

**PNPS LR EIS
Ecology Meeting
May 18, 2006**

Attendees

Entergy - Joe Egan, Rick Buckley, Fred Mogolesko, Doug Ellis
Normandeau - Mike Schera
NRC – Harriet Nash, Alicia Mullins, Alicia Williamson
Earth Tech – Steve Duda, John Szeligowski

Cooling Water System

The meeting was initiated with a discussion of the plant's cooling water system and clarifying specific questions raised by NRC.

The time of travel for water to move through the system is approximately 5 – 10 minutes, depending upon whether 1 or 2 intake pumps are in service. The pump output changes with tidal stage and therefore transit time changes with tidal stage. Transit time has been estimated during chlorination events. When chlorine is added outboard of intake screens residual readings are taken in the discharge canal and residuals are typically picked-up about five minutes into the chlorination cycle. When only 1 pump is running, typically chlorine is not added to the system. Dye dilution studies were done to estimate flow in 1980s.

Entergy stated that intake velocities at the breakwaters are in the range of 0.05 fps. The velocity increases to 0.15 fps near the fish return sluiceway. This is still considered to be low enough to allow fish to leave the intake area. Velocities approaching the screens are about 1 fps and through the screens they are about 2 fps.

The only re-impingement study that has been done at PNPS was in the 1980-1983 timeframe. A concern was expressed that a re-impingement study can't be done with enough scientific rigor (i.e., sufficient N size to make valid conclusions). There was an effort to clip impinged fish but this was not implemented because the technicians would need to wait for returns of clipped fish and this would only be of value when impingement rates were high. Also, if some of the released fish are already dead then the estimate of impingement would be biased high.

Every year, as part of the NPDES permit requirements, PNPS submits their proposal to EPA for biological studies for the upcoming year. At one point in time a PATC had been organized and meetings were attended by Entergy, USEPA and MassDEP. Many discussions were held by the PATC group concerning impingement and several Entergy programs at PNPS were shaped by the PATC. The PNPS discharge permit requires Entergy to submit results of monitoring programs each year. However, feedback is not now occurring as had been the case. When BECO submitted programs for review they were discussed. Joe does speak to John Nagel regularly to address science behind the PNPS issues. Most recently Joe discussed the larval transport study and received

feedback from agencies that resulted in program modifications. Entergy has discussed the hatchery program with Bob Lawton.

Entergy has no plans to ramp up the hatchery program at this time. Entergy prefers to obtain compliance options through the 316b review process. However, they are not opposed to expanding the hatchery program. In response to a comment that the public and agency perception is that the program is not of a significant benefit to the resource, Entergy stated that there has been some peer review of the hatchery program. Questions remain, however, about growth, feeding and survival. Entergy has estimated that stocking about 400,000- fish would compensate for plant impacts. They believe that it can be done and that scale up is doable. Everyone is waiting for EPA to act due to a legal challenge to the 316b rules. Entergy is attempting to follow the 316b process but they are not certain which of the several possible courses they will take.

Entergy has found that some hatchery reared fish survive upon release. The hatchery uses diverse brood stock obtained from Cape Cod fishermen. Biggest concern has been in raising fish. At full scale the operations would need to be significantly changed. For instance they are not yet homogenizing sperm.

Service water is discharged to west side of the discharge structure through an opening in the discharge structure walls. Usually 3 of 5 pumps are in service and these are safety related systems. Constructing a separate pump house as part of a mitigation strategy would be extremely costly.

Discharge of rad contaminants: PNPS is hoping to move to a zero discharge type of plant. Typically, PNPS only discharges low levels of rad contaminants every 2 years (at each refueling outage).

The change in temperature across the service water is 5-10°F. This is not regulated by NPDES. The service water bay is continuously chlorinated.

The intake structure undergoes mechanical cleaning at least one time/year. Divers are utilized to clean the trash racks. Mechanical cleaning of the internal area of the intake structure is coordinated with refueling outages (~ every 2 years). Service water bay cleaning can be done while the facility is online. This area is inspected at least quarterly.

Chlorination of the main cooling water system occurs inboard of the trash rack. The system is chlorinated each day for one hour.

