APPENDIX F

CANCER BURDEN ANALYSIS

APPENDIX F: CANCER BURDEN ANALYSIS

F.1 INTRODUCTION

In a comment received from the Bay Area Air Quality Management District ("the District") in a letter dated August 16, 2007, the District requested that PSC perform a cancer burden analysis. Specifically, District Comment 1 stated that "the HRA report should include the results of a cancer burden analysis for receptors within the zone of impact (greater than one in a million)". In response, ENVIRON performed a cancer burden analysis in addition to the standard risk assessment described in this HRA Report. A cancer burden analysis is a form of population-level risk evaluation and is commonly used for risk communication purposes to provide perspective on the magnitude of the potential public health threat posed by a facility. The result of a cancer burden is an estimate of the number of cancer cases expected in the exposed population from a 70-year lifetime exposure to current estimated facility emissions. The methods used and findings of the cancer burden analysis performed for PSC are presented in this Appendix F.

F.2 CANCER BURDEN CALCULATION METHODS

The cancer burden was estimated following methods recommended in OEHHA Hot Spots Guidance (Cal/EPA 2003). Specifically, cancer burden is calculated by multiplying the number of people exposed by the residential cancer risk at the population centroid of each census block and summing the resulting values within the area evaluated (Cal/EPA 2003). The population centroid is a receptor point at the geographical center of the census tract. As requested by the District, the area evaluated was defined as the area where the residential lifetime cancer risk was equal to or greater than one in one million (i.e., "zone of impact"). Modeled census block centroids are shown in Figure F.1. Census 2000 population data for the zone of impact were obtained using ENVIRON GeoLytics'® Census CD 2000 Short Form Blocks (Release 1.0), also shown in Figure F.1. For census tracts transected by the one in one million cancer risk level, the population was adjusted by multiplying the population by the proportion of the census tract area within the one-in-one million cancer risk line and the total area of the census tract. This adjustment assumes the population within those census tracts is evenly distributed over the area.

Centroid risks were calculated assuming existing operational and future controlled conditions and using the air dispersion modeling methods outlined in Section 4.0 of this HRA Report.

F.3 RESULTS OF CANCER BURDEN

The results of the cancer burden analysis indicate that less than one cancer case would be expected in the one in a million zone of impact of the Facility under existing operational and future controlled conditions. The cancer burdens associated with existing operational and future controlled conditions are 0.015 and 0.006, respectively, as shown in Table F.1. The cancer burden estimates for each of the centroid locations are also provided in Table F.1.

F.4 REFERENCES

California Environmental Protection Agency (Cal/EPA). 2003. *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments.* Office of Environmental Health Hazard Assessment. August.

Table F.1. Cancer Burden Calculation
Pacific Steel Casting Company
Berkeley, California

