East Basin	Middle Channel	4/5/2007	1800	Bluegill	14		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	17.4		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	15.6		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	11.5		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	15.5		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	6		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	16		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	17.5		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	18.5		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	16		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	11.5		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	14		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	18		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	14.5		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	17.2		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	18		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	16.5		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	15.8		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	15		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	17.7		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	19		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	12		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	11		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	10		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	16		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	12		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	18.5		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	17.5		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	14.2		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	14		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	7		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	18		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	15.7		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	16.2		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	17.7		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	16.6		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	17.5		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	17.4		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	13	e,p	Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	14.8		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	13	e,p	Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	15		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	15		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	12		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	17		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	13	e,p	Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	17.5		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	14.6		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	12.7		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	12.1		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	12	e,p	Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	11.5		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	5.8		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	11		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	6		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	11.5		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	11.4		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Bluegill	6		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Green Sunfish	17		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Green Sunfish	18		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Green Sunfish	16	e,p	Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Green Sunfish	19.4		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Green Sunfish	14		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Green Sunfish	19.1		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Green Sunfish	17.5		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Green Sunfish	11		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Green Sunfish	19		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Green Sunfish	19.7		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Green Sunfish	15		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Green Sunfish	18.5		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Green Sunfish	16		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Green Sunfish	14.9	v	Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Green Sunfish	13	v	Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Green Sunfish	15		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Largemouth Bass	36		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Largemouth Bass	23.7		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Largemouth Bass	34.5		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Largemouth Bass	35		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Largemouth Bass	44		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Largemouth Bass	29	e,p	Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Largemouth Bass	42		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Largemouth Bass	38		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Largemouth Bass	29.1		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Largemouth Bass	32		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Largemouth Bass	25		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Largemouth Bass	24		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Largemouth Bass	35.5		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Largemouth Bass	26		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Largemouth Bass	25.1		Samples collected at middle channel of East Basin-Weston Round 2

East Basin	Middle Channel	4/5/2007	1800	Largemouth Bass	20		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Largemouth Bass	35		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Largemouth Bass	22.8	v	Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Largemouth Bass	23.1	v	Samples collected at middle channel of East Basin-Weston Round 2
East Basin	Middle Channel	4/5/2007	1800	Carp	14		Samples collected at middle channel of East Basin-Weston Round 2
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	5	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	5	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	5	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	5	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	10	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	10	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	10	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	10	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	10	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	10	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	10	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	10	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	15	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	15	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	15	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	15	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	15	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	15	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	15	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	15	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	15	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	15	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	15	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	15	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Bluegill	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	10	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	10	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	10	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	10	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad

East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	35	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	35	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	35	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	35	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	35	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	35	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Black Bullhead Catfish	35	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Largemouth Bass	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Largemouth Bass	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Largemouth Bass	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Largemouth Bass	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Largemouth Bass	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Largemouth Bass	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Largemouth Bass	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Largemouth Bass	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Largemouth Bass	35	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Largemouth Bass	35	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Largemouth Bass	35	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Largemouth Bass	45	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Largemouth Bass	45	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Largemouth Bass	45	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Green Sunfish	10	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Green Sunfish	15	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Green Sunfish	15	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Green Sunfish	15	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Green Sunfish	15	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Green Sunfish	15	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Green Sunfish	15	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Green Sunfish	15	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Green Sunfish	15	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Green Sunfish	15	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Green Sunfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Green Sunfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Green Sunfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Green Sunfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Green Sunfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Green Sunfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Green Sunfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Green Sunfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Green Sunfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Green Sunfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Green Sunfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Green Sunfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Green Sunfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Green Sunfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Green Sunfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Green Sunfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Green Sunfish	20	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Carp	25	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Carp	35	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Carp	35	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Carp	35	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Carp	35	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Carp	35	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Carp	35	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East Side, Middle Channel	4/5/2007	1800	Carp	45	e	2 Coolers combined, Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	5	e	Collected by Weston-DO/CH

East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	5	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	5	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	5	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	5	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	5	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	5	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	5	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	5	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	5	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	5	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	5	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	5	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	5	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	5	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	5	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Bluegill	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston-DO/CH

East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	40	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	40	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	40	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	40	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	40	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	40	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	40	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	40	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Black Bullhead Catfish	40	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Largemouth Bass	25	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Largemouth Bass	25	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Largemouth Bass	25	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Largemouth Bass	25	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Largemouth Bass	25	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Largemouth Bass	25	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Largemouth Bass	35	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Largemouth Bass	35	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Largemouth Bass	35	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Largemouth Bass	45	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Largemouth Bass	45	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Largemouth Bass	45	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	5	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	10	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	15	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	15	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	15	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	15	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	15	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	15	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	15	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	15	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Green Sunfish	20	e	Collected by Weston-DO/CH
East Basin	East of Jefferson St. Bridge	4/6/2007	1200	Carp	25	e	Collected by Weston-DO/CH

East Basin	Middle Section	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	10	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	15	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	20	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	20	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	20	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	20	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	20	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	20	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	20	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Bluegill	20	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Black Bullhead Catfish	10	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Black Bullhead Catfish	40	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Black Bullhead Catfish	40	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Largemouth Bass	35	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Largemouth Bass	45	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Largemouth Bass	45	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Green Sunfish	25	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Green Sunfish	15	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Green Sunfish	15	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Green Sunfish	20	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Green Sunfish	20	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Green Sunfish	20	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Green Sunfish	20	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Green Sunfish	20	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Carp	35	e	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1200	Black Crappie	29.5	v	Collected by Weston-DO/CH-Round 2
East Basin	Middle Section	4/6/2007	1600	Bluegill	15	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Bluegill	15	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Bluegill	15	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	20	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	20	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	20	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	20	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	30	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	30	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	30	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	30	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	30	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	40	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	40	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Largemouth Bass	35	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Largemouth Bass	35	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Largemouth Bass	35	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Largemouth Bass	35	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Largemouth Bass	35	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Largemouth Bass	48.5		Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Largemouth Bass	45		Collected by Weston-TW/EG-Round 2

East Basin	Middle Section	4/6/2007	1600	Largemouth Bass	52.2		Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Green Sunfish	15	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Green Sunfish	20	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Green Sunfish	20	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Carp	35	e	Collected by Weston-TW/EG-Round 2
East Basin	Middle Section	4/6/2007	1600	Bluegill	10	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	15	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	15	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	15	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	15	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	15	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	15	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	15	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	15	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	15	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	15	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	15	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	15	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	15	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	15	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	15	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	15	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Bluegill	25	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	10	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	30	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	30	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	30	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	30	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	30	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	30	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	30	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	30	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	40	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	40	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	40	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Black Bullhead Catfish	40	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Largemouth Bass	25	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Largemouth Bass	25	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Largemouth Bass	25	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Largemouth Bass	25	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Largemouth Bass	25	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Largemouth Bass	35	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Largemouth Bass	35	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Largemouth Bass	35	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Largemouth Bass	35	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Largemouth Bass	35	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Largemouth Bass	35	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Largemouth Bass	35	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Largemouth Bass	45	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Largemouth Bass	45	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Largemouth Bass	45	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Largemouth Bass	45	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Largemouth Bass	45	e	Collected by Weston-TW/EG-Round 1

East Basin	Middle Section	4/6/2007	1600	Largemouth Bass	45	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Largemouth Bass	45	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Green Sunfish	15	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Green Sunfish	15	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Green Sunfish	15	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Green Sunfish	15	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Green Sunfish	15	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Green Sunfish	15	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Green Sunfish	15	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Green Sunfish	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Green Sunfish	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Green Sunfish	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Green Sunfish	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Green Sunfish	20	e	Collected by Weston-TW/EG-Round 1
East Basin	Middle Section	4/6/2007	1600	Carp	35	e	Collected by Weston-TW/EG-Round 1
East Basin	Not Specified	4/6/2007	1600	Black Crappie	25	e,v	Collected by Weston
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Largemouth Bass	15	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Largemouth Bass	25	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Largemouth Bass	25	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Largemouth Bass	25	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Largemouth Bass	25	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Largemouth Bass	25	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Largemouth Bass	25	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Largemouth Bass	35	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Largemouth Bass	35	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Largemouth Bass	35	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Largemouth Bass	35	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Largemouth Bass	45	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Largemouth Bass	45	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Green Sunfish	15	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Green Sunfish	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Green Sunfish	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Green Sunfish	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Green Sunfish	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Green Sunfish	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Green Sunfish	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Bluegill	10	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Bluegill	15	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Bluegill	15	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Bluegill	15	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Bluegill	15	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Bluegill	15	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Bluegill	15	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Bluegill	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Bluegill	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Bluegill	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Bluegill	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Bluegill	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Bluegill	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Bluegill	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Bluegill	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Bluegill	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Carp	25	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Carp	35	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Carp	35	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Carp	40	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Carp-Goldfish	28	v	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	20	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad

East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	40	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	40	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	40	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	40	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	40	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	40	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	40	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	40	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	40	e	Collected by City of Carlsbad
East Basin	East of Jefferson St. Bridge	4/7/2007	1100	Black Bullhead Catfish	40	e	Collected by City of Carlsbad
East Basin	Middle Channel	4/7/2007	1200	Bluegill	5	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	10	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	10	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	10	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	10	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	10	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	10	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	10	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	10	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	10	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	10	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	10	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	10	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	10	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	10	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	10	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	10	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	10	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	10	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	10	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	15	e	Collected by Weston DO/SC

East Basin	Middle Channel	4/7/2007	1200	Bluegill	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Bluegill	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	10	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	10	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	10	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	10	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	10	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	30	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	35	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Black Bullhead Catfish	35	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Largemouth Bass	25	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Largemouth Bass	25	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Largemouth Bass	25	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Largemouth Bass	25	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Largemouth Bass	35	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Largemouth Bass	35	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Largemouth Bass	35	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Largemouth Bass	35	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Carp	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Green Sunfish	10	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Green Sunfish	10	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Green Sunfish	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Green Sunfish	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Green Sunfish	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Green Sunfish	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Green Sunfish	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Green Sunfish	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Green Sunfish	15	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Green Sunfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Green Sunfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Green Sunfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Green Sunfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Green Sunfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Green Sunfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Green Sunfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Green Sunfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Green Sunfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Green Sunfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Green Sunfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1200	Green Sunfish	20	e	Collected by Weston DO/SC
East Basin	Middle Channel	4/7/2007	1500	Bluegill	5	e	Collected by City of Carlsbad
East Basin	Middle Channel	4/7/2007	1500	Bluegill	5	e	Collected by City of Carlsbad
East Basin	Middle Channel	4/7/2007	1500	Bluegill	10	e	Collected by City of Carlsbad
East Basin	Middle Channel	4/7/2007	1500	Bluegill	15	e	Collected by City of Carlsbad
East Basin	Middle Channel	4/7/2007	1500	Bluegill	15	e	Collected by City of Carlsbad
East Basin	Middle Channel	4/7/2007	1500	Black Bullhead Catfish	20	e	Collected by City of Carlsbad
East Basin	Middle Channel	4/7/2007	1500	Black Bullhead Catfish	20	e	Collected by City of Carlsbad
East Basin	Middle Channel	4/7/2007	1500	Black Bullhead Catfish	20	e	Collected by City of Carlsbad
East Basin	Middle Channel	4/7/2007	1500	Black Bullhead Catfish	20	e	Collected by City of Carlsbad
East Basin	Middle Channel	4/7/2007	1500	Black Bullhead Catfish	20	e	Collected by City of Carlsbad
East Basin	Middle Channel	4/7/2007	1500	Black Bullhead Catfish	30	e	Collected by City of Carlsbad

East Basin	Middle Channel	4/7/2007	1500	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	Middle Channel	4/7/2007	1500	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	Middle Channel	4/7/2007	1500	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	Middle Channel	4/7/2007	1500	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	Middle Channel	4/7/2007	1500	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	Middle Channel	4/7/2007	1500	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	Middle Channel	4/7/2007	1500	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	Middle Channel	4/7/2007	1500	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	Middle Channel	4/7/2007	1500	Black Bullhead Catfish	30	e	Collected by City of Carlsbad
East Basin	Middle Channel	4/7/2007	1500	Green Sunfish	10	e	Collected by City of Carlsbad
East Basin	Middle Channel	4/7/2007	1500	Green Sunfish	15	e	Collected by City of Carlsbad
East Basin	Middle Channel	4/7/2007	1500	Green Sunfish	20	e	Collected by City of Carlsbad
East Basin	Middle Channel	4/7/2007	1500	Carp-Goldfish	40	v	Collected by City of Carlsbad
East Basin	Not Specified	4/7/2007	1630	Bluegill	10	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Bluegill	10	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Bluegill	10	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Bluegill	10	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Bluegill	10	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Bluegill	10	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Bluegill	10	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Bluegill	10	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Bluegill	10	e	Collected by Weston-TW/MA
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East Basin	Not Specified	4/7/2007	1630	Bluegill	15	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Bluegill	15	e	Collected by Weston-TW/MA
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East Basin	Not Specified	4/7/2007	1630	Bluegill	15	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Bluegill	15	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Bluegill	15	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Bluegill	15	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Bluegill	20	e	Collected by Weston-TW/MA
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East Basin	Not Specified	4/7/2007	1630	Green Sunfish	15	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Green Sunfish	15	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Black Crappie	28		Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Black Bullhead Catfish	10	e	Collected by Weston-TW/MA
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East Basin	Not Specified	4/7/2007	1630	Black Bullhead Catfish	10	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Black Bullhead Catfish	10	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Black Bullhead Catfish	20	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Black Bullhead Catfish	20	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Black Bullhead Catfish	20	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Black Bullhead Catfish	20	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Black Bullhead Catfish	20	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Black Bullhead Catfish	20	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Black Bullhead Catfish	20	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Black Bullhead Catfish	20	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Black Bullhead Catfish	20	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Black Bullhead Catfish	20	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Black Bullhead Catfish	20	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Black Bullhead Catfish	30	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Black Bullhead Catfish	30	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Black Bullhead Catfish	30	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Black Bullhead Catfish	30	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Black Bullhead Catfish	30	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Black Bullhead Catfish	40	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Largemouth Bass	15	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Largemouth Bass	15	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Largemouth Bass	15	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Largemouth Bass	15	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Largemouth Bass	15	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Largemouth Bass	15	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Largemouth Bass	15	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Largemouth Bass	15	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Largemouth Bass	15	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Largemouth Bass	15	e	Collected by Weston-TW/MA
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East Basin	Not Specified	4/7/2007	1630	Largemouth Bass	15	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Largemouth Bass	15	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Largemouth Bass	15	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Largemouth Bass	15	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Largemouth Bass	15	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Largemouth Bass	25	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Largemouth Bass	25	e	Collected by Weston-TW/MA
East Basin	Not Specified	4/7/2007	1630	Largemouth Bass	35	e	Collected by Weston-TW/MA

1. Vouchers are preserved frozen for Dept. of Fish and Game
2. Fish length estimates began during 4/5/07 monitoring due to decaying fish. Excpetions are actual measurements for specific species.
3. For estimates on 4/5/07 and after, values represent the upper bracket of the estimate (e.g. 15-20 cm was estimated at 20 cm).

Basin	Location	Latitude	Longitude	Date	Collection Time	Bird Species	Length/cm	Estimated/Partial/Voucher	Comments
Middle Basin	Middle	33.16799	-117.35105	4/6/2007	8:00	California Gull (*Laurus californica*)		v	NS/AG-Weston (1-2 days estimated dead)
Middle Basin	East End	33.17367	-117.35002	4/7/2007	8:57	American Coot (*Fulica americana*)		v	LC/CH-Weston (decomposed)
Middle Basin	Middle	33.17091	-117.35306	4/7/2007	10:25	American Coot (*Fulica americana*)		v	LC/CH-Weston (1-2 days estimated dead)
East Basin	East of Jefferson Bridge	-	-	4/7/2007	10:55	Gadwall (*Anas strepera*)		v	City of Carlsbad-AB in concrete channel (1-2 days estimated dead)

Appendix C
Short-term Actions starting 4-10-07, end date TBD

Aeration:

- Continue operating pumps and compressors for aeration in the East basin of the lagoon until D.O. concentrations stabilize

Pump-back:

- Continue the pump-back to sewer at a rate that matches the inflow volume from Buena Vista Creek until lagoon D.O. levels stabilize

Monitoring:

- Continue collecting lagoon D.O. readings during critical morning condition (sunrise) starting 4-11-07. Modifications will be considered as D.O. stabilizes.
- Continue shoreline bacteria monitoring around the lagoon through 4-14-07
- Coordinate the development of a sediment sampling plan to address sediment chemistry with Agencies

Observations/Recovery:

- Continue once daily monitoring for dead and sick birds as well as additional fish losses. Collection of dead birds will occur and notification to Agencies will occur. This program will continue until no additional detections occur.

Buena Vista Force Main Wastewater Discharge to Buena Vista Lagoon March 31-April 2, 2007

Agency Status Update April 16, 2007
Meeting Agenda

13:00 PST at US Fish & Wildlife Service Offices

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1. Introductions

2. Additions to agenda

3. Status update

4. Recommended program changes
    a. Pumpback
    b. Aeration
    c. Discharge chemistry
    d. Sediment bacteria

5. County Vector program

Meeting on Buena Vista Lagoon Sewage Spill
April 16, 2007 1:00 pm
CFWO Office

Name	Organization	Phone	Email
Keith Merkel	Merkel & Assoc	(858)560-5465	kmerkel@merkelinc.com
Jayne Strommer	City of Vista	(760)726-1340 x 1373	JStrommer@ci.vist.ca.us
PAUL HARTMAN	CITY OF CARLSBAD	(760)602-7586	ahart@ci.carlsbad.ca.us
Jack Fancher	USFWS Carlsbad	760 431-9440 x215	jack_fancher@fws.gov
ELAINE LUKEY	CITY OF CARLSBAD	760-602-7582	eluke@ci.carlsbad.ca.us
JOHN BROOKS	USFWS-LE	619-557-5063	John_L_brooks@fws.gov
NOEL RICHARDS	CA. DEPT FISH/GAME	760-510-1256	nrichards@dfg.ca.gov
BRYAN GOUKHOFER	CA DEPT FISH & GAME	562.708.7757	BGOUKHOF@ODFW.DFG.CA.GOV
Bill Paznokas	" " "	858-467-4218	wpaznokas@dfg.ca.gov
SHARON K. TAYLOR	USFWS-CFWO	760-431-9440 x220	sharon_taylor@FWS.gov
BOB MORRIS	RWQCB	858 467 2962	bmorris@waterboards.ca.gov
Tim Dillingham	CDFG	4656 467-4204	tdillingham@dfg.ca.gov
Judy Gibson	USFWS/CFWO	760-431-9440 x260	Judy_Gibson@fws.gov

Buena Vista Force Main Wastewater Discharge to Buena Vista Lagoon

(March 31-April 2, 2007)

Environmental Response Program Agency Status Update

April 16, 2007

Information Summary In Progress Status Review

Material and data presented in this review are to be considered preliminary and reflects the best available information at the time of the presentation. Data are presented through April 15th. Further data QA may alter values. Further analysis and data may alter conclusions.

Spill Summary

- A rupture to a 24-inch ductile iron force main occurred between the Jefferson Street Pump Station and the Encina Wastewater Authority treatment plant. The pipe was originally constructed in Jefferson Street.
- Preliminary analysis indicates that the rupture was due to external corrosion even though the pipe was plastic coated.
- The pipeline was constructed in 1982, and corrosion appeared isolated within the exposed section of the line.
- Approximately 7.3 million gallons of wastewater spilled to the east basin of Buena Vista Lagoon from sometime Sat. March 31 to approximately 1pm April 2.

Response Program

- Pump-back Operations
- Aeration of Lagoon
- Environmental Monitoring Program
- Resource Impact Assessment
- Analysis, Actions, and Reporting
  - Spill Response Meetings and Site Coordination
  - Agency and Press Briefings
  - RWQCB Investigative Order

Pump-back Operation

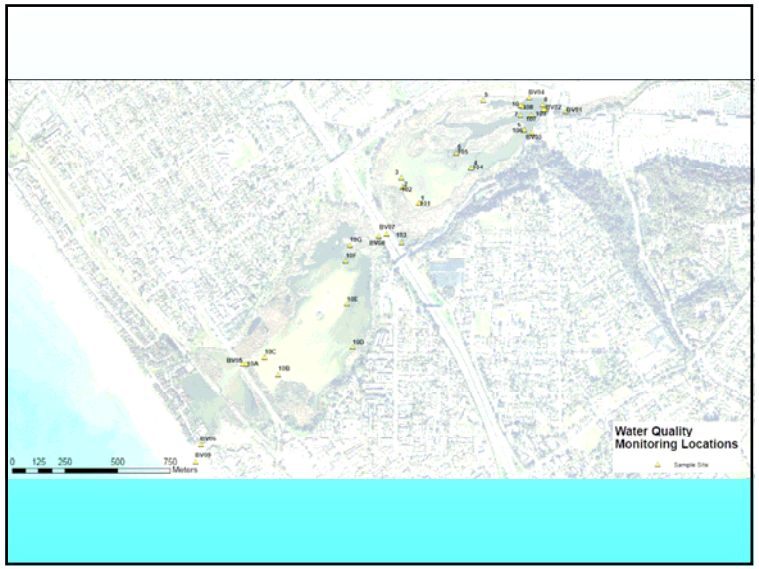
- Purpose
  - Remove wastewater from lagoon
  - Minimize extent of plume and affected area
- Pump-back Period
  - Initiated April 3 (approx. 3,000 gpm)
  - Reduced April 11 to balance creek inflows (approx. 1,170 gpm)
  - Pump-back continuing through April 15
- Volume Pumped Back
  - Approximately 31.2 million gallons by April 10th, 10am

Aeration Operation

- Purpose
  - Facilitate consumption of BOD
  - Provide refugia areas for remaining resources
- Aeration Period
  - Installed 1 aerator April 2 PM
  - Increased to 4 aerators by April 3 AM
  - Increased to 6 aerators by April 7 PM
  - Aeration continuing through April 15

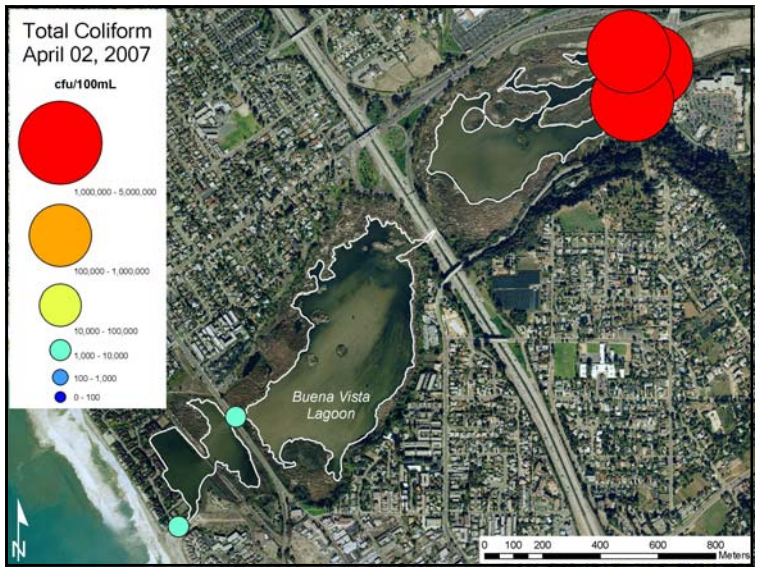
Environmental Monitoring Program *Status Indicators*

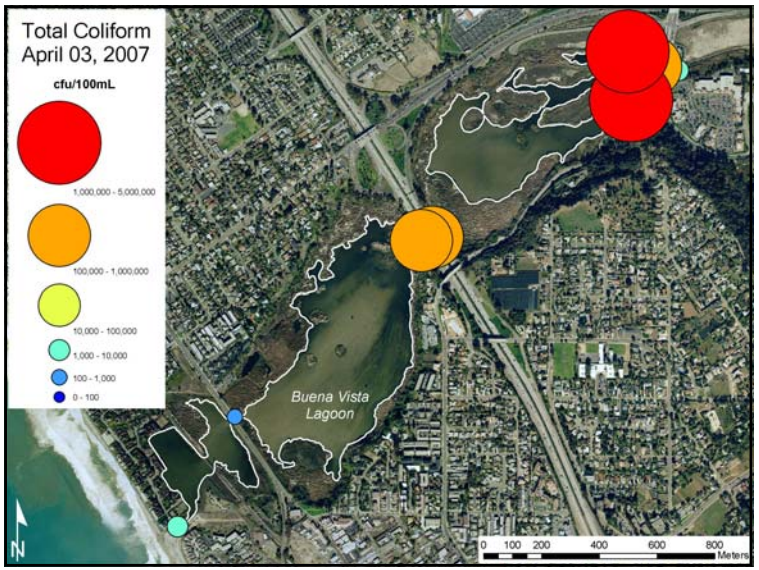
- Bacteriological Monitoring
  - Total Coliform
  - Fecal Coliform
  - Enterococcus
- Dissolved Oxygen Concentrations

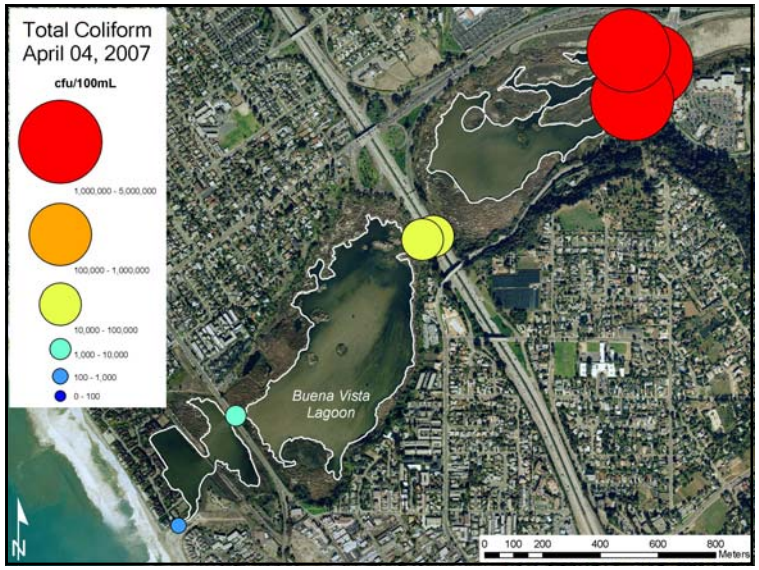


TOTAL COLIFORM

Human Health Standard <10,000



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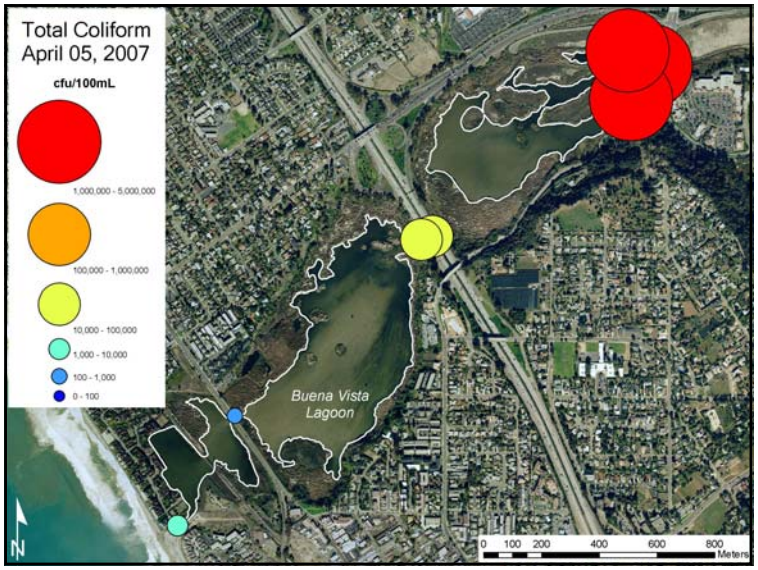
1,000 - 10,000
100 - 1,000
0 - 100
Buena Vista
Lagoon
N
0 100 200 400 600 800
Meters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Buena Vista
Lagoon
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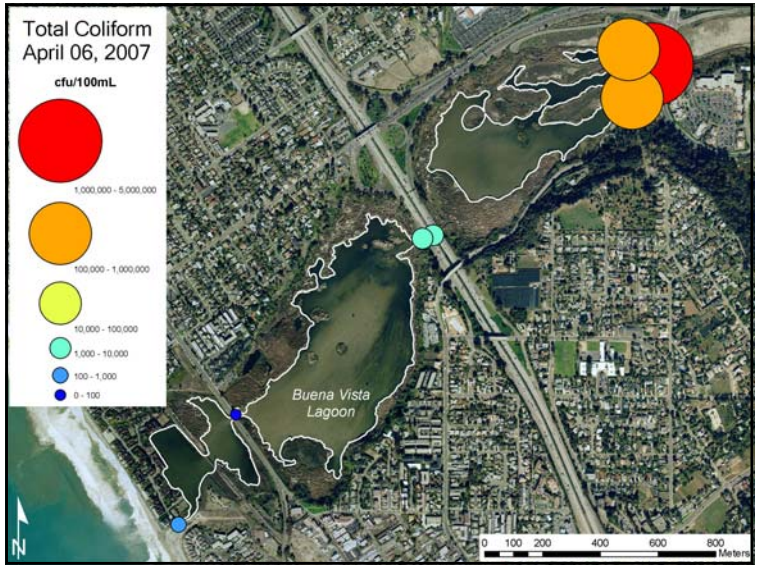
0 100 200 400 600 800
Meters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Buena Vista
Lagoon
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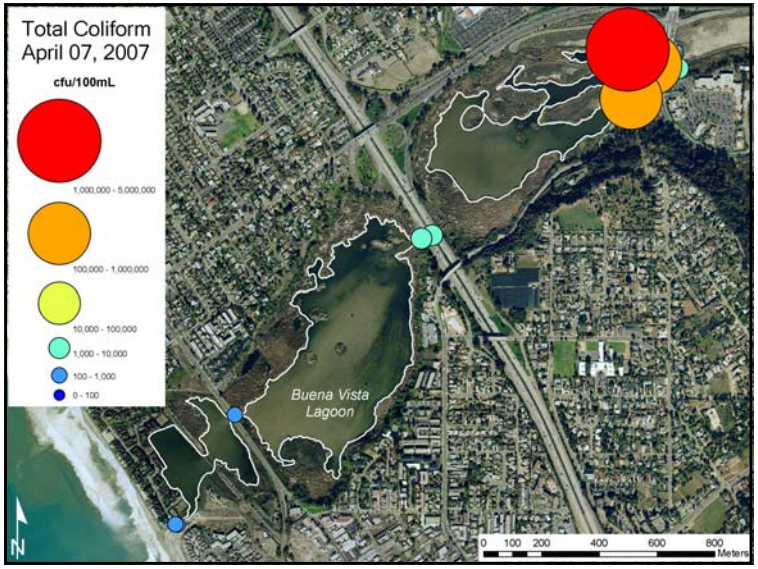
Meters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Buena Vista
Lagoon
N
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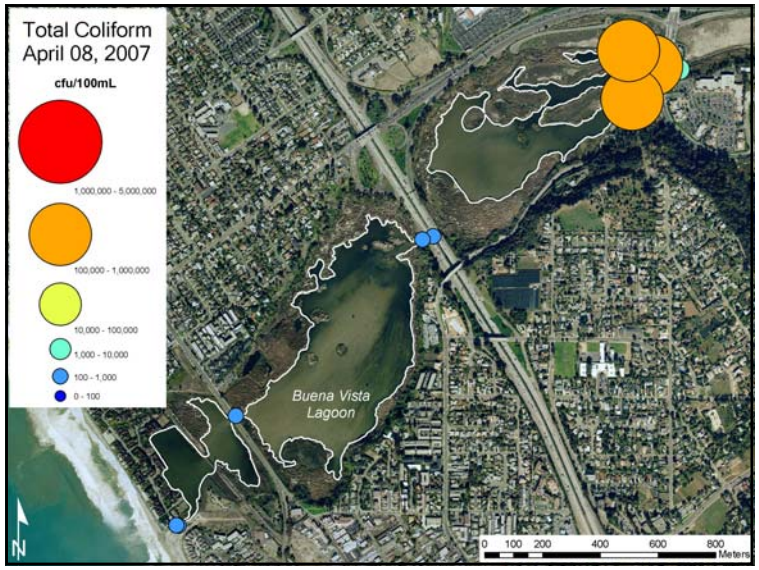
Meters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0 - 100
Buena Vista
Lagoon
N
0 100 200 400 600 800
Meters


Total Coliform
April 09, 2007
cfu/100mL
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100,000 - 1,000,000
10,000 - 100,000
1,000 - 10,000
100 - 1,000
0 - 100
Buena Vista
Lagoon
N
0 100 200 400 600 800
Meters


Total Coliform
April 10, 2007
cfu/100mL
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100,000 - 1,000,000
10,000 - 100,000
1,000 - 10,000
100 - 1,000
0 - 100
Buena Vista
Lagoon
N
0 100 200 400 600 800
Meters


Total Coliform
April 11, 2007
cfu/100mL
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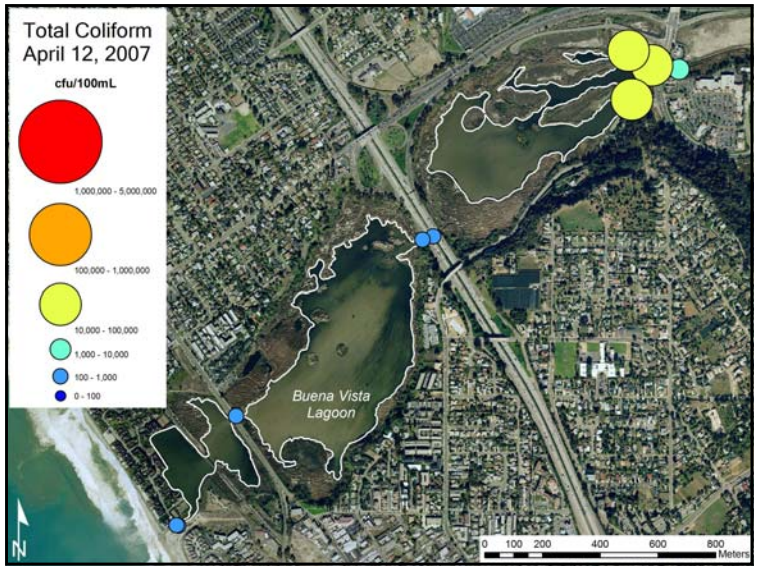
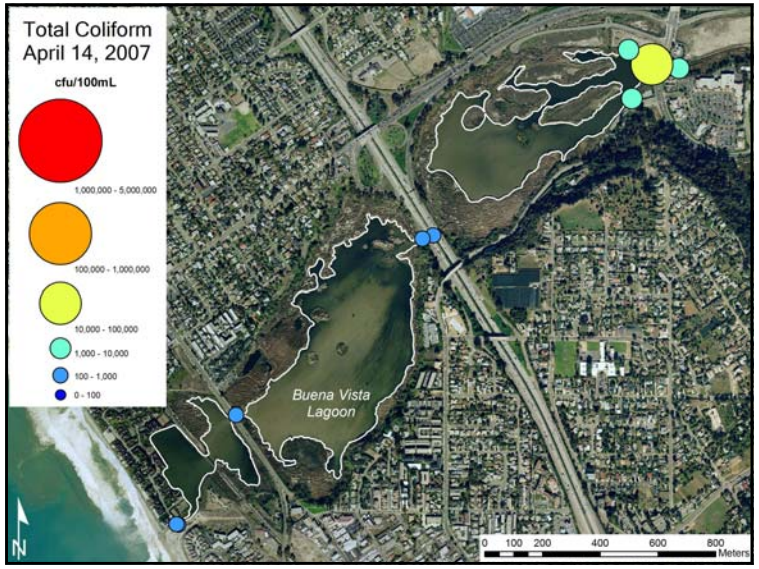
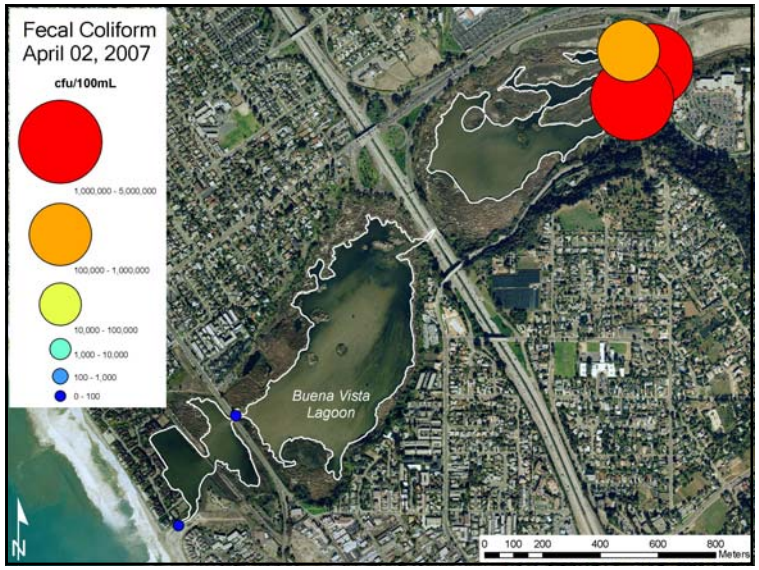
Buena Vista
Lagoon
N
0 100 200 400 600 800
Meters





FECAL COLIFORM

Human Health Standard <400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1,000 - 10,000
100 - 1,000
0 - 100
Buena Vista
Lagoon
N
0 100 200 400 600 800
Meters


Fecal Coliform
April 03, 2007
cfu/100mL
1,000,000 - 5,000,000
100,000 - 1,000,000
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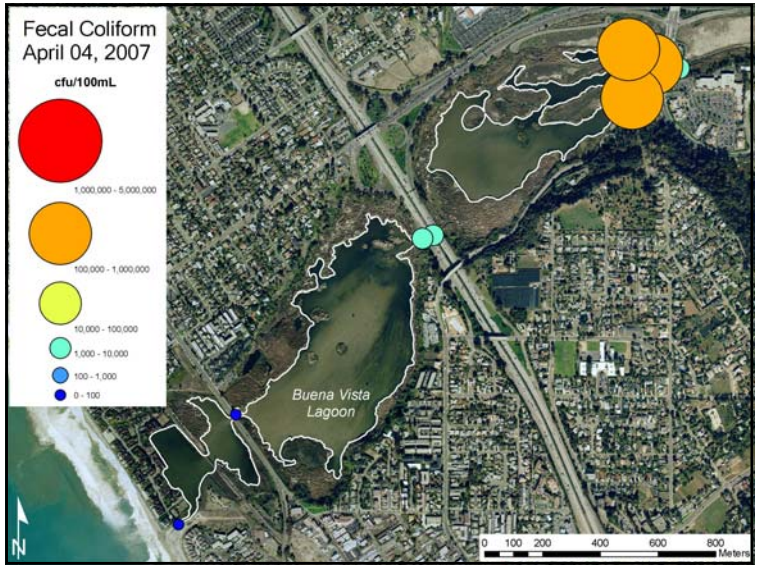
Buena Vista
Lagoon
N
0 100 200 400 600 800
Meters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April 04, 2007
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100,000 - 1,000,000
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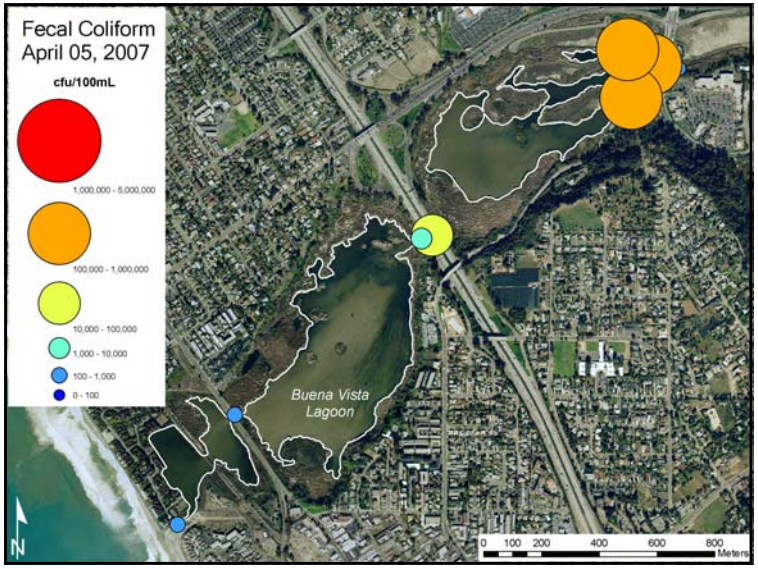
1,000 - 10,000
100 - 1,000
0 - 100
Buena Vista
Lagoon
N
0 100 200 400 600 800
Meters


Fecal Coliform
April 05, 2007
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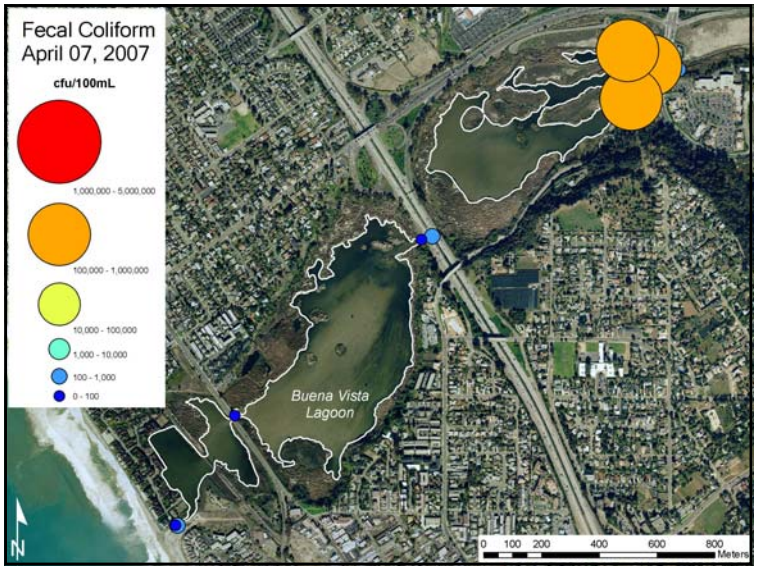
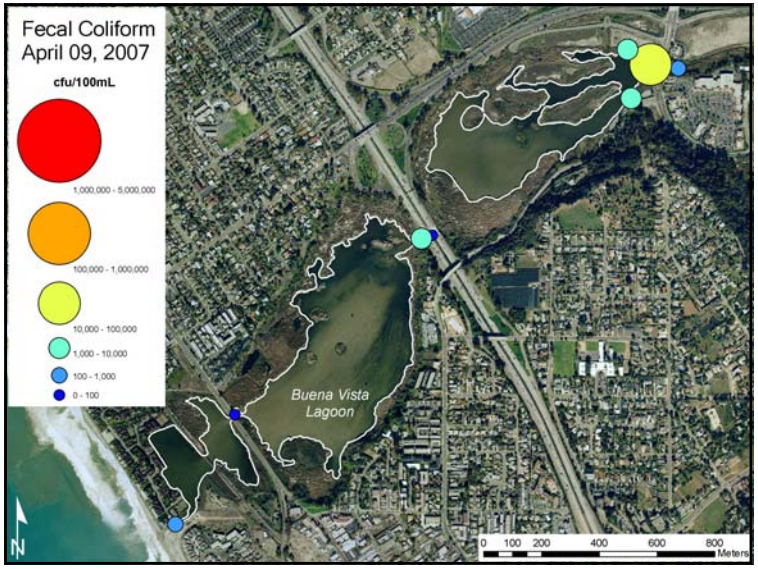
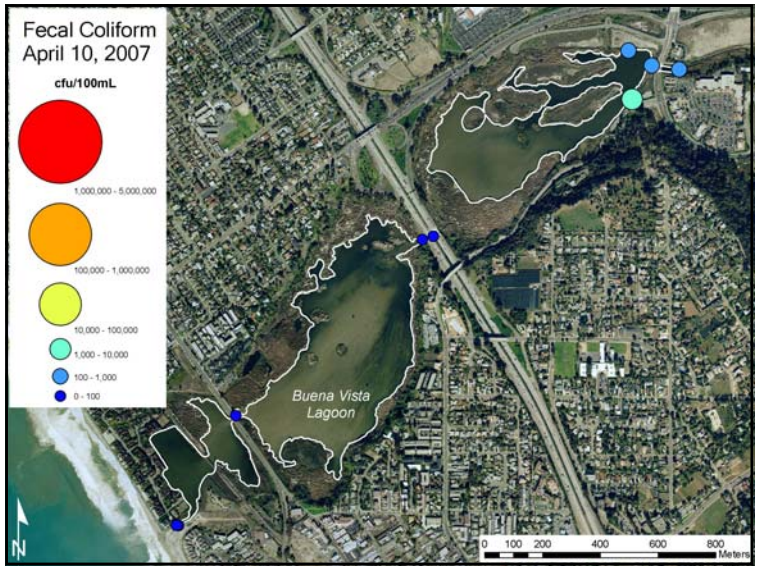
10,000 - 100,000
1,000 - 10,000
100 - 1,000
0 - 100
Buena Vista
Lagoon
N
0 100 200 400 600 800
Meters

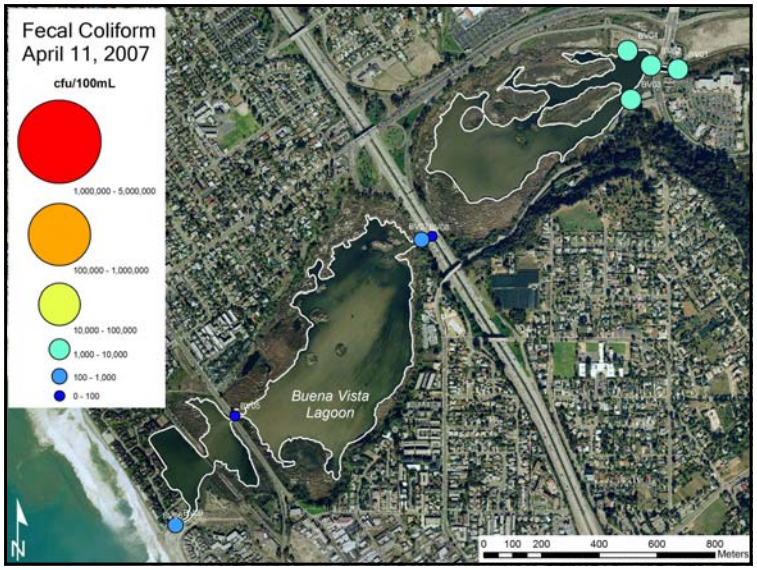

Fecal Coliform
April 06, 2007
cfu/100mL
1,000,000 - 5,000,000
100,000 - 1,000,000
10,000 - 100,000
1,000 - 10,000
100 - 1,000
0 - 100
Buena Vista Lagoon
N
0 100 200 400 600 800
Meters


Fecal Coliform
April 07, 2007
cfu/100mL
1,000,000 - 5,000,000
100,000 - 1,000,000
10,000 - 100,000
1,000 - 10,000
100 - 1,000
0 - 100
Buena Vista Lagoon
N
0 100 200 400 600 800
Meters


Fecal Coliform
April 08, 2007
cfu/100mL
1,000,000 - 5,000,000
100,000 - 1,000,000
10,000 - 100,000
1,000 - 10,000
100 - 1,000
0 - 100
Buena Vista Lagoon
N
0 100 200 400 600 800
Meters


Fecal Coliform
April 09, 2007
cfu/100mL
1,000,000 - 5,000,000
100,000 - 1,000,000
10,000 - 100,000
1,000 - 10,000
100 - 1,000
0 - 100
Buena Vista Lagoon
N
0 100 200 400 600 800
Meters


Fecal Coliform
April 10, 2007
cfu/100mL
1,000,000 - 5,000,000
100,000 - 1,000,000
10,000 - 100,000
1,000 - 10,000
100 - 1,000
0 - 100
Buena Vista
Lagoon
N
0 100 200 400 600 800
Meters

