

Section G – Naval Submarine Base, Kings Bay

Naval Submarine Base, Kings Bay supports the Trident Nuclear Submarines and their associated ballistic missile systems, as a part of the U.S. Navy's Fleet Ballistic Missile Submarine facilities. Kings Bay also supports other classes of submarines. It is situated between St. Mary's, Georgia on the West and Cumberland Sound on the East, in Camden County. Submarine wharves, dry-docks, and other support facilities are located on the waterfronts of Kings Bay and Cumberland Sound.



Figure G-1: Kings Bay Water-Front

The Georgia Department of Natural Resources (DNR) has monitored Kings Bay since it started operations in 1978. During this period, no measurable radioactivity that could be attributed to operations at the Base has been detected by DNR. Only naturally occurring radionuclides and global fall-out-related Cs-137 have been detected in the environment around King's Bay. Monitoring location maps are provided in **Figure G-3** (land-based monitoring) and in **Figure G-4** (aquatic monitoring) on the next two pages.

Direct Radiation: During the current monitoring period (2000-2002), all TLD dose-rate measurements (**Table G-1**) were normal with the possible exception of one elevated reading (**Figure G-2**) at a background location (intersection of I-95 and I-16 near Savannah). Since this TLD is located over 80 miles from Kings Bay, the anomalous reading wasn't related to operations at Kings Bay.

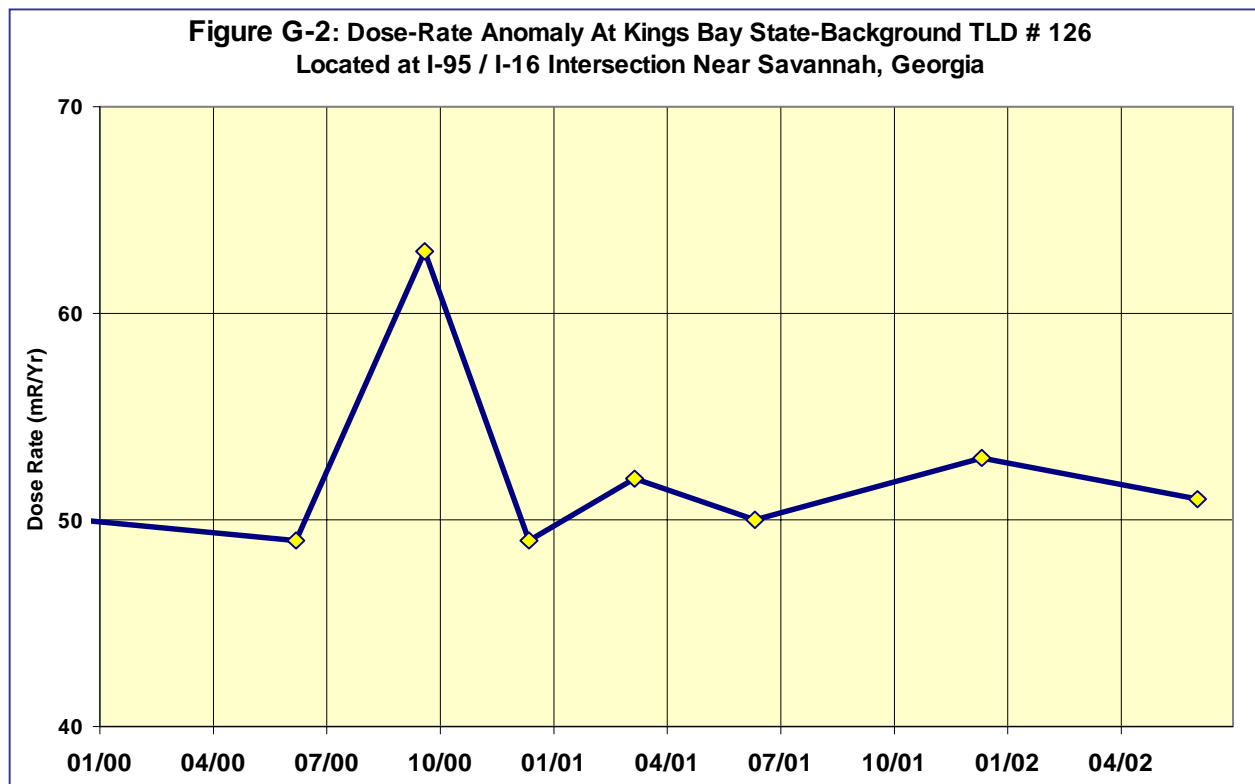


Figure G-3: Kings Bay TLD and Other Terrestrial (Soil, Vegetation, and Groundwater)

