be a problem

during the license renewal term." Does this mean that no zooplankton is entrained at Pilgrim?

No, this does not mean that no zooplankton are entrained at Pilgrim. This statement refers to the fact that the NRC considers the entrainment of phytoplankton and zooplankton is a generic license renewal issue, so the analysis appears in the GEIS rather than the individual SEISs (as described above for noise). Section 4.2.2.1.1 of the GEIS discusses entrainment of phytoplankton and zooplankton in more detail. The GEIS concludes that this issue would have SMALL impacts because there is no evidence of reductions of populations of phytoplankton or zooplankton at nuclear plants.

And if it is entrained, are there estimates of the annual loss?

The Pilgrim entrainment monitoring program only monitors for ichthyoplankton. The NRC is not aware of any studies that estimate annual losses of zooplankton at Pilgrim.

Also, the EIS refers to studies to characterize the zooplankton in the area conducted in the 1970s (2.2.5.3.3). Have there been similar studies carried out since Pilgrim became operational?

The NRC staff is not aware of any studies on zooplankton beyond those referenced in the SEIS.

Could you clarify what evidence was reviewed to make this determination.... "However, based upon the review conducted by the NRC staff, there is no evidence that the operation of the PNPS cooling system has had an impact on phytoplankton or zooplankton communities, or any resultant effects on the aquatic food web, in Cape Cod Bay." (from 4.8.1 Cumulative Impacts)

This statement refers back to the conclusion in Section 4.1 of the SEIS, which is based on the conclusion in Section 4.2.2.1.1 of the GEIS and the lack of new and significant information on this issue that would call into question whether the GEIS conclusion should apply to Pilgrim.

5. Crabs - The EIS states that cancer crabs (*Cancer* spp.) were the second most impinged invertebrate. Can you provide information on the number of crabs impinged per year?

Pilgrim impinged a mean of 273 cancer crabs (*Cancer* spp.) per year from 1980 through 2010 based on extrapolated annual totals (see Table 9 in the 2010 Normandeau impingement monitoring report). However, impingement has varied widely annually. Pilgrim impinged cancer crabs in only 2 years from 1980 to 1999, but from 2000 to 2010, Pilgrim impinged cancer crabs 9 out of the 10 years.

6. Atlantic herring: The EIS states, "and based on the 2005 Pilgrim monitoring data, the loss to the stock due to entrainment by PNPS appears to be significantly less than 1 percent (Normandeau 2006a)." Was an actual percentage provided in Normandeau 2006a?

Yes, the referenced Normandeau report provided a percentage. The most recent 2010 Normandeau ichthyoplankton entrainment report indicates that the 2010 equivalent adult value resulting from Pilgrim entrainment and impingement would account for about 0.01 percent of the spawning stock by biomass (see pages 84-86 of the report).

For more information on Atlantic herring impingement, refer to Figure 4 in the 2010 Normandeau impingement monitoring report, which depicts the extrapolated totals of Atlantic herring impinged per year from 1980 through 2010 and Table 3, which provides the extrapolated total number of Atlantic herring impinged each year from 1980 to 2010.

7. sand lance - Has there been an assessment of the effects of removal of sand lance like there is for some of the other fish species (i.e., less than 1% of the population or similar types of conclusions?).

No, Normandeau did not calculate such a percentage for sand lance. Page 34 of the 2010 Normandeau ichthyoplankton entrainment report notes that "sand lance have little to no commercial or recreational value, and therefore abundance data are unavailable to compare to the entrainment estimates." However, the 2010 Normandeau ichthyoplankton entrainment report includes entrainment numbers for the sand lance.

The 2010 Normandeau impingement monitoring report also includes information on sand lance. This report indicates that American sand lance (*Ammodytes americanus*) is impinged in only some years and at very low numbers (see Table 3 in Normandeau 2011, attached). Other species in the genus *Ammodytes* are more commonly impinged and also appear in Table 3.

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Craver, Patti

From: Egan, Joseph [jegan1@entergy.com] *entergy*
Sent: Tuesday, April 10, 2012 12:00 PM
To: Balsam, Briana
Subject: RE: Pilgrim - 2010 Annual Report_Marine Ecology Studies
Attachments: 2010 PNPS Marine Ecology Report #77_3.2.pdf; 2010 PNPS Marine Ecology Report #77_3.3.pdf

Categories: Saved in PDF folder, Put in ADAMS (public)

Briana,

Thanks for your patience. Attached are two sections from Pilgrim's 2010 Annual Report [Marine Ecology Studies] — 3.2 "Entrainment Monitoring" and 3.3 "Impingement Monitoring".

I will let you know what I find regarding the ENSR 316 Demonstration Report from 2000. Please contact me if there is anything else I can do.

Thanks,
Joe

From: Balsam, Briana [mailto:Briana.Balsam@nrc.gov]
Sent: Tuesday, April 10, 2012 11:26 AM
To: Egan, Joseph
Subject: RE: Pilgrim - A few clarification questions

INCR

Thanks, Joe.

After looking back over the questions, I think that if you just transmitted the most recent (2010) entrainment and impingement reports, that would be enough, and you wouldn't have to worry about the 2006 reports specifically referenced in the SEIS. That might help unload some of the burden of putting those documents together.

Briana

From: Egan, Joseph [mailto:jegan1@entergy.com]
Sent: Tuesday, April 10, 2012 11:17 AM
To: Balsam, Briana
Subject: RE: Pilgrim - A few clarification questions

Briana,

After our conversation this morning I began following up on your request. Sorry, but it's taking me longer than I expected. I'm still in the process of locating the documents and files you requested.

In addition, I need to ensure what is sent is in the right format and has been approved for transmittal. Please be patient while I work through this process. I'll be in touch as soon as possible.

Thanks,
Joe

J.W. EGAN 508.830.8915
ENVIRONMENTAL SPECIALIST

B/11

CHEMISTRY DEPT.
ENERGY NUCLEAR – PILGRIM STATION

From: Balsam, Briana [<mailto:Briana.Balsam@nrc.gov>]
Sent: Tuesday, April 10, 2012 8:32 AM
To: Egan, Joseph
Subject: FW: Pilgrim - A few clarification questions

Joe,

Thanks for talking to me this morning and being willing to track down the impingement and entrainment studies for me.

I attached the questions that we got from Julie Crocker of NMFS. I have been able to answer about half without additional references, but questions 2 and 5 (the first 5—Julie numbered the questions incorrectly) I need more information about the thermal plume. The last three questions 5, 6, and 7 are about cancer crabs, atlantic herring, and sand lance, and I think I can pull answers to from the impingement and entrainment reports.

Thanks for your help on this. If you know of any additional studies or documents that would provide information related to these questions, that would be helpful, too.

Briana

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Biologist

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