Receptor ID	UTMx	UTMy	Population	Total Area	Area w/in Existing Operational Conditions One in a Million Contour	Area w/in Future Controlled Conditions One in a Million Contour	Existing Operational Conditions Risk	Future Controlled Conditions Risk	Existing Operational Conditions Cancer Burden	Future Controlled Conditions Cancer Burden
Centroild #	m	m	[-]	m^2	m^2	m^2	[-]	[-]	[-]	[-]
R59	561917	4193992	92	20156	1158	--	9.5E-07	--	5.0E-06	--
R63	561632	4194137	25	14476	473	--	9.3E-07	--	7.6E-07	--
R66	561838	4193971	115	15719	8970	--	1.0E-06	--	6.6E-05	--
R67	561758	4193965	147	18410	14797	--	1.0E-06	--	1.2E-04	--
R68	561678	4193956	77	17009	16286	--	1.1E-06	--	8.0E-05	--
R76	561513	4193949	184	17105	15170	--	1.1E-06	--	1.8E-04	--
R77	561590	4193954	56	20966	18615	--	1.1E-06	--	5.4E-05	--
R78	561654	4193721	46	19436	19436	--	1.4E-06	--	6.3E-05	--
R79	561587	4193688	138	19092	19092	2757	1.5E-06	9.2E-07	2.0E-04	1.8E-05
R80	561506	4193689	130	22868	22868	6072	1.5E-06	9.2E-07	1.9E-04	3.2E-05
R81	561437	4193929	145	18380	15377	--	1.1E-06	--	1.3E-04	--
R82	561360	4193897	99	18074	13059	--	1.1E-06	--	7.8E-05	--
R83	561422	4193682	98	20880	20880	5573	1.5E-06	9.3E-07	1.4E-04	2.4E-05
R87	560593	4193939	0	189224	1030	--	6.5E-07	--	0.0E+00	--
R88	560826	4193692	0	19056	6616	--	9.6E-07	--	0.0E+00	--
R92	560992	4193727	57	10100	7408	--	1.0E-06	--	4.3E-05	--
R93	561170	4193778	106	16995	9839	--	9.7E-07	--	5.9E-05	--
R94	561298	4193858	46	12522	8561	--	1.1E-06	--	3.3E-05	--
R95	561340	4193664	85	17122	17122	4256	1.5E-06	9.2E-07	1.3E-04	1.9E-05
R96	561271	4193659	81	11509	11509	1801	1.4E-06	8.8E-07	1.1E-04	1.1E-05
R97	561204	4193641	105	15880	15880	987	1.4E-06	8.5E-07	1.4E-04	5.6E-06
R98	561129	4193633	85	12160	12160	--	1.3E-06	--	1.1E-04	--
R99	561020	4193660	87	8495	8495	--	1.1E-06	--	1.0E-04	--
R100	560933	4193653	0	8247	6570	--	1.1E-06	--	0.0E+00	--
R101	560877	4193610	0	12166	11845	--	1.1E-06	--	0.0E+00	--
R102	561045	4193591	65	11020	11020	--	1.3E-06	--	8.5E-05	--
R104	561657	4193531	0	15081	15081	12889	1.6E-06	1.0E-06	0.0E+00	0.0E+00
R105	561646	4193348	161	81450	81450	81360	2.0E-06	1.3E-06	3.2E-04	2.0E-04
