Los Peñasquitos Creek

FINAL REPORT

1999 – 2000 CITY OF SAN DIEGO AND CO-PERMITTEE NPDES STORMWATER MONITORING PROGRAM REPORT

Prepared for
The City of San Diego
Engineering & Development Department
1010 Second Avenue, Suite 500
San Diego, CA 92101

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URS Greiner Woodward Clyde

1615 Murray Canyon Road, Suite 1000
San Diego, CA 92108-4314
619-294-9400 Fax: 619-293-7920

In association with:

APPL, Inc.
California Watersports
D-TEK Environmental Testing Laboratory
MBC Applied Environmental Sciences
MGD Technologies, Inc.
Motile Laboratory Services
University of Washington
Weatherwatch Services

Hedionda stations to identify water-borne pathogens. In addition, sediment samples were collected within a public access point in the lagoon to assess the bacteria trapped in the sediment and possibly available for resuspension. A new quality assurance/quality control procedure (QA/QC) was established and implemented for bacteria samples to assess possible contamination.

Finally, in response to TMDL issues concerning diazinon and chlorpyrifos in urban runoff, an Insecticide Use Survey was created and distributed to 5,000 households and posted on the County of San Diego web site to assess trends of purchase, use, and disposal.

1.3 OVERVIEW OF SCOPE OF WORK

URSGWC provided storm water monitoring services for the co-permittees during the seventh year of the wet-weather monitoring program (1999/2000). The 1999/2000 monitoring program consisted of the following sampling services:

- Pre- and post season sediment sampling at Chollas Creek and San Diego Bay locations. These locations have been monitored since wet-weather monitoring season 1994/95.
- Chemical water quality monitoring during three storm events at five mass loading stations throughout San Diego County, AH1-Agua Hedionda, SV1-Sorrento Valley, SD13-California, SD5-Tecolote, SD8-Chollas. The mass loading stations represent large areas of the County that drain into important receiving waters. Stations SD5-Tecolote and SD8-Chollas have been monitored since the start of the wet-weather monitoring program in 1993/94. Stations SD13-California and SV1-Sorrento Valley were added to the program in 1996/97. Station AH1-Agua Hedionda was added to the program in 1998/99, concurrently with the bacteria monitoring program.
- Bacteria monitoring during three storm events at two creek monitoring stations, AH-Co and AH-Re, and two stations representing direct inputs to the creeks, AH-Coc and AH-Rec, for a total of four stations in the Agua Hedionda watershed. Stations AH-Co and AH-Re were monitored for bacteria in 1998/99. Stations AH-Coc and AH-Rec were added to the program in 1999/2000.
- Pathogen monitoring during three storm events at four creek monitoring stations, AH-Os, AH-Co, AH-Re, and AH1, and two stations representing direct inputs to the creeks, AH-Coc and AH-Rec, for a total of six stations in the Agua Hedionda watershed. Two of the creek stations monitored for pathogens, AH-Co and AH-Re, and the two stations representing direct inputs to the creeks, AH-Coc and AH-Rec, were also monitored for bacteria. One of the creek stations, AH1, monitored for pathogens was also monitored as a mass loading station.
- Post storm event bacteria and pathogen monitoring at three sampling transect locations, AH-L, AH-Lc, and AH-Lm, in Agua Hedionda Lagoon. This monitoring was performed one day and seven days after the first and third storm events that bacteria monitoring in creek and creek input stations was performed. This monitoring was not conducted following the second bacteria monitoring event because rain occurred one day and seven days following the event. Station AH-L was monitored for bacteria in 1998/99. Stations AH-Lc and AH-Lm were added to the program in 1999/2000.

Table 5-1
CONVENTIONAL, BIOLOGICAL AND ORGANIC COMPOUNDS AT MASS LOADING STATIONS (AH1, SD5, SD8, SD13, SV1), 1999/2000

Parameter	Units	AH1			SV1			SD5			SD8			SD13		
		1/25/00	2/20/00	3/5/00	1/25/00	3/5/00	4/17/00	2/12/00	2/20/00	3/5/00	2/12/00	2/20/00	3/5/00	2/12/00	2/20/00	3/5/00
Grab Samples General/Physical/Organic																
Field pH	units	8.3	7.7	8.0	8.3	8.6	--	7.6	7.7	8.1	7.9	8.6	8.3	8.3	8.4	9.0
Oil and Grease	mg/l	3.24	3.54	2.28	2.98	2.54	2.10	4.16	1.56	2.96	1.92	2.04	1.48	1.76	1.76	5.60
Electrical Conductivity	umhos/cm	2160	1172	1194	463	312	120	746	823	792	186	187	185	118	107	98.0
Bacteriological																
Total Coliform	mpn/100ml	>1600	>1600	300	--	>1600	300	240	>1600	900	500	>1600	>1600	>1600	>1600	>1600
Fecal Coliform	mpn/100ml	>1600	>1600	<2.0	--	>1600	240	<2.0	>1600	<2.0	<2.0	>1600	>1600	>1600	>1600	>1600
Fecal Streptococci	mpn/100ml	>1600	>1600	<2.0	--	>1600	23.0	<2.0	>1600	<2.0	<2.0	>1600	>1600	<2.0	>1600	>1600
Composite Samples Inorganic - Wet Chemistry																
Laboratory pH	units	7.50	7.30	7.51	6.73	6.75	7.06	7.50	7.10	7.50	7.52	6.90	7.20	7.50	7.02	7.03
Biochemical Oxygen Demand	mg/l	6.00	2.98	6.60	17.7	3.30	3.00	11.7	2.38	5.70	7.80	2.54	6.10	7.60	5.25	5.00
Chemical Oxygen Demand	mg/l	70	66	41	141	28	42	74	60	36	41	104	57	50	48	35
Nitrate - nitrogen	mg/l	1.60	1.42	1.58	3.50	2.33	2.33	3.30	0.60	2.30	3.22	1.04	3.10	2.67	1.24	2.32
Nitrite - nitrogen	mg/l	0.057	<0.050	<0.050	0.280	<0.050	0.070	0.065	<0.050	<0.050	0.086	<0.050	<0.050	0.064	<0.050	<0.050
Ammonia as Nitrogen	mg/l	0.40	<0.10	0.11	3.6	0.29	1.21	1.57	<0.10	<0.10	1.65	<0.10	0.21	1.28	0.11	<0.10
Total Kjeldahl Nitrogen	mg/l	0.85	4.02	2.11	0.28	0.52	0.80	2.10	0.77	1.83	2.98	3.10	2.36	3.70	2.26	2.61
Dissolved Phosphorous	mg/l	0.12	0.22	<0.01	0.23	<0.01	<0.01	<0.01	0.13	<0.01	0.33	0.26	0.22	0.45	0.32	0.18
Total Phosphorous	mg/l	0.16	1.04	0.74	0.21	0.31	0.06	0.21	0.34	0.40	0.46	0.33	0.60	0.51	0.39	0.20
Total Hardness	mg/l CaCO3	52.2	155	35.3	44.6	21.0	26.0	216	126	105	40.9	35.1	45.5	44.3	35.3	25.0
Total Dissolved Solids	mg/l	1356	335	362	372	69	133	279	304	302	120	111	140	132	116	117
Total Suspended Solids	mg/l	65	134	286	53	174	34	478	80	87	457	62	200	45	39	42
Turbidity	ntu	22	52	58	30	25	13	17	63	60	50	27	38	18	32	35
Surfactants (MBAS)	mg/l	0.33	0.21	0.08	1.49	0.13	0.60	0.48	0.24	0.20	0.35	0.22	0.13	0.47	0.44	0.14
Organophosphate Pesticides																
Diazinon	µg/l	<0.50	0.47**	0.29	<0.50	<0.05	<0.50	0.30*	0.39**	0.18	0.27*	0.35**	0.20**	0.43*	0.48**	.08
Chlorpyrifos	µg/l	<0.50	<0.50	<0.05	<0.50	<0.05	<0.50	<0.50	<0.50	<0.05	<0.50	<0.50	0.04*	<0.50	<0.50	<0.05

Asterisk (*) indicates an estimated value that is below quantification limit. Double asterisk (**) indicates the percent difference between primary and confirmation columns is greater than 40%.

Table 5-2
DISSOLVED METAL, TOTAL METAL, AND HARDNESS DATA SUMMARY — MASS LOADING STATIONS (AH1, SD5, SD8, SD13, SV1), 1999/2000

	AH1			SV1			SD5			SD8			SD13		
PARAMETER	1/25/00	2/20/00	3/5/00	1/25/00	3/5/00	4/17/00	2/12/00	2/20/00	3/5/00	2/12/00	2/20/00	3/5/00	2/12/00	2/20/00	3/5/00
TOTAL HARDNESS (mg/l $CaCO_3$)	52.2	155	35.3	44.6	21.0	26.0	216	126	105	40.9	35.1	45.5	44.3	35.3	25.0
TOTAL METALS (µg/l)															
ANTIMONY	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5
ARSENIC	<1.0	18.0	7.0	<1.0	<1.0	<1.0	<1.0	6.0	9.0	<1.0	7.0	5.0	<1.0	5.0	3.0
CADMIUM	<0.25	1.0	0.25	<0.25	<0.25	<0.25	<0.25	1.0	<0.25	<0.25	2.0	<0.25	2.0	1.0	<0.25
CHROMIUM	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
COPPER	<5.0	54.0	20.0	40.0	10.0	<5.0	36.0	17.0	<5.0	29.0	16.0	14.0	33.0	17.0	<5.0
LEAD	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	27.0	<1.0	<1.0	15.0	<1.0	<1.0	15.0	<1.0	<1.0
NICKEL	<5.0	50.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
SELENIUM	<1.0	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
ZINC	10.0	110.0	50.0	110.0	80.0	110.0	160.0	12.0	50.0	96.0	50.0	80.0	110.0	94.0	60.0
DISSOLVED METALS (µg/l)															
ANTIMONY	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5
ARSENIC	<1.0	11.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	5.0	<1.0	1.0	4.0	<1.0
CADMIUM	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
CHROMIUM	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
COPPER	<5.0	<5.0	<5.0	38.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
LEAD	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
NICKEL	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
SELENIUM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
ZINC	10.0	<1.0	5.0	70.0	9.0	40.0	16.0	12.0	<1.0	19.0	28.0	8.0	19.0	53.0	9.0

Table 5-2
TOTAL METAL AND HARDNESS DATA SUMMARY — MASS LOADING STATIONS (AH1, SD5, SD8, SD13, SV1), 1998/99

Metals Results 1997/98		AH1			SD5			SD8			SD13			SV1		
		11/8/98	1/31/99	3/15/99	11/8/98	1/25/99	3/15/99	11/8/98	1/25/99	3/15/99	11/8/98	1/25/99	3/15/99	11/8/98	1/25/99	3/15/99
Arsenic	mg/l	0.008	<0.001	<0.001	0.004	0.0015	0.002	0.006	0.0018	0.003	<0.001	<0.001	0.006	0.006	0.0012	0.002
Cadmium	mg/l	0.007	<0.00025	<0.00025	0.004	<0.00025	<0.00025	0.002	<0.00025	<0.00025	0.0069	<0.00025	<0.00025	0.016	<0.00025	<0.00025
Chromium	mg/l	<0.005	<0.005	0.12	<0.005	0.009	0.056	<0.005	0.015	0.035	<0.005	0.019	0.07	<0.005	0.023	0.02
Copper	mg/l	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	<0.005	0.015	<0.005	<0.005	0.10	<0.005	<0.005	0.022
Nickel	mg/l	0.03	<0.005	0.01	0.02	<0.005	0.009	0.04	0.028	0.016	0.03	0.048	0.029	0.006	0.088	0.018
Lead	mg/l	<0.001	<0.001	0.0017	0.04	0.003	0.023	<0.001	0.007	0.082	0.009	0.006	0.145	0.01	0.009	0.039
Antimony	mg/l	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	0.003	0.0019	<0.0015	<0.0015	<0.0015	<0.0015
Selenium	mg/l	<0.001	<0.001	<0.001	0.004	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	0.005	<0.001	<0.001
Zinc	mg/l	0.03	0.194	0.035	<0.025	<0.025	0.071	0.03	0.048	0.21	0.06	0.036	0.51	<0.025	<0.025	0.15
Total hardness	mg/l	137	365	568	148	218	277	77	42.5	90.8	32.9	24.5	130	151	41.0	102

Table 5-1
CONVENTIONAL, BIOLOGICAL AND ORGANIC COMPOUNDS AT MASS LOADING STATIONS (AH1, SD5, SD8, SD13, SV1), 1998/99

Mass Loading Stations		AH1			SD5			SD8			SD13			SV1		
Conventional/Biological/ Organic Constituents	Units	11/8/98	1/31/99	3/15/99	11/8/98	1/25/99	3/15/99	11/8/98	1/25/99	3/15/99	11/28/98	1/25/99	3/15/99	11/8/98	1/25/99	3/15/9
Laboratory pH	pH units	7.58	7.95	8.47	7.55	7.39	7.99	7.19	6.98	7.00	6.88	6.66	6.46	7.63	7.36	7.11
Electrical conductivity	µmhos/cm	652	1560	2270	6070	629	542	286	270	215	451	221	136	2.03	-	141
Total hardness	mg/l	137	365	568	148	218	277	77	42.5	90.8	32.9	24.5	130	151	41.0	102
Total suspended solids	mg/l	979	35.0	5.0	913	540	55.0	7.58	280	159	<1.0	164	372	349	276	116
Total dissolved solids	mg/l	853	892	1611	1492	563	660	249	125	222	111	97.0	407	1624	125	249
Turbidity	NTU	72.0	8.0	14.0	84.0	450	17.0	69	38.0	21.0	10.0	22.0	68.0	22.0	40.0	26.0
Biochemical oxygen demand	mg/l	20	<3.0	5.25	30.0	5.0	9.0	19.0	6.0	11.0	<3.0	<3.0	24.0	37.0	4.0	11.0
Chemical oxygen demand	mg/l	34.0	<5.0	21.0	61.0	33.0	33.0	59.0	41.0	85.0	38	32	160	39.0	19.0	59.0
Total coliform	MPN/100ml	>241900	8130	197000	>241900	125900	613000	>241900	298700	>2419000	344800	307600	>2419000	141360	-	9800(
Fecal coliform	MPN/100ml	>1600	240	>1600	>1600	>1600	>1600	>1600	>1600	>1600	>1600	>1600	>1600	>1600	-	>160(
Fecal streptococci	MPN/100ml	50	8	130	<1	>1600	240	30	>1600	240	240	>1600	240	30	-	130
Oil and grease	mg/l	0.67	<0.5	0.6	0.7	<0.5	<0.5	1.29	1.56	0.95	4.6	0.9	<0.5	1.11	-	<0.5
Surfactants (MBAS)	mg/l	0.25	0.07	<0.05	0.51	0.08	<0.05	0.48	0.19	0.07	0.15	0.12	0.17	0.21	0.19	0.16
Total Kjeldahl nitrogen	mg/l	<0.01	0.44	2.8	0.12	2.93	1.85	0.44	1.25	3.61	2.10	0.94	5.62	<0.01	0.16	1.70
Nitrate-nitrogen	mg/l	2.1	0.86	1.10	0.52	0.70	0.53	1.1	0.98	0.44	1.70	1.10	0.45	1.96	0.93	0.98
Nitrite – nitrogen	mg/l	<0.05	<0.05	<0.05	0.10	<0.05	0.05	0.06	0.12	0.14	0.19	0.07	<0.05	0.12	0.07	<0.0
Ammonia as nitrogen	mg/l	0.3	0.15	0.21	0.6	0.57	0.51	1.00	0.78	1.06	0.94	0.79	2.28	0.3	0.71	0.79
Total phosphorus	mg/l	0.72	0.13	0.12	0.61	0.16	0.16	1.28	0.3	0.17	0.46	0.33	0.32	1.61	0.09	0.08
Dissolved phosphorus	mg/l	0.57	0.12	0.10	0.52	0.15	0.10	1.07	0.27	0.22	0.41	0.34	0.18	1.39	0.09	0.08
Diazinon	µg/l	0.16	<0.50	0.38	0.40	0.28	0.41	0.46	0.46	0.53	0.72	0.47	0.79	0.23	<0.50	<0.5
Chlorpyrifos	µg/l	<0.05	-	<0.50	<0.05	-	<0.50	0.10	-	<0.50	-	-	<0.50	<0.05	-	<0.5

Table 5-5
CONVENTIONAL, BIOLOGICAL AND ORGANIC COMPOUNDS AT MASS LOADING STATIONS (SD5, SD8, SD13, SV1), 1997/98

Mass Loading Stations		SD5			SD8			SD13			SV1		
Conventional/Biological/Organic Constituents	**Units**	**11/10/97**	**12/6/97**	**3/25/98**	**11/10/97**	**12/6/97**	**3/14/98**	**11/10/97**	**11/26/97**	**2/3/98**	**11/10/97**	**11/26/97**	**2/3/98**
Laboratory pH	pH units	7.35	7.82	7.27	6.97	7.56[e]	6.70[e]	6.35[e]	7.10	6.70	7.41	8.90	7.19
Electrical conductivity	µmhos/cm	1130	1690	726	310	155	1146	732	337	61	—	259	62
Total hardness	mg/l	694	186	124	116	39	96.4	44.2	16.5	14.4	46.3	52.0	54.7
Total suspended solids	mg/l	410	503	2024	182	315	805	350	140	198	164	258	348
Total dissolved solids	mg/l	1730	447	318	374	250	344	167	92	98	154	180	214
Turbidity	NTU	160	27	96	90	29	24	62	71	43	63	68	392
Biochemical oxygen demand	mg/l	33	43	22	49	24	40[e]	39	62	4	15	52	15
Chemical oxygen demand	mg/l	89	20	22	146	44	135	85	100	17	124	87	22
Total coliform	MPN/100ml	>160,000	>20,000	>20,000	>160,000	>20,000	—	>160,000	>20,000	>20,000	—	>20,000	16,500
Fecal coliform	MPN/100ml	160,000	3,640	8,850	>160,000	9,450	—	90,000	10,900	9,450	—	3,640	420
Fecal streptococci	MPN/100ml	160,000	16,000[e]	50	>160,000	16,000[e]	—	160,000[e]	230	170	—	2,400	1,600
Oil and grease	mg/l	3.6	1.6	0.6	6.9	<0.5	4.56	2.9	1.3	<0.5	—	<0.5	<0.5
Total petroleum hydrocarbons (TPH)	mg/l	—	—	—	—	—	—	—	—	—	—	—	—
Surfactants (MBAS)	mg/l	<0.10	0.05	0.20	<0.10	0.07	0.66[e]	0.14	0.062	<0.05	0.10	0.112	0.08
Total Kjeldahl nitrogen	mg/l	1.6	<1.0	1.1	1.6	<1.0	15.0	1.5	1.41	1.6	0.95	1.32	<1.0
Nitrate-nitrite as nitrogen	mg/l	1.7	—	—	3.5	—	—	2.8	—	—	2.3	—	—
Nitrate-nitrogen	mg/l	—	0.54	0.5	—	0.52	0.4	—	1.0	0.5	—	1.5	0.3
Nitrite - nitrogen	mg/l	—	0.06	0.05	—	0.08	<0.05	—	<0.05	<0.05	—	0.05	<0.05
Ammonia as nitrogen	mg/l	0.56	0.57	0.60	1.3	0.4	10.0	0.55	1.09	<0.5	1.3	0.80	<0.5
Total phosphorus	mg/l	0.70	0.12	0.23	0.7	<0.10	2.2	0.90	0.70	0.36	0.30	0.273	0.25
Dissolved phosphorus	mg/l	<0.10	0.10	0.12	0.40	<0.10	1.41	0.50	0.54	0.21	0.10	0.15	0.12
Total cyanide	mg/l	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	—	<0.02	<0.02
Bis (2-ethylhexyl) phthalate*	µg/l	15[e]	24.7	13.3	24[e]	8.72	37.5	—	94.5	10.9	—	14.7	9.98
Butyl benzyl phthalate	µg/l	<10[e]	<2.5	2.51	<10[e]	<2.5	13.3	—	29.3	<2.5	—	12.8	<2.5
Di-n-butyl phthalate	µg/l	<10[e]	37.5	42.7	<10[e]	34.6	15.9	—	49.8	55.7	—	69.5	43.8

* Bis (2-ethylhexyl) phthalate was detected in a field equipment blank taken prior to the start of the wet-weather monitoring season. Since this compound was detected in the blank, levels present in the stormwater should be considered as non-detect at an elevated level.

e. Estimated result due to sample holding time exceedence.