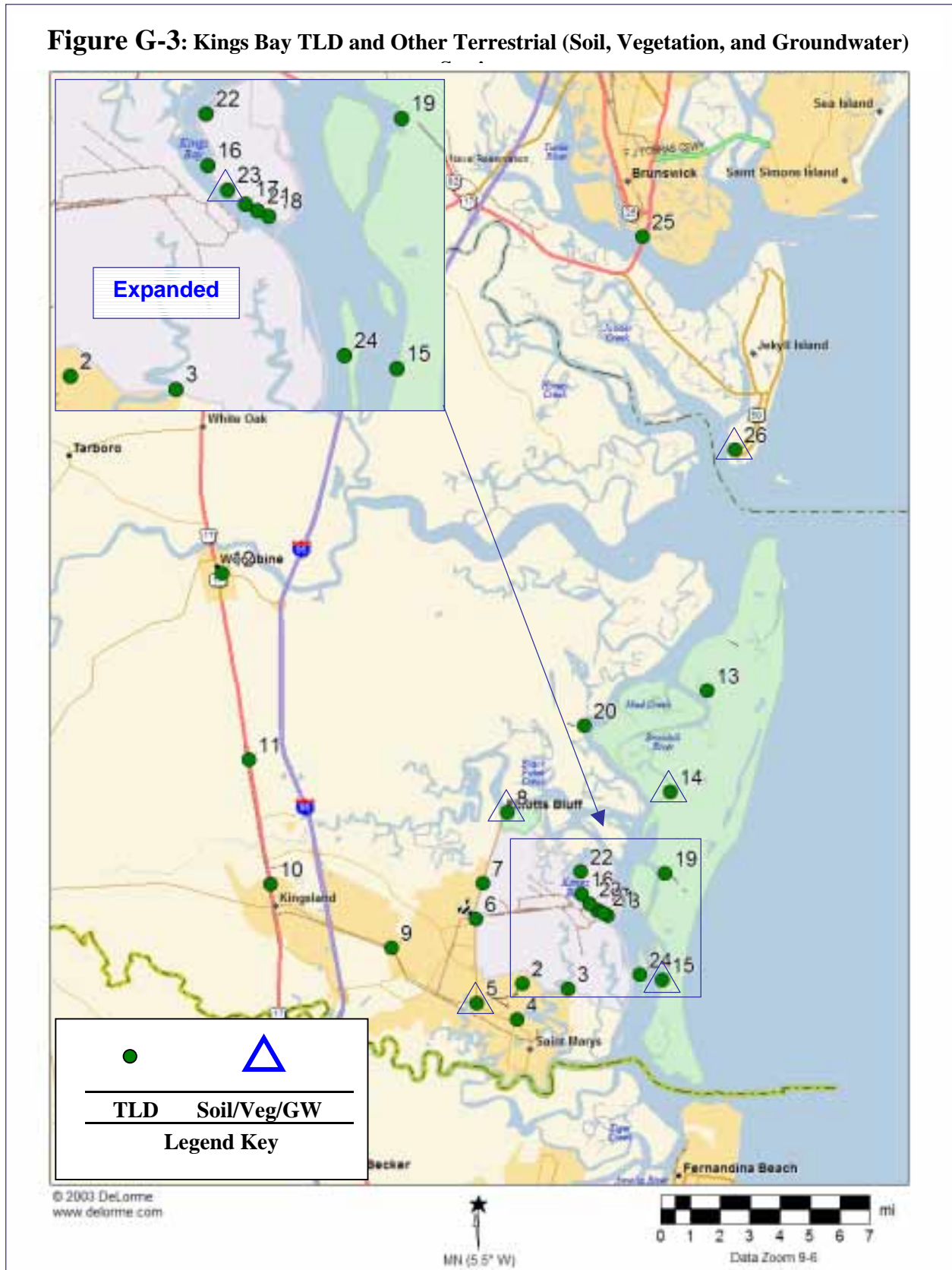
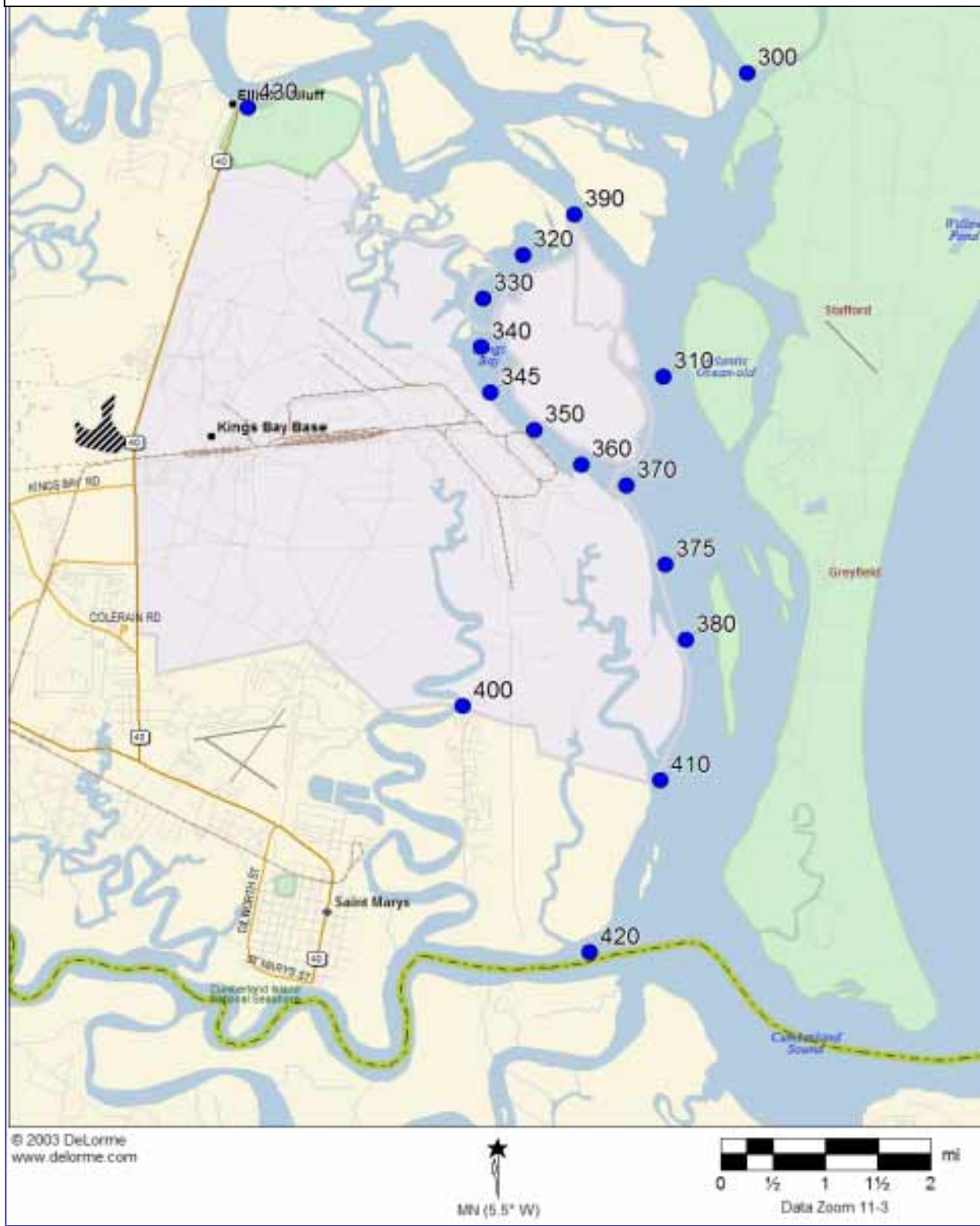


