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October 2005

A CASE STUDY DEMONSTRATING U.S. EPA GUIDANCE FOR EVALUATING LANDFILL GAS EMISSIONS FROM CLOSED OR ABANDONED FACILITIES

SOMERSWORTH SANITARY LANDFILL SOMERSWORTH, NEW HAMPSHIRE

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by

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Abstract

The report describes a case study that applies EPA-600/R-05/123—the guidance for conducting air pathway analyses of landfill gas emissions that are of interest to superfund remedial project managers, on-scene coordinators, facility owners, and potentially responsible parties. The case study exemplifies the use of the procedures and tools described in the guidance for evaluating LFG emissions to ambient air. The air pathway analysis is used to evaluate the inhalation risks to offsite receptors as well as the hazards of both onsite and offsite methane explosions and landfill fires. Landfill gases detected at the site were methane and chemicals of particular concern (COPCs) that encompassed nonmethane organic compounds, 1,1-dichloroethene, benzene, chlorobenzene, chloroethane, 1,4-dichlorobenzene, methylene chloride, toluene, trichloroethene, vinyl chloride, and xylenes. The report includes values of 90^{th} percentile concentration of COPCs and isopleths of the COPCs overlaid on an aerial photograph of the site.

Foreword

The U.S. Environmental Protection Agency (EPA) is charged by Congress with protecting the Nation's land, air, and water resources. Under a mandate of national environmental laws, the Agency strives to formulate and implement actions leading to a compatible balance between human activities and the ability of natural systems to support and nurture life. To meet this mandate, EPA's research program is providing data and technical support for solving environmental problems today and building a science knowledge base necessary to manage our ecological resources wisely, understand how pollutants affect our health, and prevent or reduce environmental risks in the future.

The National Risk Management Research Laboratory (NRMRL) is the Agency's center for investigation of technological and management approaches for preventing and reducing risks from pollution that threaten human health and the environment. The focus of the Laboratory's research program is on methods and their cost-effectiveness for prevention and control of pollution to air, land, water, and subsurface resources; protection of water quality in public water systems; remediation of contaminated sites, sediments and ground water; prevention and control of indoor air pollution; and restoration of ecosystems. NRMRL collaborates with both public and private sector partners to foster technologies that reduce the cost of compliance and to anticipate emerging problems. NRMRL's research provides solutions to environmental problems by: developing and promoting technologies that protect and improve the environment; advancing scientific and engineering information to support regulatory and policy decisions; and providing the technical support and information transfer to ensure implementation of environmental regulations and strategies at the national, state, and community levels.

This publication has been produced as part of the Laboratory's strategic long-term research plan. It is published and made available by EPA's Office of Research and Development to assist the user community and to link researchers with their clients.

Sally Gutierrez, Director
National Risk Management Research Laboratory

EPA Review Notice

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Acknowledgment

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Executive Summary

The Somersworth Sanitary Landfill Superfund Site (the "Site") is located one mile southwest of the center of the city of Somersworth in Strafford County, New Hampshire. The Site includes an approximately twenty-six acre waste disposal area. With the cessation of land fill operations, the city installed four ground water monitoring wells near the Site's northern and western boundaries. Samples taken from these wells indicated the presence of volatile organic compound (VOC) contamination. As a result of this and subsequent investigations, the landfill was placed on the National Priority List (NPL) on September 8, 1983. Approximately ten acres of the eastern portion of the landfill have been reclaimed by the city for recreational facilities; tennis and basketball courts, ball fields, and a playground.

This case study exemplifies how the Guidance for Evaluating Landfill Gas Emissions From Closed or Abandoned Facilities (EPA-600/R-05/123) can be used to evaluate landfill gas emissions. It illustrates the usefulness of the information and procedures presented in the guidance. The Sommersworth site included near-by single family homes, institutional buildings, a multi-family dwelling, and recreational facilities (i.e., two baseball fields, two basketball courts, and two tennis courts). An infiltration gallery was part of the super fund site remediation efforts. The gallery was used to remove contaminated groundwater from below the landfill and to re-inject it into the subsurface. The re-injected groundwater would flow through a permeable reactive barrier that was designed to oxidize chlorinated organic compounds. There were several LFG monitoring wells with elevated methane levels.

By applying the investigative techniques and recommended practices, the research team was able to:

1. Determine where the landfill gases are escaping into the atmosphere,
2. Identify the chemicals of potential concern,
3. Quantify the speciated LFG emission rates,
4. Identify the most likely to be affected at off-site location(s), and
5. Characterize ambient air concentrations.

This case study report provided data and information that were used by the remedial project manager to:

1. Assess the health risk associated with the emissions from the landfill,
2. Determine if additional site investigation effort is needed,
3. Evaluate the level of effort associated with the existing LFG monitoring program,
4. Determine if the previously proposed remedial design needed to be altered,
5. Evaluate the need for institution controls and future land use policy decisions, and
6. Decide if the risks and hazards associated with the landfill gas needed to be controlled with LFG control technology.

Section 1. Demonstration Objectives

The purpose of the activities described in this document was to provide a demonstration of the procedures described in the Guidance for Evaluating Landfill Gas Emissions from Closed or Abandoned Facilities (Guidance) (EPA/600/R-05/123). It was also the intent of this demonstration to provide an example case study to be included in the guidance for reference by the practitioner. These efforts were not intended to provide a comprehensive site analysis or complete risk assessment.

Section 2. Site Description

All site descriptions contained in this section are based solely on the U.S. Environmental Protection Agency (EPA) Superfund Record of Decision for the Somersworth Sanitary Landfill dated June 21, 1994 and from onsite field activities and observations. The Somersworth Sanitary Landfill Superfund Site (the "Site") is located on the north side of Blackwater Road approximately 300 to 400 feet west of the intersection of Blackwater Road and High Street (State Route 9) and one mile southwest of the center of the city of Somersworth in Strafford County, New Hampshire. Figure 1 shows the approximate location and orientation of the Site.

The Site includes an approximately twenty-six acre waste disposal area and adjacent wetlands northwest of the former landfill. The city owns the entire landfill area and much of the wetlands. The landfill was operated by the city from mid-1930 until 1981 when the city began taking wastes to a regional incinerator. From 1981 to the present, those wastes that cannot be incinerated are stockpiled in the southwest portion of the landfill and hauled away. Approximately ten acres of the eastern portion of the landfill have been reclaimed by the city for recreational facilities; tennis and basketball courts, ball fields, and a playground.

Numerous residential properties exist to the north, south, and east of the Site, including an apartment building located adjacent to the Site at the northeast corner. A fire station and a National Guard Armory are located just east of the Site.

The landfill is entirely within the Peter's Marsh Brook surface drainage basin. The Peter's Marsh Brook is a tributary to Tate's Brook that flows into the Salmon Falls River, the water supply for Somersworth, New Hampshire and Berwick, Maine.

Numerous soil gas monitoring wells have been installed and are routinely monitored around the extent of the landfill. The majority of these wells are located along the borders immediately adjacent to residential development. From previous studies there is an indication that the groundwater flows northwesterly towards the Peter's Marsh Brook and discharges to the brook and adjacent wetlands. A decommissioned municipal water supply well (well no. 3) is located approximately 2300 feet north-northwest of the Site.

Figure 1. Location and Orientation of the Somersworth Solid Waste Landfill

Section 3. Site History

The Somersworth Sanitary Landfill accepted municipal and industrial wastes from the mid-1930's to 1981. The landfill began as a burning dump in the northeast corner of the Site. In 1958 burning was stopped and land filling began. Natural soils were excavated beyond the working area, the excavation was filled with refuse, and covered at the end of each day with the excavated natural, sandy soils. The landfill expanded in a general westerly direction. The eastern portion of the landfill was not used for disposal after 1975. At that time preparations began for a recreational park on that portion of the landfill. The park was completed in late 1978.

In 1981 the city ceased waste disposal operations at the landfill and joined the Lamprey Regional Solid Waste Disposal Cooperative. Waste was thenceforth disposed at the cooperative's incinerator in Durham, New Hampshire. With the cessation of land filling operations, the city installed four ground water monitoring wells near the Site's northern and western boundaries. Samples taken from these wells indicated the presence of volatile organic compound (VOC) contamination. As a result of this and subsequent investigations, the landfill was placed on the National Priority List (NPL) on September 8, 1983.

In 1989, the Somersworth Landfill Trust (SLT) was formed by the city of Somersworth and approximately thirty businesses and industries, which had an interest in the site. The SLT voluntarily signed an Administrative Order by Consent with EPA and the State of New Hampshire. By this order, which took effect on April 28, 1989, the SLT agreed to complete limited aspects of the remedial investigation and to prepare the feasibility study for the Site.

Based on the results of the remedial investigation and the alternatives presented in the feasibility study, EPA issued a Record of Decision (ROD) on June 24, 1991, documenting the selection of an innovative technology to remediate groundwater at the site. This technology uses elemental iron in a permeable reactive "wall" which treats contaminated groundwater as it flows through it. A key part of this remedy is a permeable landfill cover that allows precipitation to flush contamination through the waste and be treated as it passes in the groundwater through the wall. The wall was completed in October of 2000. Landfill cover materials range from sandy soil to tight clays and varies in depth from six inches to three feet. Atop this was placed the permeable landfill cover, consisting of six inches of sandy gravel and six inches of loam. This was completed in the summer of 2001 when it was seeded. Therefore, the total depth of cover material on the landfill ranges from one and one-half to four feet.

In order to prevent the off-site, subsurface migration of landfill gases, principally methane, a perimeter landfill gas collection trench is scheduled for construction in 2003.

Section 4. Field Activities and Data Collection

Field activities for the Somersworth Sanitary Landfill located in Somersworth, New Hampshire were conducted from July 29, 2002 through July 30, 2002. Site activities included debriefing, landfill surface screening analysis, screening data reduction, hot spot and homogeneity determinations, landfill soil gas sampling, passive vent gas sampling, perimeter well gas sampling, and ambient air sampling. Appendix A contains pictures from the site activities.

To provide a framework for the field activities, a 30 m by 30 m sampling grid was developed across the landfill area prior to the field activities. This sampling grid was developed to include the entire extent of the landfill boundary area and extend 30 m beyond that boundary area. This grid was then numbered for each node location, forming a serpentine sampling pathway across the grid. A total of 179 sampling locations comprised the sampling grid layout developed for this site. A reference point was identified using an identifiable landmark on the site to locate the starting point. Figure 2 shows the grid and pathway used for the screening analysis.

4.1 Landfill Surface Screening Analysis

Once on site, the reference point was visually located, and using a handheld global positioning system (GPS), the starting point (Grid No. 1) was located to begin the screening analysis. The screening analysis included measurements for non-methane organic compounds (NMOCs) using a photo ionization detector (PID) and for methane (CH_4) using a flame ionization detector (FID). Both the PID and FID were held no more than one inch above the ground while measurements were being made. The PID and FID were calibrated to approximately 1 ppm using zero air and 5 and 20 ppm gases. It should be noted that the field instrumentation was very sensitive and drifted quite significantly due to slight gusts of wind across the landfill cover. Readings were taken for approximately one minute, and the average value excluding the extreme highs and lows was recorded. In conducting the serpentine walk across the site, an effort was made to identify areas containing cracks and gaps in the landfill cover, and to the extent possible, measurements were made at these locations. All predetermined sampling locations were not accessible for a variety of reasons ranging from being located on private property to inaccessible by the field crew due to extreme overgrowth. An attempt was made to collect a reading at each location, with measurements being collected not greater than 10 m from the predetermined locations. If it was necessary to skip a location due to inaccessibility within the acceptable 10 m range, then replicate readings were collected at the next accessible location. These replicate readings were intended to provide for additional quality assurance and quality control (QA and QC) data and were not intended to back fill missing data due inaccessible areas. Duplicate readings were also taken at predefined locations as part of the QA and QC efforts. These predetermined locations were selected based on a random number generator. All screening data were recorded on field log data collection forms along with any field notes relevant to this specific location. There was 95 percent data collection efficiency. Table 1 provides the screening sample results.

