Section IV - Pesticide Analysis

S.F. Bay Fish Contaminant Study Pesticide Analysis (ppb-ng/g)

IDORG #	STATION NAME	FISH TYPE	SOWEIGHT	SOMOIST	SOLIPID	ALDRIN	CCHLOR	TCHLOR
1234	SAN MATEO BRIDGE	5 White Croaker	2.58	75.34	4.29	-8	4.463	1.763
1235	SAN MATEO BRIDGE	5 White Croaker	2.59	75.9	4.79	-8	4.507	2.229
1236	SAN MATEO BRIDGE	5 White Croaker	2.73	76.38	3.85	-8	2.716	1.441
1237	SAN MATEO BRIDGE	20 Shiner Surf Perch	2.73	80	1.84	-8	1.102	0.454
1238	DUMBARTON BRIDGE	5 White Croaker	2.79	76.34	4.52	-8	4.614	2.056
1239	DUMBARTON BRIDGE	5 White Croaker	2.8	77.34	3.74	-8	2.515	1.464
1240	DUMBARTON BRIDGE	5 White Croaker	2.59	74.9	4.52	-8	3.338	1.729
1241	DUMBARTON BRIDGE	20 Shiner Surf Perch	2.56	79.56	1	-8	1.212	0.519
1242	FREMONT FOREBAY	3 Striped Bass	2.72	76.42	0.87	-8	5.494	2.033
1243	FREMONT FOREBAY	3 Striped Bass	2.51	78.56	1.19	-8	4.781	1.685
1244	FREMONT FOREBAY	3 Striped Bass	2.58	77.74	1.03	-8	4.385	1.46
1245	FREMONT FOREBAY	4 Striped Bass	2.72	78.74	0.81	-8	1.195	0.391
1246	RICHMOND HARBOR	20 Shiner Surf Perch	2.8	81.32	0.89	-8	1.302	0.506
1247	RICHMOND HARBOR	20 Shiner Surf Perch	2.71	80.32	0.87	-8	1.029	0.547
1248	RICHMOND HARBOR	20 Shiner Surf Perch	2.66	78.84	0.83	-8	1.248	0.586
1249	RICHMOND HARBOR	3 Brown Smoothhound Sharks	2.75	77.74	0.3	-8	-8	-8
1250	BERKELEY PIER	20 Shiner Surf Perch	2.83	80.18	0.57	-8	1.124	0.545
1251	BERKELEY PIER	20 Shiner Surf Perch	2.8	80.36	0.67	-8	0.613	0.247
1252	BERKELEY PIER	20 Shiner Surf Perch	2.76	80.5	0.32	-8	0.478	0.207
1253	BERKELEY PIER	3 Brown Smoothhound Sharks	2.7	79.56	0.59	-8	0.229	-8
1254	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	2.73	82.48	0.96	-8	4.608	1.91
1255	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	2.68	81.08	1.13	-8	4.049	2.327
1256	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	2.52	79.48	1.2	-8	4.207	2.586
1257	OAKLAND INNER HAR. (FRUITVALE)	3 Striped Bass	2.51	75.74	1.37	-8	2.693	0.614
1258	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	2.63	76.1	2.92	-8	4.302	2.438
1259	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	2.62	77.94	3.33	-8	2.647	1.326
1260	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	2.58	78.72	3.41	-8	2.66	1.877
1261	DOUBLE ROCK (CANDLESTICK)	20 Shiner Surf Perch	2.62	78.16	1.58	-8	2.708	1.981
1262	ISLAIS CREEK	5 White Croaker	2.61	78.16	2.48	-8	2.861	1.662
1263	ISLAIS CREEK	5 White Croaker	2.95	77.44	2.8	-8	2.662	2.213
1264	ISLAIS CREEK	5 White Croaker	2.66	79.04	1.82	-8	1.377	0.843
1265	ISLAIS CREEK	20 Shiner Surf Perch	2.63	79.46	1.16	-8	1.541	1.074
1266	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	2.73	78.06	3.77	-8	4.52	2.13
1267	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	2.53	77.9	3.23	-8	3.823	2.077
1268	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	2.59	76.86	2.64	-8	3.795	2.249
1269	OAKLAND MIDDLE HARBOR PIER	20 Shiner Surf Perch	2.62	80.12	1.34	-8	1.423	0.618
1270	POINT MOLATE	5 White Croaker	2.54	79.62	2.41	-8	2.975	1.706
1271	POINT MOLATE	5 White Croaker	2.75	76.44	3.04	-8	3.157	1.482
1272	POINT MOLATE	5 White Croaker	2.68	78.34	1.71	-8	2.253	1.115
1273	POINT MOLATE	5 Walleye Surf Perch	2.6	80.04	0.73	-8	0.503	-8
1274	RODEO	5 White Croaker	2.52	77.24	2.03	-8	3.824	1.413
1275	RODEO	5 White Croaker	2.63	82.9	0.69	-8	1.693	0.554
1276	RODEO	5 White Croaker	2.57	78.08	1.87	-8	4.121	1.688
1277	RODEO	3 Leopard Sharks	2.52	78.58	0.46	-8	0.304	-8
1282	SAN FRANCISCO PIER #7	5 White Croaker	2.72	77.28	3.3	-8	3.885	1.624
1283	SAN FRANCISCO PIER #7	5 White Surf Perch	2.64	78.86	0.59	-8	0.395	-8
1284	SAN FRANCISCO PIER #7	5 White Surf Perch	2.54	80.04	0.34	-8	0.373	-8
1285	SAN FRANCISCO PIER #7	5 White Surf Perch	2.54	79.36	0.81	-8	0.4	-8
1286	STRIPED BASS (OAKLAND INNER)	3 Striped Bass	2.55	78	0.82	-8	2.838	0.62
1287	STRIPED BASS (COYOTE POINT)	3 Striped Bass	2.66	76.6	1.98	-8	2.06	0.517
1288	STRIPED BASS (SACRAMENTO. R.)	3 Striped Bass	2.59	80.04	0.46	-8	1.768	0.375
1289	STURGEON (GRIZZLY BAY)	3 Sturgeon	2.56	79.48	2.65	-8	2.75	1.847
1292	SHARK-SOUTH BAY (S.M., COYOTE)	3 Leopard Sharks	2.64	80.08	0.4	-8	0.374	-8
1293	SHARK-SOUTH BAY (COYOTE)	3 Leopard Sharks	2.62	79.72	0.44	-8	0.341	-8
1294	SHARK-SOUTH BAY (COYOTE)	3 Brown Smoothhound Sharks	2.51	80.32	0.35	-8	-8	-8
1295	SHARK-MID BAY (TREASURE IS.)	2 Leopard Sharks	2.66	80.62	0.19	-8	0.859	0.306
1296	SHARK-MID BAY (BERKELEY)	3 Brown Smoothhound Sharks	2.5	82.98	0.33	-8	-8	-8
1297	SHARK-MID BAY (PARADISE)	3 Brown Smoothhound Sharks	2.53	80	0.2	-8	-8	-8
1298	SHARK-NORTH BAY (PT. MOLATE)	3 Leopard Sharks	2.61	80.62	0.39	-8	0.61	0.227
1299	SHARK-NORTH BAY (PT. MOLATE)	3 Brown Smoothhound Sharks	2.57	79.24	0.47	-8	0.581	0.222
1300	SHARK-NORTH BAY (Pt. MOLATE)	3 Brown Smoothhound Sharks	2.52	79.76	0.09	-8	0.484	0.239
1301	HALIBUT-SOUTH BAY (SAN MATEO)	3 Halibut	2.71	78.64	0.17	-8	0.312	-8
1336	VALLEJO-MARE ISLAND	5 White Croaker	2.6	77.2	4.59	-8	8.276	3.26
1337	VALLEJO-MARE ISLAND	5 White Croaker	2.61	75.34	4.53	-8	6.461	2.984
1338	VALLEJO-MARE ISLAND	5 White Croaker	2.55	75.98	5.38	-8	5.044	2.546
1339	VALLEJO-MARE ISLAND	3 Striped Bass	2.61	83.1	0.09	-8	2.501	0.492

S.F. Bay Fish Contaminant Study Pesticide Analysis (ppb-ng/g)

IDORG #	STATION NAME	FISH TYPE	ACDEN	GCDEN	CLPYR	DACTH	OPDDD	PPDDD	OPDDE	PPDDE
1234	SAN MATEO BRIDGE	5 White Croaker	-8	0.326	-8	0.584	2.187	17.829	-8	39.456
1235	SAN MATEO BRIDGE	5 White Croaker	-8	-8	-8	0.557	2.82	15.496	-8	47.718
1236	SAN MATEO BRIDGE	5 White Croaker	-8	-8	-8	0.52	1.774	13.369	-8	17.951
1237	SAN MATEO BRIDGE	20 Shiner Surf Perch	-8	-8	-8	-8	1.032	5.5	-8	18.98
1238	DUMBARTON BRIDGE	5 White Croaker	-8	0.445	-8	0.665	-8	29.102	-8	44.481
1239	DUMBARTON BRIDGE	5 White Croaker	-8	-8	-8	0.73	1.822	10.288	-8	22.66
1240	DUMBARTON BRIDGE	5 White Croaker	-8	-8	-8	0.796	2.131	14.232	-8	26.355
1241	DUMBARTON BRIDGE	20 Shiner Surf Perch	-8	-8	-8	-8	-8	4.395	-8	12.489
1242	FREMONT FOREBAY	3 Striped Bass	-8	1.061	2.48	1.962	1.721	10.776	-8	25.231
1243	FREMONT FOREBAY	3 Striped Bass	-8	0.71	2.444	1.081	1.917	14	-8	24.227
1244	FREMONT FOREBAY	3 Striped Bass	-8	0.757	2.582	1.442	-8	13.178	-8	27.157
1245	FREMONT FOREBAY	4 Striped Bass	-8	-8	2.169	0.617	-8	4.528	-8	10.545
1246	RICHMOND HARBOR	20 Shiner Surf Perch	-8	-8	-8	-8	2.559	20.361	-8	16.196
1247	RICHMOND HARBOR	20 Shiner Surf Perch	-8	-8	-8	-8	4.015	18.106	-8	11.847
1248	RICHMOND HARBOR	20 Shiner Surf Perch	-8	-8	-8	-8	2.264	17.753	-8	11.744
1249	RICHMOND HARBOR	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	0.79	-8	4.919
1250	BERKELEY PIER	20 Shiner Surf Perch	-8	-8	-8	-8	-8	6.501	-8	13.339
1251	BERKELEY PIER	20 Shiner Surf Perch	-8	-8	-8	-8	-8	4.38	-8	9.054
1252	BERKELEY PIER	20 Shiner Surf Perch	-8	-8	-8	-8	-8	3.705	-8	8.444
1253	BERKELEY PIER	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	-8	-8	4.292
1254	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	-8	0.296	-8	-8	1.295	11.861	-8	55.889
1255	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	-8	0.454	-8	-8	1.43	9.895	-8	13.585
1256	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	-8	0.741	-8	-8	1.937	11.163	-8	14.015
1257	OAKLAND INNER HAR. (FRUITVALE)	3 Striped Bass	-8	0.427	-8	-8	1.519	9.17	-8	17.71
1258	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	-8	-8	-8	-8	4.063	21.701	0.868	41.108
1259	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	-8	0.225	-8	-8	1.793	11.493	-8	19.391
1260	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	-8	0.304	-8	-8	2.213	10.853	-8	19.748
1261	DOUBLE ROCK (CANDLESTICK)	20 Shiner Surf Perch	-8	-8	-8	-8	-8	12.34	-8	18.367
1262	ISLAIS CREEK	5 White Croaker	-8	0.227	-8	-8	1.876	14.152	-8	20.792
1263	ISLAIS CREEK	5 White Croaker	-8	-8	-8	-8	1.475	14.032	-8	23.011
1264	ISLAIS CREEK	5 White Croaker	-8	-8	-8	-8	-8	6.77	-8	13.959
1265	ISLAIS CREEK	20 Shiner Surf Perch	-8	-8	-8	-8	-8	6.491	-8	12.262
1266	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	-8	-8	1.022	-8	1.836	22.159	-8	30.277
1267	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	-8	-8	1.456	0.451	1.375	21.106	-8	20.354
1268	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	-8	-8	1.166	-8	1.689	21.196	-8	25.685
1269	OAKLAND MIDDLE HARBOR PIER	20 Shiner Surf Perch	-8	-8	-8	-8	1.932	21.272	-8	18.488
1270	POINT MOLATE	5 White Croaker	-8	-8	-8	-8	1.449	18.342	-8	35.461
1271	POINT MOLATE	5 White Croaker	-8	-8	1.065	-8	1.934	19.013	-8	33.691
1272	POINT MOLATE	5 White Croaker	-8	-8	1.282	-8	1.178	16.397	-8	47.435
1273	POINT MOLATE	5 Walleye Surf Perch	-8	-8	-8	-8	-8	2.914	-8	5.928
1274	RODEO	5 White Croaker	-8	-8	-8	-8	2.595	21.827	-8	38.92
1275	RODEO	5 White Croaker	-8	-8	0.768	-8	1.448	9.405	-8	24.111
1276	RODEO	5 White Croaker	-8	-8	0.993	0.445	-8	16.374	-8	62.691
1277	RODEO	3 Leopard Sharks	-8	-8	-8	-8	-8	-8	-8	3.042
1282	SAN FRANCISCO PIER #7	5 White Croaker	-8	-8	1.029	-8	2.976	19.38	-8	53.619
1283	SAN FRANCISCO PIER #7	5 White Surf Perch	-8	-8	-8	-8	-8	3.023	-8	6.532
1284	SAN FRANCISCO PIER #7	5 White Surf Perch	-8	-8	0.822	-8	-8	2.156	-8	5.729
1285	SAN FRANCISCO PIER #7	5 White Surf Perch	-8	-8	-8	-8	-8	2.559	-8	6.027
1286	STRIPED BASS (OAKLAND INNER)	3 Striped Bass	-8	0.244	-8	-8	-8	9.174	-8	24.2
1287	STRIPED BASS (COYOTE POINT)	3 Striped Bass	-8	-8	-8	0.51	-8	6.716	-8	24.102
1288	STRIPED BASS (SACRAMENTO. R.)	3 Striped Bass	-8	-8	1.076	-8	1.299	9.8	-8	26.746
1289	STURGEON (GRIZZLY BAY)	3 Sturgeon	-8	0.228	1.012	0.614	1.543	15.349	-8	29.549
1292	SHARK-SOUTH BAY (S.M., COYOTE)	3 Leopard Sharks	-8	-8	-8	-8	-8	-8	-8	6.594
1293	SHARK-SOUTH BAY (COYOTE)	3 Leopard Sharks	-8	-8	-8	-8	-8	-8	-8	4.137
1294	SHARK-SOUTH BAY (COYOTE)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	-8	-8	3.011
1295	SHARK-MID BAY (TREASURE IS.)	2 Leopard Sharks	-8	-8	-8	-8	-8	-8	-8	24.031
1296	SHARK-MID BAY (BERKELEY)	3 Brown Smoothhound Sharks	-8	-8	0.722	-8	-8	-8	-8	3.336
1297	SHARK-MID BAY (PARADISE)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	-8	-8	7.22
1298	SHARK-NORTH BAY (PT. MOLATE)	3 Leopard Sharks	-8	-8	-8	-8	-8	1.221	-8	14.981
1299	SHARK-NORTH BAY (PT. MOLATE)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	0.963	-8	13.619
1300	SHARK-NORTH BAY (Pt. MOLATE)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	0.755	-8	10.869
1301	HALIBUT-SOUTH BAY (SAN MATEO)	3 Halibut	-8	-8	-8	-8	-8	0.852	-8	5.126
1336	VALLEJO-MARE ISLAND	5 White Croaker	-8	0.502	-8	0.923	3.671	54.264	-8	89.148
1337	VALLEJO-MARE ISLAND	5 White Croaker	-8	0.409	1.018	1.004	4.414	36.25	-8	80.638
1338	VALLEJO-MARE ISLAND	5 White Croaker	-8	0.442	-8	1.117	2.21	26.422	-8	49.241
1339	VALLEJO-MARE ISLAND	3 Striped Bass	-8	-8	1.462	-8	1.078	10.512	-8	36.335

IDORG #	STATION NAME	FISH TYPE	PPDDMS	PPDDMU	OPDDT	PPDDT	TTLDDT	DICLB	DIELDRIN
1234	SAN MATEO BRIDGE	5 White Croaker	-8	5.77	-8	2.412	62.58	-8	3.28
1235	SAN MATEO BRIDGE	5 White Croaker	-8	6.82	-8	2.531	69.27	-8	3.784
1236	SAN MATEO BRIDGE	5 White Croaker	-8	5.031	1.136	1.065	35.60	-8	1.795
1237	SAN MATEO BRIDGE	20 Shiner Surf Perch	-8	1.268	-8	-8	26.61	-8	1.25
1238	DUMBARTON BRIDGE	5 White Croaker	11.144	8.991	-8	4.141	78.92	-8	3.691
1239	DUMBARTON BRIDGE	5 White Croaker	-8	5.166	-8	1.183	36.65	-8	1.532
1240	DUMBARTON BRIDGE	5 White Croaker	-8	4.769	1.365	1.621	46.00	-8	3.464
1241	DUMBARTON BRIDGE	20 Shiner Surf Perch	-8	1.351	-8	-8	18.48	-8	1.177
1242	FREMONT FOREBAY	3 Striped Bass	5.188	8.347	-8	1.681	40.11	-8	2.971
1243	FREMONT FOREBAY	3 Striped Bass	5.146	3.345	0.913	1.46	42.82	-8	2.423
1244	FREMONT FOREBAY	3 Striped Bass	4.897	7.257	-8	1.291	42.83	-8	1.638
1245	FREMONT FOREBAY	4 Striped Bass	-8	1.193	-8	0.927	17.20	-8	1.072
1246	RICHMOND HARBOR	20 Shiner Surf Perch	4.95	4.016	0.889	2.186	42.49	-8	1.635
1247	RICHMOND HARBOR	20 Shiner Surf Perch	4.015	3.562	-8	2.303	36.97	-8	1.527
1248	RICHMOND HARBOR	20 Shiner Surf Perch	5.1	3.491	-8	1.756	34.22	-8	1.752
1249	RICHMOND HARBOR	3 Brown Smoothhound Sharks	-8	-8	-8	-8	7.31	-8	0.341
1250	BERKELEY PIER	20 Shiner Surf Perch	-8	1.936	-8	-8	21.44	-8	0.86
1251	BERKELEY PIER	20 Shiner Surf Perch	-8	1.055	-8	-8	15.03	-8	-8
1252	BERKELEY PIER	20 Shiner Surf Perch	-8	1.098	-8	-8	13.75	-8	0.632
1253	BERKELEY PIER	3 Brown Smoothhound Sharks	-8	-8	-8	-8	6.19	-8	-8
1254	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	-8	2.978	0.862	2.348	72.56	-8	1.752
1255	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	-8	1.712	-8	1.801	27.41	-8	1.591
1256	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	-8	3.878	-8	1.787	29.60	-8	2.586
1257	OAKLAND INNER HAR. (FRUITVALE)	3 Striped Bass	-8	3.324	-8	1.473	30.57	-8	1.87
1258	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	5.401	7.242	-8	2.51	70.65	-8	3.227
1259	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	-8	3.155	-8	1.606	34.98	-8	1.418
1260	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	-8	4.022	-8	1.192	34.71	-8	2.022
1261	DOUBLE ROCK (CANDLESTICK)	20 Shiner Surf Perch	-8	2.905	-8	0.891	32.80	-8	2.25
1262	ISLAIS CREEK	5 White Croaker	-8	4.761	-8	2.038	39.56	-8	1.433
1263	ISLAIS CREEK	5 White Croaker	-8	4.512	1.415	1.581	41.81	-8	1.139
1264	ISLAIS CREEK	5 White Croaker	-8	2.494	-8	-8	22.33	-8	-8
1265	ISLAIS CREEK	20 Shiner Surf Perch	-8	1.875	-8	-8	20.35	-8	-8
1266	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	-8	7.591	1.492	3.642	59.71	-8	3.598
1267	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	-8	6.276	-8	2.475	46.01	-8	2.807
1268	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	-8	6.873	1.076	2.279	52.23	-8	2.407
1269	OAKLAND MIDDLE HARBOR PIER	20 Shiner Surf Perch	-8	4.95	1.189	4.175	47.36	-8	0.956
1270	POINT MOLATE	5 White Croaker	5.482	6.196	-8	2.486	58.44	-8	2.588
1271	POINT MOLATE	5 White Croaker	-8	5.772	-8	2.568	57.91	-8	2.285
1272	POINT MOLATE	5 White Croaker	-8	5.307	-8	2.967	68.68	-8	1.722
1273	POINT MOLATE	5 Walleye Surf Perch	-8	-8	-8	-8	10.44	-8	0.491
1274	RODEO	5 White Croaker	-8	5.644	-8	3.687	67.73	-8	2.226
1275	RODEO	5 White Croaker	-8	2.77	-8	1.796	37.46	-8	0.92
1276	RODEO	5 White Croaker	-8	6.116	-8	3.178	83.44	-8	1.789
1277	RODEO	3 Leopard Sharks	-8	-8	-8	-8	4.94	-8	-8
1282	SAN FRANCISCO PIER #7	5 White Croaker	-8	7.657	-8	2.954	79.63	-8	2.704
1283	SAN FRANCISCO PIER #7	5 White Surf Perch	-8	-8	-8	-8	11.16	-8	0.577
1284	SAN FRANCISCO PIER #7	5 White Surf Perch	-8	-8	-8	-8	9.49	-8	-8
1285	SAN FRANCISCO PIER #7	5 White Surf Perch	-8	-8	-8	-8	10.19	-8	-8
1286	STRIPED BASS (OAKLAND INNER)	3 Striped Bass	-8	2.354	-8	1.78	36.35	-8	2.31
1287	STRIPED BASS (COYOTE POINT)	3 Striped Bass	-8	2.057	-8	1.182	33.20	-8	1.935
1288	STRIPED BASS (SACRAMENTO. R.)	3 Striped Bass	-8	3.333	-8	2.595	41.14	-8	1.543
1289	STURGEON (GRIZZLY BAY)	3 Sturgeon	-8	2.216	0.868	1.66	49.27	-8	3.057
1292	SHARK-SOUTH BAY (S.M., COYOTE)	3 Leopard Sharks	-8	-8	-8	-8	8.49	-8	-8
1293	SHARK-SOUTH BAY (COYOTE)	3 Leopard Sharks	-8	-8	-8	-8	6.04	-8	-8
1294	SHARK-SOUTH BAY (COYOTE)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	4.91	-8	-8
1295	SHARK-MID BAY (TREASURE IS.)	2 Leopard Sharks	-8	-8	-8	-8	25.93	-8	0.614
1296	SHARK-MID BAY (BERKELEY)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	5.24	-8	-8
1297	SHARK-MID BAY (PARADISE)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	9.12	-8	-8
1298	SHARK-NORTH BAY (PT. MOLATE)	3 Leopard Sharks	-8	-8	-8	-8	17.80	-8	-8
1299	SHARK-NORTH BAY (PT. MOLATE)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	16.18	-8	-8
1300	SHARK-NORTH BAY (Pt. MOLATE)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	13.22	-8	-8
1301	HALIBUT-SOUTH BAY (SAN MATEO)	3 Halibut	-8	-8	-8	-8	7.58	-8	-8
1336	VALLEJO-MARE ISLAND	5 White Croaker	8.732	12.677	1.737	6.886	156.01	-8	4.241
1337	VALLEJO-MARE ISLAND	5 White Croaker	-8	9.198	1.255	5.573	128.43	-8	3.502
1338	VALLEJO-MARE ISLAND	5 White Croaker	8.095	5.981	1.081	3.507	82.76	-8	3.243
1339	VALLEJO-MARE ISLAND	3 Striped Bass	-8	2.856	0.715	2.434	51.37	-8	1.077

S.F. Bay Fish Contaminant Study Pesticide Analysis (ppb-ng/g)

IDORG #	STATION NAME	FISH TYPE	ENDO_I	ENDO_II	ESO4	ENDRIN	HCHA	HCHB	HCHG	HCHD
1234	SAN MATEO BRIDGE	5 White Croaker	-8	-8	-8	-8	0.35	-8	0.298	-8
1235	SAN MATEO BRIDGE	5 White Croaker	-8	-8	-8	-8	1.133	-8	0.376	-8
1236	SAN MATEO BRIDGE	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	-8
1237	SAN MATEO BRIDGE	20 Shiner Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8
1238	DUMBARTON BRIDGE	5 White Croaker	-8	-8	-8	-8	0.613	-8	0.835	-8
1239	DUMBARTON BRIDGE	5 White Croaker	-8	-8	-8	-8	0.301	-8	0.746	-8
1240	DUMBARTON BRIDGE	5 White Croaker	-8	-8	-8	-8	-8	-8	0.517	-8
1241	DUMBARTON BRIDGE	20 Shiner Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8
1242	FREMONT FOREBAY	3 Striped Bass	-8	-8	-8	-8	-8	-8	2.061	-8
1243	FREMONT FOREBAY	3 Striped Bass	-8	-8	-8	-8	-8	-8	1.855	-8
1244	FREMONT FOREBAY	3 Striped Bass	-8	-8	-8	-8	-8	-8	0.922	-8
1245	FREMONT FOREBAY	4 Striped Bass	-8	-8	-8	-8	-8	-8	1.537	-8
1246	RICHMOND HARBOR	20 Shiner Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8
1247	RICHMOND HARBOR	20 Shiner Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8
1248	RICHMOND HARBOR	20 Shiner Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8
1249	RICHMOND HARBOR	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	-8	-8	-8
1250	BERKELEY PIER	20 Shiner Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8
1251	BERKELEY PIER	20 Shiner Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8
1252	BERKELEY PIER	20 Shiner Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8
1253	BERKELEY PIER	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	-8	-8	-8
1254	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8
1255	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8
1256	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8
1257	OAKLAND INNER HAR. (FRUITVALE)	3 Striped Bass	-8	-8	-8	-8	-8	-8	-8	-8
1258	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	-8	-8	-8	-8	0.6	-8	0.609	-8
1259	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	-8	-8	-8	-8	0.585	-8	0.349	-8
1260	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	-8	-8	-8	-8	0.717	-8	-8	-8
1261	DOUBLE ROCK (CANDLESTICK)	20 Shiner Surf Perch	-8	-8	-8	-8	0.273	-8	-8	-8
1262	ISLAIS CREEK	5 White Croaker	-8	-8	-8	-8	0.568	-8	0.234	-8
1263	ISLAIS CREEK	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	-8
1264	ISLAIS CREEK	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	-8
1265	ISLAIS CREEK	20 Shiner Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8
1266	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	-8	-8	-8	-8	0.531	-8	-8	-8
1267	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	-8	-8	-8	-8	0.358	0.723	-8	-8
1268	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	-8	-8	-8	-8	0.278	-8	-8	-8
1269	OAKLAND MIDDLE HARBOR PIER	20 Shiner Surf Perch	-8	-8	-8	-8	0.306	-8	-8	-8
1270	POINT MOLATE	5 White Croaker	-8	-8	-8	-8	0.43	-8	-8	-8
1271	POINT MOLATE	5 White Croaker	-8	-8	-8	-8	0.565	-8	-8	-8
1272	POINT MOLATE	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	-8
1273	POINT MOLATE	5 Walleye Surf Perch	-8	-8	-8	-8	0.371	-8	-8	-8
1274	RODEO	5 White Croaker	-8	-8	-8	-8	0.385	-8	-8	-8
1275	RODEO	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	-8
1276	RODEO	5 White Croaker	-8	-8	-8	-8	0.381	-8	0.272	-8
1277	RODEO	3 Leopard Sharks	-8	-8	-8	-8	-8	-8	-8	-8
1282	SAN FRANCISCO PIER #7	5 White Croaker	-8	-8	-8	-8	0.645	-8	0.373	-8
1283	SAN FRANCISCO PIER #7	5 White Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8
1284	SAN FRANCISCO PIER #7	5 White Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8
1285	SAN FRANCISCO PIER #7	5 White Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8
1286	STRIPED BASS (OAKLAND INNER)	3 Striped Bass	-8	-8	-8	-8	-8	-8	-8	-8
1287	STRIPED BASS (COYOTE POINT)	3 Striped Bass	-8	-8	-8	-8	0.321	-8	0.379	-8
1288	STRIPED BASS (SACRAMENTO. R.)	3 Striped Bass	-8	-8	-8	-8	-8	-8	-8	-8
1289	STURGEON (GRIZZLY BAY)	3 Sturgeon	-8	-8	-8	-8	0.772	-8	0.632	-8
1292	SHARK-SOUTH BAY (S.M., COYOTE)	3 Leopard Sharks	-8	-8	-8	-8	-8	-8	-8	-8
1293	SHARK-SOUTH BAY (COYOTE)	3 Leopard Sharks	-8	-8	-8	-8	-8	-8	-8	-8
1294	SHARK-SOUTH BAY (COYOTE)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	-8	-8	-8
1295	SHARK-MID BAY (TREASURE IS.)	2 Leopard Sharks	-8	-8	-8	-8	-8	-8	-8	-8
1296	SHARK-MID BAY (BERKELEY)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	-8	-8	-8
1297	SHARK-MID BAY (PARADISE)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	-8	-8	-8
1298	SHARK-NORTH BAY (PT. MOLATE)	3 Leopard Sharks	-8	-8	-8	-8	-8	-8	-8	-8
1299	SHARK-NORTH BAY (PT. MOLATE)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	-8	-8	-8
1300	SHARK-NORTH BAY (Pt. MOLATE)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	-8	-8	-8
1301	HALIBUT-SOUTH BAY (SAN MATEO)	3 Halibut	-8	-8	-8	-8	-8	-8	-8	-8
1336	VALLEJO-MARE ISLAND	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	-8
1337	VALLEJO-MARE ISLAND	5 White Croaker	-8	-8	-8	-8	0.444	-8	0.392	-8
1338	VALLEJO-MARE ISLAND	5 White Croaker	-8	-8	-8	-8	0.663	-8	0.574	-8
1339	VALLEJO-MARE ISLAND	3 Striped Bass	-8	-8	-8	-8	-8	-8	-8	-8

S.F. Bay Fish Contaminant Study Pesticide Analysis (ppb-ng/g)