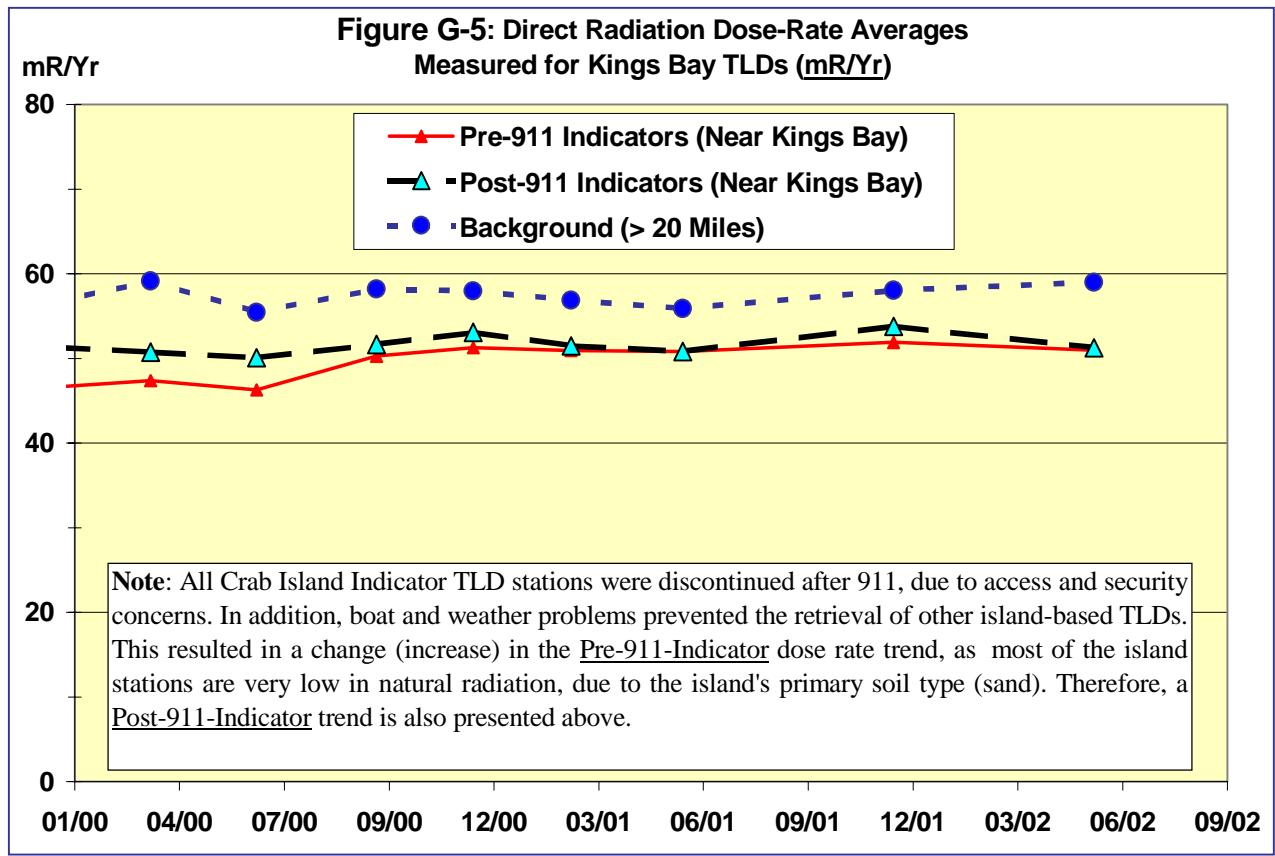
Figure G-4: Kings Bay Aquatic Stations (Surface Water, Sediment, Fish and Seafood)



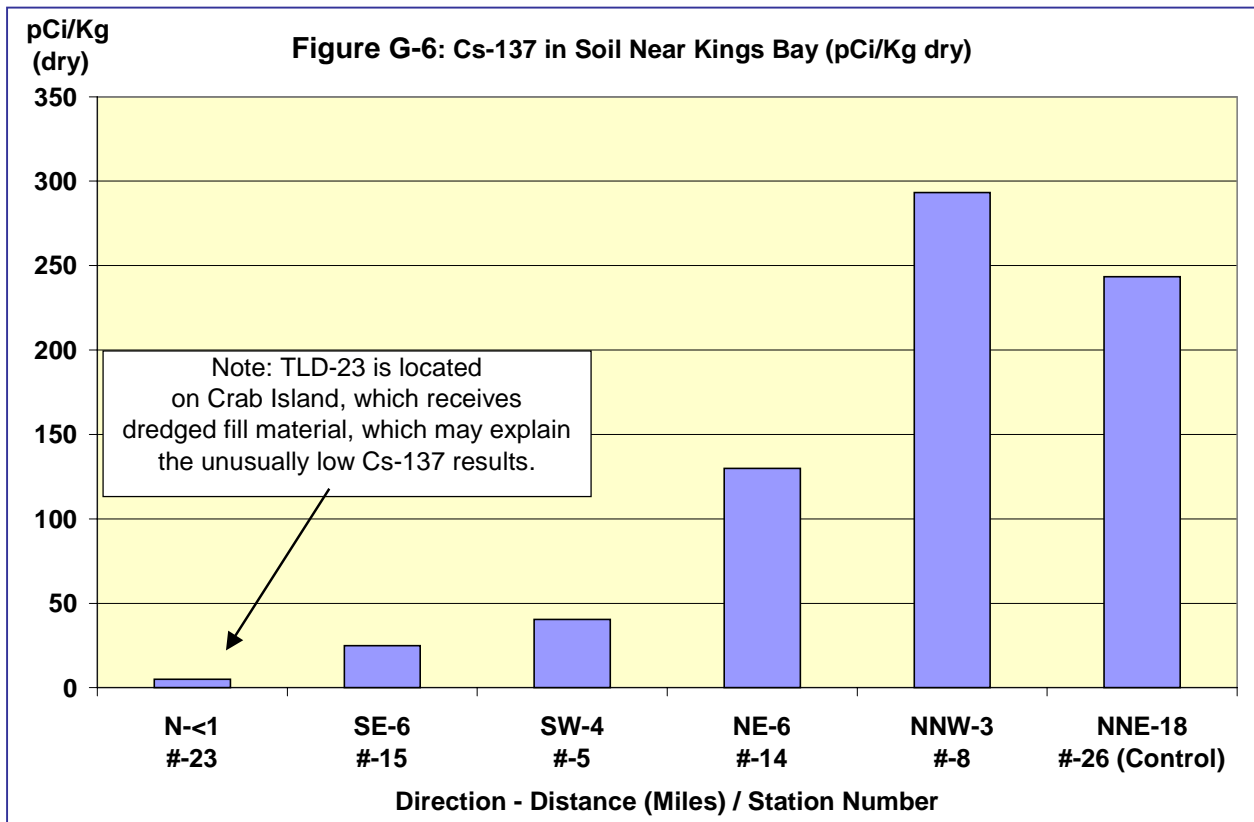
Instead, the TLD anomaly could conceivably be transportation-related, since the TLD is located at the intersection two busy freeways. It could also be construction-related, since highway and bridge maintenance occasionally requires the use of radiographic cameras and gauges. In any case, the activity wasn't related to Kings Bay, and the total dose involved was very small: less than 4 mrem total and less than 20% elevated over the normal background reading for the Quarter.

As previously noted, no other unusual results were observed on any other TLDs. Overall, background readings were higher than indicator readings (**Figure G-5**), indicating no measurable off-site doses due to operations at Kings Bay. (Higher background readings are attributed to their location near paved highways and developed areas). Naturally occurring radionuclides and their progeny (including the Uranium (Ra-226), Thorium (Ra-228), and Potassium (K-40) series) appear to account for more than 99% of the observed doses.