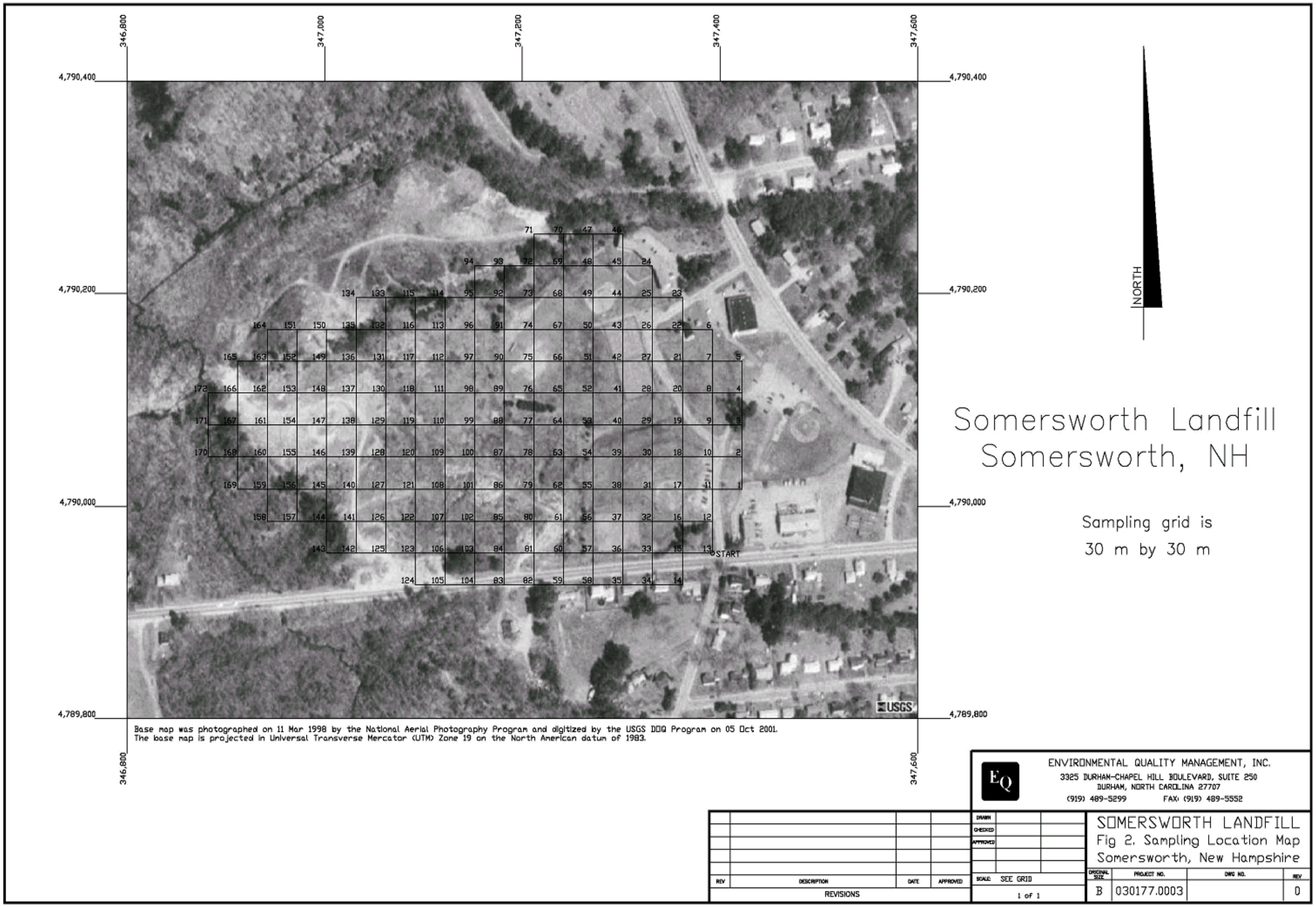


Figure 2. Screening Sampling Grid Locations

Table 1. Somersworth Screening Sample Results

Grid No.	Sample ID No.	Actual UTM Coordinates		NMOC Conc.	CH_4 Conc.
		Easting	Northing		
1	LFSG-02-07 29 02 -R 001	347418	4790016	ND[a]	ND
2	LFSG-02-07 29 02 -R 002	34723	4790042	ND	ND
3	LFSG-02-07 29 02 -R 003	347424	4790076	ND	ND
4	LFSG-02-07 29 02 -R 004	347422	4790105	ND	ND
5	LFSG-02-07 29 02 -R 005	347423	4790136	ND	ND
6	LFSG-02-07 29 02 -R 006	347420	4790156	ND	ND
7	LFSG-02-07 29 02 -R 007	347392	4790135	ND	ND
8	LFSG-02-07 29 02 -R 008	347392	4790102	ND	ND
9	LFSG-02-07 29 02 -R 009	347391	4790075	ND	ND
10	LFSG-02-07 29 02 -R 010	347391	4790045	ND	ND
11	LFSG-02-07 29 02 -R 011	347389	4790016	ND	ND
12	LFSG-02-07 29 02 -R 012	347394	4789985	ND	2
13	LFSG-02-07 29 02 -R 013	347391	4789959	2	8
14	LFSG-02-07 29 02 -D 003	NA[b]	NA	NA	NA
15	LFSG-02-07 29 02 -R 014	347361	4789954	ND	ND
16	LFSG-02-07 29 02 -R 015	347357	4789966	ND	0.5
17	LFSG-02-07 29 02 -R 016	347368	4790018	ND	0.5
18	LFSG-02-07 29 02 -R 017	347361	4790058	ND	ND
19	LFSG-02-07 29 02 -R 018	347363	4790076	ND	1
20	LFSG-02-07 29 02 -R 019	347354	4790108	ND	1.5
21	LFSG-02-07 29 02 -R 020	347361	4790136	ND	ND
22	LFSG-02-07 29 02 -R 021	347360	4790168	ND	1
23	LFSG-02-07 29 02 -R 022	347363	4790197	ND	1.2
24	LFSG-02-07 29 02 -R 023	347334	4790216	ND	1
25	LFSG-02-07 29 02 -R 024	347335	4790193	ND	ND
26	LFSG-02-07 29 02 -R 025	347331	4790165	ND	5
27	LFSG-02-07 29 02 -R 026	347335	4790133	ND	3
28	LFSG-02-07 29 02 -R 027	347334	4790107	ND	ND
29	LFSG-02-07 29 02 -R 028	347332	4790075	ND	ND
30	LFSG-02-07 29 02 -R 029	347331	4790047	ND	ND
31	LFSG-02-07 29 02 -R 030	347331	4790015	ND	ND
32	LFSG-02-07 29 02 -R 031	347333	4789985	ND	ND
33	LFSG-02-07 29 02 -R 032	347332	4789956	ND	ND
34	LFSG-02-07 29 02 -D 005	NA	NA	NA	NA
35	LFSG-02-07 29 02 -D 006	NA	NA	NA	NA
36	LFSG-02-07 29 02 -R 033	347302	4789951	ND	1
37	LFSG-02-07 29 02 -R 034	347301	4789988	ND	ND
38	LFSG-02-07 29 02 -R 035	347302	4790016	ND	0.5
39	LFSG-02-07 29 02 -R 036	347304	4790046	ND	ND
40	LFSG-02-07 29 02 -R 037	347302	4790077	ND	ND
41	LFSG-02-07 29 02 -R 038	347300	4790108	ND	ND
42	LFSG-02-07 29 02 -R 039	347306	4790140	ND	120
43	LFSG-02-07 29 02 -R 040	347298	4790160	ND	7
44	LFSG-02-07 29 02 -R 041	347303	4790199	ND	0.5
45	LFSG-02-07 29 02 -R 042	347291	4790226	ND	1

[a] ND = not detected
[b] NA = not available

continued

Table 1. Somersworth Screening Sample Results (continued)

Grid No.	Sample ID No.	Actual UTM Coordinates		NMOC Conc.	CH_4 Conc.
		Easting	Northing		
46	LFSG-02-07 29 02 -R 043	347306	4790255	ND	ND
47	LFSG-02-07 29 02 -R 044	347272	4790257	ND	ND
48	LFSG-02-07 29 02 -R 045	347272	4790223	ND	ND
49	LFSG-02-07 29 02 -R 046	347273	4790192	ND	ND
50	LFSG-02-07 29 02 -R 047	347272	4790164	ND	ND
51	LFSG-02-07 29 02 -R 048	347273	4790134	ND	0.5
52	LFSG-02-07 29 02 -R 049	347272	4790106	ND	0.5
53	LFSG-02-07 29 02 -R 050	347270	4790076	1	0.5
54	LFSG-02-07 29 02 -R 051	347273	4790045	ND	1
55	LFSG-02-07 29 02 -R 052	347272	4790016	ND	ND
56	LFSG-02-07 29 02 -R 053	347272	4789983	ND	ND
57	LFSG-02-07 29 02 -R 054	347272	4789955	ND	ND
58	LFSG-02-07 29 02 -R 055	347274	4789930	ND	ND
59	LFSG-02-07 29 02 -R 056	347242	4789933	ND	ND
60	LFSG-02-07 29 02 -R 057	347244	4789958	ND	ND
61	LFSG-02-07 29 02 -R 058	347242	4789986	ND	ND
62	LFSG-02-07 29 02 -R 059	347242	4790017	ND	ND
63	LFSG-02-07 29 02 -R 060	347242	4790045	ND	ND
64	LFSG-02-07 29 02 -R 061	347242	4790077	ND	ND
65	LFSG-02-07 29 02 -R 062	347243	4790105	ND	ND
66	LFSG-02-07 29 02 -R 063	347242	4790136	ND	0.5
67	LFSG-02-07 29 02 -R 064	347243	4790168	ND	ND
68	LFSG-02-07 29 02 -R 065	347243	4790197	ND	ND
69	LFSG-02-07 29 02 -R 066	347242	4790225	ND	ND
70	LFSG-02-07 29 02 -R 067	347245	4790257	ND	ND
71	LFSG-02-07 29 02 -R 068	347212	4790255	ND	ND
72	LFSG-02-07 29 02 -R 069	347211	4790226	ND	ND
73	LFSG-02-07 29 02 -R 070	347213	4790197	ND	ND
74	LFSG-02-07 29 02 -R 071	347210	4790166	ND	0.5
75	LFSG-02-07 29 02 -R 072	347210	4790134	ND	ND
76	LFSG-02-07 29 02 -R 073	347211	4790104	ND	0.5
77	LFSG-02-07 29 02 -R 074	347212	4790075	ND	1
78	LFSG-02-07 29 02 -R 075	347212	4790045	ND	ND
79	LFSG-02-07 29 02 -R 076	347212	4790015	ND	ND
80	LFSG-02-07 29 02 -R 077	347212	4789986	ND	ND
81	LFSG-02-07 29 02 -R 078	347210	4789955	ND	ND
82	LFSG-02-07 29 02 -R 079	347213	4789926	ND	ND
83	LFSG-02-07 29 02 -R 080	347182	4789929	ND	ND
84	LFSG-02-07 29 02 -R 081	347180	4789956	ND	ND
85	LFSG-02-07 29 02 -R 082	347184	4789989	ND	ND
86	LFSG-02-07 29 02 -R 083	347182	4790017	ND	ND
87	LFSG-02-07 29 02 -R 084	347182	4790046	ND	ND
88	LFSG-02-07 29 02 -R 085	347184	4790076	ND	ND
89	LFSG-02-07 29 02 -R 086	347181	4790106	ND	3
90	LFSG-02-07 29 02 -R 087	347182	4790135	ND	ND

[a] ND = not detected
[b] NA = not available

continued

Table 1. Somersworth Screening Sample Results (continued)

Grid No.	Sample ID No.	Actual UTM Coordinates Easting	Northing	NMOC Conc.	CH_4 Conc.
91	LFSG-02-07 29 02 -R 088	347179	4790168	ND	2
92	LFSG-02-07 29 02 -R 089	347181	4790196	ND	ND
93	LFSG-02-07 29 02 -R 090	347184	4790219	ND	ND
94	LFSG-02-07 29 02 -R 091	347152	4790227	ND	ND
95	LFSG-02-07 29 02 -R 092	347151	4790202	ND	ND
96	LFSG-02-07 29 02 -R 093	347151	4790164	ND	0.5
97	LFSG-02-07 29 02 -R 094	347152	4790134	ND	ND
98	LFSG-02-07 29 02 -R 095	347151	4790105	ND	ND
99	LFSG-02-07 29 02 -R 096	347152	4790075	ND	ND
100	LFSG-02-07 29 02 -R 097	347152	4790044	ND	ND
101	LFSG-02-07 29 02 -R 098	347153	4790016	ND	ND
102	LFSG-02-07 29 02 -R 099	347151	4789984	ND	ND
103	LFSG-02-07 29 02 -R 100	347152	4789955	ND	ND
104	LFSG-02-07 29 02 -R 101	347153	4789931	ND	ND
105	LFSG-02-07 29 02 -R 102	347119	4789931	ND	ND
106	LFSG-02-07 29 02 -R 103	347123	4789958	ND	ND
107	LFSG-02-07 29 02 -R 104	347122	4789986	ND	ND
108	LFSG-02-07 29 02 -R 105	347123	4790017	ND	ND
109	LFSG-02-07 29 02 -R 106	347122	4790046	ND	ND
110	LFSG-02-07 29 02 -R 107	347124	4790078	ND	ND
111	LFSG-02-07 29 02 -R 108	347123	4790107	ND	ND
112	LFSG-02-07 29 02 -R 109	347122	4790136	ND	ND
113	LFSG-02-07 29 02 -R 110	347123	4790166	ND	6
114	LFSG-02-07 29 02 -R 111	347123	4790197	ND	ND
115	LFSG-02-07 29 02 -R 112	347089	4790193	ND	ND
116	LFSG-02-07 29 02 -R 113	347093	4790164	ND	ND
117	LFSG-02-07 29 02 -R 114	347090	4790136	ND	ND
118	LFSG-02-07 29 02 -R 115	347094	4790105	ND	ND
119	LFSG-02-07 29 02 -R 116	347091	4790076	ND	ND
120	LFSG-02-07 29 02 -R 117	347092	4790045	ND	ND
121	LFSG-02-07 29 02 -R 118	347091	4790015	ND	ND
122	LFSG-02-07 29 02 -R 119	347092	4789987	ND	ND
123	LFSG-02-07 29 02 -R 120	347093	4788855	ND	ND
124	LFSG-02-07 29 02 -R 121	347093	4789927	ND	ND
125	LFSG-02-07 29 02 -R 122	347065	4789956	ND	ND
126	LFSG-02-07 29 02 -R 123	347065	4789988	ND	ND
127	LFSG-02-07 29 02 -R 124	347064	4790017	ND	ND
128	LFSG-02-07 29 02 -R 125	347062	4790046	ND	ND
129	LFSG-02-07 29 02 -R 126	347062	4790074	ND	ND
130	LFSG-02-07 29 02 -R 127	347063	4790106	ND	ND
131	LFSG-02-07 29 02 -R 128	347063	4790137	ND	ND
132	LFSG-02-07 29 02 -R 129	347062	4790170	ND	ND
133	LFSG-02-07 29 02 -R 130	347058	4790197	ND	ND
134	LFSG-02-07 29 02 -R 131	347031	479196	ND	ND
135	LFSG-02-07 29 02 -R 132	347032	4790167	ND	ND

[a] ND = not detected
[b] NA = not available

continued

Table 1. Somersworth Screening Sample Results (concluded)