R106	561190	4193329	972	203329	203329	183208	2.3E-06	1.4E-06	2.2E-03	1.2E-03
R107	561246	4193159	415	36501	36501	36501	3.4E-06	2.0E-06	1.4E-03	8.4E-04
R108	561436	4193228	0	40474	40474	40474	2.8E-06	1.8E-06	0.0E+00	0.0E+00
R109	561403	4193316	1	3934	3934	3934	2.5E-06	1.6E-06	2.5E-06	1.6E-06
R110	561422	4193054	0	23450	23450	23450	3.9E-06	2.4E-06	0.0E+00	0.0E+00
R111	561620	4193112	0	28563	28563	28563	2.5E-06	1.6E-06	0.0E+00	0.0E+00
R112	561765	4193140	172	15896	15896	15874	1.8E-06	1.2E-06	3.1E-04	2.0E-04
R113	560934	4193168	0	68547	68547	57718	2.3E-06	1.4E-06	0.0E+00	0.0E+00
R114	560835	4193251	0	55694	55694	30092	1.8E-06	1.0E-06	0.0E+00	0.0E+00
R115	560774	4193504	0	6595	6595	--	1.1E-06	--	0.0E+00	--
R116	560517	4193347	0	399206	232088	72000	1.1E-06	6.7E-07	0.0E+00	0.0E+00
R117	560253	4193392	0	27822	8656	1107	8.1E-07	5.0E-07	0.0E+00	0.0E+00
R121	561994	4193723	67	27241	16913	--	1.0E-06	--	4.2E-05	--
R122	561916	4193698	171	29176	29176	--	1.1E-06	--	1.9E-04	--
R123	561834	4193682	192	31682	31682	--	1.2E-06	--	2.4E-04	--
R124	561751	4193656	130	34738	34738	302	1.4E-06	8.8E-07	1.8E-04	9.9E-07
R128	562065	4193413	134	16382	4661	--	9.7E-07	--	3.7E-05	--
R129	562005	4193369	143	28708	25806	--	1.1E-06	--	1.4E-04	--
R130	561912	4193325	204	35691	35691	--	1.3E-06	--	2.6E-04	--
R131	561826	4193319	198	20183	20183	5426	1.5E-06	9.8E-07	3.0E-04	5.2E-05
R132	561857	4193096	18	6941	6941	2453	1.5E-06	9.6E-07	2.6E-05	6.1E-06
R133	561951	4193107	75	17624	17624	--	1.2E-06	--	9.0E-05	--
R134	562044	4193128	74	14055	7414	--	9.9E-07	--	3.9E-05	--
R338	562067	4192918	71	19836	957	--	8.8E-07	--	3.0E-06	--
R339	561984	4192899	82	18084	13213	--	1.0E-06	--	6.2E-05	--
R340	561949	4193012	9	1451	1451	--	1.2E-06	--	1.0E-05	--
R341	561875	4193005	17	6132	6132	211	1.4E-06	9.0E-07	2.3E-05	5.3E-07
R342	561906	4192872	79	16356	16356	--	1.2E-06	--	9.7E-05	--
R343	561956	4192685	46	14073	7136	--	9.8E-07	--	2.3E-05	--
R344	562031	4192698	75	15385	313	--	8.4E-07	--	1.3E-06	--
R349	561788	4193003	48	13417	13417	13023	1.7E-06	1.1E-06	8.2E-05	5.2E-05
R350	561631	4192977	3	25063	25063	25063	2.6E-06	1.7E-06	7.8E-06	5.2E-06