During the current monitoring period, some changes were made in DNR's TLD locations after September 11, 2001 (911), due to access and security concerns at Kings Bay. All TLD stations on Crab Island (which is between the Kings Bay waterfront and Cumberland Sound) were discontinued after 911. Since Crab Island TLDs were all very low in natural radioactivity (due to the sandy environment), their discontinuance resulted in an increase in the overall (average) indicator dose rate. Therefore, two indicator dose rate trends were established for future reference: Pre-911 and Post-911 trends.

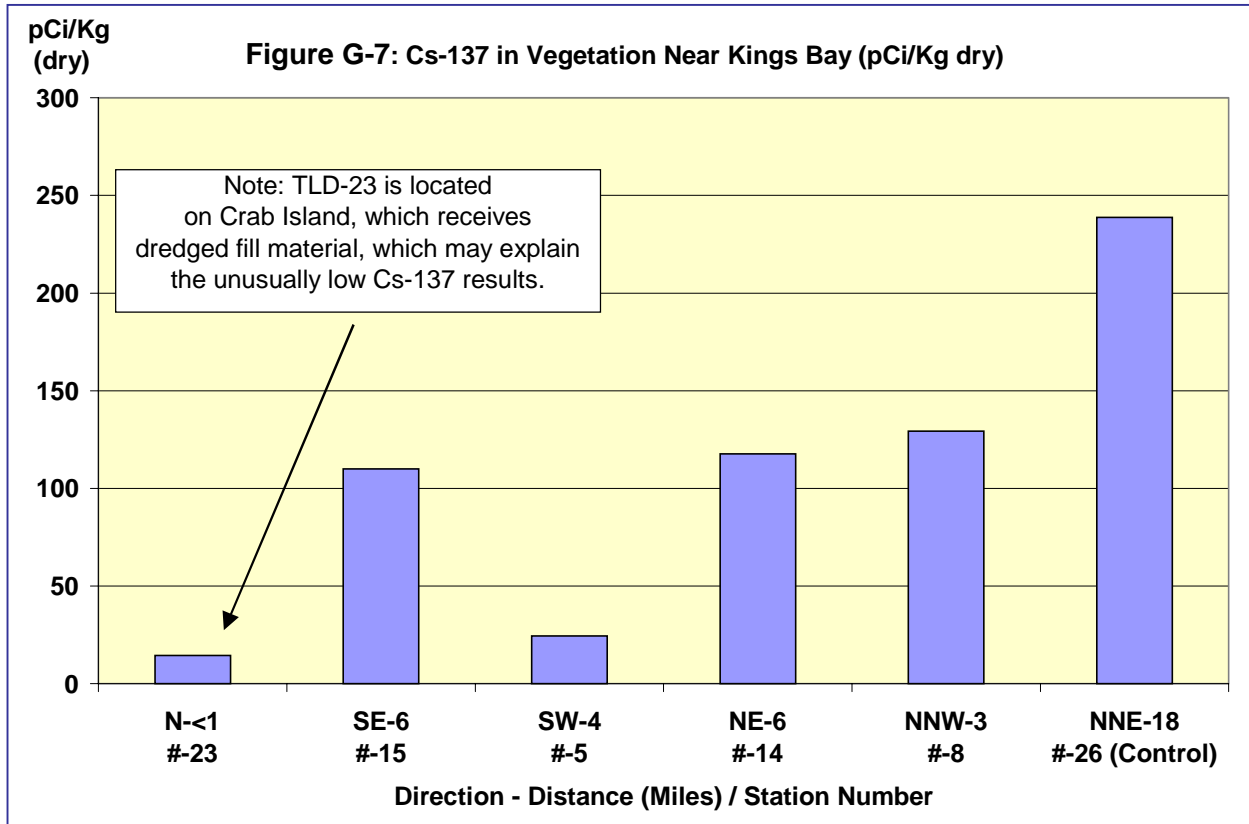


Soil: Soil sample results (**Table G-2**) were normal, with no unexpected findings. The only man-made radionuclide detected was Cs-137, which is attributed primarily to global fallout. Naturally occurring radionuclides (including Ra-226, Ra-228, and K-40) accounted for the majority of the activity detected. Cs-137 activity did show some interesting patterns (**Figure G-6**), however. Since the background sample (Station # 18 which is located 18 miles away) had the second highest level of Cs-137, Site operations don't appear to have contributed any measurable Cs-137 activity to indicator locations. In fact, the closest indicator location (Station # 23 on Crab Island less than 1 mile from operations) had the lowest activity, which seems to support this finding. However, this location has received dredged fill material over the years, so that the current top layer of soil (or sand) might not be reflective of what was deposited by global fallout from previous years.