Grid No.	Sample ID No.	Actual UTM Coordinates Easting	Northing	NMOC Conc.	CH_4 Conc.
136	LFSG-02-07 29 02 -R 133	347027	4790131	ND	ND
137	LFSG-02-07 29 02 -R 134	347032	4790105	ND	ND
138	LFSG-02-07 29 02 -R 135	347032	4790075	ND	ND
139	LFSG-02-07 29 02 -R 136	347031	4790045	ND	ND
140	LFSG-02-07 29 02 -R 137	347032	4790015	ND	ND
141	LFSG-02-07 29 02 -R 138	347032	4789986	ND	ND
142	LFSG-02-07 29 02 -R 139	347032	4789956	ND	ND
143	LFSG-02-07 29 02 -R 140	347002	4789952	ND	1
144	LFSG-02-07 29 02 -R 141	347000	4789988	ND	ND
145	LFSG-02-07 29 02 -R 142	347004	4790023	ND	ND
146	LFSG-02-07 29 02 -R 143	347008	4790048	ND	ND
147	LFSG-02-07 29 02 -R 144	346999	4790076	ND	ND
148	LFSG-02-07 29 02 -R 145	347006	4790105	ND	ND
149	LFSG-02-07 29 02 -R 146	347000	4790137	ND	ND
150	LFSG-02-07 29 02 -R 147	347000	4790166	ND	ND
151	LFSG-02-07 29 02 -R 148	346971	4790164	ND	ND
152	LFSG-02-07 29 02 -R 149	346975	4790136	ND	ND
153	LFSG-02-07 29 02 -R 150	346968	4790103	ND	ND
154	LFSG-02-07 29 02 -R 151	346968	4790073	ND	ND
155	LFSG-02-07 29 02 -R 152	346971	4790045	ND	ND
156	LFSG-02-07 29 02 -R 153	346969	4790015	ND	ND
157	LFSG-02-07 29 02 -D 012	NA	NA	NA	NA
158	LFSG-02-07 29 02 -D 013	NA	NA	NA	NA
189	LFSG-02-07 29 02 -R 154	346941	4790033	ND	ND
160	LFSG-02-07 29 02 -R 155	346952	4790061	ND	ND
161	LFSG-02-07 29 02 -R 156	346950	4790079	ND	ND
162	LFSG-02-07 29 02 -R 157	346940	4790107	ND	ND
163	LFSG-02-07 29 02 -R 158	346943	4790139	ND	ND
164	LFSG-02-07 29 02 -R 159	346943	4790164	ND	ND
165	LFSG-02-07 29 02 -R 160	346912	4790135	ND	ND
166	LFSG-02-07 29 02 -R 161	346912	4790105	ND	ND
167	LFSG-02-07 29 02 -R 162	346913	4790076	ND	ND
168	LFSG-02-07 29 02 -R 163	346915	4790055	ND	ND
169	LFSG-02-07 29 02 -D 015	NA	NA	NA	NA
170	NA	NA	NA	NA	NA
171	LFSG-02-07 29 02 -R 164	346891	4790079	ND	ND
172	NA	NA	NA	NA	NA
PV1		347353	4790062	ND	91
PV2		347352	4790062	0.7	505
,PV3		347336	4790061	0.3	500
Valve Box		347385	4790049	ND	84

[a] ND = not detected
[b] NA = not available

continued

4.2 Hot Spot and Homogeneity Determinations

The screening data collected were used for two analyses. The first was for a hot spot analysis. This was accomplished by importing the screening data set into a graphical contouring software package (Surfer) to produce concentration contours that were layered over an aerial photographic image of the site. This method allowed for a visual determination of where the higher concentrations were recorded during the screening analysis. This method also allowed the data set to be divided into two data sets based on the contours derived from these data. This population division was used as part of the homogeneity determinations. Figures 3 and 4 show the concentration contours for NMOCs and methane, respectively.

The second analysis provided a determination of the homogeneity of the site. This was accomplished through statistical means by using the Wilcoxon Rank Sum statistical method, which determines whether two data sets are statistically similar. If the two sets are similar, then the two populations are determined to be one nearly homogeneous area. If the two data sets are determined not to be statistically similar, then the two sets are said to be two non-homogeneous areas. To accomplish this task the hot spot analysis was used to determine if there appeared to be two distinct population sets. For this site it was shown that the entire sampling grid appeared to be one nearly homogeneous area. Appendix B contains the Wilcoxon data analysis. As mentioned earlier, for the purposes of this statistical analysis all non-detect, replicate, and duplicate measurements were excluded from this analysis.

4.3 Sampling Activities

Sampling activities encompassed sampling landfill soil gas, passive vent gas, perimeter well gas, and ambient air. Figure 5 shows the locations of all sampled locations. Each of these sampling methods will be discussed further in the following sections.

4.3.1 Landfill Soil Gas Sampling

As part of this demonstration, landfill soil gas samples were collected for the chemicals of potential concern (COPCs) via Summa canisters, which were sent to an off-site commercial laboratory for analysis. Field instrumentation was used at each of the designated sampling locations. These instruments were used to measure fixed gases (CO_2, N_2, and O_2), which were used to verify that landfill gas (LFG) was being collected. Sampling was conducted using a slambar to drive a sampling hole through the landfill cover, a sampling probe was inserted into the landfill area, and the hole was sealed around the probe to minimize ambient air inleakage. The slam bar was inserted to approximately 5 feet below grade.

Based on the data analysis conducted, it was determined that this site consisted of one homogeneous area. It was determined that six Summa canister samples would be collected for purposes of this demonstration. The six LFG samples were collected at the locations that had the highest recorded readings for methane gas. It should be noted that, due to the absence of detectable NMOC concentrations during the screening analysis, it was determined that methane gas concentrations would be used to determine further sampling strategies and that amples would be collected at grid location Nos. 13, 26, 42, 43, 89, and 113. These sampling locations are denoted in the Figure 5 as LFG Grid “X” where “X” is grid number 13, 26, and so forth. LFG Samples were subsequently not collected at Grid Location No. 13 because it was very close to the public roadway and subsurface conditions prevented the slambar from penetrating the surface soils. Laboratory analytical results can be found in Appendix C.

Figure 3. Measured Screening Results for NMOCs (ppm)

Figure 4. Measured Screening Results for Methane (ppm)

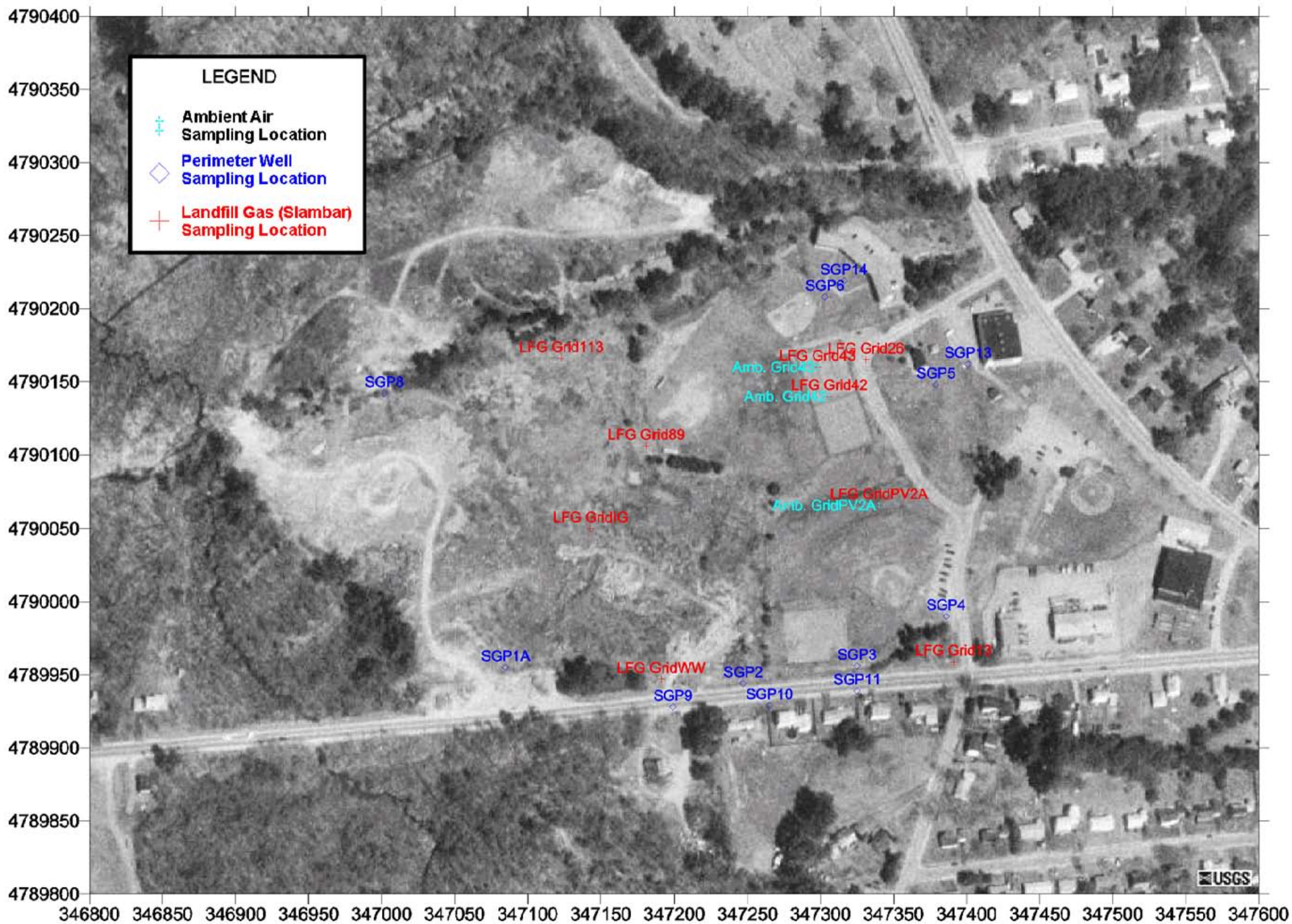


Figure 5. Somersworth Sampling Locations

4.3.2 Passive Vent Gas Sampling

While conducting the screening analysis, several unintentional passive vents were observed on the site. These vents were in the form of (1) pipes protruding from the contaminated groundwater pump station, (2) pipes protruding from the distribution box associated with the infiltration gallery and, (3) drilled auger holes that were associated with an abandoned plan to install lights on the baseball field. The slam-bar technique was used in the vicinity of the drilled auger holes. A piece of Teflon tubing was fed through the vent pipes and modeling clay was used to form a seal around the pipe. Summa canister samples were collected for COPCs and fixed gases. The locations of the passive vents were determined by using a GPS unit. These passive vent locations were identified as the wet well (LFG Grid WW), the infiltration gallery (LFG Grid IG), and at the baseball field abandoned lighting holes (LFG Grid PV2A). Appendix C presents the laboratory analytical results.

4.3.3 Perimeter Well Gas Sampling

The guidance recommends that sampling be conducted at the perimeter wells located nearest to the hot spots and at the closest off-site receptor. For this site demonstration, sampling was conducted at twelve of the perimeter wells, which are denoted on Figure 5 as SPG"X" where "X" is the perimeter well number (1A, 2, 3, and so forth). All twelve wells were located in close proximity to off-site receptors (i.e., residential houses or apartments). At each of these locations, Summa canisters were used to collect the samples and analyzed for COPC, fixed gases, and methane. The Summa canister sampling rate was set to approximately 0.1 L/min to minimize the potential for ambient air leakage. Appendix C presents the laboratory analytical results.

4.3.4 Ambient Air Sampling

As recommended by the guidance, sampling should be conducted of the ambient air at the location where the highest NMOC concentrations were measured. However, for this site demonstration, ambient air sampling was conducted at the locations where the highest methane concentrations were measured. It should be noted that methane concentrations were used to derive sampling strategies due to the absence of detectable NMOC concentrations found during the screening analysis. Three samples were collected using a Summa canister. These three locations were identified as grid Nos. 42, 43, and PV2A (passive vent located at the baseball field) and sre denoted as Amb. Grid 42, Amb. Grid 43, and Amb Grid PV2A. Appendix C presents the laboratory analytical results.

4.4 Quality Assurance and Data Evaluation

The primary purpose of this project is to establish the usefulness of the guidance document and identify areas that need to be clarified or expanded. The field efforts are a means to collect the information needed to implement the procedures included in the guidance. A secondary purpose of the project is to provide the RPMs with information that will allow them to determine if LFG controls are needed and if compliance with applicable relevant and appropriate requirements (ARARs) has been achieved. Data quality objectives are a starting point of an interactive process, and they do not necessarily constitute definitive rules for accepting or rejecting results. The measurement quality objectives have been defined in terms of standard methods with accuracy, precision, and completeness goals.

Uncertainty associated with the measurement data is expressed in terms of accuracy and precision. The accuracy of a single value contains both the measurement's random error component and the systematic error, or bias. Accuracy thus reflects the total error for a given measurement. Precision values represent a measure of only the random variability for replicate measurements. In general, the purpose of calibration is to eliminate bias, although inefficient analyte recovery or matrix interferences can contribute to sample bias, which is typically assessed by analyzing matrix spike samples. At very low levels, blank effects (contamination or other artifacts) can also contribute to low-level bias. The potential for bias is evaluated by method blanks. Instrument bias is evaluated by using control samples.

4.4.1 Accuracy

Accuracy of laboratory results has been assessed for compliance with the established QC criteria using the analytical results of method blanks, reagent or preparation blank, matrix spike and matrix spike duplicate samples, and field blanks. The percent recovery (%R) of matrix spike samples is calculated using

$$\% R = \frac{A - B}{C} \times 100$$

Where A = the analyte concentration determined experimentally from the spiked sample,
B = the background level determined by a separate analysis of the unspiked sample, and
C = the amount of the spike added.

The laboratory did not detect any of the analytes in any sample blanks. The minimum and maximum recovery for the entire set of laboratory control samples (LCS) was greater than 69 percent and less than 119 percent. The recovery of hexachlorobutadiene was outside the lower control limit of 70 percent. The low recovery indicates that the sample results may be biased low. The method specifies that 90 percent of the analytes must be within the 70 to 130 percent range. This criterion was met.

