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Craver, Patti

From: Egan, Joseph [jegan1@entergy.com] Entergy
Sent: Monday, April 16, 2012 4:11 PM
To: Balsam, Briana
Subject: RE: FW: Pilgrim question

I concur with your reply.

From: Balsam, Briana [mailto:Briana.Balsam@nrc.gov] NRC
Sent: Monday, April 16, 2012 4:00 PM
To: Julie Crocker
Cc: Logan, Dennis; Smith, Maxwell; Susco, Jeremy; Egan, Joseph
Subject: RE: FW: Pilgrim question

Julie,

I don't think I am going to be able to shed any more light on those figures than what you might be able to come up with yourself. I think the best way to characterize the surface plume is going to be to rely on Table 5.1-2 of the 316 Demonstration since the MIT study doesn't give any specific numbers.

Briana

From: Julie Crocker [mailto:julie.crocker@noaa.gov] NOAA
Sent: Monday, April 16, 2012 3:31 PM
To: Balsam, Briana
Cc: Logan, Dennis; Smith, Maxwell; Susco, Jeremy; Egan, Joseph
Subject: Re: FW: Pilgrim question

Thanks! Looking at plate 3.44 and 3.45 it seems like the plume out to a delta T of 3C extends about 4,000 feet from the discharge canal and is about 5,000 feet wide. The width seems to be similar to the length - if the maximum size of the plume is 3,000 acres that would mean at its biggest it extends about 7,000 feet from the discharge canal which seems to be in line with what the plates are showing. Does this seem reasonable to you?

Julie

On Mon, Apr 16, 2012 at 3:00 PM, Balsam, Briana <Briana.Balsam@nrc.gov> wrote:

Julie,

I am forwarding you an email from Joe Egan at Entergy. He was able to get a copy of the MIT study from a former Entergy employee and copied a large number of pages from the study (attached). I am unsure if this will help you, though, because it doesn't specifically characterize the plume in terms of acres or number of meters extending from the discharge. The MIT study was the last study that had the possibility of answering your question, so the best description seems to be in Table 5.1-2 of the 316 Demonstration, as you suggested. And yes--the area of 3,000 acres for the delta T of 1C would represent the worst case scenario.

B/25

Joe also provided some additional information on biocides in an email earlier today. I highlighted it in the email chain below.

Briana

Briana A. Balsam

Biologist

Division of License Renewal

Office of Nuclear Reactor Regulation

U.S. Nuclear Regulatory Commission

301-415-1042

briana.balsam@nrc.gov

From: Egan, Joseph [mailto:jegan1@entergy.com]
Sent: Monday, April 16, 2012 2:44 PM
To: Balsam, Briana
Subject: RE: Pilgrim question

Julie,

Enclosed is a representative excerpt of the MIT study. I copied/scanned almost a third of the pages and tried to be sure I got as many figures and plume survey maps as possible to demonstrate the scope of the document. As the "List of Plates" on pages 7 + 8 shows, there are almost fifty ISOTHERMS in the report.

Possibly because [1] it's from MIT, and [2] it was written in the 70's; I found it difficult to understand if this is what NMFS is looking for.

Let me know if there's anything else I can do.

Thanks,

Joe

From: Balsam, Briana [mailto:Briana.Balsam@nrc.gov]
Sent: Monday, April 16, 2012 1:35 PM
To: Egan, Joseph
Subject: RE: Pilgrim question

Joe,

I left you a message earlier, but I wanted to put it in an email, too, so that you don't go to the effort of printing that whole study if you don't need to. The information that Julie is specifically looking for is a characterization of the geographic extent of the thermal plume at the surface under the worst-case scenario (i.e., when the plume is the largest). If the MIT report summarizes this or provides any figures or isotherm maps that show this, just those few pages may be enough to answer the question. Below, I copied and pasted the last email I got from Julie asking about the thermal plume so you can see her specific words.

I will forward on what you wrote about biocides to Julie. Thanks for that extra info.

Briana

From: Julie Crocker [mailto:julie.crocker@noaa.gov]
Sent: Monday, April 16, 2012 11:50 AM
To: Balsam, Briana
Subject: Re: pilgrim question

Thanks - that info is helpful. Since there does not seem to be a description of the geographic area (i.e., extending X meters from the discharge canal and being X meters wide) occupied by the plume when it is at its largest, I'd like to be able to describe its maximum size. I seem to have what I need to describe the benthic

plume but am still struggling with the surface plume -- do you recommend that I use the info from table 5.1-2 in the 316b study which states an area of 3,000 acres for the delta T of 1C? Do you consider that to represent the "worst case scenario"?