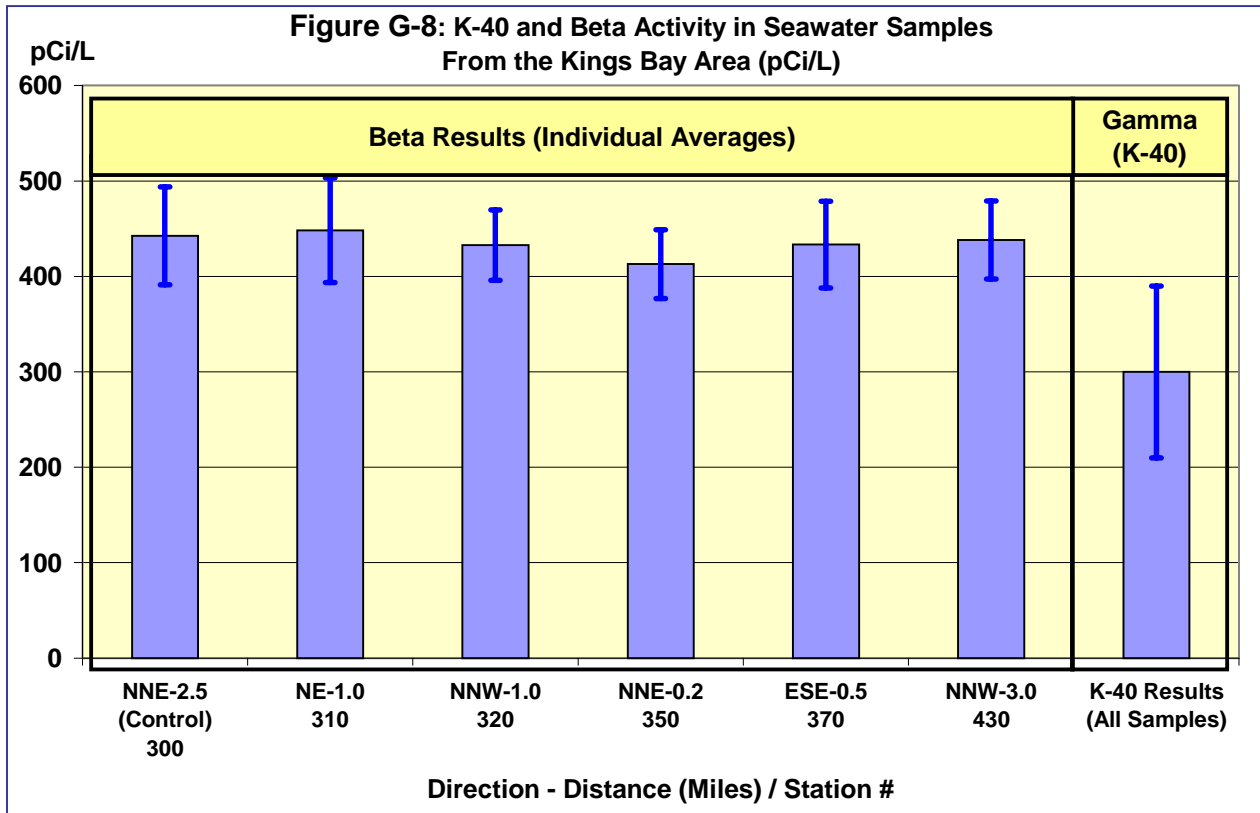


Groundwater: Groundwater results (**Table G-3**) were normal, with no detectable man-made radionuclides. Very low levels of beta activity, which are most likely due to naturally occurring Ra-228 and K-40, were detected in most samples. No site-related activity was detected.

Vegetation: Vegetation results (**Table G-4**) were normal (within the expected range) and show somewhat similar Cs-137 patterns (**Figure G-7**) as that observed in the soil samples. The background location had the highest level of Cs-137, which suggests that the Cs-137 is not site-related. Naturally occurring Be-7 and K-40 were also detected.



Surface Water: Surface Water results (Table G-5) were within the normal (expected) range, with no detectable activity that could be attributed to Site operations. No man-made gamma-emitting radionuclides were detected. However, significant levels of beta activity were detected, due primarily to naturally occurring K-40 in seawater, which can be detected by gamma analysis (Figure G-8). These levels are normal for seawater, which contains a variety of dissolved mineral salts, including KCl.



Fish and Seafood: No man-made radionuclides were detectable in fish and seafood samples (Table G-6). Naturally occurring K-40 was the only radionuclide detected. K-40 is found in all living organisms at similar concentrations, as it is present as a long-lived radioisotope of potassium, along with non-radioactive potassium, which is necessary for life.

Sediment: Results for sediment samples (Table G-7) were within the normal (expected) range, with no man-made radionuclides detected except for Cs-137. The Cs-137 is attributed primarily to global fallout, since the background location contained more Cs-137 than indicator locations (Figure G-9).

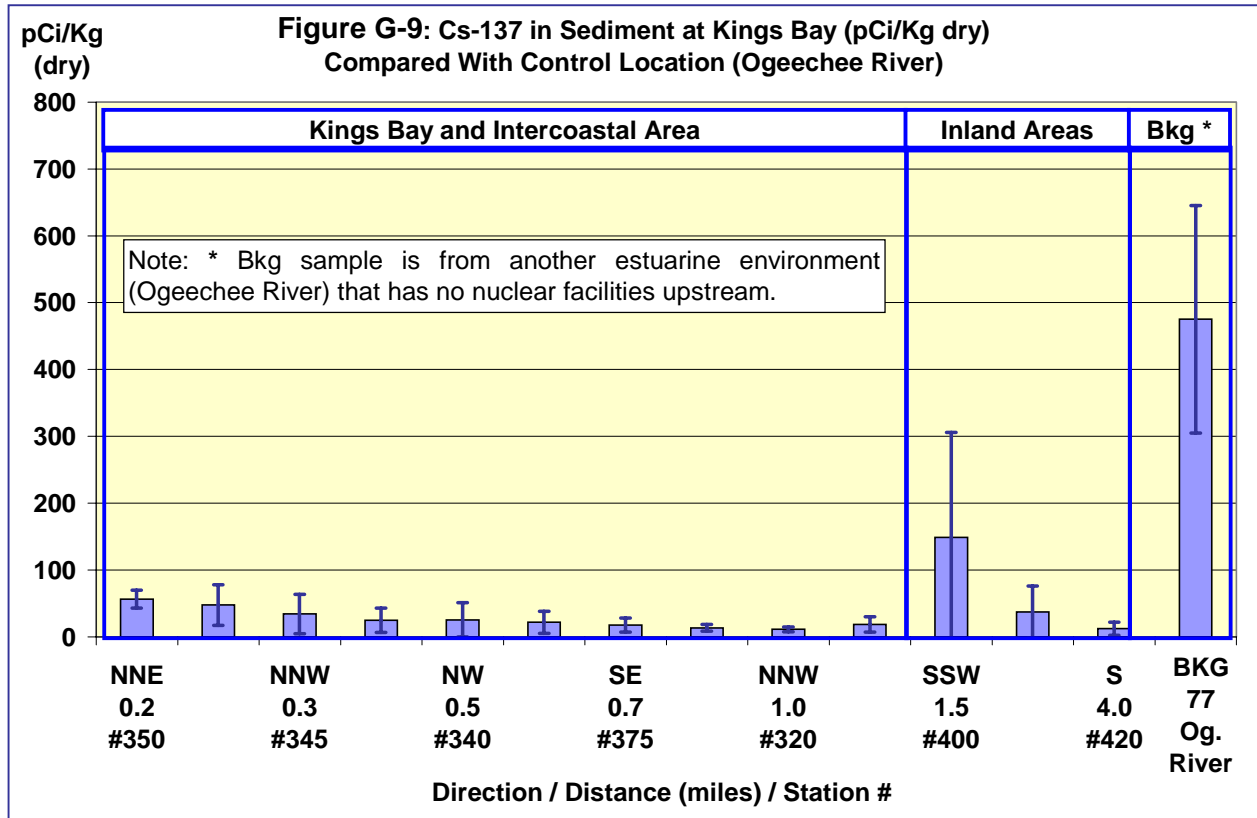


Table G-1 Kings Bay TLD Dosimetry Data (mRem per Year)