R351	561433	4192930	0	23865	23865	23865	4.6E-06	3.0E-06	0.0E+00	0.0E+00
R352	561294	4192907	134	15767	15767	15767	6.3E-06	3.7E-06	8.5E-04	5.0E-04
R353	561152	4192878	68	39700	39700	39700	7.4E-06	4.1E-06	5.0E-04	2.8E-04
R354	561037	4192739	4	39207	39207	39207	1.1E-05	5.6E-06	4.3E-05	2.2E-05
R355	560921	4192828	0	15217	15217	15217	5.6E-06	2.9E-06	0.0E+00	0.0E+00
R356	560856	4192807	0	8471	8471	8471	4.9E-06	2.6E-06	0.0E+00	0.0E+00
R357	560903	4192615	0	12413	12413	12413	9.7E-06	4.7E-06	0.0E+00	0.0E+00
R358	560967	4192641	0	16209	16209	16209	1.2E-05	6.0E-06	0.0E+00	0.0E+00
R359	561035	4192369	0	26817	26817	26817	4.0E-05	2.8E-05	0.0E+00	0.0E+00
R360	561102	4192455	10	18988	18988	18988	3.6E-05	2.0E-05	3.6E-04	2.0E-04
R361	561200	4192476	25	21915	21915	21915	2.2E-05	1.6E-05	5.4E-04	3.9E-04
R362	561161	4192630	0	10567	10567	10567	1.7E-05	9.6E-06	0.0E+00	0.0E+00
R363	561144	4192729	0	5435	5435	5435	1.3E-05	6.9E-06	0.0E+00	0.0E+00
R364	561246	4192698	0	21632	21632	21632	1.1E-05	6.9E-06	0.0E+00	0.0E+00
R365	561344	4192732	0	17946	17946	17946	8.0E-06	5.3E-06	0.0E+00	0.0E+00
R366	561430	4192760	0	19531	19531	19531	5.7E-06	3.8E-06	0.0E+00	0.0E+00
R367	561526	4192774	0	21710	21710	21710	3.9E-06	2.6E-06	0.0E+00	0.0E+00
R368	561626	4192815	0	23452	23452	23452	2.7E-06	1.8E-06	0.0E+00	0.0E+00
R369	561725	4192833	0	17560	17560	17560	2.0E-06	1.3E-06	0.0E+00	0.0E+00
R370	561816	4192844	0	19007	19007	10775	1.5E-06	1.0E-06	0.0E+00	0.0E+00
R371	561867	4192653	0	22594	21814	301	1.2E-06	7.8E-07	0.0E+00	0.0E+00
R372	561770	4192630	0	18335	18335	9889	1.5E-06	1.0E-06	0.0E+00	0.0E+00
R373	561684	4192619	0	17752	17752	17596	2.0E-06	1.3E-06	0.0E+00	0.0E+00
R374	561579	4192582	8	23597	23597	23597	2.8E-06	1.9E-06	2.3E-05	1.5E-05
R375	561479	4192549	4	18219	18219	18219	4.3E-06	2.8E-06	1.7E-05	1.1E-05
R376	561393	4192531	14	18911	18911	18911	6.6E-06	4.5E-06	9.3E-05	6.3E-05
R377	561300	4192518	0	20276	20276	20276	1.2E-05	8.7E-06	0.0E+00	0.0E+00
R378	561341	4192350	22	11315	11315	11315	8.3E-06	5.0E-06	1.8E-04	1.1E-04
R379	561432	4192367	37	10996	10996	10996	4.5E-06	2.9E-06	1.7E-04	1.1E-04
R380	561467	4192236	38	14964	14964	14964	3.9E-06	2.6E-06	1.5E-04	9.8E-05