Julie

From: Egan, Joseph [mailto:jegan1@entergy.com]
Sent: Monday, April 16, 2012 12:00 PM
To: Balsam, Briana
Subject: RE: Pilgrim question

Briana,

I have two comments to offer:

1] Chlorine is the only biocide used in the operating systems at Pilgrim. About 10 years ago, we got permission from EPA to perform a pilot scale test of a non-oxidizing biocide (Mexel) which lasted a few months. This was the only time a biocide other than chlorine (sodium hypochlorite) was used at Pilgrim.

2] We have located a bound hard copy of the MIT study (Pagenkoff et al. 1974 -- **Oceanographic Studies ... of Condenser Water Discharge**). It has not been scanned and that may take several hours since it is tightly bound and the owner does not want his only copy ripped apart.

Please let me know if I can be of assistance.

Thanks,

Joe

From: Balsam, Briana [mailto:Briana.Balsam@nrc.gov]
Sent: Monday, April 16, 2012 10:25 AM
To: Julie Crocker
Cc: Logan, Dennis; Susco, Jeremy; Smith, Maxwell; Egan, Joseph
Subject: RE: pilgrim question

Julie,

In additional to chlorine, Entergy also adds sodium thiosulfate to neutralize chlorine in discharged water. Occasionally and with prior approval from the EPA or Commonwealth of MA, Entergy also adds molluscicides.

Entergy's 2006 Environmental Report for license renewal states the following:

> During spring, summer, and fall, the circulating water system is chlorinated for up to two hours per day, one hour each pump, to control nuisance biological growth. Total residual chlorine cannot exceed 0.10 parts per million (ppm) in the cooling water discharge. Continuous chlorination of the service water system can be used to control nuisance biological organisms with a maximum daily concentration of 1.0 ppm and an average monthly concentration of 0.5 ppm in the service water discharge. During chlorination, the screens are operated, and sodium thiosulfate is added to the wash water to remove chlorine and protect organisms returned to the intake canal. Molluscicides are not permitted without the prior approval of the EPA and the Commonwealth.

To follow up on your question from Thursday's phone conversation about the geographic extent of the surface thermal plume, I was not able to locate specific details on the geographic extent of the thermal plume beyond what I had already provided you because all of the available studies (which I sent you last week) refer back to the 1974 MIT study. NRC does not seem to have a copy of this study, nor was my contact at Entergy able to readily locate a copy.

For the 1974 study, MIT collected temperature data over a range of tidal and climatic conditions to characterize the surface plume in June, August, and November of 1973. I am not sure if this study would include maps of the geographic extent of the plume, but this is the only remaining study that might include this information. If you think you need the information contained in this report, it might be best for you to request a copy directly from the MIT Civil Engineering Department. This would be faster than NRC requesting it and then transmitting it to you. Here is a link to the MIT Library catalog record for the study.

> Pagenkoff, J.R., D.F. Harleman, A.T. Ippen and B.R. Pearce. 1974. Oceanographic Studies at Pilgrim Nuclear Power Station to Determine Characteristics of Condenser Water Discharge. Massachusetts Institute of Technology. Parsons Laboratory for Water Resources and Hydrodynamics. Cambridge, MA. 156 p.

Briana

Briana A. Balsam

Biologist

Division of License Renewal

Office of Nuclear Reactor Regulation

U.S. Nuclear Regulatory Commission

301-415-1042

briana.balsam@nrc.gov

From: Julie Crocker [mailto:julie.crocker@noaa.gov]
Sent: Monday, April 16, 2012 9:26 AM
To: Balsam, Briana
Subject: pilgrim question

Are there any other biocides besides chlorine used at Pilgrim?

Thanks,

Julie

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Julie Crocker

Protected Resources Division

Northeast Regional Office

National Marine Fisheries Service

55 Great Republic Drive

Gloucester, MA 01930

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Julie Crocker
Protected Resources Division
Northeast Regional Office
National Marine Fisheries Service
55 Great Republic Drive
Gloucester, MA 01930