Sta	Type	Dir	Dis	mR/Yr 12/15/99	mR/Yr 3/7/00	mR/Yr 6/7/00	mR/Yr 9/19/00	mR/Yr 12/12/00	mR/Yr 3/7/01	mR/Yr 6/12/01	mR/Yr 12/12/01	mR/Yr 4/2/02	mR/Yr 6/4/02
1	I	SSE	1.5	47	47	49	48	49	47	46	48	49	49
2	I	S	2.6	45	45	47	47	48	48	47	47	47	49
3	I	SSE	3.1	51	53	49	54		53	50	58	48	54
4	I	S	3.9	47	47	45	48	51	48	49	49	49	52
5	I	SW	3.7	58	59	57	58	58	58	59	59	59	57
6	I	WSW	2	57	52	52	52	56	52	57	54		55
7	I	NW	2	60	56	58	59	61	60	60	61	58	62
8	I	NNW	3	38	38	34	38	40	39	39		41	41
9	I	WSW	4.9	52	50	49	49	51	51	49	52	50	54
10	B	W	8.6	50	48	47	48	49	48	44	51	47	54
11	B	WNW	10.5	58	57	59	59	59	57	57	59	59	64
12	B	NW	15	53	57	55	60	62	57	53		57	63
13	B	NE	9	36	33	35		--- Boat or Access Problems ---					34
14	I	NE	6	35	38	37		--- Boat or Access Problems ---					38
15	I	SE	5.5		40	38		--- Boat or Access Problems ---					
16	I	NNW	0.5	48	52	48	48	51	49		50		Abandoned
17	I	NNE	0.4	46	46	44	48	52	47		50		Abandoned
18	I	E	0.5	43	48	44	46	48	50		47		
19	I	NE	2.8	37	44	40		--- Boat or Access Problems ---					45
20	I	N	6.5	44	45	44		--- Boat or Access Problems ---					43

Notes: Several TLD locations on Crab Island (within the security perimeter) were abandoned after December 2001, due to security concerns and access difficulty. Access to several other island locations were also a problem, due to storms or boat (mechanical) problems.

Table G-1 Kings Bay TLD Dosimetry Data (mRem per Year) ... cont.

Sta	Type	Dir	Dis	mR/Yr	mR/Yr	mR/Yr	mR/Yr	mR/Yr	mR/Yr	mR/Yr	mR/Yr	mR/Yr	mR/Yr
				12/15/99	3/7/00	6/7/00	9/19/00	12/12/00	3/7/01	6/12/01	12/12/01	4/2/02	6/4/02
21	I	ESE	0.5	38	45	40	44	47			45		Abandoned
22	I	NNW	0.8	49		56	50	52	52		51		Abandoned
23	I	N	0.3	45	51	46	49	50	50		50		Abandoned
24	I	SE	2.5	35	39	38		39					
25	B	N	25	66	62	62	60	62	59	62	59		63
26	B	NNE	18	69	70	70	69	70	68	67	70		70
122	B	NNW	60	56	59	55	56	54	58	57	58		59
123	B	N	22	55	57	53	54	52	58	56	56		62
124	B	N	40	66	67	64	70	71	68	64	69		68
125	B	N	65	55	54	57	56	62	56	55	59		61
126	B	NNE	85	50		49	63	49	52	50	53		51
127	B	NNW	95	46	45	45	46	50	46	47	49		46
128	B	NNW	99	47		44	50	52	47	45	51		47

Note: The **highlighted** result is considered slightly elevated from the normal dose rate for this location. Since this is a background location (located at the intersection of I-95 and I-16 near Savannah), it is not related to operations at Kings Bay. However, it may be transportation-related, since it is in a heavily traveled corridor. It should also be noted that the uncertainty of this measurement was higher than normal, which could indicate a possible problem with the dosimeter rather than an actual elevated dose.

Table G-2 Kings Bay Soil Sample Data (pCi/Kg dry)

Sta	Samp	Collect	Agy	DW	Cs-137	K-40 (nat)	Ra-226 (nat)	Ra-228 (Nat)
<u>SW - 3.7 miles near Camden Co. High School</u>								
5	1113	3/7/2000	EPD	0.94	25	1,600	400	400
5	1173	3/6/2001	EPD	0.88	63	1,900	400	500
5	1207	4/2/2002	EPD	0.98	33	2,500	800	1,000
<u>NNW - 3.0 miles near Crooked River State Park</u>								
8	1114	3/7/2000	EPD	0.95	140	3,000	500	600
8	1174	3/6/2001	EPD	0.80	430	1,300	200	400
8	1208	4/2/2002	EPD	0.74	310	700	300	400
<u>NE - 6.0 miles on Cumberland Island at Plum Orchard Dock</u>								
14	1115	3/8/2000	EPD	0.99	130	800	200	200
<u>SE - 5.5 miles on Cumberland Island at Sea Camp Dock</u>								
15	1116	3/8/2000	EPD	0.99	25	2,800	700	600
<u>N - 0.3 miles on Southwest tip of Crab Island</u>								
23	1117	3/8/2000	EPD	0.99	<5	3,200	1,300	300
23	1175	3/7/2001	EPD	0.98	<5	2,600	900	300
<u>NNE - 18 miles on South end of Jekyll Island (control)</u>								
26	1118	3/7/2000	EPD	1.00	240	2,800	1,400	1,400
26	1176	3/6/2001	EPD	0.99	270	2,100	600	500
26	1209	4/2/2002	EPD	0.99	220	2,300	1,700	1,700

Table G-3 Kings Bay Groundwater Sample Data (pCi/L)

Sta	Samp	Collect	Agy	Alpha	Beta	Cs-137	H-3
<u>SW - 3.7 miles near Camden Co. High School</u>							
5	1100	3/07/2000	EPD	<3	2	<5	<200
5	1149	9/19/2000	EPD	<2	<2	<5	<200
5	1182	3/06/2001	EPD	<1	<2	<5	<200
5	1214	4/02/2002	EPD	<2	2	<5	<200
<u>NNW - 3.0 miles near Crooked River State Park</u>							
8	1101	3/07/2000	EPD	<2	3	<5	<200
8	1150	9/19/2000	EPD	<2	<2	<5	<200
8	1183	3/06/2001	EPD	<1	<2	<5	<200
8	1215	4/02/2002	EPD	<2	2	<5	<200
<u>NE - 6.0 miles on Cumberland Island at Plum Orchard Dock</u>							
14	1102	3/07/2000	EPD	<2	2	<5	<200
<u>SE - 5.5 miles on Cumberland Island at Sea Camp Dock</u>							
15	1103	3/08/2000	EPD	<2	3	<5	<200

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Table G-4 Kings Bay Vegetation Sample Data (pCi/Kg fresh)