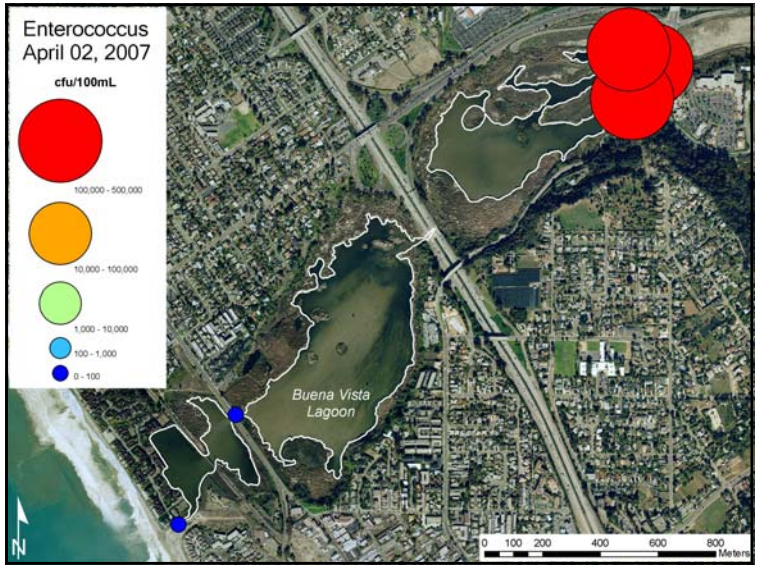

Fecal Coliform
April 11, 2007
cfu/100mL
1,000,000 - 5,000,000
100,000 - 1,000,000
10,000 - 100,000
1,000 - 10,000
100 - 1,000
0 - 100
Buena Vista
Lagoon
N
0 100 200 400 600 800
Meters

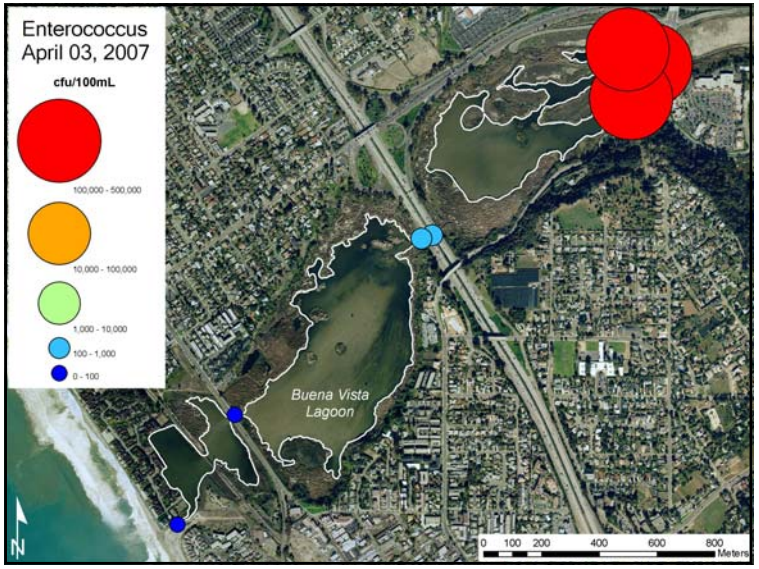

Fecal Coliform
April 12, 2007
cfu/100mL
1,000,000 - 5,000,000
100,000 - 1,000,000
10,000 - 100,000
1,000 - 10,000
100 - 1,000
0 - 100
Buena Vista
Lagoon
N
0 100 200 400 600 800
Meters

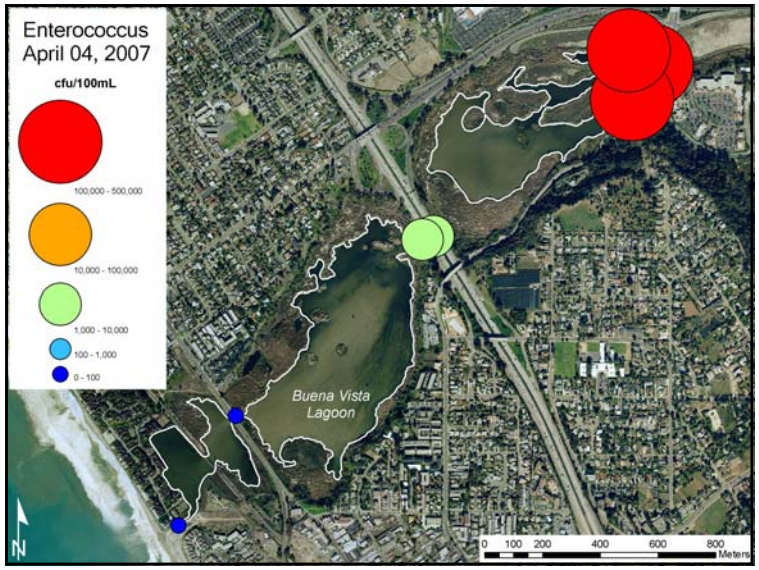

Fecal Coliform
April 13, 2007
cfu/100mL
1,000,000 - 5,000,000
100,000 - 1,000,000
10,000 - 100,000
1,000 - 10,000
100 - 1,000
0 - 100
Buena Vista
Lagoon
N
0 100 200 400 600 800
Meters

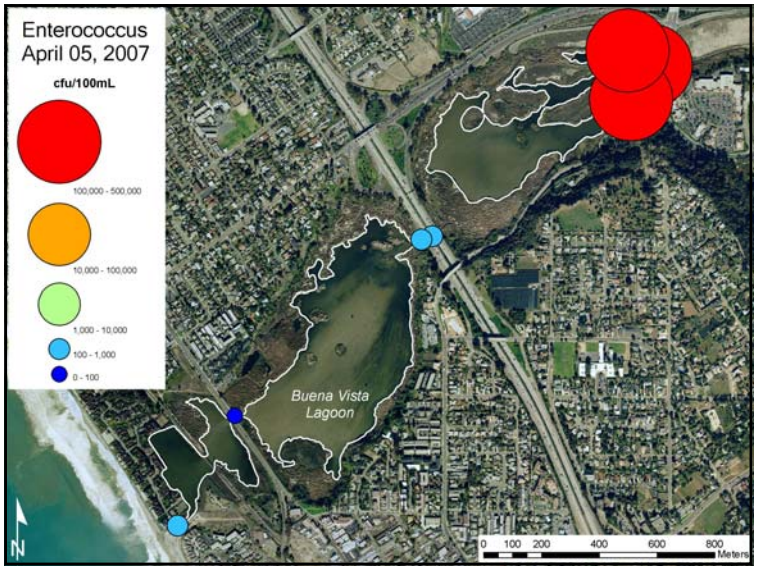
ENTEROCOCCUS

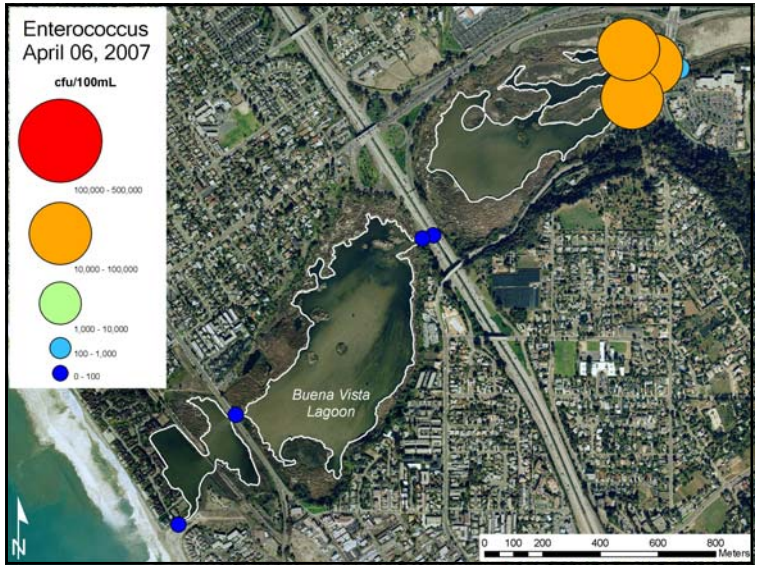
Human Health Standard <104



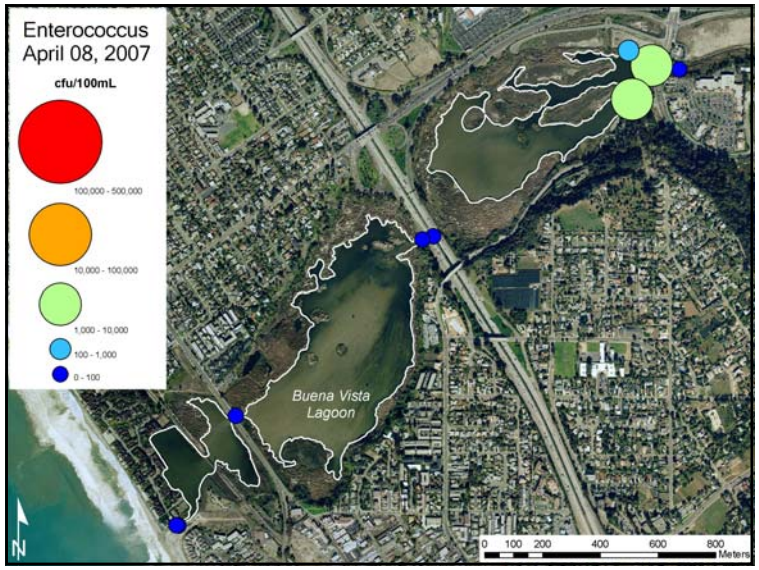


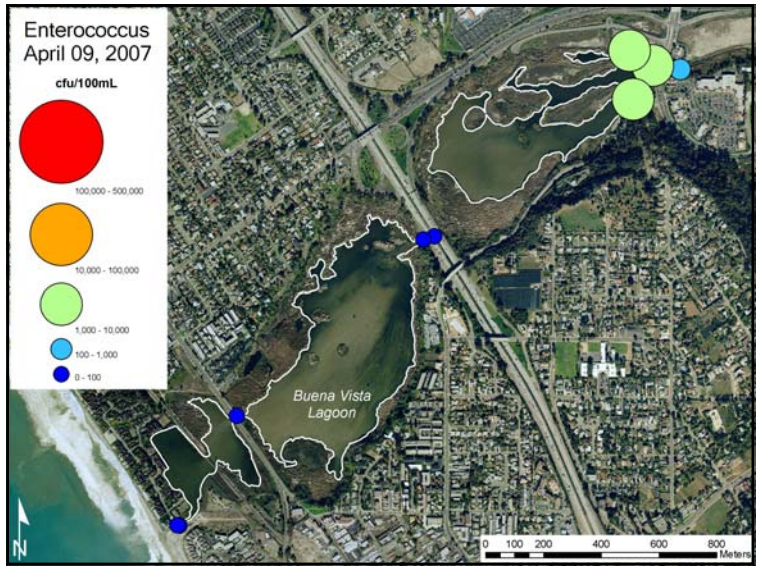

Enterococcus
April 04, 2007
cfu/100mL
100,000 - 500,000
10,000 - 100,000
1,000 - 10,000
100 - 1,000
0 - 100
Buena Vista
Lagoon
N
0 100 200 400 600 800
Meters

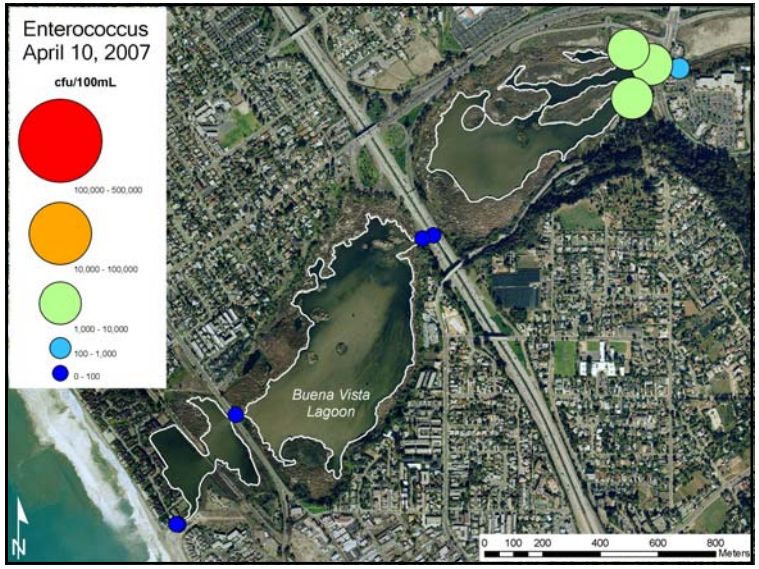

Enterococcus
April 05, 2007
cfu/100mL
100,000 - 500,000
10,000 - 100,000
1,000 - 10,000
100 - 1,000
0 - 100
Buena Vista
Lagoon
N
0 100 200 400 600 800
Meters

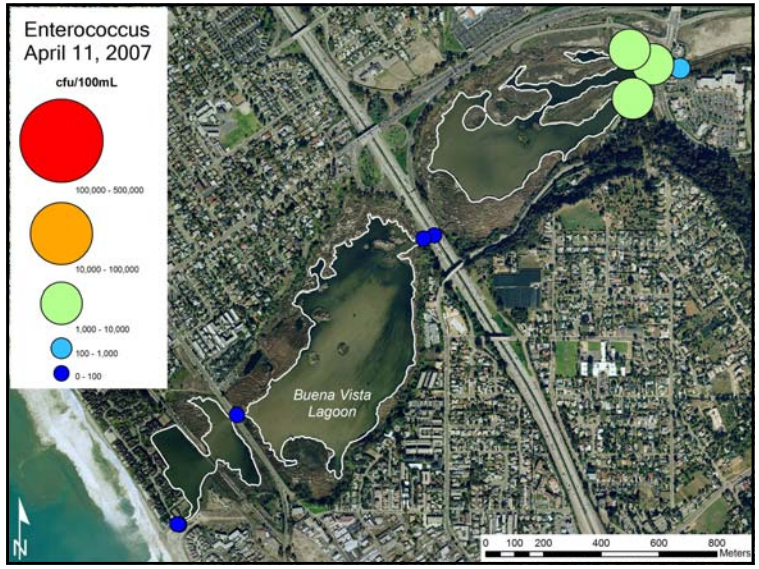

Enterococcus
April 06, 2007
cfu/100mL
100,000 - 500,000
10,000 - 100,000
1,000 - 10,000
100 - 1,000
0 - 100
Buena Vista
Lagoon
N
0 100 200 400 600 800
Meters

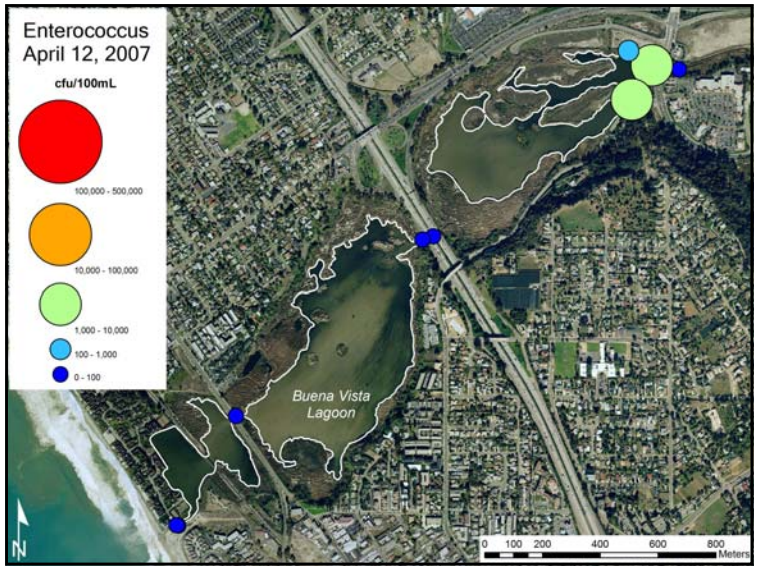

Enterococcus
April 07, 2007
cfu/100mL
100,000 - 500,000
10,000 - 100,000
1,000 - 10,000
100 - 1,000
0 - 100
Buena Vista
Lagoon
N
0 100 200 400 600 800
Meters

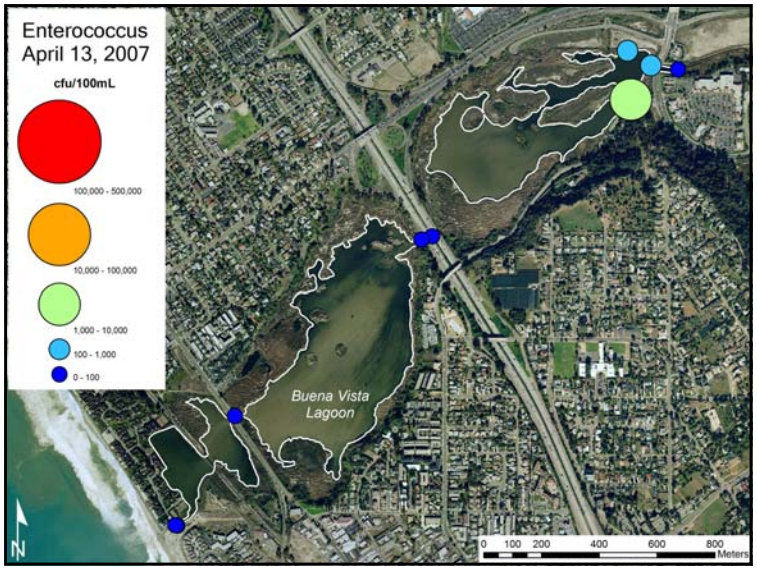

Enterococcus
April 08, 2007
cfu/100mL
100,000 - 500,000
10,000 - 100,000
1,000 - 10,000
100 - 1,000
0 - 100
Buena Vista
Lagoon
N
0 100 200 400 600 800
Meters


Enterococcus
April 09, 2007
cfu/100mL
100,000 - 500,000
10,000 - 100,000
1,000 - 10,000
100 - 1,000
0 - 100
Buena Vista
Lagoon
N
0 100 200 400 600 800
Meters


Enterococcus
April 10, 2007
cfu/100mL
100,000 - 500,000
10,000 - 100,000
1,000 - 10,000
100 - 1,000
0 - 100
Buena Vista
Lagoon
N
0 100 200 400 600 800
Meters


Enterococcus
April 11, 2007
cfu/100mL
100,000 - 500,000
10,000 - 100,000
1,000 - 10,000
100 - 1,000
0 - 100
Buena Vista
Lagoon
N
0 100 200 400 600 800
Meters


Enterococcus
April 12, 2007
cfu/100mL
100,000 - 500,000
10,000 - 100,000
1,000 - 10,000
100 - 1,000
0 - 100
Buena Vista Lagoon
N
0 100 200 400 600 800
Meters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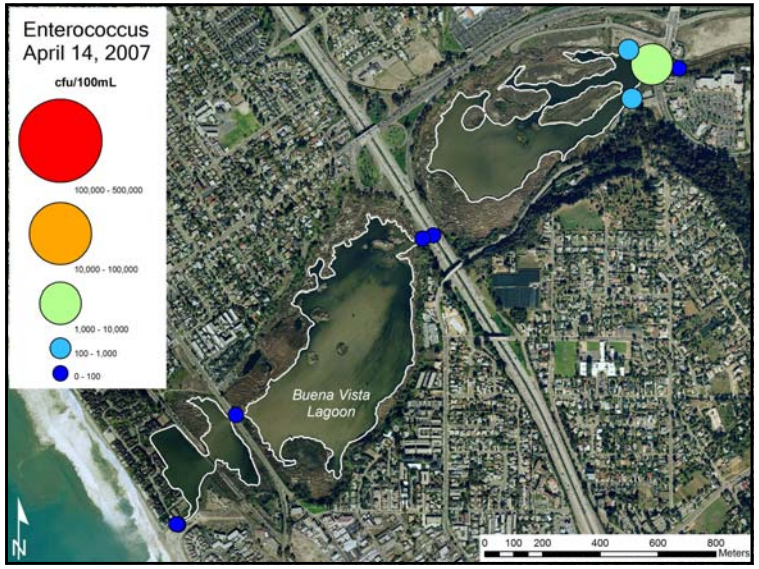
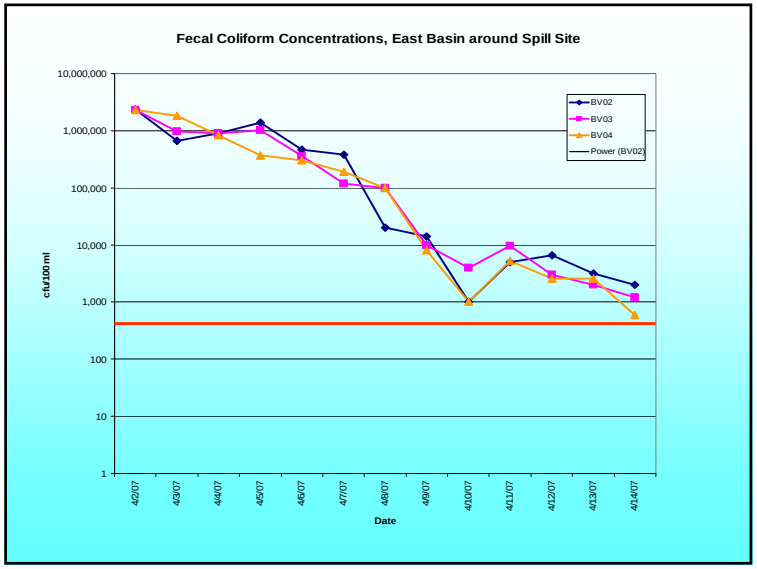
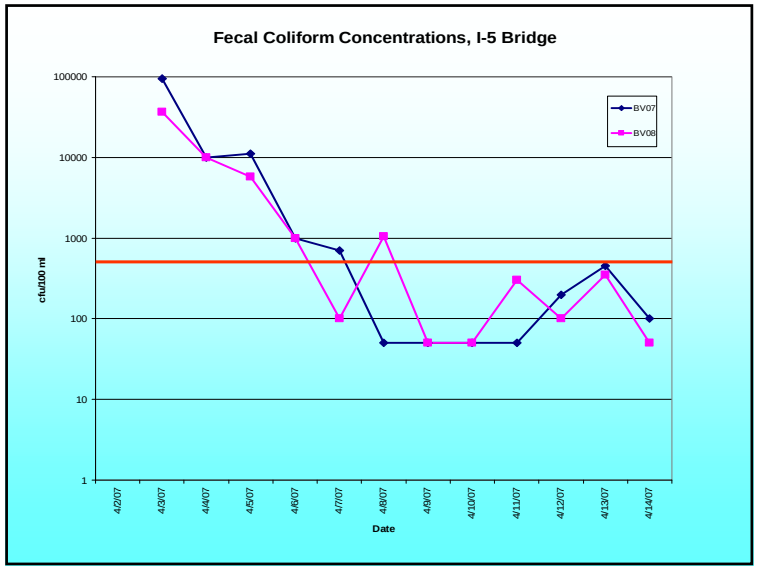
April 13, 2007
cfu/100mL
100,000 - 500,000
10,000 - 100,000
1,000 - 10,000
100 - 1,000
0 - 100
Buena Vista Lagoon
N
0 100 200 400 600 800
Meters


Enterococcus
April 14, 2007
cfu/100mL
100,000 - 500,000
10,000 - 100,000
1,000 - 10,000
100 - 1,000
0 - 100
Buena Vista Lagoon
N
0 100 200 400 600 800
Meters


Fecal Coliform Concentrations, East Basin around Spill Site
10,000,000
1,000,000
100,000
10,000
1,000
100
10
1
cfu/100 ml
BV02
BV03
BV04
Power (BV02)
4/2/07
4/3/07
4/4/07
4/5/07
4/6/07
4/7/07
4/8/07
4/9/07
4/10/07
4/11/07
4/12/07
4/13/07
4/14/07
Date



Bacterial Testing Results (cfu/100ml)

Total Coliform

	4/2/07	4/3/07	4/4/07	4/5/07	4/6/07	4/7/07	4/8/07	4/9/07	4/10/07	4/11/07	4/12/07	4/13/07	4/14/07
BV01	3,800	8,300	5,700	3,300	1,900	3,400	2,600	5,600	2,200	6,600	4,300	3,600	3,300
BV02	1,820,000	970,000	1,010,000	4,170,000	1,520,000	830,000	360,000	130,000	50,000	25,000	30,000	7,000	14,000
BV03	2,460,000	1,900,000	1,250,000	3,280,000	820,000	720,000	290,000	120,000	52,000	41,000	28,000	5,000	5,000
BV04	2,120,000	2,080,000	1,140,000	1,970,000	930,000	1,170,000	260,000	80,000	26,000	28,000	13,000	3,000	4,000
BV05	3,000	900	1,300	500	100	600	400	300	200	300	300	400	300
BV06	6,950	3,800	700	1,600	900	400	300	7,600	400	500	200	1,100	600
BV07		199,500	20,000	31,400	3,200	1,400	200	4,200	400	300	300	800	500
BV08		112,500	40,000	32,400	3,600	1,200	600	3,100	200	400	600	500	200
BV09					1,100	1,000	800	2,800	3,300	1,800	400	300	500

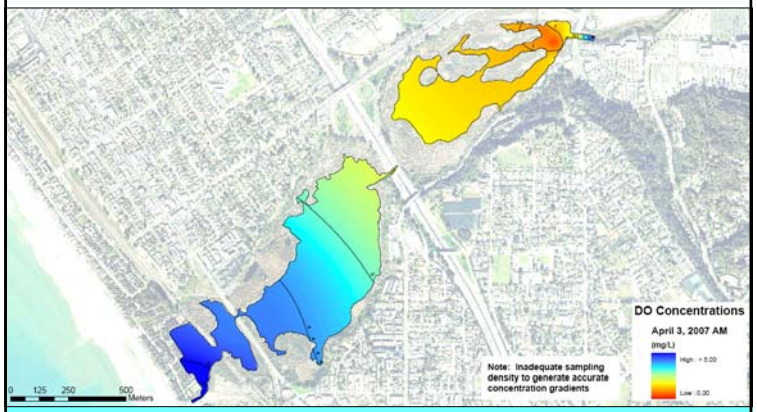
Fecal Coliform

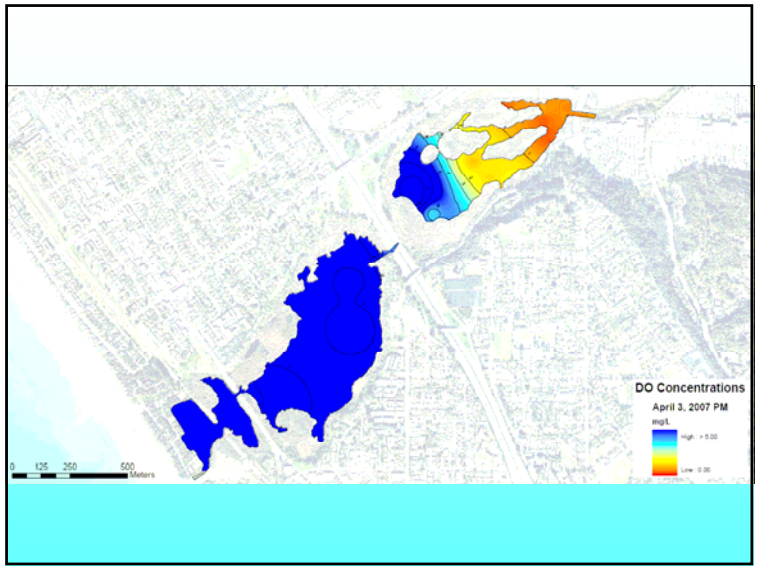
	4/2/07	4/3/07	4/4/07	4/5/07	4/6/07	4/7/07	4/8/07	4/9/07	4/10/07	4/11/07	4/12/07	4/13/07	4/14/07
BV01	1,200	2,300	2,700	1,000	300	1,000	1,300	200	200	1,300	300	1,500	900
BV02	2,350,000	670,000	890,000	1,380,000	460,000	380,000	20,000	14,000	1,000	5,000	6,600	3,200	2,000
BV03	2,300,000	980,000	900,000	1,030,000	360,000	120,000	100,000	10,000	4,000	9,600	3,000	2,000	1,200
BV04	2,280,000	1,820,000	840,000	370,000	300,000	190,000	100,000	8,000	1,000	5,200	2,600	2,600	600
BV05	100	200	100	200	200	100	100	50	50	100	100	50	50
BV06	100	100	100	200	100	200	400	1,050	100	100	250	50	150
BV07		95,500	10,000	11,200	1,000	700	50	50	50	50	200	450	100
BV08		36,500	10,000	5,800	1,000	100	1,050	50	50	300	100	350	50
BV09					700	100	200	800	100	250	50	50	200
												1	

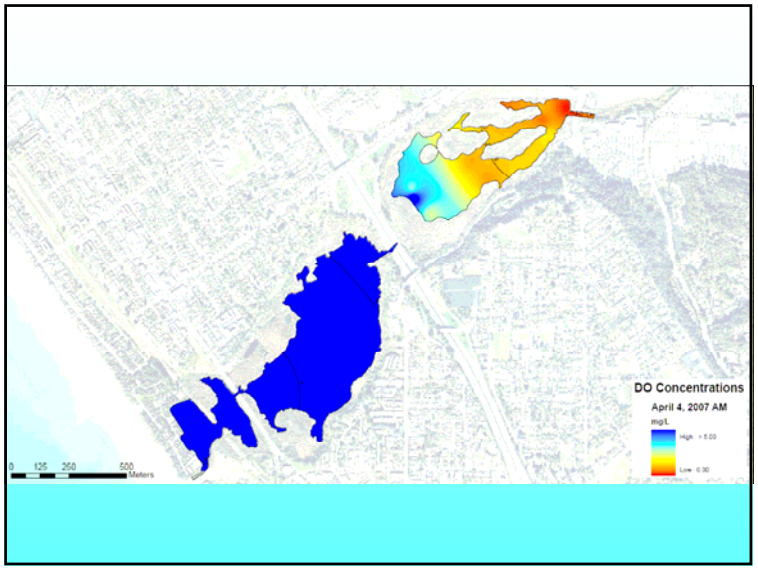
Enterococcus

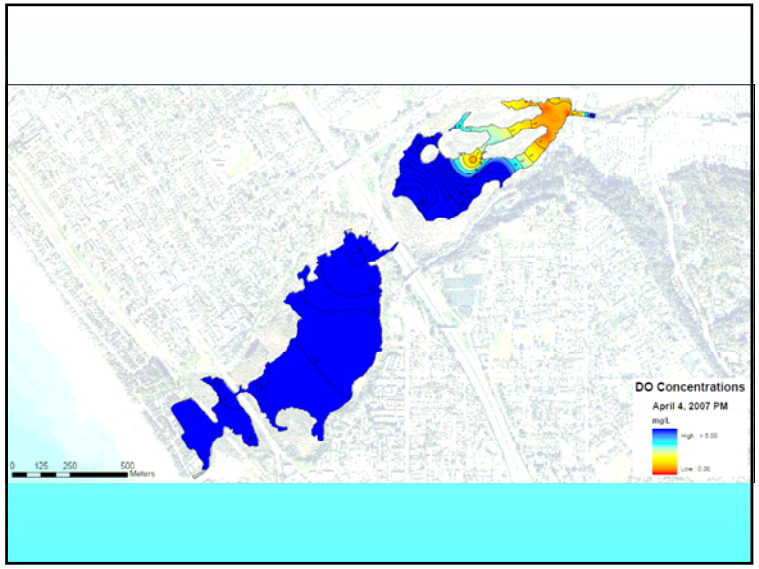
	4/2/07	4/3/07	4/4/07	4/5/07	4/6/07	4/7/07	4/8/07	4/9/07	4/10/07	4/11/07	4/12/07	4/13/07	4/14/07
BV01	200	300	300	100	200	200	100	1,000	600	900	100	100	100
BV02	482,000	116,000	110,000	116,000	22,000	8,000	3,000	3,000	2,400	1,200	1,200	200	1,200
BV03	438,500	112,000	118,000	122,000	22,000	6,000	3,000	2,000	1,400	5,200	1,400	1,200	200
BV04	421,500	118,000	126,000	118,000	36,000	4,000	1,000	2,000	2,000	2,000	400	400	600
BV05	100	100	100	100	100	100	50	50	50	50	50	50	50
BV06	100	100	100	400	100	100	100	100	50	50	100	50	50
BV07		1,000	2,000	200	100	600	50	50	50	50	50	100	50
BV08		1,000	2,000	200	100	100	50	50	50	50	50	50	50
BV09					100	100	50	100	50	50	50	50	50