The 4-bromofluorobenzene surrogate spike recovery was outside of the upper range for 13 out of 20 field samples. The maximum 4-bromofluorobenzene surrogate spike recovery was 243 percent. The high 4-bromofluorobenzene surrogate recovery is indicative of matrix interference, and the results may be biased on the high side. All other spike surrogate recovery values were within the target range of 70 to 130 percent.

4.4.2 Precision

The analytical results between matrix spike and matrix spike duplicate (MS and MSD) analyses for each COPC have been assessed. The relative percent difference (RPD) was calculated for each pair of duplicate analysis using

$$RPD = \frac{S - D}{(S + D)/2} \times 100$$

Where S = First sample value (original or MS value) and
D= Second sample value (duplicate or MSD value).

Except for methylene chloride, acetone, and hexane in the duplicate ambient air samples, the RPD for each of the matched sample pairs was less than 6 percent. The laboratory reported concentrations of methylene chloride and acetone in both of the duplicate ambient air samples. The laboratory reported hexane in one of the duplicate ambient air samples but not the other. The RPD for methylene chloride and acetone in the ambient air samples was calculated to be 56 and 47 percent, respectively. The laboratory reported concentrations for methylene chloride, acetone, toluene, and hexane in the blind reference standard. The reported values for the blind reference standard are less than five times the method detection limit (MDL) for each of the contaminants. These four contaminants were not expected to be in the blind reference standard. The RPD for the laboratory control samples (LCS) ranged from 0 to 20 percent. Except for hexachlorobutadiene, the calculated RPD for each LCS analyte was less than 5 percent.

This narrow range indicates that the laboratory was capable of reproducing the analytical results. Although, neither methylene chloride, hexane, nor acetone was found in the associated laboratory blanks, they are common laboratory contaminants.

4.4.3 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected under normal conditions. The sampling and analytical goal for completeness is 80 percent or more for all samples tested. The percent completeness was calculated by using

$$Completeness(\%) = \frac{(number\ of\ valid\ data)}{\begin{pmatrix} number\ of\ samples\ collected \\ for\ each\ parameter\ analyzed \end{pmatrix}} \times 100$$

Ninety seven percent of the targeted data was collected and validated.

Section 5. Estimation of Landfill Gas Emissions

After all samples were collected, it was possible to estimate the air impact of this site through the methods described in the guidance. For the purpose of this demonstration, it was determined that only select COPCs commonly found in LFG would be fully characterized. Table 2 provides a list of those COPCs commonly found in LFG and those considered in this demonstration. From previous site activities and visual inspection of concentration isopleths generated from the laboratory results, the data were treated as one homogenous area for analysis. Those COPCs that contained nondetect data were eliminated from further investigation. Figures 6 through 17 show the soil gas concentration isopleths of all COPCs with detected concentrations. These figures provided a visual presentation of the laboratory results that were used to further understand the dynamics of this landfill. Table 3 provides the analytical results for the landfill. The data were analyzed, and the 90th percentile concentrations were determined. Table 4 provides the 90th percentile values of the COPCs for the landfill.

Table 2. COPCs Commonly Found in LFG[a,b]

1,1,1-Trichloroethane (methyl chloroform)
1,1-Dichloroethene (vinylidene chloride)
1,2-Dichloroethane (ethylene dichloride)
Acrylonitrile
Benzene
Carbon Tetrachloride
Chlorobenzene
Chloroethane (ethyl chloride)
Chlorofluorocarbons
Chloroform
Dichlorobenzene
Ethylene Dibromide
Hydrogen Sulfide
Mercury
Methylene Chloride
Perchloroethylene (tetrachloroethylene)
Toluene
Trichloroethylene (trichloroethene)
Vinyl Chloride
Xylenes

[a] Constituents associated with carcinogenic and chronic noncarcinogenic health effects that are routinely measured
[b] Source: EPA, 1997

Figure 6. NMOC Concentration Isopleths from Summa Sampling (ppmv)

Figure 7. 1,1-Dichloroethene Concentration Isopleths from Summa Sampling (ppbv)

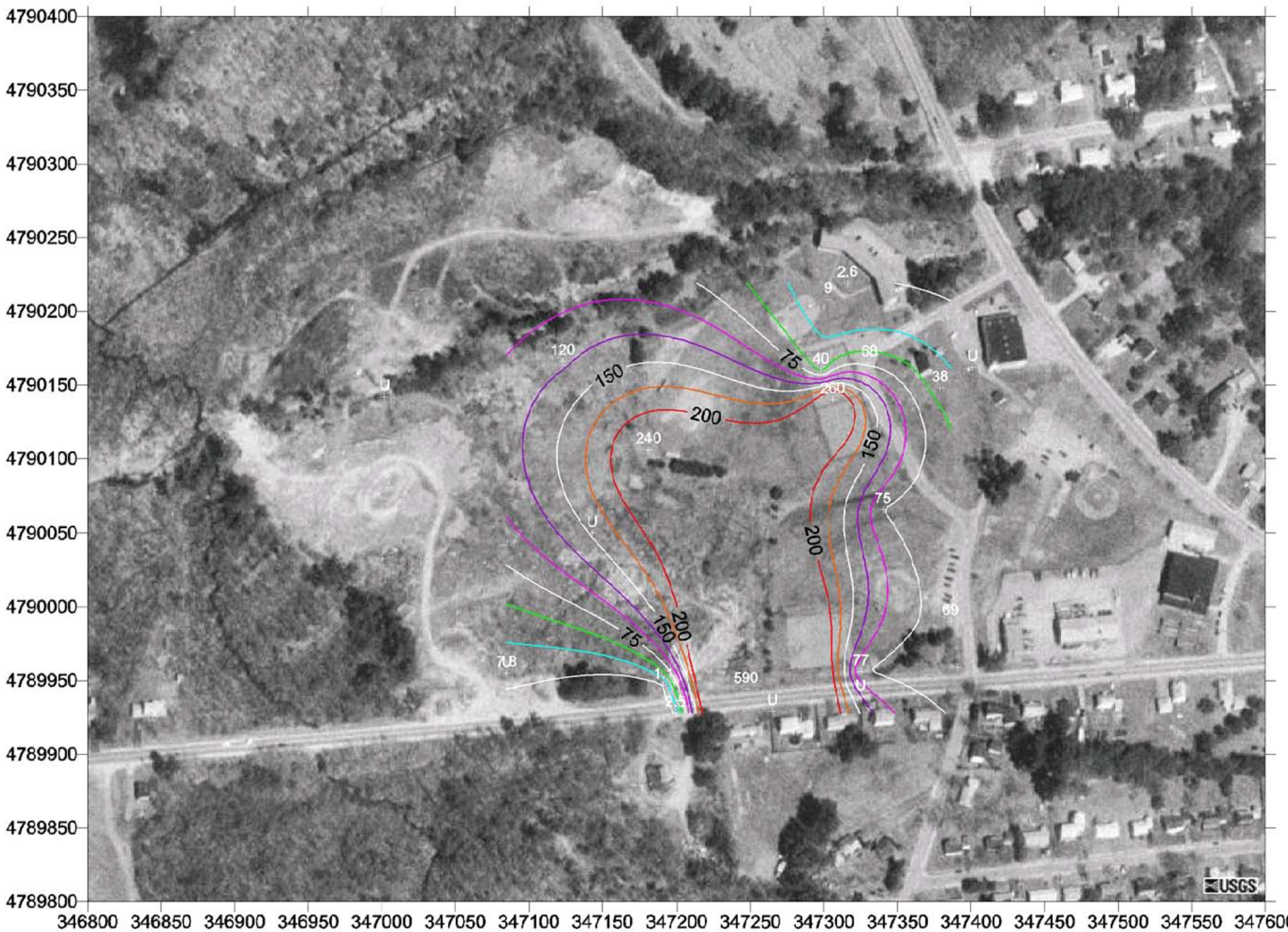


Figure 8. Benzene Concentration Isopleths from Summa Sampling (ppbv)

Figure 9. Chlorobenzene Concentration Isopleths from Summa Sampling (ppbv)

Figure 10. Chloroethane Concentration Isopleths from Summa Sampling (ppbv)

Figure 11. 1,4-Dichlorobenzene Concentration Isopleths from Summa Sampling (ppbv)

Figure 12. Methylene Chloride Concentration Isopleths from Summa Sampling (ppbv)

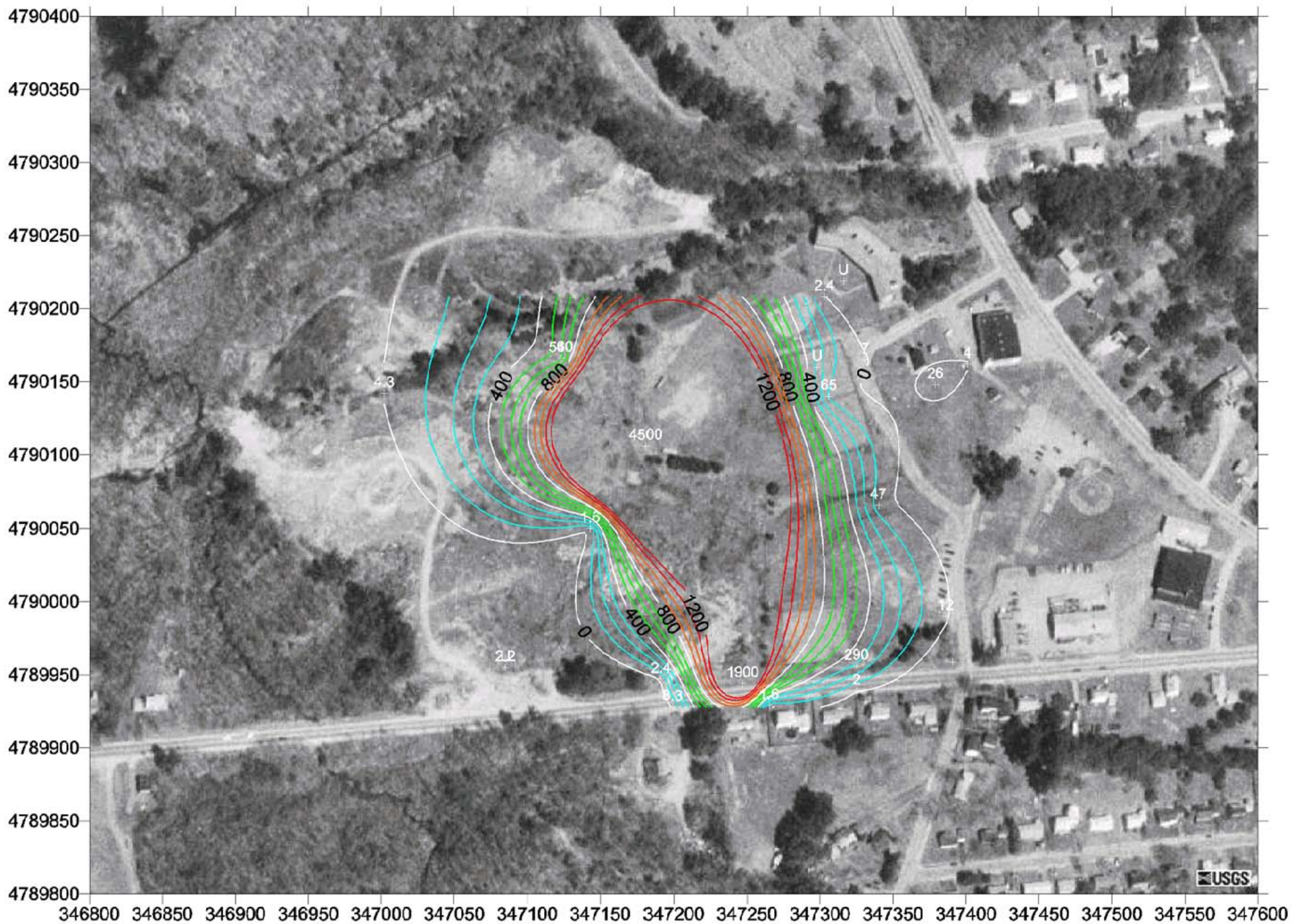


Figure 13. Toluene Concentration Isopleths from Summa Sampling (ppbv)

Figure 14. Trichloroethene Concentration Isopleths from Summa Sampling (ppbv)

Figure 15. Vinyl Chloride Concentration Isopleths from Summa Sampling (ppbv)