Sta	Samp	Collect	Agy	DW	Cs-137	Be-7 (nat)	K-40 (nat)
<u>SW - 3.7 miles near Camden Co. High School</u>							
5	1104	03/07/2000	EPD	0.31	<28	600	5,900
5	1126	06/06/2000	EPD	0.23	<14	200	5,100
5	1145	09/19/2000	EPD	0.19	<17	600	5,300
5	1157	12/12/2000	EPD	0.21	<13	700	3,200
5	1169	03/06/2001	EPD	0.14	50	400	5,600
5	1186	06/12/2001	EPD	0.17	30	200	3,900
5	1200	12/11/2001	EPD	0.18	30	800	3,300
5	1216	06/04/2002	EPD	0.25	22	400	4,800
5	1227	10/17/2002	EPD	0.17	<16	300	3,600
<u>NNW - 3.0 miles near Crooked River State Park</u>							
8	1127	06/06/2000	EPD	0.28	80	500	4,400
8	1146	09/19/2000	EPD	0.38	90	2,100	4,900
8	1158	12/12/2000	EPD	0.41	<21	1,800	5,800
8	1170	03/06/2001	EPD	0.34	<14	3,100	5,500
8	1187	06/12/2001	EPD	0.26	70	1,000	4,700
8	1210	04/02/2002	EPD	0.39	430	1,700	3,200
8	1217	06/04/2002	EPD	0.35	190	1,000	3,100
8	1228	10/17/2002	EPD	0.33	140	900	2,200
<u>NE - 6.0 miles on Cumberland Island at Plum Orchard Dock</u>							
14	1128	06/07/2000	EPD	0.40	100	1,500	1,400
14	1218	06/04/2002	EPD	0.45	190	1,100	6,300
14	1229	10/17/2002	EPD	0.29	63	900	2,600
<u>SE - 5.5 miles on Cumberland Island at Sea Camp Dock</u>							
15	1129	06/07/2000	EPD	0.22	110	2,300	2,900
<u>N - 0.3 miles on Southwest tip of Crab Island</u>							
23	1105	03/08/2000	EPD	0.14	<16	<140	7,700
23	1130	06/07/2000	EPD	0.52	<10	3,000	2,600
23	1147	09/20/2000	EPD	0.35	<14	2,000	4,100
23	1159	12/12/2000	EPD	0.48	<15	2,500	4,900
23	1171	03/07/2001	EPD	0.12	<17	100	4,700
<u>NNE - 18 miles on South end of Jekyll Island (control)</u>							
26	1131	06/06/2000	EPD	0.26	390	200	4,700
26	1148	09/19/2000	EPD	0.28	250	1,500	3,000
26	1160	12/12/2000	EPD	0.51	230	3,700	2,600
26	1172	03/06/2001	EPD	0.47	200	1,800	2,600
26	1188	06/12/2001	EPD	0.26	290	1,400	3,100
26	1201	12/11/2001	EPD	0.31	290	1,400	2,900
26	1211	04/02/2002	EPD	0.47	160	3,400	2,700
26	1219	06/04/2002	EPD	0.35	100	500	3,700

Note: Cs-137, a product of global fallout, appears to be higher in vegetation growing in sandy, nutrient-poor soils near the ocean. Crab Island, which is the closest island to Kings Bay, appears to be an exception, in that **no** Cs-137 was detected. This may be due to the dredged fill material, which has been used to build up the island, or it may be due to the proximity of the vegetation to the salt-water zone, which may improve uptake of potassium, which competes with cesium in uptake by plants.

Table G-5 Kings Bay Surface Water Sample Data (pCi/L)

Sta	Samp	Collect	Agy	Alpha	Beta	Cs-137	H-3
<u>NNE-2.5 Miles ... Cumberland Sound at Crooked River (Near Crooked River State Park)</u>							
300	1076	12/15/1999	EPD	<200	410	<5	<200
300	1106	03/08/2000	EPD	<200	390	<5	<200
300	1119	06/07/2000	EPD	<500	470	<5	<200
300	1220	06/04/2002	EPD	<900	500	<5	<200
<u>NE-1.0 Miles ... Cumberland Sound East of Crab Island and Kings Bay</u>							
310	1077	12/15/1999	EPD	<200	410	<5	<200
310	1107	03/08/2000	EPD	200	380	<5	<200
310	1120	06/07/2000	EPD	<500	480	<5	<200
310	1151	09/20/2000	EPD	<300	410	<5	<200
310	1163	12/13/2000	EPD	<500	500	<5	<200
310	1221	06/04/2002	EPD	<800	510	<5	<200
<u>NNW-1.0 Miles ... Northern Kings Bay (North of Dry Dock)</u>							
320	1078	12/15/1999	EPD	<200	400	<5	<200
320	1108	03/08/2000	EPD	<200	380	<5	<200
320	1121	06/07/2000	EPD	<500	440	<5	<200
320	1152	09/20/2000	EPD	<300	410	<5	<200
320	1164	12/13/2000	EPD	<400	480	<5	<200
320	1177	03/07/2001	EPD	<400	460	<5	<200
320	1202	12/12/2001	EPD	<500	460	<5	<200
<u>NNE-0.2 Miles Southern Kings Bay North of Explosive's Wharf</u>							
350	1079	12/15/1999	EPD	<100	370	<5	<200
350	1109	03/08/2000	EPD	<200	360	<5	<200
350	1122	06/07/2000	EPD	<500	440	<5	<200
350	1153	09/20/2000	EPD	<300	400	<5	<200
350	1165	12/13/2000	EPD	<500	440	<5	<200
350	1178	03/07/2001	EPD	<300	440	<5	<200
350	1203	12/12/2001	EPD	<400	440	<5	<200
<u>ESE-0.5 Miles ... Southern Outlet of Kings Bay at Cumberland Sound Junction</u>							
370	1080	12/15/1999	EPD	<200	380	<5	<200
370	1110	03/08/2000	EPD	<200	400	<5	<200
370	1123	06/07/2000	EPD	<500	460	<5	<200
370	1154	09/20/2000	EPD	<300	380	<5	<200
370	1166	12/13/2000	EPD	<400	480	<5	<200
370	1179	03/07/2001	EPD	<300	400	<5	<200
370	1204	12/12/2001	EPD	<600	470	<5	<200
370	1222	06/04/2002	EPD	<800	500	<5	<200
370	1234	10/17/2002	EPD	<400	430	<5	<200

Note: Elevated beta attributed primarily to natural K-40 in seawater.

Table G-5 Kings Bay Surface Water Sample Data (pCi/L) ... cont.

