**From:** "Peter MacLaggan" <pmaclaggan@poseidon1.com>
**To:** "'Chiara Clemente'" <CClemente@waterboards.ca.gov>
**CC:** "'Brian Kelley'" <BKelley@waterboards.ca.gov>, "'David Barker'" <DBarker...
**Date:** 4/30/2008 4:13 PM
**Subject:** RE: Poseidon's CDP Plan - questions regarding IM & E assessments
**Attachments:** RWQCB Staff Question and response 043008.doc

Chiara,

I see that some of the staff on your original email were not included in my earlier response so I'm resending it to everyone.

Attached is Poseidon's response to staff's questions on the Flow, Entrainment and Impingement Plan for the Carlsbad Desalination Project. Please feel free to contact me if you have any additional questions.

Peter

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-----Original Message-----
From: Chiara Clemente [mailto:CClemente@waterboards.ca.gov]
Sent: Thursday, April 17, 2008 9:48 AM
To: pmaclaggan@poseidon1.com
Cc: Brian Kelley; David Barker; Deborah Woodward; Mike McCann
Subject: Poseidon's CDP Plan - questions regarding IM & E assessments

Dear Mr. MacLaggan,

After discussing the issue with Debbie Woodward, we thought that perhaps a meeting isn't necessary to obtain the clarifications we need to proceed with our analysis. Rather, it would be most helpful if you, or your consultant(s), could confirm/clarify a couple aspects of the entrainment and impingement assessments in the Flow, Entrainment and Impingement Minimization Plan (March 6, 2008) via e-mail, in the next couple of days. Please see below.

1. ENTRAINMENT

Based on our review of the entrainment assessment in the Plan, it appears that the assessment...

(a) characterizes larval concentration in entrained water using in-plant samples, i.e., two, 24-hour samples collected near the CDP intake in the EPS discharge stream on June 10, 2004 and May 19, 2005;

(b) characterizes larval concentration in source water using source water samples, i.e., thirteen, 24-hour sample events per station collected at four lagoon (L1-4) and five nearshore (N1-5) stations, monthly from June 10,

2004 through May 19, 2005;

(c) does not draw upon the monthly samples taken in the lagoon near the entrance to the EPS intake structure (station E1); and,

(c) therefore, is for CDP/EPS co-operation rather than CDP stand-alone operation.

Is this understanding correct? Do you concur that the entrainment assessment provided in the Plan is for co-operation rather than stand-alone operation?

2. IMPINGEMENT

Based on our review of the impingement assessment in the Plan, it appears that the daily biomass of impinged fish (0.96 kgs/day) may have been incorrectly calculated.

(a) Attachment 2 appears to present counts and weights of impinged organisms found during each of the 24-hour sample events conducted weekly from June 24, 2004 through June 15, 2005, i.e., 52 sample events, each representing 24-hour impingement;

(b) Table 5-1 appears to present - not annual count and weight totals prorated to 304 MGD as indicated by the caption - but rather line totals (by taxa) of the counts and weights from Attachment 2, i.e., Table 5-1 appears to present 52-day totals with no adjustment for flow on the day of sampling, no interpolation for the days between sample events, and no prorating to 304 MD; and,

(c) therefore, calculation of the daily biomass of impinged fish by dividing the un-interpolated, un-prorated Table 5-1 total weight (351,672 grams) by 365 days appears to be in error.

Is the above staff interpretation correct? If not, then could you please let me know which of the above statements regarding Attachment 2 and/or Table 5-1 is wrong, and why?

Thank you for your time and attention on this matter,

Chiara

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1. ENTRAINMENT

***RRWQCB Comment: Based on our review of the entrainment assessment in the Plan, it appears that the assessment...***

***(a) characterizes larval concentration in entrained water using in-plant samples, i.e., two, 24-hour samples collected near the CDP intake in the EPS discharge stream on June 10, 2004 and May 19, 2005;***
***(b) characterizes larval concentration in source water using source water samples, i.e., thirteen, 24-hour sample events per station collected at four lagoon (L1-4) and five nearshore (N1-5) stations, monthly from June 10, 2004 through May 19, 2005;***
***(c) does not draw upon the monthly samples taken in the lagoon near the entrance to the EPS intake structure (station E1); and,***
***(c) therefore, is for CDP/EPS co-operation rather than CDP stand-alone operation.***
***Is this understanding correct? Do you concur that the entrainment assessment provided in the Plan is for co-operation rather than stand-alone***
***operation?***

**Response:** The entrainment assessment included in the *Flow, Entrainment and Impingement Minimization Plan* (Plan) for the Carlsbad Desalination Project relies on the monthly samples taken in the lagoon near the entrance to the EPS intake structure (station E1); and therefore it is representative of stand-alone operation.