IDORG #	STATION NAME	FISH TYPE	HEPTACHLOR	HE	HCB	METHOXY	MIREX	CNONA	TNONA
1234	SAN MATEO BRIDGE	5 White Croaker	-8	0.271	0.298	-8	-8	5.302	4.957
1235	SAN MATEO BRIDGE	5 White Croaker	-8	0.296	0.417	-8	-8	4.916	6.001
1236	SAN MATEO BRIDGE	5 White Croaker	-8	0.283	-8	-8	-8	3.023	3.212
1237	SAN MATEO BRIDGE	20 Shiner Surf Perch	-8	-8	0.244	-8	-8	1.34	1.372
1238	DUMBARTON BRIDGE	5 White Croaker	-8	0.303	0.341	-8	-8	4.141	5.087
1239	DUMBARTON BRIDGE	5 White Croaker	-8	0.292	-8	-8	-8	2.379	3.059
1240	DUMBARTON BRIDGE	5 White Croaker	-8	0.341	-8	-8	-8	3.64	3.464
1241	DUMBARTON BRIDGE	20 Shiner Surf Perch	-8	-8	-8	-8	-8	1.21	1.564
1242	FREMONT FOREBAY	3 Striped Bass	-8	0.58	0.38	-8	-8	4.103	6.06
1243	FREMONT FOREBAY	3 Striped Bass	0.3	0.242	0.285	-8	-8	4.352	5.532
1244	FREMONT FOREBAY	3 Striped Bass	-8	0.378	0.416	-8	-8	3.05	5.543
1245	FREMONT FOREBAY	4 Striped Bass	-8	-8	-8	-8	-8	1.14	1.42
1246	RICHMOND HARBOR	20 Shiner Surf Perch	-8	-8	-8	-8	-8	1.506	1.207
1247	RICHMOND HARBOR	20 Shiner Surf Perch	-8	-8	-8	-8	-8	2.637	0.951
1248	RICHMOND HARBOR	20 Shiner Surf Perch	-8	-8	-8	-8	-8	1.373	1.045
1249	RICHMOND HARBOR	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	-8	-8
1250	BERKELEY PIER	20 Shiner Surf Perch	-8	-8	-8	-8	-8	1.243	1.15
1251	BERKELEY PIER	20 Shiner Surf Perch	-8	-8	-8	-8	-8	0.823	0.66
1252	BERKELEY PIER	20 Shiner Surf Perch	-8	-8	-8	-8	-8	0.714	0.636
1253	BERKELEY PIER	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	0.278	0.239
1254	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	-8	-8	-8	-8	-8	3.486	5.659
1255	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	-8	-8	-8	-8	-8	2.933	5.033
1256	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	-8	0.234	-8	-8	-8	2.77	4.679
1257	OAKLAND INNER HAR. (FRUITVALE)	3 Striped Bass	-8	-8	0.357	-8	-8	2.572	3.663
1258	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	0.349	-8	0.268	-8	-8	4.732	4.039
1259	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	-8	-8	0.245	-8	-8	2.138	2.272
1260	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	-8	-8	-8	-8	-8	2.426	3
1261	DOUBLE ROCK (CANDLESTICK)	20 Shiner Surf Perch	-8	-8	0.251	-8	-8	3.167	1.946
1262	ISLAIS CREEK	5 White Croaker	0.341	-8	0.251	-8	-8	2.315	2.73
1263	ISLAIS CREEK	5 White Croaker	-8	-8	0.336	-8	-8	2.164	2.82
1264	ISLAIS CREEK	5 White Croaker	-8	-8	-8	-8	-8	1.276	1.545
1265	ISLAIS CREEK	20 Shiner Surf Perch	-8	-8	0.279	-8	-8	1.226	1.573
1266	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	-8	0.265	0.25	-8	-8	3.576	3.708
1267	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	0.223	-8	0.327	-8	-8	4.398	3.072
1268	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	-8	-8	0.268	-8	-8	4.073	3.101
1269	OAKLAND MIDDLE HARBOR PIER	20 Shiner Surf Perch	-8	-8	-8	-8	-8	2.008	1.489
1270	POINT MOLATE	5 White Croaker	-8	-8	-8	-8	-8	3.75	4.239
1271	POINT MOLATE	5 White Croaker	-8	-8	-8	-8	-8	3.887	3.958
1272	POINT MOLATE	5 White Croaker	-8	-8	-8	-8	-8	2.599	2.621
1273	POINT MOLATE	5 Walleye Surf Perch	-8	-8	-8	-8	-8	0.559	0.729
1274	RODEO	5 White Croaker	-8	-8	-8	-8	-8	5.235	5.394
1275	RODEO	5 White Croaker	-8	-8	-8	-8	-8	2.924	3.01
1276	RODEO	5 White Croaker	-8	-8	-8	-8	-8	5.918	7.036
1277	RODEO	3 Leopard Sharks	-8	-8	-8	-8	-8	0.287	0.317
1282	SAN FRANCISCO PIER #7	5 White Croaker	-8	-8	0.236	-8	-8	6.452	5.453
1283	SAN FRANCISCO PIER #7	5 White Surf Perch	-8	-8	-8	-8	-8	0.769	0.67
1284	SAN FRANCISCO PIER #7	5 White Surf Perch	-8	-8	-8	-8	-8	0.727	0.575
1285	SAN FRANCISCO PIER #7	5 White Surf Perch	-8	-8	-8	-8	-8	0.543	0.52
1286	STRIPED BASS (OAKLAND INNER)	3 Striped Bass	-8	-8	0.231	-8	-8	2.662	3.982
1287	STRIPED BASS (COYOTE POINT)	3 Striped Bass	-8	-8	-8	-8	-8	1.835	2.644
1288	STRIPED BASS (SACRAMENTO. R.)	3 Striped Bass	-8	-8	0.206	-8	-8	2.735	3.134
1289	STURGEON (GRIZZLY BAY)	3 Sturgeon	-8	-8	0.663	-8	-8	2.729	2.832
1292	SHARK-SOUTH BAY (S.M., COYOTE)	3 Leopard Sharks	-8	-8	-8	-8	-8	0.317	0.546
1293	SHARK-SOUTH BAY (COYOTE)	3 Leopard Sharks	-8	-8	-8	-8	-8	0.292	0.359
1294	SHARK-SOUTH BAY (COYOTE)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	-8	-8
1295	SHARK-MID BAY (TREASURE IS.)	2 Leopard Sharks	-8	-8	-8	-8	-8	0.64	1.074
1296	SHARK-MID BAY (BERKELEY)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	-8	-8
1297	SHARK-MID BAY (PARADISE)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	0.314	0.418
1298	SHARK-NORTH BAY (PT. MOLATE)	3 Leopard Sharks	-8	-8	-8	-8	-8	0.684	0.994
1299	SHARK-NORTH BAY (PT. MOLATE)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	0.679	0.687
1300	SHARK-NORTH BAY (Pt. MOLATE)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	0.684	0.716
1301	HALIBUT-SOUTH BAY (SAN MATEO)	3 Halibut	-8	-8	-8	-8	-8	0.412	0.363
1336	VALLEJO-MARE ISLAND	5 White Croaker	-8	0.235	0.306	-8	-8	10.374	12.608
1337	VALLEJO-MARE ISLAND	5 White Croaker	-8	-8	-8	-8	-8	8.828	10.752
1338	VALLEJO-MARE ISLAND	5 White Croaker	-8	-8	0.307	-8	-8	5.284	6.87
1339	VALLEJO-MARE ISLAND	3 Striped Bass	-8	-8	0.188	-8	-8	3.296	5.07

IDORG #	STATION NAME	FISH TYPE	TTLCLOR	OXAD	OCDAN	TOXAPH	PESBATCH
1234	SAN MATEO BRIDGE	5 White Croaker	17.02	-9.0	0.535	-8	73.4
1235	SAN MATEO BRIDGE	5 White Croaker	18.27	-9.0	0.617	-8	73.4
1236	SAN MATEO BRIDGE	5 White Croaker	10.81	-9.0	0.413	-8	73.42
1237	SAN MATEO BRIDGE	20 Shiner Surf Perch	4.51	-9.0	0.24	-8	73.4
1238	DUMBARTON BRIDGE	5 White Croaker	16.54	-9.0	0.644	-8	73.4
1239	DUMBARTON BRIDGE	5 White Croaker	9.86	-9.0	0.44	-8	73.41
1240	DUMBARTON BRIDGE	5 White Croaker	12.65	-9.0	0.482	-8	73.42
1241	DUMBARTON BRIDGE	20 Shiner Surf Perch	4.61	-9.0	-8	-8	73.42
1242	FREMONT FOREBAY	3 Striped Bass	18.89	-9.0	1.198	-8	73.43
1243	FREMONT FOREBAY	3 Striped Bass	17.35	-9.0	0.995	-8	73.44
1244	FREMONT FOREBAY	3 Striped Bass	16.09	-9.0	1.649	-8	73.45
1245	FREMONT FOREBAY	4 Striped Bass	4.25	-9.0	-8	-8	73.46
1246	RICHMOND HARBOR	20 Shiner Surf Perch	4.82	-9.0	0.297	-8	73.4
1247	RICHMOND HARBOR	20 Shiner Surf Perch	5.26	-9.0	-8	-8	73.41
1248	RICHMOND HARBOR	20 Shiner Surf Perch	4.35	-9.0	-8	-8	73.42
1249	RICHMOND HARBOR	3 Brown Smoothhound Sharks	0.50	-9.0	-8	-8	73.4
1250	BERKELEY PIER	20 Shiner Surf Perch	4.16	-9.0	-8	-8	73.4
1251	BERKELEY PIER	20 Shiner Surf Perch	2.44	-9.0	-8	-8	73.41
1252	BERKELEY PIER	20 Shiner Surf Perch	2.14	-9.0	-8	-8	73.42
1253	BERKELEY PIER	3 Brown Smoothhound Sharks	0.95	-9.0	-8	-8	73.4
1254	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	15.76	-9.0	-8	-8	73.4
1255	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	14.86	-9.0	0.518	-8	73.41
1256	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	14.66	-9.0	0.415	-8	73.42
1257	OAKLAND INNER HAR. (FRUITVALE)	3 Striped Bass	10.03	-9.0	0.483	-8	73.4
1258	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	16.16	-9.0	0.648	-8	73.43
1259	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	8.48	-9.0	-8	-8	73.41
1260	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	10.26	-9.0	0.3	-8	73.41
1261	DOUBLE ROCK (CANDLESTICK)	20 Shiner Surf Perch	10.40	-9.0	0.594	-8	73.45
1262	ISLAIS CREEK	5 White Croaker	9.87	-9.0	0.301	-8	73.41
1263	ISLAIS CREEK	5 White Croaker	10.09	-9.0	0.226	-8	73.42
1264	ISLAIS CREEK	5 White Croaker	5.14	-9.0	-8	-8	73.42
1265	ISLAIS CREEK	20 Shiner Surf Perch	5.51	-9.0	-8	-8	73.42
1266	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	14.36	-9.0	0.423	-8	73.47
1267	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	13.85	-9.0	0.482	-8	73.44
1268	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	13.74	-9.0	0.518	-8	73.45
1269	OAKLAND MIDDLE HARBOR PIER	20 Shiner Surf Perch	5.82	-9.0	0.28	-8	73.46
1270	POINT MOLATE	5 White Croaker	13.46	-9.0	0.787	-8	73.43
1271	POINT MOLATE	5 White Croaker	12.95	-9.0	0.466	-8	73.44
1272	POINT MOLATE	5 White Croaker	9.26	-9.0	0.676	-8	73.45
1273	POINT MOLATE	5 Walleye Surf Perch	1.99	-9.0	-8	-8	73.46
1274	RODEO	5 White Croaker	16.45	-9.0	0.587	-8	73.47
1275	RODEO	5 White Croaker	8.51	-9.0	0.325	-8	73.44
1276	RODEO	5 White Croaker	19.45	-9.0	0.688	-8	73.45
1277	RODEO	3 Leopard Sharks	1.11	-9.0	-8	-8	73.46
1282	SAN FRANCISCO PIER #7	5 White Croaker	18.39	-9.0	0.972	-8	73.43
1283	SAN FRANCISCO PIER #7	5 White Surf Perch	2.03	-9.0	-8	-8	73.44
1284	SAN FRANCISCO PIER #7	5 White Surf Perch	1.88	-9.0	-8	-8	73.45
1285	SAN FRANCISCO PIER #7	5 White Surf Perch	1.66	-9.0	-8	-8	73.46
1286	STRIPED BASS (OAKLAND INNER)	3 Striped Bass	10.60	-9.0	0.493	-8	73.41
1287	STRIPED BASS (COYOTE POINT)	3 Striped Bass	7.41	-9.0	0.33	-8	73.41
1288	STRIPED BASS (SACRAMENTO. R.)	3 Striped Bass	8.38	-9.0	0.365	-8	73.44
1289	STURGEON (GRIZZLY BAY)	3 Sturgeon	10.64	-9.0	0.482	-8	73.44
1292	SHARK-SOUTH BAY (S.M., COYOTE)	3 Leopard Sharks	1.44	-9.0	-8	-8	73.43
1293	SHARK-SOUTH BAY (COYOTE)	3 Leopard Sharks	1.19	-9.0	-8	-8	73.47
1294	SHARK-SOUTH BAY (COYOTE)	3 Brown Smoothhound Sharks	0.50	-9.0	-8	-8	73.41
1295	SHARK-MID BAY (TREASURE IS.)	2 Leopard Sharks	2.98	-9.0	-8	-8	73.43
1296	SHARK-MID BAY (BERKELEY)	3 Brown Smoothhound Sharks	0.50	-9.0	-8	-8	73.44
1297	SHARK-MID BAY (PARADISE)	3 Brown Smoothhound Sharks	1.03	-9.0	-8	-8	73.45
1298	SHARK-NORTH BAY (PT. MOLATE)	3 Leopard Sharks	2.62	-9.0	-8	-8	73.45
1299	SHARK-NORTH BAY (PT. MOLATE)	3 Brown Smoothhound Sharks	2.27	-9.0	-8	-8	73.46
1300	SHARK-NORTH BAY (Pt. MOLATE)	3 Brown Smoothhound Sharks	2.22	-9.0	-8	-8	73.45
1301	HALIBUT-SOUTH BAY (SAN MATEO)	3 Halibut	1.29	-9.0	-8	-8	73.46
1336	VALLEJO-MARE ISLAND	5 White Croaker	36.10	-9.0	1.582	-8	73.47
1337	VALLEJO-MARE ISLAND	5 White Croaker	30.70	-9.0	1.677	-8	73.43
1338	VALLEJO-MARE ISLAND	5 White Croaker	20.67	-9.0	0.922	-8	73.46
1339	VALLEJO-MARE ISLAND	3 Striped Bass	11.92	-9.0	0.564	-8	73.44

Section V - PAH Analysis

S.F. Bay Fish Contaminant Study PAH Analysis (ppb-ng/g)

IDORG #	STATION NAME	FISH TYPE	ACY	ACE	ANT	BAA	BAP	BBF	BKF	BGP	BEP	BPH	CHR	DBA
1234	SAN MATEO BRIDGE	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1235	SAN MATEO BRIDGE	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1236	SAN MATEO BRIDGE	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1237	SAN MATEO BRIDGE	20 Shiner Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1238	DUMBARTON BRIDGE	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	-8	-8	2.745	-8	-8
1239	DUMBARTON BRIDGE	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1240	DUMBARTON BRIDGE	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1241	DUMBARTON BRIDGE	20 Shiner Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8	-8	2.453	-8	-8
1242	FREMONT FOREBAY	3 Striped Bass	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1243	FREMONT FOREBAY	3 Striped Bass	-8	-8	-8	-8	-8	-8	-8	-8	-8	9.498	-8	-8
1244	FREMONT FOREBAY	3 Striped Bass	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1245	FREMONT FOREBAY	4 Striped Bass	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1246	RICHMOND HARBOR	20 Shiner Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8	-8	3.792	-8	-8
1247	RICHMOND HARBOR	20 Shiner Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8	-8	2.48	-8	-8
1248	RICHMOND HARBOR	20 Shiner Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8	-8	2.708	-8	-8
1249	RICHMOND HARBOR	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1250	BERKELEY PIER	20 Shiner Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8	-8	2.299	-8	-8
1251	BERKELEY PIER	20 Shiner Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1252	BERKELEY PIER	20 Shiner Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1253	BERKELEY PIER	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1254	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1255	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1256	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	-8	2.09	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1257	OAKLAND INNER HAR. (FRUITVALE)	3 Striped Bass	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1258	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1259	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1260	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1261	DOUBLE ROCK (CANDLESTICK)	20 Shiner Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1262	ISLAIS CREEK	5 White Croaker	-8	3.71	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1263	ISLAIS CREEK	5 White Croaker	-8	4.81	-8	-8	-8	-8	-8	-8	-8	2.391	-8	-8
1264	ISLAIS CREEK	5 White Croaker	-8	2.37	-8	-8	-8	-8	-8	-8	-8	2.494	-8	-8
1265	ISLAIS CREEK	20 Shiner Surf Perch	-8	10.2	-8	-8	-8	-8	-8	-8	-8	2.506	-8	-8
1266	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	-8	2.63	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1267	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	-8	2.7	-8	-8	-8	-8	-8	-8	-8	2.785	-8	-8
1268	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	-8	-8	2.545	-8	-8
1269	OAKLAND MIDDLE HARBOR PIER	20 Shiner Surf Perch	-8	4.83	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1270	POINT MOLATE	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1271	POINT MOLATE	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	-8	-8	2.497	-8	-8
1272	POINT MOLATE	5 White Croaker	-8	2.34	-8	-8	-8	-8	-8	-8	-8	6.801	-8	-8
1273	POINT MOLATE	5 Walleye Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1274	RODEO	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1275	RODEO	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	-8	-8	2.223	-8	-8
1276	RODEO	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1277	RODEO	3 Leopard Sharks	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1282	SAN FRANCISCO PIER #7	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	-8	-8	2.408	-8	-8
1283	SAN FRANCISCO PIER #7	5 White Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1284	SAN FRANCISCO PIER #7	5 White Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1285	SAN FRANCISCO PIER #7	5 White Surf Perch	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1286	STRIPED BASS (OAKLAND INNER)	3 Striped Bass	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1287	STRIPED BASS (COYOTE POINT)	3 Striped Bass	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1288	STRIPED BASS (SACRAMENTO. R.)	3 Striped Bass	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1289	STURGEON (GRIZZLY BAY)	3 Sturgeon	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1292	SHARK-SOUTH BAY (S.M., COYOTE)	3 Leopard Sharks	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1293	SHARK-SOUTH BAY (COYOTE)	3 Leopard Sharks	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1294	SHARK-SOUTH BAY (COYOTE)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1295	SHARK-MID BAY (TREASURE IS.)	2 Leopard Sharks	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1296	SHARK-MID BAY (BERKELEY)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1297	SHARK-MID BAY (PARADISE)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1298	SHARK-NORTH BAY (PT. MOLATE)	3 Leopard Sharks	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1299	SHARK-NORTH BAY (PT. MOLATE)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1300	SHARK-NORTH BAY (Pt. MOLATE)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	2.31	-8
1301	HALIBUT-SOUTH BAY (SAN MATEO)	3 Halibut	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1336	VALLEJO-MARE ISLAND	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1337	VALLEJO-MARE ISLAND	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1338	VALLEJO-MARE ISLAND	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8
1339	VALLEJO-MARE ISLAND	3 Striped Bass	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8	-8

S.F. Bay Fish Contaminant Study PAH Analysis (ppb-ng/g)

IDORG #	STATION NAME	FISH TYPE	DMN	FLA	FLU	IND	MNP1	MNP2	MPH1	NPH	PHN	PER
1234	SAN MATEO BRIDGE	5 White Croaker	-8	-8	-8	-8	2.565	3.206	-8	4.168	-8	-8
1235	SAN MATEO BRIDGE	5 White Croaker	-8	-8	-8	-8	5.856	9.23	-8	5.688	-8	-8
1236	SAN MATEO BRIDGE	5 White Croaker	-8	-8	-8	-8	4.417	6.354	-8	4.606	-8	-8
1237	SAN MATEO BRIDGE	20 Shiner Surf Perch	-8	-8	-8	-8	2.62	2.88	-8	5.06	-8	-8
1238	DUMBARTON BRIDGE	5 White Croaker	-8	-8	-8	-8	-8	2.626	-8	5.229	-8	-8
1239	DUMBARTON BRIDGE	5 White Croaker	-8	-8	-8	-8	3.603	6.345	-8	3.558	-8	-8
1240	DUMBARTON BRIDGE	5 White Croaker	-8	-8	-8	-8	4.317	6.15	-8	5.271	-8	-8
1241	DUMBARTON BRIDGE	20 Shiner Surf Perch	-8	-8	-8	-8	4.987	5.948	-8	6.582	-8	-8
1242	FREMONT FOREBAY	3 Striped Bass	-8	-8	-8	-8	2.665	3.301	-8	4.74	-8	-8
1243	FREMONT FOREBAY	3 Striped Bass	-8	5	2.337	-8	-8	3.002	-8	4.974	7.247	-8
1244	FREMONT FOREBAY	3 Striped Bass	-8	-8	-8	-8	-8	-8	-8	4.074	-8	-8
1245	FREMONT FOREBAY	4 Striped Bass	-8	-8	-8	-8	-8	-8	-8	3.444	-8	-8
1246	RICHMOND HARBOR	20 Shiner Surf Perch	-8	3.33	-8	-8	2.242	2.634	-8	4.932	2.335	-8
1247	RICHMOND HARBOR	20 Shiner Surf Perch	-8	3.21	-8	-8	3.562	5.51	-8	3.365	-8	-8
1248	RICHMOND HARBOR	20 Shiner Surf Perch	-8	2.73	-8	-8	3.322	5.269	-8	4.507	2.328	-8
1249	RICHMOND HARBOR	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	2.76	-8	4.229	-8	-8
1250	BERKELEY PIER	20 Shiner Surf Perch	-8	-8	-8	-8	2.596	2.933	-8	5.53	-8	-8
1251	BERKELEY PIER	20 Shiner Surf Perch	-8	-8	-8	-8	3.142	4.439	-8	2.73	-8	-8
1252	BERKELEY PIER	20 Shiner Surf Perch	-8	-8	-8	-8	3.783	5.363	-8	4.017	-8	-8
1253	BERKELEY PIER	3 Brown Smoothhound Sharks	-8	-8	-8	-8	2.514	2.719	-8	4.497	-8	-8
1254	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	-8	2.66	-8	-8	2.032	2.821	-8	4.187	2.295	-8
1255	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	-8	2.67	-8	-8	3.67	5.298	-8	2.914	2.819	-8
1256	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	-8	3.06	-8	-8	5.089	6.915	-8	5.356	2.996	-8
1257	OAKLAND INNER HAR. (FRUITVALE)	3 Striped Bass	-8	-8	-8	-8	3.566	4.537	-8	6.55	-8	-8
1258	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	-8	-8	-8	-8	-8	2.677	-8	4.374	-8	-8
1259	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	-8	-8	-8	-8	3.463	-8	-8	2.89	-8	-8
1260	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	-8	-8	-8	-8	3.66	5.788	-8	3.724	-8	-8
1261	DOUBLE ROCK (CANDLESTICK)	20 Shiner Surf Perch	-8	2.21	-8	-8	-8	-8	-8	4.128	2.512	-8
1262	ISLAIS CREEK	5 White Croaker	-8	-8	-8	-8	3.997	6.661	-8	4.215	3.975	-8
1263	ISLAIS CREEK	5 White Croaker	-8	-8	2.752	-8	3.925	6.836	-8	5.595	5.053	-8
1264	ISLAIS CREEK	5 White Croaker	-8	-8	-8	-8	4.716	6.77	-8	5.533	2.536	-8
1265	ISLAIS CREEK	20 Shiner Surf Perch	-8	4.42	4.704	-8	6.224	9.325	-8	6.901	9.859	-8
1266	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	4.937	-8	-8
1267	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	-8	-8	-8	-8	2.365	4.42	-8	5.79	-8	-8
1268	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	-8	-8	-8	-8	-8	2.638	-8	6.687	-8	-8
1269	OAKLAND MIDDLE HARBOR PIER	20 Shiner Surf Perch	-8	5.03	2.405	-8	-8	-8	-8	2.883	4.572	-8
1270	POINT MOLATE	5 White Croaker	-8	-8	-8	-8	-8	2.181	-8	5.013	-8	-8
1271	POINT MOLATE	5 White Croaker	-8	-8	-8	-8	-8	2.898	-8	6.997	-8	-8
1272	POINT MOLATE	5 White Croaker	-8	-8	-8	-8	-8	2.556	-8	5.87	-8	-8
1273	POINT MOLATE	5 Walleye Surf Perch	-8	-8	-8	-8	-8	-8	-8	2.934	-8	-8
1274	RODEO	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	4.165	-8	-8
1275	RODEO	5 White Croaker	-8	-8	-8	-8	-8	1.761	-8	4.959	-8	-8
1276	RODEO	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	4.45	-8	-8
1277	RODEO	3 Leopard Sharks	-8	-8	-8	-8	-8	-8	-8	2.57	-8	-8
1282	SAN FRANCISCO PIER #7	5 White Croaker	-8	-8	-8	-8	2.34	3.204	-8	6.543	-8	-8
1283	SAN FRANCISCO PIER #7	5 White Surf Perch	-8	-8	-8	-8	-8	-8	-8	4.926	-8	-8
1284	SAN FRANCISCO PIER #7	5 White Surf Perch	-8	-8	-8	-8	-8	-8	-8	5.21	2.315	-8
1285	SAN FRANCISCO PIER #7	5 White Surf Perch	-8	-8	-8	-8	-8	-8	-8	2.456	-8	-8
1286	STRIPED BASS (OAKLAND INNER)	3 Striped Bass	-8	-8	-8	-8	5.126	7.238	-8	4.026	-8	-8
1287	STRIPED BASS (COYOTE POINT)	3 Striped Bass	-8	-8	-8	-8	4.118	6.131	-8	3.37	-8	-8
1288	STRIPED BASS (SACRAMENTO. R.)	3 Striped Bass	-8	-8	-8	-8	-8	2.375	-8	4.611	-8	-8
1289	STURGEON (GRIZZLY BAY)	3 Sturgeon	-8	-8	-8	-8	-8	-8	-8	5.356	-8	-8
1292	SHARK-SOUTH BAY (S.M., COYOTE)	3 Leopard Sharks	-8	-8	-8	-8	-8	-8	-8	4.223	-8	-8
1293	SHARK-SOUTH BAY (COYOTE)	3 Leopard Sharks	-8	-8	-8	-8	-8	-8	-8	2.616	-8	-8
1294	SHARK-SOUTH BAY (COYOTE)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	3.188	4.723	-8	2.775	-8	-8
1295	SHARK-MID BAY (TREASURE IS.)	2 Leopard Sharks	-8	-8	-8	-8	2.597	2.907	-8	5.64	-8	-8
1296	SHARK-MID BAY (BERKELEY)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	1.838	-8	4.425	-8	-8
1297	SHARK-MID BAY (PARADISE)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	-8	-8	4.54	-8	-8
1298	SHARK-NORTH BAY (PT. MOLATE)	3 Leopard Sharks	-8	-8	-8	-8	-8	-8	-8	4.089	-8	-8
1299	SHARK-NORTH BAY (PT. MOLATE)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	-8	-8	2.491	-8	-8
1300	SHARK-NORTH BAY (Pt. MOLATE)	3 Brown Smoothhound Sharks	-8	-8	-8	-8	-8	-8	-8	4.675	-8	-8
1301	HALIBUT-SOUTH BAY (SAN MATEO)	3 Halibut	-8	-8	-8	-8	-8	-8	-8	2.307	-8	-8
1336	VALLEJO-MARE ISLAND	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	2.85	-8	-8
1337	VALLEJO-MARE ISLAND	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	3.477	-8	-8
1338	VALLEJO-MARE ISLAND	5 White Croaker	-8	-8	-8	-8	-8	-8	-8	3.171	-8	-8
1339	VALLEJO-MARE ISLAND	3 Striped Bass	-8	-8	-8	-8	-8	-8	-8	2.704	-8	-8

S.F. Bay Fish Contaminant Study PAH Analysis (ppb-ng/g)

IDORG #	STATION NAME	FISH TYPE	PYR	TMN	PAHBATCH	SODATAQC
1234	SAN MATEO BRIDGE	5 White Croaker	-8	-8	73.4	-4
1235	SAN MATEO BRIDGE	5 White Croaker	-8	-8	73.4	-4
1236	SAN MATEO BRIDGE	5 White Croaker	-8	-8	73.42	-4
1237	SAN MATEO BRIDGE	20 Shiner Surf Perch	-8	-8	73.4	-4
1238	DUMBARTON BRIDGE	5 White Croaker	-8	-8	73.4	-4
1239	DUMBARTON BRIDGE	5 White Croaker	-8	-8	73.41	-4
1240	DUMBARTON BRIDGE	5 White Croaker	-8	-8	73.42	-4
1241	DUMBARTON BRIDGE	20 Shiner Surf Perch	-8	-8	73.42	-4
1242	FREMONT FOREBAY	3 Striped Bass	-8	-8	73.43	-4
1243	FREMONT FOREBAY	3 Striped Bass	4.2	-8	73.44	-4
1244	FREMONT FOREBAY	3 Striped Bass	-8	-8	73.45	-4
1245	FREMONT FOREBAY	4 Striped Bass	-8	-8	73.46	-4
1246	RICHMOND HARBOR	20 Shiner Surf Perch	-8	-8	73.4	-4
1247	RICHMOND HARBOR	20 Shiner Surf Perch	-8	-8	73.41	-4
1248	RICHMOND HARBOR	20 Shiner Surf Perch	-8	-8	73.42	-4
1249	RICHMOND HARBOR	3 Brown Smoothhound Sharks	-8	-8	73.4	-4
1250	BERKELEY PIER	20 Shiner Surf Perch	-8	-8	73.4	-4
1251	BERKELEY PIER	20 Shiner Surf Perch	-8	-8	73.41	-4
1252	BERKELEY PIER	20 Shiner Surf Perch	-8	-8	73.42	-4
1253	BERKELEY PIER	3 Brown Smoothhound Sharks	-8	-8	73.4	-4
1254	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	-8	-8	73.4	-4
1255	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	-8	-8	73.41	-4
1256	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	-8	-8	73.42	-4
1257	OAKLAND INNER HAR. (FRUITVALE)	3 Striped Bass	-8	-8	73.4	-4
1258	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	-8	-8	73.43	-4
1259	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	-8	-8	73.41	-4
1260	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	-8	-8	73.41	-4
1261	DOUBLE ROCK (CANDLESTICK)	20 Shiner Surf Perch	-8	-8	73.45	-4
1262	ISLAIS CREEK	5 White Croaker	-8	-8	73.41	-4
1263	ISLAIS CREEK	5 White Croaker	-8	-8	73.42	-4
1264	ISLAIS CREEK	5 White Croaker	-8	-8	73.42	-4
1265	ISLAIS CREEK	20 Shiner Surf Perch	-8	-8	73.42	-4
1266	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	-8	-8	73.47	-4
1267	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	-8	-8	73.44	-4
1268	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	-8	-8	73.45	-4
1269	OAKLAND MIDDLE HARBOR PIER	20 Shiner Surf Perch	-8	-8	73.46	-4
1270	POINT MOLATE	5 White Croaker	-8	-8	73.43	-4
1271	POINT MOLATE	5 White Croaker	-8	-8	73.44	-4
1272	POINT MOLATE	5 White Croaker	-8	-8	73.45	-4
1273	POINT MOLATE	5 Walleye Surf Perch	-8	-8	73.46	-4
1274	RODEO	5 White Croaker	-8	-8	73.47	-4
1275	RODEO	5 White Croaker	-8	-8	73.44	-4
1276	RODEO	5 White Croaker	-8	-8	73.45	-4
1277	RODEO	3 Leopard Sharks	-8	-8	73.46	-4
1282	SAN FRANCISCO PIER #7	5 White Croaker	-8	-8	73.43	-4
1283	SAN FRANCISCO PIER #7	5 White Surf Perch	-8	-8	73.44	-4
1284	SAN FRANCISCO PIER #7	5 White Surf Perch	-8	-8	73.45	-4
1285	SAN FRANCISCO PIER #7	5 White Surf Perch	-8	-8	73.46	-4
1286	STRIPED BASS (OAKLAND INNER)	3 Striped Bass	-8	-8	73.41	-4
1287	STRIPED BASS (COYOTE POINT)	3 Striped Bass	-8	-8	73.41	-4
1288	STRIPED BASS (SACRAMENTO. R.)	3 Striped Bass	-8	-8	73.44	-4
1289	STURGEON (GRIZZLY BAY)	3 Sturgeon	-8	-8	73.44	-4
1292	SHARK-SOUTH BAY (S.M., COYOTE)	3 Leopard Sharks	-8	-8	73.43	-4
1293	SHARK-SOUTH BAY (COYOTE)	3 Leopard Sharks	-8	-8	73.47	-4
1294	SHARK-SOUTH BAY (COYOTE)	3 Brown Smoothhound Sharks	-8	-8	73.41	-4
1295	SHARK-MID BAY (TREASURE IS.)	2 Leopard Sharks	-8	-8	73.43	-4
1296	SHARK-MID BAY (BERKELEY)	3 Brown Smoothhound Sharks	-8	-8	73.44	-4
1297	SHARK-MID BAY (PARADISE)	3 Brown Smoothhound Sharks	-8	-8	73.45	-4
1298	SHARK-NORTH BAY (PT. MOLATE)	3 Leopard Sharks	-8	-8	73.45	-4
1299	SHARK-NORTH BAY (PT. MOLATE)	3 Brown Smoothhound Sharks	-8	-8	73.46	-4
1300	SHARK-NORTH BAY (Pt. MOLATE)	3 Brown Smoothhound Sharks	-8	-8	73.45	-4
1301	HALIBUT-SOUTH BAY (SAN MATEO)	3 Halibut	-8	-8	73.46	-4
1336	VALLEJO-MARE ISLAND	5 White Croaker	-8	-8	73.47	-4
1337	VALLEJO-MARE ISLAND	5 White Croaker	-8	-8	73.43	-4
1338	VALLEJO-MARE ISLAND	5 White Croaker	-8	-8	73.46	-4
1339	VALLEJO-MARE ISLAND	3 Striped Bass	-8	-8	73.44	-4

Section VI - Dioxin and Furan Analysis

S. F. Bay Fish Contaminant Study Dioxin/Furan Concentrations

IDORG	STATION NAME	FISH TYPE	2,3,7,8-Cl4DD		1,2,3,7,8-Cl5DD		1,2,3,4,7,8-Cl6DD	
			pg/g	DQ	pg/g	DQ	pg/g	DQ
1234	SAN MATEO BRIDGE	5 White Croaker	0.23	B	0.39	*	0.13	*
1238	DUMBARTON BRIDGE	5 White Croaker	0.36	B	0.36	*	0.17	*
1242	FREMONT FOREBAY	3 Striped Bass	0.37	*	0.55	*	0.19	*
1246	RICHMOND HARBOR	20 Shiner Surf Perch	0.23	*	0.73	*	0.44	*
1250	BERKELEY PIER	20 Shiner Surf Perch	0.22	*	0.92	*	0.53	*
1254	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	0.19	*	0.58	*	0.49	*
1258	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	0.42	B	0.39	*	0.42	*
1262	ISLAIS CREEK	5 White Croaker	0.45	*	0.71	*	0.76	*
1266	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	0.27	B	0.08	*	0.10	*
1270	POINT MOLATE	5 White Croaker	0.23	B	0.07	*	0.33	B
1274	RODEO	5 White Croaker	0.14	B	0.11	*	0.13	*
1282	SAN FRANCISCO PIER #7	5 White Croaker	0.17	B	0.05	*	0.10	*
1286	STRIPED BASS (OAKLAND INNER)	3 Striped Bass	0.15	B	0.08	*	0.09	*
1289	STURGEON (GRIZZLY BAY)	3 Sturgeon	0.07	B	0.09	*	0.06	B
1292	SHARK-SOUTH BAY (S.M., COYOTE)	3 Leopard Sharks	0.04	*	0.07	*	0.07	*
1295	SHARK-MID BAY (TREASURE IS.)	2 Leopard Sharks	0.10	*	0.14	*	0.13	*
1298	SHARK-NORTH BAY (PT. MOLATE)	3 Leopard Sharks	0.06	*	0.08	*	0.07	*
1301	HALIBUT-SOUTH BAY (SAN MATEO)	3 Halibut	0.05	*	0.08	*	0.13	*
1336	VALLEJO-MARE ISLAND	5 White Croaker	0.26		0.05	*	0.09	*

* Indicates that an analyte was below the MDL (Method Detection Limit). The number reported is the MDL for that particular sample. The MDL is based on three times the standard deviation of the noise (background of the average blank).