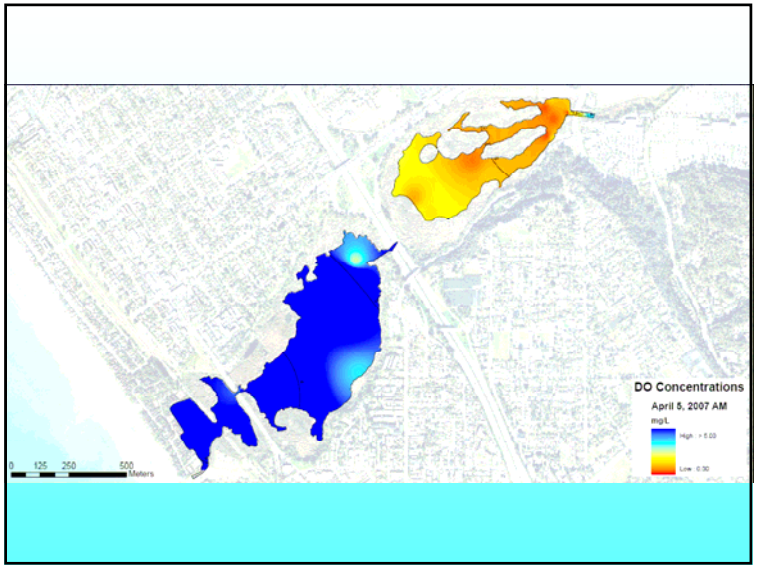
DISSOLVED OXYGEN

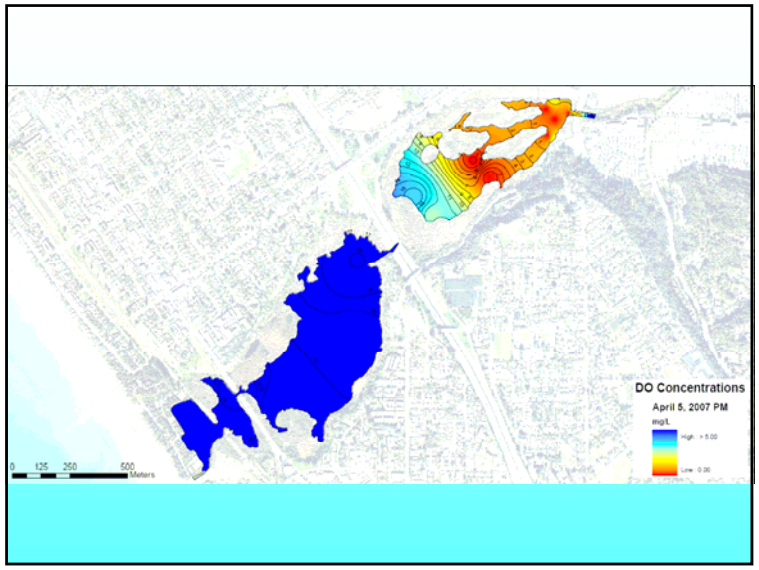


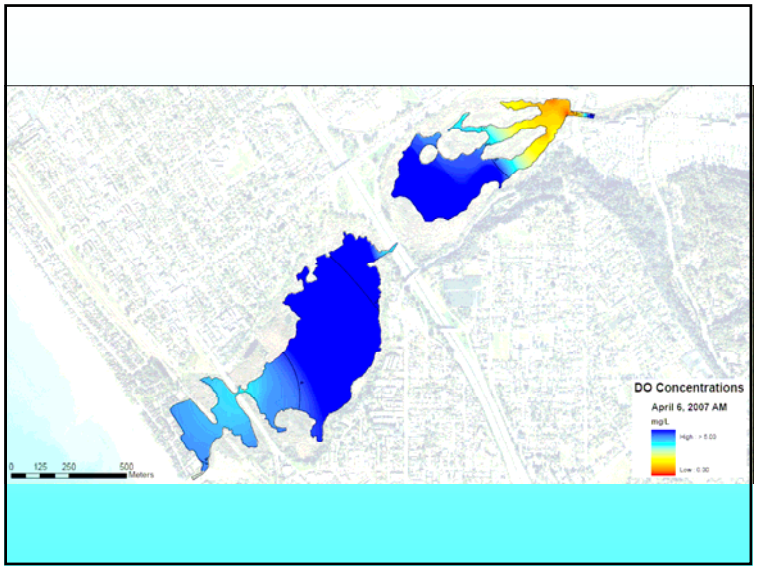

DO Concentrations
April 3, 2007 PM
mg/L
0 125 250 500
Meters

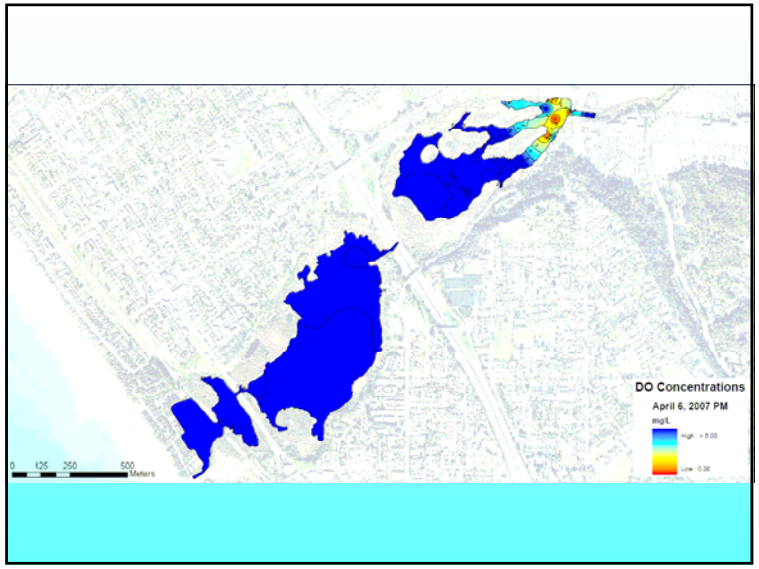

DO Concentrations
April 4, 2007 AM
mg/L
0 125 250 500
Meters

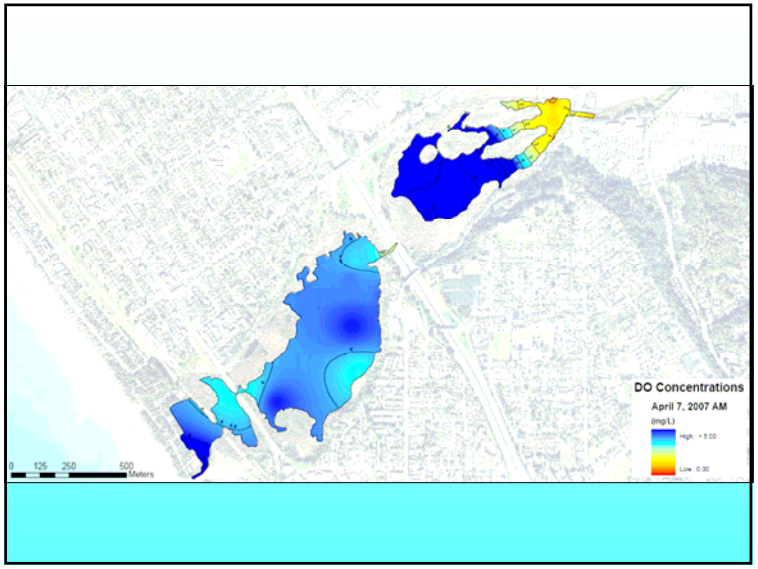

DO Concentrations
April 4, 2007 PM
mg/L
0 125 250 500
Meters

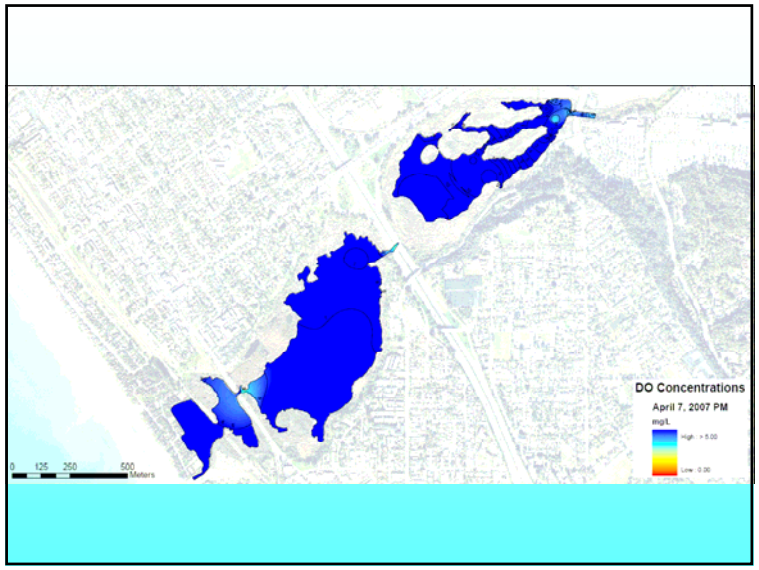

DO Concentrations
April 5, 2007 AM
mg/L
0 125 250 500
Meters

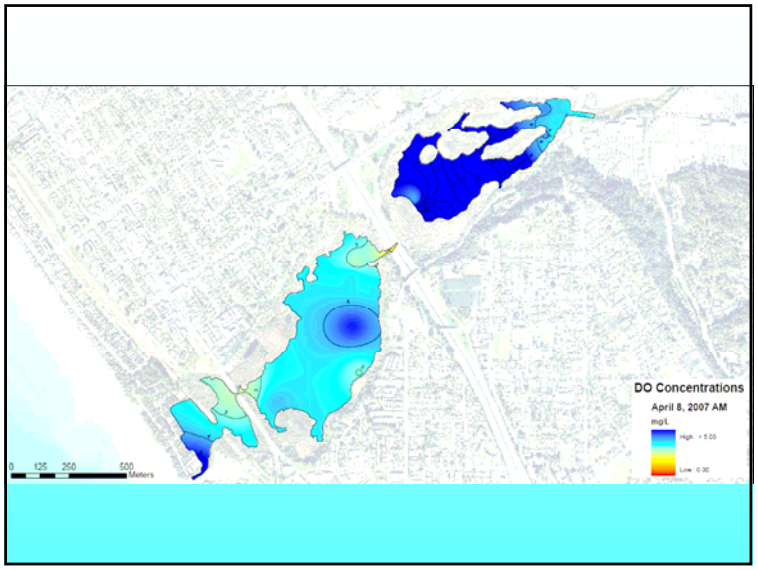

DO Concentrations
April 5, 2007 PM
mg/L
0 125 250 500
Meters

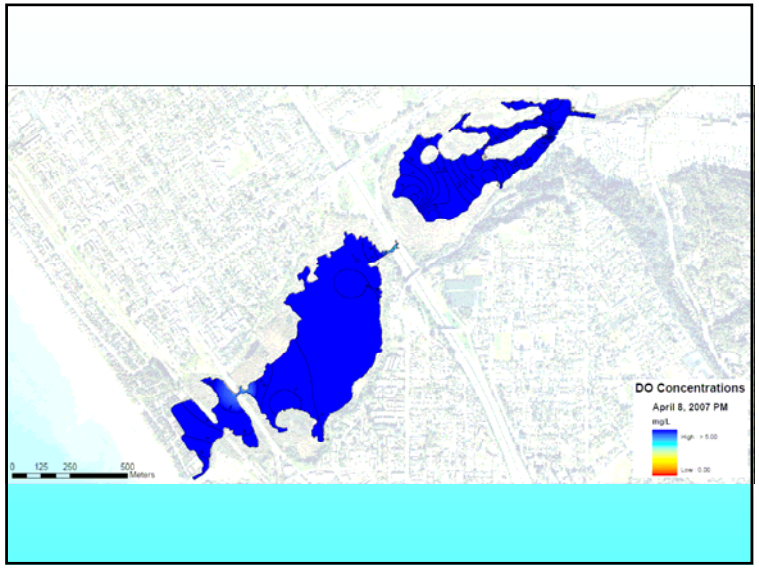

DO Concentrations
April 6, 2007 AM
mg/L
0 125 250 500
Meters

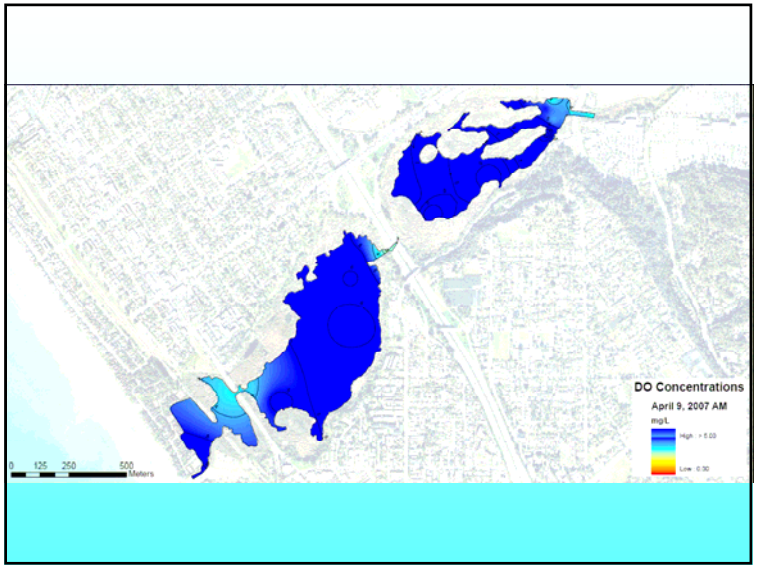

DO Concentrations
April 6, 2007 PM
mg/L
0 125 250 500
Meters

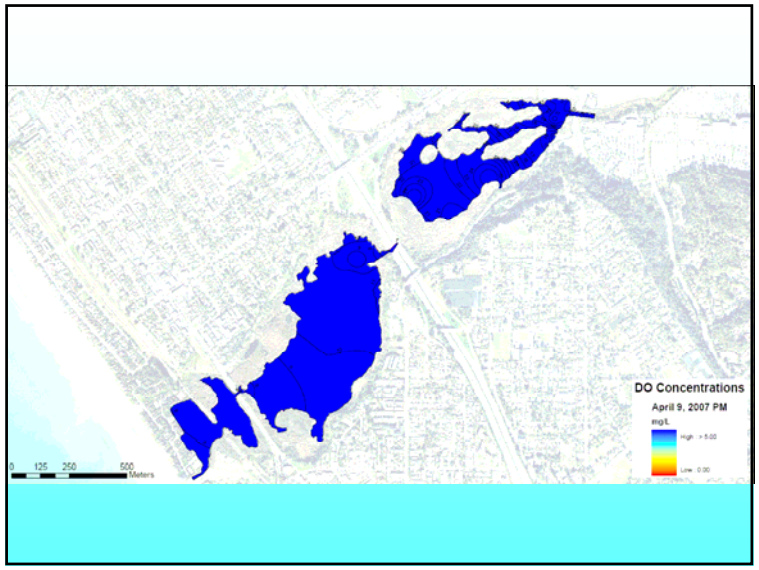

DO Concentrations
April 7, 2007 AM
(mg/L)
0 125 250 500
Meters

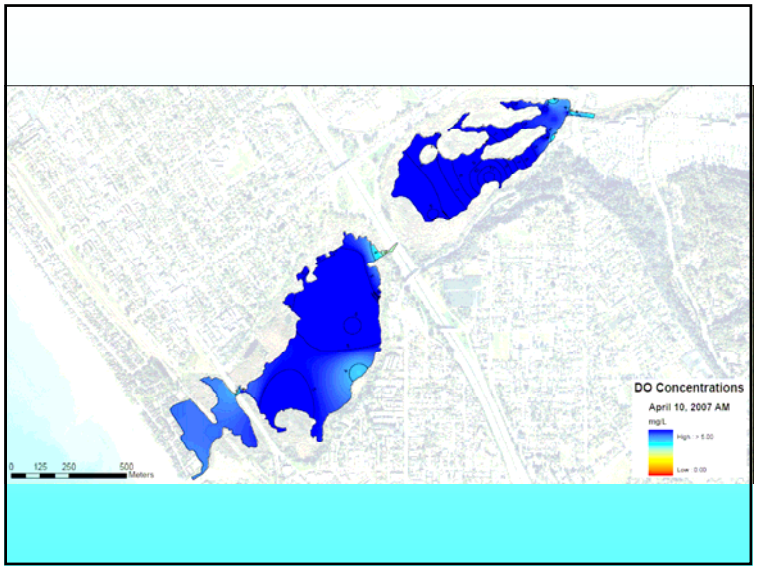

DO Concentrations
April 7, 2007 PM
mg/L
0 125 250 500
Meters

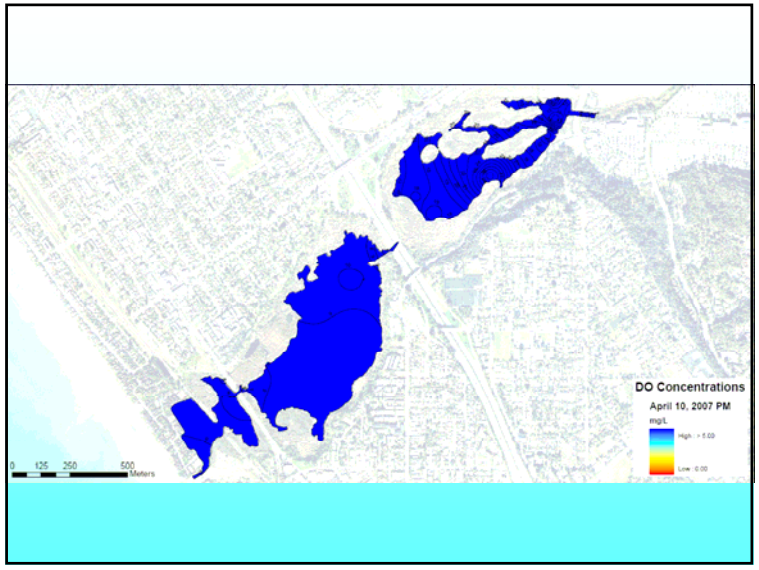

DO Concentrations
April 8, 2007 AM
mg/L
0 125 250 500
Meters

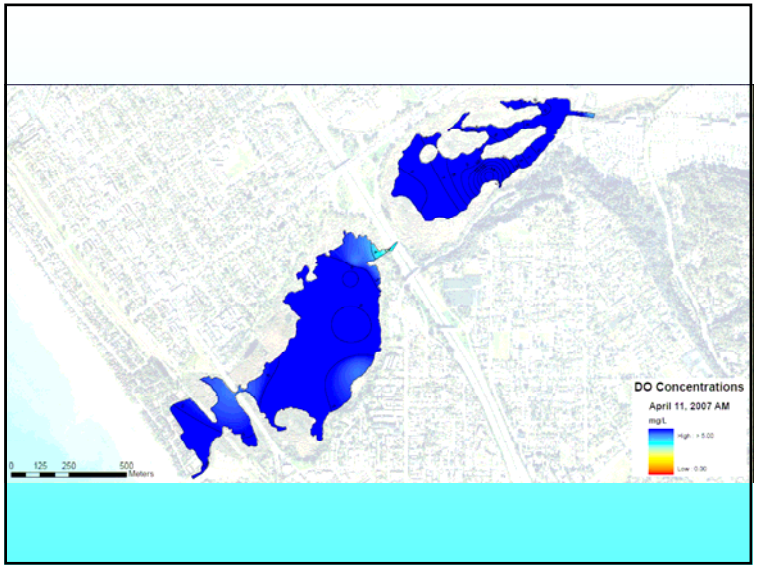

DO Concentrations
April 8, 2007 PM
mg/L
0 125 250 500
Meters

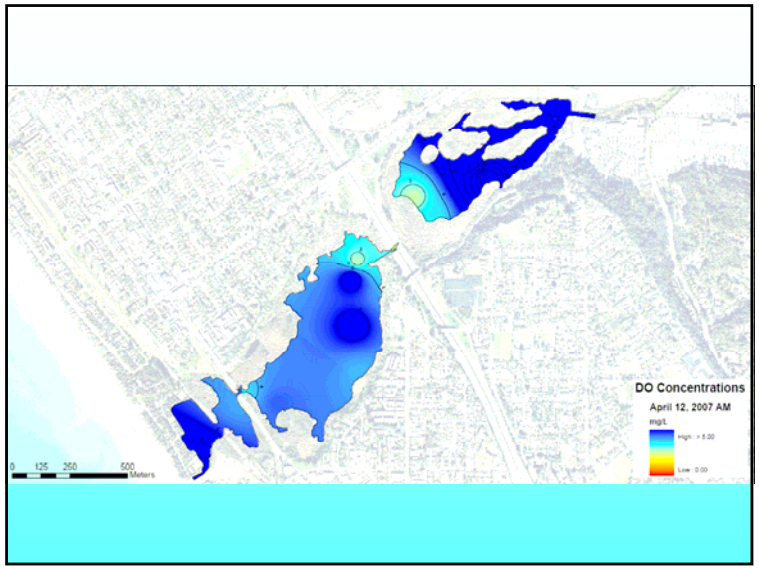

DO Concentrations
April 9, 2007 AM
mg/L
0 125 250 500
Meters


DO Concentrations
April 9, 2007 PM
mg/L
0 125 250 500
Meters


DO Concentrations
April 10, 2007 AM
mg/L
0 125 250 500
Meters


DO Concentrations
April 10, 2007 PM
mg/L
0 125 250 500
Meters


DO Concentrations
April 11, 2007 AM
mg/L
0 125 250 500
Meters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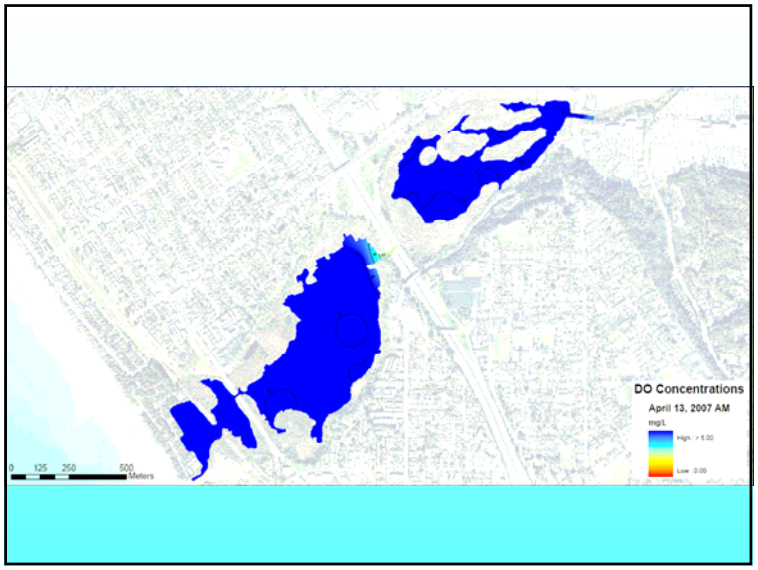
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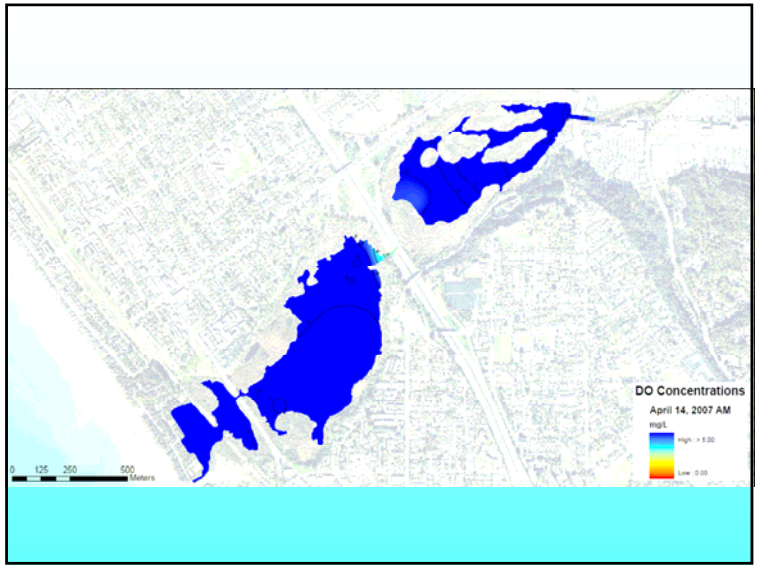
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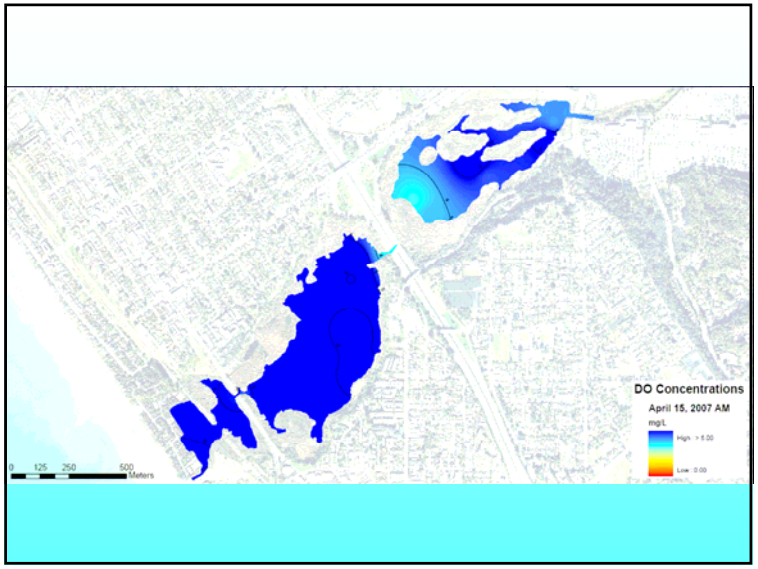
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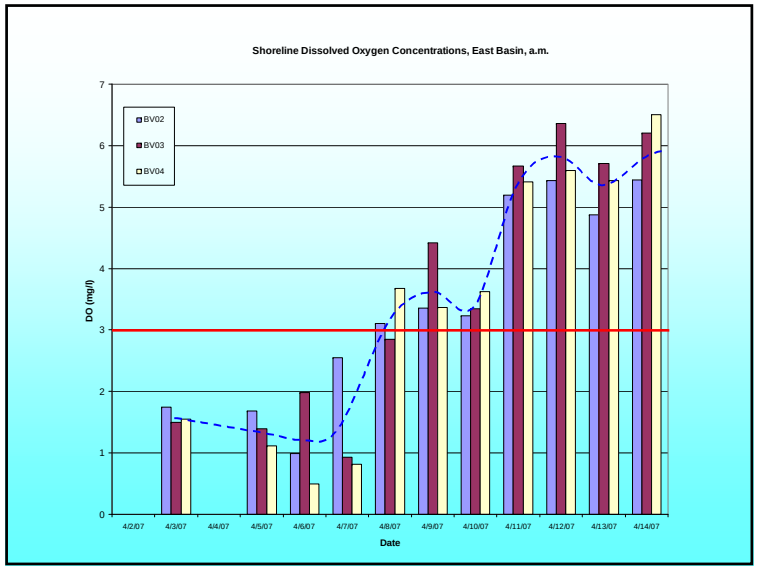
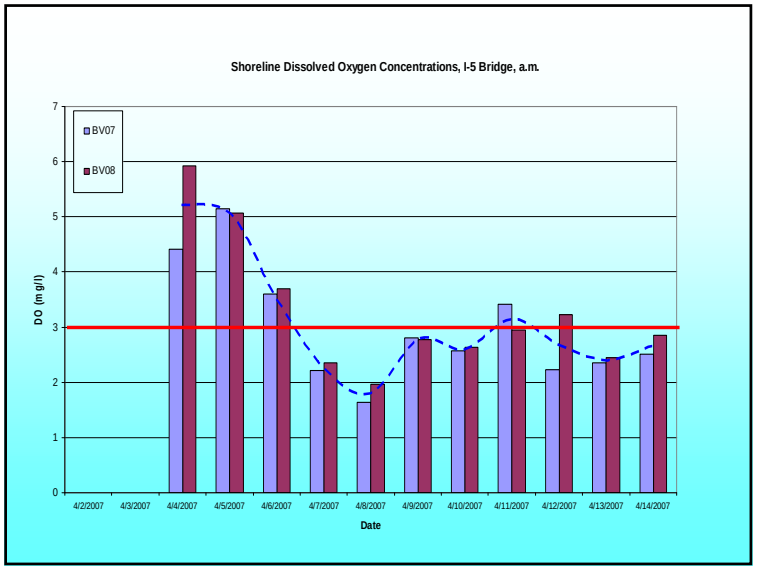
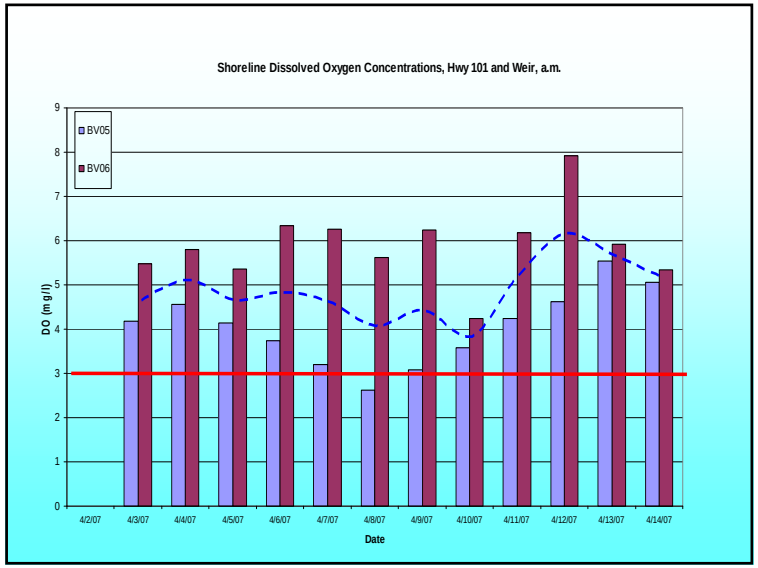


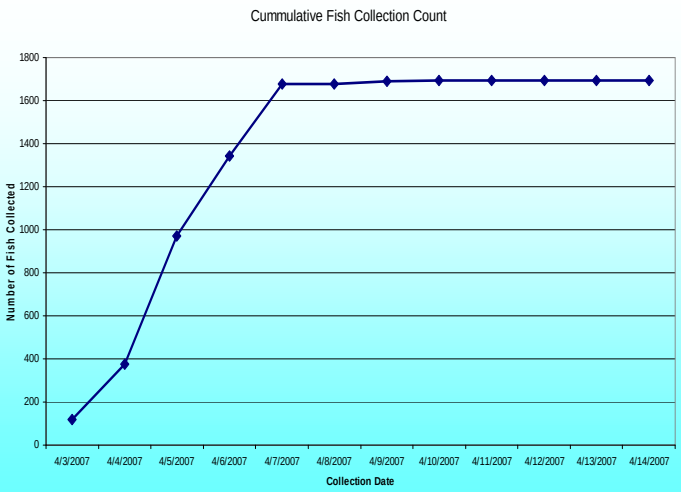




FISH LOSSES

(all losses are believed to have occurred between 4/1 and 4/7)

SPECIES	COUNT
Black Bullhead Catfish	604
Largemouth Bass	187
Carp	36
Mosquitofish	1
Bluegill	648
Carp-Goldfish	3
Black Crappie	5
Green Sunfish	210
TOTAL FISH COLLECTION	**1694**



1994-2007 Spills –Fish & Invertebrates

1994 – 4.75 MG Spill

- 835 Largemouth Bass
- 1671 Bluegill
- 279 Black Crappie
- 70 lbs. Catfish
- 348 lbs. Bullhead
- 278 lbs. Carp
- 3,000+ Mosquitofish
- 0 Green Sunfish
- 0 Carp-Goldfish
- 9,600 Crayfish
- 320,000 Freshwater Shrimp
- 0 Bullfrog

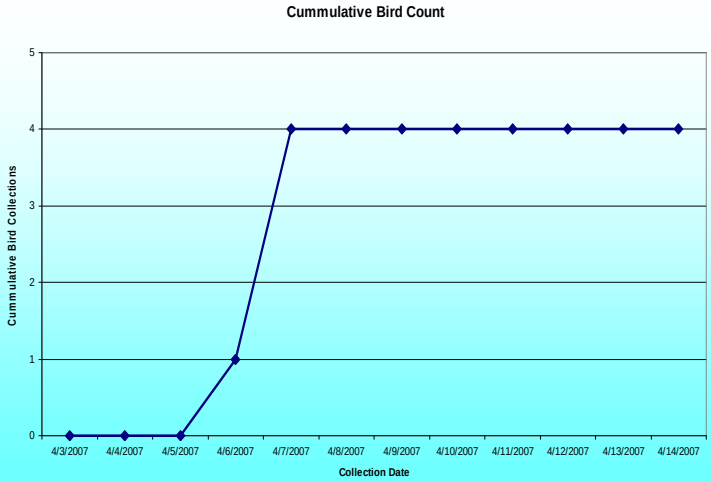
2007 – 7.3 MG Spill

- 187 Largemouth Bass
- 648 Bluegill
- 5 Black Crappie
- 0 Catfish
- 604 Bullhead (count)
- 36 Carp (count)
- 1+ Mosquitofish
- 210 Green Sunfish
- 3 Carp-Goldfish
- 3 Crayfish
- 0 Freshwater Shrimp
- 1 Bullfrog

BIRD LOSSES

(all losses were estimated to have occurred between 4/4 and 4/6)

California Gull (*Laurus californica*)
American Coot (*Fulica americana*)
American Coot (*Fulica americana*)
Gadwall (*Anas strepera*)



SUMMARY

- Aeration and pump-back have been effective
- Bacteria levels are declining
- DO is stabilizing at protective levels
- Fish losses have generally ceased
- Bird losses never reached large numbers
- Overall impacts have been less than prior spills

Recommended Program Changes

- Eliminate Pump-Back
  - DO levels have returned to lagoon
  - Bacterial levels indicate pump-back is predominantly lagoon waters not wastewater
  - Lagoon water levels are still drawn down
  - Report pump-back volume in Investigative Order
- Eliminate Aeration
  - DO levels have returned to lagoon

Recommended Program Changes

- Replace DO monitoring with 3 continuous recording DO Loggers in East and Central Basin
  - DO levels have returned to lagoon
  - Noise in DO appears to be sample time and wind driven
  - Daily DO curves would improve tracking of DO and better assist in understanding of DO demand and production at this time
  - Download and process weekly for 1 month

Recommended Program Changes

- Evaluate Waste Stream Constituents from Force Main To Evaluate Potential Mass Loading by Conserved Constituents and Nutrients
  - Review Encina Wastewater Authority (EWA) influent waste stream and identify constituents of concern
  - Prepare SAP in conjunction with agencies
  - Sample force main waste stream for constituents of concern
  - Calculate mass loading to lagoon east basin
  - Consider value of sediment sampling based on mass loading and baseline sediment chemistry from (Battelle 2003)

Recommended Program Changes

- Determine if Sediment Bacterial Sampling Should Be Performed
  - Lagoon baseline data?
  - Thresholds and impact assessment criteria?
  - Sampling methods?
  - Use of data to direct actions or assess affects?

Merkel & Associates, Inc.
5434 Ruffin Road, San Diego, CA 92123
Tel: 858/560-5465 • Fax: 858/560-7779
e-mail: associates@merkelinc.com

September 19, 2007

Eric Becker
CRWQCB
9174 Sky Park Court, Suite 100
San Diego, CA 92123

John Odermatt
CRWQCB
9174 Sky Park Court, Suite 100
San Diego, CA 92123

Re: ADDITIONAL INFORMATION SUBMITTAL for INVESTIGATIVE ORDER NO. R9-2007-0060, DISCHARGE OF UNTREATED SEWAGE INTO BUENA VISTA LAGOON WITHIN THE CITY OF CARLSBAD, SAN DIEGO COUNTY (Reference: NCRU:01-0743.02 & 01-0764.02:ebecker)

Dear Eric and John:

The Cities of Vista and Carlsbad (Cities) remain interested in scheduling a meeting with Board staff as expeditiously as your schedules will allow in order to address any questions you may have regarding previously submitted materials. Please let us know how we may best assist in coordinating such a meeting.

In Section 4.9 of the April 23, 2007 Investigative Order No. R9-2007-0060 Response (IO Response), the Cities identified opportunities to explore aspects of: 1) Discharge Avoidance; 2) Leak Detection; 3) Response Time and Resources; and 4) Impact Minimization and Recovery.

This document serves as a report on our progress in those areas and a supplemental information submittal to the IO Response. As you will gather from this submittal, the Cities continue to investigate opportunities to enhance their capabilities with respect to discharge avoidance, detection, and response. Some substantial progress has been made, and we believe reporting on that progress at the present time would be beneficial in supporting the Board's consideration of future actions.

In addition, when we submitted the IO Response, we noted that some investigations were ongoing, particularly with regards to the causes of force main failure and environmental harm. We have previously submitted additional information with respect to dissolved oxygen recovery in the system, bacteria level decline rates and recovery of natural sediment bacteria levels, and progress towards upland habitat restoration actions. There have been no additional losses of birds, fish, or invertebrates that we are aware of subsequent to the initially reported losses that occurred coincident with the spill event, and there have been no noted secondary algal blooms or indications of avian illnesses that we are aware of.

We now have the final corrosion report, and the Cities have had a chance to review this document. The Schiff report provided some disconcerting news regarding the lack of ability to further assess risks to the pipeline and indicated that other areas may be at similar risk of failure. While the Schiff report does not indicate that other pipeline failures are imminent, it does highlight the lack of capacity to determine the integrity of the pipeline relative to corrosion failure risks. We are hereby transmitting this document, along with the Cities' intended response to the findings from the report.

CORRODION INVESTIGATION AND RESPONSE

Schiff Associates Report

Schiff Associates, corrosion experts, conducted an analysis of the failure incident at the request of the Cities. The full final report of this analysis is attached. The Schiff report concluded that although the pipeline was installed with industry standard methods at the time, the fact that the polyethylene (PE) liner had been breached by an unknown cause, potentially at the time of construction, and that the pipe is located in corrosive soils, the pipeline may be at risk of other undetectable failures of a similar nature. The report suggests lining the pipe with high-density polyethylene (HDPE) or cured-in-place polyurethane (CIPP), or alternatively, cathodically protecting the pipe by electrically connecting each joint. This would require shoring, dewatering, and excavating at every joint and brazing cable connections across each pipe joint. Due to the potential for significant environmental impacts, the potential to do damage to the existing pipeline, impracticality of some of the options, and the high cost of remaining activities, these alternatives have been deemed too risky to pursue.

The Schiff Associates report also noted that the pipe could be replaced. Given the present standards, ductile iron pipe (DIP) would require more than PE encasement for the corrosivity of the soils. It was also noted that alternative materials to DIP such as HDPE might be a possibility for replacement.

Under the existing City of Carlsbad's Sewer Master Plan, the replacement of the pipeline was scheduled to be within their 2017 Wastewater CIP. This would mean that the principal capital replacement costs would be realized in 2017, 15 years ahead of the 50-year anticipated planned lifespan for the pipeline. To meet this schedule, however, work on design, environmental analysis, and permitting would commence in 2014 along a 3-year course prior to construction.

Based on the Schiff Associates Revised Final Report present findings, the Cities are moving forward with a replacement of the pipe on the earliest possible scheduled timeframe. With the City of Carlsbad as the responsible agency for maintenance and replacement of the pipeline, the Cities have re-scoped their original Capital Improvement Program (CIP) project for the construction of a parallel additional 24-inch pipeline to include the internal lining of the existing 24-inch pipeline. The Carlsbad City Council approved the preliminary design report, environmental review, permits, final design, plans, and specifications for the re-scoped project on September 11, 2007. As a part of the Carlsbad City Council's action, the noted portion of the re-scoped project was moved forward to the current fiscal year (FY 2007-2008) CIP Program. This means that work on planning and preliminary design will commence this FY 2007-2008. Contracting for construction will be funded and scheduled after the design and environmental work is completed.

While there is presently no indication that the pipeline is corroding or otherwise likely to experience a localized failure again short of its anticipated lifespan, the Cities deem action towards an expedited replacement to be prudent. If, however, along the course of project investigation, it is determined that additional failures are eminent, or in the event of an additional failure of the line, acceleration of work along a standard CIP schedule implementation may be altered to an emergency action level, thus short cutting much of the normal process.

Having received the Revised Final Report from Schiff Associates noting the possible condition of the entire pipeline, the City of Carlsbad has escaladed the frequency of visual inspections to once a week to enhance possible detection of a leak until a new line is installed and the existing pipe is lined. The City of Carlsbad is now conducting a walking inspection of the entire length of the Buena Vista Force main from the lift station up to the I-5 Bridge on a daily basis. Carlsbad staff has been instructed to report and respond to leaks and/or suspicious conditions. The City of Carlsbad has also been contracting with Sub-Surface Surveys to assist with locating a buried valve on the force main on Jefferson adjacent to the I-5.

PROGRESS ON PROGRAM ENHANCEMENT OPPORTUNITIES

Discharge Avoidance

This category focuses on means of improving detection of system weakness and responding to maintenance or operational needs prior to infrastructure failures.

Inspection and Lining

The Cities continue to perform regular video pipeline monitoring of gravity sewer lines. Although there are presently no guidelines for inspection of force mains, the Cities will continue to explore avenues to televise the Buena Vista force main and other DIP force mains.

The City of Carlsbad is studying the feasibility of using emerging technology to conduct a condition assessment of force mains. Sonar Solutions, a company that uses a sonar device within the pipeline to determine wall thicknesses, also conducted a site visit. The company was unable to conduct a condition assessment of the Buena Vista force main due to pipe bend angle constraints. ULC Robotics is another company whose technology is being explored. They use a remote-controlled and untethered crawling robot for condition assessments of natural gas mains; the company is beginning to transition to sewer and water infrastructure inspections, and inspection results look promising for pipelines with offsets and bends such as those on the Buena Vista line. The evaluation of additional new technologies, as they become known, is ongoing at this time. The City of Vista has had discussions with Downstream Services, Inc., a similar firm that may be able to perform a video and sonar profiling of the pipeline. Preliminary indications are that this option may not be feasible, even though the pipeline does not have to be emptied, drained, and flushed, because the pipeline will have to be 100% bypassed during the survey. Also, this technology may only provide a view of the interior lining and a rough approximation of the cross section of the pipeline with a sonar image. It may not provide adequate quality information regarding external corrosion conditions.

In addition, the Cities had discussions with International Pipe Lining Technologies, a firm who specializes in polyester-fleece pipe lining technologies. The outcomes of those discussions confirmed that polyester-fleece pipe lining material appears to be an acceptable material for lining force mains. There are many restrictions on the use of the material, however, such as limited length of a single pull (1,000 to 1,300 feet), thus requiring construction of several access ways, and a severe restriction on manageable bend angles (no bend greater than 12.5 degrees). These angles are exceeded within the Buena Vista force main. In addition, the polyester-fleece pipe lining material has to be installed in a clean pipeline with no water in the pipeline. This would require a 100% bypass of the force main for the time needed to empty, drain, clean, and flush the pipeline; shore, dewater, excavate and construct several access ways; and remove and realign a significant portion of the pipeline to remove 90 and 45 degree bends and line the pipeline.

The City of Vista is nearing completion (September 2007) of its Sewer Master Plan Update 2007. Vista's Sewer Master Plan Update was done by an engineering consulting firm who specializes in infrastructure condition and risk assessment of force and gravity mains in the City. The Vista Sewer Master Plan Update will be an essential element to evaluate performance, planning, and design of force and gravity mains. Factors to be considered will be pipeline age, pipeline material, operation conditions, and soil, as well as other factors and parameters that would extend or reduce the probable service life of infrastructure or play a major role in shaping inspection and replacement decisions for Vista's pipelines. The environmental, human health, and economic consequences and likelihood of pipeline failure will be further factors that could also influence further investigations such as a condition assessment of select pipelines. Similarly, the City of Carlsbad is in the process of identifying all sewer force mains that have a potential for premature failure similar to the sewer line along Buena Vista Lagoon. Based on the findings of the assessment, appropriate actions will be taken.

Pipeline Replacement

Based on many of the inspection avenues and lining options being infeasible or technologically challenged in an active facility, the Dischargers have pursued, and are in the process of, receiving governing body approvals that appropriate funds to begin engineering design of a parallel pipeline along an expedited timeline. This approval has gone further than accelerating scheduled pipeline replacement, but also has included lining of the existing pipe once the new pipe is in service. This would allow for insurance against future failures, but more importantly, it would provide redundant facilities to handle bypass needs in the event of a failure on either of the pipes. This is seen as a major benefit both in facilitating discharge avoidance and improving spill response and impact reduction.

Leak Detection

This category of potential actions addresses potential means to enhance detection of discharges. Within the Encina Wastewater Authority service area, wastewater flows are monitored by ADS, Inc. with flow meters and flow measurement devices at 16 metered locations. These meters are employed in the billing of member agencies of the JPA. With the present availability of system upgrades that would provide real time access to flow information, the Cities, as well as the other member agencies in the Encina Wastewater Authority, are pursuing the implementation of such upgrades through the EWA contract with ADS, Inc.

It was confirmed that additional sensors could be installed as an alternative system that would improve leak detection through use of system pressure and flow variance. The Dischargers have committed to installing automated alarm systems for potential leaks in this and other force main systems within their individual and collective operations areas. EWA has completed the installation of pressure and flow variance sensors at Buena Vista and Raceway Pump Stations. Real-time alarms, however, still rely on flow or pressure differential ranges. As such, small leaks or early ruptures may still go undetected, while larger ruptures should be detected earlier. The City of Carlsbad has met with ADS, Inc. to discuss the feasibility of a system that would provide real time flow tracking information. Carlsbad has coordinated with EWA to implement the system upgrades in the coming months.

Along these same lines, the City of Carlsbad has initiated discussions with Flow Metrix, a company that employs fixed-base leak detection devices in pressurized pipe. The technology is used presently on pressurized water pipelines. The City of Carlsbad, however, is still exploring its alternative use on pressurized sewer pipelines. In addition, the City of Carlsbad has had several meetings with Smartcover to discuss implementing flow change alarms on the Buena Vista force main. This would be a new use of the Smartcover technology.

As part of the City of Vista's Sewer Master Plan Update 2007, there will be a recommendation to monitor flows in the gravity flow sections of all major interceptor and trunk sewers in Vista. This process of monitoring will be reviewed to determine whether it offers a practical solution to more permanent monitoring of gravity sewers for potential capacity exceedence overflow events. Vista will also looking at the potential opportunities to install level alarms on gravity lines for potential overflow events.

Response Time and Resources

The response time and effectiveness of the actions taken after leak detection were immediate and comprehensive. There were a few points, however, where improvement could occur. To address these issues, the following measures are being undertaken:

- The City of Vista is currently scanning all of its improvement plans into a plan archival system with a central repository and indexing process that will allow more rapid access to data on trunk and main sewers, bypass interconnects, lift stations, and other critical infrastructure. In addition, the City of Vista's archival system will be accessible through the City's web page. The City of Carlsbad has previously scanned all sewer-related improvement plans into its Document Management System. Carlsbad is currently working on improving the plan indexing and retrieval process and providing a link between the Document Management System and the Geographical Information System. When completed, these integrated systems will facilitate the retrieval of all pertinent system information on field-deployed laptop computers, providing real-time access to critical data during emergency events.

- As part of the August 8, 2007, Buena Vista Pump Station Force Main Failure Joint Debriefing meeting hosted by EWA, it was agreed by the EWA member agencies that the members will upgrade call lists and create a general inventory of all assets that may be called upon in the case of emergencies. EWA will investigate possible formal agreements, like a Memorandum of Understanding, that can be set up and maintained by all member agencies and possible neighboring agencies for emergency response coordination.

- Asset inventories across mutual assistance agencies do not exist for emergency response coordination, and the requisition process to collect needed equipment can be hampered by calls to agencies or departments that lack needed resources. While it may be impractical to maintain a full list of resources, the Cities will upgrade call lists and create a general inventory of assets that may be called upon in the case of emergencies.

- To further resource readiness, the City of Carlsbad Public Works staff requested and received Council approval for: 2 new vactors, 1 new bypass trailer, 1 new CCTV van, replacement of 2 ½-ton pickups for use with the vactors, 1 new compact pickup truck, replacement of one 1-ton pickup for working on the lift stations, and adding 1 Public Works Supervisor, 4 Maintenance workers, and 1 Office Specialist for the collections system. Some or all of the proposed positions may be staffed by outside contracts. Vactors and pickup trucks will be used for line cleaning and maintenance on the lift stations, the CCTV van will be used to video inspect the gravity sewer pipelines, and the bypass trailer will be used to bypass sewer lines under construction repair or when inoperable due to blockages.

- The City of Vista Public Works Department continues to be well staffed with 18 active personnel for sewer maintenance. Currently, the City of Vista daily staffs and operates 1 CCTV van, 3 vactors, 1 rodding truck, dump truck, sewer service truck, heavy construction flat bed crane truck for spot pipeline repairs and manhole repairs and several miscellaneous pieces of equipment necessary for the care and maintenance of the City's sewer systems. In FY 07-08 Council approved budget, the Department will receive the following equipment replacements in its budget request: 1 vactor, 1 dump truck, and a flatbed crane truck. In addition, a new easement crawler hose cart machine was approved by the City Council. In FY 08-09, the Department has requested a replacement of 1 vactor.

Impact Minimization and Recovery

While each spill scenario encountered may have somewhat differing needs, almost any sizable spill into an inland lake, pond, or coastal lagoon will benefit from immediate and effective aeration.

As part of the Buena Vista Pump Station Force Main Failure Joint Debriefing meeting, it was also agreed that the Cities will update their respective Sanitary Sewer Overflow Response Plans during FY 07-08, including adding an element addressing incident response and damage minimization

guidelines for various ecologically sensitive areas potentially affected by spills from the existing systems. In addition, EWA agreed to host internet links on their web page from its member agencies for each of their respective Sanitary Sewer Overflow Response Plans for universal access. The City of Vista will have its revised Sanitary Sewer Overflow Response Plan in place by September 2007, with specific provisions for a parallel environmental response independent of response crew activities. The City of Carlsbad is making revisions to its current Sanitary Sewer Management Plan (SSMP) based on the lessons learned from the Buena Vista Lagoon experience. In addition, Carlsbad will be performing a comprehensive overhaul of its SSMP in compliance with the State's Waste Discharge Requirements. The Response Plans of both Cities will be coordinated to ensure that common facilities, such as the Buena Vista Force main, are properly addressed.

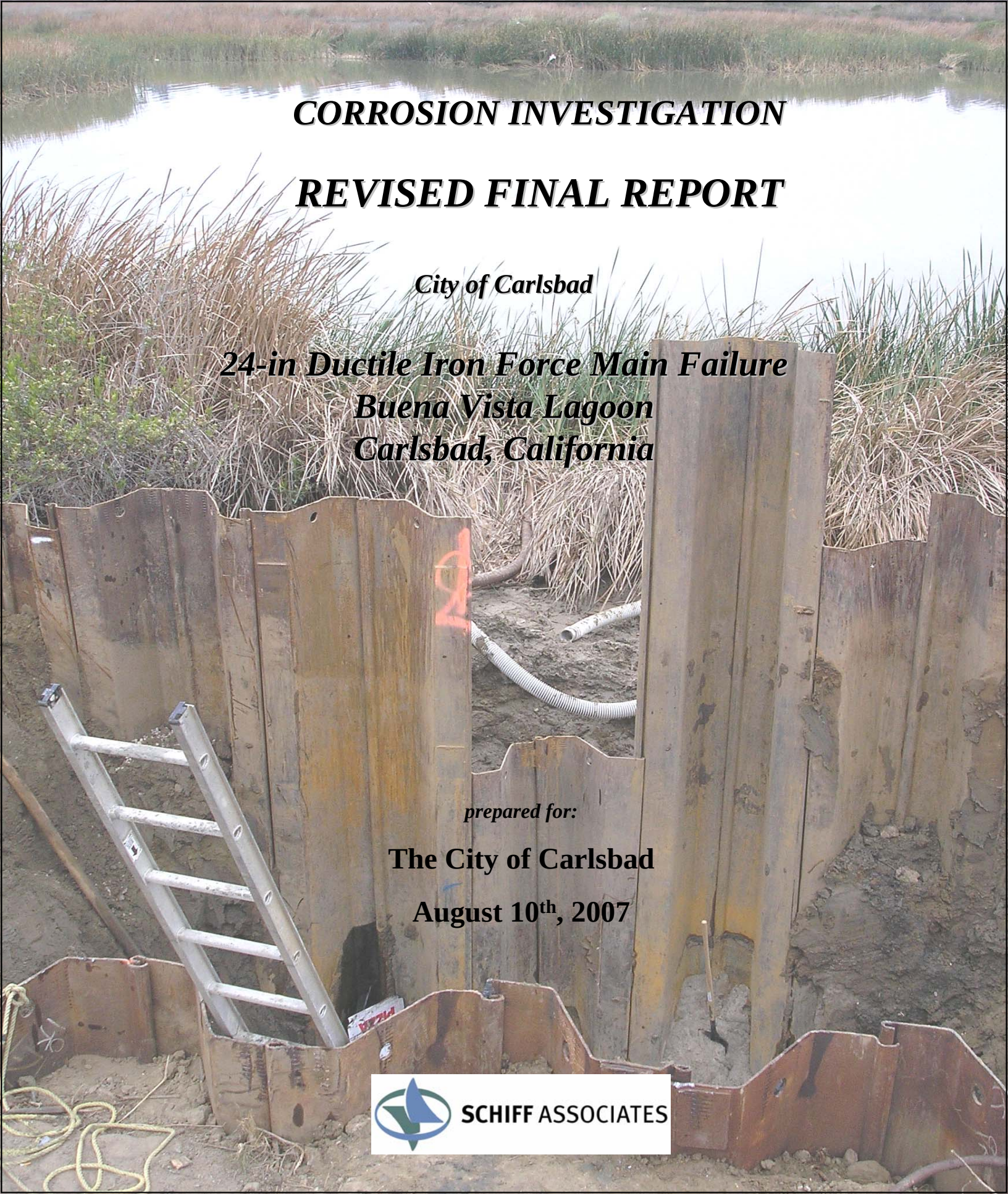
There was also an agreement made at the Buena Vista Pump Station Force Main Failure Joint Debriefing meeting to identify aeration equipment needs and options and stage that equipment at EWA for immediate availability for future events. This will allow an environmental response to be initiated immediately and independent of repair response crew activities.

Again, we continue to be very interested and available to sit down and meet with you and other staff members as soon as possible regarding the Buena Vista spill. The costs of spill response, the cost of early pipeline replacement, and the potential cost of penalties for the spill constitute a substantial fiscal impact on the Cities, particularly the City of Vista that will bear approximately 90% of the overall cost. Uncertainty in the penalties is of concern with respect to bond rating and financing capacity for present and future public projects. For this reason, it would be of great benefit for the Cities to move towards resolution of this matter in an expeditious manner.

Sincerely,

Keith W. Merkel
Principal Consultant
On behalf of the Cities of Vista and Carlsbad

cc: Rita Geldert (City Manager, City of Vista)
Glenn Pruim (Public Works Director, City of Carlsbad)



CORROSION INVESTIGATION

REVISED FINAL REPORT

City of Carlsbad

24-in Ductile Iron Force Main Failure
Buena Vista Lagoon
Carlsbad, California

prepared for:

The City of Carlsbad

August 10th, 2007

SCHIFF ASSOCIATES

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CORROSION INVESTIGATION
REVISED FINAL REPORT

CITY OF CARLSBAD
24-INCH DUCTILE IRON FORCE MAIN FAILURE
BUENA VISTA LAGOON
Carlsbad, California
NCRU: 01-0743.02 & 01-764.02:ebecker

Prepared for

The City of Carlsbad
1635 Faraday Avenue
Carlsbad, California 92008

SA #07-0477ENG

August 10, 2007

431 West Baseline Road · Claremont, CA 91711
Phone: 909.626.0967 · Fax: 909.626.3316

EXECUTIVE SUMMARY

A sewer force main (FM) jointly owned and operated by the City of Carlsbad and the City of Vista was reported to be discharging sewage into the Buena Vista Lagoon on April 1, 2007. Schiff Associates (SA) was contacted by the City of Carlsbad on the morning of April 3, 2007. Dr. Graham Bell, PE of SA visited the leak site, inspected the pipe and excavation, obtained soil samples and visually inspected the exposed pipe that same morning and early afternoon.

The ductile iron pipe (DIP) segment of the raw sewage force main alignment begins at the Buena Vista Lift Station and runs generally southwest. The discharge occurred about 700 feet downstream (west) of the Buena Vista Lift Station, on a 24-inch diameter DIP installed in 1982 and operating at or below 40-psi. Corrosion control for the exterior consisted of 8-mil polyethylene encasement (PE) per AWWA C105, and cement-mortar lining inside the pipe. The restrained pipe joint excavated was not intentionally bonded for electrical continuity by means of an external bonding strap. In the area of the excavation, gravel had been used to back fill the pipe in the pipe zone, probably due to groundwater encountered during installation.

A 40-inch long section of the FM was removed and replaced. The removed section of pipe included the leak and a restrained joint immediately upstream of the leak location. The sewage discharge was through a rectangular hole of approximately 21.7 inches^2 in the pipe just below spring line (reported as 4:30 clock position when facing downstream) on the lagoon (west) side of the pipe approximately 15 inches from the restrained joint. The hole exhibited characteristics consistent with external corrosion (concave edges on the exterior). The exterior of the pipe exhibited corrosion from sewage which leaked out and was trapped against the pipe by the PE The inside surface of the pipe was uniformly in good condition and internal corrosion was not the source of the corrosion hole.

An unknown underground irrigation pipeline was discovered approximately 4-feet above the force main during excavation and repair work on the force main. The 3-inch diameter irrigation line was unusually deep, and there was no record of the pipeline. The irrigation line was previously repaired, suggested by a section of the line containing compression couplings at each end. It is unlikely that the leak in this line damaged the liner. Also, in the absence of inspection records, specifications, or any other records, it was unlikely that there was a requirement for over excavation and re-compaction especially to 4-feet below the pipe.

Evidence of external corrosion damage due to leaked sewage near a restrained joint made it necessary to investigate the integrity of the restrained joint seal. The restrained joint, flange and seals were carefully sectioned to inspect for evidence of joint and gasket leakage. No evidence of leakage was found in any area of the joint or gasket.

Fractographic, metallographic, chemical analysis and testing for mechanical properties were conducted on specimens from the pipe sample. The pipe material was tested for tensile strength and Charpy impact values in accordance with AWWA C151/A21.5-81. The results of the mechanical testing showed that the pipe material did not meet the requirements for ductile iron

pipe. The nonconforming impact properties of the material did not cause the corrosion, nor did they have any appreciable effect on the corrosion resistance of the pipe. The microstructure showed that portions of the pipe were closer to that of grey cast iron. This appears to have been a manufacturing issue, but we do not believe that this contributed to the leak since grey and ductile iron have very similar chemical composition and the same general corrosion resistance.

Soil samples collected from the excavation were tested for electrical and chemical properties to determine corrosivity towards DIP. Resistivity and soil chemistry characteristics (high chloride concentration) along with the presence of sulfides and negative redox potentials (indicating anaerobic condition consistent with microbiological corrosion activity) result in extremely corrosive soils for DIP. Using the DIPRA 10-point Soil Test Evaluation from Appendix A of AWWA C105-82, these soils score 20.5 out of a possible 25.5 points. A score of 10 or higher classifies the soil as corrosive to DIP and protection against exterior corrosion should be provided. External corrosion protection recommended per AWWA C105-82 was polyethylene encasement as was installed. PE was the industry standard for corrosion protection at the time of design and construction.

Linear polarization resistance (LPR) tests using steel surrogate electrodes were performed in order to estimate the corrosion rate on exposed iron. Results of the LPR tests indicate general corrosion rates on the order of 8 to 10 mils per year (0.008 to 0.010 inches per year) and a tendency toward pitting which could accelerate time to perforation.

The failed pipe section did not show degradation of the cement-mortar lining, indicating there are no air pockets where sulfuric acid can form and rapidly degrade the lining resulting in corrosion of the crown of the interior of the pipeline. Based on all of the information available, the most probable cause of the corrosion hole was external corrosion of the pipe at a hole in the PE encasement which most likely occurred during construction. The exposed exterior iron surface corroded over a period of time, measured in years, down to the cement mortar liner. The exposed area of the liner continued to grow in size as the supporting iron receded and sewage fluids from inside the pipe permeated through the cement mortar. The permeated sewage fluids were trapped by the polyethylene encasement. The permeated and trapped sewage fluids increase the exterior corrosion rate and subsequent damage on the lower half of the pipe. Soil pressure on the polyethylene encasement or tape around the pipe used to keep the polyethylene encasement in place tended to prevent the severe corrosion further along the pipe and above the spring line. The major volume of sewage was discharged when the membrane of cement mortar liner, corrosion product and supporting fill could not contain the pressure or was dislodged due to a mechanical event.

If this pipe is to remain in operation, it should be lined with HDPE or CIPP or cathodically protected. Cathodic protection would require bonding all pipe joints for electrical continuity. Joint bonding would consist of thermite brazing two or three cables to pipe on each side of a joint. Cathodic protection will halt further external corrosion but will not prevent an imminent failure of pipe that has suffered similar significant corrosion damage. Bonding pipe joints should include inspection of the pipe at every excavation. Value engineering analysis can be

conducted to determine the economic viability of excavation for joint bonding and subsequent cathodic protection versus installing another pipe or lining then existing pipe.

The pipe could be replaced. The results of the soil analysis show that DIP would require protection beyond PE encasement in accordance with the most current version of AWWA C-105. Alternatives for DIP are High Density Polyethylene (HDPE) or Cured In Place Plastic (CIPP) liner are also options for repair and replacement but valving and other operational and construction issues must be considered.

FINAL REPORT

CORROSION INVESTIGATION

City of Carlsbad
24-in Force Main Failure
Buena Vista Lagoon

SA Project # 07-0477ENG
NCRU: 01-0743.02 & 01-764.02:ebecker
August 10, 2007

To: Bill Plummer, P.E.
City of Carlsbad Project Manager

From: Graham E.C. Bell, Ph.D., P.E.
Project Manager

Prepared By: Schiff Associates

Graham E.C. Bell, Ph.D., P.E.

Mark Bell, P.E.

Reviewed By:

Eric Frechette, P.E.

Robert Pannell

431 West Baseline Road · Claremont, CA 91711
Phone: 909.626.0967 · Fax: 909.626.3316

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1. INTRODUCTION AND BACKGROUND

A sewer force main jointly owned and operated by the City of Carlsbad and the City of Vista was discharging sewage into the Buena Vista Lagoon on April 1, 2007. Schiff Associates was contacted by the City of Carlsbad on the morning of April 3, 2007 to inspect the site and investigate the failure. This final report details both the investigative work and our conclusions.

1.1. DESCRIPTION OF THE FORCE MAIN PIPELINE

The ductile iron portion of the force main alignment begins at the Buena Vista Lift Station located on Marron Road, north of Jefferson Street. The raw sewage force main runs generally southwest from the Buena Vista Lift Station crossing near the lagoon in the Marron Road bridge deck and runs in Jefferson Street to transition to asbestos cement pipe force main that was installed by Caltrans to cross Interstate 5 (I-5). This portion of the force main alignment contains a parallel asbestos-cement pipe (ACP), 16-inch diameter. The ACP parallel begins at a wye with a plug valve installed in the DIP reach just past the point of the break. Flow can be directed in the ACP or DIP by operating a plug valve. East of I-5 there is another wye and plug valve. Crossing under I-5 are parallel ACP barrels, and the DIP connects to one barrel with the parallel ACP connecting to the other barrel under I-5. An aerial view of the alignment is included with the appendices. The leak occurred about 700 feet downstream (west) of the Buena Vista Lift Station.