The entrainment assessment in the Plan is based entirely on a 12-month study from June 2004 to June 2005. Entrainment and source water sampling was conducted monthly from June 2004 through May 2005 except that two surveys were done in June 2004 separated by a two-week interval. The thirteen surveys provided a complete year of seasonal data for 2004–2005. The details of both the study methods and findings are presented in their entirety in the report titled, "CLEANWATER ACT SECTION 316(b) IMPINGEMENTMORTALITY AND ENTRAINMENT CHARACTERIZATION STUDY Effects on the Biological Resources of Agua Hedionda Lagoon and the Nearshore Ocean Environment January 2008 Prepared by: Tenera Environmental, and submitted to the San Diego Regional Water Quality Control Board January 2008.

Entrainment samples were collected from a single station located in front of the EPS intakes (E1). They were collected using a bongo frame with paired 0.71 m (2.33 ft) diameter openings each equipped with 335 μm (0.013 in) mesh plankton nets and codends. The start of each tow began approximately 30 m (98 ft) in front of the intake structure and proceeded in a northwesterly direction against the prevailing intake current, ending approximately 150 m (492 ft) from the intake structure.

Source water Plankton samples were also collected monthly at four source water stations in Agua Hedionda Lagoon and five nearshore stations adjacent to the EPS. The source water stations ranged in depth from approximately –1.8 m (–5.9 ft) MLLW and to-34.1 m (–111.9 ft) MLLW. The stations were stratified to include stations in the Inner, Middle and Outer Lagoon, and at varying distances upcoast, downcoast, and offshore from the lagoon mouth lagoon.

A total of 20,601 larval fishes representing 41 taxa were collected from the EPS entrainment station E1 during 13 monthly surveys in the 2004 to 2005 sampling period. Gobies (CIQ goby complex) and blennies comprised over 90% of all specimens collected.

The results from a separate in-plant entrainment mortality study referred to in Staff's review were not used in the entrainment assessment for stand-alone operation of the desalination facility. This information was used to calculate the incremental mortality associated with the desalination facility operations when operating jointly with the power plant.

2. IMPINGEMENT

***RWQCB Comment: Based on our review of the impingement assessment in the Plan, it appears that the daily biomass of impinged fish (0.96 kgs/day) may have been incorrectly calculated.***

***(a) Attachment 2 appears to present counts and weights of impinged organisms found during each of the 24-hour sample events conducted weekly from June 24, 2004 through June 15, 2005, i.e., 52 sample events, each representing 24-hour impingement;***

***(b) Table 5-1 appears to present – not annual count and weight totals prorated to 304 MGD as indicated by the caption – but rather line totals (by taxa) of the counts and weights from Attachment 2, i.e., Table 5-1 appears to present 52-day totals with no adjustment for flow on the day of sampling, no interpolation for the days between sample events, and no prorating to 304 MD; and,***

***(c) therefore, calculation of the daily biomass of impinged fish by dividing the un-interpolated, un-prorated Table 5-1 total weight (351,672 grams) by 365 days appears to be in error.***

***Is the above staff interpretation correct? If not, then could you please let me know which of the above statements regarding Attachment 2 and/or Table 5-1 is wrong, and why?***

**Response:** The weights and taxa collected during the 52 week samples shown in Table 5.1 are correct. Therefore, the total amount of impinged species collected over the 13-month sample period of 3,651,179 grams (3,651.179 kg) is accurate. However, staff is correct that there is an error in the calculation used to convert this information to a daily amount.

In response to staff's request, we have revised the estimate of the daily impingement effect of the intake operations. Figure 1 (below) shows the average daily flow rate and impinged biomass for 50 of the 52) weekly surveys collected during the impingement survey period. The two remaining samples were outliers and therefore were not included in the analysis in order to get more accurate statistical correlation of the impingement results.

As shown in Figure 1, the sampling period flow rate consistently exceeded the stand-alone desalination plant flow of 304 MGD. However, from this information we are able to extrapolate an average daily impingement effect of 1.56 kg the desalination plant stand-alone operations at 304 MGD using the statistically significant relationship between the impingement effects and flows measured under normal power plant operations that occurred during the June 2004 to June 2005 impingement survey.