Table 5-8
TOTAL METAL AND HARDNESS DATA SUMMARY — INDUSTRIAL SITES (SC2, NC3, SD11), 1997/98

Metals Results 1997/98		NC3			SC2			SD11		
		11/26/97	12/6/97	3/14/98	11/10/97	12/6/97	2/3/98	11/10/97	11/26/97	2/3/98
Silver	µg/l	<7	<7	<7	<5	<7	<7	<5	<7	<7
Arsenic	µg/l	<53	<53	<53	<1	<53	<53	5	<53	<53
Beryllium	µg/l	<0.3	<0.3	<0.3	<2	<0.3	<0.3	<2	<0.3	<0.3
Cadmium	µg/l	<4	<4	<4	0.60	<4	<4	0.70	<4	<4
Chromium	µg/l	<7	<7	18	<5	<7	22	<5	12	<7
Copper	µg/l	42	38	60	28	36	43	96	128	37
Aqueous Mercury	µg/l	<2	<2	<2	<0.5	<2	<2	<0.5	<2	<2
Nickel	µg/l	31	43	<15	11	39	<15	16	24	<15
Lead	µg/l	<42	<42	151	2	<42	<42	5	<42	<42
Antimony	µg/l	<32	<32	<32	2.7	<32	<32	<1.5	<32	<32
Selenium	µg/l	<75	<75	<75	1	<75	<75	<1	<75	<75
Thallium	µg/l	<40	<40	<40	<2	<40	<40	<2	<40	<40
Zinc	µg/l	204	214	81	543	482	149	606	876	190
Hardness	µg/l	67.0	148.0	221.0	50.0	18.0	35.9	66.7	39.0	16.1

Table 5-9
TOTAL METAL AND HARDNESS DATA SUMMARY — MASS LOADING STATIONS (SD5, SD8, SD13, SV1), 1997/98

Metals Results 1997/98		SD5			SD8			SD13			SV1		
		11/10/97	12/6/97	3/25/98	11/10/97	12/6/97	3/14/98	11/10/97	11/26/97	2/3/98	11/10/97	11/26/97	2/3/98
Silver	µg/l	<5	<7	<7	<5	<7	<7	<5	<7	<7	<5	<7	<7
Arsenic	µg/l	1	<53	<53	2	<53	<53	<1	<53	<53	2	<53	<53
Beryllium	µg/l	<2	<0.3	<0.3	<2	<0.3	<0.3	<2	<0.3	<0.3	<2	<0.3	<0.3
Cadmium	µg/l	<0.25	<4	<4	0.30	<4	<4	<0.25	<4	<4	<0.25	<4	<4
Chromium	µg/l	<5	<7	19	<5	<7	11	<5	16	24	<5	11	23
Copper	µg/l	9	56	146	17	28	28	35	61	37	14	50	30
Aqueous Mercury	µg/l	<0.5	<2	<2	<0.5	<2	<2	<0.5	<2	<2	<0.5	<2	<2
Nickel	µg/l	<5	<15	<15	9	<15	<15	6	38	<15	5	27	<15
Lead	µg/l	<1	<42	<42	3	<42	95	5	<42	<42	1	<42	<42
Antimony	µg/l	<1.5	<32	<32	1.6	<32	<32	<1.5	<32	<32	<1.5	<32	<32
Selenium	µg/l	<1	<75	<75	1	<75	<75	<1	<75	<75	1	<75	<75
Thallium	µg/l	<2	<40	<40	<2	<40	<40	<2	<40	<40	<2	<40	<40
Zinc	µg/l	69	68	130	176	11	92	176	329	70	129	189	67
Hardness	µg/l	694.0	186.0	124.0	116.0	39.0	96.4	44.2	16.5	14.4	463	52.0	54.7

Tecolote Creek

STATION	METHOD	PARAMETER	UNITS	SAMPLE DATE 11/8/98	1/25/99	3/15/99
		GRAB SAMPLES				
		GENERAL/PHYSICAL/ORGANIC				
SD5		TEMPERATURE	C	NM		
SD5		pH	UNITS	7.46	7.14	6.49
SD5	EPA 413.2	OIL AND GREASE	MG/L	0.70	< 0.5	< 0.5
SD5	SM 2510-B	ELECTRICAL CONDUCTIVITY	UMHOS/CM	6070	629	542
		BACTERIOLOGICAL				
SD5	9221B/MMO-MUG	TOTAL COLIFORM	MPN/100ML	241900	125900	613000
SD5	9221E/MMO-MUG	FECAL COLIFORM	MPN/100ML	> 1600	> 1600	> 1600
SD5	9230	FECAL STREPTOCOCCI	MPN/100ML	< 1	> 1600	240
		COMPOSITE SAMPLES				
		INORGANIC - WET CHEM				
SD5	SM 5210-B	BOD	MG/L	30.0	5.0	9.0
SD5	SM 5220-C	CHEMICAL OXYGEN DEMAND	MG/L	61.0	33.0	33.0
SD5	SM 2340-B	TOTAL HARDNESS	MG/L	148	218	277
SD5	SM 5540-C	SURFACTANTS (MBAS)	MG/L	0.51	0.08	< 0.05
SD5	SM 4500 NH_3-C	AMMONIA AS NITROGEN	MG/L	0.6	0.57	0.51
SD5	SM 4500 NO_3-E	NITRATE-N	MG/L	0.52	0.70	0.53
SD5	SM 4500 NO_2-B	NITRITE-N	MG/L	0.10	< 0.05	0.05
SD5	SM 4500 P-E	DISSOLVED PHOSPHOROUS	MG/L	0.52	0.15	0.10
SD5	SM 4500 P-E	TOTAL PHOSPHORUS	MG/L	0.61	0.16	0.16
SD5	SM 4500 H-B	pH	UNITS	7.55	7.39	7.99
SD5	SM 2540-C	TOTAL DISSOLVED SOLIDS	MG/L	1492	563	660
SD5	SM 4500 NH_3-C	TOTAL KJELDAHL NITROGEN	MG/L	0.12	2.93	1.85
SD5	SM 2540-D	TOTAL SUSPENDED SOLIDS	MG/L	913	540	55.0
SD5	SM 2130 B	TURBIDITY	NTU	84.0	45.0	17.0
		INORGANIC - METALS				
SD5	EPA 200.7	ARSENIC	MG/L	0.004	0.0015	0.002
SD5	EPA 200.7	CADMIUM	MG/L	0.004	< 0.00025	< 0.00025
SD5	EPA 200.7	CHROMIUM	MG/L	< 0.005	0.009	0.056
SD5	EPA 200.7	COPPER	MG/L	< 0.005	< 0.005	< 0.005
SD5	EPA 200.7	NICKEL	MG/L	0.02	< 0.005	0.009
SD5	EPA 200.7	LEAD	MG/L	0.04	0.003	0.023
SD5	EPA 200.7	ANTIMONY	MG/L	< 0.0015	< 0.0015	< 0.0015
SD5	EPA 200.7	SELENIUM	MG/L	0.004	< 0.001	< 0.001
SD5	EPA 200.7	ZINC	MG/L	< 0.025	< 0.025	0.071
		ORGANOPHOSPHATE PESTICIDES				
SD5	EPA 8141	DIAZINON	UG/L	0.40	0.28	0.41
SD5	EPA 8141	CHLORPYRIFOS	UG/L	< 0.05	--	< 0.50

.05 mg/L

City of San Diego NPDES Co Permittee

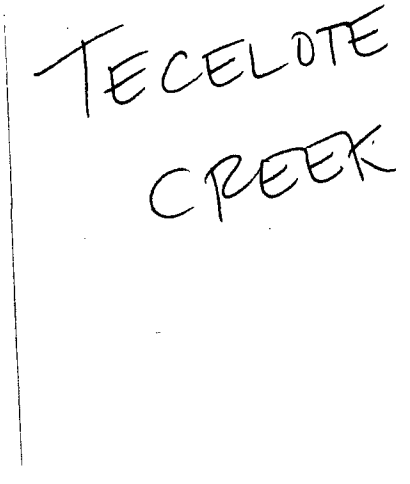
Marine Studies Research Abstract

WATER QUALITY OF TECOLOTE CANYON CREEK

Josh Garcia, Marine and Environmental Studies

Dr. Michel Boudrias, Department of Marine & Environmental Studies, USD

The Goal of my research project is to quantify the water chemistry of Tecolote Creek. This is important because during rain, excess urban run-off and non-point source pollution enter the creek and eventually Mission Bay. Water is samples weekly from four sites along the creek and analyzed for heavy metal and nutrient concentrations. Our preliminary results show dramatic differences in water quality between wet and dry periods. Future work will include a biological study of the creek and of Mission Bay.



University of San Diego
Marine & Environmental Studies Program
Graduate Students

The graduate student theses title is followed by the Graduate Committee Chair.

Amy Bergen

Email: abergen@acusd.edu

Thesis Title: Tissue metabolism and metabolic rates in the Eared Grebe (*Podiceps nigricollis*). (J. Jehl, Hubbs)

Diolinda Brickman

Email: diolinda@acusd.edu

Thesis Title: A three dimensional view of coastal upwelling. (A. Sturz, U.S.D., Marine Science)

Gabriel J. Buhr

Email: gbuhr@acusd.edu

Thesis Title: The effects of exercise conditioning on muscle growth and development in juvenile white seabass, Atractoscion nobilis.

Mary Frances Cullen

Email: mfcullen@aol.com

Thesis Title: Biochemical indicators of physiological condition of the Antarctic krill, Euphausia superba.

Geoffrey J. Daly

Email: gdaly@acusd.edu

Thesis Title: Do anthropogenically induced nutrients affect Porites lobata coral growth? Comparing a historic record of nutrient input to coral growth skeletal chemistry.

Benjamin J. Duehr

Email: bduehr@acusd.edu

Thesis: Copper induced zooxanthellae bleaching in the anemone *Anthopleura elegantissima*. (Michel Boudrias, U.S.D., Marine Science)

Kathleen Dykes

Email: lafayettek@aol.com

Thesis: Investigation of hydrothermal activity at Deception Island, Antarctica. (A. Sturz, U.S.D., Marine Science)

David Escamilla

Email: davide@acusd.edu

Thesis Title: An evaluation of the hydrothermal origin of the Fish Creek Gypsum, Imperial County, California. (A. Sturz, U.S.D., Marine Science)

Matthew Fripp

Email: mfripp@acusd.edu

Thesis: Metabolic Rates of the Green Heron, Butorides striatus, Black-crowned Night Heron, Nycticorax nycticoras, and Reddish Egret, Egretta rufescens.

Valerie R. Greenslade

Email: vcozby@acusd.edu

Thesis Title: Foraging Ecology of the Pacific Harbor Seals and California Sea Lions Inhabiting the Channel Islands, California.

Joshua A. Gregory

Email: jgregory@acusd.edu

Thesis: The Function of the Pericardium, the Pericardioperitioneal Canal and the Dynamics of Ventricular Filling Patterns in Chondrostean Fishes.

Brian Head

Email: bhead@acusd.edu

Thesis Title: Effects of diet on trimethylamine oxide levels in marine elasmobranchs. (N.C. Lai, U.C.S.D.)

Damian Head

Email: dhead@acusd.edu

Thesis Title: Osmoregulation of the Salton Sea Mollie. (R. Gonzalez, U.S.D., Biology)

Todd W. Ison

Email: tison@acusd.edu

Thesis Title: Hyperiid amphipod abundance and assemblage composition following the 1997-1998 ENSO in the Baja California region of the eastern North Pacific Ocean.

Elizabeth Johnson

Email: johnsone@acusd.edu

Thesis Title:

Jack Kittinger

Email: jkitt@acusd.edu

Thesis: Effects of Urban Runoff on Zooplankton Community Diversity in Mission Bay, San Diego.

Cherylann Kurtz

Email: ckurtz@acusd.edu

Thesis Title: The relationship of copper, lead, and zinc contamination in the sediments of San Diego Bay to the eelgrass (*Zostera marina*) at two sites with different flow regimes. (A. Sturz, U.S.D., Marine Science)

Lisa Louie

Email: llouie@acusd.edu

Thesis: California Halibut Within Two Southern California Salt Marsh Systems.

Jonathan Nelson

Email: nelson3@acusd.edu

Thesis Title: Local habitat distribution and utilization of whale shark (Rhincodon typus) within Bahia de Los Angeles, Sea of Cortez, Mexico

Karen Plues

Email: kplues@acusd.edu

Thesis Title: Habitat requirements and utilization by whale sharks (*Rhincodon typus*) within Bahia de Los Angeles, Baja California Norte, Mexico. (S. Eckert, Hubbs)

John Poland

Email: jpoland@acusd.edu

Thesis Title: The ecology of shallow-water hydrothermal vents at White Point, Southern California. (R. Kaufmann, U.S.D., Marine Science)

Hiram Sarabia-Ramirez

Email: hsarabia@acusd.edu

Thesis Title: Patterns in the structure and composition of benthic invertebrate communities along a gradient of eutrophication in Bahia Magdalena, B.C.S., Mexico. (M. Boudrias, U.S.D., Marine Science)

Jeffrey Smiley

Email: batoidea@san.rr.com

Thesis Title: The Effects of Gas Saturation Levels on Larval and Juvenile White Seabass, Atractoscion nobilis

James Swaney

Email: jswaney@acusd.edu	**Thesis Title:** The effects of temperature and ration on growth of the white seabass, *Atractoscion nobilis*. (S. Lowery, U.S.D., Biology).

Shannon L. Turnbull

Email: turnbull@acusd.edu	**Thesis Title:** The factors controlling emergence of leatherback sea turtle *(Dermochelys coriacea)* hatchlings from the nest cavity.

Back to Marine & Environmental Studies Home Page

18. FOR PROP 13 PROJECTS, IDENTIFY THE NPS MANAGEMENT MEASURE(S) THAT THE PROPOSED PROJECT WILL IMPLEMENT AND DESCRIBE HOW YOU WILL BE ABLE TO TRACK OR ACCOUNT FOR THE IMPLEMENTATION OF THESE MEASURES.

The proposed Watershed Evaluation will provide data on the impacts resulting from various land uses. These data will be used to support the implementation of pollution prevention or source reduction practices that are consistent with the *Plan for California's NPS Pollution Control Program*. Specific management measures that ultimately will be employed include management of urban and storm water runoff from existing and new development, marinas and recreational boating activities, as well as pesticide management. The proposed project also will implement public education to raise awareness of the region's water quality issues.

19. WHAT CAPABILITY OR COMMITMENTS DOES THE APPLICANT HAVE TO ENSURE THAT THE PROJECT WILL BE COMPLETED?

The **University of San Diego's** Marine and Environmental Studies (MES) Program includes faculty with extensive expertise in the design and execution of marine ecological research. The proposed project will involve three USD faculty members, two from the MES Program and one from the Department of Chemistry, and three undergraduate and two graduate students who will be fully trained in the collection and analysis of organisms from Mission Bay. USD's project coordinator will be ***Dr. Ronald Kaufmann***, who received his Bachelor of Science degree *summa cum laude* in Biology (emphasis in Ecology and Behavioral Biology) from the University of Minnesota in 1985 and his Ph.D. in Marine Biology from the Scripps Institution of Oceanography (SIO), University of California, San Diego, in 1992. His research background includes both pelagic and benthic ecology in environments ranging from coastal bays to the open ocean. He has conducted research and carried out class research projects on sediment and water quality as they relate to the pelagic and benthic communities in Mission Bay since coming to USD in 1997. ***Dr. Michel Boudrias*** of the MES Program received his Bachelor of Science degree with Great Distinction in Marine Biology from McGill University in 1983. He earned a Master of Science degree in Biological Oceanography at Oregon State University, working on the benthic ecology of Arctic habitats. He completed his Doctorate in Oceanography at SIO in 1992, where he was part of a research team that studied the community ecology of deep-sea hydrothermal vents. For the past five years he has been studying the water quality and biological communities of Tecolote Creek with his undergraduate students at USD. ***Dr. James Bolender*** obtained his Bachelor of Arts degree in Chemistry and Physics from Wittenberg University in 1988 and his Ph.D. in Chemistry from the University of Virginia in 1994. Dr. Bolender was a postdoctoral research associate in the Department of Chemistry at the Pennsylvania State University from 1994 until 1996 when he joined the faculty of the Chemistry Department at USD. Along with Dr. Boudrias, Dr. Bolender is a co-investigator on a Trans-Border Institute funded study of chemical sources and ecological impacts of pollution in Bahia Magdelena, Baja California, Sur.