B Indicates that an analyte was detected above the MDL but below the Quantitation Limit (QL). The measured value is reported. The QL is based on ten times the standard deviation of the noise (background of the average blank).

L Indicates that an analyte detected in the sample was also detected in the blanks, and the amount in the sample was less than ten times the amount in the blank. The value reported is the upper limit of the concentration that could be in the sample. The blank is not subtracted.

C Same as L but the sample was corrected for the blank

I Indicates that the analyte was detected, but interferences were present in the quantitation ion or the confirmation ion. The value reflects the upper limit of the concentration that could be in the sample. The blank is not subtracted.

S. F. Bay Fish Contaminant Study Dioxin/Furan Concentrations

IDORG	STATION NAME	FISH TYPE	1,2,3,6,7,8-Cl6DD		1,2,3,7,8,9-Cl6DD		1,2,3,4,6,7,8-Cl7DD	
			pg/g	DQ	pg/g	DQ	pg/g	DQ
1234	SAN MATEO BRIDGE	5 White Croaker	0.15	*	0.22	*	0.33	*
1238	DUMBARTON BRIDGE	5 White Croaker	0.21	*	0.24	*	0.51	*
1242	FREMONT FOREBAY	3 Striped Bass	0.18	*	0.45	*	0.58	*
1246	RICHMOND HARBOR	20 Shiner Surf Perch	0.44	*	0.64	*	0.57	*
1250	BERKELEY PIER	20 Shiner Surf Perch	0.53	*	0.69	*	0.62	*
1254	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	0.45	*	0.40	*	0.54	*
1258	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	0.51	*	0.62	*	1.18	*
1262	ISLAIS CREEK	5 White Croaker	0.76	*	1.13	*	1.57	*
1266	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	0.07	*	0.12	*	0.12	*
1270	POINT MOLATE	5 White Croaker	0.06	*	0.09	*	0.17	*
1274	RODEO	5 White Croaker	0.11	*	0.15	*	0.07	*
1282	SAN FRANCISCO PIER #7	5 White Croaker	0.15	B	0.20	*	0.17	*
1286	STRIPED BASS (OAKLAND INNER)	3 Striped Bass	0.07	*	0.11	*	0.15	*
1289	STURGEON (GRIZZLY BAY)	3 Sturgeon	0.19	B	0.09	*	0.19	B
1292	SHARK-SOUTH BAY (S.M., COYOTE)	3 Leopard Sharks	0.06	*	0.08	*	0.10	*
1295	SHARK-MID BAY (TREASURE IS.)	2 Leopard Sharks	0.11	*	0.16	*	0.18	*
1298	SHARK-NORTH BAY (PT. MOLATE)	3 Leopard Sharks	0.06	*	0.10	*	0.19	B
1301	HALIBUT-SOUTH BAY (SAN MATEO)	3 Halibut	0.11	*	0.15	*	0.18	*
1336	VALLEJO-MARE ISLAND	5 White Croaker	0.23	B	0.12	*	0.16	*

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B Indicates that an analyte was detected above the MDL but below the Quantitation Limit (QL). The measured value is reported. The QL is based on ten times the standard deviation of the noise (background of the average blank).

L Indicates that an analyte detected in the sample was also detected in the blanks, and the amount in the sample was less than ten times the amount in the blank. The value reported is the upper limit of the concentration that could be in the sample. The blank is not subtracted.

C Same as L but the sample was corrected for the blank

I Indicates that the analyte was detected, but interferences were present in the quantitation ion or the confirmation ion. The value reflects the upper limit of the concentration that could be in the sample. The blank is not subtracted.

S. F. Bay Fish Contaminant Study Dioxin/Furan Concentrations

IDORG	STATION NAME	FISH TYPE	1,2,3,4,6,7,8,9-Cl8DD		2,3,7,8-Cl4DF		1,2,3,7,8-Cl5DF	
			pg/g	DQ	pg/g	DQ	pg/g	DQ
1234	SAN MATEO BRIDGE	5 White Croaker	0.30	*	1.85		0.42	B
1238	DUMBARTON BRIDGE	5 White Croaker	0.48	*	1.79		0.48	B
1242	FREMONT FOREBAY	3 Striped Bass	0.45	*	0.18	*	0.24	*
1246	RICHMOND HARBOR	20 Shiner Surf Perch	0.60	*	0.48	B	0.44	*
1250	BERKELEY PIER	20 Shiner Surf Perch	0.97	*	0.37	B	0.39	*
1254	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	0.31	*	1.48		0.27	*
1258	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	1.38	*	2.14		0.56	B
1262	ISLAIS CREEK	5 White Croaker	2.26	*	0.52	B	0.47	*
1266	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	1.02		1.10		0.23	B
1270	POINT MOLATE	5 White Croaker	1.03		0.94		0.14	B
1274	RODEO	5 White Croaker	0.67	B	0.72		0.16	B
1282	SAN FRANCISCO PIER #7	5 White Croaker	1.02	B	1.33		0.40	
1286	STRIPED BASS (OAKLAND INNER)	3 Striped Bass	0.97		0.83		0.09	B
1289	STURGEON (GRIZZLY BAY)	3 Sturgeon	0.77		1.44		0.27	B
1292	SHARK-SOUTH BAY (S.M., COYOTE)	3 Leopard Sharks	0.67	B	0.15		0.10	B
1295	SHARK-MID BAY (TREASURE IS.)	2 Leopard Sharks	0.98	B	0.10	*	0.13	*
1298	SHARK-NORTH BAY (PT. MOLATE)	3 Leopard Sharks	2.22		0.18	B	0.05	*
1301	HALIBUT-SOUTH BAY (SAN MATEO)	3 Halibut	0.21	*	0.05	*	0.06	*
1336	VALLEJO-MARE ISLAND	5 White Croaker	0.51	B	1.69		0.29	

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C Same as L but the sample was corrected for the blank

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S. F. Bay Fish Contaminant Study Dioxin/Furan Concentrations

IDORG	STATION NAME	FISH TYPE	2,3,4,7,8-Cl5DF		1,2,3,4,7,8-Cl6DF		1,2,3,6,7,8-Cl6DF	
			pg/g	DQ	pg/g	DQ	pg/g	DQ
1234	SAN MATEO BRIDGE	5 White Croaker	0.83	B	1.70		1.01	
1238	DUMBARTON BRIDGE	5 White Croaker	0.91	B	1.72		1.06	
1242	FREMONT FOREBAY	3 Striped Bass	0.47	*	1.05	B	0.12	*
1246	RICHMOND HARBOR	20 Shiner Surf Perch	1.10	*	0.96	B	0.06	*
1250	BERKELEY PIER	20 Shiner Surf Perch	1.10	*	1.15	B	0.14	*
1254	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	0.78	*	0.81	B	0.43	B
1258	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	1.47	B	0.24	*	0.76	B
1262	ISLAIS CREEK	5 White Croaker	0.25	*	0.50	*	0.45	*
1266	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	0.78		0.17	B	0.32	
1270	POINT MOLATE	5 White Croaker	0.56		0.23	B	0.19	
1274	RODEO	5 White Croaker	0.44	B	0.21	C	0.30	
1282	SAN FRANCISCO PIER #7	5 White Croaker	1.10		0.00	C	0.71	
1286	STRIPED BASS (OAKLAND INNER)	3 Striped Bass	0.33	B	0.27	B	0.22	
1289	STURGEON (GRIZZLY BAY)	3 Sturgeon	0.28	B	0.45	C	0.04	*
1292	SHARK-SOUTH BAY (S.M., COYOTE)	3 Leopard Sharks	0.07	*	0.04	C	0.03	*
1295	SHARK-MID BAY (TREASURE IS.)	2 Leopard Sharks	0.14	*	0.35	C	0.06	*
1298	SHARK-NORTH BAY (PT. MOLATE)	3 Leopard Sharks	0.08	*	0.00	C	0.04	*
1301	HALIBUT-SOUTH BAY (SAN MATEO)	3 Halibut	0.09	*	0.00	C	0.19	B
1336	VALLEJO-MARE ISLAND	5 White Croaker	1.02		0.00	C	0.31	

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B Indicates that an analyte was detected above the MDL but below the Quantitation Limit (QL). The measured value is reported. The QL is based on ten times the standard deviation of the noise (background of the average blank).

L Indicates that an analyte detected in the sample was also detected in the blanks, and the amount in the sample was less than ten times the amount in the blank. The value reported is the upper limit of the concentration that could be in the sample. The blank is not subtracted.

C Same as L but the sample was corrected for the blank

I Indicates that the analyte was detected, but interferences were present in the quantitation ion or the confirmation ion. The value reflects the upper limit of the concentration that could be in the sample. The blank is not subtracted.

IDORG	STATION NAME	FISH TYPE	1,2,3,7,8,9-Cl6DF		2,3,4,6,7,8-Cl6DF		1,2,3,4,6,7,8-Cl7DF	
			pg/g	DQ	pg/g	DQ	pg/g	DQ
1234	SAN MATEO BRIDGE	5 White Croaker	0.29	*	0.25	*	0.86	B
1238	DUMBARTON BRIDGE	5 White Croaker	0.30	*	0.24	*	0.82	*
1242	FREMONT FOREBAY	3 Striped Bass	0.53	*	0.42	*	0.55	*
1246	RICHMOND HARBOR	20 Shiner Surf Perch	0.55	*	0.60	*	0.98	*
1250	BERKELEY PIER	20 Shiner Surf Perch	0.76	*	0.83	*	1.08	*
1254	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	0.54	*	0.49	*	0.65	*
1258	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	0.14	*	1.32	*	0.37	*
1262	ISLAIS CREEK	5 White Croaker	0.26	*	3.15	*	0.79	*
1266	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	0.12	*	0.08	*	0.40	B
1270	POINT MOLATE	5 White Croaker	0.09	*	0.07	*	0.30	B
1274	RODEO	5 White Croaker	0.15	*	0.12	*	0.95	
1282	SAN FRANCISCO PIER #7	5 White Croaker	0.15	*	0.11	*	0.18	C
1286	STRIPED BASS (OAKLAND INNER)	3 Striped Bass	0.10	*	0.09	*	0.30	B
1289	STURGEON (GRIZZLY BAY)	3 Sturgeon	0.10	*	0.15	B	1.21	
1292	SHARK-SOUTH BAY (S.M., COYOTE)	3 Leopard Sharks	0.09	*	0.06	*	1.12	
1295	SHARK-MID BAY (TREASURE IS.)	2 Leopard Sharks	0.15	*	0.12	*	1.73	
1298	SHARK-NORTH BAY (PT. MOLATE)	3 Leopard Sharks	0.10	*	0.07	*	0.96	
1301	HALIBUT-SOUTH BAY (SAN MATEO)	3 Halibut	0.21	*	0.17	*	0.00	C
1336	VALLEJO-MARE ISLAND	5 White Croaker	0.16	*	0.10	*	0.00	C

* Indicates that an analyte was below the MDL (Method Detection Limit). The number reported is the MDL for that particular sample. The MDL is based on three times the standard deviation of the noise (background of the average blank).

B Indicates that an analyte was detected above the MDL but below the Quantitation Limit (QL). The measured value is reported. The QL is based on ten times the standard deviation of the noise (background of the average blank).

L Indicates that an analyte detected in the sample was also detected in the blanks, and the amount in the sample was less than ten times the amount in the blank. The value reported is the upper limit of the concentration that could be in the sample. The blank is not subtracted.

C Same as L but the sample was corrected for the blank

I Indicates that the analyte was detected, but interferences were present in the quantitation ion or the confirmation ion. The value reflects the upper limit of the concentration that could be in the sample. The blank is not subtracted.

S. F. Bay Fish Contaminant Study Dioxin/Furan Concentrations

IDORG	STATION NAME	FISH TYPE	1,2,3,4,7,8,9-Cl7DF		1,2,3,4,6,7,8,9-Cl8DF		PCB-77	
			pg/g	DQ	pg/g	DQ	pg/g	DQ
1234	SAN MATEO BRIDGE	5 White Croaker	1.58	*	0.77	B	107	
1238	DUMBARTON BRIDGE	5 White Croaker	1.79	*	0.70	*	151	
1242	FREMONT FOREBAY	3 Striped Bass	2.10	*	0.45	*	87	
1246	RICHMOND HARBOR	20 Shiner Surf Perch	1.97	*	0.53	*	103	
1250	BERKELEY PIER	20 Shiner Surf Perch	2.21	*	0.94	*	32	
1254	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	1.55	*	0.47	*	213	
1258	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	0.62	*	0.73	*	180	
1262	ISLAIS CREEK	5 White Croaker	0.92	*	1.78	*	142	
1266	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	0.13	*	0.14	*	148	
1270	POINT MOLATE	5 White Croaker	0.03	*	0.14	*	42	
1274	RODEO	5 White Croaker	0.32	B	0.55	B	32	
1282	SAN FRANCISCO PIER #7	5 White Croaker	0.00	C	0.10	C	82	
1286	STRIPED BASS (OAKLAND INNER)	3 Striped Bass	0.04	*	0.13	*	99	
1289	STURGEON (GRIZZLY BAY)	3 Sturgeon	0.41	B	0.77		19	
1292	SHARK-SOUTH BAY (S.M., COYOTE)	3 Leopard Sharks	0.40	B	0.67		6	
1295	SHARK-MID BAY (TREASURE IS.)	2 Leopard Sharks	0.69	B	1.04	B	9	
1298	SHARK-NORTH BAY (PT. MOLATE)	3 Leopard Sharks	0.39	B	0.56	B	8	
1301	HALIBUT-SOUTH BAY (SAN MATEO)	3 Halibut	0.00	C	0.00	C	1	C
1336	VALLEJO-MARE ISLAND	5 White Croaker	0.00	C	0.00	C	111	

* Indicates that an analyte was below the MDL (Method Detection Limit). The number reported is the MDL for that particular sample. The MDL is based on three times the standard deviation of the noise (background of the average blank).

B Indicates that an analyte was detected above the MDL but below the Quantitation Limit (QL). The measured value is reported. The QL is based on ten times the standard deviation of the noise (background of the average blank).

L Indicates that an analyte detected in the sample was also detected in the blanks, and the amount in the sample was less than ten times the amount in the blank. The value reported is the upper limit of the concentration that could be in the sample. The blank is not subtracted.

C Same as L but the sample was corrected for the blank

I Indicates that the analyte was detected, but interferences were present in the quantitation ion or the confirmation ion. The value reflects the upper limit of the concentration that could be in the sample. The blank is not subtracted.

S. F. Bay Fish Contaminant Study Dioxin/Furan Concentrations

IDORG	STATION NAME	FISH TYPE	PCB-126		PCB-169		PCB-105	
			pg/g	DQ	pg/g	DQ	pg/g	DQ
1234	SAN MATEO BRIDGE	5 White Croaker	66		0.19	*	6600	
1238	DUMBARTON BRIDGE	5 White Croaker	64		0.17	*	10600	
1242	FREMONT FOREBAY	3 Striped Bass	34		0.23	*	1080	
1246	RICHMOND HARBOR	20 Shiner Surf Perch	11		0.25	*	1600	
1250	BERKELEY PIER	20 Shiner Surf Perch	8.74		0.30	*	460	
1254	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	38		0.29	*	2900	
1258	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	135		7.61		7900	
1262	ISLAIS CREEK	5 White Croaker	50		2.05		4500	
1266	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	35		2.69		5400	
1270	POINT MOLATE	5 White Croaker	22		2.58		3050	
1274	RODEO	5 White Croaker	32		2.06		5300	
1282	SAN FRANCISCO PIER #7	5 White Croaker	54		4.82		9400	
1286	STRIPED BASS (OAKLAND INNER)	3 Striped Bass	27.60		2.32		3300	
1289	STURGEON (GRIZZLY BAY)	3 Sturgeon	2		1.91		1700	
1292	SHARK-SOUTH BAY (S.M., COYOTE)	3 Leopard Sharks	1		0.16		420	
1295	SHARK-MID BAY (TREASURE IS.)	2 Leopard Sharks	2		0.36		540	
1298	SHARK-NORTH BAY (PT. MOLATE)	3 Leopard Sharks	3.09		0.42	B	760	
1301	HALIBUT-SOUTH BAY (SAN MATEO)	3 Halibut	3		0.21	B	247	
1336	VALLEJO-MARE ISLAND	5 White Croaker	57		4.78		15300	

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B Indicates that an analyte was detected above the MDL but below the Quantitation Limit (QL). The measured value is reported. The QL is based on ten times the standard deviation of the noise (background of the average blank).

L Indicates that an analyte detected in the sample was also detected in the blanks, and the amount in the sample was less than ten times the amount in the blank. The value reported is the upper limit of the concentration that could be in the sample. The blank is not subtracted.

C Same as L but the sample was corrected for the blank

I Indicates that the analyte was detected, but interferences were present in the quantitation ion or the confirmation ion. The value reflects the upper limit of the concentration that could be in the sample. The blank is not subtracted.

IDORG	STATION NAME	FISH TYPE	PCB-118		I-TEQ	PCB-TEQ
			pg/g	DQ		
1234	SAN MATEO BRIDGE	5 White Croaker	24000		1.30	9.71
1238	DUMBARTON BRIDGE	5 White Croaker	30000		1.46	10.49
1242	FREMONT FOREBAY	3 Striped Bass	4500		0.67	4.02
1246	RICHMOND HARBOR	20 Shiner Surf Perch	6200		0.89	1.95
1250	BERKELEY PIER	20 Shiner Surf Perch	2200		0.97	1.18
1254	OAKLAND INNER HAR. (FRUITVALE)	20 Shiner Surf Perch	16800		0.85	5.89
1258	DOUBLE ROCK (CANDLESTICK)	5 White Croaker	31000		1.75	17.56
1262	ISLAIS CREEK	5 White Croaker	13900		0.89	6.91
1266	OAKLAND MIDDLE HARBOR PIER	5 White Croaker	17500		0.88	5.89
1270	POINT MOLATE	5 White Croaker	10100		0.73	3.57
1274	RODEO	5 White Croaker	17000		0.57	5.50
1282	SAN FRANCISCO PIER #7	5 White Croaker	34000		1.00	9.83
1286	STRIPED BASS (OAKLAND INNER)	3 Striped Bass	11300		0.50	4.29
1289	STURGEON (GRIZZLY BAY)	3 Sturgeon	3100		0.51	0.73
1292	SHARK-SOUTH BAY (S.M., COYOTE)	3 Leopard Sharks	1800		0.12	0.35
1295	SHARK-MID BAY (TREASURE IS.)	2 Leopard Sharks	2500		0.23	0.54
1298	SHARK-NORTH BAY (PT. MOLATE)	3 Leopard Sharks	2800		0.13	0.67
1301	HALIBUT-SOUTH BAY (SAN MATEO)	3 Halibut	1030		0.12	0.43
1336	VALLEJO-MARE ISLAND	5 White Croaker	53000		1.04	12.63

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B Indicates that an analyte was detected above the MDL but below the Quantitation Limit (QL). The measured value is reported. The QL is based on ten times the standard deviation of the noise (background of the average blank).

L Indicates that an analyte detected in the sample was also detected in the blanks, and the amount in the sample was less than ten times the amount in the blank. The value reported is the upper limit of the concentration that could be in the sample. The blank is not subtracted.

C Same as L but the sample was corrected for the blank

I Indicates that the analyte was detected, but interferences were present in the quantitation ion or the confirmation ion. The value reflects the upper limit of the concentration that could be in the sample. The blank is not subtracted.

All flags are disregarded in the calculation of I-TEQs (Toxic Equivalents). Therefore , I-TEQs of flagged data represent a maximum possible value. Whenever a congener is below the detection limit, one half the detection limit is used in the I-TEQ calculation.

Section VII - Data Base Description

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I. LABORATORY ACTIVITIES

Actual field and laboratory work was completed under contract by the California Department of Fish and Game (CDFG). The CDFG contracted the majority of the sample collection activities to Dr. John Oliver of San Jose State University at the Moss Landing Marine Laboratories in Moss Landing. CDFG personnel performed the trace metals analyses at the trace metals facility at Moss Landing Marine Laboratories in Moss Landing. The synthetic organic pesticides, PAHs and PCBs, were contracted by CDFG to Dr. Ron Tjeerdema at the UCSC trace organics facility at Long Marine Laboratory in Santa Cruz. Myrto Petreas at the California EPA Hazards Material Laboratory was responsible for the dioxin and additional coplanar PCB analysis. CDFG and Moss Landing Marine Lab personnel were responsible for synthesis and final QA of the full data set, and currently maintains the database for the RWQCB. Described below is a description of that database system.

II. DESCRIPTION OF COMPUTER FILES

The sample collection/field information, dissection and chemical data are stored on a 486DX PC at Moss Landing Marine Laboratories. Access is limited to only Russell Fairey. Contact Russell Fairey at (408) 633-6035 for copies of data. The data are stored in a dBase 4 and EXCEL formats and can be exported to any number of other formats. There are two backups of this database stored in two different laboratories. The dBase database structure follows, showing chemical name abbreviations and precise characteristics of each field.

Field Data

IDORG This numeric field is 7 characters wide with 1 decimal place and contains the unique i.d. organizational number for the sample. For each station collected on a unique date, an idorg sample number is assigned. This should be the field that links the collection, toxicity, chemical, and other data bases.

STATION This character field is 30 characters wide and contains the exact name of the station.

FISH TYPE This character field is 12 characters wide and contains the common name of the type of fish collected for that particular sample.

STATION # This numeric field is 7 characters wide with 1 decimal place and contains the CDFG station numbers that are used statewide. The format is YXXXX.Z where Y is the Regional Water Quality Control Board Region number, XXXX is the number that corresponds to a given location or site and Z is the number of the station within that site. An example is San Mateo Bridge in South San Francisco Bay where the Station # is 24001.0 The 2 indicates Region 2 of California. The 0001 indicates that it is Site 1 and the .0 indicates there were no replicate samples.

DATE This date field is 8 characters long and is the date that each sample was collected in the field. It is listed as MM/DD/YY.

SAMPLERS This character field is 12 characters wide and contains the initials of the scientific personnel aboard the sampling vessel on that particular date.

COMP # This numeric field is 3 characters wide and contains the composite number of the fish sample at a particular station or area. Numbers will range from one to four.

SIZE RANGE This is a character field 10 characters wide and contains the range of sizes (in millimeters) of fish from each composite.

MN LENGTH This is a numeric field 5 characters wide and contains the mean value of lengths from the size range of the composite.

LATITUDE This character field is 12 characters wide and contains the longitude of the center of the station sampled. The format is a character field as follows: XX,YY,ZZ, where XXX is in degrees, YY is in minutes, and ZZ is in seconds or hundreds.

LONGITUDE This character field is 14 characters wide and contains the longitude of the center of the station sampled. The format is a character field as follows: XX,YY,ZZ, where XXX is in degrees, YY is in minutes, and ZZ is in seconds or hundreds.

Trace metals

Trace metals are presented in the following fields. All sediment trace metal results are reported on a wet weight basis in parts per million (ppm).

A. When the value is missing or not analyzed, the value is reported as "-9.0" = not analyzed.
B. When the value is less than the detection limit of the analytical test, the value is reported as "-8.0" = not detected.

% MOIST This is a numeric field 6 characters wide that is the percentage of moisture in the tissue used for trace metal analysis.

Tissue trace metals are numeric fields of varying character width, and include the following elements, listed by field number, then field name as it appears in the database, then numeric character width and number of decimal places:

ALUMINUM 7.0
ARSENIC. 5.2
CADMIUM. 6.3
CHROMIUM. 6.1
COPPER. 6.1
IRON. 7.0
LEAD. 5.2
MANGANESE. 5.0
MERCURY. 6.3
SELENIUM. 5.2
SILVER. 6.3
TIN. 6.2
ZINC. 4.0

TMDATAQC Data qualifier codes are notations used by data reviewers to briefly describe, or qualify data and the systems producing data, numeric character width 3. Data qualifier codes are as follows:

A. When the sample meets or exceeds the control criteria requirements, the value is reported as "-4".
B. When the sample has minor exceedences of control criteria but is generally usable for most assessments and reporting purposes, the value is reported as "-5". For samples coded "-5" it is recommended that if assessments are made that are especially sensitive or critical, the QA evaluations should be consulted before using the data.
C. When the QA samples have major exceedences of control criteria requirements and the data was not usable for most assessments and reporting purposes, the value is reported as "-6".
D. When the sample has minor exceedences of control criteria and is unlikely to affect assessments, the value is reported as -3.

Synthetic organics are presented in the following fields. All synthetic organic results are reported on a wet weight basis in parts per billion (ppb or ng/g).

A. When the value is missing or not analyzed, the value is reported as "-9.0" = not analyzed.
B. When the value is less than the detection limit of the analytical test, the value is reported as "-8.0" = not detected.

Synthetic organics are reported on a wet weight basis in parts per billion (ppb or ng/g) and are numeric fields of varying character width, and include the following compounds, listed by field number, then field name as it appears in database (and followed by the compound name if not obvious), and then finally, the numeric character width and number of decimal places is given:

Polychlorinated Biphenyls(PCBs)

PCB5.	7.3	
PCB8.	7.3	
PCB15.	7.3	
PCB18.	7.3	
PCB27.	7.3	
PCB28.	7.3	
PCB29.	7.3	
PCB31.	7.3	
PCB44.	7.3	
PCB49.	7.3	
PCB52.	7.3	
PCB66.	7.3	
PCB70.	7.3	
PCB74.	7.3	
PCB87.	7.3	
PCB95.	7.3	
PCB97.	7.3	
PCB99.	7.3	
PCB101.	8.3	
PCB105.	7.3	
PCB11O.	7.3	
PCB118.	8.3	
PCB128.	7.3	
PCB132.	7.3	
PCB137.	7.3	
PCB138.	8.3	
PCB149.	8.3	
PCB151.	7.3	
PCB153.	8.3	
PCB156.	7.3	
PCB157.	7.3	
PCB158.	7.3	
PCB170.	7.3	
PCB174.	7.3	
PCB177.	7.3	
PCB180.	7.3	
PCB183.	7.3	
PCB187.	7.3	
PCB189.	7.3	
PCB194.	7.3	
PCB195.	7.3	
PCB201.	7.3	
PCB203.	7.3	
PCB206.	7.3	
PCB209.	7.3	
TTLPCB.	7.3	The sum of 18 individual congeners (NOAA)
ARO1248.	7.3	
ARO1254.	7.3	
ARO1260	7.3	
ARO5460.	7.3	
TTLPCB.	7.3	The sum of Aroclors 1248, 1254 & 1260

Pesticides

PCBBATCH This is the batch number during which the sample was extracted. The numeric field is 6 characters wide with 2 decimal places.

SOWEIGHT This numeric field is 6 characters wide with 2 decimal places and contains the weight of the sample extracted for analysis.

SOMOIST This numeric field is 6 characters wide with 2 decimal places and contains the percent moisture of the sample extracted.

SOLIPD This numeric field is 6 characters wide with 2 decimal places and contains the percent lipid of the sample extracted.

ALDRIN. 7.3
CCHLOR. cis-Chlordane. 7.3
TCHLOR. trans-Chlorane. 7.3
ACDEN. alpha-Chlordane. 7.3
GCDEN. gamma-Chlordane. 7.3
CLPYR. Chlorpyrifos. 7.2
DACTH. Dacthal. 7.3
OPDDD. o,p'-DDD. 7.2
PPDDD. p,p'-DDD. 8.3
OPDDE. o,p'-DDE. 7.2
PPDDE. p,p'-DDE. 8.3
PPDDMS. p,p'-DDMS. 7.2
PPDDMU. p,p'-DDMU. 7.2
OPDDT. o,p'-DDT. 7.2
PPDDT. p,p'-DDT. 7.2
TTLDDT. The sum of the six DDD, DDE and DDT isomers. 7.2
DICLB. p,p'-Dichlorobenzophenone. 7.2
DIELDRIN. 7.3
ENDO_I. Endosulfan I. 7.3
ENDO_II. Endosulfan II. 7.2
ESO4. Endosulfan sulfate. 7.2
ENDRIN. 7.2
HCHA. alpha-HCHA 7.3
HCHB. beta-HCHA 7.2
HCHG. gamma-HCHA 7.3
HCHD. delta-HCHA 7.3
HEPTACHLOR. 7.3
HE. Heptachlor Epoxide. 7.3
HCB. Hexachlorobenzene. 7.3
METHOXY. Methoxychlor. 7.2
MIREX. 7.3
CNONA. cis-Nonachlor. 7.3
TNONA. trans-nonachlor. 7.3
TTLCLOR. The sum of the six chlordane, nonachlor and oxychlordane isomers 7.3
OXAD. Oxadiazon. 7.2

OCDAN. Oxychlordane. 7.3
TOXAPH. Toxaphene. 7.1

PESBATCH This is the batch number during which the sample was extracted. The numeric field is 6 characters wide with 2 decimal places.

Polycyclic Aromatic Hydrocarbons

ACY. Acenaphthylene. 7.2
ACE. Acenaphthene. 7.2
ANT. Anthracene. 9.2
BAA. Benz[a]anthracene. 8.2
BAP. Benzo[a]pyrene. 8.2
BBF. Benzo[b]fluoranthene. 8.2
BKF. Benzo[k]fluoranthene. 8.2
BGP. Benzo[ghi]perylene. 8.2
BEP. Benzo[e]pyrene. 8.2
BPH. Biphenyl. 7.2
CHR. Chrysene. 8.2
DBA. Dibenz[a,h]anthracene. 8.2
DMN. 2,6-Dimethylnaphthalene. 7.2
FLA. Fluoranthene. 8.2
FLU. Fluorene. 8.2
IND. Indo[1,2,3-cd]pyrene. 7.2
MNP1. 1-Methylnaphthalene. 7.2
MNP2. 2-Methylnaphthalene. 7.2
MPH1. 1-Methylphenanthrene. 7.2
NPH. Naphthalene. 7.2
PHN. Phenanthrene. 8.2
PER. Perylene. 7.2
PYR. Pyrene. 8.2
TMN. 2,3,4-Trimethylnaphthalene. 7.2

PAHBATCH The batch number in which the sample was extracted; numeric character width 6, with 2 decimal places.