The force main is 24-inch diameter ductile iron pipe (DIP), and was installed circa 1982. Corrosion control for the exterior consisted of 8-mil thick clear, most likely linear low density, polyethylene encasement (PE) per American Water Works Association (AWWA) C105-82. The interior was lined with cement-mortar per AWWA C104. The pipe wall thickness was approximately 0.41-inch (Thickness Class 51) with restrained joints. The pipe in the vicinity of the leak operated at a pressure at or below 40-psi. The restrained pipe joint excavated was not intentionally bonded for electrical continuity by means of an external bonding strap. In the area of the excavation, gravel had been used to back fill the pipe in the pipe zone, probably due to groundwater encountered during installation.

1.2. SCOPE OF WORK

On 3 April 2007, Dr Graham Bell visited the site for inspection, documentation, photography and sample removal. He performed the following:

- Collected soil and gravel samples from the repair excavation at the discharge site
- Collected a sample of the polyethylene encasement from the west end of the excavation
- Observed the repairs to the pipe
- Examined and documented the as-excavated condition and external corrosion on the section of pipe removed

In addition, Dr. Bell met with representatives from the City of Carlsbad and the City of Vista on April 12, 2007 at the Encina Wastewater Treatment Plant to receive documentation and discuss the investigation.

This final report presents test results and responds to Investigative Order No. R9-2007-0060 issued by the California Regional Water Quality Control Board, San Diego Region (Regional Board). Statewide Waste Discharge Requirements (WDRs) prohibit Sanitary Sewer Overflows (SSOs), or leaks that result with discharge of sewage into natural waters of the state and also prohibit discharge of raw sewage from the system upstream of a sewage treatment plant, which in this case would be the Encina Wastewater Treatment Plant. The Regional Board is calling for information that shows the actions by the municipalities to prevent sewage discharge, repair the failed pipe, and investigate water quality impacts from the sewage discharges.

2. PHYSICAL EXAMINATION OF PIPE SPECIMEN

2.1. OBSERVATIONS

A 40-inch long section of the leaking pipe was removed by the Contractor at the excavation site. The 40-in long pipe was sectioned into two pieces along the plane of the springline to facilitate removal and included a restrained joint. The sewage discharge was due to an approximate 3-in x 12-in rectangular hole in the pipe just below the spring line (reported as 4:30 clock position when facing downstream) on the lagoon (west) side of the pipe, approximately 15 inches from the restrained joint.

An unknown underground irrigation pipeline was discovered approximately 4-feet above the force main during excavation and repair work on the force main. The 3-inch diameter irrigation line was unusually deep, and there was no record of the pipeline. The irrigation line was previously repaired, suggested by a section of the line containing compression couplings at each end. It is unlikely that the leak in this line damaged the liner. Also, in the absence of inspection records, specifications, or any other records, it was unlikely that there was a requirement for over excavation and re-compaction especially to 4-feet below the pipe.

Two soil samples were collected at the excavation site; one from the pipe trench and one from the wall of the excavation adjacent to the failure. A sample of gravel from next to the pipe was collected, and a sample of the polyethylene encasement was obtained. The polyethylene sample was transmitted to the Ductile Iron Pipe Research Association (DIPRA) to be analyzed for material conformance with American Water Works Standard C105.

The rectangular corrosion hole was preserved in one half of the sectioned pipe. Two in-line pipe couplings and a short section of pipe were installed in order to place the force main back in service (see Figure 1). The two sections of pipe including the intact restrained joint were preserved and transported to Encina Wastewater Treatment Plant, 6200 Avenida Encinas, Carlsbad, CA. From there they were moved to Schiff Associates, 431 W. Baseline Rd,

Claremont, CA 91711 for cleaning, observation and analysis. The sections are currently stored in Claremont.

Figure 1 - Excavation Site

After transportation to Claremont, the pipe sections were cleaned with 2600 psi potable water pressure washer to reveal the extent of corrosion under corrosion products, surface debris and graphitization. The hole in the pipe exhibited characteristics consistent with external corrosion (concave edges on the exterior). The inside surface of the pipe was uniformly in good condition and internal corrosion was not the source of the corrosion hole.

The hole was photographed upon removal of the excavation, at the Encina WTP maintenance area and after transportation to Schiff Associates office. A CAD program was used on photographs of the hole to determine both the area of leakage and the perimeter of the hole. The results showed that area of the hole to be 21.7 in^2. The perimeter of the hole is 28.36 inches in length. This is accurate to 13% or approximately $\pm$ 2.8 inches.

Figures 2 to 6 below present photographs of the observations and findings.

Figure 2 – Sectioned pipe with failure (below springline)

This is the condition of the pipe section, from below the springline, at the failure site. The leakage hole is in this section, red arrows.

Figure 3 – Sectioned pipe opposite side of failure (above springline)

This is the section from above the spring line. This has not been cleaned, yet the band on the pipe adjacent to the bell can be seen. It is this band that delineates the taping of the PE encasement. There is no appreciable corrosion outside the encasement or above the springline. The four red arrows locate the area of the corroded band.

Figure 4 - Corrosion hole close-up

The stipple pattern from the foundry mold is still present. One characteristic of graphitic corrosion is that small details like this may still be seen but the iron has been removed due to corrosion. In this photo the stipple pattern has been retained on the corrosion product. The red arrows show the thickness of the cement liner. There is no metal left, corrosion has removed the supporting iron. The liner failed in a fast manner and not from a slow dissolution. There is no indication that the line had been thinned from a long period of time of leakage. This supports the conclusion that the leak was not slow with the hole gradually growing in size.

This is the pressure cleaned upper section. The heavily corroded area is the lower portion of the Figure. This is showing the area adjacent to the taped PE encasement. After the pipe was shot blasted, it was discovered that the liner was the only material left in some of these areas, the iron was gone due to corrosion. The marked area in the upper right locates where material was taken for the mechanical tests (Charpy impact bars, metallography and chemical analysis). A similar sample was taken 180° from this on the lower section. Figures 9 through 12 are from these locations.

Figure 5 - Cleaned upper section of pipe

Figure 6 – Four photos showing asphaltic coating and joint condition

Three photos from Figure 6 above show the excellent condition of the asphaltic lining applied at the foundry and sealed by the gasket. The pristine condition of these pipe surfaces is certain evidence that there was no leaking at the compressed joint. The lower right photograph in Figure 6 is a section through the gasket material showing a good pipe joint. The inspection of the gasket's surface after removal of the flange showed the gasket material to be undamaged, consistent with a leak free joint.

2.2. METALLOGRAPHY

Heat treatment is important in ductile iron forming good mechanical properties; therefore the use of the optical metallography is key in verifying proper heat treatment by studying the microstructure. Understanding the microstructure will tell the heat treating and casting history of the ductile iron.

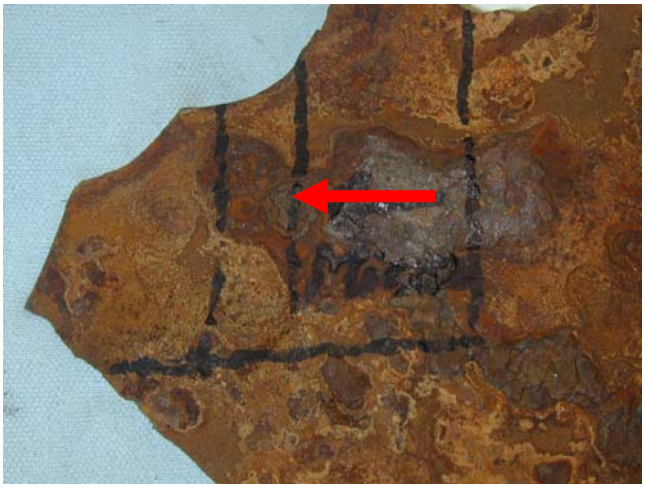
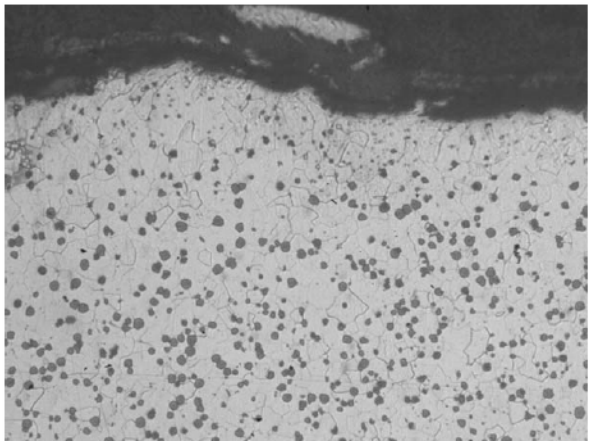


Figure 7 – Pipe specimen identified for metallographic analysis

Figure 8 – Close up of corrosion product

Besides the metallographic examination taken from the area in Figure 5 another sample was taken from the bottom of a graphitic corrosion pit as seen in Figures 7 and 8. The red arrows locate the plane of sectioning through the remaining metal and the corrosion product.

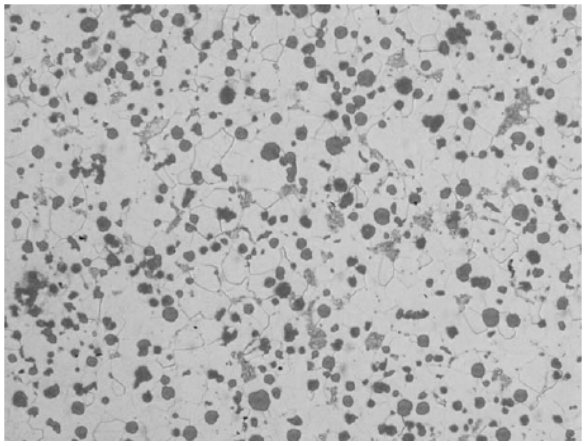
Figure 8 is a close-up of the plane (red arrow) of sectioning through the corrosion product and the DIP base metal. The results of the metallography are shown in micrograph, Figure 13. The micrograph also shows the structure of the DIP to be vermicular as the inside diameter is approached. The same structure as seen in Figure 11.



Micrograph of outside diameter surface
Upper specimen
Etched 2% Nital
Magnification 200X
Cast Ductile Iron

The microstructure is typical of that for ductile iron. The graphite nodules are dispersed. This is an acceptable microstructure. It is meets the ASTM A247 Type I and Type II chart. It is of interest that this shows no corrosion or loss of metal on the outside surface of the pipe in this specific area.

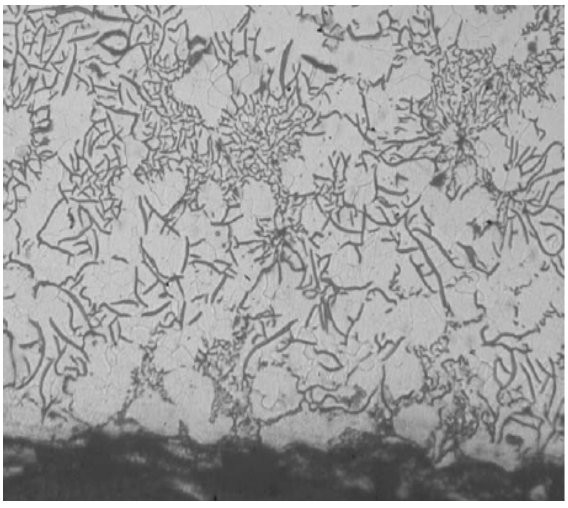
Figure 9 - Light micrograph of pipe surface



Micrograph of core
Upper specimen
Etched 2% Nital
Magnification 200X
Cast Ductile Iron

This shows the microstructure of the mid section of the wall of the ductile iron. Some of the graphite nodules are well shaped and some are showing an irregular, non preferred shape. The microstructure is starting to decay and exhibit the structure of that found in grey iron. It is meets the ASTM A247 Type II chart.

Figure 10 - Light micrograph of pipe core



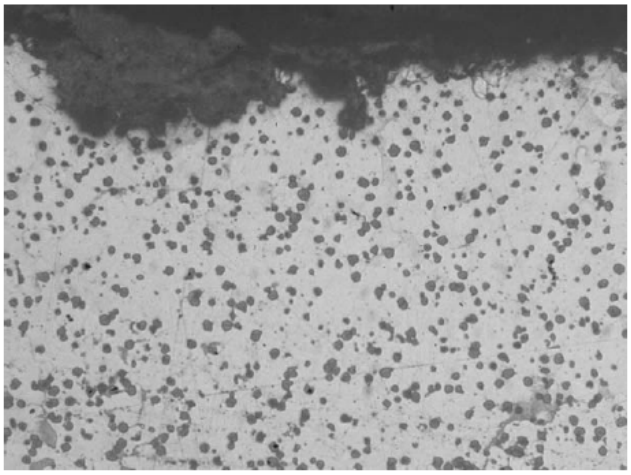
Micrograph of inside diameter surface
Upper specimen
Etched 2% Nital
Magnification 200X
Cast Ductile Iron

The microstructure is not ductile iron. Because of the cooling rate difference between the inside surface and the outside there is a difference in the microstructure. There are no graphite nodules in the microstructure. This is not an acceptable microstructure. It meets the ASTM A247 Type V II Chart. The cement liner was protecting this surface from corrosion. The corrosion rate would be similar between the nodular graphite and this vermicular structure.

Figure 11 - Light micrograph of pipe interior

The micrographs of the specimen taken at 180°, Lower Specimen (Figure 12), are similar to the previous micrographs, Figures 9, 10, 11). The outside diameter surface does show more

corrosion than this one. This is consistent with the cause of corrosion failure presented in this report. The specimen from the lower section is below the springline and would see some more metal loss then the upper section.



Micrograph of outside diameter surface
Lower specimen.
Etched 2% Nital
Magnification 200X
Cast Ductile Iron

The microstructure is typical of that for ductile iron. The graphite nodules are well shaped and evenly dispersed. This is an acceptable microstructure. It is meets the ASTM A247 Type I. chart. Because this was taken from the lowest outer section of the DIP it does evidence slightly more corrosion.

Figure 12 - Light micrograph of pipe surface (below springline)

Figure 13 is the microstructure of the iron located below the corrosion pit, (Figure 8). The pit is due to graphitic corrosion.

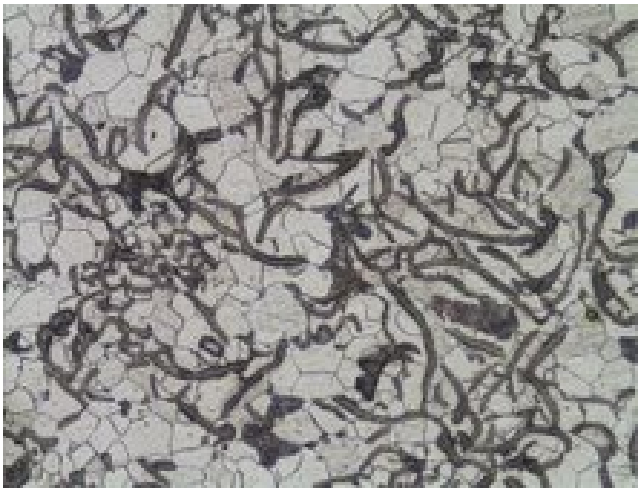


Figure 13 - Light micrograph of structure below the graphitization pit.

Micrograph of DIP below corrosion pit.
Corrosion specimen.
Etched 2% Nital
Magnification 200X
Cast Ductile Iron

This is not ductile iron. It is the same vermicular structure as seen in Figure 12. There are no graphite nodules in the microstructure. This is not an acceptable microstructure for impact resistance. The microstructure has no susceptibility or resistance to corrosion over that of a nodular structure. The cement liner was protecting this structure from corrosion from the inside of the pipe. The corrosion came from the outside diameter thought the nodular structure. The corrosion rate would be similar between the nodular graphite and this vermicular structure.

DISCUSSION OF GRAPHITIC CORROSION

The corrosion engineering industry uses the term "graphitic corrosion" to describe how in conductive environments there is a selective loss of the iron matrix in order to galvanically protect the graphite phase in the metal. Both ductile iron and grey cast iron will suffer from graphitic corrosion. The use of terms such as degraphitization and graphitization corrosion are non-standard terms when used to describe types of cast iron.

As previously discussed the corrosion rates of DIP and grey iron pipe may be similar in some environments. In evaluating the condition of the grey iron grub screws it is clear that they have undergone severe corrosion. One may conclude that the grey iron is more susceptible to corrosion and thereby extrapolate that the close-to-grey iron structure in the DIP will evidence more corrosion. On the other hand the extent of corrosion to the DIP in the area of the bell, below the springline, is also severe. It is more logical to conclude that the corrosion of both was similar and that there was no real difference.

The key to understanding the issue of the grey iron having similar rates of corrosion is that the outside diameter did have the correct nodular structure and was subjected to a more severe environment as the inside vermicular structure was protected by the cement liner. Only when the pit depths extended into the wall to such a depth that the vermicular structure was revealed and also attacked. It was the ductile structure that had to have been removed in order to expose the grey iron, vermicular graphite. There is not enough evidence one way or another in this corrosion investigation to classify the grey iron vermicular graphite as having inferior corrosion resistance to the expected nodular graphite.

Figure 14 – Corrosion of fasteners

Figure 14 above shows two sets of fasteners. The left is surface corroded grey iron. It is heavy and the fracture surface is clean and metallic in appearance. The pieces on the right are the same fasteners but they have undergone graphitic corrosion. They have very little weight because of the loss of the iron in the matrix

2.3. MECHANICAL PROPERTIES TESTING

Samples were taken at 180° at a distance of 40 inches from the bell of the pipe. Three impact bars and one tensile were taken from each location. The results are tabulated below and compared with the requirements of AWWA C151/A21.5-81, Ductile-Iron Pipe, Centrifugally

Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids. The Charpy values, tensile strength and % elongation do not meet the minimum required.

TEST	Charpy ft-lbs (average of 3)	Tensile Strength (psi)	Yield Strength (psi)	% Elongation
60-42-10	7 ft-lbs (minimum)	60,000 (minimum)	42,000 (minimum)	10% (minimum)
Sample upper	3.6	59,000	42,700	6.5
Sample lower	2.7	58,000	42,200	5.0

Table 1 – Mechanical Testing to AWWA C151/A21.5-81

2.4. CHEMICAL TESTING

Because there were fasteners at the connection which were also corroding, a chemical analysis of all materials was conducted. The corrosion of the fasteners did not cause nor did they influence the corrosion. This testing was done to confirm the material and for information purposes. There was some discussion that the fasteners were "Corten", a copper alloyed steel, good for general weathering. Neither the nut nor the bolt was "Corten". This is not a problem since "Corten" would not be a good selection for buried fasteners.

The AWWA C151/A21.5-81, Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids standard is silent regarding the chemical composition of the DIP. This is reasonable as the Charpy, mechanical testing and the required hydrostatic test are good methods for control of the strength of the pipe. The composition is not a critical factor as the properties are ultimately dependent on the cooling rate and subsequent heat treating of the pipe.

Table 2 below presents the chemical composition results for the pipe, a cast-iron grub screw and the steel nut and bolt for the flange connection. Note that the composition of the grey cast iron is similar to that of the ductile.

Element	DIP Upper	DIP LOWER	DIP PITT	Grey Iron	Steel Nut	Steel Bolt
C	3.29	3.32	3.18	3.86	0.16	0.10
Mn	0.34	0.34	0.33	0.35	O.77	0.40
Si	2.74	2.74	2.53	2.71	0.26	0.44
P	0.024	0.025	0.013	0.027	0.07	0.11
S	0.011	0.010	0.01	0.014	0.016	0.014
Cr	0.13	0.13	0.13	0.06	0.85	0.83
Ni	0.069	0.072	0.08	0.05	0.49	0.25
Cu	0.193	0.190	0.180	0.06	0.30	0.35
Mg	0.014	0.014	NOT REPORTED	NOT REPORTED	NOT REPORTED	NOT REPORTED
Al	0.012	0.012	NOT REPORTED	NOT REPORTED	NOT REPORTED	NOT REPORTED
Mo	0.013	0.015	0.015	0.01	>0.01	0.03
Iron	BALANCE	BALANCE	BALANCE	BALANCE	BALANCE	BALANCE

Table 2 - Chemical Analysis of Ductile Pipe, Grey Iron and Fasteners

3. POLYETHYLENE ENCASEMENT

The use of the PE in corrosion protection of DIP is not intended to keep all moisture and corrosives away from the iron surface, as discussed previously. Instead, its purpose is to control and mitigate the replenishment of the corrosive with oxygen which further corrodes the iron. Compaction and settling tends to seal the PE and the rate of corrosion should decrease or even stop. Present day DIPRA procedures call for use of corrosion control measures beyond just the use of PE in highly corrosive soils; this was not the case when the DIP line was installed.

A sample of the polyethylene encasement was transmitted to DIPRA, and found to be in conformance with American Water Works Standard C-105.

4. LABORATORY TESTING OF SOILS

Laboratory testing of soil can provide insight to some of the corrosion mechanisms. The soil's electrical resistivity, a measurement of the soil's resistance to conduct electricity or corrosion current, is an important factor in determining the soil's corrosiveness toward buried metallic structures, particularly ferrous metals. Corrosion of buried metals is an electrochemical process in which the amount of metal loss is directly proportional to the flow of electrical current (DC) into the soil. Corrosion currents, following Ohm's Law, are inversely proportional to soil resistivity. Low electrical resistivity soil is associated with high chemical and moisture content, and usually indicates a corrosive soil.

A correlation between electrical resistivity and corrosivity toward ferrous metals is:

Soil Resistivity in ohm-centimeters			Corrosivity Category
over		10,000	mildly corrosive
2,000	to	10,000	moderately corrosive
1,000	to	2,000	corrosive
below		1,000	severely corrosive

Other soil characteristics that may influence corrosivity toward metals are pH, chemical content, soil types, aeration, anaerobic conditions, and site drainage.

4.1. TEST PROCEDURES

The electrical resistivity of the soil samples collected at the excavation site, one from the pipe trench and one from the wall of the excavation adjacent to the failure, were measured in a soil box per ASTM G57 in their as-received condition and again after saturation with distilled water. Resistivity is at about its lowest value when the soil is saturated. The pH of the saturated samples was measured. A 5:1 water: soil extract from each sample was chemically analyzed for the major soluble salts commonly found in soil. Test results are shown in Table 1 in Appendix B.

4.2. TEST RESULTS

The electrical resistivities of both soil samples and the gravel were in the severely corrosive category with as-received moisture and after saturation. The gravel and soil pH values ranged from 7.4 to 8.3. This range is mildly alkaline to strongly alkaline. The chemical content of the samples was

very high with chloride, particularly corrosive to ferrous metals, and sulfate as the predominant constituents.

The positive reactions for sulfide and the negative redox potentials indicate reducing conditions in which anaerobic bacteria are active. Bacteria maybe due to the lagoon environment or leaked sewage.

This soil is classified as severely corrosive to ferrous metals. Using the DIPRA 10-point Soil Test Evaluation from Appendix A of AWWA C105-82, these soils score 20.5 out of a possible 25.5 points. A score of 10 or higher classifies the soil as corrosive to DIP and protection against exterior corrosion should be provided.

4.3. LINEAR POLARIZATION RESISTANCE AND ELECTROCHEMICAL IMBALANCE TESTING

Linear polarization resistance (LPR) testing was conducted to determine, by bench testing in the laboratory, the corrosion rate of ductile iron in these soils. LPR probes were made using steel electrodes as a surrogate for DIP. Electrodes were placed in the saturated soil samples taken from the excavations. The reported corrosion rates for the samples represent general corrosion rates for the electrode surface (5 cm^2). The measurement is derived from the average of the corrosion current shifts resulting from a 10 mV anodic polarization and a 10 mV cathodic polarization of the two electrodes. These DC measurements are compensated for solution resistance by an AC measurement (approximately 1 KHz).

Measurements of electrochemical imbalance between the two electrodes were also measured. The Imbalance values are shown in Imbalance Units. The scale factor is 0.5 microamperes per square centimeter of electrode surface which equates to 2.5 microamperes per imbalance unit (IU). This scale factor was determined from empirical data and selected so that when the corrosion rate in mils per year could be compared with the Imbalance reading in IU. This comparison is used as the basis for a qualitative interpretation with regard to the dominant corrosion mechanism. If corrosion rate > imbalance; this is an indication of general corrosion taking place. If corrosion rate < imbalance; this is an indication of localized corrosion activity (pitting). Since the imbalance reading is a “snapshot” of the ZRA measured current between the electrodes rather than continuous current, little can be said for the character of the localized corrosion. Also, since it is displayed as an absolute value, it is impossible to determine if localized corrosion is occurring on one or both electrodes.

The measurements taken from both of the soil samples, shown in Figure 15 indicate that both general corrosion and localized corrosion are taking place.

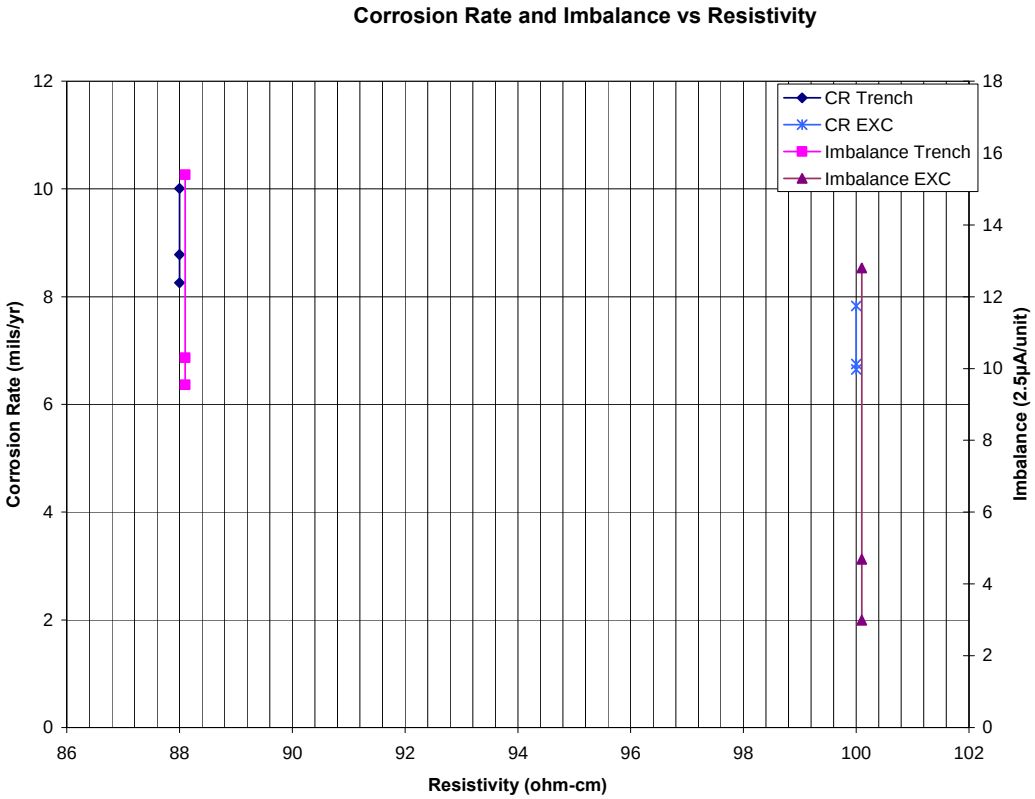


Figure 15 - LPR Tests and ECI for Soil Samples from Excavation

5. CORROSION CONTROL FOR DIP CIRCA 1982: AWWA C105-82

The American Water Works Association (AWWA) Standard C-105, Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids, 1982 version, was sent to us by Ms. Jennie Nevens of DIPRA. The Standard was preceded by The Cast Iron Pipe Research Association (CIPRA) work that demonstrated loose polyethylene encasement provides protection against soil corrosion and against stray current.

Polyethylene encasement was the state of the art for ductile iron pipe installations in corrosive environments in 1982. DIPRA and AWWA C105-82 did not recommend joint bonding and cathodic protection for ductile iron piping systems. DIPRA believed at that time and to some extent today that joint bonding could cause long line currents which may have negative effects on pipe corrosion. DIPRA relied on the polyethylene encasement to protect the pipe. This methodology was standard in the industry in the 1970s and 1980s. As infrastructure has become more developed, the cost to excavate an existing pipeline has increased, and the access to conduct dig-ups has decreased. An American Water Works Research Foundation study on External Corrosion of Distribution Systems in 2004 found that the greatest future cost to

infrastructure is and would be the extent of electrically discontinuous piping underground. Cathodic protection can be used to extend the life of a metallic pipeline, yet it requires pipe joints to be electrically continuous.

The foreword of the 1982 AWWA C105 Standard states that the polyethylene encasement had maintained its integrity after 20-years of testing its exposure in severely corrosive soil. Since 1958, polyethylene encasement has been used extensively in the waterworks industry to protect cast and ductile iron pipe in corrosive environments and it is still in use today as a method of corrosion protection for DIP. The 1982 Standard calls for physical and dielectric requirements for the polyethylene, details installation methods, and has a system for rating soil corrosivity to determine if the encasement is necessary in Appendix A. Using the DIPRA 10-point Soil Test Evaluation from Appendix A of AWWA C105-82, these soils score 20.5 out of a possible 25.5 points. A score of 10 or higher classifies the soil as corrosive to DIP and protection against exterior corrosion should be provided. Exterior corrosion protection recommended by AWWA C105-82 is polyethylene encasement as was done for the subject force main.

A copy of AWWA C105-82 is contained in Appendix D.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1. CONCLUSIONS

- The most probable cause of the corrosion hole was external corrosion of the pipe at a hole in the PE encasement which most likely occurred during construction. The exposed exterior iron surface corroded over a period of time, measured in years, down to the cement mortar liner. The exposed area of the liner continued to grow in size as the supporting iron receded and sewage fluids from inside the pipe permeated through the cement mortar. The permeated sewage fluids were trapped by the polyethylene encasement. The permeated and trapped sewage fluids increase the exterior corrosion rate and subsequent damage on the lower half of the pipe. Soil pressure on the polyethylene encasement or tape around the pipe used to keep the polyethylene encasement in place tended to prevent the severe corrosion further along the pipe and above the spring line. The major volume of sewage was discharged when the membrane of cement mortar liner, corrosion product and supporting fill could not contain the pressure or was dislodged due to a mechanical event.

- The discharge was at a single, elongated hole of approximately 21.7 inches^2 which was located at the 4:30 o'clock position (below the spring line) on the pipe.

- There were other externally corroded areas where only the cement liner was intact, yet without leakage. These were either below the spring line or under a band running along the entire circumference due to the taping or constriction of the PE by backfill.

- The failed pipe section did not show degradation of the cement-mortar lining, indicating there are no air pockets where sulfuric acid can form and rapidly degrade the lining resulting in corrosion of the crown of the interior of the pipeline.

- The tape or other backfill restraint of the PE tended to prevent the severe corrosion further up the pipe, especially above the spring line.

- The iron corroded over a period of time, measured in years, down to the liner. The exposed area of the liner continued to grow in size as the supporting iron receded. The sewage was discharged when the membrane of cement liner, corrosion product and supporting fill could not contain the pressure. It was at this recent time that the discharge occurred.

- The joint and flange were carefully sectioned to inspect for evidence of joint and gasket leakage. No evidence of leakage was found in any area of the joint or gasket. The original asphaltic coating from pipe production was found to be intact on the entire circumferential area of contact between the pipe and the gasket material.

- The microstructure showed that portions of the pipe were closer to that of grey cast iron, which is known to have the same general corrosion resistant to that of ductile iron.

- The pipe material was tested for tensile strength and for Charpy impact values in accordance with AWWA C151/A21.5-81. The results of the mechanical testing showed that the pipe material did not meet the requirements for Grade 60-42-10, ductile iron pipe. The nonconforming impact properties of the material did not cause the corrosion, nor did they have any appreciable effect on the corrosion resistance of the pipe.

6.2. RECOMMENDATIONS

- If this pipe is to remain in operation, it should be lined with HDPE or CIPP or cathodically protected. Cathodic protection would require bonding all pipe joints for electrical continuity. Joint bonding would consist of thermite brazing two or three cables to pipe on each side of a joint. Cathodic protection will halt further external corrosion but will not prevent an imminent failure of pipe that has suffered similar significant corrosion damage. Bonding pipe joints would should include inspection of the pipe at every excavation. Value engineering analysis can be conducted to determine the economic viability of excavation for joint bonding and subsequent cathodic protection versus installing another pipe or lining then existing pipe.

- The results of the soil analysis call for a DIP replacement pipeline to have additional corrosion control beyond PE encasement per AWWA C-105, Appendix A. DIP would require cathodic protection. A High Density Polyethylene (HDPE) or Cured In Place Plastic (CIPP) liner are also options for repair and replacement but valving and other operational and construction issues must be considered.

- The pipeline can have a quick evaluation of its electrical continuity by accessing the pipe at the valve nut at the transition to asbestos cement pipe at the I-5, and aboveground pipe in the bridge deck near the pump station end of the line. The flexible couplings installed during repair work will need to be bonded for this test, with a test station installed at the bonding location.

7. REGIONAL WATER QUALITY CONTROL BOARD REQUIREMENTS

Investigative Order No. R9-2007-0060 Item 4 calls for information about actions to prevent sewage discharge. Past actions as far as material selection were consistent with industry standards. The pipe material and polyethylene encasement appear to be state of the art for the construction period. It would not be uncommon for pipes of the same construction to have 50 to 100-year useful lives. In light of the untimely failure for this type and age of pipe, additional investigation to evaluate possible external corrosion elsewhere should be part of the City's SSO response plan. However, external corrosion at tears in the polyethylene encasement can not be easily detected. An electromagnetic conductivity (emag) survey of the soil along the alignment of the force main and any other iron pipes would provide information of similarly aggressive soils which could also result in pipeline failure. The emag provides a continuous plot of the soil conductivity over stationing or length. This procedure is typically done by sampling at 10-foot intervals so that virtually all of the alignment is evaluated. The emag survey uses radio frequency to evaluate soil conductivity (inverse of resistivity) and is non-intrusive. Cathodic protection can be installed to halt any further corrosion, but would not prevent failure of pipe that already had significant loss of metal. External or dig-up inspection of the entire alignment is not feasible. Conducting some excavation inspections and pipe condition assessments based on an emag survey would be prudent.

The Regional Board calls for a technical report that addresses the cause of the failure and the appropriateness of the material selection. The cause of the ductile iron pipe failure was most likely due to contact with severely corrosive soil moisture at holidays or tears and rips in the polyethylene encasement. The current version of AWWA C105, Appendix A suggests additional corrosion control beyond polyethylene encasement including application of cathodic protection in soils with high soil corrosivity test evaluation scores. The state of the art for the era the pipe was installed called for two choices: polyethylene encasement or leaving the pipe bare. Other pipe material systems, asbestos cement and reinforced plastic mortar, were used by the municipalities in the past and were abandoned. The ductile iron met the structural requirements of the force main.

In our opinion, it is unlikely that the force main was damaged during excavation and repair of an unknown irrigation line discovered buried 4-feet above the force main.

Future measures to prevent or mitigate future overflows would include replacement, lining, or cathodic protection and monitoring the cathodic protection in conjunction with periodic internal inspection.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

8. CLOSURE

Our services have been performed with the usual thoroughness and competence of the engineering profession. No other warranty or representation, expressed or implied, is included or intended.

SCHIFF ASSOCIATES

Robert Pannell
Sr. Corrosion Technologist
NACE International #5299

Graham E.C. Bell, Ph.D., P.E.
Cathodic Protection and Corrosion Specialist
NACE International #5350

Appendix A

Photographs from site visit and inspection April 3, 2007


2007 4 3


2007 4 3


2007 4 3


2007 4 3


KOMATSU
2007 4 3


260
2007 4 3

CAUTION
2007 4 3

CAUTION
2007 4 3


2007 4 3


2007 4 3


2007 4 3


2007 4 3


PIZZA
2007 4 3


2007 4 3


2007 4 3


2007 4 3


2007 4 3
FT & IN
INCHES
25FT


2007 4 3
FT & IN
INCHES
25FT


2007 4 3


2007 4 3


2007 4 3


2007 4 3

CAUTION
CAUTION
CAUTION
2007 4 3

2007 4 3


2007 4 3


2007 4 3


2007 4 3


KOMATSU
PC
300
LC-7
2007 4 3


CITY OF CARLSBAD
CALIFORNIA
2007 4 3

Appendix B

Laboratory Testing of Soil Samples

Table 1 - Laboratory Tests on Soil Samples

City of Carlsbad
24-inch DIP FM Failure, Carlsbad, CA
SA# 07-0477ENG
4-Apr-07

Sample ID			Gravel next to pipe	Soil from trench	Soil depth from exc. @ pipe
Resistivity		**Units**			
as-received		ohm-cm	560	116	128
saturated		ohm-cm	440	88	100
pH			7.4	8.3	8.1
Electrical					
Conductivity		mS/cm	1.35	5.75	3.36
Chemical Analyses					
Cations					
calcium	Ca^{2+}	mg/kg	279	270	134
magnesium	Mg^{2+}	mg/kg	131	384	118
sodium	Na^{1+}	mg/kg	836	6,100	3,737
potassium	K^{1+}	mg/kg	60	165	69
Anions					
carbonate	CO_3^{2-}	mg/kg	ND	ND	ND
bicarbonate	HCO_3^{1-}	mg/kg	552	488	433
flouride	F^{1-}	mg/kg	3.6	3.7	7.2
chloride	Cl^{1-}	mg/kg	928	7,980	5,150
sulfate	SO_4^{2-}	mg/kg	817	3,070	1,050
phosphate	PO_4^{3-}	mg/kg	3.4	ND	ND
Other Tests					
ammonium	NH_4^{1+}	mg/kg	42.2	ND	ND
nitrate	NO_3^{1-}	mg/kg	5.1	36.0	20.0
sulfide	S^{2-}	qual	Pos	Pos	Pos
Redox		mV	-503	-11	99

Electrical conductivity in millisiemens/cm and chemical analysis were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

Appendix C

Laboratory Testing of DIP samples

Bodycote

TESTING GROUP
www.bodycote.com
www.mtusa.bodycote.com

C E R T I F I C A T I O N

SUBMITTED BY: SCHIFF ASSOCIATES

431 WEST BASE LINE ROAD
CLAREMONT, CA 91711
ATTN: MARK BELL
LAB#: 06-04-SHA-07R Rev.2

DATE : 06/06/07
P. O. # : 07-0477ENG
SAMPLE ID: UPPER
INVOICE #: 644122
MATERIAL : DUCTILE IRON
PAGE # : 1 OF 1

SPECIFICATION: AWWA C151/A21.5-81.ED
WE SUBMIT THE FOLLOWING DETERMINATIONS:

NON-CONFORMING

"V" Notch Charpy Impact Test Results: Temp: ROOM

Sample Number	Impact Strength Foot-Pounds	Lateral Expansion Inches	% Shear
1	3.0	0.006	10
2	3.0	0.006	10
3	3.0	0.005	10
Average(Actual)	*3.0*		
Average(Adjusted)	*3.6*(Based on subsize specimens)		
Required, Minimum	7.0		
Actual Specimen size:	.332/.394 = 84%		

Cast Iron Microstructure: Information Only
Microstructure was evaluated IAW ASTM A247 castiron rating charts.
The results are as follows:

-OUTSIDE DIAMETER-
Types VII & IV IAW Plate I of ASTM A 247
Type A & B IAW Plate II of ASTM A 247
Size 4 - 6 IAW Plate III of ASTM A 247

-INSIDE DIAMETER-
Type I & II IAW Plate I of ASTM A 247
Plate II not applicable
Size 6 - 8 IAW Plate III of ASTM A 247

-CORE-
Type I & II IAW Plate I of ASTM A 247
Plate II not applicable
Size 6 - 8 IAW Plate III of ASTM A 247

TEST RESULTS DO NOT CONFORM TO SPECIFICATIONS. BODYCOTE MATERIALS TESTING,L.A.

Charpy test conducted in accordance with ASTM E23-06
Revised cert, changing disposition & adding specification
Ref. old LAB#: 05-22-SHA-126, Adding Micros & Photos

VICTOR S. FABIAN
Key Accounts Manager

Bodycote

TESTING GROUP
www.bodycote.com
www.mtusa.bodycote.com

C E R T I F I C A T I O N

SUBMITTED BY: SCHIFF ASSOCIATES

431 WEST BASE LINE ROAD
CLAREMONT, CA 91711
ATTN: MARK BELL
LAB#: 06-04-SHA-09R Rev.2

DATE : 06/06/07
P. O. # : 07-0477ENG
SAMPLE ID: LOWER
INVOICE #: 644122
MATERIAL : DUCTILE IRON
PAGE # : 1 OF 1

SPECIFICATION: AWWA C151/A21.5-81.ED
WE SUBMIT THE FOLLOWING DETERMINATIONS:

NON-CONFORMING

"V" Notch Charpy Impact Test Results: Temp: ROOM

Sample Number	Impact Strength Foot-Pounds	Lateral Expansion Inches	% Shear
1	2.0	0.006	10
2	2.0	0.006	10
3	2.0	0.006	10
Average(Actual)	*2.0*		
Average(Adjusted)	*2.7*(Based on subsize specimens)		
Required Minimum	7.0		
Actual Specimen size:	.289/.394 = 73%		

Cast Iron Microstructure: Information Only
Microstructure was evaluated IAW ASTM A247 castiron rating charts.
The results are as follows:

-OUTSIDE DIAMETER-
Types VII & IV IAW Plate I of ASTM A 247
Type A & B IAW Plate II of ASTM A 247
Size 4 - 7 IAW Plate III of ASTM A 247

-INSIDE DIAMETER-
Type I & II IAW Plate I of ASTM A 247
Plate II not applicable
Size 6 - 8 IAW Plate III of ASTM A 247

-CORE-
Type I & II IAW Plate I of ASTM A 247
Plate II not applicable
Size 6 - 8 IAW Plate III of ASTM A 247

TEST RESULTS DO NOT CONFORM TO SPECIFICATIONS. BODYCOTE MATERIALS TESTING,L.A.

Charpy test conducted in accordance with ASTM E23-06
Revised cert, changing disposition & adding specification
Ref. old LAB#: 05-22-SHA-131, Adding Micros & Photos

VICTOR S. FABIAN
Key Accounts Manager

Bodycote

TESTING GROUP
www.bodycote.com
www.mtusa.bodycote.com

C E R T I F I C A T I O N

SUBMITTED BY: SCHIFF ASSOCIATES

431 WEST BASE LINE ROAD
CLAREMONT, CA 91711
ATTN: MARK BELL
LAB#: 06-05-SHA-252

DATE : 06/06/07
P. O. # : 07-0477
SAMPLE ID: UPPER
INVOICE #: 644210
MATERIAL : DUCTILE IRON
PAGE # : 1 OF 1

SPECIFICATION: AWWA C151-76/A21.51-81
WE SUBMIT THE FOLLOWING DETERMINATIONS:

NON-CONFORMING

TENSION TEST RESULTS:
Elongation reported in % over 4d gauge length.

TEST TEMP: ROOM
YIELD: .2% OFFSET

SAMPLE IDENTIFICATION	DIMENSIONS IN.	YIELD LOAD LBS.	TENSILE LOAD LBS.	YIELD STRENGTH PSI	TENSILE STRENGTH PSI	ELONGATION %	REDUCTION OF AREA %	HARDNESS
AS SUPPLIED	.252	2,131	2,944	**42,700**	**59,000**	**6.5**		
MAXIMUM>>>								
MINIMUM>>>				42,000	60,000	10.0		

TEST RESULTS DO NOT CONFORM TO SPECIFICATIONS.

BODYCOTE MATERIALS TESTING, L.A.

BMA 6

JAMES HOLLMAN
Certification Supervisor PK

Tensile test conducted in accordance with ASTM E8-04

Bodycote

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C E R T I F I C A T I O N

SUBMITTED BY: SCHIFF ASSOCIATES

431 WEST BASE LINE ROAD
CLAREMONT, CA 91711
ATTN: MARK BELL
LAB#: 06-05-SHA-250

DATE : 06/06/07
P. O. # : 07-0477
SAMPLE ID: LOWER
INVOICE #: 644210
MATERIAL : DUCTILE IRON
PAGE # : 1 OF 1

SPECIFICATION: AWWA C151-76/A21.51-81
WE SUBMIT THE FOLLOWING DETERMINATIONS:

NON-CONFORMING

TENSION TEST RESULTS:
Elongation reported in % over 4d gauge length.

TEST TEMP: ROOM
YIELD: .2% OFFSET

SAMPLE IDENTIFICATION	DIMENSIONS IN.	YIELD LOAD LBS.	TENSILE LOAD LBS.	YIELD STRENGTH PSI	TENSILE STRENGTH PSI	ELONGATION %	REDUCTION OF AREA %	HARDNESS
AS SUPPLIED	.252	2,106	2,896	**42,200**	**58,000**	**5.0**		
MAXIMUM>>>								
MINIMUM>>>				42,000	60,000	10.0		

TEST RESULTS DO NOT CONFORM TO SPECIFICATIONS.

BODYCOTE MATERIALS TESTING, L.A.

BMA 6

JAMES HOLLMAN
Certification Supervisor PK

Tensile test conducted in accordance with ASTM E8-04

Bodycote Testing Group
9840 Alburtis Avenue • Santa Fe Springs • California • 90670 • USA • Tel: +1 (562) 801-5662 • Fax: +1 (562) 801-5660

Appendix D

Copy of AWWA C105-82 Standard

ANSI/AWWA C105/A21.5-82
[Revision of ANSI/AWWA C105-72 (R77)]

AMERICAN NATIONAL STANDARD

for

POLYETHYLENE ENCASEMENT FOR DUCTILE-IRON PIPING FOR WATER AND OTHER LIQUIDS

ADMINISTRATIVE SECRETARIAT

AMERICAN WATER WORKS ASSOCIATION

CO-SECRETARIATS

AMERICAN GAS ASSOCIATION
NEW ENGLAND WATER WORKS ASSOCIATION

First edition approved by American National Standards Institute, Inc., Dec. 27, 1972.
Revised edition approved by American National Standards Institute, Inc., May 26, 1982.

Published by
AMERICAN WATER WORKS ASSOCIATION
6666 West Quincy Avenue, Denver, Colorado 80235

American National Standard

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Committee Personnel

Subcommittee 4, Cast-Iron Pipe and Fittings, which reviewed this standard, had the following personnel at that time:

TROY F. STROUD, *Chairman*
KENNETH W. HENDERSON, *Vice-Chairman*

User Members	*Producer Members*
S. C. BAKER	A. M. HORTON
B. W. FRANKLIN	J. P. JOHNSON
K. W. HENDERSON	HAROLD KENNEDY JR.
R. C. HOLMAN	J. H. MILLER
M. G. HOOVER	J. H. SALE
D. A. LINCOLN	T. F. STROUD
W. H. SMITH	T. B. WRIGHT

Standards Committee A21, Cast-Iron Pipe and Fittings, which reviewed and approved this standard, had the following personnel at the time of approval:

ARNOLD M. TINKEY, *Chairman*
THOMAS D. HOLMES, *Vice-Chairman*
JOHN I. CAPITO, *Secretary*

Organization Represented	*Name of Representative*
American Gas Association	H. J. FORR
American Society for Testing and Materials	GEORGE LUCIW*
American Water Works Association	G. S. ALLEN
	R. A. ARTHUR
	D. R. BOYD
	J. I. CAPITO*
	K. W. HENDERSON

*Nonvoting liaison

Committee Personnel (continued)

American Water Works Association	M. G. HOOVER
	R. J. KOCOL
	G. M. KRALIK
	D. M. KUKUK
	R. L. LEE
	J. H. MILLER
	W. H. SMITH
	A. M. TINKEY
	D. L. TIPPIN
	THURMAN UPCHURCH
	L. W. WELLER
Canadian Standards Association	W. F. SEMENCHUK*
Ductile Iron Pipe Research Association	T. D. HOLMES
	HAROLD KENNEDY JR.
	P. I. MCGRATH JR.
	L. L. NEEPER
	T. F. STROUD
Manufacturers' Standardization Society of the Valve and Fittings Industry	T. C. JESTER
Naval Facilities Engineering Command	S. C. BAKER
New England Water Works Association	ALBERT HELT
Underwriters' Laboratories, Inc.	W. CAREY†
	L. J. DOSEDLO

*Nonvoting liaison
†Alternate

Table of Contents

Foreword

This foreword is for information only and is not a part of ANSI/AWWA C105.