AMEC is a leading international provider of environmental services and engineering solutions with more than 300 offices across Canada and the United States. Recently Ogden Environmental and Energy Services Inc. merged with AMEC and subsequently acquired its name. AMEC's Bioassay Laboratories and Aquatic Sciences Group employ highly talented teams of experienced scientists dedicated to producing the highest quality bioassay testing and risk assessment studies available. The AMEC Bioassay Unit consists of two laboratories with locations in San Diego, CA and Fife, WA. All work related to this proposal will be conducted by the San Diego laboratory. AMEC's Bioassay Unit is managed by ***Marilyn Schwartz***, who is supported by ***Steve Carlson*** (Laboratory Technical Supervisor and Quality Assurance Officer) and ***Chris Stransky*** (Manager and Technical Supervisor for all sediment and R&D related projects). The San Diego laboratory has been in operation since 1985 and currently is staffed with eight full-time technicians and four part-time technician assistants. The San Diego Bioassay Laboratory is designed for and capable of performing a wide variety and large number of simultaneous freshwater, saltwater, and sediment tests. This laboratory routinely provides testing services for a wide variety of projects both within the United States and internationally throughout the Pacific Rim. Several specialties relevant to this project include the assessment of sediment quality in support of site characterization, risk assessment, and dredging projects; toxicity identification evaluations; and toxicity evaluations of storm water in support of the development of TMDLs. A number of these studies are in the San Diego region, including substantial work within the Mission Bay watershed. The San Diego AMEC Laboratory is certified by the State of California and Washington Department of Ecology for effluent and receiving water testing, and is accredited by the State of Washington to conduct a variety of sediment toxicity tests. AMEC is also currently part of the RWQCB contract lab program. A detailed description of lab facilities, capabilities and QA/QC program are described in our QA/QC manual, which is available upon request.

San Diego BayKeeper is a community-based 501(c)(3) non-profit organization dedicated to protecting and restoring San Diego Bay, Mission Bay, the region's coastal waters and watersheds. BayKeeper launched its Citizen Water Monitoring program in December 1999, with volunteers now having adopted monitoring sites in Pacific Beach, Mission Bay, Cardiff and Cottonwood Creek. Partners include the Mesa College Chemistry Club, Grauer School in Encinitas, and Cottonwood Creek Conservancy. Most recently, BayKeeper launched an EPA-funded Seventh Street Channel/Paleta Creek Watershed citizen monitoring effort in December 2000. BayKeeper has developed RWQCB, SWRCB and EPA-approved QAP measures, and currently is educating and involving community residents in monthly stormwater sampling and analysis at designated sites in an effort to determine pollution sources. ***Hiram Sarabia-Ramirez***, Staff Scientist and BayKeeper's manager for this proposed project, is completing his master's degree in Marine Science from USD, where he received his Bachelor of Arts degree in Marine Science with an emphasis in Biology. Hiram has been working with scientists from the Centro de Investigacion Cientifica y Educacion Superior de Ensenada (CICESE) and the School for Field Studies Center for Coastal Studies (SFS-CCS) in Mexico to help establish the first biomonitoring program in Bahia Magdalena, Baja California Sur. Assisting Hiram will be Outreach Coordinator ***Joe Carrey***, who earned his bachelor's degree in geography with an emphasis on environmental policy and natural resource conservation at San Diego State University. Additionally, BayKeeper will rely on the expertise of Julie Barr, the Regional Citizen Monitoring Coordinator for the California CoastKeeper. Julie has over five years of experience implementing citizen monitoring programs along the Southern California coastline. She has attended the EPA's Water Quality Standards Academy and has conducted train the trainer classes for the SWRCB's Clean Water Citizen Monitoring Team.[7]

The **City of San Diego** already has secured funding to provide cost-share for the efforts being undertaken by USD, BayKeeper and AMEC, and the City MWWD's ongoing bacteria monitoring program has been in effect in Mission Bay since 1987. The City's commitment to restoring San Diego's beaches and bays can be seen in the establishment of a Clean Water Task Force to be co-chaired by newly elected Mayor Dick Murphy and Councilmember Scott Peters, as well as the City's recent reorganization that elevated the prominence of the City's Storm Water Pollution Prevention Program.

20. DESCRIBE ANTICIPATED FUTURE WORK.

The propose Mission Bay Watershed Evaluation should foster additional monitoring and planning efforts to help protect and restore Mission Bay. Most immediately, this evaluation will play a critical role in the City's development of an effective Watershed Management Plan, for which they are submitting a separate Proposition 13 proposal. This initial baseline study also may pave the way for an investigational survey to identify pollution sources, and should aid in the development and implementation of TMDLs for impaired segments of Mission Bay. Depending on the outcome of the proposed evaluation, additional water quality, sediment and pelagic and benthic community monitoring may be warranted to evaluate seasonal variation and assess pollution trends. Ultimately, the Watershed Evaluation could be a first step in designing, launching and maintaining a relational geographic informational system (GIS) that displays and manages environmental data describing the targeted watershed. The long-term goal of such an effort would be to summarize Mission Bay monitoring data and analyze these data in relation to environmental factors such as land use, NPDES permitted facilities and agricultural sites to determine the root causes of the pollutants. The data will be plotted in a visual format using GIS, and transmitted to the EPA, SWRCB and RWQCB, and made available to the general public on the Internet.

21. INDICATE IF THIS PROJECT IS IMPLEMENTING A TMDL.

Yes ___ No _X_ If yes, briefly explain.

The proposed project is not implementing a TMDL. However, portions of Mission Bay currently are listed as impaired for coliform, lead and eutrophication, and other impaired sections of the Bay may be identified as a result of the proposed monitoring project. Therefore, the data gathered as part of the Mission Bay Watershed Evaluation, as well as possible investigational surveys based on this baseline study, should prove to be useful in developing and ultimately implementing TMDLs for Mission Bay.

[7] Please see Attachment D for summary of qualifications for key project personnel.

Mission Bay

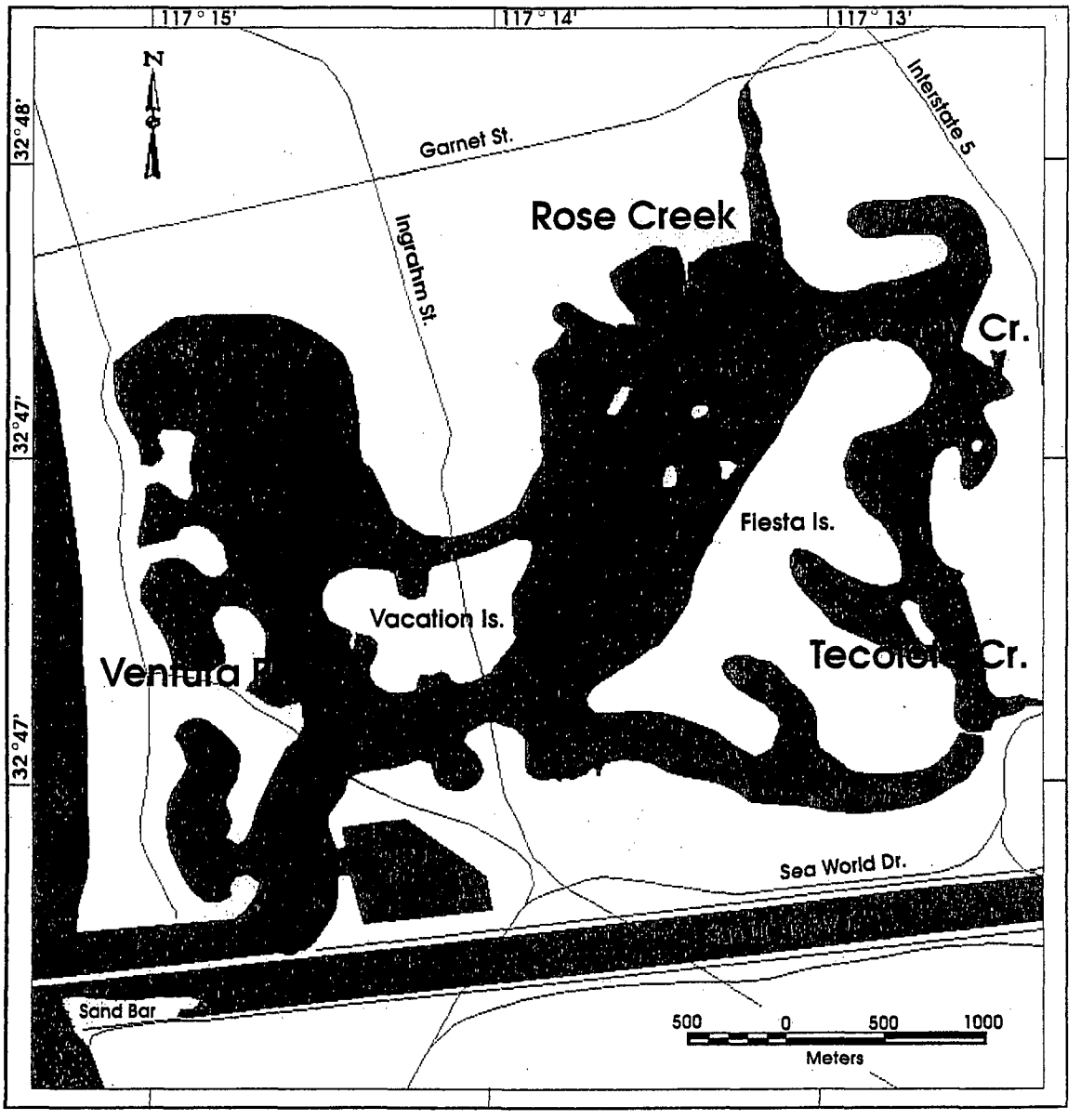


Figure 1. Proposed sampling locations in Mission Bay, San Diego, CA.

California CoastKeeper

January 30, 2001

Ron Kaufmann, Ph.D. Assistant Professor of Marine and Environmental Studies

University of San Diego
Marine and Environmental Studies Program
5998 Alcalá Park
San Diego CA 92110-2492

On behalf of the California Coast Keeper I would like to commend the University of San Diego Marine and Environmental Studies Program for taking an active roll to protect Mission Bay's water quality. The California Coast Keeper is an alliance of Southern California Keeper's with over 5 years of experience in citizen water monitoring. Our organization and its affiliates stand behind the San Diego BayKeeper ready to provide expertise and support to ensure the success of this collaboration.

We believe that the collaboration between a grassroots organization, an academic institution, government, and industry, will bring together the necessary elements of interest, manpower, expertise, and resources to make this project a success and begin to yield the long-term solutions to our region's water quality problems that our citizens expect and deserve.

Sincerely,

Julie M. Barr

Regional Citizen Monitoring Coordinator

jbarr@cacoastkeeper.org

amec

January 30, 2001

Attention: Ron Kaufmann, Ph.D. Assistant Professor of Marine and Environmental Studies
University of San Diego
Marine and Environmental Studies Program
5998 Alcala Park
San Diego, CA 92110-2492

Subject: Letter of Commitment

Reference: AMEC Proposal No. 2001-W-0044

Dear Project Team:

The purpose of this letter is to state AMEC Earth & Environmental, Inc.'s commitment to USD to perform sediment collection, sediment toxicity testing, and sediment chemistry analyses segments of the scope of work outlined in the California Proposition 13 proposal for watershed evaluation of Mission Bay. Should funds be granted, Amec's ability to undertake study is subject to negotiation of mutually acceptable contractual terms and conditions.

We look forward to the opportunity to join USD in this effort. Should you have any questions, please feel free to contact Chris Stransky at (858) 458-9044, Ext. 217.

Sincerely,

Marilyn J. Schwartz
Unit Manager
Amec Bioassay Laboratories

cc Mr. Chris Stransky, Amec San Diego Laboratory Manager

AMEC Earth & Environmental
San Diego Bioassay Laboratory
5510 Morehouse Dr. San Diego, CA
(858) 458-9044
Fax (858) 587-3961
www.amec.com

THE CITY OF SAN DIEGO

January 30, 2001

Watershed Management Initiative Committee
State Water Resources Control Board

Subject: Mission Bay Water Quality, Sediment, and Benthic Community Monitoring and Assessment

To Whom it may Concern:

The purpose of this letter is to state the City of San Diego's support of the subject project submitted by the University of San Diego (USD), in conjunction with project partners, AMEC and San Diego BayKeeper. We believe that this project clearly fulfills the local Regional Water Quality Control Board's goals to conduct monitoring and assessment of water quality and beneficial use conditions and to implement citizen monitoring. The City is proud to contribute $200,000 in matching funds towards this Mission Bay water quality and sediment testing project. The project will also compliment existing bacteriological monitoring that the City conducts along the Mission Bay shoreline.

The City of San Diego is committed to eliminating pollution and cleaning up our beaches and bays. We are proud to have USD, AMEC, and San Diego BayKeeper as partners in this project. The principal investigators, who will lead the evaluation, are knowledgeable and experienced. We believe that the baseline data obtained through this project will be beneficial to the watershed management plan development.

We encourage your favorable review of this proposal.

Karen Henry
Deputy Director

KH

IVERSITY

ATTACHMENT C:

LIST OF MISSION BAY STUDIES AND RESOURCES

SAN DIEGO BAYKEEPER

January 30, 2001

Ron Kaufmann, Ph.D. Assistant Professor of Marine and Environmental Studies

University of San Diego
Marine and Environmental Studies Program
5998 Alcalá Park
San Diego CA 92110-2492

Dear Dr. Ron Kaufmann,

I'm writing you on behalf of the San Diego BayKeeper to express our commitment to work with the University San Diego and AMEC on a one-year preliminary watershed evaluation project in Mission Bay. BayKeeper will train and coordinate citizen monitors to conduct water column sampling and analyses and provide all necessary logistical and technical support.

As a grassroots water quality advocacy organization we believe that an integral scientific evaluation, like the one offered by this project, is a crucial first step to attack water pollution problems effectively. We look forward to this collaboration and believe firmly that our combined expertise and efforts in this project will contribute significantly to the protection of our precious water resources and yield long-term benefits.

Sincerely,

Bruce Reznik

Executive Director

breznik@sdbaykeeper.org

ATTACHMENT C: LIST OF MISSION BAY STUDIES AND RESOURCES

Literature

A Water Quality Study of Mission Bay, January 1977, A Joint Report by: California Regional Water Quality Control Board San Diego Region, California Department of Health, San Diego County Department of Public Health

Analysis of PAH Levels in Mission Bay Sediments by Fluorometry, Masters Thesis, SDSU, Ronald Gauthier

California Storm Water Best Management Practice Handbooks: Municipal, Industrial/Commercial and Construction Activity

Environmental Factors Affecting Phytoplankton Populations in Mission Bay, Masters Thesis, Deborah Ann Fairbanks

Funding Coastal Resource Conservation, Restoration and Enhancement in California, Workshop Workbook, California State Coastal Conservancy

Hazardous Material Manual, City of San Diego

Improving California's System of Marine Managed Areas, Final Report of the State Interagency Marine Managed Areas Workgroup, Jan. 15, 2000

Mission Bay: A Study of Waste Assimilative Capacity, Water Utilities Department, City of San Diego, California, by Hirsch and Company, Consulting Engineers

Mission Bay Park Master Plan Update, City of San Diego

Pesticide Orientation and Pesticide Refresher Workbook, City of San Diego Park and Recreation Department

Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays and Estuaries of California, State Water Resources Control Board, California Environmental Protection Agency

Porter-Cologne Water Quality Control Act, State Water Resources Control Board

Training Manual for Pesticide Application and Safety Training, City of San Diego Park and Recreation Department

Water Quality Survey of Tecolote Creek, Tecolote Canyon Natural Park, San Diego County, December 1984, Prepared for State Water Resources Control Board by the Environmental Studies Laboratory, USD

Mission Bay Resource List

Categories for literature:

1. *Geology/Sedimentation*: includes studies on sediment geology, grain size, erosion and development related to geologic factors in Mission Bay.

2. *Biological Studies*: includes any study that studies species residing in, near or in association with Mission Bay.

3. *Physical Circulation*: includes any study that focuses on the physical circulation or physical oceanographic features of Mission Bay.

4. *Development/Technical Reports*: includes reports and/or studies that focus on development and coastal policy. May incorporate biological, physical and geologic factors, but focuses specifically on policy or a project related to development. Includes environmental impact reports (EIRs).

5. *Estuarine/Wetland Studies:* includes reports and/or studies that focus on estuarine and/or wetland related issues specifically. Includes reports that focus on using created wetlands to treat stormwater

6. *Stormwater/Runoff Studies*: includes literature that focuses on the study of stormwater and urban runoff. Includes reports on bacterial contamination and bacterial testing.

Literature List

Geology/Sedimentation:

1. ERC Environmental, Mission Bay Park Shoreline Restoration and Stabilization Project Environmental Impact Report, City of San Diego, Park and Recreation Department, 1989.

2. Gauthier, Ronald David, Analysis of PAH Levels in Mission Bay Sediments by Fluorometry, 1994.

3. Pountney and Associates, City of San Diego Park and Recreation Department, Report of Findings, Mission Bay Beach Stabilization Sand Test Project, 1994.

4. Pountney and Associates, Mission Bay Park Shoreline Stabilization and Restoration Project Plan, 1990.

5. Rambo, Charles E. and William C. Speidel, Marine Advisers, Inc. A Case Study of Estuarine Sedimentation in Mission Bay – San Diego Bay, California

6. Stransky, Brian Christopher, Assessment of Sediment Quality Effects in Mission Bay and San Diego Bay on the Growth, Behavior and Survival of Juvenile White Seabass (*Atractosion nobilis*) and Juvenile California Halibut (*Paralichthys californicus*), 1998.

7. Tetra Tech, Mission Bay Park Shoreline Erosion Study, 1984.

8. Woodward-Clyde Consultants. Rose and San Clemente Canyon Watershed Erosion/Sedimentation Study – Phase I, San Diego, California, San Diego, CA. 1986.

9. Woodward - Clyde, Watershed Erosion/Sedimentation Studies: Tecolote Canyon Natural Park, City of San Diego, 1983.

website: http://www.sccwrp.org/regional/98bight/micbio/mbwkpln.htm Bight '98: Southern California Bight - 1998 Regional Marine Monitoring Survey - Shoreline Microbiology Workplan [pdf version available for download]

Biological Studies:

1. Ecosystems Management, Inc., Eelgrass Inventory Study Mission Bay, 1986.

2. ERC Environmental and Energy Services Co., Mission Bay Park Least Tern Foraging Study, 1989.

3. Fairbanks, Deborah Ann, Environmental Factors Affecting Phytoplankton Populations in Mission Bay, Masters Thesis, SDSU, 1969.

4. Morrison, Roy Lawton, A Study of Molluscs Found at Mission Bay, San Diego, California; Their Classification and Special Attention to Their Distribution, Dissertation, 1930.

5. Rieger J.P. and R.M. Beauchamp, Inventory and Survey of the Marine Terrestrial Biological Resources in Mission Bay Park, City of San Diego, Park and Recreation Department, 1975.

6. Sitko, S.E. "Comparative Avian Habitat Utilization on San Diego Mission Bay, California" (unpublished M.S. Thesis, San Diego State University), 1979.

7. Southwest Research Associates, Inc., 1992 Mission Bay Park Least Tern Foraging Study, 1993.

8. Southwest Research Associates, Inc., 1993 Mission Bay Park Least Tern Foraging Study, 1994.

9. Southwest Research Associates, Inc., Summary Report, Mission Bay Park Least Tern Foraging Study, 1994.

10. U.S. Fish and Wildlife Service. Endangered and Threatened Wildlife and Plants. July 20, 1988.

Physical Circulation:

1. Bottin, Robert B., U.S. Army Engineer Waterways Experiment Station, Mission Bay Harbor, San Diego County, California, Design for Wave and Surge Protection, 1985.