SODATAQC Data qualifier codes are notations used by data reviewers to briefly describe, or qualify data and the systems producing data, numeric character width 3. Data qualifier codes are as follows:

A. When the sample meets or exceeds the control criteria requirements, the value is reported as "-4".
B. When the sample has minor exceedences of control criteria but is generally usable for most assessments and reporting purposes, the value is reported as "-5". For samples coded "-5" it is recommended that if assessments are made that are especially sensitive or critical, the QA evaluations should be consulted before using the data.
C. When the QA samples has major exceedences of control criteria requirements and the data is not usable for most assessments and reporting purposes, the value is reported as "-6".

D. When the sample has minor exceedences of control criteria and is unlikely to affect assessments, the value is reported as -3.

Dioxins and Furans

2,3,7,8 TCDD 7.3
1,2,3,7,8 PeCDD 7.3
1,2,3,4,7,8 HxCDD 7.3
1,2,3,6,7,8 HxCDD 7.3
1,2,3,7,8,9 HxCDD 7.3
1,2,3,4,6,7,8 HpCDD 7.3
1,2,3,4,6,7,8,9 OCDD 7.3
2,3,7,8 TCDF 7.3
1,2,3,7,8 PeCDF 7.3
2,3,4,7,8 PeCDF 7.3
1,2,3,4,7,8 HxCDF 7.3
1,2,3,6,7,8 HxCDF 7.3
2,3,4,6,7,8 HxCDF 7.3
1,2,3,7,8,9 HxCDF 7.3
1,2,3,4,6,7,8 HpCDF 7.3
1,2,3,4,7,8,9 HpCDF 7.3
1,2,3,4,6,7,8,9 OCDF 7.3
Dioxin-TEQ 7.3

DEFINITIONS OF DATA QUALIFIER (DQ) SYMBOLS USED IN THE DIOXIN AND FURAN DATA:
Results tabulated in the Report are often flagged to alert the data user to exercise caution in interpreting the significance of these results. An analyte reported without a flag indicates that the measurement was above the Quantitation Level (QL) and that no interferences were present. In any other case the reported values will be accompanied by one of the following symbols (flags):

* Indicates that an analyte was below the Method Detection Limit (MDL). **The number reported is the MDL for that particular sample.** The MDL is based on three times the standard deviation of the noise (background) of the (average) blank.

B Indicates that an analyte was detected above the MDL but below the QL. The measured value is reported. The QL is based on ten times the standard deviation of the noise (background) of the (average) blank.

L Indicates that an analyte detected in the sample was also detected in the blank, and the amount in the sample was less than ten times the amount in the blank. The value reported is the upper limit of the concentration that could be in the sample. The blank is not subtracted.

C Same as L but the sample was corrected for the blank

I Indicates that the analyte was detected, but interferences were present in the quantitation ion or in the confirmation ion. The value reflects the upper limit of the concentration that could be in the sample. The blank is not subtracted.

NA Not Applicable. This flag is used when Total Congener concentrations cannot be calculated because individual congeners are below the MDL.

ND Not Determined

All flags are disregarded in the calculation of I-TEQs (Toxic Equivalents). Therefore, I-TEQs of flagged data represent a maximum possible value. Whenever a congener is below the detection limit, one-half the detection limit is used in the I-TEQ calculations.

APPENDIX II
GUIDELINES FOR EVALUATING CONTAMINANT LEVELS IN FISH TISSUE

Guidelines For Evaluating Contaminant Levels In Fish Tissue

Several national, regional and state agencies have developed guidelines for evaluating contaminant levels in fish tissue. However, each set of values was developed for a specific purpose and has its own set of assumptions. Pilot study screening values used to evaluate data in this study are given in Table 1. Values developed by other agencies are listed for information. Pilot study screening values (see Table 1) were developed using the approach of th EPA guidance document, Guidance For Assessing Chemical Contaminant Data For Use In Fish Advisories- Volume 1- Fish Sampling And Analysis (EPA 823-R-93-002, 1993), to identify potential chemicals of concern. This approach was chosen because it has the following advantages: 1) it was designed for use in screening fish contamination data, 2) it has received extensive public and scientific review and 3) it uses updated toxicologic and exposure information in the calculations. Pilot study screening values (PS-SVs) differ from listed EPA screening values because consumption rates of fish tissue were assumed to be approximately one meal a week for the PS-SV calculations while EPA calculations were based on consumption rates of one meal a month. The EPA calculations are based on the average consumption of fish and shellfish from estuarine and fresh waters by the general U.S. population. The more conservative PS-SV calculation is based on the estimate of the average consumption of fish and shellfish from marine, estuarine and fresh waters by the 50th percentile of recreational fisheman. The Great Lakes PCB screening value is current and has been extensively reviewed, but was developed to be used for a uniform health advisory and not for initial screening of chemicals of concern. Maximum Tissue Residue Levels (MTRLs) were developed by staff at the California State Water Resources Control Board (SWRCB) to screen fish tissue data. These values were developed based on the water quality criterion for protection of public health presented in Title 40 CFR 131.36 (USEPA. 1993. Water Quality Standards Regulation). These values were calculated based on a risk level of 10^{-6} and the consumption rate of 6.5 grams per day. These values use up-to-date information, however, they have not yet received public review and have not been adopted by the SWRCB. National Academy of Science (NAS) criteria were developed to protect both the fish containing the toxic substance and any animals that prey on contaminated fish. The disadvantages of using these values are that they do not use up-to-date information (they were last published in 1973) and they are based on whole body concentrations, not on fillets. The use of FDA Action Levels to screen fish tissue data in this report has several disadvantages stemming from the fact that these standards were developed for purposes other than those of this study. FDA Action Levels are used as limits at or above which USFDA will take legal action to remove contaminated fish from the market. These values contain economic, as well as other assumptions that are not based on health risk. The USFDA states that these limits are set "... based on the unavoidability of the poisonous or deleterious substance and do not represent permissible levels of contamination where it is avoidable".

TABLE 1 - CONTAMINANT SCREENING VALUES FROM SELECTED SOURCE

ANALYTES (ppm)	PS-SV(a)	EPA(b)	Great Lakes (c)	MTRLs (d)	NAS (e)	FDA (f)
Metals						
Arsenic						
Cadmium	2.33	10				
Lead						
Mercury	0.14	0.6		1		1
Selenium	11.67	50				
Organic Pesticides						
Total Chlordane	0.0179	0.08		0.008		
Total DDT	0.0686	0.3		0.032	0.05	5
Aldrin						0.3
Dieldren	0.0015	0.007		0.0007		0.3
Endosulfan (total)	3.5	20		1.1		
Endrin	0.7	3		3.2		0.3
Heptachlor				0.0023		0.3
Heptachlor Epoxide	0.0026	0.01		0.0012		0.3
Hexachlorobenzene	0.0146	0.07		0.0067		
Mirex	0.47	2				
Toxaphene	0.0212	3		0.009		
Chlorpyrifos	7	30				
PCBs						
Total Aroclors	0.003	0.01	0.21-1.0		0.5	2
Total Dioxins & Furans	0.15 ppt	0.7ppt				

All values are reported in parts per million, except dioxins which are in parts per trillion

(a) Pilot Study Screening Values developed using the EPA Guidance document approach
Values reported are for carcinogens or non-carcinogens
Values based on consumption of 30 g/d of fish (one meal per week) for a 70 kg adult

(b) Guidance for Assessing Chemical Contaminant Data for Use In Fish Advisories
Volume 1 Fish Sampling and Analysis
EPA 823-R-93-002 August 1993
Values reported are for carcinogens or non-carcinogens
Values based on consumption of 6.5 g/d of fish (one meal per month) for a 70 kg adult

(c) Protocol for a Uniform Great Lakes Sport Fish Consumption Advisory
Great Lakes Sport Fish Advisory Task Force Draft -June 1993
Values based on consumption of 7.4 g/d of fish (one meal per month) for a 70 kg adult

(d) Maximum Tissue Residue Levels (MTRLs)
California Enclosed Bays and Estuaries Plan
State Water Resources Control Board 1993b
Values reported are for carcinogens or non-carcinogens

(e) National Academy of Sciences (NAS) - National Academy of Engineering
Water Quality Criteria, 1972 (Blue Book)
USEPA, Ecological Research Series

(f) U.S. Food and Drug Administration. 1984.
Shellfish Sanitation Interpretation: Action Levels for Chemical and Poisoness Substances

Pilot Study Screening Value Calculations

The EPA document that was used to design the study, Guidance For Assessing Chemical Contaminant Data For Use In Fish Advisories-Volume 1-Fish Sampling and Analysis (EPA 823-R-93-002, 1993), was also used to develop the screening values used in this report. In developing the pilot study screening values (PS-SVs) for a number of noncarcinogenic and carcinogenic compounds, risk based dose response variables were used (U.S. EPA, 1993). These variables were used in the following equations to calculate the PS-SVs used in this report:

For Noncarcinogens:

PS-SV = (RfD * BW)/CR

where
PS-SV = Screening Value (mg/kg:ppm)
RfD = Oral reference dose (mg/kg/d)
BW = Body Weight (kg)
CR = Consumption rate of tissue(g/d)

For Carcinogens:

PS-SV = [(RL/SF)*BW]/CR

where
PS-SV = Screening Value (mg/kg:ppm)
Rl = Maximum acceptable risk level (dimensionless)
SF = Oral slope factor $(mg/kg/d)^{-1}$
BW = Body Weight (kg)
CR = Consumption rate of tissue(g/d)

Body weight (BW), consumption rate (CR) and risk level (RL) have been held constant for all calculations in this document. Body weight was chosen at 70 kg which is the mean body weight for the average male adult population (U.S. EPA, 1990a). Consumption rate was chosen at 30 grams per day (≈ one meal a week) which is the estimate of the average consumption of fish and shellfish from marine, estuarine and fresh waters by the 50th percentile of recreational fishermen (U.S. EPA, 1990a). These constants were chosen to represent "average" recreational fisherman. The risk level (RL) was chosen at 10^{-5} as recommended by the EPA Office of Water for the calculation of screening values. In simple terms, this means that if a person weighing 70 kg consumed 30 grams of fish per day with the same concentration of contaminant, for 70 years, the increased risk would be at most one additional cancer death per 100,000 persons. The pilot study screening values calculated from the constants selected above are used to help identify potential chemicals of concern and are not meant to address health risk concerns. In order to address health risk concerns the characteristics of certain fishing populations should be studied in order to provide more relevant information.

Values are given in Table 2 for oral RfD and SF values suggested for use by the EPA (U.S. EPA, 1993). Appropriate references and methods to determine these values for each analyte can be found in that document.

Screening values (PS-SVs) reported in Table 5 are target analyte concentrations in fish tissue that equal exposure levels at either the RfD for noncarcinogens, or the SF and a RL=10^{-5} for carcinogens, given the above constants. When PS-SVs were calculated for both carcinogenic and noncarcinogenic risks only the carcinogenic value was reported since it was lower and presented a more conservative approach.

Table 2 - Reference Doses(RfD) and Slope Factors(SF) (U.S.EPA, 1993)

Target Analyte	RfD(mg/kg/d)	SF$(mg/kg/d)^{-1}$
Cadmium	1×10^{-3}	N/A
Mercury	6×10^{-5}	N/A
Selenium	5×10^{-3}	N/A
Total Chlordane	6×10^{-5}	1.3
Total DDT	5×10^{-4}	0.34
Dieldrin	5×10^{-5}	16
Endosulfan (I & II)	1.5×10^{-3}	N/A
Endrin	3×10^{-4}	N/A
Heptachlor Epoxide	1.3×10^{-5}	9.1
Hexachlorobenzene	8×10^{-4}	1.6
Mirex	2×10^{-4}	N/A
Toxaphene	2.5×10^{-4}	1.1
Total Aroclor	2×10^{-5}	7.7
Dioxin-TEQ	N/A	1.56×10^{5}

PS-SVs could not be calculated for all 142 chemicals analyzed in this study since reliable information on the toxicity or carcinogenic potency of chemicals is not available for all analytes. RfD and SF information that has been developed to date is available in the EPA's Integrated Risk Information System (IRIS, 1992). This system is continuously updated, as information becomes available, so calculations of screening values for additional chemicals may be possible in the future.

APPENDIX III
LABORATORY OPERATING PROCEDURES

Collection and Preparation of Fish for Trace Metal and Synthetic Organic Analysis

1.0 SCOPE AND APPLICATION

1.1 The following methods are for collection, transportation and preparation of fish flesh for analysis of synthetic organics and trace elements.

2.0 SUMMARY OF METHOD

2.1 Fish are collected by any of several standard collection methods such as seines, gill nets and hook and line.
2.2 Once the samples are collected, they are wrapped in trace metal and trace organically cleaned teflon sheeting, and frozen for transportation to the laboratory.
2.3 The frozen samples are prepared under non-contaminating techniques in a clean room environment.

3.0 CONTAMINATION

3.1 Potential sources of contamination during sample collection and handling are innumerable. Sampling gear, sample containers, solvents, reagents and other sample processing hardware may yield artifacts and/or elevated baseline, causing misinterpretation of inorganic and organic analyses. Extreme care must be exercised by personnel experienced in ultra-clean techniques during sample collection and handling.

4.0 APPARATUS AND MATERIALS

4.1 Sample collection
- 4.1.1 Gill nets (various sizes)
- 4.1.2 Seines or trawls (various size mesh and lengths as appropriate)
- 4.1.3 Boats (for setting and retrieving nets)
- 4.1.4 Rods and reels
- 4.1.5 Teflon sheeting
- 4.1.6 Dry ice chest

4.2 Sample Preparation
- 4.2.1 Sartorius balance capable of weighing 300.00g
- 4.2.2 Measuring board capable of 600 mm
- 4.2.3 #3, and #4 Bard Parker scalpel handles
- 4.2.4 24 x 24 x 1/4 inch glass or Teflon sheet
- 4.2.5 Freezer
- 4.2.6 Type II water purification system capable of providing water to 18 megohms-cm resistance equipped with prefilter cartridge, carbon cartridge, 2 ion-exchange cartridges and 0.22 post filter unit (Milli-Q® water).
- 4.2.7 Willems Polytron with sound suppressor on a stand with a Corian foundation equipped with a titanium

shaft, power control unit, teflon bearings and spatter shield housed in a hood.

4.2.8 Drying oven

4.2.9 Desiccator

4.2.10 Laminar flow grade hepa filter installed with a magnahelix differential pressure gauge.

5.0 REAGENTS

5.1 1N Nitric acid - 150 mL (69.0-71.0 nitric acid)/2 L Type II water).

5.2 Petroleum ether - Baker Resi-analyzed

5.3 Methanol - Baker Resi-analyzed

5.4 Dry ice

6.0 SAMPLE COLLECTION, PRESERVATION AND HANDLING

6.1 Fish are collected using the appropriate gear for the desired species and existing water conditions.

6.2 As a general rule, five fish of medium size or three fish of larger size are collected and composited for analysis. This provides sufficient quantities of fish for the dissection of 200 grams of fish flesh for organic and inorganic analysis.

6.3 When only small fish are available sufficient numbers are collected to provide the needed 200 grams of fish flesh. In this study 20 of the smaller fish (shiner surf perch) were collected.

6.4 Species of fish collected are chosen based on their priority as target species, importance as indicator species, availability and the type of analysis desired.

6.5 Fish samples are transported from the collection site to the preservation site after being frozen in teflon sheeting. The fish are frozen in dry ice and then transported to the laboratory where they are kept frozen until processing for chemical analysis.

7.0 PROCEDURE FOR SAMPLE EXTRACTION

7.1 All the surfaces that the samples and instruments may come in contact with are wiped down with Type II water and cleanroom wipes, and covered.

7.1.1 Each day or every 10 samples the 250 mL Wheaton solvent rinse bottles (1N nitric acid, methanol, and petroleum ether) are changed.

7.1.2 The same procedure is followed for cleaning solvent bottles as for cleaning glassware, instruments and polytron shaft (as described below), except that these bottles are cleaned only to the extent of the solvent which they will hold.

7.1.3 Glassware is soaked 20 minutes and washed in D.I. water with Micro®. It is then rinsed again in D.I. water and drained onto teflon grids.

7.1.4 Under hood chemical cleaning is accomplished by adding 25 mL 1N nitric acid to each bottle. To ensure

all surfaces are exposed to solvents rotate the bottle while pouring the solvents onto the ground glass stoppers. Repeating the above procedure with B through E below and allow to dry.

A. 25 mL of 6N nitric acid
B. 25 mL Type II water
C. Repeat step B.
D. 25 mL methanol
E. 25 mL petroleum ether

7.2 Large fish requiring dissection are thawed under D.I. water. They may be brushed with a tooth brush to remove mucous, rinsed and placed on a Teflon lined tray.

7.2.1 They are measured on the measuring board to the nearest millimeter, placed on a teflon lined tray on the balance (Sartorius or double beam) and weighed. All lengths and weights are recorded.

7.2.2 The fish are placed on the Teflon tray. Clean all dissection instruments in the same manner as for glassware.

7.2.3 A "U" shaped incision is made just posterior to the operculum with a #11 scalpel; the upper leg of the incision runs the length of the fish just ventrally of the dorsal fin and the lower leg just below the midline; cutting just through the epidermis.

7.2.4 The skin is peeled back using the "v" shaped forceps and the flesh exposed. With a fresh #3 or #4 blade (cutting approximately 1 cm inside the original cut to avoid contamination, providing the size of the fish allows) a fillet is cut from the entire length of the fish.

7.2.5 The fillet is removed in 5 to 10 g portions with tefzel forceps. Equal weight fillets are taken from each fish of the sample to composite 200.0 g. (ideally 5 fish/40.0 g for 200.0 g total weight).

7.2.6 The beginning bottle weight, each fillet weight and end bottle weight are recorded.

7.3 All samples are refrozen after dissection and maintained at 0° C until homogenization and/or analyses.

7.4 All samples are polytroned to provide a homogeneous material for analysis.

7.4.1 Flesh samples are removed from the freezer.

7.4.2 Prior to and after homogenization the titanium shaft of the polytron is cleaned by running in 1000 mL beakers of D.I. water until a minimum of 3-5 washes are clear.

7.4.3 The shaft is then chemically cleaned by running the shaft in a 400 mL beaker of Type II water, 250 mL Wheaton bottle of 1N nitric acid, 400 ml of Type II water, and rinsed with methanol from a 500 mL teflon squeeze bottle, and petroleum ether from a 500 mL teflon squeeze bottle.

7.4.4 Flesh samples require the addition of an equal weight of Type II water.

7.4.5 Homogenization is performed by inserting the polytron shaft into the sample material. Operate the polytron at the lowest speed possible to avoid heating the sample or spattering.

8.0 QUALITY CONTROL

8.1 Flesh samples are corrected for moisture loss. Dry the outside of the bottle with a Kimwipe and weigh the bottle with sample.
8.2 Determine the difference in the total weight at dissection and total weight just prior to homogenization. Add an equal weight of Type II water (plus any required for moisture correction).
8.3 The Sartorius balance and double beam balance are checked for accuracy with calibration weights.
8.4 Equipment Blanks: All equipment used in collection and preparation of samples is periodically checked for contamination. Before any new or different equipment is used it must be checked for contamination.
8.5 Sample Archive: All remaining sample homogenates and extracts are archived at -20° C for future analysis.
8.6 A record of sample transport, receipt and storage is maintained and available for easy reference.
8.7 All samples are prepared in a clean room to avoid airborne contamination.
8.8 A clean room blank is prepared at the beginning of each dissection session following standard clean room dissection and homogenization procedures. 50 g of Type II water is added to a chemically clean 250 mL Wheaton jar.

9.0 METHOD PERFORMANCE

9.1 Chemically cleaned instruments: Bard-Parker handles and blades, and tefzel forcep are dipped into the sample water.
9.2 An equal weight of Type II Milli- Q water is added and then polytroned to simulate normal sample procedure.

10.0 REFERENCES

10.1 U.S. Environmental Protection Agency, Test Methods for Evaluating Solid Waste, SW-486 Third Ed., Revision 1, December, 1987.

10.2 Guidance for Assessing Chemical Contaminant Data For Use In Fish Advisories. Volume 1. Fish Sampling and Analysis. 1993 EPA 823-R-93-002

Digestion And Analysis Of Trace Elements In Tissue Using Teflon Vessels

11.0 SCOPE AND APPLICATION

11.1 This procedure describes an acid pressure digestion using a closed Teflon vessel for the determination of: aluminum (Al); arsenic (As); cadmium (Cd); chromium (Cr); copper (Cu); iron (Fe); lead (Pb); manganese (Mn); mercury (Hg); selenium (Se); silver (Ag); tin (Sn); and zinc (Zn); flame (FAAS) and graphite furnace (GFAAS) atomic absorption spectrophotometry.

12.0 SUMMARY OF METHODS

12.1 Tissue samples are prepared for analysis by digesting with concentrated 4:1 nitric:perchloric acid in a Teflon vessel. Tissue samples are first heated on hot plate for five hours. Then caps are tightened and heated in vented oven at 130° C for four hours. The liquid digestate is diluted with Type II Milli-Q water to a final volume of 200.0 ml.

12.2 Tissue digestates are analyzed by GFAAS on a Perkin-Elmer Model 3030 Zeeman or by FAAS on a Perkin-Elmer Model 2280 for Ag, Al, As, Cu, Cd, Cr, Fe, Mn, Pb, Se, Sn, and Zn depending on concentration. Mercury is analyzed by cold vapor using the Perkin-Elmer Model 2280 for tissues.

12.3 The detection limits for this method are as follows:

Tissue	ug/g (ppm) wet
Aluminum	4.0
Arsenic	0.05
Cadmium	0.002
Chromium	0.02
Copper	0.03
Iron	0.03
Lead	0.02
Manganese	0.3
Mercury	0.01
Selenium	0.03
Silver	0.002
Tin	0.02
Zinc	0.02

13.0 METHOD PROCEDURES AND INTERFERENCES

13.1 Tissue Digestion

13.1.1 White plastic knives are used to aliquot 3 ± 0.1 g of homogenized tissue or 0.5 ± 0.02 g of an SRM into each Teflon vessel. Note: With each set of tissue, two replicates of two different SRM's and four blanks are analyzed. Reference materials are used with a matrix as close as possible to that of the samples. The blank Teflon vessels are left empty.

13.1.2 The Teflon vessel with sample is then reweighed and recorded.

13.1.3 Add 3.0 ml of 4:1 HNO_3:$HClO_4$ to the sample and the caps are loosely hand tightened.
13.1.4 The Teflon vessels are placed on a warm(65°C) hot plate in the hood for 5 hours to allow nitric fumes to vent in the hood prior to placement in the oven. Because hot plates often heat unevenly teflon vessels are rotated on the hot plates frequently.
13.1.5 The Teflon vessels are then removed from the hot plates. The caps are tightened with a capping station. The Teflon vessels are placed in 130°C oven for four hours. (Note: The Teflon vessels vent fumes in the oven therefore this needs to be done in a well vented hood). After four hours the oven is turned off and the samples allowed to cool overnight.
13.1.6 The next morning the Teflon vessels are removed from the oven. The caps are removed in the hood. Approximately 15 ml of Type II water are added to the Teflon vessels. The Teflon vessels are hand tightened and shaken. The solution is then quantitatively transferred to preweighed 30 ml HDPE bottles. The solution is taken to a total final weight of 20 g with Type II Milli-Q water.
13.1.7 Sample digestion and dilution steps should result in an extract that is clear and free of undissolved solid materials. If the sample solution is cloudy or has solid materials suspended in solution at the time of analysis, it is noted in the laboratory note book under a "comments" column.
13.1.8 Tissue samples can cause various problems, especially with GFAAS, due to the complex matrices involved. The matrix problems can be addressed by using standard reference materials and by using the method of standard additions.
13.1.9 Special care must be used in selecting the acid used for the digestion. Only redistilled HNO_3 and redistilled $HClO_4$ should be used because reagent grade acids are frequently contaminated with trace levels of metals, especially chromium. Prior to use all acids used in the digestion should be checked for contamination.

13.2 Direct aspiration flame AAS: Differences between the various makes and models of atomic absorption spectrophotometers prevent the formulation of detailed instructions applicable to every instrument, from being included in this document. Good laboratory practice is to have detailed instructions for the operation of each instrument kept with the instrument for the analyst to use during operation. These instructions should follow the manufacturer's operating instructions for a particular instrument. In general, after choosing the proper lamp for the analysis, allow the lamp to warm up for a minimum of 15 minutes, unless operated in a double-beam mode. During this period, align the instrument, position the monochronometer at the correct wavelength, select the proper monochronometer

slit width, and adjust the current according to the manufacturer's recommendation. Some or all of these parameters may be done by the instrument automatically. Subsequently, light the flame and regulate the flow of fuel and oxidant. Adjust the burner and nebulizer flow rate for maximum percent absorption and stability. Balance the photometer. Run a series of standards of the element under analysis. Construct a calibration curve by plotting the concentrations of the standards against absorbances or have the data system construct it. Aspirate the samples and determine the concentrations, either directly or from the calibration curve. Standards must be run each time a sample or series of samples is run.

13.2.1 The most troublesome type of interference in atomic absorption spectrophotometry is usually termed "chemical", and is caused by lack of absorption of atoms bound in molecular combination in the flame. This phenomenon can occur when the flame is not sufficiently hot to dissociate the molecule, as in the case of phosphate interference with magnesium, or when the dissociated atom is immediately oxidized to a compound that will not dissociate further at the temperature of the flame. Addition of lanthanum will overcome phosphate interference in magnesium, calcium, and barium determinations. Similarly, silica interference in the determination of manganese can be eliminated by the addition of calcium.

13.2.2 Chemical interferences may also be eliminated by separating the metal from the interfering material. Although complexing agents are employed primarily to increase the sensitivity of the analysis, they may also be used to eliminate or reduce interferences.

13.2.3 The presence of high dissolved solids in the sample may result in an interference from nonatomic absorbance such as light scattering. If background correction is not available, a nonabsorbing wavelength should be used. Preferably, samples containing high solids should be extracted.

13.2.4 Ionization interferences occur when the flame temperature is sufficiently high to generate the removal of an electron from a neutral atom, giving a positively charged ion. This type of interference generally can be controlled by the addition, to both standard and sample solutions, of a large excess (1000mg/ L) of an easily ionized element such as K, NA, Li, and Cs.

13.2.5 Spectral interference can occur when an absorbing wavelength of an element present in the sample, but not being determined, falls within the width of the absorption line of the element of interest. Results of the determination will then be erroneously high, due to the contribution of the interfering element to the atomic absorption signal. Interference can also occur when resonant energy from another element in a multi-element lamp, or from a

metal impurity in the lamp cathode, falls within the bandpass of the slit setting when that other metal is present in the sample. This type of interference may sometimes be reduced by narrowing the slit width.

13.2.6 Samples and standards should be monitored for viscosity differences that may alter the aspiration rate.

13.2.7 Some sample solutions may have solids suspended in them from incomplete digestion. These solids can plug the nebulizer tubing and slow or stop the aspiration of sample.

13.2.8 All metals are not equally stable in the digestate, especially if it contains only HNO_3, not HNO_3 and HCl. The digestate should be analyzed as soon as possible with preference given to Ag, Cd and Pb.

13.3 Furnace procedure - Furnace devices (flameless atomization) are the most useful means of extending detection limits. Because of differences between various makes and models of instruments, no detailed operating instructions can be given for each instrument in this document. Detailed operating instructions by the manufacturer of each instrument are kept with each instrument for the analyst to use during the analysis.

13.3.1 Although the problem of oxide formation is greatly reduced with furnace procedures because atomization occurs in an inert atmosphere, the technique is still subject to chemical interferences. Composition of the sample matrix can have a major effect on the analysis. It is those effects which must be determined and taken into consideration in the analysis of each different matrix encountered. To help verify the absence of matrix or chemical interference, the serial dilution technique may be used. Those samples which indicate the presence of interference should be treated in one or more of the following ways:

1) Successively dilute and reanalyze the samples to eliminate interferences.

2) Modify the sample matrix either to remove interferences or to stabilize the analyte. Examples are the addition of ammonium nitrate to remove alkali chlorides and the addition of ammonium phosphate to retain cadmium. The mixing of hydrogen with the inert purge gas has also been used to suppress chemical interference. Hydrogen acts as a reducing agent and aids in molecular dissociation.

3) Analyze the sample by method of standard additions while noticing the limitations of its use.

13.3.2 Gases generated in the furnace during atomization ion may have molecular absorption bands encompassing the analytical wavelength. When this occurs, use either background correction or choose an alternate wavelength. Background correction may also compensate for nonspecific broad-band absorption interference.

13.3.3 Continuum background correction cannot correct for all types of background interference. When the background interference cannot be compensated for, chemically remove the analyte or use an alternate form of background correction, e.g., Zeeman background correction.

13.3.4 Interference from a smoke-producing sample matrix can sometimes be reduced by extending the charring time at a higher temperature or utilizing an ashing cycle in the presence of air. Care must be taken, however, to prevent loss of the analyte.

13.3.5 Samples containing large amounts of organic materials should be oxidized by conventional acid digestion before being placed in the furnace. In this way, broad-band absorption will be minimized.

13.3.6 Anion interference studies in the graphite furnace indicate that, under conditions other than isothermal, the nitrate anion is preferred. Therefore, nitric acid is preferable for any digestion or solubilization step. If another acid in addition to HNO_3 is required, a minimum amount should be used. This applies particularly to hydrochloric and, to a lesser extent, to sulfuric and phosphoric acids.

13.3.7 Carbide formation resulting from the chemical environment of the furnace has been observed. Molybdenum may be cited as an example. When carbides form, the metal is released very slowly from the resulting metal carbide as atomization continues. Molybdenum may require 30 sec or more atomization time before the signal returns to baseline levels. Carbide formation is greatly reduced and the sensitivity increased with the use of pyrolytically coated graphite. Elements that readily form carbides are: Ba, Mo, Ni, and V.

13.3.8 For comments on spectral interference, see Paragraph 13.2.5

13.3.9 Cross-contamination and contamination of the sample can be major sources of error because of the extreme sensitivities achieved with the furnace. The sample preparation work area should be kept scrupulously clean. All glassware should be cleaned as directed earlier. Pipet tips are a frequent source of contamination. If suspected, they should be acid soaked with 1:5 HNO_3 and rinsed thoroughly with tap and Type II water. The use of a better grade of pipet tip can greatly reduce this problem. Special attention should be given to reagent blanks in both analysis and in the correction of analytical results. Pyrolytic graphite, because of the production process and handling, can become contaminated. As many as five to ten high-temperature burns may be required to clean the tube before use.

14.0 APPARATUS AND MATERIALS

14.0 APPARATUS AND MATERIALS

14.1 Hot plates: Low temperature(65°C)
14.2 Teflon Vessel: Savillex Teflon Digestion Vessel Part #561R2.
14.3 Capping Station: CEM Capping Station Part #920030.
14.4 Polyethylene High Density (HDPE) bottles: Nalgene part No. B7501-1, 30 ml polyethylene (HDPE) bottles.
14.5 Pipetors: Preferably all plastic/Teflon of various sizes from 1000uL to 5000uL with polyethylene tips. Do not use yellow pipet tips, they are commonly contaminated with cadmium.
14.6 Oven: Must be able to maintain 130° C for 12 hours. It is preferable to eliminate any metal in the interior of the oven to avoid potential contamination. It is also useful to have a programmable timer on the oven.
14.7 Atomic absorption spectrophotometer

14.7.1 FAAS Varian Spectra 300 with data system and Mark VI burners for air- and nitrous oxide-acetylene flames or a Perkin-Elmer Model 2280 spectrophotometer with deuterium arc background corrector and digital display.

14.7.2 GFAAS Perkin-Elmer Model 3030 spectrophotometer with Zeeman effect background correction, HGA-60 furnace controller, AS-60 autosampler, EDL power supply and PR-800 printer.

14.8 Hollow cathode lamps: Single-element lamps are used and are preferred over multi-element lamps which may be used occasionally. Electrodeless discharge lamps may also be used for certain elements.
14.9 Perkin-Elmer Graphite furnace parts:

Pyrolytic coated graphite tubes	091504
Pyrolytic coated graphite tubes(grooved)	109322
L'vov platforms	109324

14.10 Pressure-reducing valves: The supplies of fuel and oxidant should be maintained at pressures somewhat higher than the controlled operating pressure of the instrument by suitable valves. (See manufacturer's specifications.)