Receptor ID	UTMx	UTMy	Population	Total Area	Area w/in Existing Operational Conditions One in a Million Contour	Area w/in Future Controlled Conditions One in a Million Contour	Existing Operational Conditions Risk	Future Controlled Conditions Risk	Existing Operational Conditions Cancer Burden	Future Controlled Conditions Cancer Burden
Centroid #	m	m	[-]	m^2	m^2	m^2	[-]	[-]	[-]	[-]
R381	561369	4192215	7	15907	15907	15907	6.3E-06	4.1E-06	4.4E-05	2.9E-05
R382	561272	4192186	21	15458	15458	15458	1.0E-05	6.8E-06	2.1E-04	1.4E-04
R383	561243	4192323	0	14872	14872	14872	1.7E-05	1.3E-05	0.0E+00	0.0E+00
R384	561141	4192291	0	12960	12960	12960	4.1E-05	3.3E-05	0.0E+00	0.0E+00
R385	561179	4192159	0	12974	12974	12974	1.6E-05	1.1E-05	0.0E+00	0.0E+00
R386	561085	4192139	0	12637	12637	12637	1.5E-05	1.1E-05	0.0E+00	0.0E+00
R387	561098	4191813	2	80083	80083	80083	4.8E-06	3.3E-06	9.7E-06	6.6E-06
R388	561123	4191998	0	17142	17142	17142	8.7E-06	6.2E-06	0.0E+00	0.0E+00
R389	561222	4192033	0	12063	12063	12063	9.2E-06	6.6E-06	0.0E+00	0.0E+00
R390	561310	4192051	0	10834	10834	10834	7.0E-06	4.8E-06	0.0E+00	0.0E+00
R391	561405	4192076	15	13204	13204	13204	4.5E-06	3.0E-06	6.8E-05	4.4E-05
R392	561500	4192103	29	13298	13298	13298	3.2E-06	2.1E-06	9.3E-05	6.1E-05
R393	561550	4191937	27	20351	20351	20351	2.4E-06	1.6E-06	6.6E-05	4.3E-05
R394	561452	4191914	17	21678	21678	21678	3.4E-06	2.2E-06	5.8E-05	3.8E-05
R395	561359	4191884	0	20301	20301	20301	4.6E-06	3.1E-06	0.0E+00	0.0E+00
R396	561269	4191863	1	19955	19955	19955	5.4E-06	3.8E-06	5.4E-06	3.8E-06
R397	561172	4191845	0	20345	20345	20345	5.6E-06	3.8E-06	0.0E+00	0.0E+00
R398	561231	4191588	0	28456	28456	28456	3.1E-06	2.1E-06	0.0E+00	0.0E+00
R399	561324	4191589	0	33594	33594	33594	3.0E-06	2.0E-06	0.0E+00	0.0E+00
R400	561418	4191616	0	31947	31947	31947	2.7E-06	1.8E-06	0.0E+00	0.0E+00
R401	561512	4191642	9	35181	35181	35181	2.3E-06	1.5E-06	2.1E-05	1.4E-05
R402	561616	4191671	149	37757	37757	34235	1.8E-06	1.2E-06	2.7E-04	1.6E-04
R403	561676	4191435	0	20569	20569	3652	1.4E-06	9.0E-07	0.0E+00	0.0E+00
R404	561575	4191404	0	12524	12524	11668	1.7E-06	1.1E-06	0.0E+00	0.0E+00
R405	561483	4191384	0	12913	12913	12913	1.9E-06	1.2E-06	0.0E+00	0.0E+00
R406	561379	4191359	0	18564	18564	18564	2.0E-06	1.3E-06	0.0E+00	0.0E+00
R407	561293	4191333	0	9535	9535	9535	2.0E-06	1.3E-06	0.0E+00	0.0E+00
R415	561799	4190966	27	23749	3625	--	9.3E-07	--	3.8E-06	--
R416	561758	4191149	52	18808	16347	--	1.1E-06	--	4.8E-05	--
R417	561719	4191298	39	16564	16564	--	1.2E-06	--	4.7E-05	--
R418	561611	4191265	0	14500	14500	2613	1.4E-06	9.2E-07	0.0E+00	0.0E+00
R419	561518	4191238	0	15547	15547	10011	1.6E-06	1.0E-06	0.0E+00	0.0E+00
R420	561563	4191096	0	16002	16002	--	1.3E-06	--	0.0E+00	--
R421	561659	4191118	5	14808	14808	--	1.2E-06	--	6.0E-06	--
R422	561704	4190933	4	20473	13834	--	1.0E-06	--	2.8E-06	--