I. History of Standard

In 1926, ASA (now ANSI) Committee A21, Cast-Iron Pipe and Fittings, was organized under the sponsorship of AGA, ASTM, AWWA, and NEWWA. The current sponsors are AGA, AWWA, and NEWWA, and the present scope of Committee A21 activity is standardization of specifications for cast-iron and ductile-iron pressure pipe for gas, water, and other liquids, and fittings for use with such pipe. These specifications are to include design, dimensions, materials, coatings, linings, joints, accessories, and methods of inspection and test.

In 1958, Committee A21 was reorganized. Subcommittees were established to study each group of standards in accordance with the review and revision policy of ASA (now ANSI). The present scope of Subcommittee 4, Coatings and Linings, is to review the matter of interior and exterior corrosion of gray and ductile-iron pipe and fittings and to draft standards for the interior and exterior protection of gray and ductile-iron pipe and fittings.

In accordance with this scope, Subcommittee 4 was charged with the responsibility for:

1. Development of standards on polyethylene encasement materials and their installation as corrosion protection, when required, for gray and ductile cast-iron pipe and fittings.

2. Development of procedures for the investigation of soil to determine when polyethylene protection is indicated.

In response to these assignments, Subcommittee 4 has:

1. Developed ANSI A21.5-1972 (AWWA C105-72), Standard for Polyethylene Encasement for Gray and Ductile Cast-Iron Piping for Water and Other Liquids.

2. Developed Appendix A outlining soil-investigation procedures.

In 1976, Subcommittee 4 reviewed the 1972 edition and submitted a recommendation to Committee A21 that the standard be reaffirmed without change from the 1972 edition, except for the updating of this foreword.

In 1981, Subcommittee 4 again reviewed the standard. The major revisions incorporated into the current edition as a result of that review are listed in Sec. VII of this foreword.

II. History of Polyethylene Encasement

Loose polyethylene encasement was first used experimentally in the United States for protection of cast-iron pipe in corrosive environments in 1951. The first

field installation of polyethylene wrap on cast-iron pipe in an operating water system was in 1958 and consisted of about 600 ft (180 m) of 12-in. pipe installed in a waste-dump fill area. Since that time, hundreds of installations have been made in severely corrosive soils throughout the United States in pipe sizes ranging from 4–54 in. in diameter. Polyethylene encasement has been used as a soil-corrosion preventative in Canada, England, France, Germany, and several other countries since development of the procedure in the United States.

III. Research

Research by the Cast Iron Pipe Research Association (CIPRA)* on several severely corrosive test sites has indicated that polyethylene encasement provides a high degree of protection and results in minimal and generally insignificant exterior surface corrosion of gray and ductile cast-iron pipe thus protected.

Investigations of many field installations in which loose polyethylene encasement has been used as protection for gray and ductile cast-iron pipe against soil corrosion have confirmed CIPRA's findings with the experimental specimens. These field installations have further indicated that the dielectric capability of polyethylene provides shielding for gray and ductile cast-iron pipe against stray direct current at most levels encountered in the field.

IV. Useful Life of Polyethylene

Tests on polyethylene used in the protection of gray and ductile cast-iron pipe have shown that after 20 years of exposure to severely corrosive soils, strength loss and elongation reduction are insignificant. Studies by the Bureau of Reclamation of the US Department of the Interior† on polyethylene film used underground showed that tensile strength was nearly constant in a 7-yr test period and that elongation was only slightly affected. The Bureau's accelerated soil-burial testing (acceleration estimated to be five to ten times that of field conditions) showed polyethylene to be highly resistant to bacteriological deterioration.

V. Exposure to Sunlight

Prolonged exposure to sunlight will eventually deteriorate polyethylene film. Therefore, such exposure prior to backfilling the wrapped pipe should be kept to a minimum. If several weeks of exposure prior to backfilling are anticipated, Class C material should be used (see Sec. 5-3.1.1).

VI. Options

This standard includes certain options, which, if desired, must be specified. These options are:

1. Color of polyethylene material (Sec. 5-3).
2. Installation method—A, B, or C (Sec. 5-4)—if there is a preference.

VII. Major Revisions

The major revisions in this edition consist of the following:

1. Reference to gray cast-iron pipe in the title and throughout the standard was deleted because gray iron pipe is no longer produced in the United States.
2. Metric conversions of all dimensions are included in this standard. Metric dimensions are direct conversions of customary US inch-pound units and are not those specified in International Organization for Standardization (ISO) standards.

*CIPRA became the Ductile Iron Pipe Research Association in 1979.

†Laboratory and Field Investigations of Plastic Films, US Dept. of the Interior, Bureau of Reclamation, Rept. No. ChE-82 (Sept. 1968).

ANSI/AWWA C105/A21.5-82
[Revision of ANSI/AWWA C105-72 (R77)]

American National Standard for

Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids

Sec. 5-1 Scope

This standard covers materials and installation procedures for polyethylene encasement to be applied to underground installations of ductile-iron pipe. This standard also may be used for polyethylene encasement of fittings, valves, and other appurtenances to ductile-iron pipe systems.

Sec. 5-2 Definition

5-2.1 *Polyethylene encasement:* The encasement of piping with polyethylene film in tube or sheet form.

Sec. 5-3 Materials

5-3.1 *Polyethylene.* Polyethylene film shall be manufactured of virgin polyethylene material conforming to the following requirements of ASTM Standard Specification D-1248-78—Polyethylene Plastics Molding and Extrusion Materials:

5-3.1.1 *Raw material used to manufacture polyethylene film.*
Type: I
Class: A (natural color) or C (black)
Grade: E-1
Flow rate (formerly melt index):
0.4 maximum
Dielectric strength: Volume resistivity, minimum ohm–$cm^3 = 10^{15}$

5-3.1.2 *Polyethylene film.*
Tensile strength: 1200 psi (8.3 MPa) minimum
Elongation: 300 percent minimum
Dielectric strength: 800 V/mil (31.5 V/μm) thickness minimum

5-3.2 *Thickness.* Polyethylene film shall have a minimum thickness of 0.008 in. (8 mil, or 200 μm). The minus tolerance on thickness shall not exceed 10 percent of the nominal thickness.

5-3.3 *Tube size or sheet width.* Tube size or sheet width for each pipe diameter shall be as listed in Table 5.1.

TABLE 5.1

Tube and Sheet Sizes

Nominal Pipe Diameter *in.*	Minimum Polyethylene Width *in. (cm)*	
	Flat Tube	Sheet
3	14 (35)	28 (70)
4	16 (41)	32 (82)
6	20 (51)	40 (102)
8	24 (61)	48 (122)
10	27 (69)	54 (137)
12	30 (76)	60 (152)
14	34 (86)	68 (172)
16	37 (94)	74 (188)
18	41 (104)	82 (208)
20	45 (114)	90 (229)
24	54 (137)	108 (274)
30	67 (170)	134 (340)
36	81 (206)	162 (411)
42	95 (241)	190 (483)
48	108 (274)	216 (549)
54	121 (307)	242 (615)

Sec. 5-4 Installation

5-4.1 *General.* The polyethylene encasement shall prevent contact between the pipe and the surrounding backfill and bedding material but is not intended to be a completely airtight and watertight enclosure. Overlaps shall be secured by the use of adhesive tape, plastic string, or any other material capable of holding the polyethylene encasement in place until backfilling operations are completed.

5-4.2 *Pipe.* This standard includes three different methods of installation of polyethylene encasement on pipe. Methods A and B are for use with polyethylene tubes and method C is for use with polyethylene sheets.

5-4.2.1 *Method A.* (Refer to Figure 5.1.) Cut polyethylene tube to a length approximately 2 ft (0.6 m) longer than that of the pipe section. Slip the tube around the pipe, centering it to provide a 1-ft (0.3-m) overlap on each adjacent pipe section, and bunching it accordion-fashion lengthwise until it clears the pipe ends.

Lower the pipe into the trench and make up the pipe joint with the preceding section of pipe. A shallow bell hole must be made at joints to facilitate installation of the polyethylene tube.

After assembling the pipe joint, make the overlap of the polyethylene tube. Pull the bunched polyethylene from the preceding length of pipe, slip it over the end of the new length of pipe, and secure it in place. Then slip the end of the polyethylene from the new pipe section over the end of the first wrap until it overlaps the joint at the end of the preceding length of pipe. Secure the overlap in place. Take up the slack width to make a snug, but not tight, fit along the barrel of the pipe, securing the fold at quarter points.

Repair any rips, punctures, or other damage to the polyethylene with adhesive tape or with a short length of polyethyl-

ene tube cut open, wrapped around the pipe, and secured in place. Proceed with installation of the next section of pipe in the same manner.

5-4.2.2 *Method B.* (Refer to Figure 5.2.) Cut polyethylene tube to a length approximately 1 ft (0.3 m) shorter than that of the pipe section. Slip the tube around the pipe, centering it to provide 6 in. (15 cm) of bare pipe at each end. Make polyethylene snug, but not tight; secure ends as described in Sec. 5-4.2.1.

Before making up a joint, slip a 3-ft (0.9-m) length of polyethylene tube over the end of the preceding pipe section, bunching it accordion-fashion lengthwise. After completing the joint, pull the 3-ft (0.9-m) length of polyethylene over the joint, overlapping the polyethylene previously installed on each adjacent section of pipe by at least 1 ft (0.3 m); make snug and secure each end as described in Sec. 5-4.2.1.

Repair any rips, punctures, or other damage to the polyethylene as described in Sec. 5-4.2.1. Proceed with installation of the next section of pipe in the same manner.

5-4.2.3 *Method C.* (Refer to Figure 5.3.) Cut polyethylene sheet to a length approximately 2 ft (0.6 m) longer than that of the pipe section. Center the cut length to provide a 1-ft (0.3-m) overlap on each adjacent pipe section, bunching it

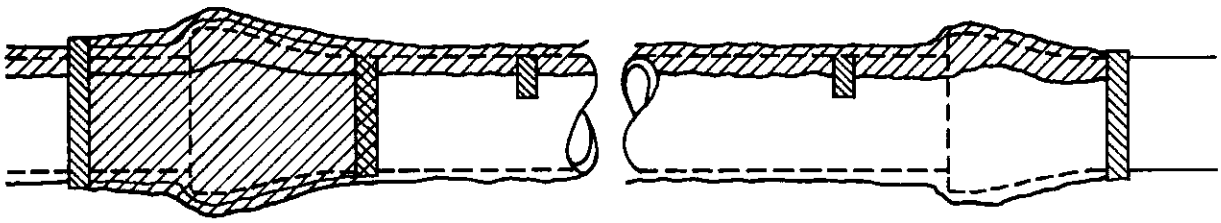

Figure 5.1. Method A: One length of polyethylene tube for each length of pipe, overlapped at joint.

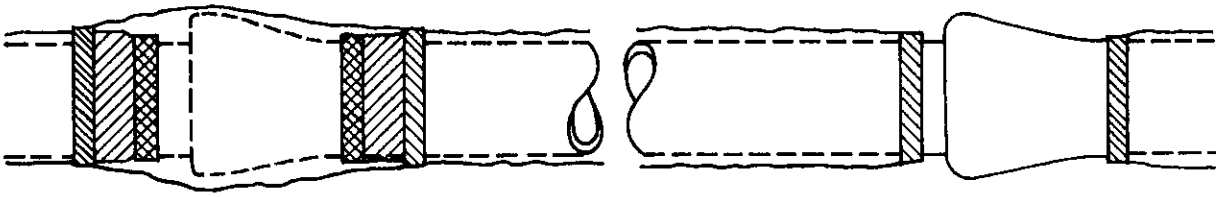

Figure 5.2. Method B: Separate pieces of polyethylene tube for barrel of pipe and for joints. Tube over joints overlaps tube encasing barrel.

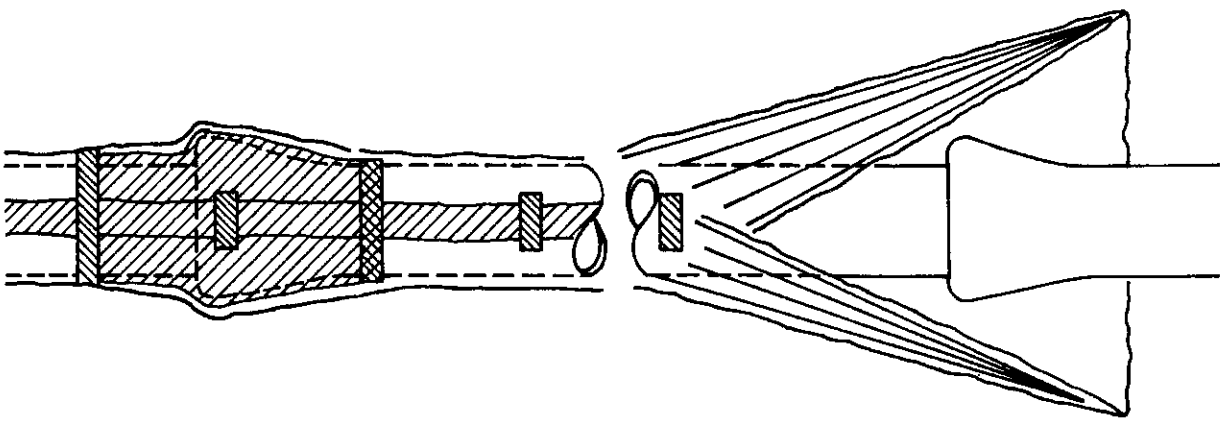

Figure 5.3. Method C: Pipeline completely wrapped with flat polyethylene sheet.

until it clears the pipe ends. Wrap the polyethylene around the pipe so that it circumferentially overlaps the top quadrant of the pipe. Secure the cut edge of polyethylene sheet at intervals of approximately 3 ft (0.9 m).

Lower the wrapped pipe into the trench and make up the pipe joint with the preceding section of pipe. A shallow bell hole must be made at joints to facilitate installation of the polyethylene. After completing the joint, make the overlap as described in Sec. 5-4.2.1.

Repair any rips, punctures, or other damage to the polyethylene as described in Sec. 5-4.2.1. Proceed with installation of the next section of pipe in the same manner.

5-4.3 *Pipe-shaped appurtenances.* Cover bends, reducers, offsets, and other pipe-shaped appurtenances with polyethylene in the same manner as the pipe.

5-4.4 *Odd-shaped appurtenances.* When valves, tees, crosses, and other odd-shaped pieces cannot be wrapped practically in a tube, wrap with a flat sheet or split length of polyethylene tube by passing the sheet under the appurtenance and bringing it up around the body. Make seams by bringing the edges together, folding over twice, and taping down. Handle width and overlaps at joints as described in Sec. 5-4.2.1. Tape polyethylene securely in place at valve-stem and other penetrations.

5-4.5 *Openings in encasement.* Provide openings for branches, service taps, blow-offs, air valves, and similar appurtenances by making an X-shaped cut in the polyethylene and temporarily folding back the film. After the appurtenance is installed, tape the slack securely to the appurtenance and repair the cut, as well as any other damaged areas in the polyethylene, with tape.

5-4.6 *Junctions between wrapped and unwrapped pipe.* Where polyethylene-wrapped pipe joins an adjacent pipe that is not wrapped, extend the polyethylene wrap to cover the adjacent pipe for a distance of at least 2 ft (0.6 m). Secure the end with circumferential turns of tape.

5-4.7 *Backfill for polyethylene-wrapped pipe.* Use the same backfill material as that specified for pipe without polyethylene wrapping, exercising care to prevent damage to the polyethylene wrapping when placing backfill. Backfill material shall be free from cinders, refuse, boulders, rocks, stones, or other material that could damage polyethylene. In general, backfilling practice should be in accordance with the latest revision of AWWA C600, Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances.

Appendix A

Notes on Procedures for Soil Survey Tests and Observations and Their Interpretation to Determine Whether Polyethylene Encasement Should Be Used

This appendix is for information only and is not a part of ANSI/AWWA C105.

In the appraisal of soil and other conditions that affect the corrosion rate of gray and ductile cast-iron pipe, a minimum number of factors must be considered. They are outlined here. A method of evaluating and interpreting each factor and a method of weighing each factor to determine whether polyethylene encasement should be used are subsequently described.

Soil Survey Tests and Observations

1. Earth Resistivity
   (a) Four-pin
   (b) Single-probe
   (c) Saturated-sample
2. pH
3. Oxidation-reduction (redox) potential
4. Sulfides
   (a) Azide (qualitative)
5. Moisture content (relative)
   (a) Prevalence
6. Soil description
   (a) Particle size
   (b) Uniformity
   (c) Type
   (d) Color
7. Potential stray direct current
   (a) Nearby cathodic protection utilizing rectifiers
   (b) Railroads (electric)
   (c) Industrial equipment, including welding equipment
   (d) Mine transportation equipment
8. Experience with existing installations in the area

1. *Earth resistivity.* There are three methods for determining earth resistivity: four-pin, single-probe, and soil-box. In the field, a four-pin determination should be made with pins spaced at approximate pipe depth. This method yields an average of resistivity from the surface to a depth equal to pin spacing. However, results are sometimes difficult to interpret where dry topsoil is underlain with wetter soils and where soil types vary with depth. The Wenner configuration is used in con-

nection with a soil resistivity meter, which is available with varying ranges of resistance. For all-around use, a unit with a capacity of up to 10^4 ohms is suggested because of its versatility in permitting both field and laboratory testing in most soils.

Because of the aforementioned difficulty in interpretation, the same unit may be used with a single-probe that yields resistivity at the point of the probe. A boring is made into the subsoil so that the probe may be pushed into the soil at the desired depth.

Inasmuch as the soil may not be typically wet, a sample should be removed for resistivity determination, which may be accomplished with any one of several laboratory units that permit the introduction of water to saturation, thus simulating saturated field conditions. Each of these units is used in conjunction with a soil resistivity meter.

Interpretation of resistivity results is extremely important. To base an opinion on a four-pin reading with dry topsoil averaged with wetter subsoil would probably result in an inaccurate premise. Only by reading the resistivity in soil at pipe depth can an accurate interpretation be made. Also, every effort should be made to determine the local situation concerning groundwater table, presence of shallow groundwater, and approximate percentage of time the soil is likely to be water saturated.

With gray and ductile cast-iron pipe, resistance to corrosion through products of corrosion is enhanced if there are dry periods during each year. Such periods seem to permit hardening or toughening of the corrosion scale or products, which then become impervious and serve as better insulators.

In making field determinations of resistivity, temperature is important. The result obtained increases as temperature decreases. As the water in the soil approaches freezing, resistivity increases greatly, and, therefore, is not reliable. Field determinations under frozen soil conditions should be avoided. Reliable results under such conditions can be obtained only by collection of suitable subsoil samples for analysis under laboratory conditions at a suitable temperature.

Interpretation of resistivity. Because of the wide variance in results obtained under the methods described, it is difficult specifically to interpret any single reading without knowing which method was used. It is proposed that interpretation be based on the lowest reading obtained, with consideration being given to other conditions, such as normal moisture content of the soil in question. Because of the lack of exact correlation between experiences and resistivity, it is necessary to assign ranges of resistivity rather than specific numbers. In Table A.1, points are assigned to various ranges of resistivity. These points, when considered along with points assigned to other soil characteristics, are meaningful.

2. *pH.* In the pH range of 0.0 to 4.0, the soil serves well as an electrolyte, and total acidity is important. In the pH range of 6.5 to 7.5, soil conditions are optimum for sulfate reduction. In the pH range of 8.5 to 14.0, soils are generally quite high in dissolved salts, yielding a low soil resistivity.

In testing pH, glass and reference electrodes are pushed into the soil sample and a direct reading is made, following suitable temperature setting on the instrument. Normal procedures are followed for standardization.

3. *Oxidation-reduction (redox) potential.* The oxidation-reduction (redox) potential of a soil is significant because the most common sulfate-reducing bacteria can live only under anaerobic conditions. A redox potential

greater than +100 mV shows the soil to be sufficiently aerated so that it will not support sulfate reducers. Potentials of 0 to +100 mV may or may not indicate anaerobic conditions; however, a negative redox potential definitely indicates anaerobic conditions under which sulfate reducers thrive. This test also is accomplished using a pH meter, with platinum and reference electrodes inserted into the soil sample, which permits a reading of potential between the two electrodes. It should be noted that soil samples removed from a boring or excavation can undergo a change in redox potential on exposure to air. Such samples should be tested immediately on removal from the excavation. Experience has shown that heavy clays, muck, and organic soils are often anaerobic, and these soils should be regarded as potentially corrosive.

4. *Sulfides.* The sulfide determination is recommended because of its field expediency. A positive sulfide reaction reveals a potential problem due to sulfate-reducing bacteria. The sodium azide–iodine qualitative test is used. In this determination, a solution of 3 percent sodium azide in a 0.1 *N* iodine solution is introduced into a test tube containing a sample of the soil in question. Sulfides catalyze the reaction between sodium azide and iodine, with the resulting evolution of nitrogen. If strong bubbling or foaming results, sulfides are present, and the presence of sulfate-reducing bacteria is indicated. If very slight bubbling is noted, sulfides are probably present in small concentration, and the result is noted as a trace.

5. *Moisture content.* Since prevailing moisture content is extremely important to all soil corrosion, every effort must be made to determine this condition. It is not proposed, however, to determine specific moisture content of a soil sample, because of the probability that content varies throughout the year, but to question local authorities who are able to observe the conditions many times during the year. (Although mentioned under item 1, Earth Resistivity, this variability factor is being reiterated to emphasize the importance of notation.)

6. *Soil description.* In each investigation, soil types should be completely described. The description should include

TABLE A.1

*Soil-Test Evaluation**

Soil Characteristics	Points
Resistivity—*ohm-cm* (based on single-probe at pipe depth or water-saturated soil box):	
<700	10
700-1000	8
1000-1200	5
1200-1500	2
1500-2000	1
>2000	0
pH:	
0-2	5
2-4	3
4-6.5	0
6.5-7.5	0†
7.5-8.5	0
>8.5	3
Redox potential:	
>+100 mV	0
+50 to +100 mV	3.5
0 to +50 mV	4
Negative	5
Sulfides:	
Positive	3.5
Trace	2
Negative	0
Moisture:	
Poor drainage, continuously wet	2
Fair drainage, generally moist	1
Good drainage, generally dry	0

*Ten points—corrosive to gray or ductile cast-iron pipe; protection is indicated.

†If sulfides are present and low or negative redox-potential results are obtained, three points shall be given for this range.

color and physical characteristics, such as particle size, plasticity, friability, and uniformity. Observation and testing will reveal whether the soil is high in organic content; this should be noted. Experience has shown that in a given area, corrosivity may often be reflected in certain types and colors of soil. This information is valuable for future investigations or for determining the most likely soils to suspect. Soil uniformity is important because of the possible development of local corrosion cells due to the difference in potential between unlike soil types, both of which are in contact with the pipe. The same is true for uniformity of aeration. If one segment of soil contains more oxygen than a neighboring segment, a corrosion cell can develop from the difference in potential. This cell is known as a differential aeration cell.

There are several basic types of soils that should be noted: sand, loam, silt, clay, muck. Unusual soils, such as peat or soils high in foreign material, also should be noted and described.

7. *Potential stray direct current.* Any soil survey should include consideration of possible stray direct current with which the gray or ductile cast-iron pipe installation might interfere. The widespread use of rectifiers and ground beds for cathodic protection of underground structures has resulted in a considerable threat from this source. Proximity of such cathodic protection systems should be noted. Among other potential sources of stray direct current are electric railways, industrial equipment (including welding equipment), and mine-transportation equipment.

8. *Experience with existing installations.* The best information on corrosivity of soil with respect to gray and ductile cast-iron pipe is the result of experience with these materials in the area in question. Every effort should be made to acquire such data by questioning local officials and, if possible, by actually observing existing installations.

Soil-Test Evaluation

When the soil-test procedures described herein are employed, the following tests are considered in evaluating corrosivity of the soil: resistivity, pH, redox potential, sulfides, and moisture. For each of these tests, results are categorized according to their contribution to corrosivity. Points are assigned based on experience with gray and ductile cast-iron pipe. When results of these five test-observations are available, the assigned points are totaled. If the sum is equal to ten or more, the soil is corrosive to gray or ductile cast-iron pipe, and protection against exterior corrosion should be provided. This system is limited to soil corrosion and does not include consideration of stray direct current. Table A.1 lists points assigned to the various test results.

General. These notes deal only with gray and ductile cast-iron pipe, the soil environment in which they will serve, and methods of determining a need for polyethylene encasement.

November 2, 2007

Mr. Michael McCann
Assistant Executive Officer (Acting)
C/O Compliance Assurance Unit
California Regional Water Quality Control Board, San Diego Region
9174 Sky Park Court, Suite 100
San Diego, California 92123-4353

Mr. John Robertus
Executive Officer
California Regional Water Quality Control Board, San Diego Region
9174 Sky Park Court, Suite 100
San Diego, California 92123-4353

CITIES OF VISTA AND CARLSBAD RESPONSE TO COMPLAINT NO. R9-2007-0099 FOR ADMINISTRATIVE CIVIL LIABILITY AGAINST THE CITIES OF VISTA AND CARLSBAD FOR VIOLATION OF NO. R9-2006-0003-DWQ, STATEWIDE GENERAL WASTE DISCHARGE REQUIREMENTS FOR SANITARY SEWER SYSTEMS (NCRU: 01-0764.02 & 01-0743.02: ebecker)

Dear Mr. McCann and Mr. Robertus,

This letter is to transmit the Response from the Cities of Vista and Carlsbad (Cities) to Complaint No. R9-2007-0099 for Administrative Civil Liability against the Cities of Vista and Carlsbad for Violation of No. R9-2006-0003-DWQ, Statewide General Waste Discharge Requirements for Sanitary Sewer Systems and the supporting staff report (Complaint). The Cities are not able to waive our right to a public hearing on the matter due to concerns over material errors and omissions in the record. The Cities also have concerns with the Board's calculations of the proposed assessment of civil liability (ACL) amount and its appropriateness to the discharge and lack of consistency with State Board Water Quality Enforcement Policy and guidance.

There is no disagreement on the part of the Cities that the spill to Buena Vista Lagoon was significant and unfortunate. Our review of the Complaint, however, leads us to conclude that it contains numerous factual errors that ultimately lead to erroneous conclusions regarding the nature of the discharge and the Cities' response to the discharge. The Cities have made continuous and ongoing efforts to meet with Board staff since the April 23rd submittal of the Investigative Order. The explicit and stated purpose of our request was to answer questions the Board staff may have regarding our submittals and to further assist the Board in preparation of an appropriate enforcement action, if any. Absent having had this opportunity for information interchange, the proposed ACL is not factually supported and, as a result, is not appropriately scaled.

Attached to this cover letter, you will find a detailed response to the Complaint and supporting Board staff report. The response addresses many factors of great concern to the Cities. These include clear factual corrections that are undisputed by the Board staff, corrections of interpretation as to City actions taken or outcomes if different actions had been taken during the spill repairs, and data submittal to fill acknowledged gaps in the Board staff's complaint record. Finally, we have included a thorough analyses of the ACL logic and calculations based on State Board policy (SWRCB 2002) and guidance (1996, amended 1997), as well as an inflation corrected analyses conducted by the Regional Board and the California Department of Fish & Game in support of the damage assessment for the August 23 and 24, 1994 Buena Vista Lagoon sewage spill.

We believe the early submittal of this information to the Board staff is of critical importance as there is nothing in the staff report to demonstrate that there has been any numeric or quantitatively objective calculation to support the Board staff's proposed ACL amount. Historically, the Board has performed numeric or quantitatively objective calculations of damages in Buena Vista Lagoon. The State Board's Water Quality Enforcement Policy suggests such a process, and the Order under which the Complaint has been issued requires adherence to the Enforcement Policy. Because the Complaint and staff report unfortunately omit specific discharger-beneficial parameters for lack of data that has not previously been requested from the Cities, we would hope that the Board staff and Board will take an opportunity to scrutinize this submittal package and consider amending the Complaint.

Notwithstanding our specific objections to various elements of the Staff Report and the need for or magnitude of the ACL, we would like to take this opportunity to express our appreciation for the assistance and good early communication we received working with Board staff during and immediately following the spill event. Mr. Bob Morris and Mr. Eric Becker have been helpful in working with the Cities staff and consultants and have championed efforts to assemble meetings between the Cities and the Board staff. We hope that this same good professional relationship continues through the enforcement process under which we presently find ourselves.

In the event that the Board, after fully considering the full record, finds that an ACL is appropriate, we would also like to note that the Cities are strongly supportive of keeping monies

local and expending funds on non-mandated system upgrades that enhance spill detection or response capabilities, local environmental projects, or other uses that benefit the public interests pertaining to water quality beneficial uses in or around Carlsbad and Vista. To this end, we would likely support appropriately scaled local benefit alternatives such as supplemental environmental projects (SEPs) in lieu of fully paying into the State Cleanup and Abatement Account.

The Cities reserve the right to submit additional comments, raise additional issues and to present evidence and testimony at any future meeting with staff or at any public hearing on this matter. The Cities ask that this letter, the Cities' Response, and the documents referenced herein, or attached, be incorporated into, and made a part of, the Record of this matter. As before, the Cities are eager and willing to meet with Board staff to discuss the material submitted here or in our initial Investigative Order response. We are strongly in favor of reaching agreement with staff on as many issues as possible prior to appearing before the Board on this complaint. Please let us know your availability to meet in the near future.

Also, as we move forward towards a hearing on the issue, the Cities would like to request that digital or hard copies of the full administrative record be provided to Board members for review. We make this request because we are concerned that the summary of the record has not been precise and balanced. Providing the full record would ensure Board members an opportunity to view the record in its entirety when considering the complaint.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Rita Geldert
City Manager, City of Vista

Glenn Pruim
Public Works Director, City of Carlsbad

Cc:
Mr. Mark Stone
General Manager
Carlsbad Municipal Water District
5950 El Camino Real
Carlsbad, CA 92008

Bill Paznokas
California Department of Fish & Game
4949 Viewridge Drive
San Diego, CA 92123

Lawrence D. Pierce P.E.
Director of Engineering/Public Works
City of Vista
600 Eucalyptus Avenue
Vista, CA 92084-6240

Michael Hogan
General Manager
Encina Wastewater Authority
6200 Avenida Encinas
Carlsbad, CA 92011-1095

Ron Wooton, Executive Director
Buena Vista Lagoon Foundation
P.O. Box 4516
Carlsbad, CA 92008

Cari Dale
Assistant General Manager
Carlsbad Municipal Water District
5950 El Camino Real
Carlsbad, CA 92008

Sharon Taylor
Division Chief
United States Fish & Wildlife Service
6010 Hidden Valley Road
Carlsbad, CA 92011

John Brooks
Special Agent
United States Fish & Wildlife Service
185 West F Street, Suite 440
San Diego, CA 92101

Keith Merkel
Merkel & Associates, Inc.
5434 Ruffin Road
San Diego, CA 92123

Warren Wong
California Department of Fish & Game
4949 Viewridge Drive
San Diego, CA 92123

CITIES RESPONSE TO
COMPLAINT NO. R9-2007-0099
FOR ADMINISTRATIVE CIVIL LIABILITY AGAINST THE CITIES OF VISTA AND CARLSBAD FOR VIOLATION OF NO. R9-2006-0003-DWQ, STATEWIDE GENERAL WASTE DISCHARGE REQUIREMENTS FOR SANITARY SEWER SYSTEMS
(Reference: NCRU:01-0743.02 & 01-0764.02:ebecker)

November 2, 2007

DISCHARGERS: CITY OF VISTA
600 Eucalyptus Avenue
Vista, California 92084
Attn: Rita Geldert, City Manager

CITY OF CARLSBAD
1635 Faraday Avenue
Carlsbad, California 92008
Attn: Glenn Pruim, Public Works Director

I certify under penalty of law that this document and all attachments were prepared under my *direction or supervision in accordance with* a *system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on* my *inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of* my *knowledge and belief, true, accurate, and complete. I* am *aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.*

Rita Geldert, City Manager
City of Vista

Glenn Pruim, Public Works Director
City of Carlsbad

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List of Appendices

CITIES' RESPONSE TO
COMPLAINT NO. R9-2007-0099
FOR ADMINISTRATIVE CIVIL LIABILITY AGAINST THE CITIES OF VISTA AND CARLSBAD FOR VIOLATION OF NO. R9-2006-0003-DWQ, STATEWIDE GENERAL WASTE DISCHARGE REQUIREMENTS FOR SANITARY SEWER SYSTEMS
(Reference: NCRU:01-0743.02 & 01-0764.02:ebecker)

November 2, 2007

EXECUTIVE SUMMARY

The cities of Vista and Carlsbad (Cities) jointly operate the Buena Vista force sewer main located adjacent to the southern edge of Buena Vista Lagoon. On the weekend of April 1, 2007 this polyethylene-encased, ductile iron force main ruptured as a result of unpredictable and undetectable exterior corrosion. The result of the rupture was the discharge of an estimated 7.329 million gallons of untreated sewage to Buena Vista Lagoon.

The diversion of over 2 million gallons of sewage to the Oceanside sanitary sewer system prevented additional discharge. The impoundment and recapture of sewage through 1 million gallons of containment at the Buena Vista Lift Station and pumper trucks and vactors collection, as well as the diversion of 669,000 gallons of sewage, ensured that over 3.669 million gallons of potential discharge volume was prevented from release as part of the initial response. Withdrawal and treatment of sewage-contaminated lagoon water totaled 42.3 million gallons. The cost of discharge response by the Cities has exceeded $750,000 with the predominant cost being associated with environmental protection, clean-up, and remediation.

On September 28, 2007, The Regional Board staff issued Complaint No. R9-2007-0099 proposing an assessment of civil liability (ACL) for the discharge in the amount of $1,095,000 and establishing a tentative Regional Board hearing date of December 12, 2007 for the complaint. The Cities have reviewed this complaint and disagree with the premise that the discharge warrants an ACL. The Cities' Response outlines that position. Further, if the Executive Officer or the Board disagrees with the Cities and finds that an ACL is warranted, the Cities' response provides documentation that the Board Staff Report does not comply with the enforcement conditions (#6 and 7) of the State Board Order No. 2006-0003-DWQ under which the Complaint has been issued and an ACL is being sought. The Staff Report does not follow the State Board's *Water Quality Enforcement Policy* and State Board's *Guidance to Implement the Water Quality Enforcement Policy*. This Cities' Response to the Complaint also identifies significant technical errors on which the Complaint is based and makes a case that the proposed assessment is not consistent with past enforcement actions of the San Diego Regional Board. Specifically, the Cities' Response reviews prior complaints referenced in the Staff Report. We have examined these complaints, including the Board's documentation for limiting, expanding, and foregoing ACLs for various discharges and

portions of prior discharges. If the Board finds that an ACL is warranted, we have calculated an assessment amount that follows State Board Policy and Guidance, as well as past precedent of the Board. The Cities' Response goes through the basis for the calculated amount in great detail.

The calculated amount of an ACL, if the Board were to determine that an assessment is warranted at all, is fairly formulaic. This amount is calculated as a base amount that reflects the extent and severity of the violation and its impact on beneficial uses. The base amount is modified by multipliers addressing discharger conduct, including culpability, notification, cleanup and cooperation, and history of violations. This amount is then modified as appropriate based on other factors including economic benefit of the discharge to the discharger, staff costs, discharger's ability to pay, and any statutory limitations. The process is outlined in Table VII-1. The procedure to set ACL amounts of the State Water Resources Control Board Water Quality Enforcement Policy is as follows:

Table VII-1. Procedure to set ACL amounts

Step	Procedure
A. Initial Liability	Set an initial liability based on the extent and severity of the violation and the sensitivity of the receiving water. An initial liability should also be calculated for non-discharge violations.
B. Beneficial Use Liability	If possible, estimate the dollar value of any impacts of the violation on beneficial uses of the affected waters.
C. Base Amount	The Base Amount is a single amount that is a result of combining the figures derived from the first 2 steps. For many ACLs, the base amount will simply be the initial liability from step A. because the calculation of the beneficial use liability may not be appropriate. The base amount reflects the extent and severity of the violation and its impact on beneficial uses.
D. Adjustment for discharger's conduct	Determine factors to adjust the Base Amount with respect to the conduct of the discharger's history of violations and other considerations. Apply these factors to the Base Amount from step C.
E. Adjustment for other factors	Determine whether any other factors should be taken into consideration when setting the ACL amount. If appropriate, adjust the figure from Step D to include these factors.
F. Economic Benefit	Estimate the economic benefit to the discharger. Economic benefit is any savings or monetary gain derived from the acts that constitute the violation. Add the economic benefit to the amount in step E.
G. Staff Costs	Estimate the SWRCB and RWQCB staff costs resulting from the violation. Add this cost to the figure determined from steps A through F.
H. Adjustment for ability to pay	If appropriate, increase or reduce the figure from Steps A through G with respect to the discharger's ability to pay and ability to continue in business.
I. Check against statutory limits	Check the figure from steps A through H against the statutory maximum and minimum limits.

(SWRCB Water Quality Enforcement Policy, 2002)

When working through this process, the Cities have calculated an assessment liability of substantially less than that proposed by the Board staff Complaint. This is calculated as follows:

The calculation of base liability is the additive result of an initial liability and a beneficial use liability. The State Board's Enforcement Policy contemplates a heavy reliance on quantification of the actual impact to beneficial uses where these are available. Specifically, the Policy indicates that ***"[W]hen it is possible to calculate the Beneficial Use Liability, the RWQCBs should assess the extent to which the Beneficial Use Liability represents the entire harm resulting from the violation."*** Indeed, this direction was employed in the 1994 ACL where actual calculable damages were used as the sole element of the base liability. We would argue that this is appropriate in the present case as well.

Initial Liability	***+***	***Beneficial Use Liability***	***=***	***Base Amount***
$0	***+***	***$194,494.34***	***=***	***$194,494.34***

The conduct factors of an assessment are used to modify the assessment amount based on several factors that are scored as increases, decreases, or no change from a multiplier value of 1.0. This document provides a significant summary as to how each of these factors was evaluated and provides support for recommended modifications based on these factors.

Perhaps the strongest argument for not assessing a civil liability in the case of the present discharge is found in the Culpability Factor analyzed through this process and the past actions of the Board where the initial discharge volume from a year 2000 force main rupture in Oceanside was excluded from the ACL because the very young age of the pipe made the break in the force main "not reasonably foreseeable." While the Oceanside pipe failure was presented in the Board's Staff Report as a primary factor in defining culpability, the Cities were not aware of the details of this prior rupture; but more importantly, upon recent investigations of the Oceanside event, it is clear that the prior Oceanside pipe rupture was not an indicator of the potential for the present Buena Vista force main rupture. In the Oceanside failure, an unlined ductile iron pipe failed due to external corrosion brought about by corrosive soil conditions. The Buena Vista force main was polyethylene encased which is the standard mitigation measure for ductile iron pipe construction in highly corrosive soil environments. Even as recently as 2006, investigation into the effectiveness of polyethylene encasement suggests a ten-fold protection level over raw ductile iron pipe in corrosive soil environments. As such, even if the Cities had specific knowledge regarding the failure details of the Oceanside pipe, it would not have altered the reasonable and prudent actions based on available information and cautious industry standard practices.

While the Cities believe that the Culpability Factor argues against any ACL, we have assigned a 0.5 value to this factor as a significant reduction based on the unforeseeable circumstances of the failure and the rapid and continuous response exhibited in the

control and termination of the discharge, including the diversion and/or recapture of over 3.669 million gallons prior to discharge to waters of the State.

The Notification Factor was not adjusted since the Cities made all of the appropriate notifications in a timely basis and as prescribed by law and permit conditions.

The Cleanup and Cooperation Factor is discussed in some detail in this document. The Cities responded immediately to the discharge with flow diversions, collections of discharge for treatment, parallel efforts to implement repairs, environmental monitoring, damage assessment, and aeration and pump-back to remediate effects and reclaim discharged waste. The cost of the environmental response exceeds $400,000 along with other release response costs.

The unquantified removal of sewage associated with the 42.3 million-gallon lagoon pump back both assisted in containing the effects of the discharge to the east end of the lagoon and withdrew a substantial volume of sewage from the environment. This lagoon cleanup operation, combined with aeration and monitoring, ran continuously 24 hours per day and 7 days a week for as long as benefit existed. In addition to the costs of the operation, the Cities also realized additional expenditures for processing the pump-back water from the lagoon.

In the final analysis, the environmental effects were greatly mitigated by the actions taken by the Cities. As such, this factor has been given a substantial reduction to 0.5.

The History of Violation Factor assesses the Dischargers' history of violations. To assess this factor, we examined the history of discharge incidents, the volume of discharge, and the percent recovery from the annual reports maintained by the Regional Board. The history of discharge was evaluated numerically in the context of the average for all sewer agencies within Region 9. We compared the facility ownership weighted (89.6% Vista, 10.4% Carlsbad) violation history with the 5-year average for all dischargers. This comparison found a dischargers violation history that is 54% of the regional mean. We thus used a factor of 0.54 as an adjustment of this factor.

Summarizing these factors in accordance with the Water Quality Enforcement Policy, the Cities have calculated a conduct factor adjustment to the base value as presented in Table VII-2 summary format below and calculated as follows:

Base Amount	×	***CF1***	×	***CF2***	×	***CF3***	×	***CF4***	=	***ACL***
$194,494.34	×	***0.5***	×	***1.0***	×	***0.5***	×	***0.54***	=	***$26,257***

Table VII-2. Conduct Factors to adjust ACLs

Factor	Adjustment for
Culpability Factor (CF1)	Discharger's degree of culpability regarding the discharge. Higher ACL amounts should be set for intentional or negligent violations than for accidental, non-negligent violations. A first step is to identify any performance standards (or, in their absence, prevailing industry practices) in the context of the violation. The test is what a reasonable and prudent person would have done or not done under similar circumstances. **There was no way for the Cities to have anticipated the rupture of the force main. The young age of the pipe, the suitable material, and PE lining would all support an anticipated design life in excess of 50 years. There is no standard industry means of regular inspection of an encased force main of this scale without extreme measures of excavation, dewatering, and breaching the protective encasement membrane. In 2000, the Board did not find liability in the initial failure of an unlined force main because the *break in the force main was not reasonably foreseeable*.** **We submit that this factor alone either eliminates the proposed ACL, or radically reduces the proposed ACL by a factor of 0.5 or less.**
Notification Factor (CF2)	Extent to which the discharger reported the violation as required by law or regulation. **The Cities made all reports as required by law. We recommend no change as a result of the Dischargers' conduct as the known notification requirements were met in a timely fashion.**
Cleanup and Cooperation Factor (CF3)	Extent to which the discharger cooperated in returning to compliance and correcting environmental damage, including any voluntary cleanup efforts undertaken. **The Cities have implemented extreme clean-up and discharge remediation efforts. The cost of these efforts has exceeded both the repair costs for the pipe and double the damage calculations for beneficial uses. The Cities have been cooperative with agencies and forthcoming with information. In addition, the Cities have gone well beyond the requirements of law to investigate, critique, learn from and enhance their capabilities in the future.** **We believe that the Cities' response should be considered to support a reduction of not less than a factor of 0.5 for any residual liability associated with the beneficial uses damage.**
History of violations factor (CF4)	Prior history of violations **The Cities' violations have resulted from discharges of sewage as a result of various factors associated with operation of a large wastewater collection system. The discharge record is better than industry standard when the events are standardized for the scale of the systems operated by the Cities. We have calculated a penalty reduction factor of 0.54 based on performance against the regional average.**

Other factors considered as adjustments include the Board's reported staff costs associated with the discharger event investigation and enforcement action. The Board staff estimates this cost at $17,500. The failure of the Buena Vista line and the

discharge from this line does not result in any cost savings on the part of the Cities. In fact, the line, which was state of the art at the time of construction, failed after only half of its programmed lifecycle of 50 years. This is a shorter lifespan than the polyethylene encased ductile iron pipe material would normally be estimated to have, even in corrosive soil environments. The response has already cost the Cities in excess of $750,000 and the Cities are moving forward with an accelerated pipeline replacement and relining in order to maintain parallel infrastructure redundancy. These actions are being taken, even though there is no knowledge of other locations on the pipe where abnormal rates of corrosion exist.

Based on consideration of all corrections, an ACL, if assessed, should not be greater than the calculated value above plus staff cost recovery. This is estimated as follows:

ACL	**+**	***Cost Recovery***	**=**	***Total Liability***
$26,257	**+**	***$17,500***	**=**	***$43,757***

Again, the Cities do not believe an ACL is warranted based on the unforeseeable nature of the discharge and the rapid and exceptional commitment to the repair and environmental damage remediation. If the Board finds that issuance of an ACL is appropriate, however, that assessment must be based on SWRCB Policy, guidance, and precedent such that it is fair and equitable to the Cities and the public constituency represented.

Finally, in the event that the Board was to find that an ACL is warranted, we request that the Board look favorably upon a local Supplemental Environmental Project that benefits the public that would be affected by the costs of the ACL through either service impacts or sewer fees. The Cities anticipate the receipt of proposed SEPs in the near future. We anticipate supporting one or more of these SEPs to the extent that the SEP amount can be aligned with the liability calculated.

1.0 BACKGROUND

The City of Vista and the City of Carlsbad, "Cities", jointly own and operate a 24-inch force sewer main located south of Buena Vista Lagoon near Jefferson Street in the City of Carlsbad. The City of Vista owns 89.6% of the line; while the City of Carlsbad owns 10.4%. This force main connects the Buena Vista Sewage Lift Station with the Encina Wastewater Authority's treatment plant located on Avenida Encinas in Carlsbad. From March 31, 2007 through April 3, 2007, the Cities discharged an estimated 7.329 million gallons of untreated sewage from a rupture of the sewer main and as a result of repair period overflow from the containment berm at the adjacent Buena Vista Sewer Lift Station into Buena Vista Lagoon. The Cities prevented the discharge of an additional 3.669 million gallons through diversion of over 2 million gallons of sewage to the Oceanside system, the impoundment and recapture of 1 million gallons within the containment at the Buena Vista Lift Station, and the collection of 669,000 gallons for treatment using pumper trucks and vactors at the Buena Vista Sewage Lift Station. Immediately upon system restoration, a pump-back of contaminated water at Buena Vista Lagoon was initiated to extract released sewage. This pump-back operation withdrew 42.3 million gallons of wastewater contaminated lagoon water from Buena Vista Lagoon. Lagoon aeration, contaminant postings, and environmental monitoring continued as dictated by environmental benefits. In total, the discharge resulted in the documented loss of 1,694 fish, 4 birds, as well as some invertebrates. The discharge response and clean-up costs have exceeded $700,000, with the majority of the cost going towards environmental response costs.

As a result of the discharge into Buena Vista Lagoon, the Regional Board requested information to evaluate the actions taken to prevent the sewage discharge, to repair the failed pipeline, and to investigate the impacts to water quality (WQ) from the sewage discharges. This request was tendered to the Cities on April 6, 2007 in the form of Investigative Order (IO) No. R9-2007-0060. In accordance with the IO, the Cities provided a response to Board questions on April 23, 2007. Subsequent updates were provided to the Board regarding the discharge response and environmental monitoring at various periods following the IO submittal; and on September 19, 2007, a supplemental submittal was made to the Board following the issuance of the final pipeline failure investigation report.