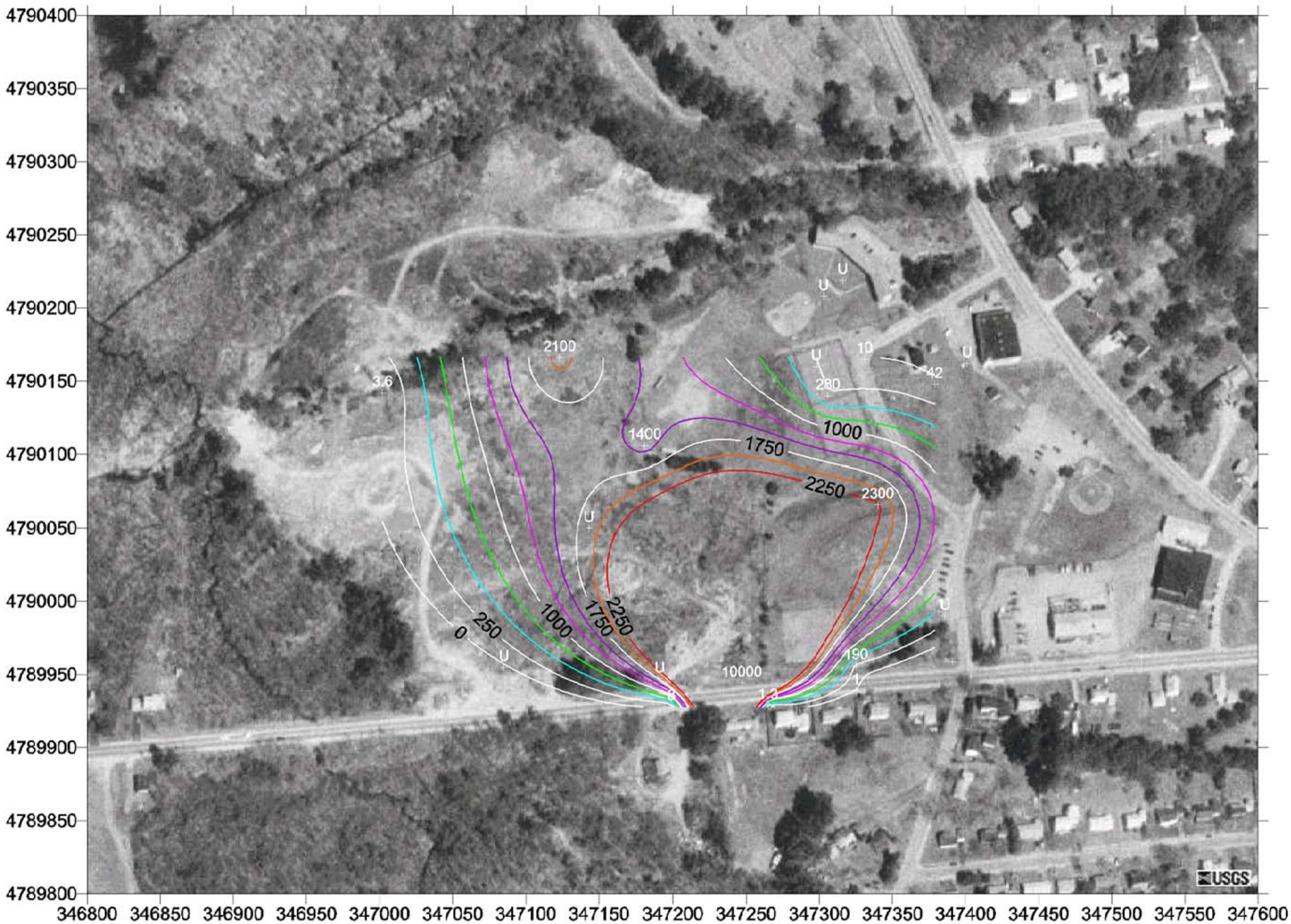


Figure 16. m,p-Xylene Concentration Isopleths from Summa Sampling (ppbv)

Figure 17. o-Xylene Concentration Isopleths from Summa Sampling (ppbv)

Table 3. Analytical Results for COPCs

Grid ID No.	O_2 (%)	N_2 (%)	CH_4 (%)	CO_2 (%)	NMOC (ppmvC)	1,1-Dichloroethene (ppmv)	Benzene (ppmv)	Chlorobenzene (ppmv)	Chloroethane (ppmv)	1,4-Dichlorobenzene (ppmv)	Methylene Chloride (ppmv)	Toluene (ppmv)	Trichloroethene (ppmv)	Vinyl Chloride (ppmv)	m,p-Xylene (ppmv)	o-Xylene (ppmv)
26	0.95	55	31	14	970	0.01	0.07	ND	0.15	ND	0.04	0.01	ND	0.66	0.01	0.016
42	0.6	13	53	30	2200	ND	0.26	0.02	ND	ND	0.23	0.07	ND	1.20	0.28	0.18
43	0.91	51	36	13	1100	ND	0.04	ND	0.06	ND	0.26	ND	ND	1.30	ND	ND
89	0.41	13	50	37	2800	ND	0.24	0.02	0.52	2.00	0.04	4.50	0.06	0.54	1.40	0.56
113	0.57	2.2	54	48	1800	ND	0.12	ND	0.38	0.04	ND	0.56	ND	0.17	2.10	0.7
113	ND	0.95	54	47	1800	ND	0.12	ND	0.37	0.036	ND	0.54	ND	0.16	2.1	0.7
PV2A	0.17	2.5	64	34	2000	ND	0.075	ND	0.016	ND	0.018	0.047	ND	0.068	2.3	0.8
WW	ND	ND	ND	ND	ND	ND	0.0011	0.0014	0.0026	ND	0.016	0.0024	ND	ND	ND	ND
IG	16	79	ND	3.2	160	ND	ND	ND	ND	0.0055	0.0022	0.0016	0.0031	ND	ND	ND

Table 4. 90th Percentile Landfill Gas Concentrations of COPCs

COPC	90th Percentile Concentration (ppmvC)
NMOC	2380
1,1-Dichloroethene	0.00152
1,4-Dichlorobenzene	0.4288
Benzene	0.244
Chlorobenzene	0.0208
Chloroethane	0.408
Methylene Chloride	0.236
Toluene	1.348
Trichloroethene	0.01428
Vinyl Chloride	1.22
m,p-Xylene	2.14
o-Xylene	0.72

5.1 LandGEM Modeling of LFG

The 90th percentile values derived from the data set were then used as input values for the LandGEM model to estimate the LFG emission rates for each of the COPCs. To model this site the following parameters were used:

1 Methane generation rate (k): 0.05/yr. (AP-42 default)
2 Methane generation potential (L_0): 170 m^3/Mg (AP-42 default)
3 Year Opened: 1958.
4 Current Year: 2003.
5 Landfill Type: Co-disposal.
6 Landfill Capacity: 300,000 Mg. This value was derived from a literature search of previous site investigations. A report prepared by GeoSyntec in October 2001 indicated that this landfill contained approximately 300,000 Mg of refuse.
7 Acceptance rate (1958-1980): 13,043.48 Mg/yr. This value was calculated using the Autocalc function within LandGEM. This was performed due to a lack of historical acceptance rate data available for this site. To perform this calculation the landfill capacity value was entered as the refuse in place for the year 1981, as historical data indicated this was the year the site was closed. Once the refuse in place was entered for the year 1981, all years in which the landfill was active were selected, including closure year (1958-1981). With these years selected the Autocalc function was initiated and the acceptance rate was derived for each of the active years as an average value for all years selected.
8 Methane percentage: 58%. This was based on the 90th percentile of the field sample data results.
9 NMOC Concentration: 2380 ppmv as carbon. This was based on the 90th percentile of the field sample data results.
10 Air Pollutants (COPCs). Modified per 90th percentile values shown in Table 4.

With all values input, LFG emission rates for each COPC were estimated using the LandGEM model. Figure 18 shows an example output file for NMOC emissions from the model. Figure 19 shows the emission rate data for NMOC versus time. Table 5 provides the emission rates estimated for each COPC. Appendix D contains all the LandGEM model runs for the landfill.

```
============================================================================
Model Parameters
============================================================================
Lo : 170.00 m^3  per      Mg ***** User Mode Selection *****
k : 0.0500 1per   yr ***** User Mode Selection *****
NMOC : 2380.00 ppmv ***** User Mode Selection *****
Methane : 58.0000 % volume
Carbon Dioxide : 42.0000 % volume
============================================================================
Landfill Parameters
============================================================================
Landfill type : Co-Disposal
Year Opened : 1958     Current Year : 2003    Closure Year : 2003
Capacity : 300000 Mg
Average Acceptance Rate Required from
        Current Year to Closure Year : 0.00 Mg per    year
============================================================================
Model Results
============================================================================
                                 NMOC Emission Rate
Year    Refuse in Place (Mg)          (Mg per   yr)         (Cubic m per   yr)
============================================================================
1959     1.304E+04              1.631E+00         4.549E+02
1960     2.609E+04              3.182E+00         8.877E+02
1961     3.913E+04              4.658E+00         1.299E+03
1962     5.217E+04              6.061E+00         1.691E+03
1963     6.522E+04              7.396E+00         2.063E+03
1964     7.826E+04              8.666E+00         2.418E+03
1965     9.130E+04              9.874E+00         2.755E+03
1966     1.043E+05              1.102E+01         3.075E+03
1967     1.174E+05              1.212E+01         3.380E+03
1968     1.304E+05              1.316E+01         3.670E+03
1969     1.435E+05              1.415E+01         3.946E+03
1970     1.565E+05              1.509E+01         4.209E+03
1971     1.696E+05              1.598E+01         4.459E+03
1972     1.826E+05              1.683E+01         4.696E+03
1973     1.957E+05              1.764E+01         4.922E+03
1974     2.087E+05              1.841E+01         5.137E+03
1975     2.217E+05              1.915E+01         5.341E+03
1976     2.348E+05              1.984E+01         5.536E+03
1977     2.478E+05              2.051E+01         5.721E+03
1978     2.609E+05              2.114E+01         5.897E+03
1979     2.739E+05              2.174E+01         6.064E+03
1980     2.870E+05              2.231E+01         6.223E+03
1981     3.000E+05              2.285E+01         6.375E+03
1982     3.000E+05              2.174E+01         6.064E+03
1983     3.000E+05              2.068E+01         5.768E+03
  .          .                      .                 .
  .          .                      .                 .
  .          .                      .                 .
2001     3.000E+05              8.406E+00         2.345E+03
2002     3.000E+05              7.996E+00         2.231E+03
2003     3.000E+05              7.606E+00         2.122E+03
  .          .                      .                 .
  .          .                      .                 .
  .          .                      .                 .
2200     3.000E+05              4.012E-04         1.119E-01
2201     3.000E+05              3.816E-04         1.065E-01
2202     3.000E+05              3.630E-04         1.013E-01
```

Figure 18. Example LandGEM Model Output

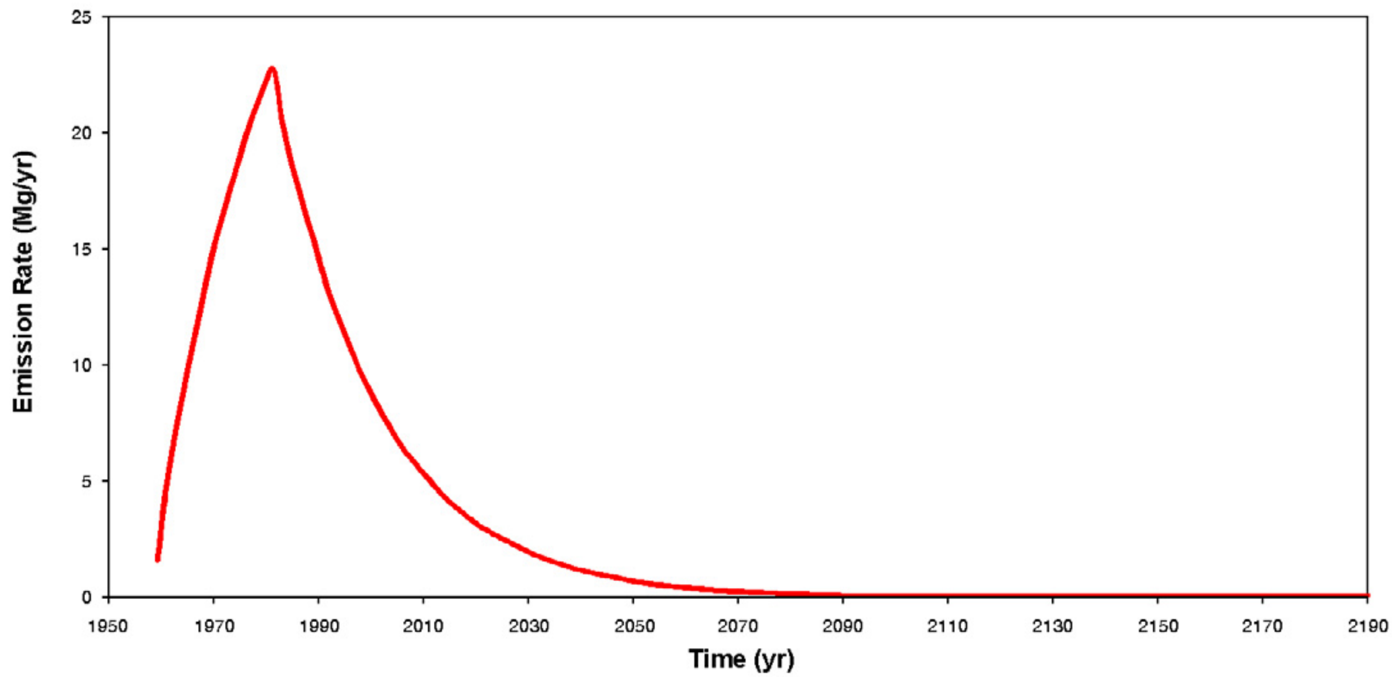


Figure 19. NMOC Emission Rates Versus Time

Table 5. COPCs' Emission Rates

COPC	2002 Emission Rate (Mg/yr)
NMOC	7.996
1,1-Dichloroethene	5.744×10^{-6}
1,4-Dichlorobenzene	2.457×10^{-3}
Benzene	7.431×10^{-4}
Chlorobenzene	9.127×10^{-5}
Chloroethane	1.026×10^{-3}
Methylene Chloride	7.814×10^{-4}
Toluene	4.842×10^{-3}
Trichloroethene	7.314×10^{-5}
Vinyl Chloride	2.973×10^{-3}
m,p-Xylene	8.857×10^{-3}
o-Xylene	2.980×10^{-3}

5.2 SCREEN3 Modeling of LFG

The next step in characterizing the emissions of LFG is to evaluate the ambient impact of each of the COPCs, and it is necessary to use an atmospheric dispersion model for this. For demonstration purposes, SCREEN3 was used to provide a screening level assessment. The landfill was treated as an "area" source within the model. In order to accomplish this, the landfill was defined into a rectangular area as shown in Figure 20. From this area, the landfill was modeled at a unity emission rate of 1 g/s to provide maximum 1 hr concentration for the landfill. Because the landfill was modeled on a unity basis, the emission rates generated from the LandGEM model could in turn be multiplied by this unity-derived concentration to determine the 1 hr maximum concentrations for each COPC. To convert these concentrations to a representative annual concentration, all derived 1 h concentrations were multiplied by the appropriate multiplying factor of 0.08. If an alternative averaging timer is to be evaluated, the reader is referred to Section 2.2.1.4, Dispersion Modeling and to Table 2-3 of the Guidance. Table 6 provides the maximum annual concentrations for each COPC. Appendix E contains the SCREEN3 model runs for the landfill.