15.0 REAGENTS

15.1 Reagent grade chemicals, unless otherwise specified, shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.
15.2 Type II water (ASTM D1193): Use Type II water for the preparation of all reagents and as dilution water.
15.3 Nitric Acid (HNO_3), Concentrated Redistilled.
15.4 Perchloric Acid ($HClO_4$), Concentrated Redistilled.
15.5 Hydrofluoric Acid(HF), Concentrated Redistilled.

15.6 Boric Acid(H_3BO_3), 99.99% pure.
15.7 Boric Acid 2.5%. Add 2.5g 99.99% pure Boric Acid Dilute to final weight of 100g.
15.8 Nitric Acid (HNO_3). 1%. Prepare by adding 1 part acid per 100 parts Type II water.
15.9 Micro detergent (International Products)
15.10 HNO_3:$HClO_4$. 4:1 Four parts of concentrated nitric acid are added to one part concentrated perchloric acid.
15.11 Fuel and oxidant: Commercial grade acetylene is generally acceptable. Air may be supplied from a compressed air line, a laboratory compressor, or a cylinder of compressed air. Reagent grade nitrous oxide is also required for certain determinations. Standard commercially available argon and nitrogen are required for furnace work.
15.12 Stock standard metal solutions: Stock standard solutions are prepared from high purity metals, oxides, or nonhydroscopic reagent-grade salts, using Type II water and redistilled nitric or hydrochloric acids. (See individual methods for specific instructions.) Sulfuric or phosphoric acids should be avoided as they produce an adverse effect on many elements. The stock solutions are prepared at concentrations of 1,000 mg of the metal per liter. Commercially available standard solutions may also be used if standards from two different vendors are checked against one another and are in agreement. Standards available from the U.S. National Institute of Standards and Technology (NIST) are also acceptable and do not have to be verified. Where the sample viscosity, surface tension, and components cannot be accurately matched with standards, the method of standard additions may be used.
15.13 Calibration standards: For those instruments which do not read out directly in concentration, a calibration curve is prepared to cover the appropriate concentration range. Usually, this means the preparation of standards which produce an absorbance of 0.0 to 0.7. Calibration standards are prepared by diluting the stock metal solutions at the time of analysis. For best results, calibration standards should be prepared fresh each time a batch of samples is analyzed, or demonstrate that the standards are still good by comparing the standard absorbances with those of SRM 1643b "Trace Elements in Water". The expiration date on the SRM 1643b should be used to validate its use for this purpose. If the standards cannot be validated using the SRM 1643b then the following can be used as a guideline:

less than 0.1 ppm - prepare daily
0.1 to 1.0 ppm - prepare weekly
1.0 to 10 ppm - prepare monthly
10 to 100 ppm - prepare quarterly
100+ ppm - prepare yearly (at a minimum)

Prepare a blank and at least three calibration standards in graduated amounts in the appropriate range of the linear part of the curve. Calibration standards should be prepared using the same type of acid or combination of acids and at the same concentration as will result in the samples following processing, 1% HNO_3 (14 ml concentrated

HNO_3/L) for tissues. Beginning with the blank and working toward the highest standard, aspirate the solutions and record the readings. Repeat the operation with both the calibration standards and the samples a sufficient number (minimum of two) of times to secure a reliable average reading for each solution. Calibration standards for furnace procedures should be prepared as described on the individual sheets for that metal.

16.0 QUALITY CONTROL

16.1 All quality control data should be maintained and available for easy reference or inspection.

16.2 A calibration curve must be prepared at least twice each day (one at the beginning and one at the end of each set of samples) for each element analyzed with a minimum of a reagent blank and three standards. The calibration curve should be verified by the use of at least a reagent blank and one quality control check standard at or near the mid-range every 15 samples. Checks throughout the day must be within 20% of the original curve.

16.3 If 20 or more samples per day are analyzed, the working standard curve must be verified by running an additional standard at or near the mid-range every 10 samples. Checks must be within $\pm$ 20% of the true value.

16.4 Employ a minimum of one reagent blank per sample batch to determine if contamination or any memory effects are occurring.

16.5 At least one spiked matrix and one replicate sample should be run every 10 samples or per analytical batch, whichever is greater. At least one spiked replicate sample should also be run with each matrix type to verify precision of the method.

16.6 Where the sample matrix is so complex that viscosity, surface tension, and components cannot be accurately matched with standards, the method of standard addition may be used.

16.7 Method of standard additions - The standard addition technique involves adding known amounts of standard to one or more aliquots of the processed sample solution. This technique compensates for a sample constituent that enhances or depresses the analyte signal, thus producing a different slope from that of the calibration standards. It will not correct for additive interferences which cause a baseline shift.

16.8 Serial dilution - Withdraw from the sample two equal aliquots. To one of the aliquots add a known amount of analyte and dilute both aliquots to the same predetermined volume. (The dilution volume should be based on the analysis of the undiluted sample. Preferably, the dilution should be 1:4, while keeping in mind that the diluted value should be at least 5 times the instrument detection limit. Under no circumstances should the dilution be less than 1:1.). The diluted aliquots should then be analyzed, and the un-spiked results, multiplied by the dilution factor, should be compared to the original determination. Agreement of the

results (within 10%) indicates the absence of interference. Comparison of the actual signal from the spike with the expected response from the analyte in an aqueous standard should help confirm the finding from the dilution analysis.

16.9 Dilute samples if they are more concentrated than the highest standard or if they fall on the plateau of a calibration curve.

16.10 Duplicates, spiked samples, standard reference materials, and check standards should be routinely analyzed.

16.11 Atomic absorption spectrophotometers (AAS) should be serviced on a regular basis by qualified technicians as part of a regularly scheduled preventive maintenance program.

16.12 A log book should be kept for each AAS that includes: Standard absorbances, photomultiplier voltages, detection limits, maintenance information, and any problems that might occur each time the instrument is used.

17.0 REFERENCES

17.1 Batelle Northwest. Unpublished Method. 439 W. Squim Bay Rd. Squim, Wa., 98382.

Analytical method for PCDD/PCDFs and Coplanar PCBs in fish tissue

18.0 SCOPE AND APPLICATION

18.1 The following analytical method is for the detection of PCDD/PCDFs and Coplanar PCBs in fish tissue.

19.0 SUMMARY OF METHOD

19.1 Samples were analyzed according to HML Method 880. In brief, wet fish tissues were kept frozen until time of preparation for extraction and clean-up. Fish tissues were transferred to freeze-drying flasks (Virtis) with liquid nitrogen (Liquid Carbonic), attached to a Virtis freeze mobile, and freeze-dried. Freeze-dried material was then transferred to 500 ml wide mouth teflon bottles. To each sample and blank, 150 ml of 9:1 hexane:methylene chloride were added and allowed to soak overnight. Fish tissues were then homogenized with a Brinkmann Polytron with approximately 15 g of sodium sulfate. Homogenization was completed when fish tissues were powdery in appearance. Internal standards were added to each sample. Fish tissues were then added to a 4.8 cm ID Kontes column containing 20 g of potassium silicate over 20 g of silica gel, with sodium sulfate added above and below the silicate and silica gel. Fish tissue residues were rinsed twice in 500 ml teflon bottles with 15 ml of 9:1 hexane:methylene chloride, then added to a Kontes column, followed by 50 ml of the same solvent mixture; drained under pressure through the carbon column. Eluants were collected as fraction 1.

19.2 Fifty milliliters of 20:80 hexane:methylene chloride were added to each carbon column via the reservoir. Eluants were collected as fraction 2.

19.3 The direction of flow was then reversed through the carbon columns and eluted with 50 ml of hot toluene. This was collected as fraction 3. Fractions 2 and fractions 3 were rotary evaporated to dryness. Each fraction 2 was applied in 1 ml hexane to a 10 ml pipet containing 1 cc potassium silicate over 2 cc 40% acid silica, with sodium sulfate above and below the silicate and silica. Three 1 ml hexane flask rinses were then added, followed by 8 ml of hexane. The clean-up procedure for fraction 3 was the same as for fraction 2, but instead of eluting with 8 ml of hexane, 16 ml of hexane was used. Fractions 2 and fractions 3 were then concentrated to approximately 1 ml using a Nitrogen-evaporator. The extracts were then transferred with appropriate rinsings to vials containing 200 pg of ^{13}C-labeled recovery standard and 8 ul of tetradecane. PCDD/Fs and PCBs 77, 126,169 were determined in fraction 3. PCBs 105, 118 were determined in fraction 2.

20.0 APPARATUS

20.1 The samples (Fractions 2 and 3) were analyzed by High

Resolution Gas Chromatography/ High Resolution Mass Spectrometry (HRGC/HRMS) (Varian 3400, Finnigan MAT 90) with a 60m, 0.25μm, DB-5 column, using a temperature program (220°C for 2 min, then 5°C/min to 260°C, followed by 1°C/min to 300°C). The MS operated in the EI mode (50 eV) with a 0.8 mA emission and a minimum resolution of 8000 amu.

21.0 DATA REPORTING

21.1 Analysis was conducted on freeze-dried material and the data converted to whole fish (fresh weight) using percent moisture content values provided by the Department of Fish & Games dissection and prep laboratory. Results are presented in units of pg/g (wet weight).

21.2 As specified in HML Method 880, if a congener concentration is below the detection limit, the detection limit is reported, flagged by an asterisk (*). When an flagged by the symbol "B" the analyte was detected above the detection limit, but below the quantitation limit. The symbol "I" indicates possible interference, and as such, the reported value represents a maximum value for that analyte. The symbol "L" indicates that an analyte detected in the sample was also detected in the blank, and that the amount in the sample was less than ten times the amount in the blank. The reported value is the upper limit of the concentration that could be in the sample when the blank is not subtracted. When the blank is subtracted, the corrected value is flagged by a "C". If a congener was not determined, the symbol "ND" is used. In the calculation of total congener concentrations, the symbol NA (not applicable) is used whenever a 2,3,7,8-substituted congener belonging to that congener group was "ND" or was flagged by "*", "B", "I" or "L", and would lead to erroneous calculations of total congener concentrations. All symbols are defined in the Data Base Description.

21.3 Toxic Equivalents (TEQs) were calculated on the basis of the International Toxic Equivalent Factors (I-TEF) (NATO, 1988). In addition, the proposed PCB Toxic Equivalents (Ahlborg *et al.*, 1994) were used to generate the PCB-TEQ. The I-TEFs and PCB-TEFs used for these calculations are shown in Section 20.3.1. In cases of flagged data, a conservative approach was taken, i.e., all flags were disregarded in the calculation of the TEQs, and as such, the calculated TEQs represent a maximum value. Whenever a congener is below the detection limit, one-half the detection limit is used in the I-TEQ calculations.

21.3.1 International Toxic Equivalency Factors (I-TEFs) for PCDD/PCDFs and WHO-sponsored TEFs for PCBs.

COMPOUND		TEF
3,3',4,4'-TCB	(PCB- 77)	0.0005
3,3',4,4',5-PeCB	(PCB-126)	0.1
3,3',4,4',5,5'-HxCB	(PCB-169)	0.01
2,3,3',4,4'-PeCB	(PCB-105)	0.0001

2,3',4,4',5-PeCB	(PCB-118)	0.0001
2,3,7,8 TCDD		1.0
1,2,3,7,8 PeCDD		0.5
1,2,3,4,7,8 HxCDD		0.1
1,2,3,6,7,8 HxCDD		0.1
1,2,3,7,8,9 HxCDD		0.1
1,2,3,4,6,7,8 HpCDD		0.01
1,2,3,4,6,7,8,9 OCDD		0.001
2,3,7,8 TCDF		0.1
1,2,3,7,8 PeCDF		0.05
2,3,4,7,8 PeCDF		0.5
1,2,3,4,7,8 HxCDF		0.1
1,2,3,6,7,8 HxCDF		0.1
2,3,4,6,7,8 HxCDF		0.1
1,2,3,7,8,9 HxCDF		0.1
1,2,3,4,6,7,8 HpCDF		0.01
1,2,3,4,7,8,9 HpCDF		0.01
1,2,3,4,6,7,8,9 OCDF		0.001

21.4 One method blank was analyzed with each of the four batches of samples. The highest background appeared in PCB 118 ranging from 35 to 200 pg/g. These background levels did not affect the measured levels of PCB 118 which ranged from 2200 to 31200 pg/g. Similarly, PCB 105 in the blanks ranged from 9 to 48 pg/g and did not affect the measured concentrations. Levels of 123478 HxCDF, 1233789 HpCDF and 1234678 HpCDF in the blanks two batches (flagged by "C") comprised the measurements of these two congeners. To remove this bias the background contamination measured in the blank was subtracted from each measurement.

22.0 QUALITY CONTROL

22.1 The effectiveness of a QA program is measured by the quality of data generated by the laboratory. Data quality is judged in terms of precision, accuracy and completeness.
22.2 Precision is the degree to which the measurement is reproducible and is determined by comparison of replicates. In the case of duplicates, the Relative Percent Difference (RPD) between the two samples may be used to estimate precision.

$$RPD = \frac{| D_1 - D_2 |}{(D1 + D_2)/2} \times 100$$

where: RPD = relative percent difference
D_1 = first sample value
D_2 = second sample value (duplicate)

Two of the nineteen samples were analyzed as replicates in separate batches, i.e., processing and analysis performed on

different days to capture the maximum variability of the system. Relative percent differences (RFD) ranged from less than 4% to 51% with an average of 23.5% for congeners above detection.

22.3 Accuracy is a determination of how close the measurement is to the true value. The determination of the accuracy of a measurement requires a knowledge of the true or accepted value for the signal being measured. With methods using isotope dilution, accuracy may be calculated in terms of percent recovery of the labeled internal standard added for each congener as follows:

$$\text{Percent Recovery} = \frac{\text{Measured value}}{\text{Amount of internal std}} \times 100$$

Percent recoveries of the internal standards were within the 40% to 120% window specified in the HML Method 880 and the USEPA SW-846 Method 8280. The only exception was encountered with the first batch of samples where slightly higher percent recoveries were attributed to a defective electronic board in the HRMS. External calibration confirmed the accuracy of the measurements.

22.4 Completeness- To be considered complete, the data must contain all QC check analyses verifying precision and accuracy for the analytical protocol. The percent completeness for each set of samples is calculated as:

$$\text{Completeness} = \frac{\text{Valid data obtained}}{\text{Total data planned}} \times 100$$

No samples or data were lost or invalidated and, therefore, the completeness of this study was 100%.

23.0 METHOD PERFORMANCE

23.1 Each batch of 4 to 6 samples was analyzed along with a method blank. Every other batch included one sample analyzed in duplicate. Precision was expressed as the Percent Relative Difference (RPD) and accuracy as the % recovery of the labeled internal standard. All samples were spiked with a mixture of all seventeen ^{13}C-labeled PCDD/PCDF and four PCB internal standards prior to clean up, and the final extract was made up in a tetradecane solution containing a mixture of three $^{13}C_6$-labeled recovery standards. The percent recovery of the internal standards was calculated relative to the recovery standards.

23.1.1 ^{13}C-labeled internal standards and $^{13}C_6$-labeled recovery standards are used with all samples.

^{13}C-3,3′,4,4′ TCB	(PCB #77)
^{13}C-3,3′,4,4′,5 PeCB	(PCB #126)
^{13}C-3,3′,4,4′,5,5′ HxCB	(PCB #169)

^{13}C-2,3',4,4',5 PeCB (PCB #118)
^{13}C-2,3,7,8 TCDD
^{13}C-1,2,3,7,8 PeCD
^{13}C-1,2,3,4,7,8 HxCDD
^{13}C-1,2,3,6,7,8 HxCDD
^{13}C-1,2,3,7,8,9 HxCDD
^{13}C-1,2,3,4,6,7,8 HpCDD
^{13}C-1,2,3,4,6,7,8,9 OCDD
^{13}C-2,3,7,8 TCDF
^{13}C-1,2,3,7,8 PeCDF
^{13}C-2,3,4,7,8 PeCDF
^{13}C-1,2,3,4,7,8 HxCDF
^{13}C-1,2,3,6,7,8 HxCDF
^{13}C-1,2,3,7,8,9 HxCDF
^{13}C-2,3,4,6,7,8 HxCDF
^{13}C-1,2,3,4,6,7,8 HpCDF
^{13}C-1,2,3,4,7,8,9 HpCDF
^{13}C-1,2,3,4,6,7,8,9 OCDF

23.1.2 Recovery Standards

$^{13}C_6$-2,3,4,7,8 PeCDF
$^{13}C_6$-1,2,3,4,7,8 HxCDF
$^{13}C_6$-1,2,3,4,7,8,9 HpCDF

24.0 REFERENCES

24.1 Ahlborg UG, GC Becking, LS Birnbaum *et al*. Toxic equivalency factors for dioxin-like PCBs. Report on a WHO_ECEH and IPCSA consulation, December 1993. Chemosphere 28: 1049-1067, 1994.

24.2 Hazardous Materials Laboratory. Analysis of PCDD/PCDFs, Method 880, 1991.

24.3 NATO, Committee on the challenges of Modern Society. Pilot Study on International Information Exchange on Dioxins and Related Compounds. International Toxicity Equivalency Factor (I-TEF) Method of Risk Assessment for Complex Mixtures of Dioxins and Related Compounds, Report # 176, 1988.

ANALYSIS OF TRACE ORGANICS

25.0 SCOPE AND APPLICATION

25.1 The following method describes fish tissue analysis for the detection of PCBs, Pesticides and PAHs.

26.0 SUMMARY OF METHOD: TOF SOP #9302 rev 6/94

26.1 A 5 gram sample of tissue is extracted 2 times with 35 mL of methylene chloride using a Tekmar Tissumizer®. Prior to extraction, sodium sulfate and extraction surrogates are added to the sample and methylene chloride.
26.2 After combining the two extraction aliquots and a 10 mL rinse, the extract is divided into three portions; one quarter for lipid weight determination and one half for aromatic and chlorinated hydrocarbon (AH/CH) analysis. The remaining aliquot is set aside in the event that analysis is required separating the PCBs from the more polar pesticides.
26.3 The AH/CH portion is eluted through a silica/alumina column for pre-HPLC cleanup. One half of the AH/CH portion undergoes additional cleanup using size-exclusion High Performance Liquid Chromatography (HPLC/SEC) (TOF SOP #9321). The post-HPLC AH/CH fraction is concentrated to 125 µL using a combination of tube heater and nitrogen gas evaporation. This fraction is utilized for both CH and AH analysis as described below.
26.4 The AH/CH fraction is analyzed by capillary gas chromatography for chlorinated hydrocarbons utilizing an electron capture detector (GC/ECD; TOF SOP #9332). A single 2 µL splitless injection is directed onto two columns of different polarity (DB-17 & DB-5) to provide two dimensional confirmation of each analyte.
26.5 The AH/CH fraction is also analyzed by gas chromatography mass spectrometry (GC/MS) for aromatic hydrocarbons (TOF SOP #9333). A 2 µL splitless injection is chromatographed on a 0.25 i.d. x 60m DB-5ms column (J & W Scientific) and analyzed in a single ion monitoring (SIM) mode.
26.6 Quality Assurance measures include the use of dual column chromatography, calibration check solutions, inspection and verification of internal standard and surrogate recoveries. Tracking of analytical precision and accuracy is accomplished through the use of method duplicates and standard reference materials. Samples are extracted and analyzed in sets of 10-12. Standard Reference Materials and method blanks are analyzed with each analytical set. Method duplicates are analyzed at a frequency of one sample every other set.

27.0 QUALITY CONTROL

27.1 Accuracy - Certified Standard Reference Materials (SRM) are utilized to verify the accuracy of analytical methods. SRMs are analyzed at a minimum of once monthly, however when sufficient supplies are available one SRM sample is analyzed with each set of 10-12 samples.

27.1.1 Mussel Tissue SRM 1974a was purchased in January 1994 from the National Institute of Standards and Technology (NIST) through their Intercalibration Exercise Program as QA93TIS5 Mussel Tissue V. To date the official certificate of analysis has not been released from NIST, so this report has been generated using the consensus values from the 1993 intercalibration exercise.

27.1.2 Using the intercalibration consensus values and their standard deviations as confidence interval ranges, the results of the 8 SRM 1974a samples extracted for this project met the accuracy requirements outlined in the BPTCP Quality Assurance Project Plan (BPTCP QAPP). Accuracy control charts were generated for all analytes with values greater than 10 times the method detection limit (MDL).

27.2 Precision - SRMs and method duplicates are utilized to determine methodological precision. When available, one SRM is analyzed with every set of 10-12 samples. Method duplicates are analyzed with a frequency of one in 20-24 samples (i.e. 5%). Duplicates are scheduled in such a manner that they are not included in the same extraction set or analytical run.

27.2.1 SRM analyses showed acceptable precision for both PAHs and chlorinated organics. As outlined in the BPTCP QAPP, analytical precision is acceptable if duplicate analyses of SRMs yield replicate results with less than 30% relative standard deviation for analytes with certified values greater than 10x the MDL. Since the data set revealed extremely low PAH levels, SRM values were used to calculate precision estimates at both 5x MDL and 1x MDL.

27.2.2 Method duplicates also provide a strong analytical assurance in the precision of the reported data. The control criteria for the analysis of method duplicates is based on a relative percent difference (RPD) of less than 30% for analyte results greater than 10 times the MDL. Eighty percent of all analytes within an analytical class, i.e. PAHs or chlorinated organics, must meet this control criterion. For the purpose of creating control charts the analytes were divided into three main classes of compounds: PAHs, PCBs, and pesticides. Four of the sixty-six analyzed samples were treated as method duplicates to provide precision estimates for the reported data set. All of the chosen samples had chlorinated organics results which were greater than 10x MDL. No sample provided

PAH values greater than 10x MDL. The method duplicate precision results were considered acceptable with 99% of the 73 independent chlorinated organic measurements having RPDs of less than 30%.

27.3 Blanks - One procedural blank was analyzed with each set of 10-12 samples. While no analytical interference greater than or equal to the control limit of 3 times the MDL was found, naphthalene, 1-methyl naphthalene, and 2-methyl naphthalene were in many of the method blanks at levels similar to those reported in the samples. These low boiling semi-volatile are common laboratory contaminants. Considering the low PAH results obtained in the reported data set, all results less than 3x MDL, the reported naphthalene values may be significantly influenced by the laboratory contaminants.

27.4 Continuing Calibration Checks - Instrument calibration is verified every 10 - 16 hours to allow for the control of instrumental drift and resulting quantitation errors. The analysis of calibration check solutions must result in "recoveries" of 100 ± 25% and "mean % differences" (MPDs) for all analytes not to exceed ± 15% of expected. If any one analyte or the MPD of all analytes exceed these control limits the test fails and corrective action is taken.

27.4.1 Dilutions of certified NIST solutions were prepared and analyzed with each set of samples to verify instrumental calibration stability over the length of the analytical run. The PAH and Pesticide calibration solutions were prepared from NIST SRMs 2260 and 2261, respectively. The PCB calibration solutions were prepared from the NIST solution presently being certified; draft values were utilized for the generation of the PCB results.

27.4.2 Since the reported analyte list included many non-NIST analytes, we also analyzed our mid-level standards to augment the NIST derived calibration solutions and to provide calibration verification for compounds not found in these solutions.

27.4.3 PAH CCCs: The calibration checks resulting from each analytical set were in control for all analytes.

27.4.4 CH CCCs: Chlorinated Pesticides and PCBs. The calibration checks resulting from each analytical set were in control for most analytes. HCB, Heptachlor, and Aldrin revealed problems in our standards ability to attain values which were comparable to NIST Certified values. This problem affected no data in the reported data set and we are in the process of making new analytical standards. The calibration check procedures also highlighted an intermittent problem with the quantitation of gamma-HCH which was also not seen in either the field duplicates or the method duplicates of the affected sample.

Therefore, the calibration checks show that the analytical system was stable for all of the reported results.

28.0 METHOD PERFORMANCE

28.1 Analytical Method Validation - In the past, our laboratory has performed the bulk of our analyses through the fractionation of sample extracts by polarity. Previous analyses of bivalves from the San Francisco Bay led us to believe that biological samples from this region would be relatively uncomplicated and could be accurately analyzed in a single fraction. Therefore we proceeded with the current analyses using a single analytical fraction and an extended chromatographic program. In order to document if any consistent bias was introduced into the data set, a simple validation exercise was performed.

28.1.1 During the course of this project, 10% of the samples analyzed and 2 SRMs were subjected to a full fractionation procedure to determine if analytical bias was introduced into the data set by analyzing these samples in a single fraction. The results of this analysis revealed no consistent problems and indicate that fractionation is not necessary to produce acceptable results for the present analyte list in fish muscle from the geographical region studied.

28.2 Holding Time Verification - All samples met the holding time criterion of 40 days from extraction to analysis. CH analyses were performed within 9 ± 4 days while AH analyses were performed within 17 ± 6 days.

28.3 Surrogate Recovery Verification - All surrogate recoveries were well within the QA/QC criterion of 30 to 150%. Aromatic hydrocarbon surrogate recoveries ranged from 65 to 120% with d8-Napthalene showing the lowest recoveries. Chlorinated hydrocarbon surrogate recoveries ranged from 77 to 103%.

28.4 Completeness - The delivered samples were analyzed for all of the requested analytes. Therefore the completeness of this data set was 100%.

29.0 METHOD DETECTION LIMITS

29.1 Chlorinated Organic Pesticides and Their Wet Weight Detection Limits in Tissue

Analytes	Database Abbreviation	MDL, ng/g
Aldrin	ALDRIN	0.2
cis-Chlordane	CCHLOR	0.2
trans-Chlordane	TCHLOR	0.2
alpha-Chlordane	ACDEN	0.2

gamma-Chlordane	GCDEN	0.2
Chlorpyrifos	CLPYR	0.8
Dacthal	DACTH	0.2
o,p'-DDD	OPDDD	1
p,p'-DDD	PPDDD	0.6
o,p'-DDE	OPDDE	0.6
p,p'-DDE	PPDDE	0.2
p,p'-DDMS	PPDDMS	4
p,p'-DDMU	PPDDMU	1
o,p'-DDT	OPDDT	0.8
p,p'-DDT	PPDDT	0.8
p,p'-Dichlorobenzophenone	DICLB	5
Dieldrin	DIELDRIN	0.2
Endosulfan I	ENDO_I	0.2
Endosulfan II	ENDO_II	0.6
Endosulfan sulfate	ESO4	1
Endrin	ENDRIN	1.2
alpha-HCH	HCHA	0.2
beta-HCH	HCHB	0.6
gamma-HCH	HCHG	0.2
delta-HCH	HCHD	0.4
Heptachlor	HEPTACHLOR	0.2
Heptachlor Epoxide	HE	0.2
Hexachlorobenzene	HCB	0.2
Methoxychlor	METHOXY	3
Mirex	MIREX	0.2
cis-Nonachlor	CNONA	0.2
trans-Nonachlor	TNONA	0.2
Oxychlordane	OCDAN	0.2
Toxaphene	TOXAPH	20

29.2 NIST PCB Congeners and Their Wet Weight Detection Limits in Tissue

NIST PCB Analytes	Database Code	MDL,ng/g
2,4'-dichlorobiphenyl	PCB8	0.2
2,2',5-trichlorobiphenyl	PCB18	0.2
2,4,4'-trichlorobiphenyl	PCB28	0.2
2,2',3,5'-tetrachlorobiphenyl	PCB44	0.2
2,2',5,5'-tetrachlorobiphenyl	PCB52	0.2
2,3',4,4'-tetrachlorobiphenyl	PCB66	0.2
2,2',3,4,5'-pentachlorobiphenyl	PCB87	0.2
2,2',4,5,5'-pentachlorobiphenyl	PCB101	0.2
2,3,3',4,4'-pentachlorobiphenyl	PCB105	0.2

2,3',4,4',5-pentachlorobiphenyl	PCB118	0.2
2,2',3,3',4,4'-hexachlorobiphenyl	PCB128	0.2
2,2',3,4,4',5'-hexachlorobiphenyl	PCB138	0.2
2,2',4,4',5,5'-hexachlorobiphenyl	PCB153	0.2
2,2',3,3',4,4',5-heptachlorobiphenyl	PCB170	0.2
2,2',3,4,4',5,5'-heptachlorobiphenyl	PCB180	0.2
2,2',3,4',5,5',6-heptachlorobiphenyl	PCB187	0.2
2,2',3,3',4,4',5,6-octachlorobiphenyl	PCB195	0.2
2,2',3,3',4,4',5,5',6-nonachlorobiphenyl	PCB206	0.2
2,2',3,3',4,4',5,5',6,6'-decachlorobiphenyl	PCB209	0.2

29.3 Additional PCB Congeners and Their Wet Weight Detection Limits in Tissue

PCB Analytes	Database Code	MDL, ng/g
2,3-dichlorobiphenyl	PCB5	0.2
4,4'-dichlorobiphenyl	PCB15	0.2
2,3',6-trichlorobiphenyl	PCB27	0.2
2,4,5-trichlorobiphenyl	PCB29	0.2
2,4',4-trichlorobiphenyl	PCB31	0.2
2,2,'4,5'-tetrachlorobiphenyl	PCB49	0.2
2,3',4',5-tetrachlorobiphenyl	PCB70	0.2
2,4,4',5-tetrachlorobiphenyl	PCB74	0.2
2,2',3,5',6-pentachlorobiphenyl	PCB95	0.2
2,2',3',4,5-pentachlorobiphenyl	PCB97	0.2
2,2',4,4',5-pentachlorobiphenyl	PCB99	0.2
2,3,3',4',6-pentachlorobiphenyl	PCB110	0.2
2,2',3,3',4,6'-hexachlorobiphenyl	PCB132	0.2
2,2',3,4,4',5-hexachlorobiphenyl	PCB137	0.2
2,2',3,4',5',6-hexachlorobiphenyl	PCB149	0.2
2,2',3,5,5',6-hexachlorobiphenyl	PCB151	0.2
2,3,3',4,4',5-hexachlorobiphenyl	PCB156	0.2
2,3,3',4,4',5'-hexachlorobiphenyl	PCB157	0.2
2,3,3',4,4',6-hexachlorobiphenyl	PCB158	0.2
2,2',3,3',4,5,6'-heptachlorobiphenyl	PCB174	0.2
2,2',3,3',4',5,6-heptachlorobiphenyl	PCB177	0.2
2,2',3,4,4',5',6-heptachlorobiphenyl	PCB183	0.2
2,3,3',4,4',5,5'-heptachlorobiphenyl	PCB189	0.2
2,2',3,3',4,4',5,5'-octachlorobiphenyl	PCB194	0.2
2,2',3,3',4,5',6,6'-octachlorobiphenyl	PCB201	0.2
2,2',3,4,4',5,5',6-octachlorobiphenyl	PCB203	0.2
AROCLOR1248		6
AROCLOR1254		2
AROCLOR1260		2

29.4 Wet Weight Detection Limits of Polychlorinated Terphenyls in Tissue

Analyte	Database Code	MDL,ng/g
Polychlorinated Terphenyl Aroclor 5460	ARO5460	20

29.5 Polycyclic Aromatic Hydrocarbons and Their Wet Weight Detection Limits in Tissue

Analyte	Database Code	MDL, ng/g
Naphthalene	NPH	2
2-Methylnaphthalene	MNP2	2
1-Methylnaphthalene	MNP1	2
Biphenyl	BPH	2
2,6-Dimethylnaphthalene	DMN	2
Acenaphthylene	ACY	2
Acenaphthene	ACE	2
2,3,5-Trimethylnaphthalene	TMN	2
Fluorene	FLU	2
Phenanthrene	PHN	2
Anthracene	ANT	2
1-Methylphenanthrene	MPH1	2
Fluoranthene	FLA	2
Pyrene	PYR	2
Benz[a]anthracene	BAA	2
Chrysene	CHR	2
Benzo[b]fluoranthene	BBF	2
Benzo[k]fluoranthene	BKF	2
Benzo[e]pyrene	BEP	2
Benzo[a]pyrene	BAP	2
Perylene	PER	2
Indo[1,2,3-cd]pyrene	IND	3
Dibenz[a,h]anthracene	DBA	3
Benzo[ghi]perylene	BGP	3

30.0 AROCLOR ANALYTICAL METHODS

30.1 All SO data is acquired and analyzed using a Hewlett-Packard DOS based ChemStation system.

30.2 Instruments are calibrated with PCB congener standards prepared from neat materials in house. The

calibration range is approximately 0.001 - 500 pg/uL per component.