2. Curren, Charles R., U.S. Army Engineer District, Los Angeles, California, Design for Wave and Surge Protection and Flood Control, Hydraulic Model Investigation, 1983.

3. Marine Advisors. Mission Bay Development: An Evaluation of Pertinent Oceanographic Factors. July, 1957

4. McNoboe, G.J., L.C. Homes and C.E. Dorman, 1978: Mission Bay Tidal Currents. Center for Marine Studies, San Diego State University, San Diego, CA 92182

Development/Technical Reports:

1. California Department of Public Works, Views and Recommendations of State of California on Report of District Engineer, Los Angeles District, War Department, Entitled Survey of San Diego River and Mission Bay for Flood Control and Navigation, 1946.

2. City of San Diego, Adopted by the City Council of San Diego. Mission Bay Coastal Access Study: Coastal Access Component of the Mission-Pacific Beach/Mission Bay Park Local Coastal Program.

3. City of San Diego, Mission Bay Park Master Plan for Land and Water Use, 1976.

4. City of San Diego Planning Department, Environmental Impact Report, Mission Bay Master Plan Update, 1994.

5. City of San Diego Planning Department, History and Development of Mission Bay, 1957.

6. City Planning Department, Mission Bay Park Master Plan for Land and Water Use, Local Coastal Program Addendum, 1982.

7. City of San Diego Planning Department. Proposed Draft Environmental Impact Report: North City Tunnel Connector/Pipeline Lower and East Mission Bay Pipeline Project.

8. City of San Diego, Planning Department, Environmental Analysis Section, Environmental Impact Report for the Proposed North City Tunnel Connector, North City Pipeline Lower, and East Mission Bay Pipeline Program for the Clean Water Program for Greater San Diego, 1993.

9. City of San Diego Planning Department, Environmental Quality Division. Environmental Impact Report, Mission Bay Park Shoreline Stabilization and Restoration Project Plan and Natural Resource Management Plan.

10. City of San Diego Planning Department, Environmental Quality Division, Mission Beach Storm Drain Project; Mitigated Negative Declaration, 1990.

11. Cresap, McCormick, and Paget, Management Consultants. A Survey of the Mission Bay Administration, City of San Diego. Sept. 1956.

12. Derby, George Horatio, Survey of San Diego River and its Vicinity with a View to the Construction of the Levee and Canal to Turn the River from its Present Course, 1853

13. Goff, James L. and Ed Mendoza. Park and Recreation Department Amendment to the Mission Bay Park Master Plan and Local Coastal Program Addendum.

14. Herron, Jr., William J., Moffat and Nichol Engineers, Chapter 43, Proceedings of the 13th Coastal Engineering Conference, July 10-14, 1972.

15. Herron, Jr., William J., Moffatt and Nichol, Engineers. Case History of Mission Bay Inlet, San Diego, California, Long Beach, California. Chapter 43, Reprinted from the Proceedings of the 13th Coastal Engineering Conference, July 10-14, 1972, Vancouver, B.C., Canada, by the American Society of Civil Engineers for the U.S. Army Coastal Engineering Center.

16. Pacific Southwest Biological Services, Famosa Slough Enhancement Plan, 1993.

17. Peterson, John K. City of San Diego Engineering Department, Mission Bay 1939-1965, 1965.

18. Rick, Glenn A., Mission Bay Small Boat Harbor and Marine Park, 1970.

19. San Diego Regional Water Quality Control Board, Water Quality Control Policy for Mission Bay, the Tidal Prism of the San Diego River and Agua Hedionda Lagoon

20. Schwob, Walter, City of San Diego Planning Department, Report on Mission Bay, San Diego, 1954.

21. U.S. Army Corps of Engineers. Detailed Project Report for Rose Creek Channel Improvements, San Diego, California, Los Angeles, CA. 1966

Estuarine/Wetland Studies:

1. California State Coastal Conservancy, The Coastal Wetlands of San Diego County, 1989.

2. Fischer, H.B., E.J. List, R.C.Y. Koh, J. Imberger and N.H. Brooks, 1979: Mixing in Inland and Coastal Waters. Academic Press. New York. 483 pp.

3. Gersberg, Richard. M., et al. Pathogen Removal in Constructed Wetlands. In Constructed Wetlands for Wastewater Treatment (D. A. Hammer, ed.), Lewis Publishers: Chelsea, MI. 1989.

4. Gersberg, Richard M. Use of Created Wetlands for Stormwater Treatment in Mission Bay, California, San Diego, CA. 1992.

5. Guida, V.G. and I.J. Kugleman. Experiments in Wastewater Polishing in Constructed Tidal Marshes. In Constructed Wetlands for Wastewater Treatment. (D. A. Hammer, ed.) Lewis Publishers: Chelsea, MI. 1989.

6. Hirsch and Company. Mission Bay, A Study of Waste Assimilative Capacity, 1978.

7. Josselyn, Michael. Public Access and Wetlands: Impacts of Recreational Use, 1989.

8. O'Leary, D.A. Mission Bay and Coastal Estuarine Zones, UCSD Scripps, 1966.

9. Sinicrope, T.L. et al. In Press. Metal Removal by Wetland Mesocosms Subjected to Different Hydroperiods. Ecological Engineering. In Press.

Stormwater/Runoff Studies:

1. Baran, Edward D., An Evaluation of the Relation Between Rainfall and Water Quality in Mission Bay, Master's Project, SDSU, 1994.

2. California Regional Water Quality Control Board. A Water Quality Study of Mission Bay California Department of Health, San Diego County Department of Public Health. April 1975 through September 1975.

3. Davies, Donald William, Nonconservative Constituents in the Waters of Mission Bay, Masters Thesis, SDSU, 1972.

4. Kinnetic Laboratories, Inc., Mission Bay Bacteria Contamination Study, 1994.

5. Kinnetic Laboratories, Inc., Mission Bay Watershed Bacterial Sources Wet Weather Testing Program, 1995.

6. Livingston, E.H. Stormwater Regulatory Program in Florida. In Urban Runoff Quality-Impact and Quality Enhancement Technology, Proceedings of an Engineering Foundation. Conference, Henniker, NH. June 23-27, 1986.

7. MEC Analytical Systems, Inc., Results of Chemical Testing at Mission Bay Thunderboat Racing Event, 1999

8. San Diego County Department of Public Health, A Bacteriological Survey of the Pacific Ocean, San Diego Bay and Mission Bay, 1957.

9. San Diego Regional Water Quality Control Board. Water Quality Control Policy for Mission Bay, the Tidal Prism of the San Diego River and Agua Hedionda Lagoon.

10. Silverman, G.S. Treatment of Non-point Source Pollutants-Urban Runoff Treatment Wetlands in Fremont, CA. In Constructed Wetlands for Wastewater Treatment (D.A. Hammer, ed.). Lewis Publishers: Chelsea, MI. 1989.

11. State Department?, Report of Bacteriological Study of Ocean Beaches, International Border through Oceanside, California (including San Diego Bay, Mission Bay and Agua Hedionda Lagoon, 1960.

12. Tetra Tech, Water Quality Control Studies, Mission Bay Park, 1983.

13. Tetra Tech, Inc., Water Quality Studies for Mission Bay Park, City of San Diego, Park and Recreation Department, 1983.

14. Woodward-Clyde Consultants. Analysis of Storm Event Characteristics for Selected Rainfall Guages Throughout the United States, Oakland, CA. 1989

Additional Mission Bay Resources available online:

Kay, Isabelle et al., Reintroduction of salt marsh-upland transition habitat. Society for Ecological Restoration 1995 Abstracts http://www.ser.org/library/seattle/Coastal.html

Winfield et al. Review of Physical and Biological Performance of Tidal Marshes Constructed on Dredged Materials in San Francisco Bay, CA. Society forEcological Restoration 1995 Abstracts http://www.ser.org/library/seattle/Coastal.html

Toxic Chemical Contaminents Program" {excerpt re Mission Bay}:
http://www.cop.noaa.gov/projects/toxics.html Last updated August 10, 1995

"Microhabitat utilization by juvenile California killifish, Fundulus parvippinnis, in Mission Bay, California" Drew M. Talley, Scripps Institution of Oceanography, UC San Diego, La Jolla CA. [posted yr. 2000]
http://levin.ucsd.edu/Drew/abstracts/BEM00.html

"Ichthyofaunal utilization of newly-created versus natural salt-marsh creeks in Mission Bay, CA. Drew M. Talley, Wetlands Ecology and Management 8:117-132, 2000.
http://levin.ucsd.edu/Drew/abstracts/WEMms.html

"Trophic interactions in a created and natural salt marsh inferred from stable isotope analyses" Levin, L.A. et al. 28th Annual Benthic Ecology Meetings, March 1999, Baton Rouge LA. [includes thumbnail enlarge-able image of the marsh]
http://levin.ucsd.edu/Drew/abstracts/BEM99.html

"The Ecology of the California horn snail (*Cerithidea californicia*) in a created salt marsh in Mission Bay, southern California" Talley, T.S. et al. [1998]
http://levin.ucsd.edu/Drew/abstracts/Cerith.html

Ichthyofaunal community structure and trophic interactions in a created and adjacent natural salt marsh in Mission Bay, California" Poster Abstract for the International Marsh Symposium - Concepts and Controversies in Tidal Marsh Ecology (Vineland, New Jersey).
http://levin.ucsd.edu/Drew/abstracts/jersey.html

Restoration of Spartina marsh function: an infaunal prspective. Levin, L.A. et al, 1997.
IN: Macdonald & Weinmann (eds.) Wetland and Riparian Restoraton: Taking a Broader View. Contributed Papers and Selected Abstracts, Society for Ecological Restoration, 1995 International conference, September 14-16, 1995, University of Washington, Seattle, Washington, USA.
http://levin.ucsd.edu/Drew/abstracts/SERtalk.html

"Succession of macrobenthos in a created salt marsh" Levin, Lisa A. et al. Marine Ecology Progress Series, v.141, n.1-3, 1996:67-82.
http://levin.ucsd.edu/Drew/abstracts/MEPS.html

"Development of Sediment Bioassays using Newly Settled California Halibut (Paralichthys californicus)" Liesl L. Tiefenthaller, Mark A. Skracic.
http://www.sccwrp.org/pubs/annrpt/94-95/art-09.htm

"The Fish of San Diego Coastal Wetlands" Talk by Drew Talley, March 25, 1998, at the Friends of Famosa Slough General Meeting.

http://www.sandiegoinsider.com/communitygroups/ffs/Fish_of_San_Diego_Co.html

"A Guide to the SIO Subject Files Records, 1890-1981" Archival Collection AC 6 (35 li. ft.) Archives of the Scripps Institution of Oceanography, University of California, San Diego, La Jolla CA 92093-0219. Revised, March 1995. SIO Reference Number 81-16, Excerpt: CONSERVATION. Folder 16 in box 24 contains material dated 1944-54, 1956, 1964-1969 and 1972 under the heading "university of California Natural Land and Water Reserves." Material in this folder dated 1944-1949 concerns the conservation of wildlife in the Mission Bay area. ..... Material dated 1951-1954, 1956 and 1964 concerns a proffered gift of marshland in the Mission Bay area from Mrs. Oscar J. Kendall and Mr. A.A. Frost to the University of California. The marshland was offered to the University to protect it from commercial development" http://orpheus.ucsd.edu/speccoll/testing/html/ac6.html

Shoreline Microbiology Sampling Stations Map: Mission Bay to U.S.- Mexican Border Author: Larry Cooper. Printed 11AUG98. http://www.sccwrp.org/regional/98bight/micbio/map7.htm

"Pacific Coast Benthic Surveillance" U.S. Dept. of Commerce, NOAA, NMFS, NMFSC, Publications, Tech. Memo-16 [date?] Introduction/ Methods/ Results & Discussion. http://www.nwfsc.noaa.gov/pubs/tm/tm16/intro.htm

"NRPI: Project Description for the San Diego County Priority Area (CERPI)" http://endeavor.des.ucdavis.edu/nrpi/NRPIDescription.asp?ProjectPK-5000

*Courtesy of Judy Swink

ATTACHMENT D:

QUALIFICATIONS OF KEY PERSONNEL

RONALD SANDOR KAUFMANN, Ph.D.
Marine and Environmental Studies Program
University of San Diego
5998 Alcalá Park
San Diego, CA 92110 USA
(619) 260-5904 FAX: 260-6874
E-mail: kaufmann@acusd.edu

Education:

Ph.D. in Marine Biology: University of California, San Diego, 1992
B.S. in Biology *summa cum laude* with an emphasis in Ecology and Behavioral Biology: University of Minnesota, 1985

Research Interests:

Spatial and temporal dynamics of marine communities
Physiological and behavioral ecology of aquatic animals

Professional Experience:

Assistant Professor, Marine and Environmental Studies Program, University of San Diego, 1997-2001.
Visiting Scholar, Marine Biology Research Division, Scripps Institution of Oceanography, University of California, San Diego, 1997-2001.
Lecturer, Biology Department, University of San Diego, 1993-94, 1996-97.
Post-Graduate Researcher, Marine Biology Research Division, Scripps Institution of Oceanography, University of California, San Diego, 1992-97.
Lecturer, Marine and Environmental Studies Program, University of San Diego, 1996.
Instructor, NSF-sponsored short course for training of faculty at teaching colleges, 1993.
Research Assistant, Marine Biology Research Division, Scripps Institution of Oceanography, University of California, San Diego, 1991-92.
Teaching Assistant, University of California, San Diego, 1986.

Courses Taught:

Biological Oceanography, Lab, University of San Diego, Fall 1998-2000
Biology Senior Seminar, Seminar, University of San Diego, Spring 1997, Fall 1997
Biology of Organisms, Lab, University of San Diego, Fall 1993, Spring 1994, Fall 1996, Spring 1997
Environmental Issues, Lecture, University of San Diego, Fall 1996-2000
Introduction to Genetics, Ecology and Evolution, Lecture, University of San Diego, Fall 1999-2000
Introduction to Marine Biology, Lecture, University of San Diego, Spring 1998, Fall 1998
Marine Environment, Lecture, University of San Diego, Fall 1997-1999
Marine Science Senior Seminar, Seminar, University of San Diego, Spring 1998-2001, Fall 2000
Oceanography II (Biological), Graduate Lecture/Lab, University of San Diego, Spring 1998-2001
Presentations, Graduate Seminar, University of San Diego, Spring 1998.
Principles of Biology, Lecture, University of San Diego, Spring 1994.

Awards and Honors:

U.S. Antarctica Service Medal - National Science Foundation (1999)
ARCS Foundation Fellowship (1985-91)
University of California, San Diego Regents Fee Scholarship (1985)
Phi Beta Kappa (1984)

Professional Societies:

American Association for the Advancement of Science
American Society of Limnology and Oceanography
The Crustacean Society

USD Service

Member, Academic Integrity Hearing Committee, College of Arts and Sciences (2000-2001)
Internship Coordinator, Marine and Environmental Studies Program (2000-2001)
Member, Undergraduate Curriculum Committee, College of Arts and Sciences (1999-2001)
Faculty Advisor, Associated Students Research Grant Screening Board (1999-2000)
Faculty Advisor, The Environmental Action Group (1998-2001)
Seminar Coordinator, Marine and Environmental Studies Program (1997-2001)

Additional Service:

Member, M.S. Committee, Scripps Institution of Oceanography/UCSD (2000)
Volunteer, National Ocean Sciences Bowl (1998-1999)
Founding Member, Conservation Committee, San Diego County Orchid Society (1997-2001)
Naturalist/Lecturer, Scripps Aquarium (1989-93)
Member, Scripps Institution of Oceanography Marine Operations Committee (1988-92)
Member, ad hoc Faculty Evaluation Committee, Scripps Institution of Oceanography (1985-91)

Publications:

Wilson, R.R., Jr. and **R.S. Kaufmann**. 1987. Seamount biota and biogeography. In: Keating, B., P. Fryer, R. Batiza and G. Boehlert, eds. Seamounts, Islands and Atolls, Geophysical Monograph No. 43, AGU, Washington, D.C., pp. 355-377.

Kaufmann, R.S., W.W. Wakefield and A. Genin. 1989. Distribution of epibenthic megafauna and lebensspuren on two central North Pacific seamounts. Deep-Sea Research 36: 1863-1896.

Kaufmann, R.S. and R.R. Wilson, Jr. 1991. A summary and bibliography of seamount biota. Scripps Institution of Oceanography Reference Series #91-8.

Smith, K.L., Jr., **R.S. Kaufmann**, J.L. Edelman and R.J. Baldwin. 1992. Abyssopelagic fauna in the central North Pacific: comparison of acoustic detection and trawl and baited trap collections to 5800 m. Deep-Sea Research 39: 659-685.

Smith, K.L., Jr., **R.S. Kaufmann** and W.W. Wakefield. 1993. Mobile megafaunal activity monitored with a time-lapse camera in the abyssal North Pacific. Deep-Sea Research 40: 2307-2324.

Kaufmann, R.S. 1994. The structure and function of chemoreceptors in scavenging lysianassoid amphipods. Journal of Crustacean Biology 14: 54-71.

Smith, K.L., Jr., **R.S. Kaufmann** and R.J. Baldwin. 1994. Coupling of near-bottom pelagic and benthic processes at abyssal depths in the eastern North Pacific. Limnology and Oceanography 39: 1101-1118.

Kaufmann, R.S., K.L. Smith, Jr., R.J. Baldwin, R.C. Glatts, B.H. Robison and K.R. Reisenbichler. 1994. Epipelagic communities in the northwestern Weddell Sea: results from acoustic, trawl and trapping surveys. Antarctic Journal of the United States 28: 138-141.

Kaufmann, R.S., K.L. Smith, Jr., R.J. Baldwin, R.C. Glatts, B.H. Robison and K.R. Reisenbichler. 1995. Effects of seasonal pack ice on the distribution of macrozooplankton and micronekton in the northwestern Weddell Sea. Marine Biology 124: 387-397.

Lauerman, L.M.L., **R.S. Kaufmann** and K.L. Smith, Jr. 1996. Abundance and distribution of epibenthic megafauna at an abyssal station in the eastern North Pacific. Deep-Sea Research 43: 1075-1103.

Kaufmann, R.S. and K.L. Smith, Jr. 1997. Activity patterns of mobile epibenthic megafauna at an abyssal site in the eastern North Pacific: results from a 17-month time-lapse photographic study. Deep-Sea Research 44: 559-579.

Lauerman, L.M.L. and **R.S. Kaufmann**. 1998. Deep-sea epibenthic echinoderms and a temporally varying food supply: results from a one year time-series in the N.E. Pacific. Deep-Sea Research II 45: 817-842.

Smith, K.L., Jr., R.J. Baldwin, R.C. Glatts, **R.S. Kaufmann** and E.C. Fisher. 1998. Detrital aggregates on the sea floor: chemical composition and aerobic decomposition rates at a time-series station in the abyssal NE Pacific. Deep-Sea Research II 45: 843-880.