Table 6. Maximum Annual COPC Concentrations

COPC	Total Concentration ($\mu g/m^3$)
NMOC	20.69
1,1-Dichloroethene	1.4486×10^{-5}
1,4-Dichlorobenzene	6.356×10^{-3}
Benzene	1.922×10^{-3}
Chlorobenzene	2.361×10^{-4}
Chloroethane	2.654×10^{-3}
Methylene Chloride	2.021×10^{-3}
Toluene	1.253×10^{-2}
Trichloroethene	1.892×10^{-4}
Vinyl Chloride	7.691×10^{-3}
m,p-Xylene	2.291×10^{-2}
o-Xylene	7.709×10^{-3}

Figure 20. Modeling Area Defined for SCREEN3

Section 6. Risk Calculations

The risk assessment provided in this section is for illustrative purposes only. It is not intended to represent a complete and detailed risk assessment for determining further actions at this site.

In order to calculate the incremental risk associated with exposure to a COPC, the time averaged emission rate for the time period of concern must first be determined. The equation for determining the time averaged emission rate is

$$<E> = (1/ED) \times \left[(h/2) \times \left(E_0 + 2\sum_{E_0}^{E_{n-1}} E \right) + E_n \right]$$

where

$<E>$ = Time-averaged emission rate (megagrams per year),
ED = Exposure duration (years),
h = Time-step interval (years), h = 1 yr,
$E_{0,1,2\ldots n}$ = Emission rate at the end of the first year (E_0) and each succeeding year from LandGEM (megagrams per year), and
n = Number of time-steps ($n = ED$).

This time averaged emission rate is then entered into the atmospheric dispersion model to estimate the average exposure point concentration of the COPC. Using this approach, a dispersion model run will be required for each chemical of concern. Alternatively, if the dispersion model is run assuming the emission rate is at unity (1 g/m^2•s), the dispersion model will generate a normalized air concentration in (micrograms per cubic meter per gram per square meter second) at the receptor of concern. The estimated ambient air concentration (micrograms per cubic meter) is determined by multiplying the dispersion coefficient and the time averaged emission rate. The LandGEM model runs for the Somersworth Landfill predicted very low emission rates, and the emission rate for every COPC was declining from 2002 forward. Hence, it was decided to use only the 2002 emission rates to calculate, for illustrative purposes, the ambient air concentrations. These predicted ambient air concentrations were then compared to the target concentrations in Table 7.

Table 7. Risk Analysis

CAS No.	Chemical	Basis of Target Conc.	C_{target}, Target Indoor Air Concentration to Satisfy both the Prescribed Risk Level (R) and the Target Hazard Index (HI)			NH Regulated Toxic Air Pollutant Annual Ambient Limits (µg/m^3)	Total Ambient Air Conc. (µg/m^3)
			R=10^{-4}, HI=1 (µg/m^3)	R=10^{-5}, HI=1 (µg/m^3)	R=10-^{6}, HI=1 (µg/m^3)		
75354	1,1-Dichloroethylene	NC[a]	$2.0\times10^{+02}$	$2.0\times10^{+02}$	$2.0\times10^{+02}$	67	1.5×10^{-05}
106467	1,4-Dichlorobenzene	NC	$8.0\times10^{+02}$	$8.0\times10^{+02}$	$8.0\times10^{+02}$	800	6.4×10^{-03}
71432	Benzene	C[b]	31.	3.1	0.31	3.80	1.9×10^{-03}
108907	Chlorobenzenr	NC	60.	60	60	154	2.4×10^{-04}
75003	Chloroethane (ethyl chloride)	NC	$1.0\times10^{+04}$	$1.0\times10^{+04}$	$1.0\times10^{+04}$	10.000	2.7×10^{-03}
75092	Methylene chloride	C	520.	52	5.2	414	2.0×10^{-03}
108883	Toluene	NC	$4.0\times10^{+02}$	$4.0\times10^{+02}$	$4.0\times10^{+02}$	400	1.3×10^{-02}
79016	Trichloroethylene	C	2.2	0.22	2.2×10^{-02}	640	1.9×10^{-04}
75014	Vinyl Chloride (chloroethene)	C	28.	2.8	0.28	100	7.7×10^{-03}
108383	m,p-Xylene	NC	$7.0\times10^{+03}$	$7.0\times10^{+03}$	$7.0\times10^{+03}$	1033	2.3×10^{-02}
95476	o-Xylene	NC	$7.0\times10^{+03}$	$7.0\times10^{+03}$	$7.0\times10^{+03}$	1033	7.7×10^{-03}

[a] NC = noncancer risk
[b] C = cancer risk

Table 7 identifies target media concentrations corresponding to risk or hazard based concentrations for ambient air in residential settings. Only air concentrations that satisfy both the prescribed cancer risk level and the target hazard index are included in Table 7. The approach described here also can be used to evaluate chemicals not listed in the tables. It must be emphasized that the concentrations presented in Table 7 are screening levels. They are not cleanup levels or preliminary remediation goals nor are they intended to supercede existing criteria of the lead regulatory authority. The lead regulatory authority for a site may determine that criteria other than those provided herein are appropriate for their specific site or area.

The sources of chemical data used in the calculations necessary to create Table 7 were EPA's Superfund Chemical Data Matrix (SCDM) database and EPA's Water 9 database whenever a chemical was not included in the SCDM database. EPA's Integrated Risk Information System (IRIS) is the preferred source of carcinogenic unit risks and noncarcinogenic reference concentrations (RfCs) for inhalation exposure.[1] The following two sources were consulted, in order of preference, when IRIS values were not available: provisional toxicity values recommended by EPA's National Center for Environmental Assessment (NCEA) and EPA's Health Effects Assessment Summary Tables (HEAST). If no inhalation toxicity data could be obtained from IRIS, NCEA, or HEAST, extrapolated unit risks and RfCs were derived by using toxicity data for oral exposure (cancer slope factors and reference doses, respectively) from these reference sources using the same preference order. Toxicity databases such as IRIS are constantly being updated; this table is current as of August 2002. Users of this guidance are strongly encouraged to research the latest toxicity values for contaminants of interest from the sources noted above.

The ambient air concentrations in the table are risk-based screening levels calculated following an approach consistent with that presented in HEAST (U.S. EPA, 1997). Separate carcinogenic and non-carcinogenic target concentrations were calculated for each compound when both unit risks and reference concentrations were available. When inhalation toxicity values were not available, unit risks and reference concentrations were extrapolated from oral slope factors or reference doses, respectively. For both carcinogens and non-carcinogens, target air concentrations were based on an adult exposure scenario and assume maximum exposure of an individual (i.e., exposure to contaminants 24 hours per day, 7 days per week, over 30-year residential exposure). An inhalation rate of 20 m^3/day and a body weight of 70 kg are assumed and have been factored into the inhalation unit risk and reference concentration toxicity values.

Unit risks were extrapolated from cancer slope factors using

$$URF = CFS \times IR \times \left(\frac{1}{BW}\right)\left(\frac{10^{-3}\,mg}{\mu g}\right)$$

where

URF = unit risk factor (micrograms per cubic meter)$^{-1}$,
CSF = cancer slope factor,
IR = inhalation rate (cubic meters per day), and
BW = body weight (kilograms).

Reference concentrations were extrapolated from reference doses using

$$RfC = RfD \times BW \times \left(\frac{1}{IR}\right)$$

where

RfC = reference concentration (milligram per cubic meter) and
RfD = reference dose (milligram per kilogram per day).

For carcinogens,

$$C_{cancer} = TCR/URF$$

and for noncarcinogens,

$$C_{noncancer} = THQ \times RfC$$

where

C_{cancer} = target indoor air carcinogen concentration (micrograms per cubic meter),
$C_{noncancer}$ = target indoor air noncarcinogen concentration (micrograms per cubic meter),
TCR = target cancer risk (e.g., 1.0×10^{-5}), and
THQ = target hazard quotent (e.g., 1.0).

For most compounds, the more stringent of the cancer- and non-cancer-based contaminant concentrations is chosen as the target air concentration that satisfies both the prescribed cancer risk level and the target hazard quotient.

[1] U.S. EPA. 2002. Integrated Risk Information System (IRIS). http://www.epa.gov/iriswebp/iris/index.html (accessed October 2005)

$$C_{target} = MIN(C_{cancer}, C_{noncancer})$$

The target concentration, however, was preferentially selected for those compounds that had both an inhalation-based toxicity value and an oral-extrapolated value. The selected screening level was preferentially based on the non-extrapolated toxicity value chosen to calculate the acceptable ambient air concentration.[2]

For ease in application of the table, the indoor air concentrations are given in units of micrograms per cubic meter. The conversion from parts per billion by volume to micrograms per cubic meter is

$$C[ppmv] = C\left[\frac{\mu g}{m^3}\right] \times 10^9 \left[\frac{ppb}{atm}\right] \times 10^{-3} \left[\frac{m^3}{L}\right] \times R \times \frac{T}{MW \times 10^6 [\mu g/g]}$$

where

R = gas constant (0.0821 L•atm/mole•K),
T = absolute temperature (298 K), and
MW = molecular weight (grams per mole).

The calculated target air concentrations are listed in the tables along with a column indicating whether cancer or noncancer risks drive the target concentration. If the exposure scenario of concern is an adult resident living at the receptor location being most impacted, the forward-calculation of incremental risks begins with the estimated ambient air concentration (i.e., C_{air} in micrograms per cubic meter). For carcinogenic contaminants, the risk level is calculated as

$$Risk = \frac{URF \times EF \times ED \times C_{air}}{AT_C \times 365\, days/yr}$$

where

$Risk$ = incremental risk level, unitless (e.g., 1×10^{-6}),
C_{air} = annual average ambient air concentration for each carciogen (micrograms per cubic meter),
AT_C = averaging time for carcinogens (years—70 yr),
EF = exposure frequency (days per year—350 days), and
ED = exposure duration (years—30 yr).

For noncarcinogenic contaminants, the hazard quotient is calculated as

$$HQ = \frac{EF \times ED \times \frac{1}{RfC} \times C_{air}}{AT_{NC} \times 365\, days/yr}$$

where

HQ = Hazard quotient, unitless (e.g., 1.0) and
AT_{NC} = Averaging time for noncarcinogens (year—30 yr)

Table 7 illustrates the results of using the above equations and discussions. The last column in Table 7 represents the total ambient air concentration in micrograms per cubic meter. This value is derived by multiplying the emission flux values from LandGEM by the ambient air concentration from the dispersion model (SCREEN3) when run at a unity emission rate (1 g/s). These values would be compared to the appropriate risk derived concentrations as seen in the previous three columns to determine if a particular COPC is above or below an acceptable air concentration and whether further actions or investigations may be needed. Again Table 7 is presented for illustrative purposes only and is not intended to represent the results or conclusions drawn from a detailed risk assessment.

In conclusion, based solely on the risk calculations, no further air investigations or remedial actions would appear to be warranted. However, other factors often come into play and additional investigations may be desired (e.g., Fourier transform infrared spectroscopy).

[2] The target air concentration for trichloroethylene is the lone exception to this rule. The target concentration is based on a carcinogenic unit risk extrapolated from an upper bound oral cancer slope factor of 4×10^{-1} $(mg/kg/day)^{-1}$ cited in NCEA's draft risk assessment for trichloroethylene (EPA, 2001). However, as noted in that document, available evidence from toxicological studies suggests similar carcinogenic effects from both the oral and inhalation routes of exposure. The existence of this evidence gives greater weight to the extrapolated unit risk, and given that the unit risk produces a lower target concentration than the non-extrapolated RfC, the unit risk-based value is adopted here as the target air concentration for trichloroethylene.

Section 7. Findings and Conclusions

This case study documents how the guidance can be used to evaluate landfill gas emissions. It illustrates the usefulness of both the information and the procedures presented in the Guidance for Evaluating Landfill Gas Emissions from Closed or Abandoned Facilities. The Somersworth site includes near-by single family homes, institutional buildings, a multi-family dwelling, and recreational facilities (e.g., two baseball fields, two basketball courts and two tennis courts). An infiltration gallery is part of the super fund site remediation efforts. The gallery is used to remove contaminated groundwater from below the landfill and to re-inject it into the subsurface. The re-injected groundwater flows through a permeable reactive barrier that is designed to oxidize chlorinated organic compounds, and there is concern that volatile chemicals may be allowed to reach the atmosphere through the cover. There are several LFG monitoring wells with elevated methane levels.

By applying the investigative techniques and recommended practices, the research team was able to:

1 Determine where the landfill gases are escaping into the atmosphere,
2 Identify the chemicals of potential concern,
3 Quantify speciated LFG emission rates,
4 Identify the most likely to be affected off-site location(s), and
5 Characterize ambient air concentrations using dispersion models (An alternative to this would be to use the ground-based ORS results directly).

This case study report provided data and information that were used by the remedial project manager to:

1 Assess the health risk associated with the emissions from the landfill,
2 Determine if additional site investigation effort is needed,
3 Evaluate the level of effort associated with the existing LFG monitoring program,
4 Determine if the previously proposed remedial design needed to be altered,
5 Evaluate the need for institution controls and future land use policy decisions, and
6 Decide if the risks and hazards associated with the landfill gas needed to be controlled with LFG control technology.