30.3 Previously, a compositional analysis was performed on all in house Aroclor mixtures providing conversion factors for PCB congener concentrations to Aroclor concentrations.

30.4 Aroclor 1260 values were generated from congeners 194, 195, 201 and 203.

30.5 Aroclor 1248 values were generated from congeners 18, 31, and 28.

30.6 After correcting for positive biases due to calculated values of Aroclor 1260 and/or Aroclor 1248, Aroclor 1254 is quantitated from congeners 99, 118, 128, and 138.

30.7 In all cases the mean value of the listed congeners is considered valid and reported if the associated relative standard deviation is less than 50%. The values generated by this approach compared well with values calculated using classical approaches, as shown by in house tests and round robin exercises with the CDFG Water Pollution Control Laboratory in Rancho Cordova.

30.8 Quality assurance associated with this analysis consisted of precision measurements through the analysis of samples in duplicate. Certified Aroclor values are not available for the SRM utilized during this project.

APPENDIX IV
CRUISE REPORT

APPENDIX IV
CRUISE REPORT

CRUISE REPORT FOR THE
SAN FRANCISCO BAY HEALTH RISK ASSESSMENT STUDY

Sampling for the San Francisco Bay Fish Health Risk Assessment Study began on **Monday, 5-2-94.** The sampling crew mobilized from Moss Landing and arrived at the Redwood City Marina at 1130. The boat (18' Boston Whaler) was launched and equipment set up for otter trawls (1 1/4" size nylon stretch mesh), with the crew under way by 1300. The crew for the day consisted of Karen Taberski (RWQCB), Russell Fairey (CDFG) and Eric Johnson (CDFG). The initial sampling site was **24002.0 Dumbarton Bridge Pier.** Weather conditions were clear but windy with waves hindering sampling work. Approximately eight-fifteen minute otter trawls were made within one mile of the pier. Fifteen white croaker were selected from the trawls and grouped to three size class composites (five fish each). A fourth composite of five shiner surfperch was also collected. Gravid female surfperch were abundant in the trawls but were selectively excluded from the composites at this and all subsequent sites. Total length for the croaker ranged from 157-286 mm and from 102-157 mm for the surfperch. All composites were stored in teflon and frozen on dry ice. Sampling was concluded and the boat trailered by 1900.

Tuesday, 5-3-94 Sampling was begun at 0730 with the boat being launched from the Coyote Point Marina. The crew for the day consisted of Karen Taberski (RWQCB), Russell Fairey (CDFG) and Eric Johnson (CDFG). Weather conditions were clear, but windy, with waves hindering sampling work. Approximately 600' of trammel net (2 outer panels with 18" & one inner panel with 8" nylon stretch mesh size) was deployed 2 miles north of the San Mateo Bridge in an effort to capture sharks from the southern region of S.F. Bay. After the trammel net deployment, approximately six fifteen minute otter trawls were done within one mile of the site **24001.0 San Mateo Bridge Pier.** Fifteen white croaker were selected from the trawls and grouped to three size class composites (five fish each). A fourth composite of twenty shiner surfperch was also collected. Gravid female surfperch were abundant in the trawls but were selectively excluded from the composites. Total length for the croaker ranged from 154-254 mm and from 103-136 mm for the surfperch. A single halibut (660 mm) was captured in one of the trawls and saved for a composite of this species. After concluding work at the San Mateo Bridge Pier site, the crew returned to the Dumbarton Bridge Pier to collect additional shiner surfperch. This was deemed necessary to insure sufficient fish tissue available from these small species for all chemical analysis. Three trawls were needed to obtain the fifteen fish required to make a total composite of twenty, counting the five fish from the previous day. The crew returned to the trammel nets north of the San Mateo Bridge and collected one leopard shark (1194 mm) and two halibut(660 & 953 mm) during retrieval. Approximately eighty bat rays were also captured in the nets but released since they were not a target species. The

halibut caught during the day were subsampled to make a south Bay composite of three. All composites were stored in teflon and frozen on dry ice. Sampling was concluded and the boat trailered by 1930.

Wednesday 5-4-94 Sampling personnel included Eric Johnson (CDFG) and Stewart Lamerdin (CDFG) and James Sundu (RWQCB). The Whaler was launched from the Oyster Point Marina at 0730 hrs. The sampling crew proceeded to site # **24007.0 Double Rock (Candlestick).** The trammel net was set at 4 meters depth across the center of the small bay at this site prior to trawling. Approximately seven otter trawls were conducted between 3 and 10 meter depth at the site yielding 3 composites of white croaker and one composite of shiner surfperch. Total length for the croaker ranged from 165-254 mm and from 105-147mm for the surfperch. The trammel net was set for 2 hours and yielded no target species though bat rays and a sublegal halibut were captured.

After completing site 24007.0, the sampling crew proceeded to site# **24008.0 Islais Creek.** Prior to sampling at site 24008.0, the sampling crew set a 300 ft. trammel net in a small bay off the northeast corner of the San Francisco Airport at 2.5 meters depth. Approximately 10 trawls were conducted at site 24008.0 between 11 and 15 meters depth, yielding 3 composites of white croaker and 1 composite of shiner surfperch. Total length for the croaker ranged from 161-229 mm and from 106-116 mm for the surfperch. The trammel net off San Francisco yielded 1 leopard shark (1321 mm). Also captured were 15 bat rays and 2 legal halibut, all which were released. The trammel net was reset in this same location, and checked again at the completion of collection at site 24008.0. This second trammel net set yielded a leopard shark (1219 mm) and approximately 10 bat rays.

The sampling crew proceeded back to Oyster Point Marina, arriving at 1930 hrs. Fish samples were prepared and all composites were stored in teflon and frozen on dry ice. The sampling crew departed Oyster Point Marina at 2300 hrs.

Thursday, 5-5-94 Sampling was begun at 0830 with the boat being launched from Pier 56 launch ramp in San Francisco. The crew for the day consisted of Russell Fairey (CDFG) and Eric Johnson (CDFG). The sampling crew proceeded to **24013.0 San Francisco Pier #7.** Weather conditions were clear, but windy. This in conjunction with very strong tide movement made trawling ineffective, so work at this station was ended and the crew moved across the Bay to **24009.0 Oakland Middle Harbor Pier.** Approximately 10 trawls were conducted at site 24009.0 between 4 and 10 meters depth, yielding 3 composites of white croaker and 1 composite of shiner surfperch. Total length for the croaker ranged from 166-242 mm and from 98-147 mm for the surfperch. After completion of this site, the crew returned to sample the 24013.0 San Francisco Pier #7 site. A 300' gill net (2 1/2" monofilament mesh) was deployed and several trawls were attempted. No fish were caught in the trawls so hook and line was attempted. Again, no fish were caught. The gill net was retrieved and 4 croaker (251-305 mm) were captured. The crew again attempted trawling this site, after dark, without success, so the

crew returned to the launch ramp. Fish samples were prepared and all composites were stored in teflon and frozen on dry ice. The sampling crew departed the Pier #56 launch ramp at 2200 hrs.

Friday, 5-6-94 Sampling was begun at 0730 with the boat being launched from the Alameda launch ramp and the crew proceeding to **24006.0 Oakland Harbor (Fruitvale)**. The crew for the day consisted of Russell Fairey (CDFG) and Eric Johnson (CDFG). Weather conditions were windy and cloudy with heavy rain at times.

Several otter trawls were made with the only species captured being three composites of shiner surf perch. The gill net was set for two hours and six legal size striped bass (460-501 mm) and three sublegal striped bass (370-375 mm) were captured. Three of the intermediate sized legal striped bass (460-468) were selected for the fourth composite at this site. The remainder were used for two composites of the separate striped bass samples. Fish samples were prepared and all composites were stored in teflon and frozen on dry ice. The sampling crew departed the Alameda launch ramp at 1700 hrs.

Saturday, 5-7-94 This date was the scheduled interagency cooperative sampling effort involving CDFG, SWRCB, DHS and SAFER. Several representatives from each government group were present at the **24003.0 Fremont Forebay** site to assist private fisherman from SAFER with the handling of hook and line caught fish. Approximately twenty fisherman began fishing at 0830 from the bank of the forebay. Weather conditions were cloudy and rainy with excessive freshwater runoff entering the forebay. Fishing continued until 1430 with only two immature striped bass being caught in that time period. Lack of success brought an early end to this effort and plans were made to return at a later date and sample this site with gill nets and trammel nets.

Monday, 5-9-94 Sampling was begun at 1030 with the boat being launched from Pier 56 launch ramp in San Francisco. The crew for the day consisted of Russell Fairey (CDFG) and Eric Johnson (CDFG). The sampling crew proceeded to **24013.0 San Francisco Pier #7** and set the 300' gill net. The crew then proceeded across the Bay to just north of the Berkeley Fishing Pier and set the 300' trammel net. Trawls were begun at **24005.0 Berkeley Pier** with the only species captured being three composites of shiner surf perch (100-150 mm). The crew returned to the Pier #7 site and retrieved the gill net capturing three composites of white surf perch (219-280 mm) and one white croaker (279 mm). These fish along with those caught on 5-5-94 were enough to complete sampling at the Pier #7 site. The crew trailered the boat across the Bay and launched again at the Berkeley Marina. The crew returned to the Berkeley Pier and deployed the 300' gill net. The trammel net which was deployed earlier in the day was retrieved next, though only bat rays were captured. The trammel net was moved to deeper water, near Treasure Island, and redeployed. The trammel was checked after one hour and one leopard shark (1143 mm) was caught. The trammel was deployed again at the same location and the crew returned to the gill net at Berkeley Pier where six brown smoothhound sharks

were captured. Three of the smaller sharks (457-508 mm) were used as composite #4 at the Berkeley Pier and the larger three (686-711) were used as composite #2 of the Mid-Bay Sharks. Weather conditions deteriorated and the crew was unable to return to the trammel net set at Treasure Island due to rough water. The crew returned to the marina and fish samples were prepared. All composites were stored in teflon and frozen on dry ice. The sampling crew departed the Berkeley Marina launch ramp at 2200 hrs.

Tuesday, 5-10-94 The sampling crew of Russell Fairey (CDFG) and Eric Johnson (CDFG) launched from the Berkeley Marina at 0800 and retrieved the trammel net from the overnight deployment at Treasure Island. The net was heavily fouled with algae and required several hours to retrieve and clean. One leopard shark (1259 mm) was caught as well as a legal halibut which was released. The crew then returned to the launch ramp and trailered to the Richmond Marina. The boat was launched and sampling was begun at **24004.0 Richmond Harbor** at 1230. Weather conditions were clear, but windy. The gill net and trammel net were set and then several trawls were made. Shiner surf perch were the only species caught in the trawls so three composites were taken (100-161 mm). The gill net was retrieved and three brown smoothhounds were caught to make the fourth composite (559-711 mm). The trammel net was retrieved and one legal sized halibut was captured and released. The crew returned to the marina and fish samples were prepared. All composites were stored in teflon and frozen on dry ice. The sampling crew departed the Richmond Marina at 2000 hrs.

Wednesday, 5-11-94 The sampling crew of Russell Fairey (CDFG) and Eric Johnson (CDFG) launched from the Richmond Marina at 0800 and traveled north to **24010.0 Point Molate.** Weather conditions were clear and slightly windy. The gill net was deployed in 2-4 meters of water and then the crew moved north into San Pablo Bay and deployed the 300' trammel net. The crew returned to Point Molate and made several trawls capturing numerous white croaker and a legal halibut. The gill net was retrieved with a catch of white croaker, brown smoothhounds and walleye surf perch.

Three composites of white croaker were selected and the walleye surf perch were chosen for the fourth composite. Two composites of brown smoothhounds were chosen for north Bay shark samples. The crew retrieved the trammel net from San Pablo Bay and found no fish captured, so the trammel was redeployed at the Point Molate site. The crew used hook and line for approximately one hour at Point Molate, catching one Leopard Shark (1346 mm).

At approximately 1500 hrs. Russell Fairey left and James Downing arrived. The sampling crew, now Eric Johnson and James Downing, returned to sampling at site #24010.0 Point Molate to complete sampling. Concurrent trammel net sets at 12 to 14 meters depth yielded 1 additional leopard shark (1247 mm). The sampling crew proceeded back to the Richmond Marina at 2000 hrs. Fish samples were prepared at the marina and placed in dry ice. The sampling crew departed at 2145 hrs.

Thursday, 5-12-94 The sampling crew consisted of Eric

Johnson and James Downing. The Rodeo public launch ramp was dry with the low tide, thus the boat was launched from a public launch ramp in Vallejo and proceeded to the **24011.0 RODEO** site. Otter trawls were initiated in several areas with no yield of target species, so both trammel and gill nets were set. The trammel net was set in 8 meters depth while the gill net was set at 4 meters depth. A total of 12 otter trawls were completed yielding no target species. The trammel net was set for four hours and yielded nothing. It was then reset near the "Mothball Fleet" at 7 meters depth for 3 hours. This set also yielded nothing. The gill net was set for 3 hours and yielded 10 white croaker and 12 brown smoothhounds. The net was reset in the same location for 2 hours yielding 8 white croaker and 15 brown smoothhounds. This site yielded 3 composites of white croaker (270-340 mm) and one composite of brown smoothhound (470-559 mm). After completing the composites for this site, the sampling crew proceeded to site **24012.0 Martinez Pier/ Suisin** and conducted otter trawls there between approximately 1700 and 1900 hours yielding no target species. The sampling crew returned to the public launch at Vallejo at 2030 hours. Fish samples were prepared at the launch in Vallejo and placed in dry ice. The sampling crew departed at 2200 hours.

Friday, 5-13-94 The sampling crew attempted to launch out of Benecia but the boat launch was dry. Thus the boat was launched from the Martinez public boat launch at 0945 hours and the sampling crew proceeded to the **24012.0 Martinez Pier/ Suisin** site. Both the 300 ft. trammel and the 300 ft. gill nets were set in or near the shallow bench just adjacent and west of the harbor. Four otter trawls were also conducted in this area. All yielded nothing. Sampling was then shifted to the other side of the Carquinez Straits Bridge where the water averaged a shallower depth. Two 150 ft. trammel nets, a 300 ft. trammel net, and a 300 ft. gill net were set around the "Mothball Fleet". These nets were allowed to fish while otter trawls were conducted (approximately 3 hours). The net sets and otter trawls yielded no target species. Interviews with locals on the pier and at the bait shop suggest that croaker, perch, smelt and shark are not commonly caught at this location. The only potential catch at this location is striped bass and sturgeon, neither of which appeared to be there at that time. Sampling was terminated at this site with no target species captured.

Saturday, 5-14-94 The sampling crew on this date was Eric Johnson and Stewart Lamerdin. The boat was launched from the public launch ramp in Sausalito at 0930. The boat proceeded to the paradise cove area and set 2-150' trammel nets, a 300' trammel net, and a 300' gill net proceeding progressively towards the San Rafael Bridge. The trammel nets were set between 7 and 11 meters depth, while the gill net was set in 4 meters of water. After two hours the trammel nets yielded 2 sublegal sturgeon, a bat ray, and two sublegal halibut. The two small trammel nets were reset in the original area while the large trammel net was reset in the Pt. Molate area to capture the final north Bay shark. Hook and line fishing was also used while the net was set to capture a large shark. The hook and line fishing and trammel

netting yielded only three spiny dogfish. The two small trammel nets were retrieved after two hours and yielded 5 sublegal sturgeon, 2 sublegal and 2 legal halibut, and a long nosed skate. The gill net was retrieved after approximately 5.5 hours yielding white croaker, brown smoothhound sharks and sublegal striped bass. Three brown smoothhounds (635-711 mm) were used as the third composite of Mid Bay Sharks. The boat was loaded on the trailer at Sausalito at 1545 hours and was trailered to Coyote Point Launch Facility to attempt to catch the remainder of the South Bay Shark samples. The boat was launched at 1800 hours and proceeded 0.5 miles south from the harbor to a shallow mud flat area. A 300' gill net was set in 3 meters depth there and fished for 2.5 hours. this set yielded a composite of brown smoothhound sharks (457-584 mm), a composite of medium sized leopard shark (660-813 mm), the final large leopard shark (1219 mm) needed to complete the large composite and 3 striped bass (477-486 mm). The fish were prepared and placed on dry ice. The boat was placed on the trailer and the crew departed at 2200 hours.

Friday, 5-20-94 This field day was used to re-sample **24003.0 FREMONT FOREBAY.** The sampling crew for the day was Russell Fairey, Eric Johnson, James Downing and Lisa Kerr. This area is inaccessible by boat so nets were set by the sampling crew swimming them into position across narrow channels. High tide was at approximately 1030 hrs. and a 300' gill net and a 300' trammel were set during slack tide. The nets fished throughout the out-going tide and were retrieved during slack low tide. The trammel net caught no target species. The gill net caught numerous sublegal striped bass and three composites were selected (356-445 mm). A fourth composite was selected from striped bass (343-381 mm) exhibiting large open wound lesions along their sides. Sampling was concluded and the crew departed by 1700 hrs. Samples were transported to the Moss Landing lab, prepared and frozen.

Wednesday, 5-25-94 The sampling crew consisting of Eric Johnson and Stewart Lamerdin left Moss Landing Marine Laboratories at 1230 hrs. and arrived at the Vallejo Public Launch at 1525 hrs. The Mare Island Strait was surveyed for potential trawl and net set sites until 1630 hrs. A 300' gill net and a 300' trammel net were set at 1645 hrs. in the channel north of the fishing pier and main bridge at 5 meters depth. Several trawls were conducted during the 2 hrs. that the nets were set yielding only shrimp and anchovies. While the trammel net yielded nothing, the gill net yielded 2 white croaker and approximately 10 sublegal striped bass. The nets were reset at 1930 hrs. and retrieved at 2130 hrs. Again the trammel net was empty, while the gill net yielded 6 white croaker and several striped bass including one of legal size. The gill net was reset and left for the night. The sampling crew left at 2300 hrs.

Thursday, 5-26-94 The sampling crew met Karen Taberski of the SRWQCB at 0900 hrs. at the Vallejo Public Launch. The boat proceeded to the net which was left overnight and retrieved it at 1015 hrs. This set yielded approximately 12 white croakers, 25 striped bass of which 2 were legal size, 6 brown smoothhounds, and a very small sturgeon. The crew returned to shore, prepped

the fish samples (3 composites white croaker and one composite striped bass), and placed the samples in dry ice. The crew then departed Vallejo for Richmond at 1215 hrs. The crew arrived at Richmond Public Launch at 1310 hrs. and proceeded to untangle and clean three trammel nets which were fouled quite badly. After cleaning the nets were reloaded nd the boat proceeded to Pt. Molate to attempt to capture the last large leopard shark for the North Bay composite. The nets were set at Pt. Molate from 1600 to 1830 hrs. The trammel nets yielded 7 large brown smoothhounds. As the wind was quite strong and the water choppy, the crew retired for the day and left at 1930 hrs.

Friday, 5-27-94 Wardens of the CDF&G had obtained the remnants of a legal sized leopard shark from a local commercial fisherman and placed this in the freezer of the patrol boat "Albacore" in the Berkeley Marina. Wardens of this vessel were contacted agreeing to meet prior to 0930 hrs to deliver the sample. When the sample crew arrived at 0900 hrs. the vessel had already left. The wardens were contacted via cellular phone and agreed to meet between 1500 and 1700 hrs. The sampling crew left for Richmond at 1015 hrs. and arrived at the Richmond Public Launch facility at 1100 hrs. The boat proceeded to the area beyond Pt. San Pablo to set nets along the edge of the channel to the north of Castro Cove. Three trammel nets were set around the "4" red day mark from 1145 to 1400 hrs. The nets yielded several brown smoothhounds and a California bat ray. The nets were then reset in the same place from 1445 to 1745 hours. The set yielded several brown smoothhounds and 1 legal leopard shark, completing the North Bay shark composite. The sampling crew prepared the shark and returned to Berkeley to pick up the shark sample from the "Albacore". The crew then left for Benecia arriving at 2100 hrs.

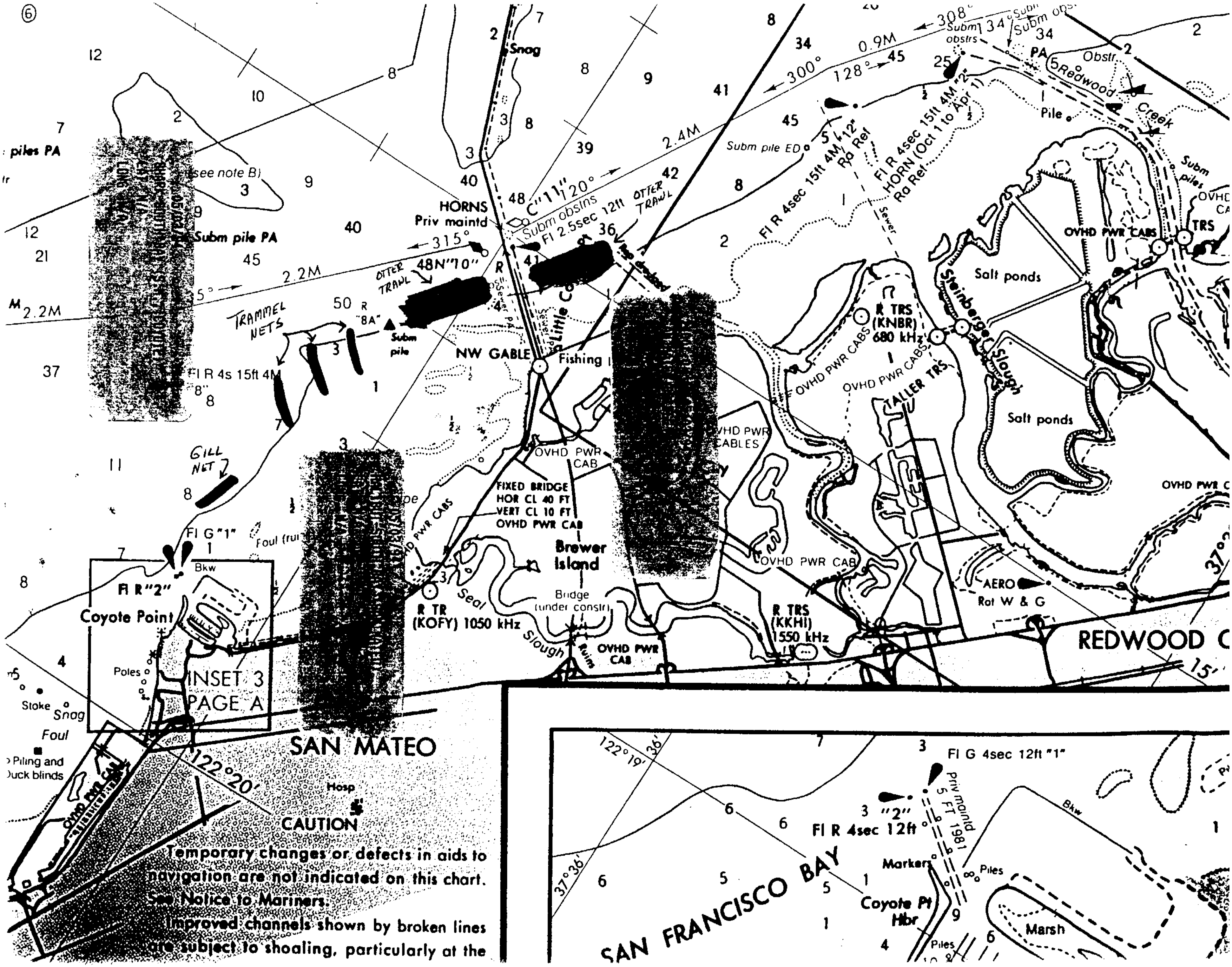
Saturday, 5-28-94 The sampling crew left Benecia for Martinez, arriving at 0945 hrs. The boat proceeded from Martinez toward Roe and Ryer Islands in Suisun Bay. Three trammel nets were set; one between the islands, one off Garnet Pt. of Ryer Is., and one in the entrance to Montezuma Slough. These were left from 1030 to 1230 hrs. and yielded nothing. The nets were reset with: one in deeper water off Garnet Pt., one approximately 0.5 miles up Montezuma Slough and one 0.25 mi. up Suisun Slough. These yielded a 53" and a 46" sturgeon. The nets were set again with two nets in deeper water off Garnet Pt. and one near the entrance to Suisun Slough. These were retrieved after two hrs. yielding a 43" sturgeon. The fish were packed in ice and the crew departed Martinez for Moss Landing Marine Laboratories, arriving at 2200 hrs. The fish were prepped and placed in the freezer and the crew left at 2345 hrs.

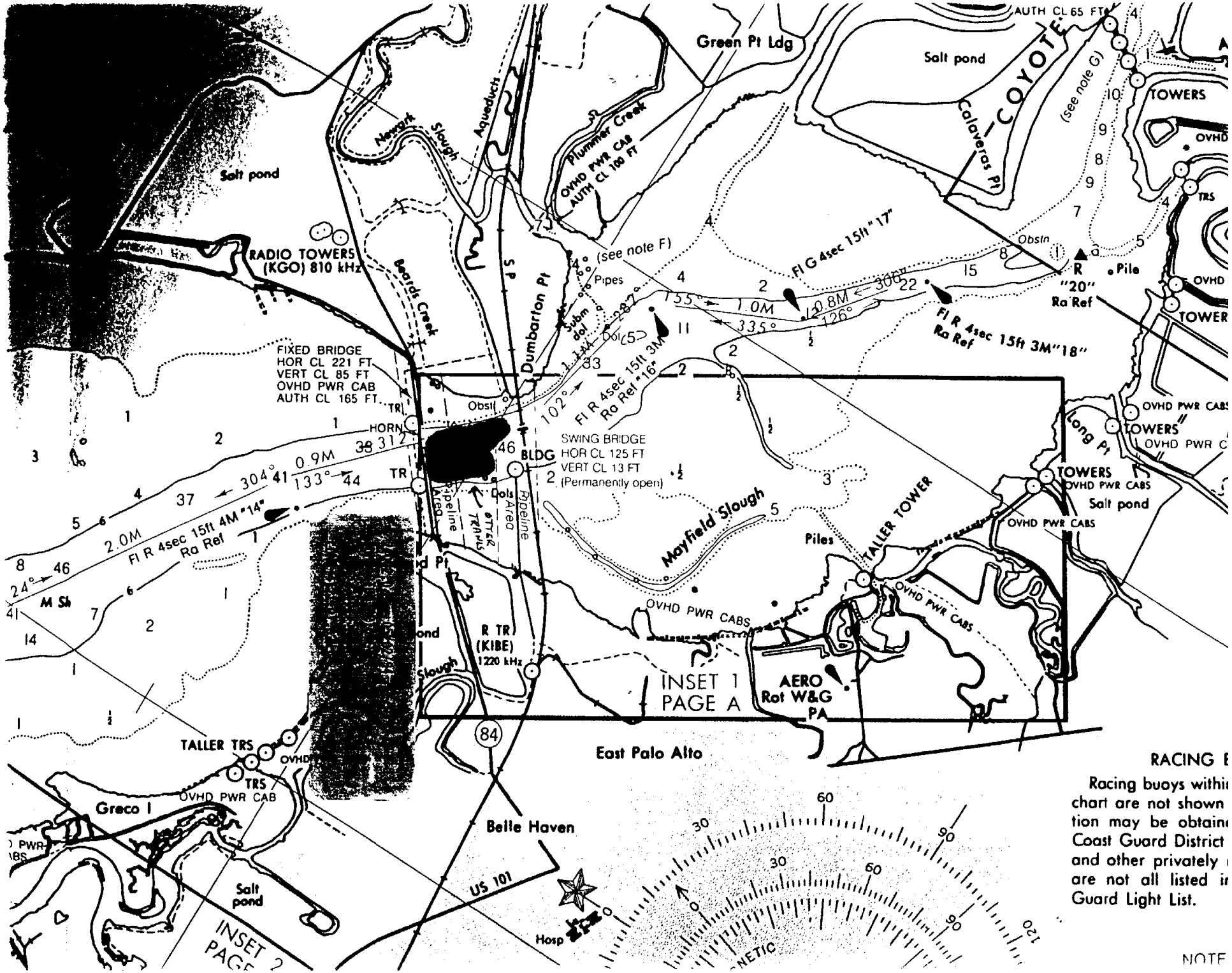
Wednesday, 6-8-94 Eric Johnson left Moss Landing Marine Laboratories at 1530 hrs. for Sacramento to obtain a composite of "large" striped bass. These fish were collected the same day in traps in the Sacramento river near Knights Landing by a CDF&G biologist. The fish were transported on ice to Moss Landing, then prepared and frozen. Eric was finished with the collection phase at 2230 hrs.

Navigational Maps of Sampling Locations

The following maps are copies of the navigational maps used in the field to indicate exact locations of the samples collected. The original maps were color coded to indicate the type of sampling technique used at that location to collect the sample. For the purposes of this report the following copies have been modified by the addition of a description of the sampling device that was used at each of the shaded sampling locations.

⑥

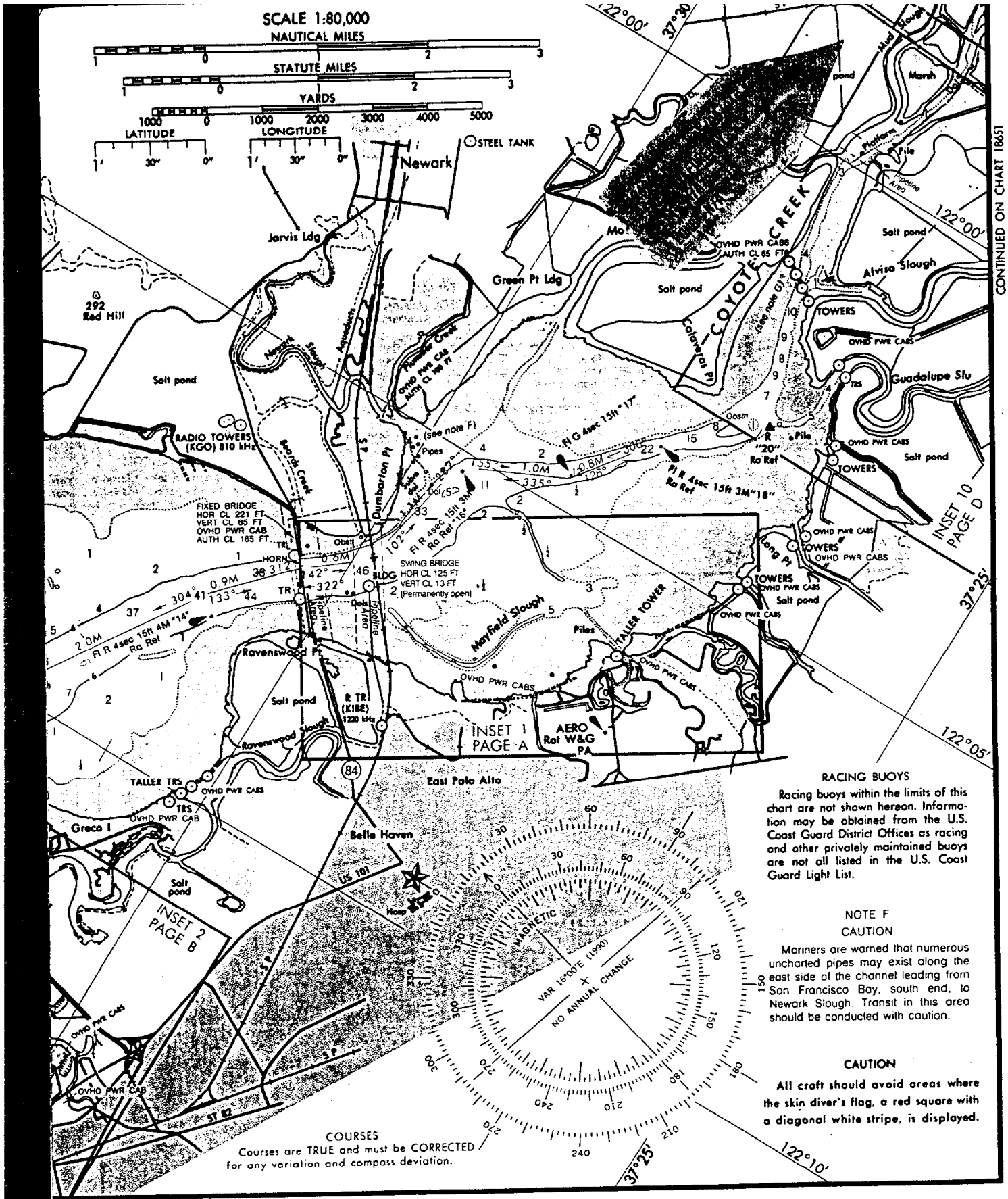

SAN MATEO
REDWOOD C
SAN FRANCISCO BAY
Coyote Point
Fl R "2"
Fl G "1"
Bkw
INSET 3
PAGE A
122°20'
122°19'
37°36'
Poles
Stoke
Snag
Foul
Piling and
Duck blinds
Hosp
CAUTION
Temporary changes or defects in aids to
navigation are not indicated on this chart.
See Notice to Mariners.
Improved channels shown by broken lines
are subject to shoaling, particularly at the
HORNS
Priv maintd
315°
2.2M
2.4M
0.9M
300°
128°
120°
308°
134°
48N"10"
OTTER TRAWL
TRAMMEL NETS
GILL NET
"8A"
Subm pile
Subm pile PA
Subm pile ED
see note B
Fl R 4s 15ft 4M
"8"
NW GABLE
Fishing
Little
C"11"
Subm obstns
Fl 2.5sec 12ft
Snag
Fl R 4sec 15ft 4M "12"
Ra Ref
Fl R 4sec 15ft 4M "2"
HORN (Oct 1 to Apr 1)
Sewer
Sewer PA
Subm obstrs
Obstr
Redwood
Creek
Pile
Subm piles
TRS
OVHD PWR CABS
Salt ponds
Steinberger Slough
R TRS
(KNBR)
680 kHz
TALLER TRS
OVHD PWR CABLES
OVHD PWR CAB
FIXED BRIDGE
HOR CL 40 FT
VERT CL 10 FT
OVHD PWR CAB
Brewer Island
Bridge
(under constr)
Ruins
Seal Slough
R TR
(KOFY) 1050 kHz
R TRS
(KKHI)
1550 kHz
AERO
Rot W & G
Foul
Fl G 4sec 12ft "1"
Priv maintd
5 FT 1981
"2"
Fl R 4sec 12ft
Markers
Piles
Coyote Pt Hbr
Marsh



RACING E

Racing buoys withi
chart are not shown
tion may be obtain
Coast Guard District
and other privately
are not all listed i
Guard Light List.