Impingement monitoring is conducted for a minimum of ½ hour. Impingement rates are dependent upon the number of hours per collection period.

Screen rate is typically slow (5 FPS) or fast (20 FPS). The faster speed is typically used only during storms (but not every storm). The low and high pressure washes are ~ 18-24 inches apart. During a high impingement event, the screens are turned at a slow speed. Screens are also turned a minimum of every shift (12 hours), typically at the beginning

and end of each shift and will usually turn for a few hours (1-2). A chart is maintained which documents when the screens were turned. There is also a scheduled screen wash 8 hours prior to each of the 3 weekly sampling events. Screens are run often in colder months (October – March).

With regard to running the traveling screens continuously, Entergy believes that this mode of operation would cause the screens to deteriorate rapidly. However, this approach may be considered further in the 316b review.

The outside skimmer wall has ~ 6-12 fish escape ports, which at low tide may be visible.

Entergy has thought about conducting entrainment sampling upstream of the condensers but they are not certain it can be accomplished and prefer this be considered during the 316b review. Entergy did state that they do see some small fish in the entrainment samples.

Additional Questions

The second part of the meeting involved a discussion of a list of questions submitted by NRC to Entergy.

1. Are there any winter flounder estimates pre-1995?
 - Prior to 1995, there was no flounder work done by PNPS. Flounder work in the area was performed by MA DMF. Trawl studies were done through 1993, using two different methodologies. A series of reports were generated.
 - Any current sampling data collected by NOAA would be found in the Stock Assessment Reports
 - Possibly talk to Vincent Malkoski with MA DMF regarding additional data.
 - In the late 70s, early 80s, several studies were done by MIT to evaluate circulation dynamics and larval transport
 - Consider talking to Paul Nietscke – Woods Hole Lab WF expert
2. Was there a summary report for Cape Cod Bay ichthyoplankton in 1976? This was noted in Marine Ecology Studies #65.
 - PNPS is not aware of any specific newer studies
 - There could be specific studies related to the right whale or on-going monitoring programs conducted by the MWRA.
 - Also look at NOAA MARMAP and ECOMON programs
3. How does the PNPS winter flounder study data compare to other studies in the bay?
 - Over last 3 years the area swept data (indicating a decline) has paralleled NOAA Gulf of Maine data (see page 84 (Figure 9) of Marine Ecology Studies Report #67)
 - The local winter flounder populations are considered by DMF to be part of the Northern stock.
4. Have there been any survival studies on impinged organisms?

- Low pressure spray nozzles were put on the screens in 1981 – 1982. The fish lips were added in the mid to late 1990s.
 - A 1984 report is available to evaluate impingement survival (prior to the addition of fish lips to the screens).
5. Have there been any studies on the habitat value of rocky point and associated shoals/structure?
 - Paul Nietscke may have done some cunner work in the area related to the ledges.
 - The March 2000 report from ENSR may also have some information
 - Phil Collarusso with EPA previously worked on eelgrass.
 - University of MA, Boston and Northeastern may also have some information.
 6. What are the off-shore flow dynamics in this area? Is there any salinity or temp stratification?
 - An MIT study done by Brian Pearce under the Sea Grant Program. Also call University of MA at Boston. Fred will get this study from MIT.
 - The larval transport study done by PNPS also has more information
 - Consider doing a Goggle search on Cape Cod Bay Circulation Models.
 - Check the MWRA web site
 7. Are any commercial fisheries catch stats for Cape Cod Bay and/or Mass Bay available? Specifically can you speak to the lobster/mussel status in the area.
 - The local area is in Area 514 (all of Cape Cod Bay). This information should be in the NMFS SAW reports. If data is not available, consider contacting David Southerland – NMFS.
 8. Has any recent plankton work been done near the site?
 - The most recent report was distributed at the meeting.
 9. Is any data available on macrophytes in the area?
 - A 1984 monograph describes this benthic algal monitoring. Joe will provide the reference
 10. Have the impacts of entrainment on forage species been studied?
 - Impact assessments on menhaden and cunner were provided in the 316b report
 - There is also a potential chapter in the 1984 monograph. Impingement of Menhaden appears to somewhat correlate with beach wash-ups. There is no pattern with other species.
 11. Is data available to distinguish between warm water and cool water impingement
 - Generally impingement numbers go up in cooler water
 - Additional info can be found in Table 1 of Marine Ecology Studies Report # 67
 12. What studies are available to assess the thermal plumes capacity to:

- Attract and expose organisms to areas of elevated temp during spawning periods
 - Preclude the use of affected areas by temperature sensitive species
 - Expose eggs and larvae to water temperatures well above levels that are typical under ambient conditions
 - Affect fish migration
- EG&G Document #86 is a good reference regarding the thermal plume (copy provided). The studies performed in support of this document cover various tidal cycles and wind conditions. This study was done in conjunction with a DOD satellite study. PNPS is not sure if it was submitted to EPA. This is the best and most detailed study they have on the thermal discharge.
13. Are aerial photos available of the site – pre-construction through current?
- These were provided by Fred and reviewed on-site to determine if there were any obvious coastal erosion problems associated with the site.
14. The 316(b) report mentions a potential smelt habitat and stocking effort. What is the status of this?
- PNPS was contributing money to DMF for egg trays. PNPS doesn't think this is occurring anymore. Brad Chase would know the answer to this.
15. Please provide additional documentation regarding dredging of the intake and discharge canal. Specifically frequency, any chemical, biological, or toxicological analysis, disposal methods.
- Dredging of the discharge canal has never been done. The intake has only been dredged twice (1982 and the late 1990s). There is no set frequency for dredging. The purpose of the dredging was to bring colder water into the intake. This activity didn't really help with this objective. Every dredging event was permitted individually from the USACE. Testing conducted as part of the permit included chemical, biological, and radiological. The dredge material was disposed of in open water, at a site north of Boston.
 - Ken Sikora, from the radiological monitoring program may have sediment chemistry data for rad compounds.
 - A bathymetric map of the intake canal was produced in the Fall of 2005.
 - The dredged material permit application was provided
16. Are any maps available showing the types of sediment (sand, silt, etc.) in the offshore areas adjacent to PNPS?
- These should be in the FSAR or in Volume 2 of Marine Ecological Studies
17. Please provide the most recent Marine Ecology Studies report (anticipated publication date – May, 2006).
- Report was provided

18. In the 3/11/02 response to EPA comments on the 316b report (pg 13), a statement is made that the hatchery fish (winter flounder) clearly survive and at a higher rate than the wild fish (40% vs. 25%). What is the source for this statement?
- This information is contained in the hatchery reports submitted as part of the Marine Ecological Studies.
19. In the facilities 1994 NPDES permit, it is stated that fish mortality reports are required when mortality is observed associated with the thermal plume or when they are an unusual number of fish impinged. Is this data reported in the semi-annual ecological reports? If not, where is it reported? Have there been any mortality events associated with the thermal discharge and plume?
- A current list of impingement events is provided as Table 4 of Marine Ecology Studies Report # 67. This information is also submitted as separate reports/email to EPA. Joe has a list of unusual events.
 - There have been no thermal mortality events. There was a significant mortality event in 1978, but this was attributed to gas bubble disease.
 - 20 fish/hour is the trigger for an unusual impingement event and is reported to EPA (NPDES requirements). A minor event is considered to be >20/hour, while a major event is considered to be > 1000 total #
 - In August of 2005 there was a significant impingement event. Bluefish and stripers appeared to be chasing forage fish into the intake canal
 - The reporting threshold may change (have talked to EPA). PNPS does not anticipate getting a specific number in the NPDES permit renewal.
 - Some of the latest impingement events have correlated with other plants in the area.
20. In the facilities 1994 NPDES permit, it is stated that thermal discharge fish surveillance is required (using overflights, dive surveys, etc.). Where is this information reported? Is it still being conducted? If it is not currently being conducted, when was it discontinued and why? Is any documentation available regarding this?
- This was only done for a few years after the 1994 permit
 - Reported a part of Ecology Studies reports.
 - Discontinued.
21. Does the applicant agree that the rainbow smelt that are being impinged at the facility are part of the Jones River population? Is the applicant aware of any recent studies on this population? Please provide the most recent information on impingement of rainbow smelt at the plant. What is the basis for the current concern over RA?
- Fish that are impinged are probably part of the Jones River population. Other runs in the area (Boston Harbor) may be potentially mixing with the Jones River population. There is really no good information on RB smelt populations in the area
 - Jones River approximately 7-8 miles from the plant.
 - There is a Jerry Szal report on RS. Also, NOAA identifies this species as a "species of concern".