Kaufmann, R.S. and K.L. Smith, Jr. 1998. Epipelagic communities in the northwestern Weddell Sea: results from high-resolution trawl surveys. Antarctic Journal of the United States 32: 88-90.

Smith, K.L., Jr. and **R.S. Kaufmann**. 1999. Long-term discrepancy between food supply and demand in the deep eastern North Pacific. Science 284: 1174-1177.

Smith, K.L., Jr., **R.S. Kaufmann**, R.J. Baldwin and A. Carlucci. In press. Pelagic-benthic coupling in the abyssal eastern North Pacific: an eight-year time-series study of food supply and demand. Limnology and Oceanography

Kaufmann, R.S., E.C. Fisher, C. Hammock and K.L. Smith, Jr. In preparation. The life history of Antarctic krill (*Euphausia superba*) and salps (*Salpa thompsoni*) in the northwestern Weddell Sea.

Fisher, E.C., **R.S. Kaufmann** and K.L. Smith, Jr. In preparation. The abundance and distribution of macrozooplankton and micronekton in the northwestern Weddell Sea over a complete annual cycle: influence of seasonal ice cover.

Published Abstracts:

Kaufmann, R.S. and F.H. Barnwell. 1985. Morphology of putative sound-producing structures in fiddler crabs of subgenus *Celuca*. American Zoologist 25: 37A.

Wakefield, W.W., C.E. Reimers, K.L. Smith, Jr., A. Sanfilippo, C.B. Lange and **R.S. Kaufmann**. 1988. Biogenic structures as traps for siliceous material on a deep mid-Pacific seamount. EOS 69: 1124.

Kaufmann, R.S. 1990. The role of gnathopods as sensory organs in scavenging amphipods belonging to the genus *Orchomene*. American Zoologist 30: 6A.

Kaufmann, R.S. 1991. Energetics and feeding ecology of scavenging crustaceans: comparison of shallow- and deep-water species. American Zoologist 31: 24A.

Kaufmann, R.S., K.L. Smith, Jr., R.C. Glatts, R.J. Baldwin, B.H. Robison and K.R. Reisenbichler. 1994. The influence of seasonal pack ice on the distribution and abundance of epipelagic fauna in the northwestern Weddell Sea. EOS 75: 188.

Kaufmann, R.S. and K.L. Smith, Jr. 1996. Orientation behavior of mobile epibenthic megafauna at an abyssal site in the eastern North Pacific. EOS 77: 68.

Lauerman, L.M.L. and **R.S. Kaufmann**. 1997. Deep-sea epibenthic echinoderms and a temporally varying food supply: a time series from the abyssal NE Pacific. Deep-Sea Biology Symposium Abstracts 8: 68.

Smith, K.L., Jr., R.J. Baldwin, R.C. Glatts and **R.S. Kaufmann**. 1997. Detrital aggregates on the sea floor: chemical composition and aerobic decomposition rates at a time-series station in the abyssal NE Pacific. Deep-Sea Biology Symposium Abstracts 8: 112.

Smith, K.L., Jr., R.J. Baldwin, R.C. Glatts, **R.S. Kaufmann** and E.C. Fisher. 1998. Detrital aggregates on the sea floor: chemical composition and aerobic decomposition rates at a time-series station in the abyssal NE Pacific. EOS 79: 31.

Swaney, J.S., **R.S. Kaufmann**, M. Drawbridge and M.S. Lowery. 2000. Effects of temperature and ration on growth of white seabass, (*Atractoscion nobilis*). FASEB Journal 14: A594.

Oceanographic Experience:

R/V *Melville*: Southern California Bight - Nov. 11-16, 1986
R/V *Robert G. Sproul*: Southern California Bight - Dec. 10-12, 1986
R/V *Atlantis II*: Equatorial Central Pacific - Feb. 28-Apr. 1, 1987
R/V *Robert G. Sproul*: Southern California Bight - Sep. 28-30, 1987
Southern California Bight - Nov. 2-9, 1987
Southern California Bight - Apr. 18-20, 1988
R/V *New Horizon*: Southern California Bight - Nov. 29-Dec. 5, 1988
R/V *Thomas Washington*: Central North Pacific - Mar. 25-Apr. 28, 1989
R/V *Robert G. Sproul*: Southern California Bight - Jul. 2-8, 1989
Southern California Bight - Sep. 12-13, 1989
Southern California Bight - Feb. 27-Mar. 1, 1990
Southern California Bight - Aug. 20-22, 1990
Southern California Bight - Aug. 27-29, 1991
Southern California Bight - Feb. 10-11, 1992
R/V *Nathaniel B. Palmer*: Weddell Sea - Sep. 18-Oct. 10, 1992
R/V *Atlantis II*: Eastern Pacific - Aug. 15-31, 1994
Eastern Pacific - Sep. 13-26, 1994
Eastern Pacific - Apr. 21-May 4, 1995
R/V *Nathaniel B. Palmer*: Weddell Sea - Sep. 21-Oct. 22, 1995
R/V *Polar Duke*: Weddell Sea - Apr. 7-May 11, 1996
R/V *Laurence M. Gould*: Antarctic Peninsula Region - May 16-Jun. 15, 2000

Personal Information

Michel A. Boudrias, Assistant Professor
Marine Science & Environmental Studies Program
University of San Diego
5998 Alcalá Park
San Diego, CA 92110-2492 (work)

(619) 260-4794; 260-4795 (Dept.); 260-6874 (FAX)
email: boum@acusd.edu

Education

1985-1992:	Ph. D.	Oceanography	Scripps Institution of Oceanography (UCSD)
1983-1985:	M. Sc.	Bio.Oceanography	Oregon State University
1980-1983:	B. Sc.	Marine Biology	McGill University

Professional Experience

1996-Present	Assistant Professor	Biological Oceanography	USD
1996	Co-organizer	ILBS & TCS Summer Meeting	USD
1994-Present	Co-Principal Investigator	Vernal pool invertebrate Survey	USD
1992-1996	Lecturer	Invertebrate Zoology General Biology (lab) Marine Biology General Oceanography	USD

Contracts, Grants, Awards, and Scholarships

1999	Packard Foundation with School for Field Studies	Beach Pollution in Bahia Magdalena
1999	NCUR/Lancy grant with Jim Bolender, Lisa Baird, Mike Mayer	USD San Diego River Project (Resubmission in process)
1995	NSF Equipment grant (with Lisa Baird & Sue Lowery)	USD
1994	NAS Miramar Sub-contract Invertebrate Vernal pool survey	USD

Professional Interests

Crustacean swimming & functional morphology; Biofluiddynamics; Benthic community analysis related to environmental stresses; Photographic and video analysis of benthic communities and crustacean swimming behavior.

A. Publications

Boudrias, M.A. in press. Are pleopods just "more legs"?: The functional morphology of swimming limbs in *Eurythenes gryllus* (Crustacea:Amphipoda). Journal Crustacean Biology, In press.

Boudrias, M.A. in press. Review of "Traité de Zoologie Tome VII - Fascicule III A: Crustacés Péracarides" published in "Mémoires de l'Institut Océanographique, Monaco, No. 19, 1999". Journal of Crustacean Biology, In press.

Draze[g]. L & Boudrias, M.A. The effects of copper on the symbiont density and mitotic index in the temperate anemone *Anthopleura elegantissima*. Submitted Marine Biology

Boudrias, M.A. 1991. Methods for the study of amphipod swimming: behavior, morphology, and fluid dynamics. Hydrobiologia 223:11-25.

Boudrias, M.A. and Andrew G. Carey, Jr. 1988. Life history patterns of *Pseudalibrotus litoralis* (Crustacea: Amphipoda) on the inner continental shelf of the SW Beaufort Sea. Mar. Ecol. Prog. Ser. 49:249-257.

Carey, A.G. Jr. and M.A. Boudrias. 1987. Feeding ecology of *Pseudalibrotus (=Onisimus) litoralis* (Crustacea: Amphipoda) on the inner continental shelf of the SW Beaufort Sea. Polar Biol. 8: 29-33.

Van Dover, C.L., J.F. Grassle and M.A. Boudrias. 1990. Hydrothermal vent fauna of Escanaba Trough (Gorda Ridge). IN G.R. McMurray (ed.) Gorda Ridge: A seafloor spreading center in the United States' Economic Zone. Springer-Verlag. p.285-287.

Hessler, R.R., W.M. Smithey, M.A. Boudrias, C.H. Keller, R.A. Lutz and J.J. Childress. 1988. Temporal change in megafauna of the Rose Garden hydrothermal vent (Galapagos Rift, eastern tropical Pacific). Deep-Sea Res. 35: 1681-1709.

Manuscripts in preparation

Boudrias, M.A. Body shape in *Eurythenes gryllus* (Crustacea: Amphipoda) swimming at intermediate Reynolds number: the advantages of a streamlined body shape.

Boudrias, M.A. Thrust generation by the drag-based propulsive limbs of *Eurythenes gryllus* (Crustacea: Amphipoda).

Boudrias, M.A. Unusual swimming kinematics and body positions in *Branchinecta gigas*: tossing and turning in large anostracans

Boudrias, M.A. & J.A. Pires[u]. Unusual sensory setae on the antennae and cercopods of the raptorial *Branchinecta gigas* (Brachiopoda: Anostraca)

Draze[g]. L, M. Feddersen[u] & Boudrias, M.A. Salinity stresses affecting symbiont density and mitotic index in the temperate anemone *Anthopleura elegantissima*

Draze[g]. L, C. Hammock[u], & Boudrias, M.A. Temperature stresses affecting symbiont density and mitotic index in the temperate anemone *Anthopleura elegantissima* during the 1997-1998 El Niño.

German[u], D. & M.A. Boudrias. The burrowing behavior of the vernal pool ostracod *Cypris pubera*.

Leonard, A.B. & M.A. Boudrias. Finite arrays of finite parallel cylinders oriented normal to a flow: exploring the properties of animal filters.

g = graduate student
u = undergraduate student

Published Abstracts

Boudrias, Michel A. 1998. Unusual swimming kinematics and body positions in *Branchinecta gigas*: Tossing and turning in large anostracans. Amer. Zool. 38 (4)

Boudrias, M.A. & M.A. Simovich. 1993. Locomotion in branchiopods with an emphasis on *Branchinecta gigas*. Amer. Zool. 33(4): 55A.

Boudrias, M.A. 1991. Thrust generation by setose appendages in crustacean drag-based swimmers. Proceedings of the 1991 AMS/IMS/SIAM Summer Research Conference in Biofluiddynamics

Boudrias, M.A. 1991. Streamlined body shape in amphipods (Crustacea: Peracarida) swimming at intermediate Reynolds number. Jour. Mar. Biol. Ass. U.K. 71: 710.

Boudrias, M.A. 1989a. History of deep-sea biology: the legacy of Howard L. Sanders. Amer. Zool. 29(4): 124 (ABS. 549).

Boudrias, M.A. 1989b. Swimming limb mechanics in *Ampithoe humeralis* (Crustacea: Amphipoda). Amer. Zool. 29(4): 130 (ABS. 580).

Boudrias, M.A. 1988. Locomotion in deep-sea amphipods: body design and functional morphology of swimming appendages. Amer. Zool. 28(4): 3 (ABS. 7).

Boudrias, M.A. 1987. Effects of current velocity on the swimming behavior of a gravel beach amphipod, *Paramaera mohri*. Amer. Zool. 27(4): 81 (ABS. 416).

Boudrias, M.A. and A.B. Leonard. 1990. Drag in deep-sea amphipods: the prevalence of a streamlined body shape at intermediate Reynolds number. Amer. Zool. 30 (4): 5 (ABS. 16).

Leonard, A.B. and M.A. Boudrias. 1990. The bristle project: an empirical approach to flow around setose appendages. Amer. Zool. 30 (4): 116 (ABS. 663).

Wilson, G.D.F., M.A. Boudrias, R. Miller, and G. R. Harbison. 1989. A unique form of swimming in the deep-sea isopod crustacean *Munneurycope*: Walking. Amer. Zool. 29(4): 66 (ABS. 289).

Hessler, R.R., S.C. France and M.A. Boudrias. 1987. Hydrothermal vent communities of the Mariana Back-Arc Basin. Proceedings of the AGU/ASLO 1987 Fall Meeting.

James P. Bolender, Jr.

Address: Department of Chemistry
University of San Diego
5998 Alcála Park
San Diego, CA 92110

Phone: (619) 260-4792
Fax: (619) 260-2211
Email: bolender@acusd.edu

Education :

University of Virginia, Charlottesville, VA.
Ph. D. Physical Chemistry, May, 1994

Dissertation : Intermolecular Chiral Recognition and Discrimination Processes Probed by Enantioselective Excited-State Quenching Kinetics.

Wittenberg University, Springfield, OH.
B.A. Chemistry and Physics, June, 1988

Experience :

Assistant Professor, Department of Chemistry, University of San Diego (September 1, 1996 to present).

Teaching responsibilities: Advanced Integrated Laboratory (Physical/Inorganic), Instrumental Analysis, Physical Chemistry, Special Topics (Physical Methods in Chemistry and Biochemistry), Quantitative Analysis, General Chemistry, and Chemistry and Society (with Laboratory).

Research interests: 1) Inter-molecular energy-transfer and electron-transfer processes as probes of chiral recognition and discrimination, and intra-molecular electron-transfer processes in biologically relevant systems. 2) Field and laboratory analysis of chemical impacts in the environment. Develop new techniques and methodologies for the analysis of field problems.

University Service: Faculty Representative, Barry M. Goldwater Scholarship; Natural Sciences Representative to the Honors Program Committee; Health Sciences Student Evaluation Committee, Chemistry Representative.

Post-Doctoral Research Associate, Department of Chemistry, Pennsylvania State University, Professor William DeW. Horrocks, Jr. Research Advisor (March 1, 1994 - July 15, 1996)

Principal Research Area : Developed a new luminescence technique for probing inter- and intra-molecular electron transfer in proteins between photo-excited tryptophan or tyrosine residues and redox active lanthanide ions. Explored the chiral recognition and discrimination phenomena in dynamic energy transfer processes between lanthanide substituted protein systems (energy donor) and enantiomerically resolved Co^{3+}complexes (energy acceptors). Experimental observations are compared to theoretical results obtained from various molecular modeling programs. Two papers published, and one manuscript in preparation, presented one poster at international conference.

Graduate Research Assistant, Department of Chemistry, University of Virginia, Professor F.S. Richardson, Thesis Advisor (November 1988 - February 1994)

Principal Research Area : Research examines the chiral recognition and enantioselective energy transfer processes between a solution mixture of a racemic, luminescent lanthanide complex (energy donor) and an enantiomerically resolved cobalt complex (energy acceptor). Other research entailed the experimental and theoretical characterization of the electronic state structure of several lanthanide containing crystalline systems via polarized absorption, excitation, and emission (steady state and time resolved) spectroscopy at cryogenic temperatures; and the use of a semi-empirical computational program for the analysis and modeling of lanthanide electronic energy-level structure. Published seven papers in peer-reviewed scientific journals, Two manuscripts currently in preparation. Presented four papers at regional, national, and international conferences.

Research Interests:

Continued study of dynamic molecular (chiral) recognition and discrimination via energy transfer and electron transfer phenomena as applied to small molecule and biological systems. Development of fast (nanosecond timescale) chiroptical fluorescence instrumentation.

Investigating the chemical impacts on benthic species in Bahia Magdelena.

Grants and Awards :

"An Environmental Investigation of Bahia Magdelena (Baja California Sur)" University of San Diego, Trans-Border Institute, $12,500

Nominated – Senior Class (1999) Outstanding Faculty Award, University of San Diego

U.S. National Science Foundation Instrumentation for Laboratory Improvement Grant (NSF# 9750919)
Funded July 1, 1997 - $28,679

Allan Talbott Gwathmey Memorial Award, Outstanding Research in the Physical Sciences and Engineering University of Virginia, 1994
Dean's Research Fellowship, University of Virginia, 1989 - 1990
Phillip Morris Research Fellowship, University of Virginia, 1988 - 1989
Pratt Research Fellowship, University of Virginia, 1988 - 1991
Outstanding Junior and Senior Chemistry Major, Wittenberg University 1987, 1988.

Memberships:

American Chemical Society
Division of Physical Chemistry
Council for Undergraduate Research

Publications

"Chiral Recognition Probed Stern-Volmer Quenching Kinetics" James P. Bolender, Andrew Meyers, Joseph Cordaro, and Ryan S. Ries, manuscript submitted to *Analytical Chemistry*.

"Pore Fomation by Apoptotic Cytoplamic Peptide of Neurotrophin Receptor p75NTR", Martha L. Medina, Barbara S. Chapman, James P. Bolender, and Leigh A. Plesniak, submitted to *Biophysical Journal*.

"Chirality-Dependent Interactions between Molecular Propeller Structures in Solution. Chiral Recognition and Discrimination Processes Modulated by Changes in Stereochemical and Electronic Structure." James P. Bolender and F.S. Richardson, manuscript in preparation.

"Chiral Recognition in Dynamic Energy Transfer Between Lanthanide Substituted Cod(III) Parvalbumin and Chiral Werner-Type Complexes", James P. Bolender, Xiong Sun, and William DeW. Horrocks, Jr., manuscript in preparation.

"Chirality-Dependent Interaction Between Molecular Propellor Structures in Solution. Chiral Recognition and Discrimination Processes Modulated by Temperature and Incremental Changes in Structural Chirality." James P. Bolender and F.S. Richardson, manuscript in preparation.

"Lanthanide Ions as Redox Probes of Long-Range Electron Transfer in Proteins." Ronald M. Supkowski, James P. Bolender, Wendy D. Smith, Lewis E.L. Reynolds, and William DeW. Horrocks, Jr.; *Coord. Chem. Rev.*, **185-186** (1999) 307-319.

"Photosensitized Near Infrared Luminescence of Ytterbium(III) in Proteins and Complexes Occurs Via an Internal Redox Process." William DeW. Horrocks, Jr., James P. Bolender, Wendy D. Smith, and Ronald M. Supkowski; J. Am. Chem. Soc. **119** (1997) 5972-5973.

"Polarized Optical Spectra, Transition Line Strengths, and the Electronic Energy-Level Structure of $Eu(dpa)_3^{3-}$ Complexes in Single Crystals of Hexagonal $Na_3[Yb_{0.95}Eu_{0.05}(dpa)_3]\bullet NaClO_4\bullet 10H_2O$." T.A. Hopkins, James P. Bolender, David H. Metcalf, and F.S. Richardson, *Inorg. Chem*, **35** (1996) 5347-5355.

"Polarized Optical Absorption and Emission Spectra, and the Electronic Energy-Level Structure of $Tb(dpa)_3^{3-}$ Complexes in $Na_3[Yb_{0.95}Tb_{0.05}(dpa)_3]\bullet NaClO_4\bullet 10H_2O$." T.A. Hopkins, James P. Bolender, David H. Metcalf, and F.S. Richardson, *Inorg. Chem.*, **35** (1996) 5356-5362.