Specific to the Somersworth site the following lessons were learned:

- The conventional field screening, discrete sampling, laboratory analysis, and modeling procedures provided the information needed to assess the risks and hazards associated with the LFG emissions. The turn-around time for the laboratory was measured in weeks. The data reduction and modeling efforts require 2–3 man days of effort, so health risks could not be quantified on a real time basis. Readily available equipment and ordinary environmental technician skills are required to obtain quality results. These techniques are capable of achieving lower analytical detection limits when compared to the open-path Fourier transform infrared (OP-FTIR) technique that was also demonstrated at this site.
- The OP-FTIR and radial plume mapping technique also provided the information needed to assess the risks and hazards associated with the LFG emissions on a real time basis.
- Sophisticated equipment and highly skilled equipment operators were required to obtain quality results. The success of this demonstration effort encouraged investigators within EPA ORD to evaluate other remote sensing technologies. The research team believes that using a tunable diode laser has been demonstrated to work well when evaluating landfill gas emissions. This new technology can be operated by two field technicians. The tunable laser equipment is more robust and less sensitive to adverse environmental conditions such as high humidity and wind when compared to the FTIR equipment. Effort is underway through EPA's Office of Air Quality Planning and Standards to develop an EPA test method that uses ground-based optical remote

sensing devices. The method has been drafted and is under review.

- The two techniques yielded very similar results. The major difference is that ground-based optical remote sensing (ORS) allows direct measurements of ambient concentration for use in risk assessment evaluation. The conventional techniques require use of a mass emission model (i.e., LandGEM) and dispersion model (SCREEN3, ISCST, AERMOD, and so forth) and field equipment that is readily and commonly available. As noted earlier, the other difference is with the access to results with the ground-based ORS resulting in much quicker results on a real time basis.
- High levels of methane gas (above the LEL) were discovered in the infiltration gallery. Special precautions are needed to minimize the potential for ignition and to ventilate the gallery prior to it being entered for maintenance and repairs.
- The highest LFG emission rates were associated with cracks, excavations, and penetrations of the landfill surface cover material. This discovery emphasized the need for proper maintenance and repairs.
- Using the data from this research, a risk level below 1×10^{-5} was calculated based on the prediced COPC concentration in the air.

Appendix A
Site Activity Photographs

Somersworth Superfund Landfill Site

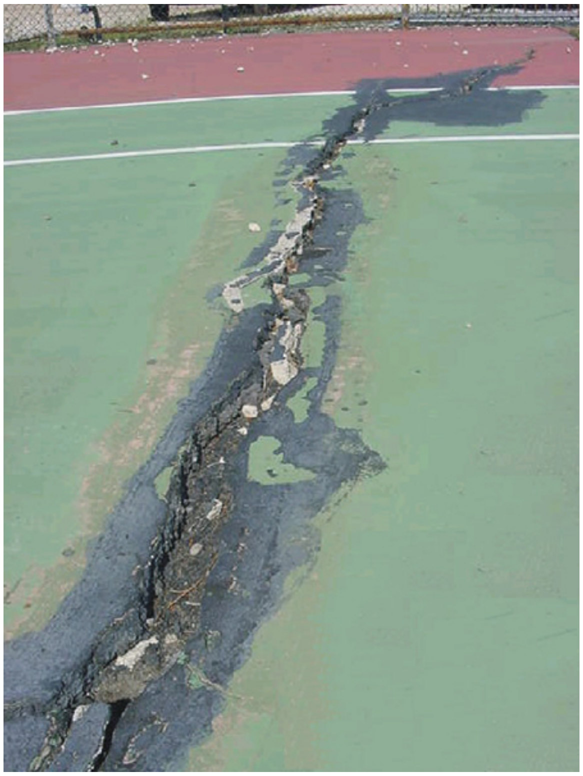
General View of the Somersworth Landfill Site

Baseball Fields on the Somersworth Site

Basketball Courts on the Somerswoth Landfill

General View of the Tennis Courts on the Somersworth Landfill

Close-up of the Tennis Courts



Cracks in the Tennis Court Surface

Base of the Tennis Court Light Poles

Drainage Cilvert on the Site

Playground on the Somersworth Landfill

Valve Box near the Baseball Field at the Site Entrance

Abandoned Hole for Baseball Field Lighting Installation

Somersworth Site Looking East

West Side of the Somersworth Site

Wetlands on the West Side of the Somersworth Landfill

Access Road Around the West Side of the Site

Monitoring Wells on the Landfill's West Side

Gas Line Marker on the Somersworth Site

Infiltration Pumping System on the Somersworth Site

Infiltration Gallery

Damaged Monitoring Well

Storm Water Drain on the Somersworth Site

Residential Dwellings South of the Somersworth Landfill

National Guard Armory Southeast of the Landfill

Fire Rescue Building on the East Side of the Site

Sampling a Somersworth Landfill Gas Well

Appendix B
Wilcoxon Statistical Analysis

Wilcoxon Two-Sample, Rank-Sum Test

In order to properly characterize and establish a sampling method for each landfill, it is necessary to identify those areas that are nearly homogeneous in composition. This is determined following the screening procedures. Through application of statistical methods on the screening data, it is possible to divide the landfill into nearly homogeneous areas. For the purpose of this guidance, it was decided to use a method referred to as the Wilcoxon two-sample, rank-sum test, or simply the rank-sum test. This is a statistical method used to determine if two independent sample populations are statistically similar (i.e., they have the same mean and median). For this application, statistically similar populations refer to areas within the landfill that are nearly homogeneous.

The first step is to assign the screening data that was collected to two populations (i.e., east landfill and west landfill) as

$$n = n_1 + n_2$$

where

n = entire screening data set,
n_1 = population of size n_1,
n_2 = population of size n_2, and
$n_1 \leq n_2$.

Once the all data has been assigned to one or the other populations, all the data must be placed in ascending order regardless of which population it was assigned and assigned a rank from 1 to n. In case of ties, all tied values should be assigned a ranking that is the mean of the tied rankings. For example, if two values are tied for the second lowest value, they both would be assigned a ranking of 2.5, which is the mean of the second and third ranking spots. After all values have been ranked, the ranks associated with the values from the smaller population, n_1, are added and the sum denoted as T'. Once T' is derived, it is compared with the values in Table X to decide on a given level of significance. Table X can be used for a given combination of n_1 and n_2 up to a total population size (n) of 20. If $T'_{\alpha} \leq T' \leq T'_{1-\alpha}$, then the two populations can be considered statistically similar and therefore one homogeneous area.

For a larger data set, the following statistical test must be used.

$$Z = \frac{T' - \dfrac{n_1(n_1 + n_2 + 1)}{2}}{\sqrt{\dfrac{n_1 n_2 (n_1 + n_2 + 1)}{12}}}$$

This value of Z is then compared to a specific level of significance on a t distribution shown in Table IV, where df is the total population size (n). If $|Z| \geq Z_{\alpha/2}$, then the two populations can not be considered statistically similar and are therefore two nonhomogeneous areas.

Continue this process until all areas of the landfill have been divided into distinct homogeneous areas.

TABLE X DISTRIBUTION OF THE RANK SUM T'

The values of T'_{α}, $T'_{1-\alpha}$, and α are such that, if the n_1 and n_2 observations are chosen at random from the same population, the chance that the rank sum T' of the n_1 observations in the smaller sample is equal to or less than T'_{α} is α and the chance that T' is equal to or greater than $T'_{1-\alpha}$ is α. The sample sizes are shown in parentheses (n_1, n_2)

T'_{α}	$T'_{1-\alpha}$	α	T'_{α}	$T'_{1-\alpha}$	α	T'_{α}	$T'_{1-\alpha}$	α	T'_{α}	$T'_{1-\alpha}$	α
	(1,9)			(3,8)			(4,8) (*Cont.*)			(5,7) (*Cont.*)	
1	10	.100	6	30	.006	12	40	.008	19	46	.015
	(1,10)		7	29	.012	13	39	.014	20	45	.024
1	11	.091	8	28	.024	14	38	.024	21	44	.037
	(2,3)		9	27	.042	15	37	.036	22	43	.053
3	9	.100	10	26	.067	16	36	.055	23	42	.074
	(2,4)		11	25	.097	17	35	.077		(5,8)	
3	11	.067		(3,9)			(4,9)		15	55	.001
	(2,5)		6	33	.005	10	46	.001	16	54	.002
3	13	.047	7	32	.009	11	45	.003	17	53	.003
4	12	.095	8	31	.018	12	44	.006	18	52	.005
	(2,6)		9	30	.032	13	43	.010	19	51	.009
3	15	.036	10	29	.050	14	42	.017	20	50	.015
4	14	.071	11	28	.073	15	41	.025	21	49	.023
	(2,7)			(3,10)		16	40	.038	22	48	.033
3	17	.028	6	36	.003	17	39	.053	23	47	.047
4	16	.056	7	35	.007	18	38	.074	24	46	.064
	(2,8)		8	34	.014	19	37	.099	25	45	.085
3	19	.022	9	33	.024		(4,10)			(5,9)	
4	18	.044	10	32	.038	10	50	.001	15	60	.000
5	17	.089	11	31	.056	11	49	.002	16	59	.001
	(2,9)		12	30	.080	12	48	.004	17	58	.002
3	21	.018		(4,4)		13	47	.007	18	57	.003
4	20	.036	10	26	.014	14	46	.012	19	56	.006
5	19	.073	11	25	.029	15	45	.018	20	55	.009
	(2,10)		12	24	.057	16	44	.026	21	54	.014
3	23	.015	13	23	.100	17	43	.038	22	53	.021
4	22	.030		(4,5)		18	42	.053	23	52	.030
5	21	.061	10	30	.008	19	41	.071	24	51	.041
6	20	.091	11	29	.016	20	40	.094	25	50	.056
	(3,3)		12	28	.032		(5,5)		26	49	.073
6	15	.050	13	27	.056	15	40	.004	27	48	.095
7	14	.100	14	26	.095	16	39	.008		(5,10)	
	(3,4)			(4,6)		17	38	.016	15	65	.000
6	18	.028	10	34	.005	18	37	.028	16	64	.001
7	17	.057	11	33	.010	19	36	.048	17	63	.001
	(3,5)		12	32	.019	20	35	.075	18	62	.002
6	21	.018	13	31	.033		(5,6)		19	61	.004
7	20	.036	14	30	.057	15	45	.002	20	60	.006
8	19	.071	15	29	.086	16	44	.004	21	59	.010
	(3,6)			(4,7)		17	43	.009	22	58	.014
6	24	.012	10	38	.003	18	42	.015	23	57	.020
7	23	.024	11	37	.006	19	41	.026	24	56	.028
8	22	.048	12	36	.012	20	40	.041	25	55	.038
9	21	.083	13	35	.021	21	39	.063	26	54	.050
	(3,7)		14	34	.036	22	38	.089	27	53	.065
6	27	.008	15	33	.055		(5,7)		28	52	.082
7	26	.017	16	32	.082	15	50	.001		(6,6)	
8	25	.033		(4,8)		16	49	.003	21	57	.001
9	24	.058	10	42	.002	17	48	.005	22	56	.002
10	23	.092	11	41	.004	18	47	.009	23	55	.004

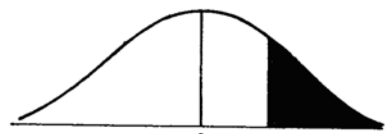
DISTRIBUTION OF THE RANK SUM T' (continued)

T'_{α}	$T'_{1-\alpha}$	α	T'_{α}	$T'_{1-\alpha}$	α	T'_{α}	$T'_{1-\alpha}$	α	T'_{α}	$T'_{1-\alpha}$	α
	(6,6) (*Cont.*)			(6,9) (*Cont.*)			(7,8) (*Cont.*)			(8,8) (*Cont.*)	
24	54	.008	35	61	.072	41	71	.047	37	99	.000
25	53	.013	36	60	.091	42	70	.060	38	98	.000
26	52	.021		(6,10)		43	69	.076	39	97	.001
27	51	.032	21	81	.000	44	68	.095	40	96	.001
28	50	.047	22	80	.000	45	67	.116	41	95	.001
29	49	.066	23	79	.000		(7,9)		42	94	.002
30	48	.090	24	78	.001	28	91	.000	43	93	.003
	(6,7)		25	77	.001	29	90	.000	44	92	.005
21	63	.001	26	76	.002	30	89	.000	45	91	.007
22	62	.001	27	75	.004	31	88	.001	46	90	.010
23	61	.002	28	74	.005	32	87	.001	47	89	.014
24	60	.004	29	73	.008	33	86	.002	48	88	.019
25	59	.007	30	72	.011	34	85	.003	49	87	.025
26	58	.011	31	71	.016	35	84	.004	50	86	.032
27	57	.017	32	70	.021	36	83	.006	51	85	.041
28	56	.026	33	69	.028	37	82	.008	52	84	.052
29	55	.037	34	68	.036	38	81	.011	53	83	.065
30	54	.051	35	67	.047	39	80	.016	54	82	.080
31	53	.069	36	66	.059	40	79	.021	55	81	.097
32	52	.090	37	65	.074	41	78	.027		(8,9)	
	(6,8)		38	64	.090	42	77	.036	36	108	.000
21	69	.000		(7,7)		43	76	.045	40	104	.000
22	68	.001	28	77	.000	44	75	.057	41	103	.001
23	67	.001	29	76	.001	45	74	.071	42	102	.001
24	66	.002	30	75	.001	46	73	.087	43	101	.002
25	65	.004	31	74	.002		(7,10)		44	100	.003
26	64	.006	32	73	.003	28	98	.000	45	99	.004
27	63	.010	33	72	.006	29	97	.000	46	98	.006
28	62	.015	34	71	.009	30	96	.000	47	97	.008
29	61	.021	35	70	.013	31	95	.000	48	96	.010
30	60	.030	36	69	.019	32	94	.001	49	95	.014
31	59	.041	37	68	.027	33	93	.001	50	94	.018
32	58	.054	38	67	.036	34	92	.001	51	93	.023
33	57	.071	39	66	.049	35	91	.002	52	92	.030
34	56	.091	40	65	.064	36	90	.003	53	91	.037
	(6,9)		41	64	.082	37	89	.005	54	90	.046
21	75	.000		(7,8)		38	88	.007	55	89	.057
22	74	.000	28	84	.000	39	87	.009	56	88	.069
23	73	.001	29	83	.000	40	86	.012	57	87	.084
24	72	.001	30	82	.001	41	85	.017		(8,10)	
25	71	.002	31	81	.001	42	84	.022	36	116	.000
26	70	.004	32	80	.002	43	83	.028	41	111	.000
27	69	.006	33	79	.003	44	82	.035	42	110	.001
28	68	.009	34	78	.005	45	81	.044	43	109	.001
29	67	.013	35	77	.007	46	80	.054	44	108	.002
30	66	.018	36	76	.010	47	79	.067	45	107	.002
31	65	.025	37	75	.014	48	78	.081	46	106	.003
32	64	.033	38	74	.020	49	77	.097	47	105	.004
33	63	.044	39	73	.027		(8,8)		48	104	.006
34	62	.057	40	72	.036	36	100	.000	49	103	.008

