

CARLSBAD SEAWATER DESALINATION PROJECT

SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD

REGION 9, SAN DIEGO REGION

ORDER NO. R-9-2006-0065

NPDES NO. CA0109223

FLOW, ENTRAINMENT AND IMPINGEMENT MINIMIZATION PLAN

“Analysis of 1979-1980 Flow and Impingement Data for EPS”

(San Diego Gas & Electric, December 1980)

April 8, 2009

The enclosed attachment (“Attachment”) contains flow and impingement data from San Diego Gas & Electric’s 1980 316(b) Study. This Study was prepared for the San Diego Regional Water Quality Control Board by SDG&E and submitted in December 1980. The data were collected on 336 consecutive days from February 4, 1979 to January 4, 1980

Table 7.5-1 contains mean impingement information for the EPS in terms of numbers of organisms and weight (in grams). Table 7-5.2 contains, inter alia, weekly mean flow rates for the EPS, presented in terms of gallons per minute (GPM).

In order to compare the data in these tables with the impingement data presented in the revised Minimization Plan, we did the following:

1. Copied the impingement data from Table 7.5-1 and the flow data from Table 7-5.2 into a new table (Table A).
2. Converted the flow rate data into millions of gallons per day as follows:
  - a. Multiply:  $1,000 \text{ GPM} \times 60 \text{ minutes/hour} \times 24 \text{ hours/day} = 1,440,000$
  - b. Divide:  $1,440,000/1,000,000 = 1.44 \text{ MGD}$
  - c. Multiply  $1.44 \text{ MGD} \times$  mean flow rate for each week (last column) in MGD
3. Calculate average for impingement number, weight, flow rate
4. Mean Results EPS:
  - a. Number: 255 fishes
  - b. Weight: 2.46 kg/day
  - c. Flow: 619 MGD
5. Since CDP will operate at 304 MGD, estimate CDP’s impingement by discounting EPS’s actual mean impingement values by 304/619.
6. Mean Results CDP (at 304 MGD):
  - a. Number: 125 fishes
  - b. Weight: 1.2 kg/day
  - c. Flow: 304 MGD