On September 28, 2007, The Regional Board staff issued Complaint No. R9-2007-0099 proposing an assessment of civil liability (ACL) for the discharge in the amount of $1,095,000 and establishing a tentative Regional Board hearing date of December 12, 2007 for the complaint. The Cities have been given an option of waiving their rights to a public hearing or proceeding to hearing on the complaint. The Cities have determined that a public hearing is necessary to address errors and omissions in the record, as well as to present information pertinent to the Board's consideration of the proposed ACL. The complaint provides that written evidence may be submitted to the Board by the Cities prior to 5 P.M. on November 13, 2007 in order to be considered by the Regional Board at the public hearing.

This submittal has been prepared to provide a response to the Complaint and Staff Report. It conveys supplemental information and evidence for consideration leading up to and at the public hearing. This response does not supplant prior information submittals already on record. Further, documents referenced in this submittal should be considered part of the record, as if they are provided in full as attachments.

2.0 SIGNIFICANT RECORD DOCUMENTS

The following response document is based in large part on information present in the Cities' Investigative Order Dischargers' Response submittal and supplemental information submittals, a variety of technical documents that pertain to this discharge and prior discharges, and State Water Resources Control Board policy and guidelines, as well as material collected from varied sources including the Cities, state, and federal government publications.

Most of these supporting documents are being incorporated as appendices to this response. Due to size and ready availability, however, some of these documents are referenced here and omitted as attachments. Excerpts are provided where most applicable.

No.	Appendix	Reference
1	NA	**Discharger Response To Investigative Order No. R9-2007-0060, Discharge Of Untreated Sewage Into The Buena Vista Lagoon Within The City Of Carlsbad, San Diego County (Reference: Ncru:01-0743.02 & 01-0764.02:Ebecker)**; April 23, 2007 + Appendices
2	NA	**Cities of Vista and Carlsbad. September 19, 2007. Additional Information Submittal For Investigative Order No. R9-2007-0060, Discharge Of Untreated Sewage Into Buena Vista Lagoon Within The City Of Carlsbad, San Diego County (Reference: Ncru:01-0743.02 & 01-0764.02:Ebecker)**, September 19, 2007, letter from Keith Merkel to Eric Becker and John Odermatt + Appendices
3	1	**State Water Resources Control Board Order No. 2006-0003-DWQ. Statewide General Waste Discharge Requirements for Sanitary Sewer Systems.** May 2, 2006.
4	2	**Guidance to Implement the Water Quality Enforcement Policy**. State Water Resources Control Board. April 1996, amended September 18, 1997.
5	3	**Water Quality Enforcement Policy**. State Water Resources Control Board. February 19, 2002
6	4	**Fact Sheet State Water Resources Control Board Order No. 2006-0003. Statewide General Waste Discharge Requirements for Sanitary Sewer Systems.** May 2, 2006.
7	5	**Staff Report In Support of Complaint No. 2000-74**; City of Oceanside Spill to Buena Vista Creek. California Regional Water Quality Control Board, San Diego Region. April 17, 2000.
8	6	**Staff Report on the Discharge of Untreated Sewage from the Buena Vista Pump Station to Buena Vista Lagoon on August 23, 1994; In Support of Complaint No. 95-90**; California Regional Water Quality Control Board, San Diego Region. July 6, 1995 + Appendices

9	6	**Preliminary Report on Damage Assessment of the Buena Vista Lagoon Sewage Spill on August 23 and 24, 1994** and **Preliminary Report on Cost Recovery for the Buena Vista Lagoon Spill** (prepared for August 23 and 24, 1994 spill). California Department of Fish & Game. Attachment #4 to Staff Report on the Discharge of Untreated Sewage from the Buena Vista Pump Station to Buena Vista Lagoon on August 23, 1994; In Support of Complaint No. 95-90; California Regional Water Quality Control Board, San Diego Region. July 6, 1995
10	7	**The Economic and Fiscal Impact of Carlsbad's Beaches: A Survey and Estimate of Attendance**. Philip King. December 12, 2005
11	8	**Ductile Iron Pipe Case Study: Corrosion Control Performance Monitoring in a Severely Corrosive Tidal Muck.** Corrpro Companies, Inc. 2006
12	9	**Uniquely Severe Environments Letter.** Ductile Iron Pipe Research Association. May 14, 2004
13	10	**Regional Water Quality Control Board in Response to Supplemental Brief In Support of Petition for Review Submitted By the City of Oceanside (SWRCB/OCC File A-1300).** California Regional Water Quality Control Board San Diego Region. February 13, 2001
14	11	**Discharge Response Costs**

3.0 CRITICAL CORRECTIONS TO THE COMPLAINT

While the Cities have concerns regarding some of the interpretations made by the Board staff regarding information provided or gathered by the staff, we believe that much of this stems from misunderstandings of fact that lead to erroneous conclusions. Of greatest importance to the conclusions contained within the complaint are the following:

- The Board's Staff Report includes in the allegation that the discharge occurred from a 24-inch pipe located at the Buena Vista Pump Station (3.0 Allegations, lines 3-4). This should be corrected to indicate that the discharge occurred from the Buena Vista Force Main down system from the Buena Vista Pump Station. Prior discharges at the pump station that are later referenced in the complaint are unrelated to the present discharge and were the result of completely different factors.

- The Complaint Staff Report notes that the Cities' April 23, report states the discharge started sometime Friday, March 30, or Saturday, March 31, 2007 (4.1 Nature, Extent, & Gravity of the Sewage Discharge, line 3). The report, however, indicates that the discharge date was determined to be March 31, 2007 (IO Response 1.0 Background, paragraph 2; 4.4 Calculation of Wastewater Discharge Volume, paragraph 1). There are no references to March 30 in our submitted report, and no other areas of the Complaint appear to have the same error.

- The Complaint Staff Report asserts that ***"because the City of Carlsbad could not locate the pipeline as-built plans to ensure the exact location of the pipeline, the needed work to uncover and repair the pipeline was delayed"*** (4.1 Nature, Extent, & Gravity of the Sewage Discharge). This is not correct. While plans could not be immediately located for a 25 year old pipe at 1:30 AM by the responding engineers and public works supervisors, the determination that the pipe excavation and repair would require a specialty contractor and shoring was made prior to this search for as-built plans. Due to the saturation of soils around the pipe, the early excavation indicated that excavation wall failures would prevent safe access without acquisition of trench shoring (IO Response, Appendix 3, Sunday 4/1/07-21:30 hrs). The timing of the break and the need for a specialty contractor rendered the acquisition of the as-built plans, wholly irrelevant to the response needs and timeline for termination of the release.

- The Staff Report for the Complaint indicates that; ***"Warning signs were posted around the lagoon from April 2 through April 19 for a loss of 17 days of recreation. The coastal areas 600 feet south and 1200 feet north of the Buena Vista Lagoon outlet were also posted with warning signs as a precautionary measure, from April 2, 2007 until April 9, 2007, for an additional loss of 7 days of recreation".*** It should be noted that the ocean

posting is part of the total 17 day posting and once it was confirmed that sewage had not reached the ocean, these signs were removed leaving the lagoon postings for an additional 10 days.

- The Staff Report for the complaint indicates that; ***"The Dischargers reported a fish kill of approximately 1,700 individuals with some bird, bullfrog, and crayfish kills".*** It is prudent to clarify that these losses were quantified as 1694 fish, 4 birds, 1 bullfrog, and 3 crayfish based on regular survey and collections.

- The Staff Report indicates that ***"[T]he California Department of Fish & Game and United States Fish & Wildlife Service reported that the sewage discharge and subsequent repair work impacted the Light-footed Clapper Rail, a Federal and State endangered species".*** There has been no such determination of impact. In fact, in a May 31, 2007 letter to the Board from the USFWS, it was explicitly stated that "[P]otential impacts to the light-footed clapper rail, the Belding's savannah sparrow, and other migratory bird species **are yet to be determined** [emphasis added]. This is based on a prior assertion made by the USFWS that, *[B]ased on 2007 survey data, light-footed clapper rails were nesting in the Buena Vista Lagoon near the discharge site at the time of the release (Zembal unpubl. data 2007 and pers. comm. 2007). Survey data (2006) also indicate that the Belding's savannah sparrow (Passerculus sandwichensis beldingi) was also nesting in the lagoon at this time of the year (McKee-Lewis unpubl. data 2006). Disruption or flushing of breeding birds nesting in the lagoon, with associated impacts (including failure of nesting attempts),* ***may*** [emphasis added] *have occurred as a result of operational activities during the incident*".

  Please note that the Cities have provided information in our IO Response (pgs. 43-44) addressing the likelihood of affects to state and federally listed species. Among the information is a discussion of the fairly significant separation between the discharge point at the Lagoon wildlife viewing area and the clapper rails nesting sites. There is also a specific discussion that the distance between the pipeline rupture location and the clapper rails nesting site is approximately 800-1000 feet. Between these areas is extensive cattail marsh, a segment of marsh that has been removed by the Department of Fish & Game to maintain viewing access, and a wildlife viewing area and kiosk. Clean-up operations were all staged from existing designated fishing access points, at the concrete bridge structures, and in areas where the Department had removed shoreline vegetation. No staging or vegetation removal occurred in areas known to be occupied by listed species. The Board's Staff Report appears to be overstated to conclude impacts to listed species beyond that which has been demonstrated or may be reasonably inferred with adequate factual support.

- The Staff Report indicates that ***"[T]he Dischargers could have implemented measures to reduce the amount of the discharge. The discharge was not discovered for almost 2 days because the Dischargers failed to have the capability to monitor the flow or pressure in the force sewer main."*** This

statement is not correct. If the flow variance data are reviewed in Appendix 4 of the Dischargers' Response to the IO, it is clear that the variance measured on Saturday, March 31, was only 6.7% of that measured on Sunday, April 1. The variance was higher on Monday when the pipe was exposed and subject to less soil back pressure thus allowing a greater rate of release. If it is assumed that a relatively consistent rate of release occurred on Saturday as on Sunday, it is likely that the pipe leak began late Saturday night at about 10:30 PM. It was ultimately detected and called in at 6:52 PM on Sunday. This would mean that the discharge was likely detected approximately 20.5 hours after initial breach.

- The Staff Report indicates that ***"[T]he Dischargers recognized that the force sewer main needed improvement and/or replacement. As part of the City of Carlsbad's 2003 Sewer Master Plan, the City of Carlsbad included a project to install a parallel force main from the Buena Vista Pump Station to I-5 likely using a high-density polyethylene pipe that is not susceptible to corrosion, but the City of Carlsbad failed to construct the parallel force main before the discharge."*** Contrary to the Board Staff Report claims, however, the City of Carlsbad's 2003 Sewer Master Plan, proposed to install a parallel force main from the Buena Vista Pump Station to I-5, not for reasons of concern over the competence of the existing pipe, but rather for capacity enhancements based on regional planning demands for sewer service. This upgrade did not include improvements to the existing pipe, as it was not nearing its recognized service life of 50 years. Parallel piping and lining of the existing pipe (dependent upon a parallel pipe for flow diversion) are now planned to be advanced to the earliest practical period based on a new understanding that potential corrosion areas may exist elsewhere on the pipe. This change in Master Plan programming was explained in the Discharger's September 19 supplement to the IO response.

4.0 BASIS FOR CALCULATION OF A PROPOSED ACL

4.1 BACKGROUND AND ISSUE

The Cities have conducted a thorough review of the SWRCB documents that underpin the assessment of an administrative civil liability (ACL) and other enforcement actions that may be administered by the Regional Board or SWRCB under the California Water Code. Most specifically these documents include: 1) SWRCB Order No. 2006-0003-DWQ, the State Board Order under which a violation is being alleged, (Appendix 1); 2) *Guidance to Implement the Water Quality Enforcement Policy* (1996, amended 1997) (Appendix 2), 3) the current *State Water Resources Control Board Water Quality Enforcement Policy* (2002) that includes earlier enforcement guidance (Appendix 3); and 4) SWRCB Order No. 2006-0003-DWQ Fact Sheet (Appendix 4)

As a matter of policy, the State Board declared in its 1997 guidance that:

> ***It is the policy of the State Water Board that enforcement actions throughout the State shall be consistent, predictable, and fair.***

In its current Enforcement Policy, the State Board also indicates that:

> ***Enforcement actions should be appropriate for each type of violation and should be similar for violations that are similar in nature and have similar water quality impacts.***

Finally, Order 2006-0003 explicitly mandates the Board to follow the adopted State Board Enforcement Policy. This Order goes even further by obliging the Board to consider measures taken to contain, control, and mitigate discharges when contemplating enforcement actions. In considering these measures, the Order provides specific factors that must be considered. The specific language from Order No. 2006-0003 that is applicable is as follows:

> ***6. In any enforcement action, the State and/or Regional Water Boards will consider the appropriate factors under the duly adopted State Water Board Enforcement Policy. And, consistent with the Enforcement Policy, the State and/or Regional Water Boards must consider the Enrollee's efforts to contain, control, and mitigate SSOs when considering the California Water Code Section 13327 factors. In assessing these factors, the State and/or Regional Water Boards will also consider whether:***
>
> ***i. The Enrollee has complied with the requirements of this Order, including requirements for reporting and developing and implementing a SSMP;***
>
> ***ii. The Enrollee can identify the cause or likely cause of the discharge event;***
>
> ***iii. There were no feasible alternatives to the discharge, such as temporary storage or retention of untreated wastewater, reduction of inflow and infiltration, use of adequate backup equipment, collecting and hauling of untreated wastewater to a treatment facility, or an increase in the capacity of the system as necessary to contain the design storm event identified in the SSMP. It is inappropriate to consider the lack of feasible alternatives,***

if the Enrollee does not implement a periodic or continuing process to identify and correct problems.

iv. The discharge was exceptional, unintentional, temporary, and caused by factors beyond the reasonable control of the Enrollee;

v. The discharge could have been prevented by the exercise of reasonable control described in a certified SSMP for:

- ***Proper management, operation and maintenance;***
- ***Adequate treatment facilities, sanitary sewer system facilities, and/or components with an appropriate design capacity, to reasonably prevent SSOs (e.g., adequately enlarging treatment or collection facilities to accommodate growth, infiltration and inflow (I/I), etc.);***
- ***Preventive maintenance (including cleaning and fats, oils, and grease (FOG) control);***
- ***Installation of adequate backup equipment; and***
- ***Inflow and infiltration prevention and control to the extent practicable.***

vi. The sanitary sewer system design capacity is appropriate to reasonably prevent SSOs.

vii. The Enrollee took all reasonable steps to stop and mitigate the impact of the discharge as soon as possible.

7. When a sanitary sewer overflow occurs, the Enrollee shall take all feasible steps and necessary remedial actions to 1) control or limit the volume of untreated or partially treated wastewater discharged, 2) terminate the discharge, and 3) recover as much of the wastewater discharged as possible for proper disposal, including any wash down water.

The Enrollee shall implement all remedial actions to the extent they may be applicable to the discharge and not inconsistent with an emergency response plan, including the following:

i. Interception and rerouting of untreated or partially treated wastewater flows around the wastewater line failure;

ii. Vacuum truck recovery of sanitary sewer overflows and wash down water;

iii. Cleanup of debris at the overflow site;

iv. System modifications to prevent another SSO at the same location;

v. Adequate sampling to determine the nature and impact of the release; and

vi. Adequate public notification to protect the public from exposure to the SSO.

SWRCB Order No. 2006-0003

The State Board's Enforcement Policy offers very specific guidance and direction in developing monetary assessments. These are outlined in section *VII. Monetary Assessments in Administrative Civil Liabilities (ACLs)*. This section outlines the steps that the Board must take in establishing a monetary assessment value. These steps encourage enumeration and quantification where possible. The Enforcement Policy also indicates that **"*[P]rior to issuing a complaint the RWQCB Executive Officer should consider each factor. This shall be documented in the ACL Complaint or in a staff report*."** The text of the Policy goes on to indicate: **"*If the RWQCB issues an ACL Order, the order shall contain findings explaining the Board's consideration of the factors. The documentation of elements such as economic***

***benefit, staff costs and avoided costs are necessary for the appropriate distribution of the total liability*.”**

While it can be argued that all of the factors required by the Water Code are included in the Complaint and staff report, it does not appear that the Enforcement Policy procedures to be used by SWRCB and RWQCB staff to develop a recommendation for the amount of the monetary assessment in an ACL have been followed. The steps in the procedure are provided to SWRCB and RWQCB staff in *Table VII-1 Procedures to Set ACL Amounts* within the Enforcement Policy (reproduced below). Further, the Enforcement Policy states that **“*[S]taff should carefully document each step in the ACL Complaint, ACL Order, or the staff-report of the ACL*”.** This has not been done.

Table VII-1. Procedure to set ACL amounts

Step	Procedure
J. Initial Liability	Set an initial liability based on the extent and severity of the violation and the sensitivity of the receiving water. An initial liability should also be calculated for non-discharge violations.
K. Beneficial Use Liability	If possible, estimate the dollar value of any impacts of the violation on beneficial uses of the affected waters.
L. Base Amount	The Base Amount is a single amount that is a result of combining the figures derived from the first 2 steps. For many ACLs, the base amount will simply be the initial liability from step A. because the calculation of the beneficial use liability may not be appropriate. The base amount reflects the extent and severity of the violation and its impact on beneficial uses.
M. Adjustment for discharger’s conduct	Determine factors to adjust the Base Amount with respect to the conduct of the discharger's history of violations and other considerations. Apply these factors to the Base Amount from step C.
N. Adjustment for other factors	Determine whether any other factors should be taken into consideration when setting the ACL amount. If appropriate, adjust the figure from Step D to include these factors.
O. Economic Benefit	Estimate the economic benefit to the discharger. Economic benefit is any savings or monetary gain derived from the acts that constitute the violation. Add the economic benefit to the amount in step E.
P. Staff Costs	Estimate the SWRCB and RWQCB staff costs resulting from the violation. Add this cost to the figure determined from steps A through F.
Q. Adjustment for ability to pay	If appropriate, increase or reduce the figure from Steps A through G with respect to the discharger’s ability to pay and ability to continue in business.
R. Check against statutory limits	Check the figure from steps A through H against the statutory maximum and minimum limits.

(SWRCB Water Quality Enforcement Policy, 2002)

The Cities are troubled by the non-substantiated penalties proposed in the Complaint that result in a proposed fine of exactly $0.15 per gallon of discharge. In response to our requests for records of analyses and calculations that were made to support the proposed assessment, Mr. Becker informed us that no calculation spreadsheet or other

formulaic assessment method was undertaken but that the cost is higher than the $0.10 per gallon assessed on the 2000 discharge by the City of Oceanside (Appendix 5).

The Complaint staff report offers that, ***"[T]he liability is calculated at $0.15 per gallon and is substantially less than the statutory maximum."*** While this statement is true and the Cities appreciate the spread between the maximum and the proposed assessment, it needs to be recognized that the statutory maximum is reserved to the gravest of circumstances when considering all factors, and these limits cannot be exceeded by law even for wanton abuses. In the State Board's Guidance, it is noted that **"*maximum potential assessments are huge for some violations. Setting ACL amounts at or near the maximum often is not practical nor is it always good public policy*".** As a result, it is comforting to know that the Board does not believe that the assessment should be near the maximum. We believe, however, that the amount should further be based on State Board policy of being ***"consistent, predictable, and fair"*** and the assessment should be ***"similar for violations that are similar in nature and have similar water quality impacts*."**

We are, therefore, concerned about an omission of a documented assessment considering that a detailed analysis was previously made for the imposition of a prior ACL against the Cities for an unrelated release in 1994 at the Buena Vista Pump Station. In this prior release of 4.75 MG into Buena Vista Lagoon, the effects to the lagoon beneficial uses were more severe based on fish and invertebrate losses, but the nature of the discharge and types of effects were similar in scope. In this case, the Board, with assistance from the CDFG, specifically documented and numerically assessed the effects of the discharge to appropriately assessed liability (Appendix 6). In the 1994 discharge, the Board imposed a $142,302 civil liability assessment on the Cities after completion of the documented assessment process. We would like to encourage a comparable process be used for the present discharge, especially given the magnitude of the proposed assessment.

The consideration of actual damages associated with the discharge is extremely important to the Cities in that it would allow an acknowledgment of the unforeseeable failure of the line and the reasonable acknowledgement of the tremendous beneficial and immediate actions taken by the Cities, at great expense, to recover discharged sewage and mitigate adverse effects of the discharge.

4.2 RECOMMENDED ANALYSES PROCESS

To provide a specific response to the factors required to be considered and the findings contained in the Staff Report, the Cities would offer an alternative analysis framed in the context of direction of the State Board's Water Quality Enforcement Policy, with consideration of past ACL actions pertaining to similar geography, types of affects to the beneficial uses of receiving waters, and discharge facts. We believe that an analysis based on consideration of prior events and actions taken by the Board, combined with the present event facts, would offer **"*a consistent, predictable, and fair"*** consideration and would ensure that ***"similar for violations that are similar in nature and have***

***similar water quality impacts*"** are treated similarly. As a result, we would encourage the Board to consider the prior 1994 ACL, the 1997 discharge during which no ACL was issued, and the 2000 ACL issued to the City of Oceanside. We believe that when evaluating the present discharge in the context of these prior actions, the facts strongly support either no ACL or a much-reduced assessment. An important consideration is the fact that none of the Cities' prior releases are related or similar to the present discharge, and the Cities have consistently taken steps to modify and enhance their system both to protect against failures and to respond to unforeseeable failures as they are identified. Further evidence of the Dischargers' commitment to proactive management of their sanitary sewer system is documented on Page 36 in Section 5.2.

The following section of this document is a reproduction of the Complaint Staff Report section *4.0 Determination of Administrative Civil Liability,* reproduced along with the applicable Enforcement Policy guidance and narrative insertions of information that will assist in correction of factual errors and quantification of factors.

5.0 DETERMINATION OF ADMINISTRATIVE CIVIL LIABILITY

The California Water Code lists a number of factors that must be taken into consideration when setting ACLs. California Water Code section 13327, governing ACL amounts for a wide variety of violations, states that:

> [The Board] shall take into consideration the nature, circumstance, extent, and gravity of the violation or violations, whether the discharge is susceptible to cleanup or abatement, the degree of toxicity of the discharge, and, with respect to the violator, the ability to pay, the effect on ability to continue in business, any voluntary cleanup efforts undertaken, any prior history of violations, the degree of culpability, economic benefit or savings, if any, resulting from the violation, and other matters as justice may require.

SWRCB Enforcement Policy

An administrative civil liability (ACL) is imposed pursuant to the procedures described in California Water Code (CWC) Section 13323. The procedures specify that the Regional Board Executive Officer issues a complaint to any person on whom the civil liability may be imposed. The complaint alleges the act or failure to act that constitutes a violation of law, the provision of law authorizing civil liability to be imposed and the proposed civil liability.

Persons or entities that discharge waste in violation of Waste Discharge requirements are subject to an ACL pursuant to California Water Code Section 13350, either on a daily basis not to exceed five thousand dollars ($5,000) for each day the violation occurs, or on a per gallon basis, not to exceed ten dollars ($10) for each gallon of waste discharged, but not both. The statutory maximum ACL amount for the March 31, 2007 to April 3, 2007 sewage discharges therefore is $73,000,000. The amount of the ACL is based upon consideration of the following factors:

Staff Report No. R9-2007-0099

5.1 NATURE, EXTENT, & GRAVITY OF THE SEWAGE DISCHARGE

Initial Liability

A. INITIAL LIABILITY

Set an Initial Liability based on factors related to the discharge - the nature, circumstances, extent, and gravity of the violation, the degree of toxicity of the discharge, and the susceptibility of the discharge to cleanup or abatement. This may include the consideration of information such as the pollutants contained in a discharge, the volume of the discharge, the sensitivity of the receiving water and its beneficial uses, threats to water quality and aquatic life, threats to human health and the volume of the receiving water relative to the discharge. The way that this amount is calculated will depend on the type of violation. For spills, effluent limitation violations, and similar violations, the initial water quality liability can be based on a per-gallon and/or per day charge.

For non-discharge violations such as late reports, failure to submit reports, and failure to pay fees, this initial water quality liability should be set considering the impact on the RWQCB's ability to effectively administer its water quality programs in addition to the above factors. These impacts include, but are not limited to, additional RWQCB staff costs beyond the normally required effort and the potential consequences of delayed clean-up, coordination, mitigation and enforcement response by the RWQCB due to late or omitted reports. For late or missing reports, the initial water quality liability amount could also consider impacts to water quality caused by the delay or failure. Timely follow-up on these violations acts as a deterrent to the violator and others and supports those dischargers who readily commit the resources necessary to comply with similar requirements.

SWRCB Enforcement Policy

The Discharger's report dated April 23, 2007 states the discharge of untreated sewage from the 24-inch force sewer main into the Buena Vista Lagoon started sometime Friday March 30, 2007 or Saturday March 31, 2007. At approximately 7:00 PM on Sunday April 1, 2007, a private citizen observed the discharge and reported it to the police. The City of Carlsbad was notified and responded immediately to the report. By 8:00 PM, the City of Carlsbad confirmed the discharge (estimated at 1,000 to 2,000 gallons per minute). The Dischargers initially used a small backhoe in an attempt to excavate and repair the damaged force sewer main. Due to the location, depth, and lack of available force sewer main construction plans, the City of Carlsbad's initial efforts to repair the leak were inadequate. Because the City of Carlsbad could not locate the pipeline as-built plans to ensure the exact location of the pipeline, the needed work to uncover and repair the pipeline was delayed.

By the next day, April 2, 2007, the Dischargers contracted with a private pipeline company that was qualified to repair the pipe. Repair of the pipe included constructing a sheet piling coffer dam, dewatering the area around the leak, cutting out the damaged section, and installing a repair coupling. All repair work was completed by 12:00 on April 3, 2007 and the force sewer main was returned to service.

The Dischargers hired Schiff Associates (a corrosion engineer) to assess the condition of the failed pipe. Schiff Associates, in a report dated April 17, 2007, responded that the likely cause of the pipe failure was external corrosion, caused by damage to a protective polyethylene encasement. The report concluded the initial damage to the encasement may have occurred during installation of the force sewer main. The report recommends additional testing of the pipe material, testing of the encasement material, and testing of other sections of the pipe for external corrosion. The testing recommended is an electromagnetic conductivity survey of the pipe to identify potential areas of corrosion. The report also recommends the pipe be evaluated for the feasibility of installing cathodic protection to protect against further corrosion.

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As indicated previously, the pipeline repair work was not delayed as a result of commencing work with a backhoe that was undersized for the job. In a detailed forensic analysis of the nearly minute-by-minute chronology of the discharge response (IO Response, Appendix 3), we identified benefits of ready plan access that could have assisted in this and future discharge responses. In the present case, however, plan availability had little to do with the response time and much more to do with planning and executing non-critical path actions. Acquisition of a specialty contractor and required shoring sheetpiling late on a Sunday night was not practical. Contractors were on-site by 09:15 on Monday morning. Had the pipeline plans been on site Sunday night, it would have made no difference to the contractor response time since the plans themselves would not dictate a requirement for trench shoring to access the pipe and acquisition of the sheetpile and a pile-driving contractor was the critical path for making the repairs. This being said, it is clear in the chronology of events that there was uncertainty regarding the pipe that could have been eliminated by having the as-built plans in hand. In consideration of this release and others in the future, we identified actions needed to improve accessibility of plan documents. The Cities' Sanitary Sewer Overflow Response Plans (SSORPs) are predicated on learning and improving with each incident. This was in no way intended as a condemnation of the discharge response, but rather was intended to be a helpful lesson learned to enhance future actions.

The April 17, 2007 preliminary report by Schiff Associates did conclude that the failure was likely due to external corrosion as a result of damage to the protective polyethylene encasement that may have occurred during initial construction. The report went on to suggest additional testing and an evaluation of the feasibility of installing cathodic protection. Because these tests and evaluations were not completed at the time of the Cities' IO Response submittal, we noted in our cover letters to the IO Response that environmental response and forensic analyses were still underway; and as such, results should be considered preliminary and supplemental information would be forthcoming. Additional information was subsequently provided in our September 19, 2007 status report that also served as a transmittal for the final Schiff Associates Report. The final Schiff Report indeed maintained the cause of the failure as external corrosion as indicated in the preliminary report. It also provided additional information, however, that is pertinent to the discussions. This information should be reflected in the complaint. Specifically, the Schiff Report noted that ***"[P]ast actions as far as material selection were consistent with industry standards. The pipe material and polyethylene encasement appear to be state of the art for the construction period. It would not be uncommon for pipes of the same construction to have 50 to 100-year useful lives."*** The Schiff Report further noted that ***"[T]he state of the art for the era the pipe was installed called for two choices: polyethylene encasement or leaving the pipe bare. Other pipe material systems, asbestos, cement, and reinforced plastic mortar, were used by the municipalities in the past were abandoned. The ductile iron met the structural requirements of the force main."***

The Schiff Report noted that ***"[I]n light of the untimely failure of this type and age of pipe, additional investigation to evaluate possible external corrosion elsewhere should be part of the City's SSO response plan. However, external corrosion and tears in the polyethylene encasement can not be easily detected. An electromagnetic conductivity (emag) survey of the soil along the alignment of the force main and any other iron pipes would provide information of similarly aggressive soils which could result in pipeline failures."***

Beneficial Use Liability

B. BENEFICIAL USE LIABILITY
Review the designated beneficial uses of the receiving water and determine whether the violation has resulted in any quantifiable impacts related to beneficial uses. Quantitative information may only be available for a limited number of impacts such as beach closure days, but where readily available the RWQCB should consider it.

SWRCB Enforcement Policy

The sewage discharge had significant short term impacts to both water quality and beneficial uses. Bacterial samples collected from Buena Vista Creek and Lagoon indicated public contact was unsafe. Warning signs were posted around the lagoon from April 2 through April 19 for a loss of 17 days of recreation. The coastal area 600 feet south and 1200 feet north of the Buena Vista Lagoon outlet were also posted with warning signs as a precautionary measure, from April 2, 2007 until April 9, 2007, for an additional loss of 7 days of recreation. Water quality sampling results indicated that the untreated sewage

plume migrated throughout the eastern basin of the Buena Vista Lagoon and under the I-5 Freeway into the western basin, but it appears that the waste plume did not to reach the Pacific Ocean. The approximate extent of the sewage discharge in the Buena Vista Lagoon is illustrated on the Incident Area Map (Figure 1, Keith Merkel & Associates, Inc.) in Appendix A.

The discharge of untreated sewage significantly impacted beneficial uses of surface waters by sensitive ecological receptors in the lagoon. The Dischargers reported a fish kill of approximately 1,700 individuals with some bird, bullfrog, and crayfish kills. The California Department of Fish and Game and United States Fish and Wildlife Services reported that the sewage discharge and subsequent repair work impacted the Light-footed Clapper Rail, a Federal and State endangered species. Potential long-term impacts to the lagoon continue to be assessed under the direction of the California Department of Fish and Game and the United States Fish and Wildlife Service.

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Buena Vista Lagoon is identified in the Basin Plan as supporting the following beneficial uses: industrial service supply (IND), contact water recreation (REC-1), non-contact water recreation (REC-2), preservation of biological habitats of special significance (BIOL), warm freshwater habitat (WARM), wildlife habitat (WILD), rare, threatened, or endangered species (RARE), and marine habitat (MAR). These uses and impacts to these uses are discussed in detail within the Dischargers' Response to the issued IO. In addition, the discharge affected REC-1 and REC-2 beneficial uses of the Pacific Ocean as a result of precautionary contaminated water postings.

In the prior 1994 Complaint Staff Report, a detailed analysis and quantification of impacts to beneficial uses was undertaken. Using the format for analysis applied by the Board to the 1994 discharge, along with the relevant facts of the present discharge, we have calculated the beneficial use impacts. In accomplishing the analysis, we advanced the economic valuation of impacts to present worth using inflation indices and updated costing. Where values were inflated by calculation, this was based on the U.S. Bureau of Labor Statistics Inflation Calculator (2007) that resulted in an inflation factor of 1.41. We have also added factors that were not calculable in 1994 but are today. Most specifically, this includes the value of beach recreation on Carlsbad beaches and nutrient loading that was assigned an arbitrary value in 1994.

Industrial Service Supply (IND)

The lagoon does not presently offer industrial service supply uses, and the discharge to the lagoon did not have had adverse short or long-term affects on this use.

Contact water recreation (REC-1)

While designated for REC-1 uses, Buena Vista Lagoon is closed to on-water activities, wading, and swimming through use restrictions within the Buena Vista Lagoon Ecological Reserve and the San Diego Basin Plan. Fishing in the lagoon does occur and is designated as a REC-1 beneficial use. REC-1 designations do apply to coastal beaches that were also affected by the discharge response actions, although the discharge itself did not reach the coastal beaches. Contaminated water warnings were posted on the lagoon for 17 days and on the coastal beach for 7 days.

Lagoon Use

In 1994, the Department of Fish & Game calculated the economic value of fishing loss to the lagoon as a result of the discharge and loss of fish in the east basin. This calculation was reported as follows:

> ***Through interviews conducted with the wardens who routinely monitor this area for fishermen and fishing activities it was determined that approximately 15 people utilize Buena Vista Lagoon for fishing on a daily basis. The Department's resource economist has supplied information that identifies the monetary value of a freshwater shoreline fishing day is valued at $26.26 per person per day. Utilizing this information, the monetary damage assessment for the loss of fishing activity during the 21-day closure is as follows:***
>
> ***21 days x 15 persons per day x $26.26 = $8271.90***
>
> ***For the additional six months of loss of fishing in the easternmost basin of the lagoon, we determined that approximately half of the fishermen or 7.5 persons per day fish in the eastern basin. Utilizing this information, the monetary damage assessment for the loss of fishing activity during the additional six months in the eastern basin is as follows:***
>
> ***180 days x 7.5 persons per day x $26.26 = $35,451.00***
>
> ***CDFG 1994***

The claim of extended damages was ultimately rejected by the Board as follows:

> ***The Regional Board staff believes that the second part of the fishing loss calculation (for the additional six month period of substandard fishing) might be too high. Since some people may resume fishing in the lagoon, not knowing that all or most of the fish in some areas have been killed, Regional Board staff has dropped the $35,451.00 assessment from the DFG assessment.***
>
> ***Regional Board 1994***

Today, the lagoon shoreline is highly inaccessible, and authorized fishing access is restricted to a designated fishing shoreline along the northeastern portion of the east basin and various points in the other basins. In addition, according to fishermen on the lagoon, fishing is better near the bridges of downstream basins as a result of cattail marsh and sediment infill of the lagoon. For this reason, it is probably reasonable to continue to use 15 fishermen for the lagoon and 7.5 fishermen per day as a liberal estimate of fishing pressures on the east basin. We have advanced the valuation of per day economic benefit to 2007 dollars using an inflationary rate of 1.41 as discussed previously. Using the closure period of 17 days, the value of lost fishing opportunity in the lagoon is as follows:

17 days x 15 fishermen/day x $26.26/fisherman x 1.41 = $9,441.78

(REC-1Lagoon)

Based on the same logic as expressed in 1994, the calculated value of six additional months of substandard fishing was not included in the estimated impact to beneficial uses. Had it been included, this value would be an additional $49,985.91.

Beach Use

Beach and coastal access is of great value to the City of Carlsbad and the North County region as a whole. In 2005, Carlsbad commissioned a study of beach use economics (Appendix 7). The study concluded that 600,000 people visit Carlsbad beaches each year during the summer months from June-September and that the economic benefit of a beach visitor day in the summer is $66.08 per person day. The study divided the beaches into reaches in order to develop an understanding of visitor distribution patterns. The reach affected by precautionary beach closure associated with the Buena Vista Force Main rupture is Reach 1a. This reach is approximately 3,000 feet long from north end of Carlsbad Beach at (St. Malo) to the south end of the Army Navy Academy. This beach reach supported an average use by 250 persons during the summer peak season. Beach postings associated with the discharge extended over an 1,800-foot segment of the 3,000-foot reach (60%).

If it were assumed that summer peak use were indicative of non-peak periods and the mix of visitors and residents remained comparable (visitors tend to spend more) and that posting of the beaches for water contact resulted in a complete loss of beach uses during the posting period, the posting would have resulted in an impact to 150 persons per day for a period of 7 days at a value of $66.08 per person day. While these assumptions are highly liberal towards increasing the loss of value, they were maintained for lack of ability to otherwise scale the numbers and in recognition that perception of closure likely extends beyond the posted area of closure.

This lost beneficial use value of beach REC-1 and REC-2 is calculated as follows:

7 days x 150 visitors/day x $66.08/visitor = $69,384

(REC-1Coastal Beach)

Non-contact water recreation (REC-2)

Non-contact water recreation that was adversely affected at the lagoon principally includes wildlife viewing. The discharge occurred within a popular viewing area that was taken over by discharge response activities on April 1, 2007. This area remained closed through the discharge response period. Bird watching is a principal REC-2 use at the lagoon.

No long-term adverse affects to REC-2 uses are anticipated.

The calculation of loss of non-contact recreation again follows closely along the lines of that performed for the 1994 assessment by the Department of Fish & Game. The Department used lagoon census data collected in a public use survey performed in 1993 by the Buena Vista Audubon Society combined with daily value per visitor of $50.84 provided by the Department's resource economist to determine the following losses associated with the 21 day lagoon closure.

21 days x 82 persons per day x $50.84 = $87,546.48

CDFG 1994

For the present discharge, the majority of the lagoon was not closed except for water contact. Only areas within the east basin were blocked to public access for REC-2 uses as a result of construction period erection of barricades along Lagoon Drive and occupying the wildlife viewing area. It was later determined that the Department of Fish & Game has locked the gates to the wildlife viewing area and this area is not available to public access except for infrequent uses. For these reasons, it is not possible to obtain a legitimate estimate of users displaced from REC-2 pursuits. If extremely liberal assumptions are made, however, the same formula applied in 1994 may be used with an inflation index being added. In this case, the estimated losses would be calculated as follows:

17 days x 82 persons/day x $50.84/visitor x 1.41 = $99,928.05

(REC-2)

Preservation of Biological Habitats of Special Significance (BIOL)

The wastewater discharge occurred into the Buena Vista Lagoon Ecological Reserve, an area designated as a State Ecological Reserve by the Fish & Game Commission under California Code of Regulations, Title 14, Section 630. The discharge adversely affected freshwater and avian resources, as well as minor amounts of vegetated habitat within this reserve. The discharge did not result in any permanent losses of biological habitats of special significance. The specific affects to resources are discussed under the beneficial use categories most specifically applicable including (WARM, WILD, and RARE). As a result, no valuation is attributed here to avoid double counting of costs.

Warm Freshwater Habitat (WARM)

The discharge resulted in mortality of a documented 1,694 non-native freshwater fish from affected portions of the lagoon and some macro invertebrates. These losses were highly reduced from the losses suffered in the smaller 1994 discharge event. Following the valuation procedures used in the 1994 Department of Fish & Game resource damage assessment, the impacts are summarized in the table below:

FISH	NUMBER	VALUE PER FISH*	TOTAL
Largemouth bass	187	$7.05	$1,318.35
Bluegill	648	$1.65	$1,069.20
Crappie	5	$3.53	$17.65
Bullhead	604	$3.17	$1,914.68
Carp	36	$1.41	$50.76
Gambusia/misc forage fish	1	**	
		TOTAL	**$4,370.64**

INVERTEBRATE	NUMBERS	VALUE PER ORGANISM	TOTAL
Crayfish	3	$0.21	$0.63
Bullfrog	1	***	$0.00
		TOTAL	**$0.63**

*Values came from using the Bureau of Labor Statistics Inflation Calculator to determine current values from the value per fish or organism in the 1994 CDFG report.
** No value is assigned to this species as it is provided free from the County of San Diego as a vector control agent.
***No value is assigned to this species because it is a pest species targeted in active eradication efforts in the region.

In addition to fish and invertebrate losses, the discharge is considered to have been responsible for the loss of four birds (a California gull, two American coots, and one gadwall). Following an equivalent process as used for determining the value of fish and invertebrates, the value of the bird losses were calculated. Costs for birds were derived based on identification of purchase values from wild game and poultry farms. It was difficult to obtain purchase price valuation for the California gull and American coot since these species have no commercial value and are not commonly traded. Value for the gadwall was obtained by searching wild game farms on the internet and obtaining prices for farm-raised birds. For gadwall, the price of $45 per pair ($22.50 each) was obtained from Roberts Waterfowl. Other farms sold this species at a comparable price when available. For the American coots, a comparable value was used as this species could easily be obtained through regular trapping programs from urban lakes or raised by a bird farm if there was an available market. The value of the California gull could not be located easily, and use of waterfowl and gallinule prices would be inappropriate as the husbandry practices for this bird would be different than typical farm-raised species. Absent a valid market cost for gulls, we reviewed the cost of replacement for gulls oiled or killed in oil spills. The most comparable value for gull replacement was $167 based on 1990 prices reported in (Tinney 1990). Inflating this cost to 2007 prices would raise the cost to $234. The table below summarizes the market replacement cost for birds lost to the discharge.

BIRDS	NUMBER	VALUE PER BIRD	TOTAL
Gadwall	1	$22.50	$22.50
American Coot	2	$22.50	$45.00
California Gull	1	$234.00	$234.00
		TOTAL	**$301.50**

In addition to the direct losses of aquatic resources, the discharge of sewage pollutants results in increased pollutant loading of the lagoon. In 1994, the Board Staff Report acknowledged potential prolonged effects of sewage pollution in the lagoon. The Board staff report read as follows:

> ***The persistence of sewage pollutants in the lagoon presents a potential for long term water quality impacts. The MEC water quality data reveal that algal mats and associated periods of oxygen depression were present in many areas of the lagoon under non-spill conditions. As such, the lagoon may be expected to be uniquely sensitive to any additional loadings of nutrients. Regional Board staff believes that an assessment of at least $5,000 is reasonable for the long-term impact from the loading of nutrients and other pollutants to the lagoon from the sewage spill.***
>
> ***Regional Board 1994***

The potential effects of nutrient loading from the discharge were explored in the Dischargers' Response to the IO. In this evaluation, it was noted that the lagoon is recognized in the San Diego Basin Plan as impaired for aquatic life, contact recreation, and non-contact recreation (RWQCB 1996 and 1998). Pollutants determined to be critical in the 303(d) listing as impaired waters were nutrients, sediment, and bacteria. As such, any additional nutrient load or bacterial load would be a concern. In both the 1996 and 2002 303(d) lists, nutrients and bacteria were listed as low priority in the list of priority pollutants.

The lagoon is already moderately to highly eutrophic depending upon particular areas and particular years. Absent relatively immediate consumption by algae, additional nutrients may be temporarily sequestered in the lagoon sediments until released as the lagoon warms and algal and vascular vegetation growth is accelerated. Considerable sediment nutrients may result in spring algal blooms and, thus, hugely cyclic diurnal DO levels. Such effects, however, were not referenced as occurring in specific association with the 1994 and 1997 discharge events. As a result, a more thorough consideration of the proportional load of nutrients from the 2007 discharge was undertaken. A mass loading calculation was completed to estimate the approximate percentage of the total annual load of nitrogen, in the form of total nitrogen and total phosphorus contributed to the lagoon by the pipe rupture.

For the 2007 discharge, the concentrations of nitrogen and phosphorus, when accumulated over the entire release volume, would translate into mass loading rates of approximately 0.61 tons of nitrogen and 0.03-0.12 tons of phosphorus, assuming no benefits of atmospheric loss of ammonia and no reduction of sewage from the pump-back operation; both highly conservative assumptions. Without discounting the loading by an unknown but substantial percentage of effluent recapture and atmospheric ammonia loss, the annual percentage of nitrogen loading contributed to the lagoon would be approximately 0.85% of the total annual load. For phosphorus, the load would be approximately 0.4%-1.8%. Given the relatively minor contribution to nutrient loading of the discharge and the low rainfall winter, it was not expected that the lagoon would experience particularly high algal blooms during the Spring and Summer 2007 seasons. This was indeed borne out by observation during the past season when no atypical blooms were noted in the lagoon.

It is difficult to establish an economic value to beneficial use degradation where the effects cannot be quantified. There is, however, no dispute that additional nutrient loading and other pollutants are adverse stressors of the lagoon. For consistency, we have retained the concept of the 1994 Board staff report recommendation for an assessment of $5,000 for the 4.65 MG discharge. When scaled to the discharge volume of 7.3 MG and adjusted for inflation, the calculation for residual adverse effects would be:

$5,000/4.65 MG x 7.3 MG x 1.41 = $11,067.74

With the calculated values for species losses and value added for prolonged effects, the beneficial use impact to WARM is calculated as:

$$\$4{,}370.64_{(fish)} + \$0.63_{(inverts.)} + \$301.50_{(birds)} + \$11{,}067.74_{(pollutant\ load)} = \$15{,}740.51\ (WARM)$$

Wildlife Habitat (WILD)

Wildlife habitat impacts from the discharge are limited to effects of the discharge response. Wetland habitat impacts are predominantly temporary in nature and have resulted from establishing pumping and aeration sites at existing clearings. In total, 152 square feet of freshwater marsh were impacted at existing clearings and 350 square feet of non-tidal alkali marsh were impacted. In all cases where the wetland damage has occurred, it was expected that viable rootstock would allow for rapid recovery of the trampled vegetation. This, in fact, did occur during the 2007 summer season, and there are no apparent residual effects of the trampling.

The majority of the impacted habitat actually occurred outside of waters of the state within the uplands where the pipeline rupture occurred and excavation of the pipe was performed. Non-wetland upland habitat was removed from the wildlife viewing area and at an entry point where a fence was taken down to access the north side of the lagoon from South Vista Way. The principal impacts occurred within the actual repair area in a location that has been a restoration site. No cost has been assessed to this factor since the impact to wetland habitat was highly restricted and has recovered. The Cities are committed to restoration of the upland vegetation damage and are working with CDFG as the landowner and manager on this upland restoration issue at the staging area.

Rare, Threatened, or Endangered Species (RARE)

At the present time, there is no evidence that rare, threatened, or endangered species have been harmed as a result of the discharge. This is discussed in detail within the Dischargers' Response to the IO.

Marine Habitat (MAR)

Marine Habitat beneficial uses were not adversely affected by the discharge, and no long-term affects to these resources are anticipated.

Estuarine Habitat (EST)

The potential beneficial use of Estuary Habitat was not adversely affected by the discharge.

Beneficial Uses Impact Summary

Based on the numeric analyses conducted following the guidance of the Enforcement Policy and the model of the 1994 discharge assessment, the calculated beneficial uses liability assessment can be summarized as follows:

NO.	BENEFICIAL USE	LIABILITY AMOUNT
1	REC-1 LAGOON	$9,441.78
2	REC-1 COASTAL BEACH	$69,384.00
3	REC-2	$99,928.05
4	WARM	$15,740.51
	TOTAL	**$194,494.34**

Base Amount

> **C. BASE AMOUNT**
> The Base Amount is the Initial Liability, the Beneficial Use Liability or a combination of the Initial Liability and the Beneficial Use Liability. When it is possible to calculate the Beneficial Use Liability, the RWQCBs should assess the extent to which the Beneficial Use Liability represents the entire harm resulting from the violation. The RWQCBs may, at their discretion, find it appropriate to combine the amounts from Steps A and B in a way that reflects the significance of the impacts quantified in Step B relative to the total impacts of the violation.
>
> The way that the Initial Liability and the Beneficial Use Liability should be combined will depend on how the violation harms the beneficial uses of the receiving waters and the extent to which this harm has been quantified. For example, a sewage spill will typically result in a wide variety of impacts, such as fish kills, degradation of wildlife habitat, and beach closures. For a sewage spill to the ocean in an urban area with high beach use, impacts on beach recreation may represent most of the harm resulting from the spill. If it is possible to estimate the value of the lost beach recreation in step B, it is appropriate to take this value and add it to some portion of the Initial Liability amount to reflect the total impact.
>
> For a sewage spill contaminating a beach in a remote area, where beach use is relatively low, impacts on beach use may be less important than other impacts, such as degradation of wildlife habitat and harm to a pristine environment. In such a case, the combined liability (steps A and B) may be based more heavily on the Initial Liability, because the impacts quantified in step B may be less significant relative to the entire impacts of the violation.
>
> ***SWRCB Enforcement Policy***

The calculation of base liability as outlined in the State Board's Enforcement Policy contemplates a heavy reliance on quantification of the actual impact to beneficial uses where these are available. Specifically, the Policy indicates that ***"[W]hen it is possible to calculate the Beneficial Use Liability, the RWQCBs should assess the extent to which the Beneficial Use Liability represents the entire harm resulting from the violation."*** Indeed, this direction was employed in the 1994 ACL where actual calculable damages were used as the sole element of the base liability. We would argue that this is appropriate in the present case as well for the following reasons.