It is important to note that 6 of the 13 samples collected for plant intake flows at or below 550 MGD had impingement effect approximately equal to or less than the initially estimated daily impingement effect 0.96 kg/day. Another trend that can be noted in Figure 1 is that the opposite is true for flows above 550 MGD -- the majority of the impingement results are above the average of the curve.

This observation is consistent with other nationwide findings on the relationship of intake volume, velocity, and impingement that indicate an impingement effects threshold at or above a velocity of approximately 2 fps. Below this velocity, impingement effects decline rapidly. The impingement effects continue to dramatically decline as the intake approach velocity nears 0.5 fps and below. The desalination plant stand-alone operations at 304 MGD will mirror these conditions -- intake approach velocities at bar racks will be approximately of 0.5 fps. Consequently, we expect to observe a velocity driven impingement reduction effect that will result in actual impingement rates that are below the statistical projection of 1.56 kg/d and possibly below 1.0 kg/d.

Although the estimated daily impingement rate of 1.56 kg/d is slightly higher than previously indicated, the total amount of impinged species collected over the 13-month sample period of 3,651,179 grams is unchanged. This level of impingement, along with the adjusted daily estimate continues to represent a *de minimis* impingement effect.

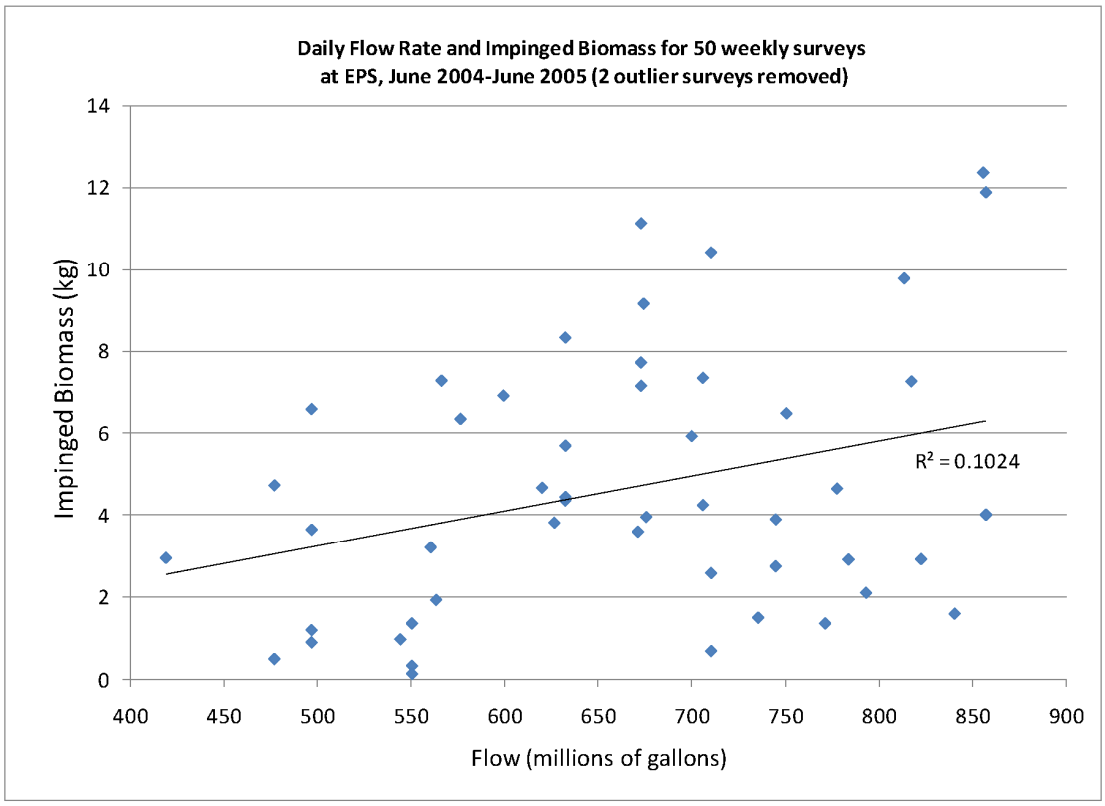
Daily Flow Rate and Impinged Biomass for 50 weekly surveys
at EPS, June 2004-June 2005 (2 outlier surveys removed)
Impinged Biomass (kg)
Flow (millions of gallons)
R² = 0.1024
0
2
4
6
8
10
12
14
400
450
500
550
600
650
700
750
800
850
900

Figure 1.