ATTACHMENT

Month	Date	Week	Station 1			Station 4			Station 5			All Stations		
			Total Number	Total Weight	MGD	Total Number	Total Weight	MGD	Total Number	Total Weight	MGD	Total Number	Total Weight	MGD
Feb.	4-10	1	46	522.0	174.24	293	2688.0	259.2	116	1786.0	316.8	455	4996.0	750
	11-17	2	31	242.0	192.96	170	1107.0	259.2	90	1148.0	316.8	291	2497.0	769
	18-24	3	72	788.0	192.96	519	5447.0	220.32	783	5759.0	316.8	1374	11994.0	730
Feb-Mar	25-3	4	91	914.0	192.96	160	2392.0	220.32	115	1603.0	316.8	366	4909.0	730
March	4-10	5	6	50.0	192.96	0	0.0	0	41	1123.0	316.8	47	1173.0	510
	11-17	6	13	73.0	192.96	0	0.0	0	35	1157.0	316.8	48	1230.0	510
	18-24	7	13	105.0	192.96	0	0.0	0	30	4583.0	316.8	43	4688.0	510
	25-31	8	7	29.0	192.96	0	0.0	0	24	2232.0	316.8	31	2261.0	510
April	1-7	9	5	174.0	192.96	0	0.0	0	271	9573.0	316.8	276	9747.0	510
	8-14	10	3	91.0	185.76	0	0.0	0	21	1135.0	316.8	24	1226.0	503
	15-21	11	2	47.0	174.24	0	0.0	0	18	1470.0	316.8	20	1517.0	491
	22-28	12	8	110.0	182.88	0	0.0	0	50	1944.0	270.72	58	2054.0	454
Apr-May	29-5	13	14	185.0	155.52	0	0.0	0	11	2882.0	316.8	25	3067.0	472
May	6-12	14	97	521.0	192.96	0	0.0	0	0	0.0	0	97	521.0	193
	13-19	15	33	219.0	192.96	0	0.0	0	0	0.0	0	33	219.0	193
	20-26	16	67	820.0	192.96	0	0.0	18.72	0	0.0	0	67	820.0	212
May-June	27-2	17	52	478.0	192.96	0	0.0	0	0	0.0	0	52	478.0	193
June	3-9	18	57	288.0	184.32	12	92.0	38.88	49	952.0	316.8	118	1332.0	540
	10-16	19	91	798.0	192.96	42	224.0	38.88	61	948.0	309.6	194	1970.0	541
	17-23	20	107	487.0	139.68	236	1943.0	38.88	148	3585.0	316.8	491	6015.0	495
	24-30	21	51	274.0	126.72	320	927.0	0	145	2105.0	316.8	516	3306.0	444
July	1-7	22	31	187.0	109.44	235	549.0	0	102	593.0	316.8	368	1329.0	426
	8-14	23	30	59.0	118.08	323	716.0	38.88	258	1642.0	316.8	611	2417.0	474
	15-20	24	31	274.0	192.96	77	426.0	220.32	58	752.0	316.8	166	1452.0	730
	22-28	25	87	237.0	164.16	112	278.0	259.2	106	1052.0	316.8	305	1567.0	740
July-Aug	29-4	26	95	972.0	192.96	195	476.0	259.2	72	3193.0	316.8	362	4641.0	769
Aug.	5-11	27	17	145.0	192.96	58	183.0	259.2	32	563.0	316.8	107	891.0	769
	12-18	28	46	192.0	182.88	105	422.0	259.2	41	945.0	316.8	192	1559.0	759
	19-25	29	108	425.0	191.52	380	1012.0	259.2	103	1040.0	270.72	591	2477.0	721
Aug-Sept	26-1	30	55	194.0	192.96	153	1381.0	259.2	53	267.0	270.72	261	1842.0	723
Sept.	2-8	31	54	113.0	192.96	216	703.0	185.76	73	739.0	316.8	343	1555.0	696
	9-15	32	15	106.0	192.96	67	109.0	220.32	21	234.0	316.8	103	449.0	730
	16-22	33	39	168.0	192.96	31	312.0	220.32	20	530.0	302.4	90	1010.0	716
	23-29	34	57	463.0	192.96	42	365.0	220.32	90	932.0	316.8	189	1760.0	730
Sept-Oct	30-6	35	41	283.0	192.96	100	515.0	259.2	53	980.0	316.8	194	1778.0	769
Oct.	7-13	36	33	2033.0	192.96	75	414.0	259.2	22	722.0	316.8	130	3169.0	769
	14-20	37	34	110.0	192.96	94	257.0	259.2	28	501.0	316.8	156	868.0	769
	21-27	38	79	471.0	192.96	223	909.0	259.2	68	760.0	316.8	370	2140.0	769
Oct -Nov	28-3	39	187	494.0	192.96	168	375.0	259.2	62	1114.0	316.8	417	1983.0	769
Nov.	4-10	40	88	539.0	192.96	100	430.0	259.2	59	1164.0	316.8	247	2133.0	769
	11-17	41	53	520.0	192.96	196	675.0	259.2	58	640.0	316.8	307	1835.0	769
	18-24	42	210	711.0	192.96	394	1094.0	259.2	189	1353.0	316.8	793	3158.0	769
Nov-Dec	25-1	43	60	537.0	182.88	513	207.0	259.2	11	343.0	316.8	584	1087.0	759
Dec.	2-8	44	37	235.0	192.96	143	1032.0	259.2	49	1379.0	316.8	229	2646.0	769
	9-15	45	13	152.0	192.96	60	544.0	246.24	24	866.0	316.8	97	1562.0	756
	16-22	46	9	187.0	192.96	123	844.0	259.2	64	1146.0	316.8	196	2177.0	769
	23-29	47	34	391.0	192.96	91	773.0	18.72	21	357.0	316.8	146	1521.0	528
Dec-Jan	30-4	48	8	112.0	192.96	33	1523.0	246.24	7	1204.0	316.8	48	2839.0	756

Mean Values EPS	255	2455.5	619
MGD	125	1205.2	304

66407-INTAKE  
R9-CA-Encina  
#22484 Intake

8916

Docket OW-2002-0049 DCN# 6-2076  
San Diego Gas & Electric  
Encina Power Plant Cooling Water Intake System  
Demonstration (In Accordance with Section 316(b)  
Federal Water Pollution Control Act Amendment of  
1972). Volume I. Prepared for California Regional  
Water Quality Control Board. December.