First, the application of the Beneficial Use Liability is the most factually supportable basis for an assessment. Second, this methodology has been applied previously, and thus it is predictable and fair. Finally, the discharged sewage principally consists of non-conserved pollutants such as BOD, nutrients, and bacteria. The Cities conducted considerable clean-up and toxicity reduction through pump-back reclamation and aeration. As a result, the actual volume and toxicity of residual sewage unrecovered

from the lagoon is not fully known. As such, a volume-based assessment erroneously penalizes the Cities for recovered sewage and fails to recognize the tremendous recovery and remediation efforts.

5.2 CONDUCT OF THE DISCHARGER

D. CONDUCT OF THE DISCHARGER

The Base Amount from Step C must then be adjusted to reflect the conduct of the discharger. This adjustment reflects factors such as the degree of culpability of the discharger, any voluntary cleanup efforts undertaken and the discharger's history of violations. This adjustment can be made by determining values for the four factors in Table VII-2, and using them to determine a conduct factor that is applied to the Base Amount. The RWQCB may apply the various conduct factors using percentages. A percentage less than 100 percent may be appropriate for a discharger that made exemplary efforts such as voluntary cleanup. Percentages greater than 100 percent are appropriate for dischargers that demonstrated less than exemplary behavior such as delaying notification of a spill. Large multiplier percentages 200 - 500 percent may be appropriate for cases involving falsification of data or other deliberate acts or in cases where the discharger disregarded warnings from Board staff or other parties about the threat of discharge.

This calculation is:

$$ACL = Base\ Amount \times CF1 \times CF2 \times CF3 \times CF4$$

Note: Conduct factors should be expressed as a decimal (e.g. 90% = .9).

Table VII-2. Conduct Factors to adjust ACLs

Factor	Adjustment for
Culpability Factor (CF1)	Discharger's degree of culpability regarding the discharge. Higher ACL amounts should be set for intentional or negligent violations than for accidental, non-negligent violations. A first step is to identify any performance standards (or, in their absence, prevailing industry practices) in the context of the violation. The test is what a reasonable and prudent person would have done or not done under similar circumstances.
Notification Factor (CF2)	Extent to which the discharger reported the violation as required by law or regulation.
Cleanup and Cooperation Factor (CF3)	Extent to which the discharger cooperated in returning to compliance and correcting environmental damage, including any voluntary cleanup efforts undertaken.
History of violations factor (CF4)	Prior history of violations

In considering the discharger's prior history of violations careful consideration should be given to whether or not past violations that were not subject to previous ACLs should be included in the current ACL. Where there is a pattern of violations or the violation was intentional, the assessed liability could be substantially affected when considerations such as aggregate impacts and economic benefit are included.

SWRCB Enforcement Policy

Culpability Factor (CF1)

Quantity of Sewage Discharge

The Dischargers could have implemented measures to reduce the amount of the discharge. The discharge was not discovered for almost 2 days because the Dischargers failed to have the capability to monitor the flow or pressure in the force sewer main. Capability to monitor the force main flow could have alerted the Dischargers of a reduction of flow through the sewage system.

The Dischargers reported that the Buena Vista Pump Station is inspected daily. The Dischargers also reported that when a call was received alerting them to a possible sewage spill, the spill was confirmed by a visual observation. While the better option would be for the Dischargers to install a redundant force main to be used for emergency situations, at the very least visual observations of the force main at various times of the day in the vicinity of the lagoon should be conducted to ensure that a sewage spill is not occurring.

The Dischargers reported that the Buena Vista Pump Station is inspected daily. However, it was a member of the public that initially called the City of Carlsbad Police Department to notify the City of the ongoing sewage discharge. The police then notified the City of Carlsbad on-duty person. The on-duty personnel notified City of Carlsbad Public Works personnel, who inspected the location and confirmed the spill. More reliable options exist to determine when a spill has occurred or is ongoing, such as alarms and monitoring devices that send an alarm when pressure drops, and/or installation of a redundant force main to be used for emergency situations. As this spill incident reveals, reliance on limited daily visual observation of the force main in the vicinity of the lagoon is not a sufficient tool that can be relied upon to ensure that a sewage spill is not occurring.

Further delays to the timely response to the spill occurred when the Dischargers did not initially have copies of the construction details of the force sewer main, leading to the delay in deploying the appropriate equipment to complete the repair. Lack of adequate construction details resulted in the Dischargers hiring a contractor that did not have the equipment capable of doing the repair work. These preventable delays resulted in greater volume of untreated sewage discharged to the lagoon.

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It should be clarified that we believe the discharge was discovered approximately 20.5 hours after pipeline rupture based on flow variance calculations (see Section 3.0). The Cities noted in the Dischargers' Response to the IO that it may have been possible to detect the pipe rupture and sewage release earlier if there had been monitoring capacity in the force main comparable to the pump stations. The Cities indicated that they would explore the technology for implementing such automated monitoring and alarms building off of the current sewer monitoring system. The Response also noted that **"*preliminary indications are that there may be additional means to enhance the ADS system or install alternative systems that would improve leak detection through use of system pressure and flow variance and point-to-point differential. While these tools are widely available for potable and raw water pipelines, it is not clear if comparable systems are readily available for wastewater systems*."** The technologies for monitoring pressurized force mains for leaks are still developing, and such monitoring is not presently a *"prevailing industry practice"*. Subsequent to the discharge, the Cities have further investigated sensor technologies with the specific

objective of monitoring force mains for ruptures comparable to that of the Buena Vista Force Main. As was reported in the September 19 supplemental information submittal to the IO, it has been confirmed that additional sensors could be installed that would improve leak detection through use of system pressure and flow variance. The Dischargers have committed to installing automated alarm systems for potential leaks in this and other force main systems within their individual and collective operations areas. EWA has completed the installation of pressure and flow variance sensors at Buena Vista and Raceway Pump Stations. Real-time alarms, however, still rely on flow or pressure differential ranges. As such, small leaks or early ruptures may still go undetected, while larger ruptures should be detected earlier. The City of Carlsbad has met with ADS, Inc. to discuss the feasibility of a system that would provide real time flow tracking information. Carlsbad has coordinated with EWA to implement the system upgrades in the coming months. Along these same lines, the City of Carlsbad has initiated discussions with FlowMetrix, a company that employs fixed-base leak detection devices in pressurized pipe. The technology is used presently on pressurized water pipelines. The City of Carlsbad, however, is still exploring its alternative use on pressurized sewer pipelines, as this is a non-standard application of the equipment. In addition, the City of Carlsbad has had several meetings with Smartcover to discuss implementing flow change alarms on the Buena Vista force main. This would be a new use of the Smartcover technology as well.

While it is conceptually clear that an automated monitoring system would provide enhanced discharge detection, it is also empirically clear that such monitoring systems are only now emerging as potential technologies for the specific application desired. These are not standard in the industry; and thus, it is not reasonable to find the Cities culpable for failing to have such equipment in place at the time of the release.

As indicated previously, the pipeline repair work was not delayed as a result of commencing work with a backhoe that was undersized for the job. The critical path actions for the response were acquisition of a specialty contractor and required shoring sheetpiling to allow safe access to the deep pipe in unstable sediments. Concurrent with the search for a contractor, it should also be noted that a parallel effort was initiated by the Cities to install a high-line diversion around the rupture. By pursuing parallel corrective actions, the Cities improved the chances of a more rapid termination of the discharge. It ultimately proved that the direct repair approach was the victor over a diversion and repair approach. This is documented in detail within the Dischargers' Response.

Prevention of Discharge

The Dischargers failed to implement measures that could have prevented the discharge. This sewage spill occurred in the same area and from similar cause attributed to a 1.7 million gallon sewage spill, during January 2000, into Buena Vista Lagoon from a force main owned by the City of Oceanside. In May of 2000, the Regional Board assessed civil liability against the City of Oceanside in the amount of $334,615. In 2000, the City of Oceanside's concluded that their spill resulted from a corroded ductile iron pipe force main. The force main was installed in 1980 under similar conditions and in the same general vicinity of the Discharger's failed force main pipeline. The City of Oceanside's

corrosion engineer determined that the May 2000 spill was caused by exterior corrosion. Corroded portions of the City of Oceanside's pipeline were identified, repaired, and reported to the City as being in good condition. The City returned the pipeline back into service, during February 2000, only to have it fail again twelve days later, resulting in a discharge approximately 200,000 gallons of sewage into the Buena Vista Lagoon.

With knowledge of the condition of Oceanside's failed force main in 2000 and the extremely corrosive soil in the vicinity of their force main, the Dischargers failed to implement any additional measures to evaluate the condition of their force sewer main and identify potential problem areas. The Dischargers failed to conduct an internal survey or conduct other inspections of the force sewer main. Even though the Dischargers were fully aware of potential risks to the force sewer main, the Dischargers chose not to implement adequate preventative measures, such as, replacing or relining the pipe, installing a backup system, or at a minimum installing monitors and alarms that could have all reduced the volume of sewage discharge if not eliminate the discharge from occurring in March and April 2007.

The Dischargers recognized that the force sewer main needed improvement and/or replacement. As part of the City of Carlsbad's 2003 Sewer Master Plan, the City of Carlsbad included a project to install a parallel force main from the Buena Vista Pump Station to I-5 likely using a high-density polyethylene pipe that is not susceptible to corrosion, but the City of Carlsbad failed to construct the parallel force main before the discharge. As with Oceanside, the Dischargers have reported that the sections of pipeline on either side of the corroded area were in good condition. Yet the Dischargers have put the potentially corroded force sewer main back into service without upgrades or new lining.

On September 19, 2007, the Dischargers submitted, to the Regional Board, a final corrosion report by Schiff Associates identifying the existing force sewer main as being at risk for further failure and recommending lining or replacing the pipe. Based on recommendations in the report and potential for future failure, the Dischargers now propose to install a new parallel force sewer main and line the existing pipe within 3 years, instead of in 2017 that was originally scheduled. The Dischargers propose to monitor the existing force sewer with weekly inspections and install flow and pressure meters.

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The Complaint Staff Report is excessively presumptive about what was known by the Cities regarding the circumstances of the 2000 rupture of the Oceanside force main. The Staff Report incorrectly ascribes knowledge about the event that the Cities did not possess. As a result of this assumed knowledge, the Staff Report concludes that the Dischargers then willfully put off replacement of a line with knowledge that it suffers from the same risks as the failed Oceanside line. These allegations are flatly incorrect conclusions based on erroneous assumptions.

First, the Cities did not know the details of the Oceanside force main failure in 2000. The Oceanside line was owned and operated by a different agency as an element of a different disposal system. The cause of the failure and the circumstances surrounding the failure were not transferred to the Cities. As a result of the present Staff Report, however, an investigation of the Board's records regarding the discharge was undertaken to determine whether the suggested knowledge would have resulted in the conclusions alleged by the Staff Report. Ironically, it was determined that the Oceanside pipe was not polyethylene encased (PE) as was standard for corrosive soils.

This fact alone is so significant to the anticipated performance of ductile iron pipe in corrosive soils as to have lead to a dismissal of the corrosion as a concern for the Buena Vista Force Main. As was indicated in the Schiff Report, polyethylene encasement was state of the art for corrosive soil environments at the time the pipeline was installed. In addition, as late as May 2006, data continues to be developed that indicates the polyethylene encasement of pipes in highly corrosive soils will improve the lifespan of the material by a factor of 10 over unprotected pipe (Horton et al. 2006, Appendix 8). Further, in a 2004 letter clarifying recommendations beyond PE as they pertain to highly corrosive soil environments, the Ductile Iron Pipe Research Association continued to express the unique and rare circumstances for exterior corrosion failure of PE ductile iron pipes (Appendix 9).

> ***The term "uniquely severe environments" was incorporated in the 1999 revision of ANSI/AWWA C105/A21.5. It states "Research has shown that polyethylene encasement alone is a viable corrosion protection system for ductile- and gray-iron pipe in most environments. However, other options should be considered for environments where all the following characteristics co-exist: (1) soil resistivity ≤500 ohm-cm; (2) anaerobic conditions in which sulfate-reducing bacteria thrive [neutral pH (6.5 to 7.5), low or negative redox-potential (negative to +100 mV), and the presence of sulfides (positive or trace)]; and (3) water table intermittently or continually above the invert of the pipe."***
>
> ***One of the reasons for this classification was due to the fact that DIPRA had observed some corrosion under polyethylene encasement in its Everglades, Florida test site. However, those specimens were installed prior to the development of the current standard procedure for encasement below the water table which calls for circumferential wraps of tape at two-foot intervals. Secondly, the margin for error is smaller and the consequences of a poor installation more severe in this type of environment.***
>
> ***This recommendation is a cautionary one, consistent with DIPRA's historically conservative approach. This is evident since there are pipes in service in similar environments today with no apparent problems being reported, including the first pipeline encased in polyethylene in 1958 located in LaFourche Parish, Louisiana.***
>
> ***DIPRA 2004***

Also, contrary to the Board Staff Report claims, the City of Carlsbad's 2003 Sewer Master Plan, proposed to install a parallel force main from the Buena Vista Pump Station to I-5, likely using a high-density polyethylene pipe, not for reasons of concern over the competence of the existing pipe, but rather for capacity enhancements based on regional planning demands for sewer service. This upgrade did not include improvements to the existing pipe, as it was not nearing its recognized service life of 50 years. Parallel piping and lining of the existing pipe (dependent upon a parallel pipe for flow diversion) are now planned to be advanced to the earliest practical period based on a new understanding that potential corrosion areas may exist elsewhere on the pipe. This change in Master Plan programming was explained in the Discharger's September 19 supplement to the IO response. Again, it bears repeating that at the present time, there are no known additional areas of PE breach or corrosion on the pipe. Further, there is no way to inspect the condition of the pipe. As a result, the reprogramming of CIP schedules within the Master Plan and the addition of lining of the existing pipe are being implemented as a matter of prudence given the new knowledge of potential risk.

When considering the full scope of the Buena Vista Force Main failure, including information that was unknown and that which was known or knowable by the Cities, there was no reason to suspect a failure of the line. The line was younger than half its conservative service life. The pipe was polyethylene encased, which was state of the art at the time of installation and remains a standard for corrosive environments. The Oceanside force main failure occurred to a bare ductile iron pipe of the same vintage and the circumstances were unknown to the Cities.

The unanticipated failure in the present circumstance actually parallels closely the surprise failure of the Oceanside pipeline. In Oceanside's case, the Board clarified that the unforeseeable failure of the pipe was not a cause for assessment of civil liabilities. Rather, the Board found fault with Oceanside's response after a discharge alarm was sounded (Appendix 10). Specifically, the Board found as follows:

> ***"Besides not assessing a $10,000 per day liability, the SDRWQCB did not assess any liability against Oceanside for the first 323,850 gallons of the January 31, 2000 spill. The SDRWQCB determined that it was fair to forego assessing any per-gallon liability for this portion of the illegal discharge because the first break in the force main was not reasonably foreseeable due to its relatively recent installation*** *[emphasis added]**. The SDRWQCB imposed liability of $0.10 per gallon only for that volume of sewage discharged after Oceanside crews responded to an alarm, made an incorrect diagnosis, and left the pump station until the weekday crew could come in to evaluate the situation."***
>
> ***SDRWQCB's February 15, 2001 Response to the Supplemental Brief in Support of Petition for Review Submitted by the City of Oceanside SWRCB/OCC File A-1300 (Page 5, Section II, Paragraph 4)***

Equal treatment with respect to this issue would warrant the Board setting aside any assessment for discharge prior to discharge detection and separately evaluating the performance of the Cities relative to post-detection responsiveness. In the Dischargers' Response to the IO, the discharge volumes were presented from beginning to end of discharge. That portion of the discharge occurring prior to detection constituted 39% of the total discharge, or 2.87MG (223,000 gallons on 3/31 and 2.65 MG on 4/1). This 39% should be completely removed from any further consideration, and the Cities' response to the detected discharge should be evaluated relative to the residual volume released. In this circumstance, the discharge that occurred wasn't as a result of negligent or untimely actions by the Dischargers. Subsequent to detection, there was no way to stop it until the repairs were completed. Although the release itself was unavoidable, the Cities took immediate actions to limit, recapture, and clean up the discharge that was unavoidable.

Buena Vista Lagoon

> ***The Discharger's force main runs along the edge of the Buena Vista Lagoon, which is owned and maintained by the California Department of Fish & Game (CDFG). Because of the lagoon's unique and highly valued coastal wildlife habitat, the CDFG has designated the Buena Vista Lagoon as an ecological reserve. Based upon available water quality data, the lagoon is listed on the Clean Water Act section 303(d) impaired waterbody.***

Due to the unique qualities of the lagoon, the Dischargers should have implemented additional measures to prevent sewage spills to this enclosed coastal lagoon.

The Staff Report suggests that additional measures should have been implemented to prevent sewage discharges to the lagoon. There are no additional measures identified, however, and the report does not acknowledge the system history and measures that have been taken to protect the lagoon. These include early replacement of pipes as a result of developing failure history for the materials, construction within road right-of-ways, and continued development of discharge response actions and capabilities as a part of a cooperative preparedness effort through dishcarge drills, discharge debriefings, and mutual aid programs. These are detailed in the Dischargers' Response to the IO.

It should be noted that the force main was originally constructed in 1963 as a 16-inch diameter asbestos cement pipe (ACP) and was located entirely within Jefferson Street. At the time of the original pipeline construction, Jefferson Street was aligned along the lagoon edge, and the utilities, including the force main, were constructed within the roadway below pavement and subgrade. In approximately 1970, two 16-inch diameter reinforced plastic mortar pipes (RPMP) were constructed to replace the easterly most portion of the original ACP force main. While considered state-of-the-art in the 1970s and expected to have 50-year plus life spans, RPMP pipes began to show high failure rates, with breaks from fatigue occurring fairly often. Although the two 16-inch force mains in Jefferson Street had not suffered any failures, these pipes were retired in 1982 after only 12 years of service and replaced with a superior 24-inch DIP that extended from the Buena Vista Lift Station westerly. This pipeline replacement was exclusively a pre-emptive action to protect against discharges as a result of pipe ruptures. As indicated earlier, this shows the Dischargers' commitment to proactive management of their sanitary sewer system. Jefferson Street was realigned away from the lagoon edge; making room for the present wildlife viewing area, while the underground utilities have remained in their current alignment.

It should also be noted that designation of Buena Vista Lagoon as an impaired waterbody under section 303(d) post-dated the construction of the Buena Vista Force Main. While this designation provides a special recognition of impairment within the lagoon, it would not have altered material selection decisions at the time of pipe installation, as there was not a better-suited pipe material available. Further, standard maintenance for a force main of the Buena Vista force main type would be maintenance and exercising of valves and inspection and maintenance of force main air release valves. Inspection and maintenance of valves at the Buena Vista Lift Station and the single force main air release valve on the pipe have been performed regularly by EWA. The lift station maintenance is on going, and the air release valve has been inspected or maintained a total of 34 times since 2000.

The Carlsbad Master Plan proposal to parallel the line with a new, high-density polyethylene pipe is a continued enhancement of materials based on new product capabilities for pressure piping. This material was not available in 1982 when the line

was constructed. Even today, high-density, polyethylene plastic pipe lacks the performance history of DIP; and as such, properties are largely based on theoretical assessments, laboratory generated deterioration curves, and advanced aging processes. This material, however, is considered by industry standards to be an enhanced material over DIP and will, therefore, be used in the replacement project.

Notification Factor (CF2)

The Cities made all notices required by law in association with the discharge event. There does not appear to be any dispute on this issue by the Board staff, responsible agencies, or the public.

Clean-up And Cooperation Factor (CF3)

Response to Discharge

The Discharger's report dated April 23, 2007 states the discharge of untreated sewage from the 24-inch force sewer main into the Buena Vista Lagoon began sometime Friday March 30, 2007 or Saturday March 31, 2007. At approximately 7:00 PM on Sunday April 1, 2007, a private citizen observed the discharge and reported it to police. Sometime after receiving a call from a private citizen about a sewage spill on April 1, 2007, the Dischargers diverted 2 million gallons of sewage to the City of Oceanside's sanitary sewer system for treatment, thereby reducing the potential volume of the untreated sewage being discharged into the Buena Vista Lagoon.

The City of Carlsbad was notified by the Carlsbad Police Department and responded immediately to the report. By 8:00 PM, the City of Carlsbad confirmed the discharge (estimated rate of ranged from 1,000 to 2,000 gallons per minute). The City of Carlsbad initial response was to bring a small backhoe to the site in an attempt to excavate and repair the damaged force sewer main. This proved to be wholly inadequate, due to the location, depth, and lack of available force sewer main construction plans. Compounding the delay was the City of Carlsbad could not locate the appropriate plans to ensure the exact location of the pipeline. Consequently, this further delayed the need to uncover and repair the pipeline.

By the next day, April 2, 2007, the Dischargers contracted with a private pipeline company that was qualified to repair the pipe. Repair of the pipe included constructing a sheet piling coffer dam, dewatering the area around the leak, cutting out the damaged section, and installing a repair coupling. All repair work was completed by 12:00 on April 3, 2007 and the force sewer main was returned to service.

After the initial delays, the Dischargers implemented reasonable steps to terminate, evaluate, and cleanup the discharge. The Dischargers immediately monitored part of the lagoon for dissolved oxygen and bacteria to determine the extent of the sewage plume. The Dischargers also began aerating the lagoon to increase dissolved oxygen and protect aquatic life. From April 3 through April 10, over 40 million gallons of a mixture of lagoon water and sewage was pumped into the sanitary sewer system for treatment at the Encina Water Pollution Control Facility in Carlsbad. These cleanup efforts by the Dischargers expedited the cleanup of the Buena Vista Lagoon.

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The Complaint Staff Report understates and underplays the response of the Cities to the discharge. As discussed earlier, the Cities' response was swift and deliberate. It was organized under an incident command structure more typical of major police and fire responses, and it was underpinned by coordinated support of not less than five mutual aid agencies. Response moved forward continuously and aggressively from the time the discharge was identified on a Sunday night. Parallel efforts were undertaken to divert flows, pursue repair solutions (including both a direct repair and a separate highline bypass), implement environmental response, and coordinate agency, public, and media communications. At no time during the discharge or ongoing period of pump-back and aeration did City staff and/or contractors not man the site. We strongly encourage the Board members and Board staff to not only review the Dischargers' Response Section 4.3, Chronology of Events, but also Appendix 3, Combined Chronology of Events, to obtain a full appreciation of the extent of actions that were being undertaken in parallel. This review will also reaffirm that the elements of the response that have been condemned as resulting in delay, truly did not affect the timeliness or effectiveness of the response.

The extent of the response has been overwhelming and costly. The investment in the response by the Cities has been documented to date in Appendix 11. In total, the Cities have expended over $700,000 through October 15, 2007 in association with the discharge. This has been summarized as follows:

Pipeline Repairs	Environmental Response	Investigation and Reporting	Total Expenditures
$242,498	$411,588	$90,917	$745,003

Under the current Complaint, there is no acknowledgement of the value of reduction of impact as a result of the clean-up and remediation efforts undertaken during and following the discharge event. This clean-up effort was highly acknowledged as beneficial by the resource agencies and Board staff while underway, but we are concerned that they are now apparently dismissed at the point of assessment of liabilities. This is especially troubling since the 1994 efforts to remediate discharge damage were criticized in the prior Staff Report as too little too late. The present response was rapid, well orchestrated, and substantial based largely on lessons learned from the prior discharge event and critiques. In the present response, the Cities not only reclaimed and removed a substantial amount of the sewage released to the lagoon, but actually reduced the footprint of effect by temporarily reversing the flow gradient in the lagoon. The Cities carefully documented creek inflow rates, stationed pumps strategically, and monitored lagoon water levels in a balanced extraction of sewage contaminated water that ultimately resulted in the withdrawal and sewering of 42.3 MG of contaminated water without adverse effects on lagoon levels. In addition, the Cities installed and operated multiple aerators to consume biochemical oxygen demand. Pumps and aerators, along with environmental response monitoring and testing, continued 24 hours per day for 7 days a week for as long as the remediation actions were beneficial. This environmental response ultimately cost the Cities in excess of $400,000 and was by far the most costly element of the discharge response. This environmental response investment, however, kept impacts to a substantially reduced rate from those seen in the 1994 discharge (Appendix 6).

History of Violations Factor (CF4)

> ***In 1994, a total 4.75 million gallons of untreated sewage was discharged from a force sewer main, into Buena Vista Lagoon. That reported cause was a ruptured pipe caused by a contractor. The spill resulted in a significant fish and shrimp kill. At that time, the Regional Board imposed a $142,302 civil liability on the Dischargers.***
>
> ***In 1997, a failure at the Buena Vista Lift Station resulted in the discharge of 1.75 million gallons of untreated sewage into Buena Vista Lagoon. The Dischargers cleaned up the spill by pumping 4.7 million gallons of combined sewage and surface water from the lagoon into the sanitary sewer system for treatment. THE REGIONAL BOARD DID NOT ASSESS CIVIL LIABILITY FOR THE SEWAGE DISCHARGE IN 1997. From July 2006 through July 2007, the Dischargers have had a total of 21 overflows for a total of 7,725,707gallons (including 7,300,000 to Buena Vista Lagoon) of raw sewage discharged from the Dischargers' sanitary sewer system.***
>
> ***Staff Report No. R9-2007-0099***

In order to assess the history of violations as a factor, it is important to examine the circumstances of the individual discharges and question whether the events are related or pervasive in the context of the Dischargers' operations. In the case of the 4.75 MG discharge in 1994, in strict violation of legal and contract mark-out requirements, a contractor drilling a foundation caisson pile at the Buena Vista Lift Station accidentally drilled into a 16-inch diameter force main, causing 4.75 million gallons of sewage to discharge into the Buena Vista Lagoon. The 1997 discharge resulted from a flange failure within the lift station that failed during a flow test event to verify correct operation of pumps, valves, and switches under maximum load. Following shutdown of the pumps, an alarm went off indicating that the dry well within the lift station was flooding. With the station flooding, access to necessary valves to alter flows was cut off by rising sewage in the station. Several failed attempts to close the valves occurred during the day with the final closure of the isolation valve to the dry well being accomplished by a diver. The discharge event resulted in an estimated 1.75 million gallons of raw sewage discharging into the lagoon between 11:45 am and 5:00 pm on 2/25/97.

In the case of the 1994 discharge event, a contractor operating in violation of mark out requirements caused the discharge. This event was deemed negligent, and there was an assessment of liability by the Board. In the 1997 event, an unforeseeable failure during testing resulted in the discharge. This event was not deemed to be negligent, and no assessment was levied.

The present major discharge event has been discussed in depth, but also was not negligent and was unforeseeable. As with the rejection of an ACL in the 1997 case and in keeping consistent with the early exclusion of Oceanside's pipe rupture discharge in 2000, the facts of the present case do not warrant an assessment for negligent actions.

When considering the recent year's history of 21 incidents of release, it is important to note that these events include all scales of discharge that must be contextualized with the size of the collection systems of the two agencies and the magnitude of sewage handled during the same yearlong period. Vista's sewer system handles 2.4 billion

gallons of sewage per year and Carlsbad's system handles a comparable 2.6 billion gallons of sewage per year. In this context, Vista and Carlsbad's collective discharge events total 6.8 $x10^{-3}$ percent of the sewage handled in the system.

Historically the Cities have performed better than the norm for sewer agencies within the region. The last 5 years of published data FY2001-2002 through FY2005-2006 were obtained through the San Diego Regional Water Quality Control Board's web site at (http://www.waterboards.ca.gov/sandiego/programs/sso/). These data are provided to the Board and summarized as a reporting requirement of Board Order 96-04. We analyzed these data to determine what the true history of performance has been for the Cities relative to violations. We examined the two agencies separately and collectively as a weighted average of ownership in the Buena Vista Force Main. The parameters examined are those that may be standardized to system scale across all of the sewer agencies in the region. These include 1) number Sanitary Sewer Overflows (SSO) per 100 miles of system; 2) total discharge volume/-million gallons processed, and 3) percent of release volume recovered. The results of this analysis are as follows:

5-year Average 2001-2006 Sanitary Sewer Overflow Reported Data

	Region Average	Vista	Carlsbad	Ownership Weighted
#SSO/100 mi. system	3.6	3.5	5.3	3.7
SSO gal./Mgal.	29.1	9.8	1.2	7.6
% volume recovered	22.2%	75.1%	34.5%	64.2%

It is clear than the Cities of Vista and Carlsbad have a better performance record than the regional average individually and as a function of ownership weighted interest in the Buena Vista Force Main. The presentation of raw numbers of discharges or volumes without context is an unfair characterization of the Cities performance history.

While the Cities continue to strive for a no-discharge record, the present discharge record clearly indicates that the Cities outperform the standard. For this reason, we have calculated a positive change for the History of Violation Factor (CF4). This calculation is based on an average of the ratio comparison of the regional standard performance (Region Average) and the facility ownership weighed performance (Ownership Weighted) of the two Cities for each the three factors discussed above. For the number of discharges per 100 miles, the ratio is 1.02 meaning that the Cities performed slightly worse than average. For the discharge volume, the ratio was 0.26 meaning the Cities performed approximately 4 times better than the average. For the discharged volume recovered, the ratio was 0.35 meaning the Cities performed approximately 3 times better than the average for the region. The average of the three ratios is 0.54 that suggests that on whole the Cities have a 5-year history of performance about twice as well as the regional average. We are proposing use of this average ratio as a weighting factor for CF-4.

Table VII-2. Conduct Factors to adjust ACLs

Factor	Adjustment for
Culpability Factor (CF1)	Discharger's degree of culpability regarding the discharge. Higher ACL amounts should be set for intentional or negligent violations than for accidental, non-negligent violations. A first step is to identify any performance standards (or, in their absence, prevailing industry practices) in the context of the violation. The test is what a reasonable and prudent person would have done or not done under similar circumstances. **There was no way for the Cities to anticipate the rupture of the force main. The young age of the pipe, the suitable material, and PE lining would all support an anticipated design life in excess of 50 years. There is no standard industry means of regular inspection of an encased force main of this scale without extreme measures of excavation, dewatering, and breaching the protective encasement membrane. In 2000, the Board did not find liability in the initial failure of an unlined force main because the *break in the force main was not reasonably foreseeable*.** **We would recommend that this factor alone either eliminate the proposed ACL, or radically reduce the proposed ACL by a factor of 0.5 or less.**
Notification Factor (CF2)	Extent to which the discharger reported the violation as required by law or regulation. **The Cities made all reports as required by law. We are recommending no change as a result of the Dischargers' conduct as the known notification requirements were met in a timely fashion.**
Cleanup and Cooperation Factor (CF3)	Extent to which the discharger cooperated in returning to compliance and correcting environmental damage, including any voluntary cleanup efforts undertaken. **The Cities have implemented extreme clean-up and discharge remediation efforts. The cost of these efforts has exceeded both the repair costs for the pipe and double the damage calculations for beneficial uses. The Cities have been cooperative with agencies and forthcoming with information. In addition, the Cities have gone well beyond the requirements of law to investigate, critique, learn from and enhance their capabilities in the future.** **We believe that the Cities' response should be considered to support a reduction of not less than a factor of 0.5 for any residual liability associated with the beneficial uses damage.**
History of violations factor (CF4)	Prior history of violations **The Cities' violations have resulted from discharges of sewage as a result of various factors associated with operation of a large wastewater collection system. The discharge record is better than industry standard when the events are standardized for the scale of the systems operated by the Cities. We have calculated a penalty reduction factor of 0.54 based on performance against the regional average.**

Based on the analyses above, the Cities believe that if an assessment were to be levied, that assessment must be derived following State Board Enforcement Policy. Specifically the assessment must be calculated from applicable standards this calculation would follow that outlined in the Policy as follows:

Initial Liability	***+***	***Beneficial Use Liability***	***=***	***Base Amount***
$0	***+***	***$194,494.34***	***=***	***$194,494.34***

After calculation of the Base Amount, the Conduct Factors are used to adjust the amount to determine the proposed ACL. This is accomplished as indicated in the Policy and specifically for the present incident as shown below:

Base Amount	***×***	***CF1***	***×***	***CF2***	***×***	***CF3***	***×***	***CF4***	***=***	***ACL***
$194,494.34	***×***	***0.5***	***×***	***1.0***	***×***	***0.5***	***×***	***0.54***	***=***	***$26,257***

In the 1997 Guidance document, the State Board recommended evaluation of a proposed assessment within an Assessment Matrix that uses a minor to major rating of the "Environmental Significance" of the discharge along with a minor to major rating of the "Compliance Significance" of the discharger. This tool was employed in the evaluation of the 2000 Oceanside discharge to determine the reasonableness of the proposed assessment.

> ***"Environmental Significance" relates to the violation itself: the gravity of the violation(s) – nature, circumstances, extent, and degree of toxicity of the discharge; and whether the discharge is susceptible to cleanup or abatement. The "Compliance Significance" deals with the discharger: voluntary cleanup efforts undertaken by the discharger; the violator's prior history of violations; and the violator's degree of culpability.***
>
> ***SWRCB Guidance 1997***

Assessment Matrix			
COMPLIANCE SIGNIFICANCE (DISCHARGER)	**ENVIRONMENTAL SIGNFICANCE (DISCHARGE)**		
	MINOR	**MODERATE**	**MAJOR**
MINOR	$100-$2,000	$1,000-$20,000	$10,000-$100,000
MODERATE	$1,000-$20,000	$10,000-$100,000	$50,000-$200,000
MAJOR	$10,000-$100,000	$50,000-$200,000	$100,000 to maximum

SWRCB Guidance 1997

In the present case, there is no question that the discharge was major in terms of Environmental Significance based on the environmental impacts and the sensitivity of Buena Vista Lagoon. The Cities, however, invested a huge amount on effective voluntary clean-up; the Cities have a much better than average record of performance for SSO violations, and the pipeline rupture was unlikely and unforeseen given the young age of the pipe and the polyethylene encasement. As such, it is believed that the Compliance Significance is minor. As such, the proposed ACL would fall within the scoring recommended.

5.3 OTHER FACTORS

> **E. OTHER FACTORS**
> If the RWQCB believes that the amount determined using Steps A through D is inappropriate, the amount may be adjusted. Examples of circumstances warranting an adjustment under this step are:
>
> (a) The discharger publicized the violation and the subsequent enforcement actions in a way that encourages others to violate water quality laws and regulations.
> (b) The threat to human health or the environment was so egregious that the preceding factors did not, in the opinion of the RWQCB, adequately address this violation.
> (c) The discharger has provided, or RWQCB staff has identified other pertinent information not previously considered that indicates a higher or lower amount is justified.
> (d) A consideration of issues of environmental justice indicates that the amount would have a disproportionate impact on a particular socioeconomic group.
>
> If such an adjustment is made, the reasons for the extent and direction of the adjustment must be noted in the administrative record.
>
> ***SWRCB Enforcement Policy***

The Cities have expressed both through agency and press relations and through their actions, a full appreciation for the magnitude and concern for the discharge. They have invested over $700,000 in discharge response, environmental clean-up, and other even-related actions. The Cities are moving forward with the accelerated process of installing a parallel sewer main and lining the existing main, well ahead of its capacity demand or its scheduled replacement life. These actions are being taken, not because there is a knowledge that the line is presently subject to other areas of corrosion, but rather because the Cities are now painfully aware that there is a potential that the line is subject to other areas of corrosion and there remains no reasonable way to inspect the line without full excavation and breaching the very polyethylene liner intended to protect the pipe from corrosive soil conditions. As a result, this commitment to the present course of action is being made as insurance against the potential for future ruptures with the available information at hand today.

It is important for the Board to give full consideration as to whether the present failure could have reasonably been prevented or responded to in a manner that would have been better executed or resulted in less environmental effect. It is especially important to consider whether any ACL should be levied against the Cities given the discharge facts, the logic for not assessing any liability for the initial 2000 Oceanside discharge where the ***"break in the force main was not reasonably foreseeable due to its relatively recent installation",*** and the premise expressed by the State Board policy "***that enforcement actions throughout the State shall be consistent, predictable, and fair."*** The Cities would suggest that an assessment is not warranted under these circumstances; and if there remains disagreement, that the assessment should not exceed the actual damages to beneficial uses as calculated and modified by conduct criteria.

5.4 ECONOMIC SAVINGS

F. ECONOMIC BENEFIT

Economic benefit is any savings or monetary gain derived from the acts that constitute the violation. In cases when the violation occurred through no fault of the discharger and it was demonstrated that the discharger exercised due care, there may be no economic benefit. In cases where the violation occurred because the discharger postponed improvements to a treatment system, failed to implement adequate control measures (such as Best Management Practices (BMPs)) or did not take other measures needed to prevent the violations, economic benefit should be estimated as follows:

(a) Determine those actions required by an enforcement order or an approved facility plan, or that were necessary in the exercise of reasonable care, to prevent the violation. Needed actions may have been capital improvements to the discharger's treatment system, implementation of adequate BMPs or the introduction of procedures to improve management of the treatment system.

(b) Determine when and/or how often these actions should have been taken as specified in the order or approved facility plan, or as necessary to exercise reasonable care, in order to prevent the violation.

(c) Estimate the type and cost of these actions. There are two types of costs that should be considered, delayed costs and avoided costs. Delayed costs include expenditures that should have been made sooner (e.g. for capital improvements such as plant upgrades and collection system improvements, training, development of procedures and practices, etc) but that the discharger is still obligated to perform. Avoided costs include expenditures for equipment or services that the discharger should have incurred to avoid the incident of non-compliance, but that are no longer required. Avoided costs also include ongoing costs such as needed additional staffing from the time determined under step "b" to the present, treatment or disposal costs for waste that cannot be cleaned up, and the cost of effective erosion control measures that were not implemented as required.

(d) Calculate the present value of the economic benefit. The economic benefit is equal to the present value of the avoided costs plus the "interest" on the delayed costs. This calculation reflects the fact that the discharger has had the use of the money that should have been used to avoid the instance of non-compliance. This calculation should be done using the USEPA's BEN computer program (the most recent version is accessible at http://www.swrcb.ca.gov) unless the SWRCB or RWQCB determines, or the discharger demonstrates to the satisfaction of the SWRCB or RWQCB, that, based on case-specific factors, an alternate method is more appropriate for a particular situation.

(e) Determine whether the discharger has gained any other economic benefits. These may include income from continuing in production when equipment used to treat discharges should have been shut down for repair or replacement.

(f) The RWQCBs should not adjust the economic benefit for expenditures by the discharger to abate the effects of the discharge.

The economic benefit shall be added to the adjusted base amount calculated from the previous steps unless the RWQCB determines that it is not appropriate. The ACLC or ACL Order shall include a finding that supports the determination.

SWRCB Enforcement Policy

At this time, the Regional Board does not have information to determine the specific amount of economic benefit or savings of avoiding the cost of needed measures to prevent and reduce the sewage discharge.

Staff Report No. R9-2007-0099

The failure of the Buena Vista Force Main was a catastrophic and unforeseeable failure of a capital facility of the Cities. It was not an older pipe where deferred replacement was a factor in its failure. In fact, it was half its programmed service life of a conservative 50 years. When it was installed, it was constructed with state of the art materials and encased for additional protection against corrosive soils. There has been no economic benefit afforded the Cities in relation to the discharge event.

5.5 OTHER MATTERS AS JUSTICE MAY REQUIRE

G. STAFF COSTS
Staff costs may be one of the "other factors that justice may require", and should be estimated when setting an ACL. Staff should estimate the cost that investigation of the violation and preparation of the enforcement action(s) has imposed on government agencies. This can include all activities of a progressive enforcement response that results in the ACL. Staff costs should be added to the amount calculated from the previous steps.

SWRCB Enforcement Policy

To date, the Regional Board has spent an estimated 140 hours to investigate and consider action regarding this matter. At an average rate of $125 per hour, the staff costs at this time are no less than $17,500.

Staff Report No. R9-2007-0099

The Cities are not opposed to reimbursement of Board staff time as may be reasonably calculated and documented as legitimate expenses incurred in response to this discharge event that are above and beyond the normal duties and functions of Board staff.

5.6 ABILITY TO PAY AND ABILITY TO CONTINUE IN BUSINESS

H. ABILITY TO PAY AND ABILITY TO CONTINUE IN BUSINESS
The procedure in Steps A through G gives an amount that is appropriate to the extent and severity of the violation, economic benefit and the conduct of the discharger. This amount may be reduced or increased based on the discharger's ability to pay.

The ability of a discharger to pay an ACL is limited by its revenues and assets. In most cases, it is in the public interest for the discharger to continue in business and bring operations into compliance. If there is strong evidence that an ACL would result in widespread hardship to the service population or undue hardship to the discharger, it may be reduced on the grounds of ability to pay. The RWQCBs may also consider increasing an ACL to assure that the enforcement action would have a similar deterrent effect for a business or public agency that has a greater ability to pay.

Normally, an ACL should not seriously jeopardize the discharger's ability to continue in business or operation. The discharger has the burden of proof of demonstrating lack of ability to pay and must provide the information needed to support this position. This adjustment can be used to reduce the ACL to an amount that the discharger can reasonably pay and still bring operations into compliance. The downward adjustment for ability to pay should be made only in cases where the discharger is cooperative and has the ability and the intention to bring operations into compliance within a reasonable amount of time. If the violation occurred as a result of deliberate or malicious conduct, or there is reason to believe that the discharger can not or will not bring operations into compliance, the ACL must not be adjusted for ability to pay.

The RWQCBs may also consider increasing the ACL because of ability to pay. For example, if the RWQCB determines that the proposed amount is unlikely to have an appropriate deterrent effect on an uncooperative discharger with a greater ability to pay, the amount should be increased to the level that the Board determines is necessary to assure future compliance.

SWRCB Enforcement Policy

At this time, the Regional Board does not have information that the Dischargers are unable to pay the proposed administrative civil liability or any information on how payment of the proposed administrative civil liability would affect the ability to provide required services.
Staff Report No. R9-2007-0099

The Cities are municipal agencies mandated to provide sewer services within their service districts. As a result, an assessment of an ACL will not affect the Cities ability to continue in business. The ACL, however, will affect the base operating cost of the system and will affect prioritization and initiation schedules for capital improvement projects, sewer rate structures, and lastly maintenance and operations. Neither Vista nor Carlsbad operates their wastewater collection systems in a for-profit manner. As such, any payments made out must ultimately be recaptured by rate increases or deferral of expenditures.

As a result, the Cities are opposed to expending funds on non-supported penalties. The Cities also support the premise that if public funds must be expended, it is best to expend these funds locally where the paying public may best benefit from the expenditures.

6.0 RECOMMENDED ASSESSMENT OF CIVIL LIABILITY

The Cities have reviewed State Board Policy, pertinent sections of the California Water Code, and past actions of the San Diego Regional Water Quality Control Board and do not believe that an ACL is warranted for the discharge of sewage associated with the rupture of the 24-inch ductile iron pipe Buena Vista Force Main. This position is largely based on the fact that the rupture of the line was unforeseeable; the Cities exercised due care and were not negligent in their original selection of materials for the pipe, maintenance of the pipe, or response to the discharge. The San Diego Board has previously defended the position that accidental releases barring negligent response are not a cause for assessment without history of negligence on the part of the Dischargers. We believe this case is perfectly consistent with this past precedent.

Notwithstanding the Cities' firm belief that the discharge does not warrant an assessment, it would be erroneous to ignore the fact that the Board may disagree. In such a case, we would argue that any assessment should be based on documented facts and supporting evidence. The assessment should be based on a reasoned and fair application of existing policy and guidance and should carefully weigh past actions to ensure fair treatment, as is the stated policy of the State Board.

In this light, we would argue that an assessment should not exceed that calculated in this document. Specifically, we would request that the proposed assessment be set at a value of the Beneficial Use Liability as the Base Value adjusted by the Discharger Conduct Factors. Based on this analysis, the calculated assessment would be as follows and as consistent with the State Board guidance for calculation of the liability:

ACL	**+**	***Cost Recovery***	**=**	***Total Liability***
$26,257	**+**	***$17,500***	**=**	***$43,757***

I. STATUTORY MAXIMUM AND MINIMUM LIMITS

The ACL must be checked against the statutory maximum and minimum limits to ensure that it is in compliance with the appropriate section of law. The maximum amount for an ACL issued under California Water Code section 13385 is $10,000 for each day in which a violation occurs plus $10 per gallon for amounts discharged but not cleaned up in excess of 1,000 gallons. The statutory maximum amounts for ACLs issued under California Water Code sections 13261, 13350, and 13399.33 are summarized in Table IV-1.

California Water Code section 13385, which applies to discharges regulated pursuant to the CWA, was amended effective January 1, 2000, to state that "At a minimum, liability shall be assessed at a level that recovers the economic benefits, if any, derived from the acts that constitute the violation". Therefore, for such violations occurring on or after January 1, 2000, the minimum amount for an ACL is the economic benefit. For violations subject to mandatory minimum penalties pursuant to California Water Code section 13385 (h) and (i), the Regional Board may choose in its discretion to assess civil liability in addition to the mandatory penalty. In such cases, the total recovered amount must be no less than the mandatory penalty amount or the economic benefit, whichever is greater.

It is the policy of the SWRCB that all ACLs that are not Mandatory Minimum Penalties should be assessed at a level that at a minimum recovers the economic benefit.

SWRCB Enforcement Policy

The recommended rejection of an ACL or the alternative proposed ACL do not violate the statutory maximum or minimum limits established for violations under Section 13350 of the California Water Code. Nor would an assessment of an ACL in the amount of the alternative liability assessment identified above.

7.0 REFERENCES

Appendix A of the ANSI/AWWA C105/A21.5 Standard "Polyethylene Encasement for Ductile-Iron Pipe Systems."

Coastal Environments. 2000. Buena Vista Lagoon Land Management Plan Elements. Lagoon Bathymetry, Water Quality, Biological Analysis, and Soils Analysis. Prepared for Buena Vista Lagoon Foundation.

Everest International Consultants. 2004. Buena Vista Lagoon Restoration Feasibility Study – Final Report June 2004. Prepared for Buena Vista Lagoon Foundation, California Coastal Conservancy, U.S. Fish & Wildlife Service

RWQCB. 1994. Water Quality Control Plan for the San Diego Basin (9). California Regional Water Quality Control Board, San Diego Region.

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Standard Specifications for Public Works Construction (Greenbook) 1982 edition.

Tinney, R. 1990. The Oil Drilling Prohibitions as the Channel Islands and Pr. Reyes – Farallon Islands National Marine Sanctuaries: Some Costs and Benefits. Center for Environmental Education, Washington D.C.

STATE WATER RESOURCES CONTROL BOARD
ORDER NO. 2006-0003-DWQ

STATEWIDE GENERAL WASTE DISCHARGE REQUIREMENTS FOR SANITARY SEWER SYSTEMS

The State Water Resources Control Board, hereinafter referred to as "State Water Board", finds that:

1. All federal and state agencies, municipalities, counties, districts, and other public entities that own or operate sanitary sewer systems greater than one mile in length that collect and/or convey untreated or partially treated wastewater to a publicly owned treatment facility in the State of California are required to comply with the terms of this Order. Such entities are hereinafter referred to as "Enrollees".

2. Sanitary sewer overflows (SSOs) are overflows from sanitary sewer systems of domestic wastewater, as well as industrial and commercial wastewater, depending on the pattern of land uses in the area served by the sanitary sewer system. SSOs often contain high levels of suspended solids, pathogenic organisms, toxic pollutants, nutrients, oxygen-demanding organic compounds, oil and grease and other pollutants. SSOs may cause a public nuisance, particularly when raw untreated wastewater is discharged to areas with high public exposure, such as streets or surface waters used for drinking, fishing, or body contact recreation. SSOs may pollute surface or ground waters, threaten public health, adversely affect aquatic life, and impair the recreational use and aesthetic enjoyment of surface waters.