R423	561616	4190916	1	18332	17626	--	1.1E-06	--	1.0E-06	--
R424	561665	4190711	0	19368	410	--	9.1E-07	--	0.0E+00	--
R451	560705	4192714	0	123782	123782	123782	4.1E-06	2.2E-06	0.0E+00	0.0E+00
R452	560603	4192576	0	18565	142347	142347	3.3E-06	1.8E-06	0.0E+00	0.0E+00
R453	560523	4191608	30	705679	413962	264756	1.2E-06	7.8E-07	2.1E-05	8.7E-06
R454	561009	4191872	0	95065	95065	94135	4.8E-06	3.2E-06	0.0E+00	0.0E+00
R455	561428	4190133	0	155637	40512	7272	6.0E-07	4.0E-07	0.0E+00	0.0E+00
R456	561623	4190099	17	552064	81552	19240	5.9E-07	3.9E-07	1.5E-06	2.3E-07
R457	561495	4190968	4	40052	40052	--	1.2E-06	--	4.8E-06	--
R458	561417	4191211	35	15426	15426	13991	1.6E-06	1.1E-06	5.7E-05	3.4E-05
R461	560897	4190627	5	311648	89906	--	7.2E-07	--	1.0E-06	--
R464	561911	4192497	55	14843	5575	--	9.5E-07	--	2.0E-05	--
R465	561816	4192468	51	11125	11125	--	1.2E-06	--	6.0E-05	--
R466	561722	4192450	105	13846	13846	7478	1.5E-06	1.0E-06	1.6E-04	5.6E-05
R467	561621	4192423	114	17594	17594	17594	2.1E-06	1.3E-06	2.4E-04	1.5E-04
R468	561525	4192383	84	13362	13362	13362	2.9E-06	1.9E-06	2.4E-04	1.6E-04
R469	561563	4192255	72	11945	11945	11945	2.6E-06	1.7E-06	1.9E-04	1.2E-04
R470	561656	4192280	40	12282	12282	12282	1.9E-06	1.2E-06	7.4E-05	4.8E-05
R471	561753	4192308	52	17660	17660	3599	1.4E-06	8.9E-07	7.2E-05	9.4E-06
R472	561857	4192335	60	14134	11773	--	1.1E-06	--	5.3E-05	--
R473	561948	4192360	35	12687	101	--	8.5E-07	--	2.4E-07	--
R475	561890	4192203	51	14457	9833	--	1.0E-06	--	3.6E-05	--
R476	561794	4192175	44	12769	12769	496	1.4E-06	8.8E-07	6.0E-05	1.5E-06
R477	561678	4192184	18	5744	5744	5695	1.8E-06	1.2E-06	3.3E-05	2.1E-05
R478	561597	4192128	83	12451	12451	12451	2.4E-06	1.6E-06	2.0E-04	1.3E-04
R479	561704	4192128	26	8120	8120	7578	1.7E-06	1.1E-06	4.4E-05	2.7E-05
R481	561937	4192049	96	21176	5423	--	9.4E-07	--	2.3E-05	--
R482	561835	4192008	91	22018	21523	--	1.2E-06	--	1.1E-04	--
R483	561734	4191985	108	20009	20009	10916	1.5E-06	9.9E-07	1.6E-04	5.9E-05
R484	561640	4191969	89	19807	19807	19807	1.9E-06	1.2E-06	1.7E-04	1.1E-04
R485	561693	4191757	126	17274	17274	7857	1.5E-06	9.7E-07	1.9E-04	5.6E-05
R486	561784	4191780	0	22966	22966	15	1.2E-06	7.8E-07	0.0E+00	0.0E+00
R487	561887	4191823	114	23581	10849	--	9.8E-07	--	5.1E-05	--
R492	561920	4191648	66	13733	0.3	--	8.6E-07	--	1.2E-09	--
R493	561828	4191622	105	12381	10389	--	1.1E-06	--	9.3E-05	--
R494	561736	4191598	125	9309	9309	--	1.3E-06	--	1.6E-04	--
R495	561779	4191474	102	13855	13829	--	1.1E-06	--	1.2E-04	--
R496	561866	4191490	58	12297	4032	--	9.5E-07	--	1.8E-05	--
R658	561818	4191329	13	12878	9185	--	1.0E-06	--	9.4E-06	--
R659	561857	4191169	102	15015	1341	--	9.1E-07	--	8.3E-06	--
R786	557521	4192744	0	8287476	106684	--	1.3E-07	--	0.0E+00	--
R787	558549	4190194	0	18297292	637831	--	1.5E-07	--	0.0E+00	--
	Total Population		8571				Total Cancer Burden		0.015	0.0060