# SAN DIEGO GAS & ELECTRIC

  

# ENCINA POWER PLANT

## COOLING WATER INTAKE SYSTEM DEMONSTRATION



VOLUME I

RETURN TO  
316 LIBRARY

DECEMBER, 1980

000001

# ENCINA POWER PLANT

COOLING WATER INTAKE SYSTEM DEMONSTRATION  
(IN ACCORDANCE WITH SECTION 316(b) FEDERAL WATER POLLUTION  
CONTROL ACT AMENDMENT OF 1972)

PREPARED FOR:  
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
SAN DIEGO REGION  
SAN DIEGO, CALIFORNIA

PREPARED BY:  
SAN DIEGO GAS & ELECTRIC

PROJECT MANAGER:  
JOSEPH F. DIETZ

DECEMBER, 1980

SAN DIEGO GAS & ELECTRIC  
101 ASH STREET  
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TABLE 7.5-1  
 MEAN TOTAL NUMBER AND WEIGHT (g) OF ALL FISHES IMPINGED AT ENCINA  
 POWER PLANT TRAVELING SCREEN STATIONS PER 24-HOUR INTERVAL  
 OVER THE PERIOD FEBRUARY 4, 1979 - JANUARY 4, 1980

TIME PERIOD	WEEK	STATION 1		STATION 4		STATION 5		ALL STATIONS	
		Total Number	Total Weight	Total Number	Total Weight	Total Number	Total Weight	Total Number	Total Weight
Feb 4-10	1	46	522.0	293	2688.0	116	1784.0	455	4996.0
11-17	2	31	242.0	170	1107.0	90	1148.0	291	2497.0
18-24	3	72	788.0	519	5447.0	783	5759.0	1374	11994.0
Feb 25-Mar 3	4	91	914.0	160	2392.0	115	1603.0	366	4909.0
Mar 4-10	5	6	50.0	0	0.0	41	1123.0	47	1173.0
11-17	6	13	73.0	0	0.0	35	1157.0	48	1230.0
18-24	7	13	105.0	0	0.0	30	4583.0	43	4688.0
25-31	8	7	39.0	0	0.0	24	2232.0	31	2261.0
Apr 1-7	9	5	174.0	0	0.0	271	9573.0	276	9747.0
8-14	10	3	91.0	0	0.0	21	1135.0	24	1226.0
15-21	11	2	47.0	0	0.0	18	1470.0	20	1517.0
22-28	12	8	110.0	0	0.0	50	1944.0	58	2054.0
Apr 29-May 5	13	14	185.0	0	0.0	11	2882.0	25	3067.0
May 6-12	14	97	521.0	0	0.0	0	0.0	97	521.0
13-19	15	33	219.0	0	0.0	0	0.0	33	219.0
20-26	16	67	820.0	0	0.0	0	0.0	67	820.0
May 27-Jun 2	17	52	478.0	0	0.0	0	0.0	52	478.0
Jun 3-9	18	57	288.0	12	92.0	49	952.0	118	1332.0
10-16	19	91	798.0	42	224.0	61	948.0	194	1970.0
17-23	20	107	487.0	236	1943.0	148	3585.0	491	6015.0
24-30	21	51	274.0	320	927.0	145	2105.0	516	3306.0
Jul 1-7	22	31	187.0	235	549.0	102	593.0	368	1329.0
8-14	23	30	59.0	323	716.0	258	1642.0	611	2417.0
15-21	24	31	274.0	77	426.0	58	752.0	166	1452.0
22-28	25	87	237.0	112	278.0	106	1052.0	305	1567.0
Jul 29-Aug 4	26	95	972.0	195	476.0	72	3193.0	362	4641.0
Aug 5-11	27	17	145.0	58	183.0	32	563.0	107	891.0
12-18	28	46	192.0	105	422.0	41	945.0	192	1559.0
19-25	29	108	425.0	380	1012.0	103	1040.0	591	2477.0
Aug 26-Sep 1	30	55	194.0	153	1381.0	53	267.0	261	1842.0
Sep 2-8	31	54	113.0	216	703.0	73	739.0	343	1555.0
9-15	32	15	106.0	67	109.0	21	234.0	103	449.0
16-22	33	39	168.0	31	312.0	20	530.0	90	1010.0
23-29	34	57	463.0	42	365.0	90	932.0	189	1760.0
Sep 30-Oct 6	35	41	283.0	100	515.0	53	980.0	194	1778.0
Oct 7-13	36	33	2033.0	75	414.0	22	722.0	130	3169.0
14-20	37	34	110.0	94	257.0	28	501.0	156	868.0
21-27	38	79	471.0	223	909.0	68	760.0	370	2140.0
Oct 28-Nov 3	39	187	494.0	168	375.0	62	1114.0	417	1983.0
Nov 4-10	40	88	539.0	100	430.0	59	1164.0	247	2133.0
11-17	41	53	520.0	196	675.0	58	640.0	307	1835.0
18-24	42	210	711.0	394	1094.0	189	1353.0	793	3158.0
Nov 25-Dec 1	43	60	537.0	513	207.0	11	343.0	584	1087.0
Dec 2-8	44	37	235.0	143	1032.0	49	1379.0	229	2646.0
9-15	45	13	152.0	60	544.0	24	866.0	97	1562.0
16-22	46	9	187.0	123	844.0	64	1146.0	196	2177.0
23-29	47	34	391.0	91	773.0	21	357.0	146	1521.0
Dec 30-Jan 4	48	8	112.0	33	1523.0	7	1204.0	48	2839.0
48-WK MEAN		50.4	365.1	126.2	653.0	78.2	1437.0	254.8	2455.5