NOTE



RACING BUOYS

Racing buoys within the limits of this chart are not shown hereon. Information may be obtained from the U.S. Coast Guard District Offices as racing and other privately maintained buoys are not all listed in the U.S. Coast Guard Light List.

NOTE F

CAUTION

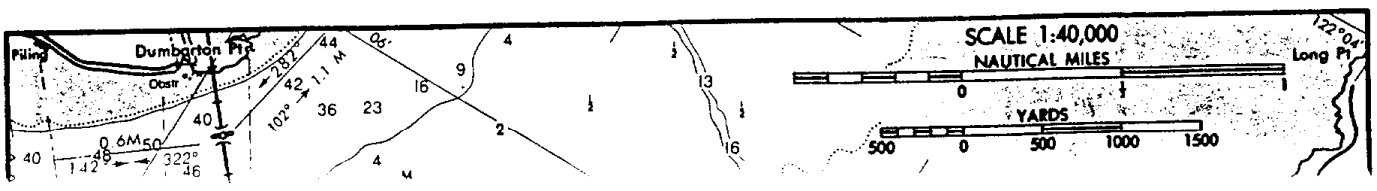
Mariners are warned that numerous uncharted pipes may exist along the east side of the channel leading from San Francisco Bay, south end, to Newark Slough. Transit in this area should be conducted with caution.

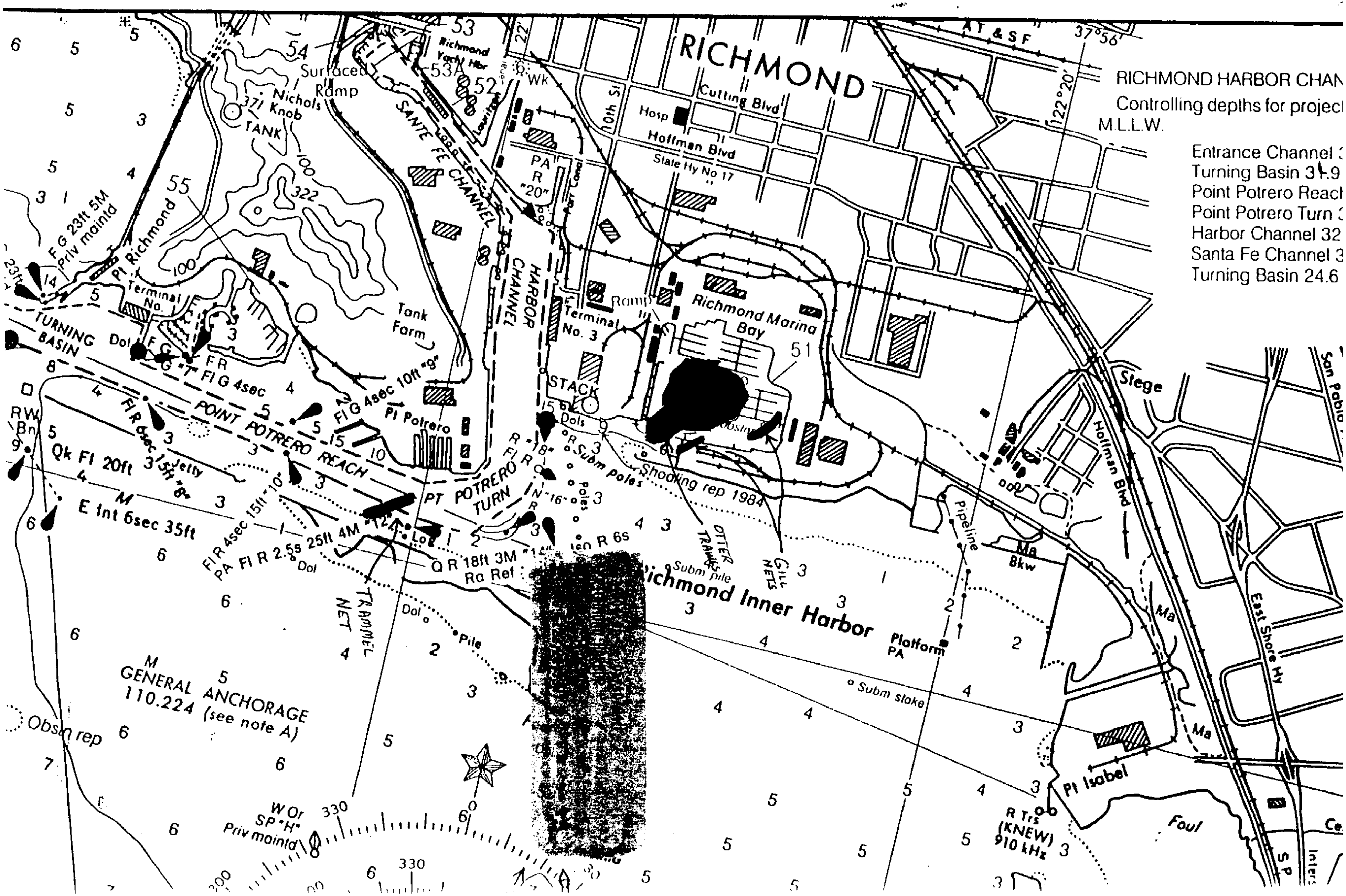
CAUTION

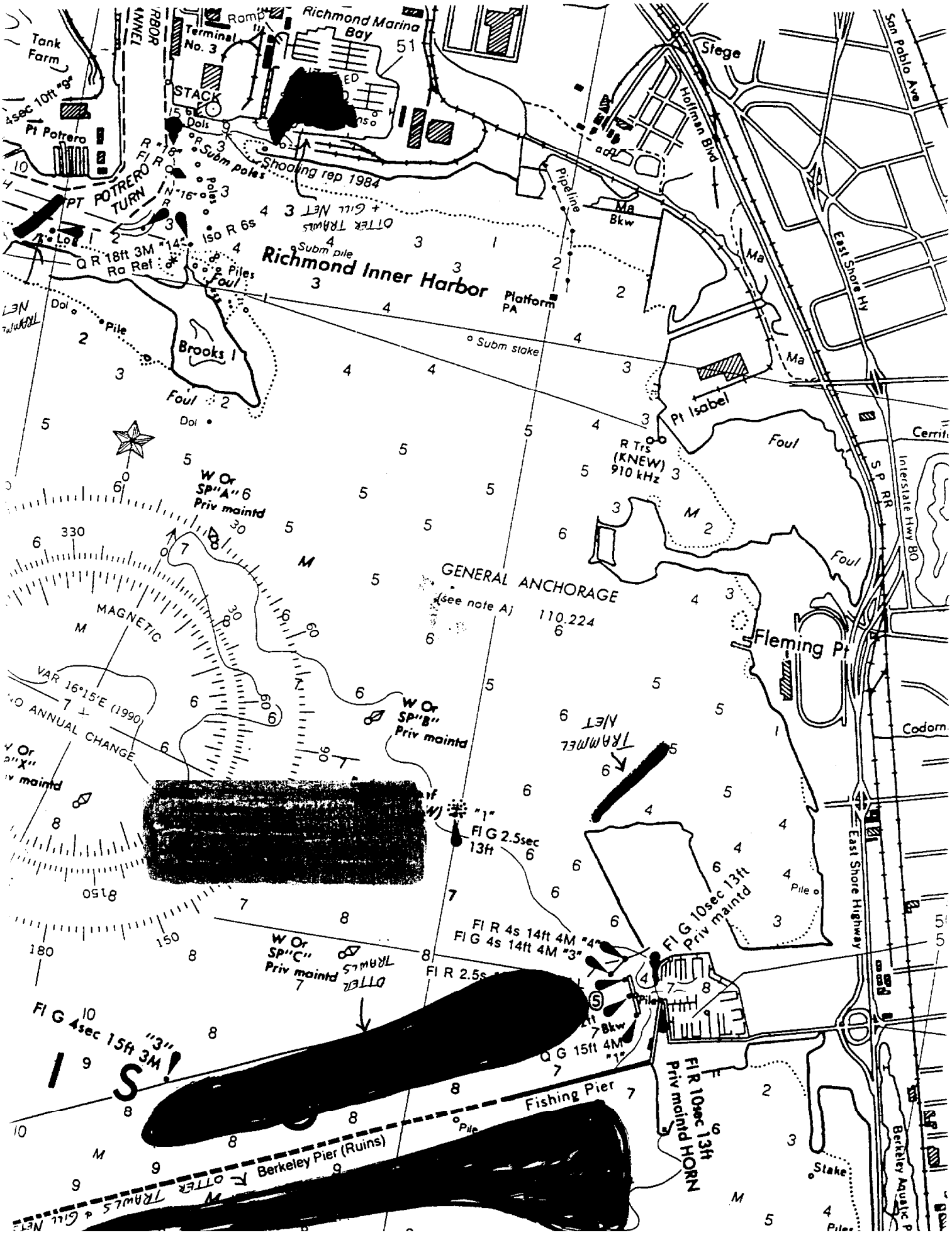
All craft should avoid areas where the skin diver's flag, a red square with a diagonal white stripe, is displayed.

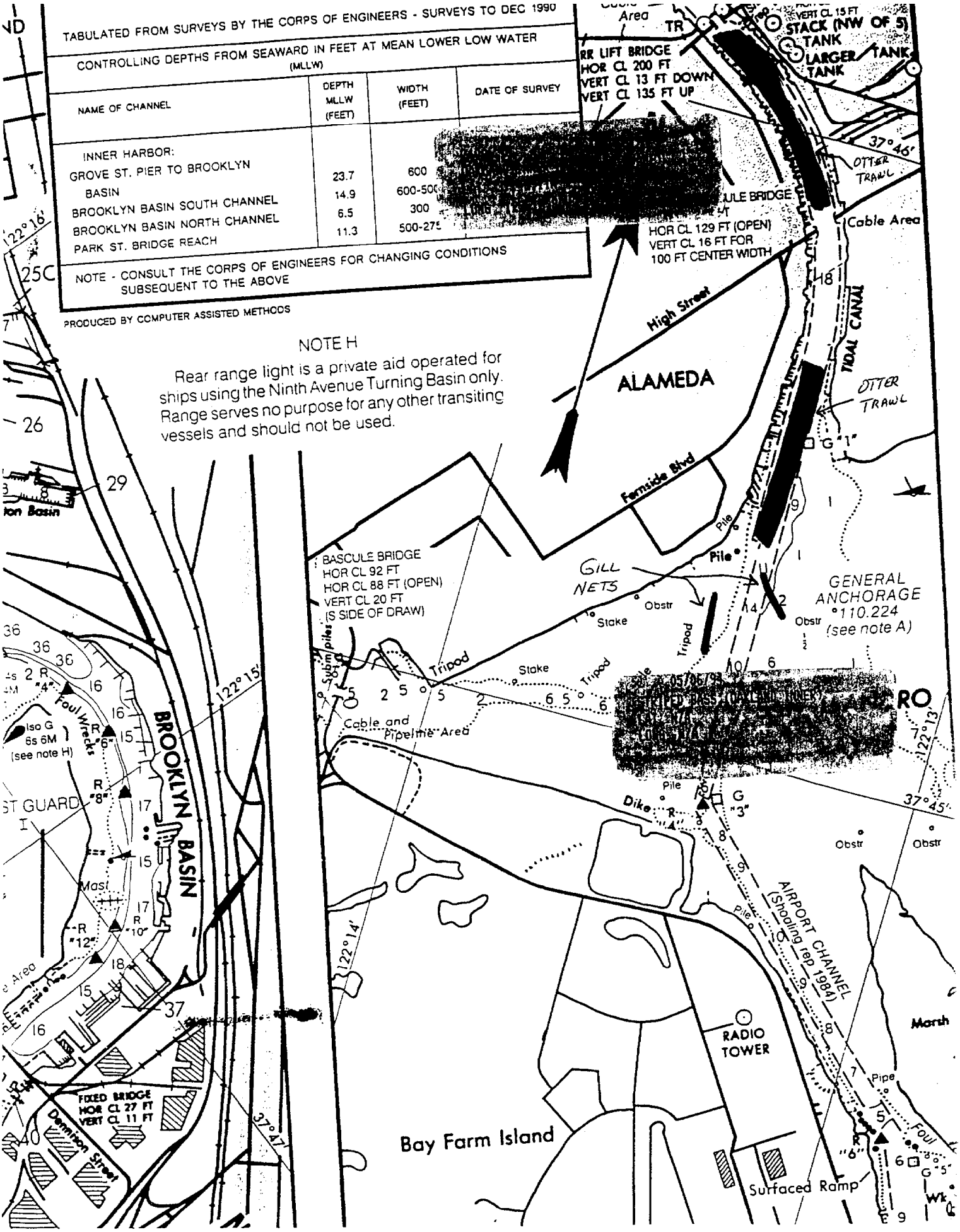
COURSES

Courses are TRUE and must be CORRECTED for any variation and compass deviation.




RICHMOND HARBOR CHAN
Controlling depths for project
M.L.L.W.
Entrance Channel 3
Turning Basin 31.9
Point Potrero Reach
Point Potrero Turn 3
Harbor Channel 32.
Santa Fe Channel 3
Turning Basin 24.6
RICHMOND
Cutting Blvd
Hoffman Blvd
State Hy No 17
Hosp
10th St
AT & SF
37°56'
122°20'
Richmond Yacht Hbr
SANTE FE CHANNEL
HARBOR CHANNEL
Surfaced Ramp
Nichols Knob
TANK
Tank Farm
Pt Potrero
Terminal No. 3
Terminal No. 1
Richmond Marina Bay
STACK
Ramp
Pt Richmond
TURNING BASIN
POINT POTRERO REACH
PT POTRERO TURN
Subm poles
Shoaling rep 1984
OTTER TRAWLS
GILL NETS
TRAMMEL NET
Richmond Inner Harbor
Platform PA
Subm stake
Subm pile
Pipeline
Siege
Hoffman Blvd
East Shore Hy
San Pablo
Pt Isabel
R Trs (KNEW) 910 kHz
Foul
GENERAL ANCHORAGE 110.224 (see note A)
Obstn rep
W Or SP "H" Priv maintd
Qk Fl 20ft
E Int 6sec 35ft
Fl R 6sec 15ft "8" Jetty
Fl G 4sec
Fl G 4sec 10ft "9"
Fl R 4sec 15ft "10"
PA Fl R 2.5s 25ft 4M "12"
Q R 18ft 3M "14"
Ra Ref
F G 23ft 5M Priv maintd
Dol
Pile


Richmond Marina Bay
Terminal No. 3
Ramp
Tank Farm
STACK
Pt Potrero
PT POTRERO TURN IN
Shoaling rep 1984
Subm poles
Pipeline
Stege
Hoffman Blvd
San Pablo Ave
East Shore Hy
Richmond Inner Harbor
Platform PA
Subm pile
Subm stake
Piles
Foul
Brooks I
Pile
Pt Isabel
R Trs (KNEW) 910 kHz
S P RR
Interstate Hwy 80
GENERAL ANCHORAGE
(see note A)
110.224
Fleming Pt
MAGNETIC
VAR 16°15'E (1990)
NO ANNUAL CHANGE
W Or SP"A" 6 Priv maintd
W Or SP"B" Priv maintd
W Or SP"C" Priv maintd
Fl G 2.5sec 13ft
Fl R 4s 14ft 4M "4"
Fl G 4s 14ft 4M "3"
Fl G 10sec 13ft Priv maintd
Fl G 4sec 15ft 3M "3"
Fl G 15ft 4M "1"
Fl R 10sec 13ft Priv maintd HORN
Fishing Pier
Berkeley Pier (Ruins)
East Shore Highway
Codorn
Berkeley Aquatic P
Stake



TABULATED FROM SURVEYS BY THE CORPS OF ENGINEERS - SURVEYS TO DEC 1990

CONTROLLING DEPTHS FROM SEAWARD IN FEET AT MEAN LOWER LOW WATER (MLLW)

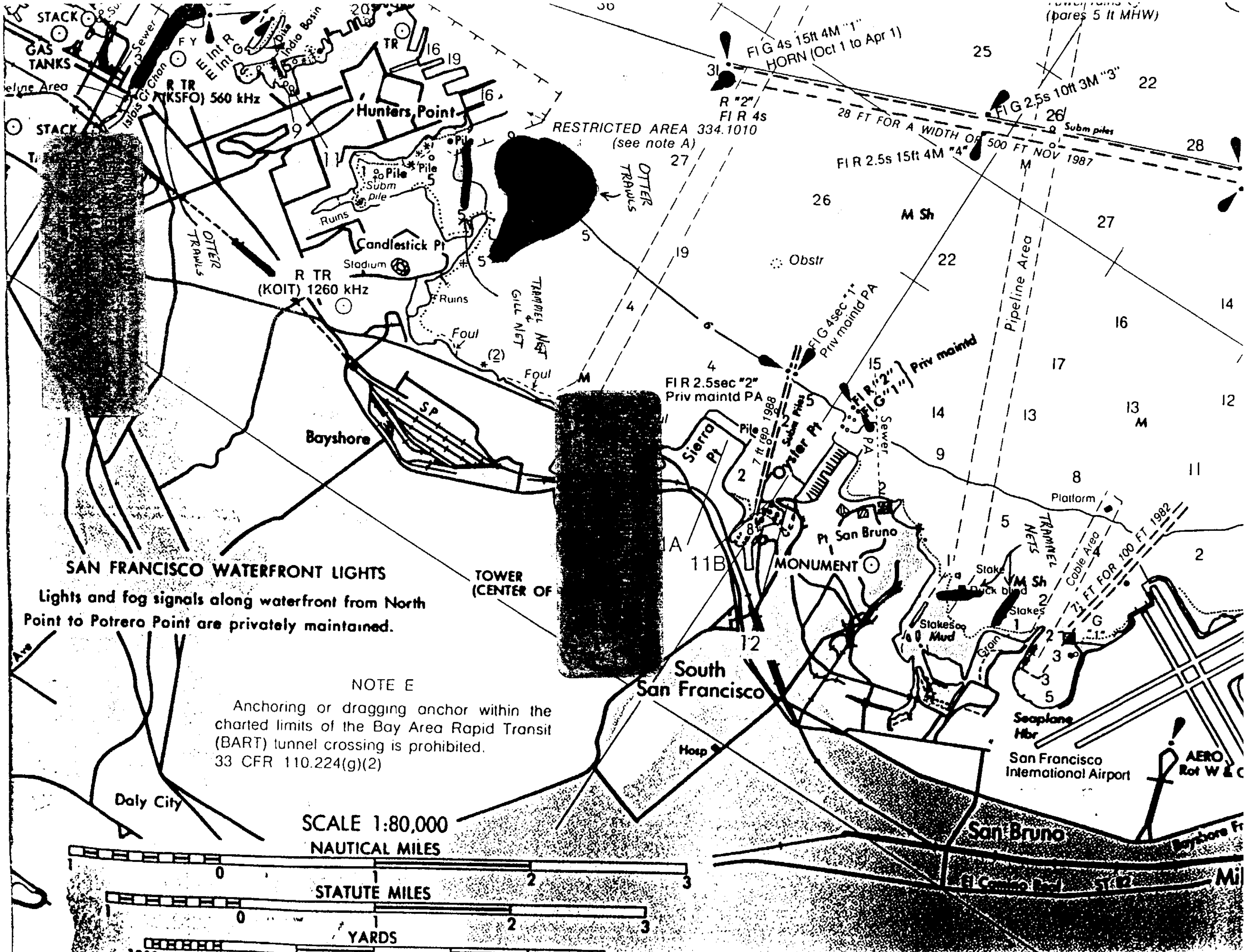
NAME OF CHANNEL	DEPTH MLLW (FEET)	WIDTH (FEET)	DATE OF SURVEY
INNER HARBOR:			
GROVE ST. PIER TO BROOKLYN BASIN	23.7	600	
BROOKLYN BASIN SOUTH CHANNEL	14.9	600-500	
BROOKLYN BASIN NORTH CHANNEL	6.5	300	
PARK ST. BRIDGE REACH	11.3	500-275	

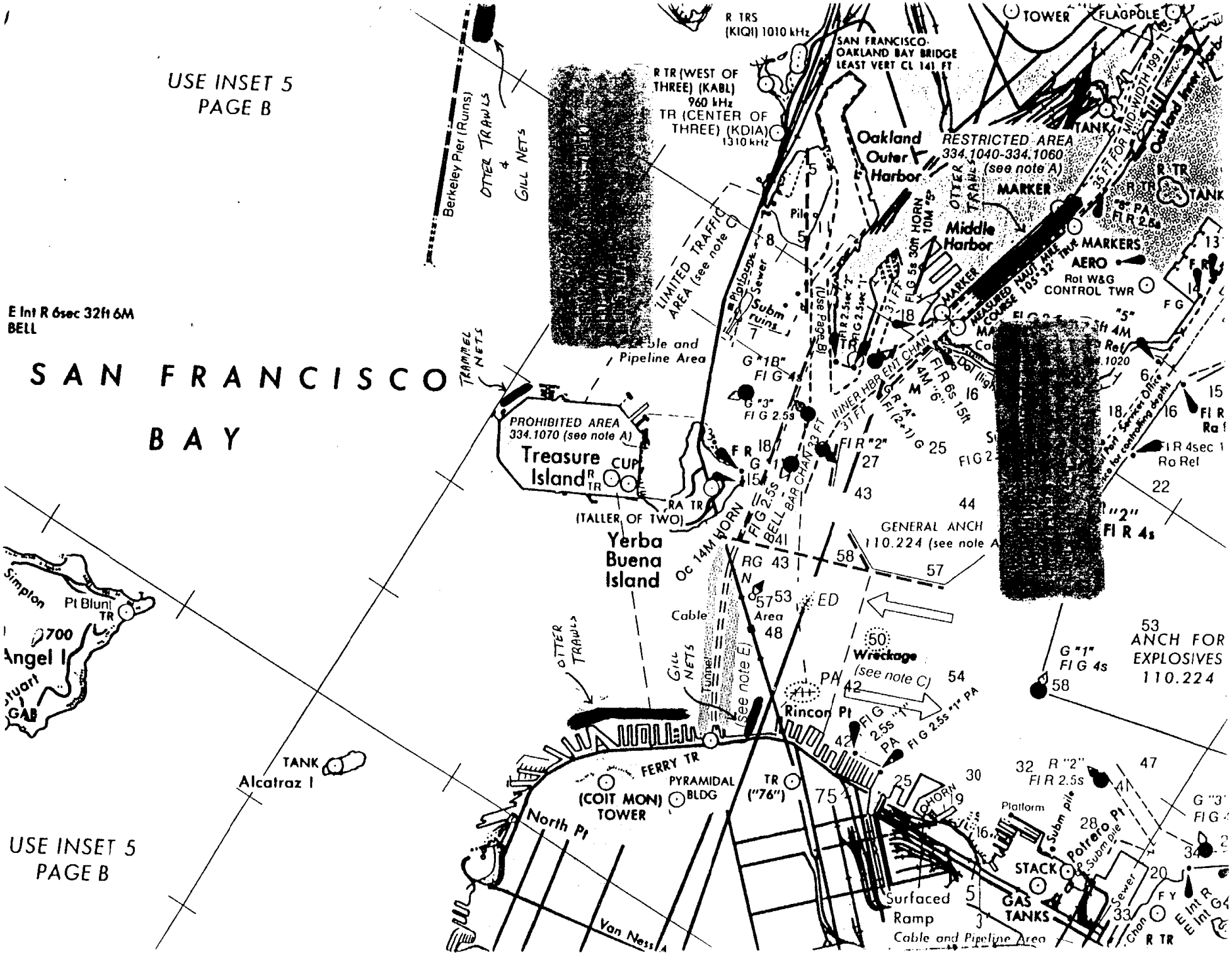
NOTE - CONSULT THE CORPS OF ENGINEERS FOR CHANGING CONDITIONS SUBSEQUENT TO THE ABOVE

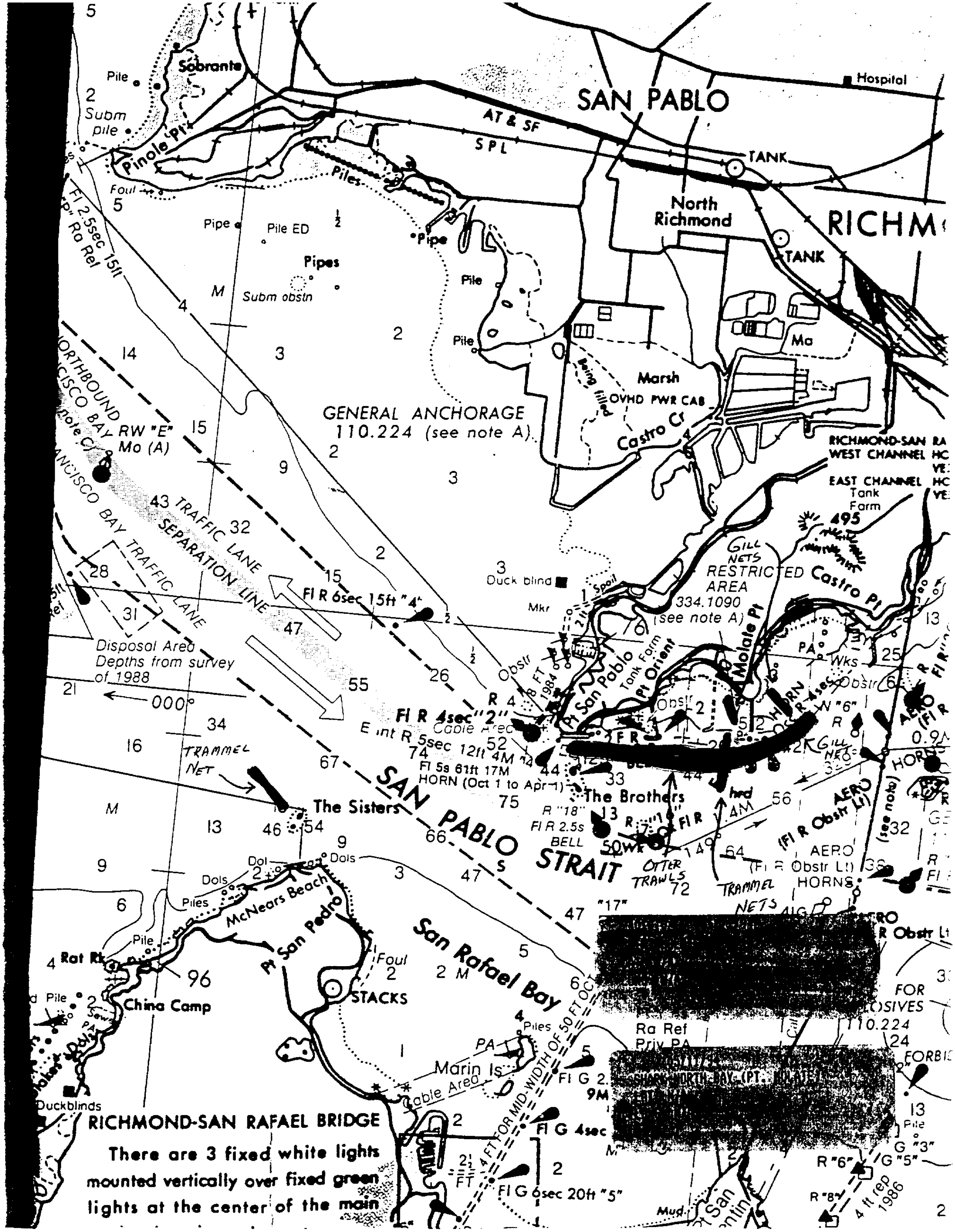
PRODUCED BY COMPUTER ASSISTED METHODS

NOTE H

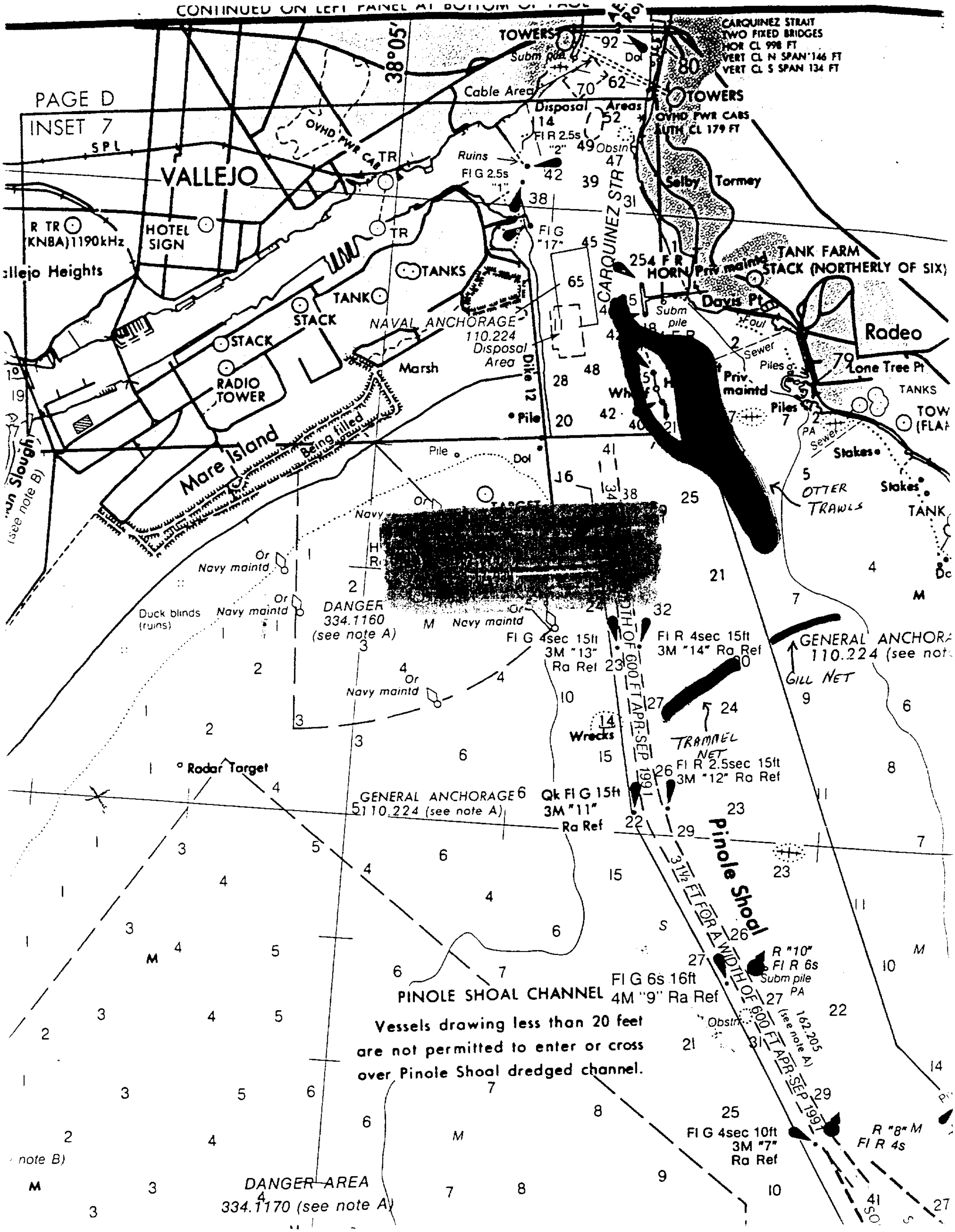
Rear range light is a private aid operated for ships using the Ninth Avenue Turning Basin only. Range serves no purpose for any other transiting vessels and should not be used.