"Chiral Discrimination in Electronic Energy-transfer Processes in Solution. Effects of Temperature and Solution Properties on Chirality-dependent Rate Parameters.", Deborah P. Glover-Fischer, David H. Metcalf, James P. Bolender, and F.S. Richardson, *Chem. Phys.* **198** (1995) 207-234.

"Chirality-Dependent Intermolecular Interactions Probed by Time-Resolved Chiroptical Luminescence Measurements of Enantio-Differential Excited-State Quenching Kinetics", James P. Bolender, David H. Metcalf, and F. S. Richardson, *Chem. Phys. Lett.* **213** (1993) 131-138.

"Chirality-Dependent Excited-State Quenching of $Eu(dpa)_3^{3-}$ and $Tb(dpa)_3^{3-}$ Luminophores by Diastereomeric Structures of Δ-[Co(*trans*-1,2-cyclohexanediamine)$_3$]$^{3+}$ in Aqueous Solution", James P. Bolender, David H. Metcalf, and F.S. Richardson, *J. Alloys and Compounds* 207-8 (1994) 55-58.

"Chiral Discrimination in Electronic Energy Transfer between Dissymmetric Lanthanide (III) and Cobalt (III) Complexes in Solution. Effects of Ligand Size, Shape, and Configuration in the Acceptor Complexes", David H. Metcalf, James P. Bolender, Michael S. Driver, and F.S. Richardson. *J. Phys. Chem.* **1993**, *97*, 553-564.

"Optical Absorption and Emission Spectra of Tb^{3+} in Hexagonal Crystals of $Na_3[Tb(pyridine\text{-}2,6\text{-}dicarboxylate)_3] \bullet NaClO_4 \bullet 10H_2O$" James P. Bolender, David H. Metcalf, and F.S. Richardson. *J. Alloys and Compounds*, **1992**, *180*, 177-181.

"f-Electron Localization / Delocalization Phenomena in $PrBa_2Cu_3O_7$ and $CmBa_2Cu_3O_7$" L. Soderholm, C.-K. Loong, G.L. Goodman, U. Welp, J. Bolender, and C.W. Williams. *Physica B*, **1990**, *163*, 655-658.

"The Synthesis and Characterization of $CmBa_2Cu_3O_7$." L. Soderholm, G.L. Goodman, U. Welp, C.W. Williams, and J. Bolender. *Physica C*, **1989**, *161*, 252-256.

Scientific Presentations

Invited Oral Presentation: "Discrimination in the Undergraduate Laboratory: Stern-Volmer Quenching Experiments as a Probe of Chiral Recognition." James P. Bolender, American Chemical Society National Meeting, "Laser Experiments in the Undergraduate Laboratory: Symposium in Honor of Ben DeGraff", Washington D.C., August 20-24, 2000.

Poster: "Chiral Recognition Probed by Steady-State Luminescence Measurements" James P. Bolender, Jr., Andrew Meyers*, Joseph Cordaro*, and Ryan S. Ries*, American Chemical Society National Meeting, San Francisco, California, March 26-30, 2000.

Poster: "Chiral Recognition Probed by Steady-State Luminescence Measurements" James P. Bolender, Jr., Andrew Meyers*, Joseph Cordaro*, and Ryan S. Ries*, Western Spectroscopy Association Conference, Monterey, California, January 26-28, 2000.

Poster: "Exploration of the Electronic Interactions between Fluorescent Calcium Indicators and Various Lanthanide Ions" Ryan S. Ries*, Kristina Pohaku#, and James P. Bolender, National American Chemical Society Meeting, Anaheim, April 1999; and University of San Diego Student Research and Internship Conference, April, 1999.

Poster: "Binding of Lanthanide Ions to the Fluorescent Calcium Indicator, Fura-2: Ion Size Effects on Fluorescence" Ryan S. Ries* and James P. Bolender, University of San Diego Student Research and Internship Conference, April, 1999.

Poster: "Synthesis and Fluorescence Characterization of Tyrosine-EDTA Derivatives." Timothy Clark*, Joseph Cordaro*, and James P. Bolender, University of San Diego Student Research and Internship Conference, April, 1999.

Poster: "Fluorescence Studies of Fluorophore-Cyclodextrin Inclusion Complexes: Changes in Molecular Environments, and their Effect on Fluorescence.", Andrew Meyers*, Ryan S. Ries*, and James P. Bolender, University of San Diego Student Research and Internship Conference, April, 1999.

Poster : Fall Assessment Event, University of San Diego, November 12, 1997
"Bringing the Scientific Meeting to the Upper Division Laboratory"
James P. Bolender.

Poster : 40th Annual Meeting of the Biophysical Society, Baltimore, MD., February 17-21, 1996.
"Chiral Recognition in Dynamic Energy Transfer Between Lanthanide Substituted Cod(III) Parvalbumin and Chiral Werner-Type Complexes"
James P. Bolender, Xiong Sun, and William DeW. Horrocks, Jr.

Poster : 20th Rare Earth Research Conference, Monterey, CA., September 12-17, 1993.
"Chirality-dependent Excited-State Quenching of $Eu(dpa)_3^{3-}$ and $Tb(dpa)_3^{3-}$ Luminophores by Diastereomeric Structures of Δ-[Co(*trans*-1,2-cyclohexanediamine)$_3$]$^{3+}$ in Aqueous Solution."
James P. Bolender, David H. Metcalf, and F.S. Richardson

Oral presentation : 43rd Southeast Regional American Chemical Society Meeting, Richmond, Virginia, November 12-15, 1991.
"Enantioselective Energy Transfer Between Dissymmetric Lanthanide (III) and Cobalt (III) Complexes in Solution."

Poster : 19th Rare Earth Research Conference, Lexington, Kentucky, July 14-19, 1991.
"Polarized Luminescence and Absorption Spectra of Tb^{3+} and Eu^{3+} in Trigonal Na_3[Ln(pyridine-2,6-dicarboxylate)$_3$] $\bullet NaClO_4 \bullet 10H_2O$."
James P. Bolender, David H. Metcalf, and F.S. Richardson

Oral Presentation : 69th Annual Virginia Academy of Sciences Meeting,Blacksburg, Virginia, May 21-24, 1991.
"Polarized Luminescence and Absorption Spectra of Tb^{3+} and in Trigonal Na_3[Ln(pyridine-2,6-dicarboxylate)$_3$] $\bullet NaClO_4 \bullet 10H_2O$."

* indicates undergraduate students # indicates highschool students

General Presentations

"Chiral Drugs", Science Lecture Series, University of San Diego, November 1999.

"My Love is Chemical, The Chemistry of Attraction", Science Lecture Series, University of San Diego, February 1999.

"Cold Fusion", Science Lecture Series, University of San Diego, April 1998.

Hiram Alejandro Sarabia-Ramirez
3546 Beyer Blvd. #204
San Ysidro, CA 92173
(619) 428-2862
hsarabia@students.acusd.edu

Education

University of San Diego
M.S. Marine Science — Anticipated completion Spring 2001
GPA 3.33

Thesis: Patterns in the structure and composition of meio- and macrobenthic invertebrate communities along a nutrient and lead pollution gradient in Bahia Magdalena, B.C.S., Mexico.

B.A. Marine Science (emphasis in Biology) — May 1997
GPA 3.23

Awards and Accomplishments

USD Excellence in Marine Science Research Award 1997
(Scripps Institution of Oceanography Research Cruise) 1997
Who's Who Among American Colleges and Universities 1997
Arcaro Academic Scholarship recipient 1993-1997
USD Dean's and President's list 1993-1994

Research Experience

Bahia Magdalena Biomonitoring Program. 1998 - Present

Working in conjunction with scientists from the Centro de Investigacion Cientifica y Educacion Superior de Ensenada (CICESE) and the School for Field Studies Center for Coastal Studies (SFS-CCS) in Mexico, developed field and lab methodologies and established an invertebrate community database to serve as the foundation for the first biomonitoring program in Bahia Magdalena. This biomonitoring program is now funded for the next two years by a grant from the Packard Foundation and is undergoing expansion to include a remediation component. Under this project, trained undergraduate and incoming graduate students in the marine and environmental sciences to perform environmental chemistry and benthic community analyses and coordinated field sampling.

Work Experience

USD Arts & Sciences, Part-time Lecturer in Marine & Environmental Studies 1997 – Spring 2000

Teach hands-on marine science field laboratory that develops student's critical thinking, field sampling, and data analyses and interpretation skills. Developed and implemented field exercises to strengthen student's applied skills and understanding of scientific concepts. Taught both Marine Science 1 and Marine Science 20, for marine science majors, and edited field laboratory manuals for both labs. In addition, assisted in the instruction of both Marine Science 131 (upper division biological marine science) and 150 (physicochemical oceanography), which involve semester long field-based environmental impact assessment projects and laboratory and field based physicochemical oceanography exercises, respectively.

Ocean Imaging Inc., Remote Sensing Analyst and Research Intern Summer 1997 & 1999

Processed and analyzed ocean satellite imagery for university and government research, commercial, and coastal management applications.

USD Marine & Environmental Studies Laboratory, Laboratory and Research Assistant 1994 - 1997

Assisted faculty with research, field collection, class projects, computer hardware and software questions, and helped operate marine laboratory facility.

Skills

Native Spanish speaker, experience in chemical and biological field sampling and laboratory analyses, working knowledge of HTML, UNIX (SUN & HP), remote sensing and extensive training in GIS (ArcView & ArcInfo).

Personal Interests

Founder and President of Baja Conserva (international, non-profit, conservation organization)
Mentoring programs and Science Olympiad training for inner-city middle/high school students

B. CHRIS STRANSKY

Laboratory Co-Manager/ Aquatic Biologist
(AMEC San Diego Bioassay Laboratory)

Professional Summary

Mr. Stransky joined the bioassay laboratory in 1994 and currently co-manages the San Diego Laboratory operations. Chris's experience has centered on marine ecology, aquatic toxicology, risk assessment, and analytical chemistry. Primary management responsibilities include oversight of dredged material and sediment risk assessment projects, toxicity identification evaluations (TIEs), storm water projects, and R&D related studies. He also assists with and supervises various field-related activities including sediment collection, test organism collection, and various water quality monitoring studies. He is versed in and participates in all aspects of performing tests under guidelines published by USEPA, ASTM, OECD, State of California, Army Corps of Engineers, the Puget Sound Estuary Program, PSSDA, the Marine Bioassay Project and the State of Washington DOE. To date Chris has had experience with over 10 large-scale dredge material projects, over 35 sediment risk assessment studies, and approximately 30 Phase I and 12 Phase II/Phase III TIEs.

Education

M.S. Marine Ecology, San Diego State University, 1998
B.A. Aquatic Biology, University of California, Santa Barbara, 1992

Employment History

Ogden Environmental/ AMEC Earth and Environmental (Sept. 1994 - Present).

Analytical Technologies Inc - Environmental Chemist (Jan. 1993 - Sept. 1994). Performed a wide range of EPA method organic and inorganic extractions and analyses.

Frank Orth and Associates/ National Marine Fisheries - NMFS Observer (June - Nov. 1992). Responsible for collecting and analyzing catch data, performing marine mammal surveys, and reporting observed violations on fishing vessels in the Gulf of Alaska and Bering Sea.

Memberships/Certifications

Society of Environmental Toxicology and Chemistry - Board Member, So. Cal Chapter (1997-present)
Southern California Academy of Sciences
American Red Cross, CPR and First Aid Certified
SSI Open Water Scuba Certification
OSHA Hazardous Waste Operations and Emergency Response Training (Section 1910.120). Initial Training: Feb. 2, 1996

Summary of Core Skills

1) Aquatic toxicity test methodology and data interpretation 2) toxicity identification evaluations 3) risk assessment studies employing toxicity test procedures 3) analytical chemistry procedures and data interpretation and 4) environmental sample and organism collection techniques, and 5) taxonomy (fish, phytoplankton, zooplankton and benthic invertebrates).

Publications

Stransky, B.C. 1998. Assessment of Sediment Quality Effects in Mission Bay and San Diego Bay on Juvenile White Seabass (*Atractoscion nobilis*) and California Halibut (*Paralichthys Californicus*). San Diego State University Masters Thesis Pub. 287pp.

Clayton, J.R. Jr., B.C. Stransky, A.C. Adkins, D.C. Lees, J. Michel, M.J., Schwartz, B.J. Snyder, and T.K. Reilly. 1996. Methodology for estimating cleaning effectiveness and dispersion of oil with shoreline cleaning agents in the field. Proc. 19th Arctic and Marine Oil Spill Program. June 12-14, Calgary, Alberta Canada. pp. 423-585.

Schiff, K, S. Bay, B.C. Stransky. Characterization of Stormwater Toxicants from an Urban Watershed to Freshwater and Marine Organisms. Accepted for publication in the Southern California Coastal Water Research Project Annual Report 2000-2001.

Presentations

Assessment of Sediment Quality Effects in Mission Bay and San Diego Bay on Juvenile White Seabass (*Atractoscion nobilis*) and California Halibut (*Paralichthys californicus*). Southern Calif. Academy of Science. Cal State Fullerton (May 1998 presentation); 18th Annual National SETAC Conference, San Francisco, CA (Nov 19, 1997 poster).

Toxicity Identification Evaluation (TIE) of Chollas Creek Storm Water using the Freshwater Invertebrate Ceriodaphnia dubia. San Diego Regional Water Quality Control Board (June 18, 1999 presentation); SoCal SETAC Annual Conference, Del Mar, CA (June 17, 2000 presentation).

Methods for Estimating Cleaning Effectiveness, Dispersion, and Toxicity of Shoreline Cleaning Agents at Oil Spills. 17th Annual National SETAC Conference, Washington D.C. (Nov 19, 1996 poster).

PROFESSIONAL EXPERIENCE

Toxicity Identification Evaluations (TIEs) Mr. Stransky managed the following TIE projects. He was responsible for proper experimental design, testing, data analysis, data interpretation, and final report preparation.

Camp Pendleton, CA (March 1997). Determined the cause of effluent toxicity from two wastewater treatment plants. Phase I TIE methods were implemented using kelp spore germination and sea urchin egg fertilization test methodology.

PCR Environmental, Guam (Sept. 1998). Phase I TIE on power plant effluent (Guam Power Authority) and receiving water was performed using an echinoderm egg fertilization test.

Chollas Creek, San Diego, CA (March - April 1999). In support of TMDL development, the cause of toxicity in storm water from Chollas Creek was investigated in a joint effort with the Southern California Coastal Water Research Project (SCCWRP). Phase I, II, and III TIE methods were conducted for three storm events using the freshwater cladoceran *Ceriodaphnia dubia*, a marine crustacean *Mysidposis bahia*, and the sea urchin egg fertilization test.

City of Brawley, CA (Nov. 1999). Determined the cause of toxicity in wastewater from the City of Brawley wastewater treatment plant. Phase I TIE methods were implemented using the fathead minnow *Pimephales promelas* and the freshwater cladoceran *Ceriodaphnia dubia*.

Integrated Environmental (Sept. 2000). Determined the class of compounds responsible for toxicity in a process water. Phase I TIE methods were implemented using the fathead minnow *Pimephales promelas*.

Law Crandall, CA (April 2000 - Present). Last year and currently we are evaluating the cause of toxicity in a large number of storm water samples collected in the San Diego region. Phase I, II, and III TIE methods have been conducted using the marine crustacean *Mysidposis bahia*.

Dredeged Material Evaluations Mr. Stransky assisted with the conduct and management of the following dredged material evaluation projects:

Sediment Disposal Study - CVN Homeporting Project, Naval Air Station North Island U.S. Navy Southwest Division (July 1995 - Oct. 1997). A comprehensive testing program was designed to identify and rank areas of sediment contamination in a proposed 2-million-cubic-yard dredge footprint. The program included initial collection of sediment cores at over 70 locations in the dredging area, followed by separation of each core into three subsections. Subsections were observed for appearance, and analyzed for particle size, total organic carbon, and toxicity using a solid-phase amphipod bioassay. Results of the testing program were used in the identification of appropriate dredged material disposal options and the design of a follow-up testing program to meet the necessary disposal criteria. Based on the information derived for the study outlined above, a follow-up program was designed and conducted with the goal of obtaining

permits for beach nourishment, ocean disposal, and on-site fill. This study included physical, chemical, and a suite of bioassay analyses.

Vertical and Horizontal Contamination Gradient Analysis – Piers 2 and 3, Naval Station San Diego U.S. Navy Southwest Division (Aug. 1997). A comprehensive testing program was designed to identify and rank areas of sediment contamination in two proposed dredged footprints. The program included collection of sediment cores at over 50 locations in the dredging areas, followed by separation of each core into three subsections. Subsections were observed for appearance, and analyzed for particle size, total organic carbon, and toxicity using a solid-phase amphipod bioassay. Results of the testing program were used in the identification of appropriate dredged material disposal options and the design of follow-up testing program to meet the necessary disposal criteria.

Port of San Diego 10th Street Marine Terminal Expansion (May - Oct. 1998). In an effort to expand the capabilities of the 10th Street Marine Terminal in San Diego Bay, the Port of San Diego developed a testing program to evaluate the quality of approximately 3,280,000 cubic yards of harbor sediment to be dredged from the Central Navigation Channel of San Diego Bay. The testing program included a combination of physical, chemical, bioassay, bioaccumulation examinations to determine the overall sediment quality in the project area.

The Port of Long Beach (Feb. 1998). Evaluation of dredged material was performed for a maintenance dredging project consisting of approximately 8,800 cubic yards of bay sediment from 5 sites within the Port of Long Beach. To characterize this sediment for disposal purposes, a testing program was conducted by Ogden Environmental and Energy Services (Ogden). Test sediment was collected at 15 locations within the five separate dredge footprints. The sediment characterization program included a combination of chemical and physical examinations to determine the suitability of this material for disposal. Test procedures employed in this study followed standard methods outlined by the Los Angeles District of the Army Corps of Engineers (ACOE) and the Environmental Protection Agency Region 9 (EPA), and were consistent with the site-specific Sampling and Analysis Plan (SAP) prepared for the Port prior to initiation of the field collection operation.

Additional Dredged Material Quality Assessments: Mr. Stransky also assisted with the management and conduct of aspects related to sample collection, toxicity testing, and report preparation for the following dredged material projects: Naval Station San Diego, Chollas Creek (March 1995); US Navy Pac. Div. (Pearl Harbor, Hawaii, 1996); Continental Maritime Berth Expansion San Diego Bay (1997); Port of Long Beach (Sept. 1998 and Oct. 1999); Port of LA (Berths 121, 126 and 191, March 1997) and Port of San Diego (Dec. 1999).