TABLE 7.5-2  
WEEKLY MEAN TEMPERATURES (°C), SALINITIES (‰) AND FLOW RATES  
(1000 gpm) OF SEAWATER ENTERING THE COOLING WATER SYSTEM OF THE  
ENCINA POWER PLANT DURING THE PERIOD  
FEBRUARY 4, 1979 - JANUARY 4, 1980

TIME PERIOD	WEEK	TEMPERATURE (°C)	SALINITY (‰)	UNITS 1-3 Flow Rate (1000 gpm)	UNIT 4 Flow Rate (1000 gpm)	UNIT 5 Flow Rate (1000 gpm)	TOTAL PLANT Flow Rate (1000 gpm)
Feb 4-10	1	13.5	32.5	121	180	220	521
11-17	2	14.5	32.5	134	180	220	534
18-24	3	14.0	31.3	134	153	220	507
Feb 25-Mar 3	4	14.0	32.1	134	153	220	507
Mar 4-10	5	14.5	32.5	134	0	220	354
11-17	6	15.5	31.5	134	0	220	354
18-24	7	15.0	30.6	134	0	220	354
25-31	8	16.5	30.9	134	0	220	354
Apr 1- 7	9	17.0	31.8	134	0	220	354
8-14	10	17.0	31.7	129	0	220	349
15-21	11	17.0	31.9	121	0	220	341
22-28	12	16.0	32.7	127	0	188	315
Apr 29-May 5	13	17.0	32.4	108	0	220	328
May 6-12	14	16.0	31.1	134	0	0	134
13-19	15	16.5	32.2	134	0	0	134
20-26	16	18.0	32.0	134	13	0	147
May 27-Jun 2	17	19.0	32.3	134	0	0	134
Jun 3- 9	18	18.5	32.6	128	27	220	375
10-16	19	20.5	33.0	134	27	215	376
17-23	20	20.0	32.5	97	27	220	344
24-30	21	21.5	32.8	88	0	220	308
Jul 1- 7	22	20.5	32.6	76	0	220	296
8-14	23	21.0	32.7	82	27	220	329
15-21	24	19.5	32.4	134	153	220	507
22-28	25	21.0	32.4	114	180	220	514
Jul 29-Aug 4	26	20.0	32.3	134	180	220	534
Aug 5-11	27	22.5	32.5	134	180	220	534
12-18	28	22.0	32.5	127	180	220	527
19-25	29	20.5	32.4	133	180	188	501
Aug 26-Sep 1	30	21.0	32.2	134	180	188	502
Sep 2- 8	31	21.0	32.7	134	180	220	534
9-15	32	20.5	32.6	134	129	220	483
16-22	33	21.0	32.6	134	153	210	497
23-29	34	19.5	32.6	134	153	220	507
Sep 30-Oct 6	35	16.5	32.8	134	153	220	507
Oct 7-13	36	17.5	32.7	134	180	220	534
14-20	37	18.0	32.7	134	180	220	534
21-27	38	17.5	32.7	134	180	220	534
Oct 28-Nov 3	39	14.5	32.8	134	180	220	534
Nov 4-10	40	16.0	32.7	134	180	220	534
11-17	41	15.0	32.7	134	180	220	534
18-24	42	11.5	32.8	134	180	220	534
Nov 25-Dec 1	43	14.0	32.8	127	180	220	527
Dec 2- 8	44	14.0	32.8	134	180	220	534
9-15	45	14.5	33.0	134	171	220	525
16-22	46	15.0	32.8	134	180	220	534
23-29	47	14.0	32.6	134	13	220	367
Dec 30-Jan 4	48	12.5	32.7	134	171	220	525