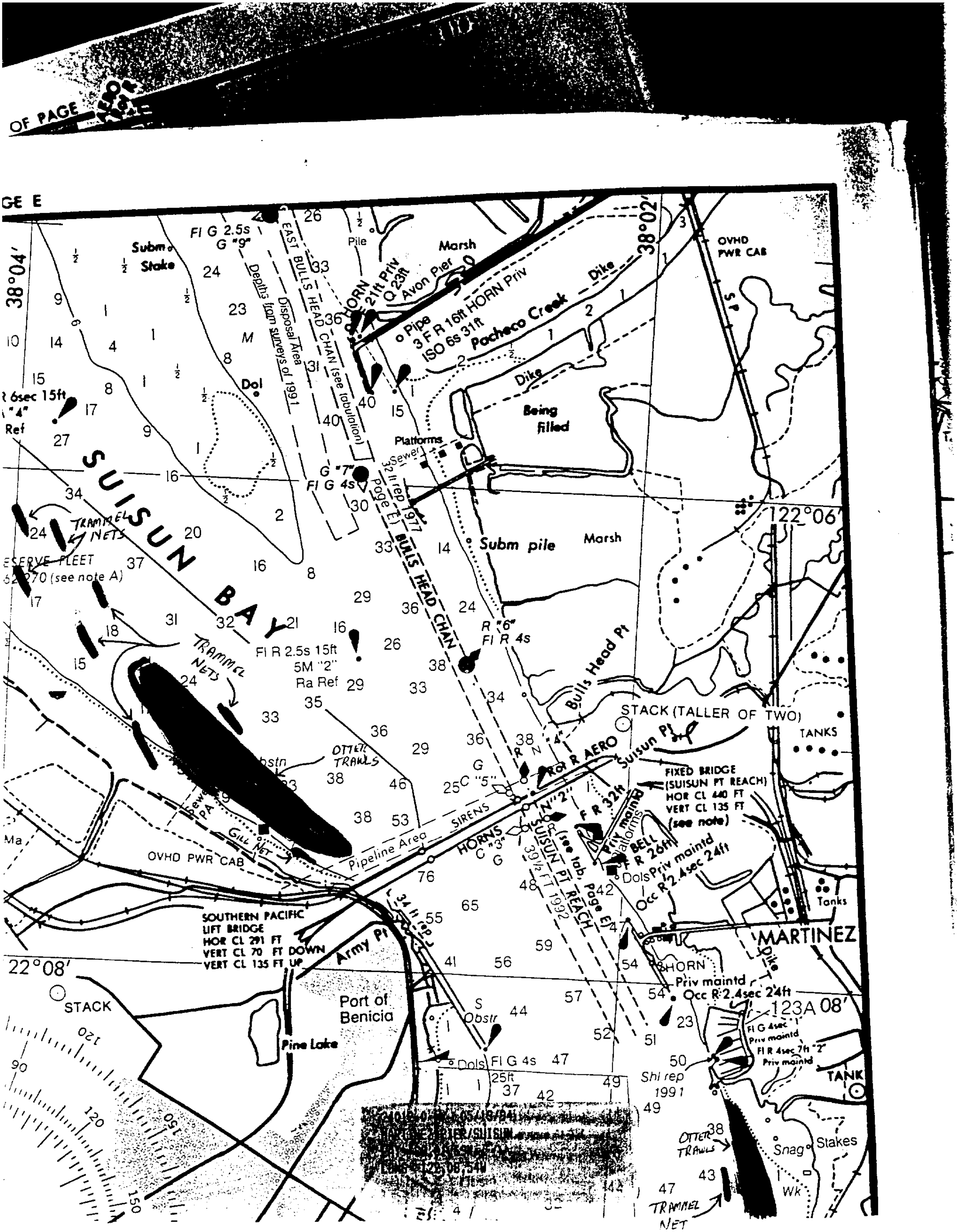

STACK
GAS TANKS
STACK
Sewer
Islais Cr Chan
F Y
E Int R
E Int G
India Basin
R TR (KSFO) 560 kHz
TR
16
19
Hunters Point
Pile
Subm pile
Ruins
Candlestick Pt
Stadium
R TR (KOIT) 1260 kHz
OTTER TRAWLS
RESTRICTED AREA 334.1010 (see note A)
TRAMMEL NET & GILL NET
Foul
Bayshore
SP
FI G 4s 15ft 4M "1" HORN (Oct 1 to Apr 1)
R "2" FI R 4s
28 FT FOR A WIDTH OF 500 FT NOV 1987
FI G 2.5s 10ft 3M "3"
Subm piles
FI R 2.5s 15ft 4M "4"
M Sh
Obstr
Pipeline Area
FI G 4sec "1" Priv maintd PA
FI R 2.5sec "2" Priv maintd PA
FI R "2" FI G "1" Priv maintd
Sewer PA
Sierra Pt
Oyster Pt
7 ft rep 1988
Pt San Bruno
MONUMENT
TOWER (CENTER OF
[redacted]
Platform
Cable Area
7 FT FOR 100 FT 1982
TRAMMEL NETS
Stake
Duck blind
Stakes
Mud
Seaplane Hbr
San Francisco International Airport
AERO Rot W & G
South San Francisco
Hosp
San Bruno
El Camino Real
Bayshore Fr
Daly City
SAN FRANCISCO WATERFRONT LIGHTS
Lights and fog signals along waterfront from North Point to Potrero Point are privately maintained.
NOTE E
Anchoring or dragging anchor within the charted limits of the Bay Area Rapid Transit (BART) tunnel crossing is prohibited. 33 CFR 110.224(g)(2)
SCALE 1:80,000
NAUTICAL MILES
STATUTE MILES
YARDS


USE INSET 5
PAGE B
E Int R 6sec 32ft 6M
BELL
SAN FRANCISCO
BAY
USE INSET 5
PAGE B
R TRS
(KIQI) 1010 kHz
SAN FRANCISCO-
OAKLAND BAY BRIDGE
LEAST VERT CL 141 FT
TOWER
FLAGPOLE
R TR (WEST OF
THREE) (KABL)
960 kHz
TR (CENTER OF
THREE) (KDIA)
1310 kHz
Berkeley Pier (Ruins)
OTTER TRAWLS
& GILL NETS
Oakland
Outer
Harbor
RESTRICTED AREA
334.1040-334.1060
(see note A)
MARKER
Middle
Harbor
MARKERS
AERO
Rot W&G
CONTROL TWR
LIMITED TRAFFIC
AREA (see note
Subm
ruins
Pipeline and
Pipeline Area
TRAMMEL
NETS
PROHIBITED AREA
334.1070 (see note A)
Treasure
Island
CUP
RA TR
(TALLER OF TWO)
Yerba
Buena
Island
INNER HBR ENT CHAN
31 FT
BELL
BAR CHAN
GENERAL ANCH
110.224 (see note A
ANCH FOR
EXPLOSIVES
110.224
Cable
Area
Wreckage
(see note C)
Rincon Pt
OTTER
TRAWLS
GILL
NETS
Tunnel
(see note E)
FERRY TR
PYRAMIDAL
BLDG
(COIT MON)
TOWER
TR
("76")
North Pt
Van Ness
Alcatraz I
TANK
Simpson
Pt Blunt
TR
Angel I
Surfaced
Ramp
Cable and Pipeline Area
Platform
Subm pile
Potrero Pt
STACK
GAS
TANKS
Sewer
Chan
R TR
E Int R
E Int G

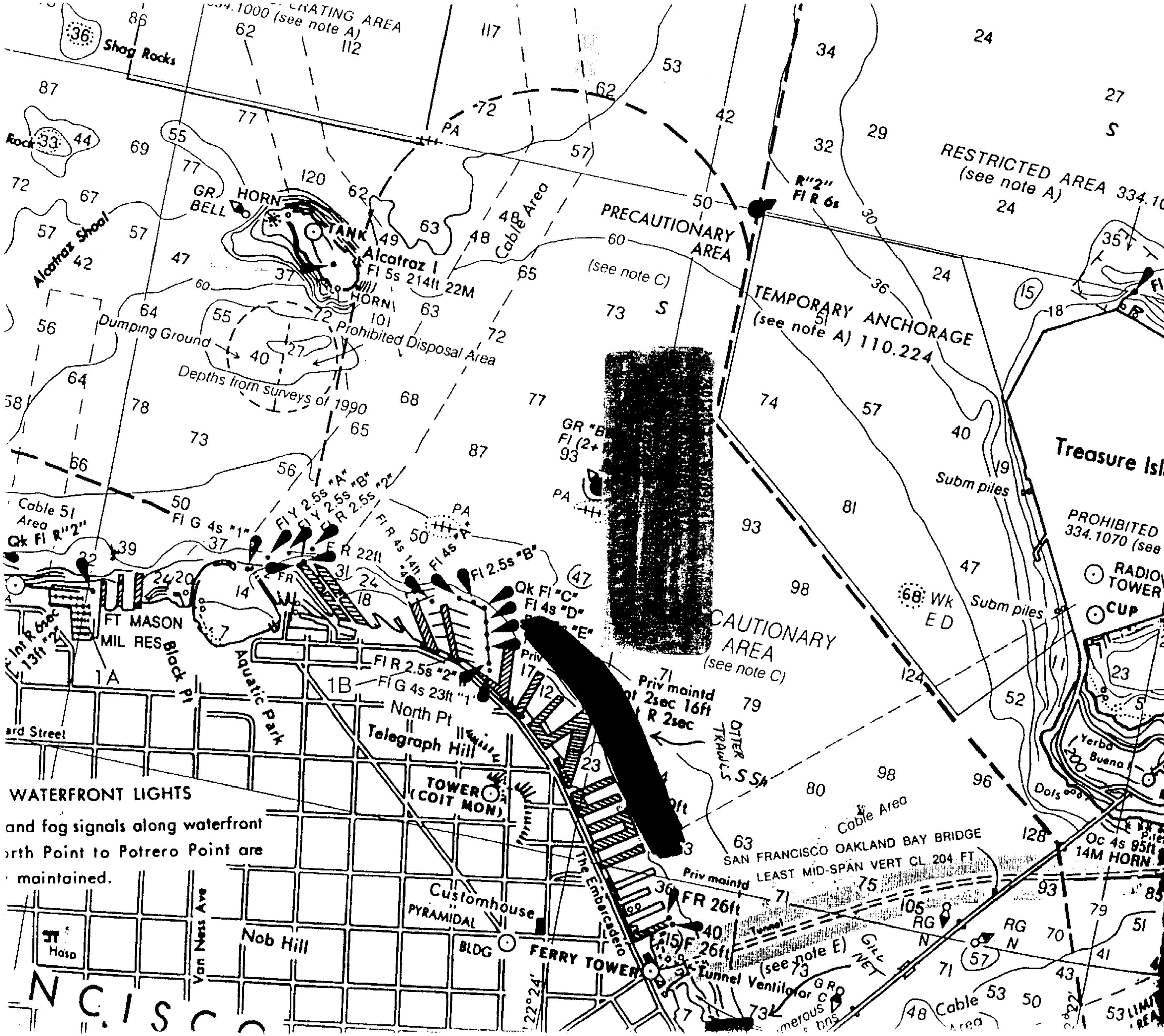


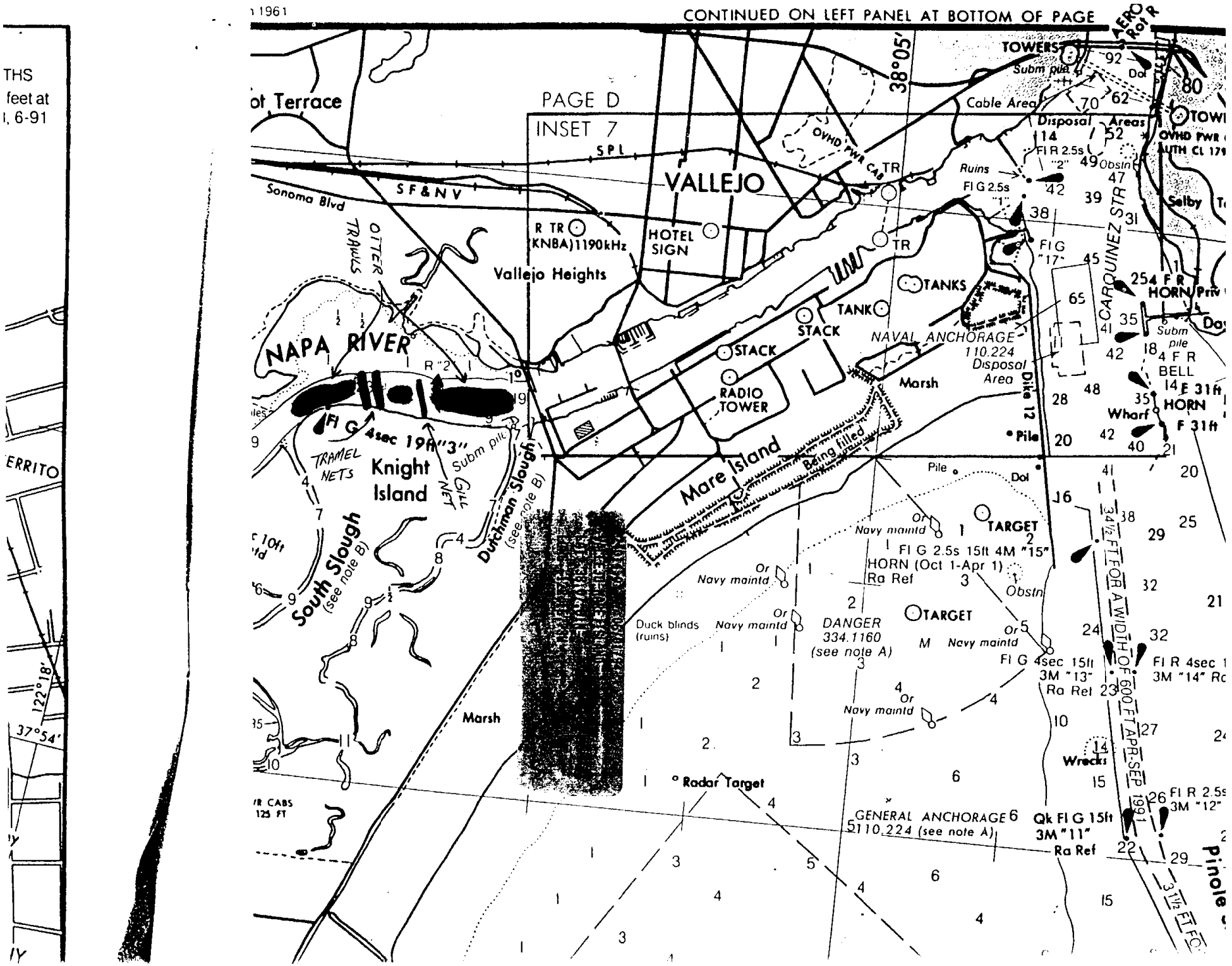
Sobrante
Pile
Subm pile
Pinole Pt
Foul
Fl 2.5sec 15ft
Ra Ref
SAN PABLO
AT & SF
SPL
TANK
Hospital
North Richmond
RICHM
Pipe
Pile ED
Piles
Pipes
Subm obstn
Pile
Marsh
OVHD PWR CAB
Castro Cr
GENERAL ANCHORAGE
110.224 (see note A)
NORTHBOUND
RW "E" Mo (A)
TRAFFIC LANE
SEPARATION LINE
TRAFFIC LANE
RICHMOND-SAN
WEST CHANNEL
EAST CHANNEL
Tank Farm
495
GILL NETS
RESTRICTED AREA
334.1090
(see note A)
Castro Pt
Molate Pt
Duck blind
Mkr
Spoil
Fl R 6sec 15ft "4"
Disposal Area
Depths from survey of 1988
000°
Obstr
Pt San Pablo
Tank Farm
Pt Orient
Fl R 4sec "2"
Cable Area
E int R 5sec 12ft 4M
Fl 5s 61ft 17M
HORN (Oct 1 to Apr 1)
TRAMMEL NET
The Sisters
The Brothers
R "18"
Fl R 2.5s
BELL
SAN PABLO STRAIT
OTTER TRAWLS
TRAMMEL NETS
AERO
(Fl R Obstr Lt)
HORNS
Dols
Piles
McNears Beach
Pt San Pedro
San Rafael Bay
"17"
[redacted]
R Obstr Lt
Rat Rk
Pile
China Camp
Foul
STACKS
Piles
FOR
OSIVES
110.224
Ra Ref
Priv PA
[redacted]
FORBI
Marin Is
Cable Area
Fl G 2.
9M
Fl G 4sec
Duckblinds
RICHMOND-SAN RAFAEL BRIDGE
There are 3 fixed white lights mounted vertically over fixed green lights at the center of the main
4 FT FOR MID-WIDTH OF 50 FT OC
Fl G 6sec 20ft "5"
R "6"
G "3"
G "5"
R "8"
4 ft rep 1986
Mud
San Quentin

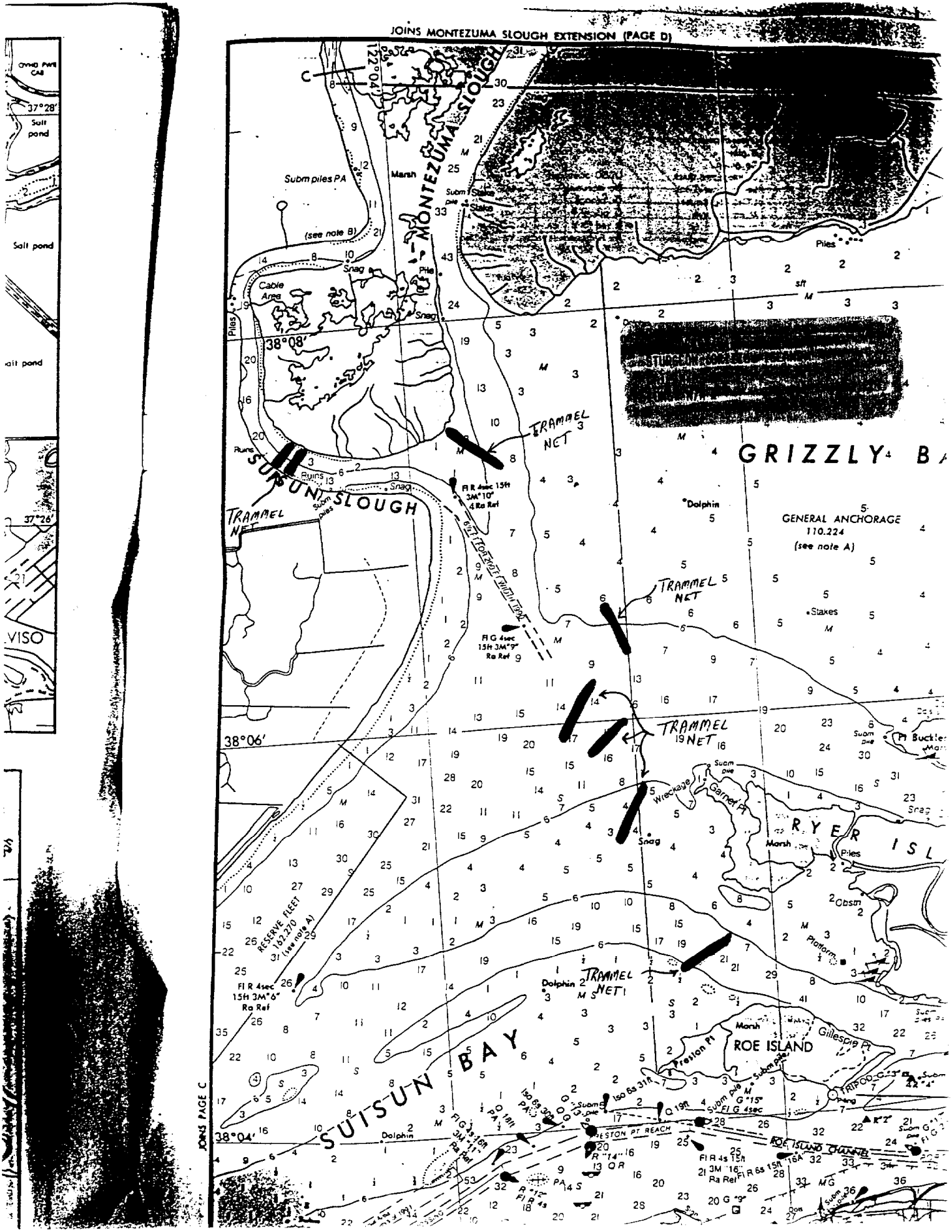

CARQUINEZ STRAIT
TWO FIXED BRIDGES
HOR CL 998 FT
VERT CL N SPAN 146 FT
VERT CL S SPAN 134 FT
TOWERS
Subm pile
Dol
Cable Area
Disposal Areas
OVHD PWR CABS
AUTH CL 179 FT
PAGE D
INSET 7
SPL
OVHD PWR CAB
TR
VALLEJO
Ruins
Fl R 2.5s "2"
Fl G 2.5s "1"
Obstn
Selby
Tormey
R TR
(KNBA)1190kHz
HOTEL SIGN
Fl G "17"
CARQUINEZ STR
Vallejo Heights
TANKS
TANK FARM
STACK (NORTHERLY OF SIX)
HORN
Priv maintd
Davis Pt
Foul
Radeo
Sewer
Piles
Lone Tree Pt
TANK
STACK
NAVAL ANCHORAGE 110.224
Disposal Area
RADIO TOWER
Marsh
Dike 12
Pile
Mare Island
Being filled
Stakes
OTTER TRAWLS
Navy
Or Navy maintd
Duck blinds (ruins)
DANGER 334.1160 (see note A)
Fl G 4sec 15ft 3M "13" Ra Ref
Fl R 4sec 15ft 3M "14" Ra Ref
GENERAL ANCHORAGE 110.224 (see note
GILL NET
Wrecks
TRAMMEL NET
Fl R 2.5sec 15ft 3M "12" Ra Ref
Radar Target
GENERAL ANCHORAGE 110.224 (see note A)
Qk Fl G 15ft 3M "11" Ra Ref
Pinole Shoal
31½ FT FOR A WIDTH OF 600 FT APR-SEP 1991
R "10" Fl R 6s
Subm pile PA
Fl G 6s 16ft 4M "9" Ra Ref
PINOLE SHOAL CHANNEL
Vessels drawing less than 20 feet are not permitted to enter or cross over Pinole Shoal dredged channel.
Obstn
162.205 (see note A)
Fl G 4sec 10ft 3M "7" Ra Ref
R "8" Fl R 4s
note B)
DANGER AREA 334.1170 (see note A)



OF PAGE
GE E
38°04'
38°02'
122°06'
22°08'
123A 08'
SUISUN BAY
BULLS HEAD CHAN
EAST BULLS HEAD CHAN (see tabulation)
Disposal Area
Depths from surveys of 1991
Fl G 2.5s G "9"
Subm Stake
Pile
Marsh
HORN 21ft Priv Q 23ft
Avon Pier
Pipe
3 F R 16ft HORN Priv
ISO 6s 31ft
Pacheco Creek
Dike
OVHD PWR CAB
SP
Being filled
Platforms
Sewer
G "7" Fl G 4s
32 ft rep 1977
Page E
Subm pile
R "6" Fl R 4s
Bulls Head Pt
STACK (TALLER OF TWO)
TANKS
Suisun Pt
R 6sec 15ft "4" Ref
TRAMMEL NETS
RESERVE FLEET
(see note A)
Fl R 2.5s 15ft
5M "2"
Ra Ref
OTTER TRAWLS
R N "4"
R AERO
G C "5"
N "2"
F R 32ft
Priv maintd
Platforms
BELL F R 26ft
Dols
Priv maintd Occ R 2.4sec 24ft
FIXED BRIDGE (SUISUN PT REACH)
HOR CL 440 FT
VERT CL 135 FT
(see note)
SIRENS
Pipeline Area
HORNS C "3" G
SUISUN PT REACH (see tab, Page E)
39½ FT 1992
GILL NET
OVHD PWR CAB
Ma
SOUTHERN PACIFIC
LIFT BRIDGE
HOR CL 291 FT
VERT CL 70 FT DOWN
VERT CL 135 FT UP
Army Pt
34 ft rep
MARTINEZ
Dike
HORN
Priv maintd
Occ R 2.4sec 24ft
Tanks
Fl G 4sec "1" Priv maintd
Fl R 4sec 7ft "2" Priv maintd
TANK
STACK
Port of Benicia
Pine Lake
S Obstr
Dols Fl G 4s 25ft
Shl rep 1991
OTTER TRAWLS
Snag
Stakes
Wk
TRAMMEL NET


RESTRICTED AREA 334.10
(see note A)
Shag Rocks
Alcatraz Shoal
Alcatraz I
Fl 5s 214ft 22M
TANK
HORN
GR BELL
Prohibited Disposal Area
Dumping Ground
Depths from surveys of 1990
PRECAUTIONARY AREA
(see note C)
TEMPORARY ANCHORAGE
(see note A) 110.224
R "2" Fl R 6s
CAUTIONARY AREA
(see note C)
[redacted]
Cable Area
Subm piles
Treasure Isl
PROHIBITED
334.1070
RADIO TOWER
CUP
Yerba Buena
Oc 4s 95ft 14M HORN
SAN FRANCISCO OAKLAND BAY BRIDGE
LEAST MID-SPAN VERT CL 204 FT
Priv maintd
OTTER TRAWLS
GILL NET
Priv maintd
FT MASON
MIL RES
Black Pt
Aquatic Park
North Pt
Telegraph Hill
TOWER (COIT MON)
Customhouse
PYRAMIDAL BLDG
FERRY TOWER
The Embarcadero
Nob Hill
Van Ness Ave
Tunnel Ventilator
WATERFRONT LIGHTS
and fog signals along waterfront
orth Point to Potrero Point are
maintained.


1961
CONTINUED ON LEFT PANEL AT BOTTOM OF PAGE
PAGE D
INSET 7
VALLEJO
Vallejo Heights
Sonoma Blvd
SF&NV
SPL
OVHD PWR CAB
R TR (KNBA) 1190kHz
HOTEL SIGN
OTTER TRAWLS
NAPA RIVER
Fl G 4sec 19ft "3"
TRAMEL NETS
Knight Island
Subm pile
GILL NET
Dutchman Slough
(see note B)
South Slough
(see note B)
Mare Island
Being filled
Marsh
RADIO TOWER
STACK
TANK
TANKS
NAVAL ANCHORAGE
110.224
Disposal Area
Dike 12
Pile
Wharf
HORN
BELL
CARQUINEZ STR
TOWER
Cable Area
Disposal Areas
Ruins
Fl G 2.5s
Fl R 2.5s
Obstn
Selby
Fl G "17"
254 F R
HORN Priv
4 F R
F 31ft
Fl R 2.5s
3M "12"
Pinole
Navy maintd
TARGET
Fl G 2.5s 15ft 4M "15"
HORN (Oct 1-Apr 1)
Ra Ref
DANGER
334.1160
(see note A)
Duck blinds (ruins)
Fl G 4sec 15ft
3M "13"
Fl R 4sec
3M "14" Ra
34½ FT FOR A WIDTH OF 600 FT APR-SEP 1991
3½ FT FO
Wrecks
Radar Target
GENERAL ANCHORAGE
5110.224 (see note A)
Qk Fl G 15ft
3M "11"
Ra Ref
38°05'
122°18'
37°54'


JOINS MONTEZUMA SLOUGH EXTENSION (PAGE D)
MONTEZUMA SLOUGH
SUISUN SLOUGH
SUISUN BAY
GRIZZLY
ROE ISLAND
RYER ISL
GENERAL ANCHORAGE
110.224
(see note A)
TRAMMEL NET
RESERVE FLEET
182.270
(see note A)
ROE ISLAND CHANNEL
PRESTON PT REACH
Subm piles PA
Marsh
Snag
Piles
Cable Area
Ruins
Dolphin
Wreckage
Garnet Pt
Gillespie Pt
Preston Pt
Platform
Obstn
Subm pipe
Stakes
37°28'
37°26'
38°08'
38°06'
38°04'
Salt pond
JOINS PAGE C

RICHMOND
North Richmond
TANK
USE INSET 5
PAGE B
Marsh
OVHD PWR CAB
Castro Cr
RICHMOND-SAN RAFAEL BRIDGE
WEST CHANNEL HOR CL 1000 FT
VERT CL 185 FT
EAST CHANNEL HOR CL 970 FT
VERT CL 135 FT
Tank Farm
495
TANK
Point Richmond
SAN FRANCISCO
E Int R 6sec 32ft 6M BELL
BELL
Priv maintd
RESTRICTED AREA
334.1090
(see note A)
Castro Pt
Molate Pt
Southampton Shoal
SIREN
R "8"
Fl R 2.5s
R "2" QR
R "2"
Fl R 2.5s
R "4"
Fl R 4s
44 FT FEB 1991
G "1"
Fl G 4s
Pt Simpton
Angel I
HORN
Occ R 4sec
AERO
(Fl R Obstr Lt)
0.9M
Red Rock
GENERAL ANCH
110.224 (see note A)
R "10"
Fl R 4s BELL
The Brothers
R "16"
Fl R 1.4M
R "14"
Fl R 4s
R "12"
Fl R 4s
HORNS
RW "B"
Mo (A)
RACCOON STRAIT
Pt Chauncey
Bluff Pt
S' PIPE
Fl G 4s
25ft "9"
Pt Tiburon
TRAMMEL NETS
"17"
Fl G 4s
15ft Ra Ref
[redacted]
M S
Priv
Fl Y 4s
Ra Ref
Priv PA
Iso R 6s 3M "2"
Priv maintd
FORBIDDEN ANCH
GENERAL ANCHORAGE
110.224 (see note A)
748
TIBURON PENINSULA
"1"
Fl G 2.5sec 20ft
Fl G 4sec 20ft "3"
Sewer
R "4"
G "3"
R "6"
G "5"
R "8"
G "7"
4 ft rep 1986
GILL NET
Paradise Cay
75A
Hosp
RICHARDSON BAY
Pt San Quentin
SECURITY ZONE
R "10"
San Quentin
R "12"
G "9"
Fl G 2.5s "11"
R "14"
G "13"
Corte Madera Creek
...All lights are 9 feet above water, equipped with radar reflectors and are privately maintained.
OVHD PWR CAB
AUTH CL 120 FT
STACK
Marsh
Meadowsweet
ABAND RR
US 101
Cable and Pipeline Area
FIXED BRIDGES
HOR CL 40 FT
VERT CL 21 FT
BASCULE BRIDGE
HOR CL 46 FT
HOR CL 18 FT (OPEN)
VERT CL 10 FT
Corte
Marin City
INSET 5
PAGE B