Sediment Quality Risk Assessments and Remediation Monitoring Studies

A few of the projects Mr. Stransky has assisted with the conduct and management of are outlined below:

Pearl Harbor Superfund Ecological and Human Health Risk Assessment (Aug – Nov. 1996). As a part of this large on-going study, the lab conducted 10-day amphipod

survival and echinoderm egg fertilization assays on sediments collected from 219 sites in and around Pearl Harbor. The test species used were *Ampelisca abdita* and *Dendraster excentricus*. Mr. Stransky also assisted with data analysis and risk model development.

Mouchel Asia Limited, SSDS Stage 1 Baseline Monitoring and Performance Verification (Dec. 1996 - July 2000). Quarterly testing of six sediment sites using *Ampelisca abdita* and *Neanthes arenaceodentata* were conducted under the direction of the Environmental Protection Department of the Hong Kong Government. This was a long-term effort to assess outfall impacts on the surrounding sediments.

Mouchel Asia Limited, Environmental Monitoring for Contaminated Mud Pit II (April 1996 - Present). Quarterly testing of 12 sediment sites in East Sha Chau using *Ampelisca abdita*, *Neanthes arenaceodentata*, and *Mytilus edulis* is conducted under the direction of the Environmental Protection Department of the Hong Kong Government. Regional and site-specific impacts of operations at a mud pit previously dredged sediments are being evaluated.

Additional Marine and Freshwater Sediment Risk Assessment and Remediation Project Experience (1994 - Present) Includes: US Navy CLEAN (Guam & Midway Island); Montgomery Watson (Hong Kong), Dames and Moore (Castro Cove, San Francisco Bay); Chevron (yearly monitoring in the marine receiving environment off El Segundo, CA); ENSR (Thea Foss Waterway, WA); Ogden (quarterly testing for Beazer in Charlston, SC and a risk assessment of sediments in Valdosta, GA); ThermoRetec (risk assessment projects in the State of Washington including Renton, the North Platte River, Lake Washington and the Port of Bellingham and a risk assessment project in Soda Lake, Idaho).

Research and Development Projects

Marine Oil Spill Cleanup Assessment - Marine Spill Response Corporation. (April 1995). Mr. Stransky was involved in all aspects of designing and building a field test kit to be used for the assessment of cleaning effectiveness and toxicity of shoreline cleaning agents used in response to oil spills. Primary responsibilities included assisting in developing and validating new experimental methods, experimental design, writing SOPs, and building a functional test kit.

EPA Interlaboratory Study (Aug. 1999 - May 2000). Mr. Stransky managed a study coordinated by DynCorp to evaluate the interlaboratory variability for a number of EPA standard test methods. Our lab coordinated sample prep and shipping to 12 other labs for acute and chronic tests using the inland silverside minnow *M. beryllina*. Prior to the interlaboratory study, a series of confirmation studies were performed using *M. beryllina* to finalize the most appropriate methodology to be implemented. The Ogden laboratory also participated in the following methods (acute and chronic tests using *P. promelas, C. dubia*, and *M. bahia*, and *Selenastrum* algae growth.

MARILYN J. SCHWARTZ
Unit Manager, Amec Bioassay Laboratories

SUMMARY OF QUALIFICATIONS

Ms. Schwartz joined Amec (formerly Ogden Environmental) in 1990 and currently serves as the manager of Amec's two aquatic toxicology laboratories located in San Diego, California and Fife, Washington. Her primary responsibilities are oversight and management of the staff as well as fiscal and technical operations of the laboratories, marketing and business development, developing future direction of technical services and market areas, and general management including client contact, regulatory liaison and support, scheduling of testing and personnel, final data and statistical analysis review, report review and approval, laboratory cost controls, financial management, and equipment and animal procurement and subcontracting. The unit currently totals 21 employees.

Ms. Schwartz currently manages laboratory projects for more than 75 clients, ranging in scope from storm water and NPDES permit oversight and compliance monitoring to OPPTS and OECD product evaluation studies to multiple phase toxicity identification evaluations. In addition, she provides coordination and oversight for the laboratory components of large-scale sediment collection and analysis projects in conjunction with Amec's aquatic scientists.

Prior to her current position, Ms. Schwartz was QA/QC supervisor and was responsible for review of all data generated by the laboratory; coordinating internal and external audits; statistical analysis of the data; preparation and implementation of training and standard operating procedures for test conduct and routine laboratory activities; and the update and maintenance of laboratory, training, and QA/QC documentation and records. As a laboratory technician upon joining the firm, she was versed in all aspects of marine and freshwater testing procedures under U.S. EPA, State of California, ASTM, and Marine Bioassay Project guidelines.

EDUCATION

B.A. Ecology, Behavior, and Evolution, University of California at San Diego, 1990
Hazardous Materials Management Certificate, University of California at San Diego, In progress.

PROFESSIONAL REGISTRATIONS/AFFILIATIONS/CLEARANCES

OSHA Hazardous Waste Operations and Emergency Response Training (§ 1910.120)
Initial Training, August 1991; 8-Hour Refresher, Annually
American Heart Association Basic Life Support, Type A; CAL OSHA Basic First Aid
Society of Environmental Toxicology and Chemistry - National Organization Member
Society of Environmental Toxicology and Chemistry - So. California Chapter Past President/Board of Directors
Southern California Toxicity Assessment Group - QA/QC, Methods, and Policy Committee Member
Southern California Academy of Sciences - Member

PROFESSIONAL EXPERIENCE

Ms. Schwartz has conducted and managed programs of varying size and complexity for over 100 clients, partially represented by the following:

Storm Water Programs: City of San Diego; California Department of Pesticide Regulation Port of San Diego; Regional Water Quality Control Board (San Diego Region); National Steel and Shipbuilding

Company, Continental Maritime San Diego, Southwest Marine, The Irvine Company, Law Crandall, Navy Public Works, Oceanside Marine Centre, and Navy Environmental Laboratory.

Research/Industrial: National Steel and Shipbuilding Company (NASSCO), Southwest Marine, Campbell Shipyards, Marine Spill Response Corporation (MSRC); Virgin Islands Rum Institute Limited (VIRIL); U.S. Navy - San Diego, Honolulu, and Guam; Sea World; Chevron - California and Hawaii; Exxon; Texaco; Torch Operations; Pacific Offshore Operators, Inc.; Mouchel Asia Ltd. Hong Kong; Montgomery Watson Hong Kong; ICI Surfactants Division; GeoTrans; and Continental Lime.

Cities/Municipalities/WWTFs: San Diego; Auburn; Rialto; Santa Paula; Fallbrook; Colton; Oceanside; Encina; San Elijo Joint Powers Authority; Aliso Wastewater Management Authority; SERRA; Tacoma, Washington; Boise, Idaho; Blackfoot, Idaho; Fairbanks, Alaska; Kenai, Alaska; Honolulu, Hawaii; Washington Department of Ecology Manchester Laboratory; and more than a dozen facilities located in the Imperial Valley of California including the cities of Calexico; Imperial; Holtville; El Centro; Seeley; Brawley; Niland; Calipatria; Coachella; Westmorland; and facilities of Sunset Mutual; Imperial Valley College; Date Gardens; KOA; and the Desert Water Agency.

Counties/Water Districts/Power: Orange County Sanitation District; Los Angeles County Sanitation District; Imperial Irrigation District - Steamplant, Grasscarp Farm, and Drain Water Quality Improvement Program; Ormesa Geothermal Facilities; San Diego Gas & Electric; Pacific Gas & Electric; Guam Power Authority; Fluor Daniel Hanford Waste Management; and Southern California Edison's San Onofre Nuclear Generating Station.

SEDIMENT PROJECT DESCRIPTIONS

Pearl Harbor Superfund Ecological and Human Health Risk Assessment. Ten-day amphipod survival and echinoderm fertilization assays were conducted using sediment collected from 219 sites in and around Pearl Harbor. The test species used were *Ampelisca abdita* and *Dendraster excentricus*. This program was extremely time sensitive, with all sites sampled and testing initiated within a 14-week period.

CVN Homeporting EIS – U.S. Navy, Southwest Division. Performance of the sediment characterization portion of the project, which addresses potential impacts associated with homeporting a nuclear-powered carrier at Naval Air Station North Island. The project includes dredging to accommodate deep draft; power intensive ships; demolition of some existing facilities; and construction of new piers, maintenance buildings, and other facilities. Major environmental issues include quality of bottom sediments and evolution of disposal sites, potential impacts from sediment toxicity, and loss of eelgrass habitat.

Mouchel Asia Limited, SSDS Stage 1 Baseline Monitoring and Performance Verification. Quarterly testing of six sediment sites using *Ampelisca abdita* and *Neanthes arenaceodentata* are conducted under the direction of the Environmental Protection Department of the Hong Kong Government. This is a long-term effort to assess outfall impacts continuing into summer of 2000.

Mouchel Asia Limited, Environmental Monitoring for Contaminated Mud Pit II. Quarterly testing of 12 sediment sites in East Sha Chau using *Ampelisca abdita*, *Neanthes arenaceodentata*, and *Mytilus edulis* are conducted under the direction of the Environmental Protection Department of the Hong Kong Government. Regional and site-specific impacts of operations at a mud pit containing previously dredged sediments are being evaluated.

Montgomery Watson Hong Kong, Environmental Monitoring for Pillar Point. Conducted periodic testing efforts in support of both pre- and post-commissioning monitoring at a newly constructed treatment facility at Pillar Point in Hong Kong. Bioassay using *Ampelisca abdita*, *Neanthes arenaceodentata*, and *Mytilus edulis* are conducted under the direction of the Environmental Protection Department of the Hong Kong Government. Regional and site-specific impacts of potential operations are being evaluated.

Port of San Diego. Managed laboratory segments of a contract for the Port of San Diego to perform sediment quality testing in support of proposed dredging plans. In May 1998, Ogden performed Green Book bioassay ocean disposal testing of sediments for one location and separate sediment quality assessments using chemical testing at several additional locations.

Sediment Analysis – Navy CLEAN. Conducted aquatic and terrestrial species testing at multiple sites on Guam and Midway Islands as part of a comprehensive ecological risk assessment program under Ogden's CLEAN program for WESTDIV.

Port of Los Angeles. Three-year Indefinite Quantity Contract (IQC) for the Port of Los Angeles to perform sediment quality tests related to dredging and Port construction. In April 1995, Ogden performed Green Book bioassay ocean disposal testing of sediments for three maintenance dredging projects and three separate sediment quality assessments using chemical testing at locations with unknown sediment quality. For each of these projects, Ogden was responsible for resource agency coordination, collection, testing, data analysis, and reporting of results.

EMPLOYMENT HISTORY

Amec Earth and Environmental, August 1990 - present

Nicholas Buhbe, M.S.

Marine Scientist
AMEC Aquatic Sciences Group

Professional summary

Mr. Buhbe is a marine scientist with over 6 years of experience in environmental assessment. He has conducted a variety of field investigations including sediment characterization, water quality, and biological studies. Duties include field work, report writing, and project management. Mr. Buhbe has also conducted a variety of sediment characterization projects at numerous sites for ocean disposal, unconfined aquatic disposal and remedial action. Biological monitoring studies that Mr. Buhbe has participated in include the LA-5 Ocean Dredged Material Disposal Site monitoring program, the San Onofre Nuclear Generating Station NPDES monitoring program, and numerous eelgrass bed extent and density mapping surveys. Recent water quality monitoring programs for which Mr. Buhbe has been responsible include the Port of Los Angeles Pier 400 Construction Project, the Oceanside Harbor Maintenance Dredging Project, and the Convair Lagoon Capping Project.

Professional qualifications

American Red Cross, CPR and First Aid Certified
OSHA Hazardous Waste Operations and Emergency Response Training (Section 1910.120). Initial training: 17.Feb.95
OSHA DOT Hazardous Materials Transport Training
NAUI Open Water II SCUBA Certification

Education

San Diego State University, M.S. Biology, 1997
University of California, Santa Cruz, B.A. Marine Biology, 1992

Memberships

Divers Alert Network
Western Society of Naturalists

Location

San Diego, California

Summary of core skills

Sediment Characterization

Mr. Buhbe has participated in several sediment characterization studies in the Los Angeles/Long Beach and San Diego harbor complexes. Although projects in the harbor complexes typically opt for the ocean disposal option, Mr. Buhbe has also worked on projects with specialized goals, including projects driven by cleanup and abatement orders, remedial action, and confined aquatic disposal.

Recent project experience includes the Berth 121-124 Maintenance Dredging and Capital Improvement Project for the Port of Los Angeles, the Pier S Realignment Project for the Port of Long Beach, the National City Marine Terminal Extension Project for the Port of San Diego, and the Sediment Characterization and Remediation Plan Project for Southwest Marine in San Diego Bay.

Marine Biology

Mr. Buhbe's background is centered on diverse ecological research, including both intertidal and subtidal biological systems. This experience includes both the collection and analysis of invertebrate and fish population data in southern California. Subtidal research has been carried out in San Diego and Orange Counties, Santa Catalina Island, central California, and the Hawaiian Islands and includes research of kelp forest, eelgrass bed, and sandy substrate habitats. Subtidal research conducted by Mr. Buhbe has used many methods of study, which include spearfishing, otter trawling, benthic grab, the design and use of transect and quadrat methods, and other standard research diving methods. Mr. Buhbe is also familiar with the taxonomy of marine animals and plants, especially invertebrate fauna, including the Mollusca, Echinodermata, Crustacea, Annelida, and other minor phyla.

Water Quality

Mr. Buhbe has also managed water quality projects for the Aquatic Sciences Group, and AMEC's Seabird SBE-19 CTD has been used to conduct water quality compliance studies for several dredging projects in southern California. Routine reporting, interaction with regulatory authorities and interaction with clients to determine the most appropriate methodologies for conducting monitoring work are typical duties that Mr. Buhbe has performed for water quality monitoring studies.

Employment history

1994- present: Marine Scientist, AMEC Earth + Environmental Inc., San Diego, California

1994: Teaching Associate, San Diego State University, San Diego, California

1992-1994: Assistant Marine Collector, San Diego State University, San Diego, California

Project Details

Port of San Diego – National City Marine Terminal Wharf Extension: In order to accommodate additional vessels at the National City Marine Terminal, a sediment characterization was necessary to determine the appropriate disposal options for dredging of areas for both maintenance and capital improvement portions of the project. Mr. Buhbe took part in the 13-site field effort and was responsible for incorporating chemistry and bioassay results into the final report, which was submitted to ACOE in support of dredge/disposal permitting.

U.S. Navy – P-326 Sediment Characterization: In order to accommodate deep-draft power-intensive vessels at the 32nd Street Naval Base, a sediment characterization was necessary to determine the appropriate disposal options for approximately 740,000 cubic yards of sediment. Field efforts requiring the coordination of subcontractors and multiple Navy commands were necessary to complete the project in an efficient manner. Mr. Buhbe was responsible for coordinating chemistry and bioassay laboratory reporting and incorporating results into the final report.

LA-5 Ocean Disposal Site Monitoring - CVN Homeporting Project, Naval Air Station North Island, U.S. Navy Southwest Division: Due to the large volume of sediment disposed of at the LA-5 Ocean Dredged Material Disposal Site, the Environmental Protection Agency (EPA) and U.S. Army Corps of Engineers (ACOE) required the U.S. Navy to conduct monitoring of the site and its vicinity. Monitoring techniques included bathymetric, side-scan sonar, sediment profiling, and benthic grab techniques. Mr. Buhbe was responsible for drafting the Sampling and Analysis Plan, participating in the coordination of the task groups, serving as the task manager of the benthic grab portion of the survey, characterizing the benthos of 15 van Veen grab samples, and producing the introduction and benthos sections of the three post-monitoring reports completed to date.

Port of Long Beach - Pier S Dredging and Realignment Project: The port is in the planning process of converting an oil production facility into a container terminal in the vicinity of the Cerritos Channel. The project will require the dredging of approximately 447,000 cubic yards of sediment to accommodate the facility, and will therefore be subject to Sections 10 and 404 portions of the Clean Water Act. As project manager, Mr. Buhbe wrote the sampling and analysis plan required by the EPA/ACOE, coordinated the field collection of sediments and the bioassay and chemical testing program, and was responsible for the production of the final report, which included recommendations regarding the appropriate disposal of the sediment.

Port of Los Angeles Pier 400 – Water Quality: Mr. Buhbe is currently responsible for coordinating weekly sampling events with Great Lakes Dredge and Dock Co., the primary contractor on the POLA Pier 400 team. Sampling includes taking water samples from mid depth using a van Dorn bottle and using a Seabird SBE 19 to obtain turbidity, dissolved oxygen, pH, depth, and salinity data from dredging operations sites as well as reference sites in the harbor. Reporting has included quality control of chemistry data generated by PTAS, interaction with the Regional Water Quality Control Board (RWQCB) regarding changes to the water quality permit, and coordination of sampling with multiple dredging efforts under the jurisdiction of the water quality permit.

Navy Homeporting Project – Water Quality Monitoring: The U.S. Navy is homeported the aircraft carrier USS *Stennis* to Naval Air Station North Island (NASNI), San Diego, in 1999. To ensure safe navigation, the San Diego Channel was dredged to -53 feet MLLW by the hopper dredge *Stuyvesant*. Mr. Buhbe was responsible for coordinating weekly and monthly water sampling with Stuyvesant Dredging Company, and reporting results to the dredge company, the Navy, and the RWQCB.

NASSCO Sediment Characterization: The collection of sediment samples from 102 subtidal coordinates, which were located using DGPS, served as the basis for this characterization study. Subsequent reporting of low levels of lead and zinc contamination showed the need for the designation of 13 additional stations to fully explore the extent of contamination at the site. Reporting is now complete; action by the RWQCB regarding the four identified remediation areas is pending.

Southwest Marine Sediment Characterization: This industrial shipyard on San Diego Bay is currently undertaking sediment characterization efforts to find the extent and nature of heavy metal and PCB contamination within its leasehold. Mr. Buhbe designed a sampling and analysis plan for the project and participated in the field collection and reporting tasks of this project. The project is currently under review by the RWQCB.

U.S. Navy – P-326 Initial Characterization Study: Characterization of sediments is a key part of obtaining the necessary permits to proceed with a dredging project. This project involved the first of two sampling events to characterize the sediments of an area scheduled for dredging and subsequent pier refurbishment. Data collected during this project was used to produce an EIR/EIS document assessing the best option for placement of a new deep-draft power intensive vessel pier.

Long Beach Naval Complex – EIR/EIS: Mr. Buhbe was responsible for writing the portions of the EIR/EIS relating to the marine environment. This consisted of assessing potential effects of conversion of the naval complex from military/industrial uses to commercial uses that were proposed as redevelopment options for the property.

Soliflo Dredging – Chollas Creek Water Quality Project: Results of this study included Secchi disk, TSS and TRPH data, which were reported to the RWQCB via the client.

Soliflo Dredging – Newport Dunes Water Quality Project: Mr. Buhbe was responsible for collection of water quality parameters using a Sea-Bird Electronics SBE-19 CTD, coordination of sampling with client field personnel, and summarizing the water quality (including depth and turbidity) results.