3. Sanitary sewer systems experience periodic failures resulting in discharges that may affect waters of the state. There are many factors (including factors related to geology, design, construction methods and materials, age of the system, population growth, and system operation and maintenance), which affect the likelihood of an SSO. A proactive approach that requires Enrollees to ensure a system-wide operation, maintenance, and management plan is in place will reduce the number and frequency of SSOs within the state. This approach will in turn decrease the risk to human health and the environment caused by SSOs.

4. Major causes of SSOs include: grease blockages, root blockages, sewer line flood damage, manhole structure failures, vandalism, pump station mechanical failures, power outages, excessive storm or ground water inflow/infiltration, debris blockages, sanitary sewer system age and construction material failures, lack of proper operation and maintenance, insufficient capacity and contractor-caused damages. Many SSOs are preventable with adequate and appropriate facilities, source control measures and operation and maintenance of the sanitary sewer system.

SEWER SYSTEM MANAGEMENT PLANS

5. To facilitate proper funding and management of sanitary sewer systems, each Enrollee must develop and implement a system-specific Sewer System Management Plan (SSMP). To be effective, SSMPs must include provisions to provide proper and efficient management, operation, and maintenance of sanitary sewer systems, while taking into consideration risk management and cost benefit analysis. Additionally, an SSMP must contain a spill response plan that establishes standard procedures for immediate response to an SSO in a manner designed to minimize water quality impacts and potential nuisance conditions.

6. Many local public agencies in California have already developed SSMPs and implemented measures to reduce SSOs. These entities can build upon their existing efforts to establish a comprehensive SSMP consistent with this Order. Others, however, still require technical assistance and, in some cases, funding to improve sanitary sewer system operation and maintenance in order to reduce SSOs.

7. SSMP certification by technically qualified and experienced persons can provide a useful and cost-effective means for ensuring that SSMPs are developed and implemented appropriately.

8. It is the State Water Board's intent to gather additional information on the causes and sources of SSOs to augment existing information and to determine the full extent of SSOs and consequent public health and/or environmental impacts occurring in the State.

9. Both uniform SSO reporting and a centralized statewide electronic database are needed to collect information to allow the State Water Board and Regional Water Quality Control Boards (Regional Water Boards) to effectively analyze the extent of SSOs statewide and their potential impacts on beneficial uses and public health. The monitoring and reporting program required by this Order and the attached Monitoring and Reporting Program No. 2006-0003-DWQ, are necessary to assure compliance with these waste discharge requirements (WDRs).

10. Information regarding SSOs must be provided to Regional Water Boards and other regulatory agencies in a timely manner and be made available to the public in a complete, concise, and timely fashion.

11. Some Regional Water Boards have issued WDRs or WDRs that serve as National Pollution Discharge Elimination System (NPDES) permits to sanitary sewer system owners/operators within their jurisdictions. This Order establishes minimum requirements to prevent SSOs. Although it is the State Water Board's intent that this Order be the primary regulatory mechanism for sanitary sewer systems statewide, Regional Water Boards may issue more stringent or more

prescriptive WDRs for sanitary sewer systems. Upon issuance or reissuance of a Regional Water Board's WDRs for a system subject to this Order, the Regional Water Board shall coordinate its requirements with stated requirements within this Order, to identify requirements that are more stringent, to remove requirements that are less stringent than this Order, and to provide consistency in reporting.

REGULATORY CONSIDERATIONS

12. California Water Code section 13263 provides that the State Water Board may prescribe general WDRs for a category of discharges if the State Water Board finds or determines that:

    - The discharges are produced by the same or similar operations;
    - The discharges involve the same or similar types of waste;
    - The discharges require the same or similar treatment standards; and
    - The discharges are more appropriately regulated under general discharge requirements than individual discharge requirements.

    This Order establishes requirements for a class of operations, facilities, and discharges that are similar throughout the state.

13. The issuance of general WDRs to the Enrollees will:
    a) Reduce the administrative burden of issuing individual WDRs to each Enrollee;
    b) Provide for a unified statewide approach for the reporting and database tracking of SSOs;
    c) Establish consistent and uniform requirements for SSMP development and implementation;
    d) Provide statewide consistency in reporting; and
    e) Facilitate consistent enforcement for violations.

14. The beneficial uses of surface waters that can be impaired by SSOs include, but are not limited to, aquatic life, drinking water supply, body contact and non-contact recreation, and aesthetics. The beneficial uses of ground water that can be impaired include, but are not limited to, drinking water and agricultural supply. Surface and ground waters throughout the state support these uses to varying degrees.

15. The implementation of requirements set forth in this Order will ensure the reasonable protection of past, present, and probable future beneficial uses of water and the prevention of nuisance. The requirements implement the water quality control plans (Basin Plans) for each region and take into account the environmental characteristics of hydrographic units within the state. Additionally, the State Water Board has considered water quality conditions that could reasonably be achieved through the coordinated control of all factors that affect

water quality in the area, costs associated with compliance with these requirements, the need for developing housing within California, and the need to develop and use recycled water.

16. The Federal Clean Water Act largely prohibits any discharge of pollutants from a point source to waters of the United States except as authorized under an NPDES permit. In general, any point source discharge of sewage effluent to waters of the United States must comply with technology-based, secondary treatment standards, at a minimum, and any more stringent requirements necessary to meet applicable water quality standards and other requirements. Hence, the unpermitted discharge of wastewater from a sanitary sewer system to waters of the United States is illegal under the Clean Water Act. In addition, many Basin Plans adopted by the Regional Water Boards contain discharge prohibitions that apply to the discharge of untreated or partially treated wastewater. Finally, the California Water Code generally prohibits the discharge of waste to land prior to the filing of any required report of waste discharge and the subsequent issuance of either WDRs or a waiver of WDRs.

17. California Water Code section 13263 requires a water board to, after any necessary hearing, prescribe requirements as to the nature of any proposed discharge, existing discharge, or material change in an existing discharge. The requirements shall, among other things, take into consideration the need to prevent nuisance.

18. California Water Code section 13050, subdivision (m), defines nuisance as anything which meets all of the following requirements:
    a. Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property.
    b. Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal.
    c. Occurs during, or as a result of, the treatment or disposal of wastes.

19. This Order is consistent with State Water Board Resolution No. 68-16 (Statement of Policy with Respect to Maintaining High Quality of Waters in California) in that the Order imposes conditions to prevent impacts to water quality, does not allow the degradation of water quality, will not unreasonably affect beneficial uses of water, and will not result in water quality less than prescribed in State Water Board or Regional Water Board plans and policies.

20. The action to adopt this General Order is exempt from the California Environmental Quality Act (Public Resources Code §21000 et seq.) because it is an action taken by a regulatory agency to assure the protection of the environment and the regulatory process involves procedures for protection of the environment. (Cal. Code Regs., tit. 14, §15308). In addition, the action to adopt

this Order is exempt from CEQA pursuant to Cal.Code Regs., title 14, §15301 to the extent that it applies to existing sanitary sewer collection systems that constitute "existing facilities" as that term is used in Section 15301, and §15302, to the extent that it results in the repair or replacement of existing systems involving negligible or no expansion of capacity.

21. The Fact Sheet, which is incorporated by reference in the Order, contains supplemental information that was also considered in establishing these requirements.

22. The State Water Board has notified all affected public agencies and all known interested persons of the intent to prescribe general WDRs that require Enrollees to develop SSMPs and to report all SSOs.

23. The State Water Board conducted a public hearing on February 8, 2006, to receive oral and written comments on the draft order. The State Water Board received and considered, at its May 2, 2006, meeting, additional public comments on substantial changes made to the proposed general WDRs following the February 8, 2006, public hearing. The State Water Board has considered all comments pertaining to the proposed general WDRs.

IT IS HEREBY ORDERED, that pursuant to California Water Code section 13263, the Enrollees, their agents, successors, and assigns, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted hereunder, shall comply with the following:

A. DEFINITIONS

1. **Sanitary sewer overflow (SSO)** - Any overflow, spill, release, discharge or diversion of untreated or partially treated wastewater from a sanitary sewer system. SSOs include:
   (i) Overflows or releases of untreated or partially treated wastewater that reach waters of the United States;
   (ii) Overflows or releases of untreated or partially treated wastewater that do not reach waters of the United States; and
   (iii) Wastewater backups into buildings and on private property that are caused by blockages or flow conditions within the publicly owned portion of a sanitary sewer system.

2. **Sanitary sewer system** – Any system of pipes, pump stations, sewer lines, or other conveyances, upstream of a wastewater treatment plant headworks used to collect and convey wastewater to the publicly owned treatment facility. Temporary storage and conveyance facilities (such as vaults, temporary piping, construction trenches, wet wells, impoundments, tanks, etc.) are considered to be part of the sanitary sewer system, and discharges into these temporary storage facilities are not considered to be SSOs.

For purposes of this Order, sanitary sewer systems include only those systems owned by public agencies that are comprised of more than one mile of pipes or sewer lines.

3. **Enrollee** - A federal or state agency, municipality, county, district, and other public entity that owns or operates a sanitary sewer system, as defined in the general WDRs, and that has submitted a complete and approved application for coverage under this Order.

4. **SSO Reporting System** – Online spill reporting system that is hosted, controlled, and maintained by the State Water Board. The web address for this site is http://ciwqs.waterboards.ca.gov. This online database is maintained on a secure site and is controlled by unique usernames and passwords.

5. **Untreated or partially treated wastewater** – Any volume of waste discharged from the sanitary sewer system upstream of a wastewater treatment plant headworks.

6. **Satellite collection system** – The portion, if any, of a sanitary sewer system owned or operated by a different public agency than the agency that owns and operates the wastewater treatment facility to which the sanitary sewer system is tributary.

7. **Nuisance** - California Water Code section 13050, subdivision (m), defines nuisance as anything which meets all of the following requirements:
    a. Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property.
    b. Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal.
    c. Occurs during, or as a result of, the treatment or disposal of wastes.

B. APPLICATION REQUIREMENTS

1. Deadlines for Application – All public agencies that currently own or operate sanitary sewer systems within the State of California must apply for coverage under the general WDRs within six (6) months of the date of adoption of the general WDRs. Additionally, public agencies that acquire or assume responsibility for operating sanitary sewer systems after the date of adoption of this Order must apply for coverage under the general WDRs at least three (3) months prior to operation of those facilities.

2. Applications under the general WDRs – In order to apply for coverage pursuant to the general WDRs, a legally authorized representative for each agency must submit a complete application package. Within sixty (60) days of adoption of the general WDRs, State Water Board staff will send specific instructions on how to

apply for coverage under the general WDRs to all known public agencies that own sanitary sewer systems. Agencies that do not receive notice may obtain applications and instructions online on the Water Board's website.

3. Coverage under the general WDRs – Permit coverage will be in effect once a complete application package has been submitted and approved by the State Water Board's Division of Water Quality.

C. PROHIBITIONS

1. Any SSO that results in a discharge of untreated or partially treated wastewater to waters of the United States is prohibited.

2. Any SSO that results in a discharge of untreated or partially treated wastewater that creates a nuisance as defined in California Water Code Section 13050(m) is prohibited.

D. PROVISIONS

1. The Enrollee must comply with all conditions of this Order. Any noncompliance with this Order constitutes a violation of the California Water Code and is grounds for enforcement action.

2. It is the intent of the State Water Board that sanitary sewer systems be regulated in a manner consistent with the general WDRs. Nothing in the general WDRs shall be:

    (i) Interpreted or applied in a manner inconsistent with the Federal Clean Water Act, or supersede a more specific or more stringent state or federal requirement in an existing permit, regulation, or administrative/judicial order or Consent Decree;
    (ii) Interpreted or applied to authorize an SSO that is illegal under either the Clean Water Act, an applicable Basin Plan prohibition or water quality standard, or the California Water Code;
    (iii) Interpreted or applied to prohibit a Regional Water Board from issuing an individual NPDES permit or WDR, superseding this general WDR, for a sanitary sewer system, authorized under the Clean Water Act or California Water Code; or
    (iv) Interpreted or applied to supersede any more specific or more stringent WDRs or enforcement order issued by a Regional Water Board.

3. The Enrollee shall take all feasible steps to eliminate SSOs. In the event that an SSO does occur, the Enrollee shall take all feasible steps to contain and mitigate the impacts of an SSO.

4. In the event of an SSO, the Enrollee shall take all feasible steps to prevent untreated or partially treated wastewater from discharging from storm drains into

flood control channels or waters of the United States by blocking the storm drainage system and by removing the wastewater from the storm drains.

5. All SSOs must be reported in accordance with Section G of the general WDRs.

6. In any enforcement action, the State and/or Regional Water Boards will consider the appropriate factors under the duly adopted State Water Board Enforcement Policy. And, consistent with the Enforcement Policy, the State and/or Regional Water Boards must consider the Enrollee's efforts to contain, control, and mitigate SSOs when considering the California Water Code Section 13327 factors. In assessing these factors, the State and/or Regional Water Boards will also consider whether:

   (i) The Enrollee has complied with the requirements of this Order, including requirements for reporting and developing and implementing a SSMP;

   (ii) The Enrollee can identify the cause or likely cause of the discharge event;

   (iii) There were no feasible alternatives to the discharge, such as temporary storage or retention of untreated wastewater, reduction of inflow and infiltration, use of adequate backup equipment, collecting and hauling of untreated wastewater to a treatment facility, or an increase in the capacity of the system as necessary to contain the design storm event identified in the SSMP. It is inappropriate to consider the lack of feasible alternatives, if the Enrollee does not implement a periodic or continuing process to identify and correct problems.

   (iv) The discharge was exceptional, unintentional, temporary, and caused by factors beyond the reasonable control of the Enrollee;

   (v) The discharge could have been prevented by the exercise of reasonable control described in a certified SSMP for:
   - Proper management, operation and maintenance;
   - Adequate treatment facilities, sanitary sewer system facilities, and/or components with an appropriate design capacity, to reasonably prevent SSOs (e.g., adequately enlarging treatment or collection facilities to accommodate growth, infiltration and inflow (I/I), etc.);
   - Preventive maintenance (including cleaning and fats, oils, and grease (FOG) control);
   - Installation of adequate backup equipment; and
   - Inflow and infiltration prevention and control to the extent practicable.

   (vi) The sanitary sewer system design capacity is appropriate to reasonably prevent SSOs.

(vii) The Enrollee took all reasonable steps to stop and mitigate the impact of the discharge as soon as possible.

7. When a sanitary sewer overflow occurs, the Enrollee shall take all feasible steps and necessary remedial actions to 1) control or limit the volume of untreated or partially treated wastewater discharged, 2) terminate the discharge, and 3) recover as much of the wastewater discharged as possible for proper disposal, including any wash down water.

   The Enrollee shall implement all remedial actions to the extent they may be applicable to the discharge and not inconsistent with an emergency response plan, including the following:

   (i) Interception and rerouting of untreated or partially treated wastewater flows around the wastewater line failure;
   (ii) Vacuum truck recovery of sanitary sewer overflows and wash down water;
   (iii) Cleanup of debris at the overflow site;
   (iv) System modifications to prevent another SSO at the same location;
   (v) Adequate sampling to determine the nature and impact of the release; and
   (vi) Adequate public notification to protect the public from exposure to the SSO.

8. The Enrollee shall properly, manage, operate, and maintain all parts of the sanitary sewer system owned or operated by the Enrollee, and shall ensure that the system operators (including employees, contractors, or other agents) are adequately trained and possess adequate knowledge, skills, and abilities.

9. The Enrollee shall allocate adequate resources for the operation, maintenance, and repair of its sanitary sewer system, by establishing a proper rate structure, accounting mechanisms, and auditing procedures to ensure an adequate measure of revenues and expenditures. These procedures must be in compliance with applicable laws and regulations and comply with generally acceptable accounting practices.

10. The Enrollee shall provide adequate capacity to convey base flows and peak flows, including flows related to wet weather events. Capacity shall meet or exceed the design criteria as defined in the Enrollee's System Evaluation and Capacity Assurance Plan for all parts of the sanitary sewer system owned or operated by the Enrollee.

11. The Enrollee shall develop and implement a written Sewer System Management Plan (SSMP) and make it available to the State and/or Regional Water Board upon request. A copy of this document must be publicly available at the Enrollee's office and/or available on the Internet. This SSMP must be approved by the Enrollee's governing board at a public meeting.

12. In accordance with the California Business and Professions Code sections 6735, 7835, and 7835.1, all engineering and geologic evaluations and judgments shall be performed by or under the direction of registered professionals competent and proficient in the fields pertinent to the required activities. Specific elements of the SSMP that require professional evaluation and judgments shall be prepared by or under the direction of appropriately qualified professionals, and shall bear the professional(s)' signature and stamp.

13. The mandatory elements of the SSMP are specified below. However, if the Enrollee believes that any element of this section is not appropriate or applicable to the Enrollee's sanitary sewer system, the SSMP program does not need to address that element. The Enrollee must justify why that element is not applicable. The SSMP must be approved by the deadlines listed in the SSMP Time Schedule below.

Sewer System Management Plan (SSMP)

(i) **Goal**: The goal of the SSMP is to provide a plan and schedule to properly manage, operate, and maintain all parts of the sanitary sewer system. This will help reduce and prevent SSOs, as well as mitigate any SSOs that do occur.

(ii) **Organization**: The SSMP must identify:

(a) The name of the responsible or authorized representative as described in Section J of this Order.

(b) The names and telephone numbers for management, administrative, and maintenance positions responsible for implementing specific measures in the SSMP program. The SSMP must identify lines of authority through an organization chart or similar document with a narrative explanation; and

(c) The chain of communication for reporting SSOs, from receipt of a complaint or other information, including the person responsible for reporting SSOs to the State and Regional Water Board and other agencies if applicable (such as County Health Officer, County Environmental Health Agency, Regional Water Board, and/or State Office of Emergency Services (OES)).

(iii) **Legal Authority:** Each Enrollee must demonstrate, through sanitary sewer system use ordinances, service agreements, or other legally binding procedures, that it possesses the necessary legal authority to:

(a) Prevent illicit discharges into its sanitary sewer system (examples may include I/I, stormwater, chemical dumping, unauthorized debris and cut roots, etc.);

(b) Require that sewers and connections be properly designed and constructed;

(c) Ensure access for maintenance, inspection, or repairs for portions of the lateral owned or maintained by the Public Agency;

(d) Limit the discharge of fats, oils, and grease and other debris that may cause blockages, and

(e) Enforce any violation of its sewer ordinances.

(iv) **Operation and Maintenance Program**. The SSMP must include those elements listed below that are appropriate and applicable to the Enrollee's system:

(a) Maintain an up-to-date map of the sanitary sewer system, showing all gravity line segments and manholes, pumping facilities, pressure pipes and valves, and applicable stormwater conveyance facilities;

(b) Describe routine preventive operation and maintenance activities by staff and contractors, including a system for scheduling regular maintenance and cleaning of the sanitary sewer system with more frequent cleaning and maintenance targeted at known problem areas. The Preventative Maintenance (PM) program should have a system to document scheduled and conducted activities, such as work orders;

(c) Develop a rehabilitation and replacement plan to identify and prioritize system deficiencies and implement short-term and long-term rehabilitation actions to address each deficiency. The program should include regular visual and TV inspections of manholes and sewer pipes, and a system for ranking the condition of sewer pipes and scheduling rehabilitation. Rehabilitation and replacement should focus on sewer pipes that are at risk of collapse or prone to more frequent blockages due to pipe defects. Finally, the rehabilitation and replacement plan should include a capital improvement plan that addresses proper management and protection of the infrastructure assets. The plan shall include a time schedule for implementing the short- and long-term plans plus a schedule for developing the funds needed for the capital improvement plan;

(d) Provide training on a regular basis for staff in sanitary sewer system operations and maintenance, and require contractors to be appropriately trained; and

(e) Provide equipment and replacement part inventories, including identification of critical replacement parts.

(v) **Design and Performance Provisions**:

(a) Design and construction standards and specifications for the installation of new sanitary sewer systems, pump stations and other appurtenances; and for the rehabilitation and repair of existing sanitary sewer systems; and

(b) Procedures and standards for inspecting and testing the installation of new sewers, pumps, and other appurtenances and for rehabilitation and repair projects.

(vi) **Overflow Emergency Response Plan -** Each Enrollee shall develop and implement an overflow emergency response plan that identifies measures to protect public health and the environment. At a minimum, this plan must include the following:

(a) Proper notification procedures so that the primary responders and regulatory agencies are informed of all SSOs in a timely manner;

(b) A program to ensure an appropriate response to all overflows;

(c) Procedures to ensure prompt notification to appropriate regulatory agencies and other potentially affected entities (e.g. health agencies, Regional Water Boards, water suppliers, etc.) of all SSOs that potentially affect public health or reach the waters of the State in accordance with the MRP. All SSOs shall be reported in accordance with this MRP, the California Water Code, other State Law, and other applicable Regional Water Board WDRs or NPDES permit requirements. The SSMP should identify the officials who will receive immediate notification;

(d) Procedures to ensure that appropriate staff and contractor personnel are aware of and follow the Emergency Response Plan and are appropriately trained;

(e) Procedures to address emergency operations, such as traffic and crowd control and other necessary response activities; and

(f) A program to ensure that all reasonable steps are taken to contain and prevent the discharge of untreated and partially treated wastewater to waters of the United States and to minimize or correct any adverse impact on the environment resulting from the SSOs, including such accelerated or additional monitoring as may be necessary to determine the nature and impact of the discharge.

(vii) **FOG Control Program:** Each Enrollee shall evaluate its service area to determine whether a FOG control program is needed. If an Enrollee determines that a FOG program is not needed, the Enrollee must provide justification for why it is not needed. If FOG is found to be a problem, the Enrollee must prepare and implement a FOG source control program to reduce the amount of these substances discharged to the sanitary sewer system. This plan shall include the following as appropriate:

(a) An implementation plan and schedule for a public education outreach program that promotes proper disposal of FOG;

(b) A plan and schedule for the disposal of FOG generated within the sanitary sewer system service area. This may include a list of acceptable disposal facilities and/or additional facilities needed to adequately dispose of FOG generated within a sanitary sewer system service area;

(c) The legal authority to prohibit discharges to the system and identify measures to prevent SSOs and blockages caused by FOG;

(d) Requirements to install grease removal devices (such as traps or interceptors), design standards for the removal devices, maintenance requirements, BMP requirements, record keeping and reporting requirements;

(e) Authority to inspect grease producing facilities, enforcement authorities, and whether the Enrollee has sufficient staff to inspect and enforce the FOG ordinance;

(f) An identification of sanitary sewer system sections subject to FOG blockages and establishment of a cleaning maintenance schedule for each section; and

(g) Development and implementation of source control measures for all sources of FOG discharged to the sanitary sewer system for each section identified in (f) above.

(viii) **System Evaluation and Capacity Assurance Plan**: The Enrollee shall prepare and implement a capital improvement plan (CIP) that will provide hydraulic capacity of key sanitary sewer system elements for dry weather peak flow conditions, as well as the appropriate design storm or wet weather event. At a minimum, the plan must include:

(a) **Evaluation**: Actions needed to evaluate those portions of the sanitary sewer system that are experiencing or contributing to an SSO discharge caused by hydraulic deficiency. The evaluation must provide estimates of peak flows (including flows from SSOs

that escape from the system) associated with conditions similar to those causing overflow events, estimates of the capacity of key system components, hydraulic deficiencies (including components of the system with limiting capacity) and the major sources that contribute to the peak flows associated with overflow events;

(b) **Design Criteria:** Where design criteria do not exist or are deficient, undertake the evaluation identified in (a) above to establish appropriate design criteria; and

(c) **Capacity Enhancement Measures:** The steps needed to establish a short- and long-term CIP to address identified hydraulic deficiencies, including prioritization, alternatives analysis, and schedules. The CIP may include increases in pipe size, I/I reduction programs, increases and redundancy in pumping capacity, and storage facilities. The CIP shall include an implementation schedule and shall identify sources of funding.

(d) **Schedule:** The Enrollee shall develop a schedule of completion dates for all portions of the capital improvement program developed in (a)-(c) above. This schedule shall be reviewed and updated consistent with the SSMP review and update requirements as described in Section D. 14.

(ix) **Monitoring, Measurement, and Program Modifications:** The Enrollee shall:

(a) Maintain relevant information that can be used to establish and prioritize appropriate SSMP activities;

(b) Monitor the implementation and, where appropriate, measure the effectiveness of each element of the SSMP;

(c) Assess the success of the preventative maintenance program;

(d) Update program elements, as appropriate, based on monitoring or performance evaluations; and

(e) Identify and illustrate SSO trends, including: frequency, location, and volume.

(x) **SSMP Program Audits** - As part of the SSMP, the Enrollee shall conduct periodic internal audits, appropriate to the size of the system and the number of SSOs. At a minimum, these audits must occur every two years and a report must be prepared and kept on file. This audit shall focus on evaluating the effectiveness of the SSMP and the

Enrollee's compliance with the SSMP requirements identified in this subsection (D.13), including identification of any deficiencies in the SSMP and steps to correct them.

(xi) **Communication Program** – The Enrollee shall communicate on a regular basis with the public on the development, implementation, and performance of its SSMP. The communication system shall provide the public the opportunity to provide input to the Enrollee as the program is developed and implemented.

The Enrollee shall also create a plan of communication with systems that are tributary and/or satellite to the Enrollee's sanitary sewer system.

14. Both the SSMP and the Enrollee's program to implement the SSMP must be certified by the Enrollee to be in compliance with the requirements set forth above and must be presented to the Enrollee's governing board for approval at a public meeting. The Enrollee shall certify that the SSMP, and subparts thereof, are in compliance with the general WDRs within the time frames identified in the time schedule provided in subsection D.15, below.

    In order to complete this certification, the Enrollee's authorized representative must complete the certification portion in the Online SSO Database Questionnaire by checking the appropriate milestone box, printing and signing the automated form, and sending the form to:

    State Water Resources Control Board
    Division of Water Quality
    Attn: SSO Program Manager
    P.O. Box 100
    Sacramento, CA 95812

    The SSMP must be updated every five (5) years, and must include any significant program changes. Re-certification by the governing board of the Enrollee is required in accordance with D.14 when significant updates to the SSMP are made. To complete the re-certification process, the Enrollee shall enter the data in the Online SSO Database and mail the form to the State Water Board, as described above.

15. The Enrollee shall comply with these requirements according to the following schedule. This time schedule does not supersede existing requirements or time schedules associated with other permits or regulatory requirements.

Sewer System Management Plan Time Schedule

Task and Associated Section	**Completion Date**			
	Population > 100,000	Population between 100,000 and 10,000	Population between 10,000 and 2,500	Population < 2,500
Application for Permit Coverage ***Section C***	6 months after WDRs Adoption			
Reporting Program ***Section G***	6 months after WDRs Adoption[1]			
SSMP Development Plan and Schedule ***No specific Section***	9 months after WDRs Adoption[2]	12 months after WDRs Adoption[2]	15 months after WDRs Adoption[2]	18 months after WDRs Adoption[2]
Goals and Organization Structure ***Section D 13 (i) & (ii)***	12 months after WDRs Adoption[2]		18 months after WDRs Adoption[2]	
Overflow Emergency Response Program ***Section D 13 (vi)***	24 months after WDRs Adoption[2]	30 months after WDRs Adoption[2]	36 months after WDRs Adoption[2]	39 months after WDRs Adoption[2]
Legal Authority ***Section D 13 (iii)***				
Operation and Maintenance Program ***Section D 13 (iv)***				
Grease Control Program ***Section D 13 (vii)***				
Design and Performance ***Section D 13 (v)***	36 months after WDRs Adoption	39 months after WDRs Adoption	48 months after WDRs Adoption	51 months after WDRs Adoption
System Evaluation and Capacity Assurance Plan ***Section D 13 (viii)***				
Final SSMP, incorporating all of the SSMP requirements ***Section D 13***				

1. In the event that by July 1, 2006 the Executive Director is able to execute a memorandum of agreement (MOA) with the California Water Environment Association (CWEA) or discharger representatives outlining a strategy and time schedule for CWEA or another entity to provide statewide training on the adopted monitoring program, SSO database electronic reporting, and SSMP development, consistent with this Order, then the schedule of Reporting Program Section G shall be replaced with the following schedule:

Reporting Program ***Section G***	
Regional Boards 4, 8, and 9	8 months after WDRs Adoption
Regional Boards 1, 2, and 3	12 months after WDRs Adoption
Regional Boards 5, 6, and 7	16 months after WDRs Adoption

If this MOU is not executed by July 1, 2006, the reporting program time schedule will remain six (6) months for all regions and agency size categories.

2. In the event that the Executive Director executes the MOA identified in note 1 by July 1, 2006, then the deadline for this task shall be extended by six (6) months. The time schedule identified in the MOA must be consistent with the extended time schedule provided by this note. If the MOA is not executed by July 1, 2006, the six (6) month time extension will not be granted.

E. WDRs and SSMP AVAILABILITY

1. A copy of the general WDRs and the certified SSMP shall be maintained at appropriate locations (such as the Enrollee's offices, facilities, and/or Internet homepage) and shall be available to sanitary sewer system operating and maintenance personnel at all times.

F. ENTRY AND INSPECTION

1. The Enrollee shall allow the State or Regional Water Boards or their authorized representative, upon presentation of credentials and other documents as may be required by law, to:

    a. Enter upon the Enrollee's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Order;

    b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order;

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and

d. Sample or monitor at reasonable times, for the purposes of assuring compliance with this Order or as otherwise authorized by the California Water Code, any substances or parameters at any location.

G. GENERAL MONITORING AND REPORTING REQUIREMENTS

1. The Enrollee shall furnish to the State or Regional Water Board, within a reasonable time, any information that the State or Regional Water Board may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order. The Enrollee shall also furnish to the Executive Director of the State Water Board or Executive Officer of the applicable Regional Water Board, upon request, copies of records required to be kept by this Order.

2. The Enrollee shall comply with the attached Monitoring and Reporting Program No. 2006-0003 and future revisions thereto, as specified by the Executive Director. Monitoring results shall be reported at the intervals specified in Monitoring and Reporting Program No. 2006-0003. Unless superseded by a specific enforcement Order for a specific Enrollee, these reporting requirements are intended to replace other mandatory routine written reports associated with SSOs.

3. All Enrollees must obtain SSO Database accounts and receive a “Username” and “Password” by registering through the California Integrated Water Quality System (CIWQS). These accounts will allow controlled and secure entry into the SSO Database. Additionally, within 30days of receiving an account and prior to recording spills into the SSO Database, all Enrollees must complete the “Collection System Questionnaire”, which collects pertinent information regarding a Enrollee’s collection system. The “Collection System Questionnaire” must be updated at least every 12 months.

4. Pursuant to Health and Safety Code section 5411.5, any person who, without regard to intent or negligence, causes or permits any untreated wastewater or other waste to be discharged in or on any waters of the State, or discharged in or deposited where it is, or probably will be, discharged in or on any surface waters of the State, as soon as that person has knowledge of the discharge, shall immediately notify the local health officer of the discharge. Discharges of untreated or partially treated wastewater to storm drains and drainage channels, whether man-made or natural or concrete-lined, shall be reported as required above.

   Any SSO greater than 1,000 gallons discharged in or on any waters of the State, or discharged in or deposited where it is, or probably will be, discharged in or on any surface waters of the State shall also be reported to the Office of Emergency Services pursuant to California Water Code section 13271.

H. CHANGE IN OWNERSHIP

1. This Order is not transferable to any person or party, except after notice to the Executive Director. The Enrollee shall submit this notice in writing at least 30 days in advance of any proposed transfer. The notice must include a written agreement between the existing and new Enrollee containing a specific date for the transfer of this Order's responsibility and coverage between the existing Enrollee and the new Enrollee. This agreement shall include an acknowledgement that the existing Enrollee is liable for violations up to the transfer date and that the new Enrollee is liable from the transfer date forward.

I. INCOMPLETE REPORTS

1. If an Enrollee becomes aware that it failed to submit any relevant facts in any report required under this Order, the Enrollee shall promptly submit such facts or information by formally amending the report in the Online SSO Database.

J. REPORT DECLARATION

1. All applications, reports, or information shall be signed and certified as follows:

    (i) All reports required by this Order and other information required by the State or Regional Water Board shall be signed and certified by a person designated, for a municipality, state, federal or other public agency, as either a principal executive officer or ranking elected official, or by a duly authorized representative of that person, as described in paragraph (ii) of this provision. (For purposes of electronic reporting, an electronic signature and accompanying certification, which is in compliance with the Online SSO database procedures, meet this certification requirement.)

    (ii) An individual is a duly authorized representative only if:

        (a) The authorization is made in writing by a person described in paragraph (i) of this provision; and

        (b) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity.

K. CIVIL MONETARY REMEDIES FOR DISCHARGE VIOLATIONS

1. The California Water Code provides various enforcement options, including civil monetary remedies, for violations of this Order.

2. The California Water Code also provides that any person failing or refusing to furnish technical or monitoring program reports, as required under this Order, or

falsifying any information provided in the technical or monitoring reports is subject to civil monetary penalties.

L. SEVERABILITY

1. The provisions of this Order are severable, and if any provision of this Order, or the application of any provision of this Order to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this Order, shall not be affected thereby.

2. This order does not convey any property rights of any sort or any exclusive privileges. The requirements prescribed herein do not authorize the commission of any act causing injury to persons or property, nor protect the Enrollee from liability under federal, state or local laws, nor create a vested right for the Enrollee to continue the waste discharge.

CERTIFICATION

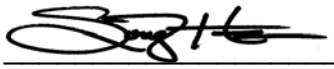
The undersigned Clerk to the State Water Board does hereby certify that the foregoing is a full, true, and correct copy of general WDRs duly and regularly adopted at a meeting of the State Water Resources Control Board held on May 2, 2006.

AYE: Tam M. Doduc
Gerald D. Secundy

NO: Arthur G. Baggett

ABSENT: None

ABSTAIN: None



Song Her
Clerk to the Board

STATE WATER RESOURCES CONTROL BOARD

MONITORING AND REPORTING PROGRAM NO. 2006-0003-DWQ
STATEWIDE GENERAL WASTE DISCHARGE REQUIREMENTS
FOR
SANITARY SEWER SYSTEMS

This Monitoring and Reporting Program (MRP) establishes monitoring, record keeping, reporting and public notification requirements for Order No. 2006-2003-DWQ, "Statewide General Waste Discharge Requirements for Sanitary Sewer Systems." Revisions to this MRP may be made at any time by the Executive Director, and may include a reduction or increase in the monitoring and reporting.

A. SANITARY SEWER OVERFLOW REPORTING

SSO Categories

1. Category 1 - All discharges of sewage resulting from a failure in the Enrollee's sanitary sewer system that:
   A. Equal or exceed 1000 gallons, or
   B. Result in a discharge to a drainage channel and/or surface water; or
   C. Discharge to a storm drainpipe that was not fully captured and returned to the sanitary sewer system.

2. Category 2 – All other discharges of sewage resulting from a failure in the Enrollee's sanitary sewer system.

3. Private Lateral Sewage Discharges – Sewage discharges that are caused by blockages or other problems within a privately owned lateral.

SSO Reporting Timeframes

4. Category 1 SSOs – All SSOs that meet the above criteria for Category 1 SSOs must be reported as soon as: (1) the Enrollee has knowledge of the discharge, (2) reporting is possible, and (3) reporting can be provided without substantially impeding cleanup or other emergency measures. Initial reporting of Category 1 SSOs must be reported to the Online SSO System as soon as possible but no later than 3 business days after the Enrollee is made aware of the SSO. Minimum information that must be contained in the 3-day report must include all information identified in section 9 below, except for item 9.K. A final certified report must be completed through the Online SSO System, within 15 calendar days of the conclusion of SSO response and remediation. Additional information may be added to the certified report, in the form of an attachment, at any time.

   The above reporting requirements do not preclude other emergency notification requirements and timeframes mandated by other regulatory agencies (local

County Health Officers, local Director of Environmental Health, Regional Water Boards, or Office of Emergency Services (OES)) or State law.

5. Category 2 SSOs – All SSOs that meet the above criteria for Category 2 SSOs must be reported to the Online SSO Database within 30 days after the end of the calendar month in which the SSO occurs (e.g. all SSOs occurring in the month of January must be entered into the database by March 1st).

6. Private Lateral Sewage Discharges – All sewage discharges that meet the above criteria for Private Lateral sewage discharges may be reported to the Online SSO Database based upon the Enrollee's discretion. If a Private Lateral sewage discharge is recorded in the SSO Database, the Enrollee must identify the sewage discharge as occurring and caused by a private lateral, and a responsible party (other than the Enrollee) should be identified, if known.

7. If there are no SSOs during the calendar month, the Enrollee will provide, within 30 days after the end of each calendar month, a statement through the Online SSO Database certifying that there were no SSOs for the designated month.

8. In the event that the SSO Online Database is not available, the enrollee must fax all required information to the appropriate Regional Water Board office in accordance with the time schedules identified above. In such event, the Enrollee must also enter all required information into the Online SSO Database as soon as practical.

Mandatory Information to be Included in SSO Online Reporting

All Enrollees must obtain SSO Database accounts and receive a "Username" and "Password" by registering through the California Integrated Water Quality System (CIWQS). These accounts will allow controlled and secure entry into the SSO Database. Additionally, within thirty (30) days of receiving an account and prior to recording SSOs into the SSO Database, all Enrollees must complete the "Collection System Questionnaire", which collects pertinent information regarding an Enrollee's collection system. The "Collection System Questionnaire" must be updated at least every 12 months.

At a minimum, the following mandatory information must be included prior to finalizing and certifying an SSO report for each category of SSO:

9. Category 2 SSOs:

   A. Location of SSO by entering GPS coordinates;
   B. Applicable Regional Water Board, i.e. identify the region in which the SSO occurred;
   C. County where SSO occurred;
   D. Whether or not the SSO entered a drainage channel and/or surface water;
   E. Whether or not the SSO was discharged to a storm drain pipe that was not fully captured and returned to the sanitary sewer system;

F. Estimated SSO volume in gallons;
G. SSO source (manhole, cleanout, etc.);
H. SSO cause (mainline blockage, roots, etc.);
I. Time of SSO notification or discovery;
J. Estimated operator arrival time;
K. SSO destination;
L. Estimated SSO end time; and
M. SSO Certification. Upon SSO Certification, the SSO Database will issue a Final SSO Identification (ID) Number.

10. Private Lateral Sewage Discharges:

A. All information listed above (if applicable and known), as well as;
B. Identification of sewage discharge as a private lateral sewage discharge; and
C. Responsible party contact information (if known).

11. Category 1 SSOs:

A. All information listed for Category 2 SSOs, as well as;
B. Estimated SSO volume that reached surface water, drainage channel, or not recovered from a storm drain;
C. Estimated SSO amount recovered;
D. Response and corrective action taken;
E. If samples were taken, identify which regulatory agencies received sample results (if applicable). If no samples were taken, NA must be selected.
F. Parameters that samples were analyzed for (if applicable);
G. Identification of whether or not health warnings were posted;
H. Beaches impacted (if applicable). If no beach was impacted, NA must be selected;
I. Whether or not there is an ongoing investigation;
J. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the overflow and a schedule of major milestones for those steps;
K. OES control number (if applicable);
L. Date OES was called (if applicable);
M. Time OES was called (if applicable);
N. Identification of whether or not County Health Officers were called;
O. Date County Health Officer was called (if applicable); and
P. Time County Health Officer was called (if applicable).

Reporting to Other Regulatory Agencies

These reporting requirements do not preclude an Enrollee from reporting SSOs to other regulatory agencies pursuant to California state law. These reporting requirements do not replace other Regional Water Board telephone reporting requirements for SSOs.

1. The Enrollee shall report SSOs to OES, in accordance with California Water Code Section 13271.

Office of Emergency Services
Phone (800) 852-7550

2. The Enrollee shall report SSOs to County Health officials in accordance with California Health and Safety Code Section 5410 et seq.

3. The SSO database will automatically generate an e-mail notification with customized information about the SSO upon initial reporting of the SSO and final certification for all Category 1 SSOs. E-mails will be sent to the appropriate County Health Officer and/or Environmental Health Department if the county desires this information, and the appropriate Regional Water Board.

B. Record Keeping

1. Individual SSO records shall be maintained by the Enrollee for a minimum of five years from the date of the SSO. This period may be extended when requested by a Regional Water Board Executive Officer.

3. All records shall be made available for review upon State or Regional Water Board staff's request.

4. All monitoring instruments and devices that are used by the Enrollee to fulfill the prescribed monitoring and reporting program shall be properly maintained and calibrated as necessary to ensure their continued accuracy;

5. The Enrollee shall retain records of all SSOs, such as, but not limited to and when applicable:

   a. Record of Certified report, as submitted to the online SSO database;
   b. All original recordings for continuous monitoring instrumentation;
   c. Service call records and complaint logs of calls received by the Enrollee;
   d. SSO calls;
   e. SSO records;
   f. Steps that have been and will be taken to prevent the SSO from recurring and a schedule to implement those steps.
   g. Work orders, work completed, and any other maintenance records from the previous 5 years which are associated with responses and investigations of system problems related to SSOs;
   h. A list and description of complaints from customers or others from the previous 5 years; and
   i. Documentation of performance and implementation measures for the previous 5 years.

6. If water quality samples are required by an environmental or health regulatory agency or State law, or if voluntary monitoring is conducted by the Enrollee or its agent(s), as a result of any SSO, records of monitoring information shall include:

a. The date, exact place, and time of sampling or measurements;
b. The individual(s) who performed the sampling or measurements;
c. The date(s) analyses were performed;
d. The individual(s) who performed the analyses;
e. The analytical technique or method used; and,
f. The results of such analyses.

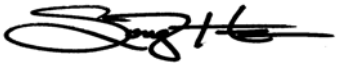
C. Certification

1. All final reports must be certified by an authorized person as required by Provision J of the Order.
2. Registration of authorized individuals, who may certify reports, will be in accordance with the CIWQS' protocols for reporting.

Monitoring and Reporting Program No. 2006-0003 will become effective on the date of adoption by the State Water Board.

CERTIFICATION

The undersigned Clerk to the Board does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Board held on May 2, 2006.



Song Her
Clerk to the Board

GUIDANCE TO IMPLEMENT

THE WATER QUALITY ENFORCEMENT POLICY

April 1996
Amended September 18, 1997

STATE WATER RESOURCES CONTROL BOARD
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

TABLE OF CONTENTS

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GUIDANCE TO IMPLEMENT
THE WATER QUALITY ENFORCEMENT POLICY

This document is intended to clarify the State Water Resources Control Board's (State Water Board's) policy on enforcement and to provide general guidance to the Regional Water Quality Control Boards (Regional Water Boards), their staff, the regulated community and the general public. Statements which appear in ***bold italics*** indicate an actual statement of State Water Board policy intended to be implemented by the State and Regional Water Boards or their staff. The remainder of the document is intended as guidance.

Where the word "should" is used in a policy statement (***bold italics***), it is intended that the State and Regional Water Boards or their staff exercise their discretion, and that they be prepared to justify whatever decision is made or action is taken. Where the word "shall" is used in a policy statement (***bold italics***) requiring that State or Regional Water Board staff act or bring a matter to the attention of their respective Board, it is not intended to mandate that the State or Regional Water Board itself take any enforcement action. Unless otherwise specified, it is intended that the State or Regional Water Boards exercise their discretion in pursuing enforcement actions.

INTRODUCTION

The State Water Board and Regional Water Boards exercise the regulatory and adjudicatory powers of the State of California in the field of water resources. One of these powers is the implementation of statutes and programs to protect the quality of the waters of the State. Timely and consistent enforcement of these laws is critical to the success of the water quality program and to ensure that the people of the State have clean water. ***It is the policy of the State Water Board that enforcement actions throughout the State shall be consistent, predictable, and fair.*** In their review of State and Regional Water Board activities, the External Program Review's Regional Board Consistency Task Force specifically recommended that the State Water Board adopt a statewide enforcement policy that would ensure this.

Enforcement serves many purposes. First and foremost, it assists in keeping the State's waters clean. Swift and sure enforcement orders can prevent threatened pollution from occurring and can promote prompt cleanup and correction of existing pollution problems. It ensures compliance with State and Regional Water Board orders. Enforcement not only protects the public health and the environment, but also creates an "even playing field", ensuring that dischargers who comply with the law are not placed at a competitive disadvantage by those who do not. It will also deter potential violators and, thus, further protect the environment.

Other benefits result from a strong enforcement program. Monetary remedies, an essential component of an effective enforcement program, provide a funding source for needed cleanup projects, provide compensation for the often unquantifiable damage pollution causes the environment, and ensure that polluters do not gain a substantial economic advantage from violations of water quality laws.

The State and Regional Water Boards have a wide array of enforcement options at their disposal. Enforcement actions are available to address many circumstances, including but not limited to the following:

- Violation of an effluent limit, receiving water limit, or discharge prohibition contained in an order or Water Quality Control Plan (Basin Plan) adopted by the State Water Board or a Regional Water Board.

- An unauthorized spill, leak, fill, or other discharge.

- Failure to perform an action required by the State Water Board or a Regional Water Board, such as submittal of a self-monitoring or technical report, or completion of a cleanup task by a specified deadline.

The procedures set forth in this document are not intended to be a substitute for the sound discretion of the State and Regional Water Boards in enforcement matters. Enforcement determinations are complicated decisions based ultimately on experience and professional judgement. Rather, the purpose of this document is to provide a framework within which such decisions may be better made.

In deciding which course of action should be pursued, Regional Water Board staff should consult with their supervisors and with legal counsel assigned to the Regional Water Board. The Regional Water Board's legal counsel is its expert on most aspects of enforcement, including precedents and conformity with existing laws, regulations, and guidance.

It is important to note that enforcement of the State's water quality statutes is not solely the purview of the State and Regional Water Boards and their staff. State law allows for members of the public to bring enforcement matters to attention of the State and Regional Water Boards and authorizes aggrieved persons to petition the State Water Board to review any action or inaction by the Regional Water Board. In addition, the Water Code provides for public participation in the issuance of orders, policies and water quality control plans.

I. DISCOVERY OF VIOLATION

Violation of waste discharge requirements (WDRs), enforcement orders, or applicable provisions of law administered by the State or Regional Water Boards can be discovered through discharger self-monitoring reports (SMRs), compliance inspections, facility reporting, complaints, or file review. Unauthorized discharges, those for which WDRs have not been issued, are most commonly discovered through complaints and interagency notifications .

A. SELF-MONITORING REPORTS

The State and Regional Water Boards ensure compliance with WDRs by requiring all dischargers to implement a monitoring and reporting program and to periodically submit SMRs. Reporting frequency for regulated dischargers will depend on the nature and effect of the discharge. Most dischargers, however, are required to submit SMRs monthly.

B. COMPLIANCE INSPECTIONS

Compliance inspections are conducted on-site by the Regional Water Board staff under the authority provided in Water Code Sections 13267 and 13383. Compliance inspections address compliance with WDRs; laboratory quality control and assurance; record keeping and reporting; time schedules; best management plans; and any other pertinent provisions. The inspections are also used as a verification of the accuracy of the discharger's

SMR. In addition, the U.S. Environmental Protection Agency (USEPA) has authority to inspect facilities which discharge to surface waters.

C. DIRECT FACILITY REPORTING

Dischargers with regulated facilities are generally required to report to the Regional Water Board by phone, usually immediately or within 24 hours, followed by a written report and a discussion in the next SMR, when certain events occur, such as:

- Bypass of raw or partially treated sewage from a treatment unit or discharge of wastewater from a collection system.

- Treatment unit failure or loss of power which threatens to cause a bypass.

- Any other operational problems which threaten to cause significant violations of WDRs or impacts to receiving waters.

D. COMPLAINTS

Often information regarding an actual or potential violation or unauthorized discharge is obtained through telephone or written notification from a member of the public, another public agency or an employee working at a regulated facility. Complaints may also involve nuisance conditions, such as noxious odors that extend beyond a wastewater treatment plant boundary.

E. FILE REVIEW

WDRs frequently mandate completion of tasks, which the dischargers must confirm by submission of appropriate reports to the Regional Water Boards. Failure to submit the reports or to complete the required tasks may be the basis for initiating enforcement.