- RS populations in Jones River appear to be falling. Brad Chase indicated this has been happening for the last 5-10 years.
 - Smelt spawn on cold nights. They move down the coast when not spawning. The relationship to PNPS is uncertain because the population range is not known.
22. In the South Shore Coastal Water Quality Assessment Report, a statement is made regarding the discharge, that "...due to effects on Irish Moss, the facility reimbursed one harvester for losses". Can you please provide additional detail regarding this?
- Only one individual was paid. However PNPS does not recall any payments within the last 6 years.
23. In the South Shore Coastal Water Quality Assessment Report, a statement is made that diver-assisted studies were conducted in the late 1990s to evaluate the effects of the plant's discharge on the benthic community. Please provide these references as well as any historical data from pre-plant operation through the time period mentioned.
- Battelle used an air lift sampler with a quadrat design to do this original work. DMF may possibly have done some work in the 1969 to 1991 time period.
 - Joe will look for this data.
24. Have any studies been performed to evaluate the potential impacts of the thermal backwash on the intake canal?
- Fred provided a journal reference which also looks at thermal profiles.
25. In a 11/16/02 letter from the MA Office of Coastal Zone Management, a request is made that Entergy "...identify the origin of the source population of winter flounder larvae drifting past PNPS...". Has this been done? Is this the larval transport studies that have been conducted by PNPS?
- Larval transport studies were done in response to EPA's interpretations of PNPS impacts.
26. Has PNPS received any communications from the Priscilla Beach Association regarding the erosion of Priscilla Beach?
27. Is PNPS aware of any other local concerns regarding coastal/beach erosion?
- Dave Tarentino - Priscilla Beach (south of plant) approximately 5 years ago contacted PNPS and asked for borrow from the upland area.
 - One member of the Priscilla Beach Assoc associated the PNPS breakwaters with their erosion problems.
 - MA CZMA seems to think that coastal storms (nor'easters) may be to blame for some of the erosion in the area.
 - Entergy donated ~ 5000 \$ to the Priscilla Beach replenishment fund, however the beach replenishment was never actually done.
 - There is considerable erosion in Manomet and areas south of this.
 - PNPS has not really heard much of anything from the community blaming coastal erosion issues on the facility.

28. Is the facility aware of any significant populations of invasive or non-native populations of aquatic organisms in this area?

- PNPS is not aware of any in this area.
- The CZM coastline newsletter has a DMF link to alien species (green crab and Japanese shore crab).

Other Items

- A question was asked about knowledge of local shellfish beds. Greg Sawyer of DMF or his boss Mike Hickey may have some available info. Should probably contact Jack Schwartz to initiate this contact.
- PNPS currently has no plans to ramp up the hatchery program.
- R. B. Smelt – we should call Brad Chase. There is uncertainty regarding fidelity of local populations.
- There is currently a moratorium on the taking of river herring in MA.
- A short discussion on cumulative impacts ensued. Joe handed out a flyer on the already built Hubline transmission line across Boston Harbor (Salem to Weymouth) ; Several off shore LNG terminals have been proposed to connect to this gas line.
- The MA Bay Cod Conservation Zone is north of and around Boston and therefore is not applicable to this area.
- Plymouth Conservation Commission (Liz Sullivan) may have knowledge of local dredging. Bob Hellman is also on this group.
- There was an outbreak of red tide last year on the north shore.
- For additional information on eel grass see the Cape Cod Monogram; Merriman/Davis, Editor; Springer Valley, Publisher