Port of Los Angeles – Berths 121-126 and 191 Maintenance Dredging Sediment Characterization: This project required the collection of marine sediment using vibracore equipment, and coordinating sampling with the Port of Los Angeles, the berth tenants, and subcontractors. Sediment samples were later composited and tested for bioassay toxicity and for chemical contaminants. Mr. Buhbe's duties included field manager responsibilities in addition to reporting the results to the Port for subsequent review.

Teledyne Ryan Aeronautical – Convair Lagoon Water Quality Study: Mr. Buhbe was responsible for the coordination and reporting of water quality conditions present at the lagoon and collection of water samples during construction of a berm and cap system that would entomb contaminants. Techniques included the use of Secchi disc and van Dorn samplers as well as Ocean Sensors and Sea-Bird Electronics CTDs equipped with DO and turbidity meters to monitor parameters as required by the ACOE and RWQCB.

CTO 206 – Pearl Harbor Naval Complex: The project involved the characterization of Pearl Harbor in terms of chemical contaminants from a variety of sources from agricultural to industrial. Mr. Buhbe traveled to Hawaii to participate in a long-term effort to collect sediment samples that were subsequently tested using toxicity, risk assessment, and chemical characterization methodologies. Operations consisted of working on a catamaran vessel equipped with a DGPS; sampling at predetermined sites and with clamshell dredge, clean techniques, and orderly and efficient data recording; and dealing with unexpected events.

Teledyne Ryan Aeronautical – Convair Lagoon Eelgrass Study: Responsible for written report summarizing the extent and density of *Zostera marina* and how this related to past surveys. Mr. Buhbe participated in surveying the location and elevation of the upper intertidal limit of the *Zostera marina* beds at the site as well as the location and density of subtidal *Zostera marina* beds in the lagoon. Participated in collection of sediment and tissue samples from the lagoon to assess toxicity and bioavailability of contaminants. Results were used to assess the design of a restoration plan for the site.

Caltrans – Coronado Bridge Eelgrass Survey: The westernmost portion of this bridge is supported by pilings in shallow subtidal habitat that includes eelgrass habitat. In preparation for the seismic retrofitting project, Mr. Buhbe participated in a survey assessing the presence and density of eelgrass (*Zostera marina*) using standard transect methods, including the surveying of control sites in San Diego Bay. Two subsequent studies have been undertaken to document the variation in the extent and density of eelgrass at the site.

Beach Replenishment Survey – CVN Homeporting Project, Naval Air Station North Island, U.S. Navy Southwest Division: Participated in sampling nearshore areas from Oceanside to Imperial Beach, California, to find suitable

sites for beach replenishment as a disposal option for dredged material. Sites were characterized from the intertidal zone to 30 feet subtidally, and substrata and biota were recorded. Sediment samples were also collected for chemical and grain size analyses. Responsible for data collection and analysis, and report preparation.

Manson Construction – Port of Los Angeles Dredge Water Quality Monitoring: Participated in field surveys to monitor water quality per RWQCB requirements at several dredge sites at the Port of Los Angeles. Responsible for data collection (conductivity, temperature, pressure, turbidity, dissolved oxygen, pH, and salinity) and report preparation.

Southern California Edison (SCE) - San Onofre Nuclear Generating Station (SONGS) Radiological Monitoring: Responsible for collection of samples and communication with California State Department of Health Laboratory, as well as contracted agents and SCE as to collection time, conditions, and completion of sampling efforts. The sampling regime includes collection of fish, crustacean, mollusc, kelp, water, and sediment samples for analysis by independent laboratories.

Navy CLEAN – Naval Air Station, Midway Atoll; Baseline Sampling: Was responsible for the inventory and sorting of invertebrate fauna from benthic sediment samples and identifying invertebrates to the Family level.

Southern California Edison (SCE) - San Onofre Nuclear Generating Station (SONGS) Operational Studies: Participated in fish trawl sampling in the Southern California Bight to survey fish population parameters as well as kelp forest surveys assessing long-term temporal variation in community biology of the San Onofre kelp forest. Fish population parameters include identification to species level and the use of length measurements to assess both long-term changes in the density of fish populations as well as changes in population biology of various species, especially *Seriphus politus* and *Genyonemus lineatus*. Kelp forest surveys included estimating density of *Macrocystis pyrifera* as well as other kelps and invertebrates. These data were used to construct long-term records of community structure in the kelp forest near SONGS.

Richmond Harbor Benthic Infauna Survey: This study was designed to assess the composition as well as the species diversity of the invertebrate infauna of sediments at a dredging site. Mr. Buhbe sorted infauna from the sediment samples collected and prepared data summaries for the final report.

Southern California Edison (SCE) - San Onofre Mitigation Reef Studies: Participated as a research diver for this study, which seeks to maximize the recruitment of giant kelp (*Macrocystis pyrifera*) on artificial reefs. This involved field experimentation with different reef configurations and assessment of the potential competitive exclusion of kelp by the coelenterate *Muricea californica*.

David Gillespie B.S.

Senior Bioassay Laboratory Technician
AMEC San Diego Bioassay Laboratory

Professional summary

Mr. Gillespie joined the company in May 1995 and has conducted freshwater, marine, and sediment toxicity testing utilizing a variety of aquatic organisms (fish, cladocerans, sea urchins, polychaete worms, molluscs, crustacea, and giant kelp. He is versed in all aspects of performing tests under EPA, Army Corps of Engineers, State of California, State of Washington DOE, ASTM, PSDDA, and Marine Bioassay Project guidelines.

Mr. Gillespie is responsible for routine data collection and test observation, implementation of special project research and requirements including development of toxicity identification evaluation capabilities, assistance with results evaluation, presentation, and reporting, and care and maintenance of laboratory vehicles. He has several years of previous experience in the field of chemistry.

His field experience has included: fish sampling using otter trawls, purse seines, long lines, and crab pots, fish taxonomy, phytoplankton, zooplankton, and benthic invertebrate collection and taxonomy, marine water collection and chemical analysis, eelgrass surveys, and sediment sampling techniques including Van Veen grab, vibracore, and diving.

CERTIFICATIONS

OSHA Hazardous Waste Operations and Emergency Response Training (§ 1910.120)
American Red Cross, CPR, and First Aid Certified

David Gillespie

PADI Divemaster Certification

EDUCATION

MS (in progress), Graduate School of Public Health, San Diego State University, June 2001
B.Sc. (General) Zoology, Botany, Marine Biology University College Galway, Ireland, 1992
B.Sc. (Honors) Botany, University College Galway, Ireland, 1993

Memberships

Society of Environmental Toxicology and Chemistry, So. California Chapter
Southern California Society of Toxicology

Languages

French and German

PROFESSIONAL EXPERIENCE

Marine Sediment Project Experience:

Mouchel Asia Limited, SSDS Stage 1 Baseline Monitoring and Performance Verification. Quarterly testing of six sediment sites using *Ampelisca abdita* and *Neanthes arenaceodentata* are conducted under the direction of the Environmental Protection Department of the Hong Kong Government. This is a long-term effort to assess outfall impacts continuing into summer of 2000.

Mouchel Asia Limited, Environmental Monitoring for Contaminated Mud Pits I/II. Quarterly testing of twelve sediment sites in East Sha Chau using *Ampelisca abdita*, *Neanthes arenaceodentata*, and *Mytilus edulis* are conducted under the direction of the Environmental Protection Department of the Hong Kong Government. Regional and site-specific impacts of operations at mud pit previously dredged sediments are being evaluated.

Mouchel Asia Limited, Performance Verification of Discharge into Victoria Harbour from Tolo Harbour Effluent Export Scheme. Effluent assessment and monitoring using larval development of *Mytilus edulis*, survival and growth of *Atherinops affinis*, bioluminescence of *Microtox* bacteria, and *Selenastrum capricornutum* cell production and density.

Montgomery Watson Hong Kong Ltd., Pillar Point Sewage Outfall Performance Verification. Testing of effluent discharged from the Pillar Point Sewage Outfall using amphipod survival and reburial and bivalve larvae development of the species *Mytilus edulis*. Initial baseline monitoring as well as ongoing assessment. Project is intended to support the site-specific Screening Level Risk Assessment.

ERM Hong Kong, Performance Verification of Discharge of Stanley 1 and ShekO Outfalls. Testing of discharge effluent from the two outfalls as well as associated marine receiving water evaluation to provide information on potential effects to the receiving bodies. *Atherinops affinis* survival and growth, Larval development of *Mytilus edulis*, and survival and growth of the mysid shrimp *Mysidopsis bahia* are the species and endpoints employed.

CVN Homeporting EIS – U.S. Navy, Southwest Division. Performance of the sediment characterization portion of the project which addresses potential impacts associated with homeporting a nuclear-powered carrier at Naval Air Station North Island. The project includes dredging to accommodate deep draft; power intensive ships; demolition of some existing facilities; and construction of new piers, maintenance buildings, and other facilities. Major environmental issues include quality of bottom sediments and evolution of disposal sites, potential impacts from sediment toxicity, and loss of eelgrass habitat.

Pearl Harbor Superfund Ecological and Human Health Risk Assessment. Ten-day amphipod survival and echinoderm fertilization assays were conducted using sediment collected from 219 sites in and around Pearl Harbor. The test species used were *Ampelisca abdita* and *Dendraster excentricus*. This program was extremely time sensitive, with all sites sampled and testing initiated within a 14-week period.

NPDES Procedures. Various projects for approximately 50 to 70 clients per year using federally and state-approved methodologies and guidelines in support of research, industrial, commercial, municipal, power, and water clients.

Toxicity Identification Evaluations (TIEs) - Camp Pendleton, PCR Guam, Port of San Diego, and the San Diego Regional Water Quality Control Board - Involved in the implementation, and reporting aspects of

David Gillespie

Phase I, II, and III TIEs conducted to determine the cause of effluent and stormwater toxicity.

Additional Dredge Material Test Project Experience: Chollas Creek, San Diego Bay; US Navy CLEAN - Guam & Midway Is.; Continental Maritime, San Diego; US Navy Pac. Div. - Pearl Harbor, Hawaii; Port of Los Angeles. Involved in all types and phases of routine dredge material toxicity testing for ocean disposal under the US Army Corps. Engineers "Green Book" guidelines. Experience also includes sample collection.

Environmental Chemist - Analytical Technologies Inc. (March 1993 – May 1995).
Performed a wide range of EPA method organic and inorganic extractions and analyses.

Employment history

Environmental Chemist, Analytical Technologies Inc. Responsible for the preparation and analysis of soil and water samples for volatile and semi-volatile organic compounds using GCMS.
Salmon Farm Biologist. St. Killians Seafarms. Responsible for care and maintenance of salmon stock. Duties included monitoring and treating disease, implementing feeding regimes and harvesting of stock. Carried out all scuba work on site.

John D. Rudolph

Senior Bioassay Laboratory Technician

AMEC San Diego Bioassay Laboratory

Professional summary

Mr. Rudolph joined Ogden in September 1999 and has conducted freshwater, marine, and sediment toxicity testing utilizing a variety of aquatic organisms (fish, cladocerans, sea urchins, polychaete worms, molluscs, crustacea, and giant kelp). He is versed in all aspects of performing tests under EPA, Army Corps of Engineers, State of California, State of Washington DOE, ASTM, PSDDA, and Marine Bioassay Project guidelines.

Mr. Rudolph is responsible for routine data collection and test observation, field collection of test organisms and sample materials, assistance with results evaluation, presentation, and reporting, and care and maintenance of organisms and laboratory systems.

Prior to joining Ogden, Mr. Rudolph's experience centered on Marine Ecology and Taxonomy. While at Hubbs/Sea World Research Institute Mr. Rudolph was involved in projects designed to restore threatened marine fish populations. Duties included population assessments via field sampling, fish taxonomy, larval fish rearing, report writing and presentation.

Professional qualifications

Research Assistant, Hubbs/Sea World Research Institute, 1992

Education

MS Marine Ecology, San Diego State University, 1995

BA Ecology, Austin College, 1992

Languages

German

Certifications

OSHA Hazardous Waste Operations and Emergency Response Training (§ 1910.120)

American Red Cross, CPR, and First Aid Certified

PADI Open Water Certification

Employment history

1995-99: Aquarist, Aquatic Design Systems, design, build and maintain large scale seawater systems

1992-95: Research Assistant, Hubbs/Sea World Research Institute, lab and field data collection, report writing and presentation

Presentations / publications

Toxicity Investigation of Storm Water from Chollas Creek, San Diego: Comparative Impacts to *C. dubia* and *H. azteca*; presentation at Southern California SETAC Meeting, San Diego, April 2000.

John Rudolph

Effect of a predator and vegetation density on defensive behavior of cultured white seabass, *Atractoscion nobilis*. poster presentation at World Aquaculture Society Meeting, San Diego, April 1994.

Detailed core skills or details by project

Mouchel Asia Limited, SSDS Stage 1 Baseline Monitoring and Performance Verification. Quarterly testing of six sediment sites using *Ampelisca abdita* and *Neanthes arenaceodentata* are conducted under the direction of the Environmental Protection Department of the Hong Kong Government. This is a long term effort to assess outfall impacts continuing into summer of 2000.

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ERM Hong Kong, Performance Verification of Discharge of Stanley 1 and ShekO Outfalls. Testing of discharge effluent from the two outfalls as well as associated marine receiving water evaluation to provide information on potential effects to the receiving bodies. *Atherinops affinis* survival and growth, Larval development of *Mytilus edulis*, and survival and growth of the mysid shrimp *Mysidopsis bahia* are the species and endpoints employed.

Toxicity Identification Evaluations (TIEs) - Camp Pendleton, Port of San Diego, and the San Diego Regional Water Quality Control Board - Involved in the implementation of Phase I, II, and III TIEs conducted to determine the cause of effluent and stormwater toxicity.

Additional Dredge Material Test Project Experience: Chollas Creek, San Diego Bay; Continental Maritime, San Diego; US Navy Pac. Div. - Pearl Harbor, Hawaii; Port of Los Angeles. Involved in all types and phases of routine dredge material toxicity testing for ocean disposal under the US Army Corps. Engineers "Green Book" guidelines. Experience also includes sample collection.

NPDES Procedures. Various projects for approximately 50 to 70 clients per year using federally and state-approved methodologies and guidelines in support of research, industrial, commercial, municipal, power, and water clients.

Steve T. Carlson

Laboratory Co-Manager / Aquatic Biologist
(AMEC San Diego Bioassay Laboratory)

Professional Summary

Mr. Carlson joined the company in 1996 and currently co-manages the San Diego Laboratory operations. Steve has worked in the bioassay field since 1992, and his experience centers around marine ecology and aquatic toxicology. Primary management responsibilities include oversight of marine and freshwater effluent testing and NPDES permit monitoring, as well as supervising day-to-day laboratory operations, test scheduling, supply and inventory maintenance, technician training, and managing the lab's QA/QC and data management programs. Steve is well versed in all aspects of performing bioassay tests under guidelines published by USEPA, ASTM, State of California, Army Corps of Engineers, Marine Bioassay Project, and the State of Washington DOE.

Education

B.S. Applied Ecology (marine ecology emphasis), University of California at Irvine, 1987

Certifications

OSHA Hazardous Waste Operations and Emergency Response Training (§ 1910.120)
Hazardous Material Management certificate, UCSD Extension Program
American Red Cross, CPR, and First Aid Certified

Employment History

Ogden Environmental / AMEC Earth & Environmental (Sep 1996 - Present).

Coastal Resources Associates, Inc. - Laboratory Manager (May 1995 - Jul 1996).
Responsibilities were the same as described above in the Professional Summary.

Coastal Resources Associates, Inc. - Laboratory Technician (Nov 1992- May 1995).
Conducted bioassay tests with industrial effluents for NPDES monitoring and general water quality studies. Also involved with sample collection and data entry and analysis.

U.S. Army, Special Forces Operations - Intelligence Analyst (Nov 1987- Jul 1992).
Processed, analyzed, and reported tactical and strategic intelligence for ongoing operations.

Steve T. Carlson

Professional Experience

Southern California Edison, CA (Dec 1992 - Dec 1995). Conducted NPDES permit testing on 7 different power plants located in Southern California. Monthly tests were performed using *Macrocystis pyrifera* (giant kelp), and annual screening tests were performed with the addition of *Haliotis rufescens* (red abalone) and *Menidia beryllina* (inland silverside minnow).

NPDES Permit Monitoring (Sep 1996 - present). Monthly, quarterly, and annual bioassay testing for approximately 50 to 70 clients per year using federally and state-approved methodologies and guidelines in support of research, industrial, commercial, municipal, power, and water clients.

Chemical Product Testing - Uniqema/ ICI Surfactants, DE (1998 - present). Conducted range-finding and definitive toxicity tests on approximately 20 separate chemical products to determine toxicity levels and lethal concentrations to the freshwater cladoceran *Ceriodaphnia dubia* and the fathead minnow *Pimephales promelas*.

Chemical Registration Studies under TSCA (1998 - present). Conducted hazardous material characterization testing under the California Title 22 guidelines set down by the Toxic Substances Control Act. Tests have been performed on over 100 different substances from numerous clients using the fathead minnow *Pimephales promelas*.

Stormwater Toxicity Monitoring (1998 - present). Performed numerous acute toxicity tests using several test species during the stormwater seasons for such clients as the U.S. Navy Public Works Dept., the Port of San Diego, Southwest Marine, NASSCO, Continental Maritime of San Diego, Law Crandall, and The Irvine Company.

Quality Assurance/Reference Toxicant Testing for the USEPA (1998 - present). Supervised and conducted all standard bioassay tests required by the USEPA to be performed on an annual basis with an unknown reference toxicant. All tests were successful and satisfied the requirements for the USEPA Discharge Monitoring and Reporting (DMR) Program, which allows are Laboratory to remain certified to conduct toxicity analyses by the California Department of Health Services.

Dredged Material and Sediment Characterization (1997 - present). Assisted with the conduct of numerous sediment toxicity tests using several species of amphipods, polychaete worms, mysid shrimp, Pacific topsmelt, and inland silverside minnows. Clients included the U.S. Navy, Port of San Diego, Port of Long Beach, Port of Los Angeles, Montgomery Watson (Hong Kong), Mouchel Asia Ltd. (Hong Kong), Beazer (S. Carolina), and Thermo Retec (Washington).

A Water Quality Inventory Series
Biological and Physical/ Habitat Assessment of
California Water Bodies

San Diego Regional Water Quality Control Board: 1999 Biological Assessment Annual Report

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(Data attached)

California Department of Fish and Game
Office of Spill Prevention and Response
Water Pollution Control Laboratory
2005 Nimbus Road
Rancho Cordova, CA. 95670
(916) 358-2858; jharring@ospr.dfg.ca.gov

Program Manager
James M. Harrington

Project Leaders
Peter Ode, Angie Montalvo

Laboratory and Field Technicians
Doug Post, Christopher Sheehy, Mike Dawson