Notes:

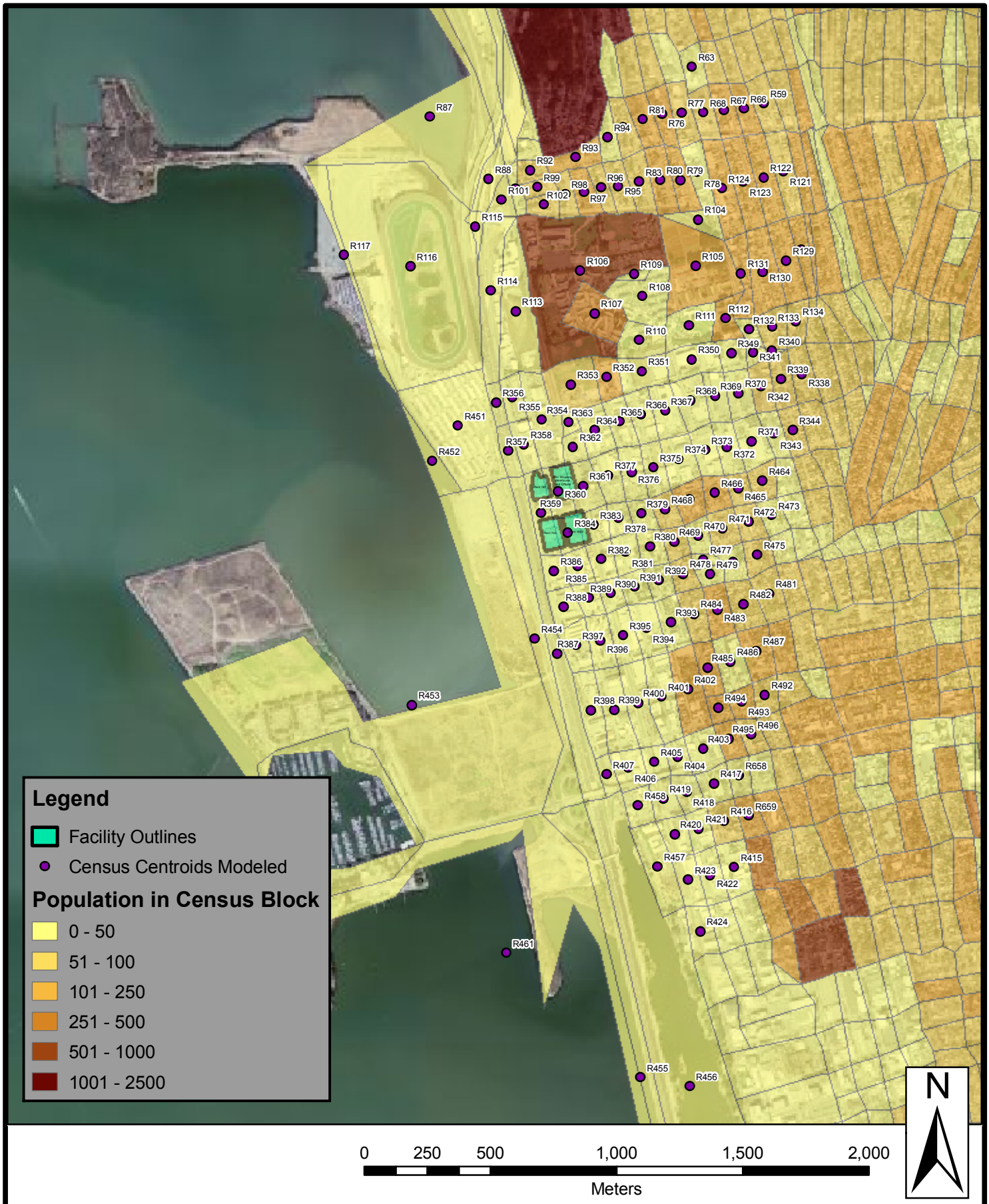
Cancer Burden for Each Census Block = Cancer Risk at the Centroid of the Block * Population of the Block * Area W/in One in a Million Contour / Total Area of the Block

Sources:

"Air Toxics Hot Spots Program Risk Assessment Guidelines, the Air Toxics Hot Spots Program Guidance Manual for Preparations of Health Risk Assessments," OEHHA, August

Acronyms:

OEHHA = Office of Environmental Health Hazard Assessment



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Census Centroids and Population Values Used for Cancer Burden Calculation Pacific Steel Casting Company, Berkeley, CA

Figure

F.1