Sta	Samp	Collect	Agy	Alpha	Beta	Cs-137	H-3
<u>NNE-1.2 Miles ... Northern Outlet of Kings Bay at Crooked River Junction</u>							
390	1235	10/17/2002	EPD	<500	410	<5	<200
390	1223	06/04/2002	EPD	<1100	530	<5	<200
<u>SSW-1.5 Miles ... North River</u>							
400	1064	09/21/1999	EPD	<200	290	<5	<200
400	1081	12/14/1999	EPD	<100	300	<5	<200
400	1111	03/07/2000	EPD	<50	230	<5	<200
400	1124	06/06/2000	EPD	700	290	<5	<200
400	1155	09/19/2000	EPD	<100	170	<5	<200
400	1167	12/12/2000	EPD	<100	230	<5	<200
400	1180	03/06/2001	EPD	<100	300	<5	<200
400	1184	06/12/2001	EPD	<200	350	<5	<200
400	1205	12/12/2001	EPD	<100	250	<5	<200
400	1212	04/02/2002	EPD	<50	200	<5	<200
400	1224	06/04/2002	EPD	<300	390	<5	<200
<u>NNW-3.0 Miles ... Crooked River at the end of Spur-40</u>							
430	1065	09/21/1999	EPD	<200	380	<5	<200
430	1082	12/14/1999	EPD	<100	390	<5	<200
430	1112	03/07/2000	EPD	<300	420	<5	<200
430	1125	06/06/2000	EPD	1,000	470	<5	<200
430	1156	09/19/2000	EPD	<300	450	<5	<200
430	1168	12/12/2000	EPD	<500	460	<5	<200
430	1181	03/06/2001	EPD	<300	440	<5	<200
430	1185	06/12/2001	EPD	<400	480	<5	<200
430	1206	12/11/2001	EPD	<500	450	<5	<200
430	1213	04/02/2002	EPD	<100	380	<5	<200
430	1225	06/04/2002	EPD	<700	500	<5	<200

Notes: (a) Elevated beta attributed primarily to natural K-40 in seawater.

(b) Alpha detection limit is high for seawater samples due to the high level of dissolved solids typically found in seawater, which cause self-absorption.

Table G-6 Kings Bay Aquatic Species Sample Data (pCi/Kg fresh)

Sta	Samp	Collect	Agy	DW	Species	Cs-137	K-40 (nat)
<u>ESE-0.5 Miles ... Cumberland Sound Near Kings Bay Southern Outlet</u>							
370	1191	10/04/2000	EPD	0.28	Sea Trout	<11	3,400
370	1190	10/04/2000	EPD	0.40	Shrimp	<12	3,500
370	1189	10/04/2000	EPD	0.28	Flounder	<9	3,400
370	1226	12/10/2001	EPD	0.27	Shrimp	<8	3,300
370	1236	12/04/2002	EPD	0.25	Shrimp	<3	3,300

Table G-7 Kings Bay Marine Sediment Sample Data (pCi/Kg dry)

Sta	Samp	Collect	Agy	DW	Cs-137	K-40 (nat)	Ra-226 (nat)	Ra-228 (nat)
<u>NE-1.0 Miles ... Cumberland Sound East of Crab Island and Kings Bay</u>								
310	1085	12/15/1999	EPD	0.70	17	5,100	900	1,100
310	1132	09/20/2000	EPD	0.55	10	5,400	1,000	1,100
<u>NNW-1.0 Miles ... Northern Kings Bay (North of Dry Dock)</u>								
320	1086	12/15/1999	EPD	0.74	7	2,500	600	700
320	1133	09/20/2000	EPD	0.66	14	3,400	1,000	1,000
320	1192	12/12/2001	EPD	0.67	12	3,500	700	800
<u>NNW-0.7 Miles ... Northern Kings Bay South of Dry Dock</u>								
330	1087	12/15/1999	EPD	0.73	<10	2,400	1,200	1,600
330	1134	09/20/2000	EPD	0.54	41	5,600	700	800
330	1193	12/12/2001	EPD	0.62	14	3,300	500	500
<u>NW-0.5 Miles ... Middle Kings Bay North of Refit Area</u>								
340	1088	12/15/1999	EPD	0.52	55	7,100	900	800
340	1135	09/20/2000	EPD	0.65	<10	5,200	900	1,100
340	1194	12/12/2001	EPD	0.76	11	3,800	600	700
<u>NNW-0.3 Miles ... Middle Kings Bay South of Refit Area</u>								
345	1089	12/15/1999	EPD	0.61	11	5,300	1,100	1,200
345	1136	09/20/2000	EPD	0.47	67	7,800	900	900
345	1195	12/12/2001	EPD	0.55	24	8,000	1,200	1,000
<u>NNE-0.2 Miles Southern Kings Bay ... North of Explosive's Wharf</u>								
350	1090	12/15/1999	EPD	0.41	68	7,600	1,000	800
350	1137	09/20/2000	EPD	0.51	42	7,700	1,200	1,200
350	1196	12/12/2001	EPD	0.40	59	8,200	800	800
<u>ENE-0.3 ... Southern Kings Bay ... South of Explosive's Wharf</u>								
360	1091	12/15/1999	EPD	0.32	69	10,000	1,000	1,100
360	1138	09/20/2000	EPD	0.45	26	7,600	900	900

Table G-7 Kings Bay Marine Sediment Sample Data (pCi/Kg dry) ... cont.

Sta	Samp	Collect	Agy	DW	Cs-137	K-40 (nat)	Ra-226 (nat)	Ra-228 (nat)
<u>ESE-0.5 Miles ... Southern Outlet of Kings Bay at Cumberland Sound Junction</u>								
370	1092	12/15/1999	EPD	0.52	45	7,400	700	700
370	1139	09/20/2000	EPD	0.68	19	4,800	500	500
370	1230	10/17/2002	EPD	0.69	<10	4,300	800	1,100
<u>SE-0.7 Miles ... Cumberland Sound near Drum Point Island and DeGauss Wharf</u>								
375	1093	12/15/1999	EPD	0.61	25	3,400	1,000	1,300
375	1140	09/20/2000	EPD	0.63	<10	5,500	1,000	1,300
<u>NNE-1.2 Miles ... Northern Outlet of Kings Bay at Crooked River Junction</u>								
390	1095	12/15/1999	EPD	0.62	<10	6,600	1,000	1,200
390	1141	09/20/2000	EPD	0.59	<10	3,800	1,400	2,000
390	1197	12/12/2001	EPD	0.35	<20	9,400	800	1,100
390	1231	10/17/2002	EPD	0.40	34	7,200	700	1,000
<u>SSW-1.5 Miles ... North River</u>								
400	1096	12/14/1999	EPD	0.64	49	4,000	900	1,100
400	1142	09/20/2000	EPD	0.31	370	8,500	1,500	1,800
400	1198	12/12/2001	EPD	0.42	150	5,200	700	700
400	1232	10/17/2002	EPD	0.70	26	2,300	900	900
<u>S-4.0 Miles ... Saint Marys River at Cumberland Sound</u>								
420	1098	12/15/1999	EPD	0.71	8	4,900	1,000	1,100
420	1161	12/12/2000	EPD	0.68	23	5,000	700	800
420	1199	12/12/2001	EPD	0.80	<5	1,800	300	100
<u>NNW-3.0 Miles ... Crooked River at the end of Spur-40</u>								
430	1099	12/15/1999	EPD	0.57	37	6,900	1,600	2,100
430	1143	09/20/2000	EPD	0.40	<10	8,200	600	1,000
430	1162	12/12/2000	EPD	0.58	9	4,400	1,000	1,200
430	1233	10/17/2002	EPD	0.26	92	10,300	1,000	1,100