DISTRIBUTION OF THE RANK SUM T' (continued)

T'_{α}	$T'_{1-\alpha}$	α	T'_{α}	$T'_{1-\alpha}$	α	T'_{α}	$T'_{1-\alpha}$	α	T'_{α}	$T'_{1-\alpha}$	α
(8,10) (*Cont.*)			(9,9) (*Cont.*)			(9,10) (*Cont.*)			(10,10) (*Cont.*)		
50	102	.010	58	113	.007	58	122	.004	69	141	.003
51	101	.013	59	112	.009	59	121	.005	70	140	.003
52	100	.017	60	111	.012	60	120	.007	71	139	.004
53	99	.022	61	110	.016	61	119	.009	72	138	.006
54	98	.027	62	109	.020	62	118	.011	73	137	.007
55	97	.034	63	108	.025	63	117	.014	74	136	.009
56	96	.042	64	107	.031	64	116	.017	75	135	.012
57	95	.051	65	106	.039	65	115	.022	76	134	.014
58	94	.061	66	105	.047	66	114	.027	77	133	.018
59	93	.073	67	104	.057	67	113	.033	78	132	.022
60	92	.086	68	103	.068	68	112	.039	79	131	.026
(9,9)			69	102	.081	69	111	.047	80	130	.032
45	126	.000	70	101	.095	70	110	.056	81	129	.038
50	121	.000	(9,10)			71	109	.067	82	128	.045
51	120	.001	45	135	.000	72	108	.078	83	127	.053
52	119	.001	52	128	.000	73	107	.091	84	126	.062
53	118	.001	53	127	.001	(10,10)			85	125	.072
54	117	.002	54	126	.001	65	145	.001	86	124	.083
55	116	.003	55	125	.001	66	144	.001	87	123	.095
56	115	.004	56	124	.002	67	143	.001			
57	114	.005	57	123	.003	68	142	.002			

TABLE IV *t* DISTRIBUTION



df	.100	.050	.025	.010	.005	df
1	3.078	6.314	12.706	31.821	63.657	1
2	1.886	2.920	4.303	6.965	9.925	2
3	1.638	2.353	3.182	4.541	5.841	3
4	1.533	2.132	2.776	3.747	4.604	4
5	1.476	2.015	2.571	3.365	4.032	5
6	1.440	1.943	2.447	3.143	3.707	6
7	1.415	1.895	2.365	2.998	3.499	7
8	1.397	1.860	2.306	2.896	3.355	8
9	1.383	1.833	2.262	2.821	3.250	9
10	1.372	1.812	2.228	2.764	3.169	10
11	1.363	1.796	2.201	2.718	3.106	11
12	1.356	1.782	2.179	2.681	3.055	12
13	1.350	1.771	2.160	2.650	3.012	13
14	1.345	1.761	2.145	2.624	2.977	14
15	1.341	1.753	2.131	2.602	2.947	15
16	1.337	1.746	2.120	2.583	2.921	16
17	1.333	1.740	2.110	2.567	2.898	17
18	1.330	1.734	2.101	2.552	2.878	18
19	1.328	1.729	2.093	2.539	2.861	19
20	1.325	1.725	2.086	2.528	2.845	20
21	1.323	1.721	2.080	2.518	2.831	21
22	1.321	1.717	2.074	2.508	2.819	22
23	1.319	1.714	2.069	2.500	2.807	23
24	1.318	1.711	2.064	2.492	2.797	24
25	1.316	1.708	2.060	2.485	2.787	25
26	1.315	1.706	2.056	2.479	2.779	26
27	1.314	1.703	2.052	2.473	2.771	27
28	1.313	1.701	2.048	2.467	2.763	28
29	1.311	1.699	2.045	2.462	2.756	29
inf.	1.282	1.645	1.960	2.326	2.576	inf.

Sommersworth Landfill Site
29-30 July 2002
Wilcoxon Rank Sum Analysis (Run 1)

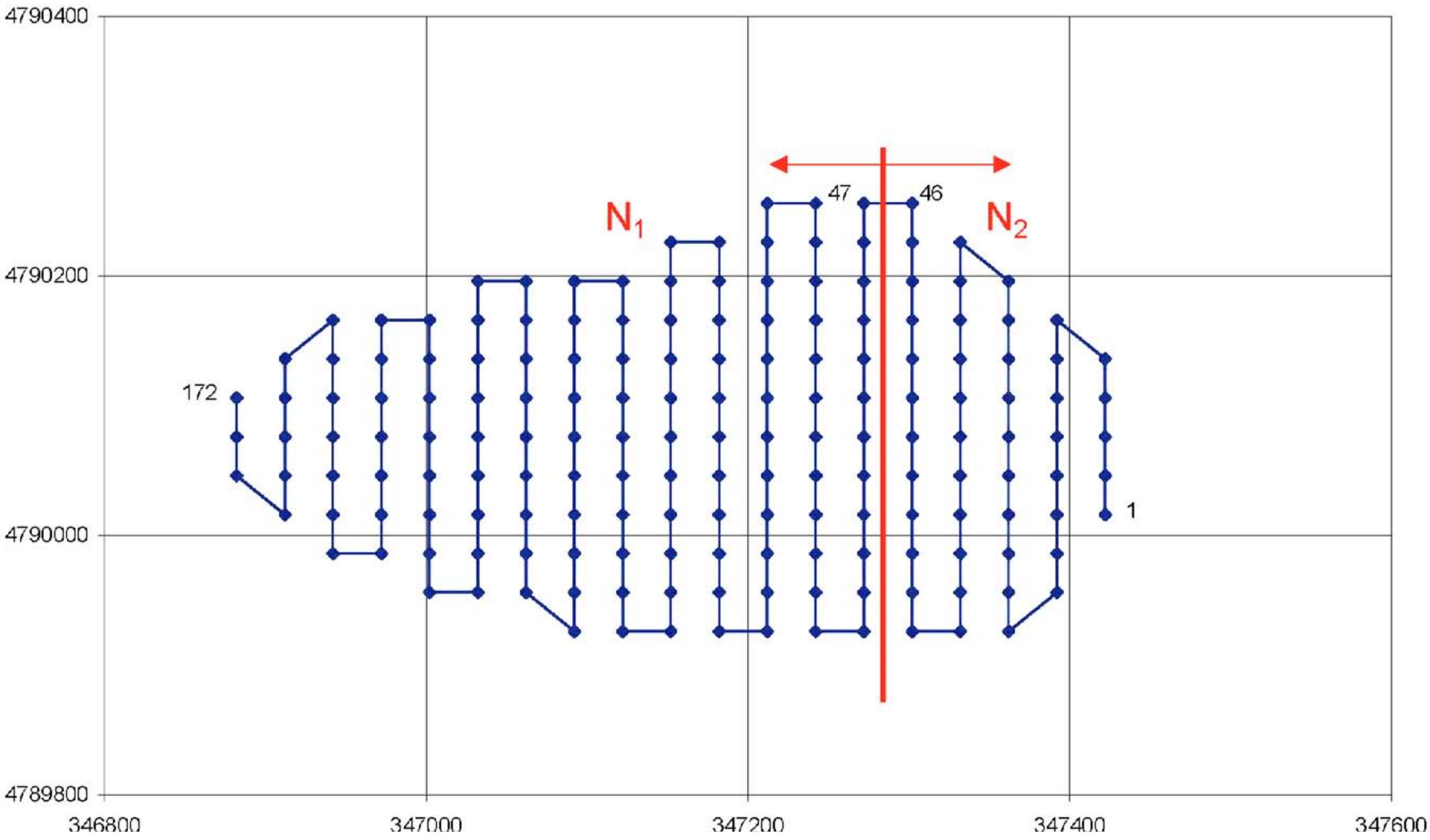
Population 1 size (n_1)	13
Population 2 size (n_2)	18
Total population size (n)	31
Sum of Ranks (W_{rs})	172
Large Sample Statistic (Z_{rs})	-1.49844
Confidence Interval	5.0%
$Z_{1-\alpha}$	1.645
Accept or Reject H_0?	ACCEPT

Somersworth Landfill Site
29-30 July 2002
Wilsoxon Rank Sum Analysis (Run 1, Population 1)

Grid No.	UTM Coordinates of Grid Node		Methane Conc.	Methane Conc. for Rank	Assign Pop. Set	Prelim Ranking	No. Ties 24	Final Ranking	Pop. 1 W_{rs} 172.0
	Easting	Northing							
51	347272	4790136	0.5	0.5	1	1	12	6.5	6.5
52	347272	4790106	0.5	0.5	1	1	12	6.5	6.5
53	347272	4790076	0.5	0.5	1	1	12	6.5	6.5
54	347272	4790046	1	1	1	13	8	16.5	16.5
66	347242	4790136	0.5	0.5	1	1	12	6.5	6.5
74	347212	4790166	0.5	0.5	1	1	12	6.5	6.5
76	347212	4790106	0.5	0.5	1	1	12	6.5	6.5
77	347212	4790076	1	1	1	13	8	16.5	16.5
89	347182	4790106	3	3	1	25	2	25.5	25.5
91	347182	4790166	2	2	1	23	2	23.5	23.5
96	347152	4790166	0.5	0.5	1	1	12	6.5	6.5
113	347122	4790166	6	6	1	28	1	28	28
143	347002	4789958	1	1	1	13	8	16.5	16.5

Somersworth Landfill Site
29-30 July 2002
Wilsoxon Rank Sum Analysis (Run 1, Population 2)

Grid No.	UTM Coordinates of Grid Node		Methane Conc.	Methane Conc. for Rank	Assign Pop. Set	Prelim Ranking	No. Ties 24	Final Ranking	Pop. 1 W_{rs} 172.0
	Easting	Northing							
12	347392	4789966	2	2	2	23	2	23.5	
13	347392	4789956	8	8	2	30	1	30	
16	347362	4789986	0.5	0.5	2	1	12	6.5	
17	347362	4790016	0.5	0.5	2	1	12	6.5	
19	347362	4790076	1	1	2	13	8	16.5	
20	347362	4790106	1.5	1.5	2	22	1	22	
22	347362	4790166	1	1	2	13	8	16.5	
23	347362	4790196	1.2	1.2	2	21	1	21	
24	347332	4790226	1	1	2	13	8	16.5	
26	347332	4790166	5	5	2	27	1	27	
27	347332	4790136	3	3	2	25	2	25.5	
32	347332	4789986	0.5	0.5	2	1	12	6.5	
36	347302	4789956	1	1	2	13	8	16.5	
38	347302	4790016	0.5	0.5	2	1	12	6.5	
42	347302	4790136	120	120	2	31	1	31	
43	347302	4790166	7	7	2	29	1	29	
44	347302	4790196	0.5	0.5	2	1	12	6.5	
45	347302	4790226	1	1	2	13	8	16.5	



Somersworth Screening Sampling Locations for Wilcoxon Run 1 Populations

Appendix C
Laboratory Results

Table 1. Summary of VOCs from July 2002 SUMMA Sampling at the Sommersworth Landfill, Somersworth NH

October 2002

	Concentration in parts per billion by volume						
Sample Number	**12961[1]**	**12962[1]**	**12963[1]**	**12964**	**12965**	**12966**	**12967[1]**
Sample Location	**Grid Node 42**	**Grid Node 26**	**Grid Node 43**	**Grid Node 42 Amb[2]**	**Grid Node 42 Amb Dup**	**Grid Node 43 Amb**	**PV2A**
1,1-Dichloroethene	U[3]	7.6	U	U	U	U	U
cis-1,2-Dichloroethene	U	19	16	U	U	U	U
trans-1,2-Dichloroethene	U	U	U	U	U	U	U
1,1-Dichloroethane	U	U	U	U	U	U	U
1,2-Dichloroethane	U	U	U	U	U	U	U
1,4-Dichloroebenzene	U	U	U	U	U	U	U
1,2,4-Trimethylbenzene	84	U	U	U	U	U	450
1,3,5-Trimethylbenzene	48	U	U	U	U	U	160
2-Butanone (methyl ethyl ketone)	U	U	U	U	U	U	U
2-Propanol	U	U	U	U	U	U	U
4-Ethyltoluene	U	U	U	U	U	U	230
Acetone	160	490	U	26	16	12	U
Benzene	260	68	40	U	U	U	75
Carbon Tetrachloride	U	U	U	U	U	U	U
Chlorobenzene	24	U	U	U	U	U	U
Chloroethane	U	150	62	U	U	U	16
Chloroform	U	U	U	U	U	U	U
Cyclohexane	4800	U	U	U	U	U	12,000 E[4]
Ethyl Benzene	240	U	U	U	U	U	1800
Freon 11	U	U	U	U	U	U	U
Freon 12	78	100	91	U	U	U	78
Freon 113	U	U	U	U	U	U	U
Freon 114	110	230	220	U	U	U	35
Heptane	1900	U	72	U	U	U	7400 E
Hexane	2600	140	180	4.0	U	U	8400 E
Methylene Chloride	230	44	260	23	4.1	3.8	18
Styrene	U	U	U	U	U	U	U
Tetrachloroethene	U	U	U	U	U	U	U
Tetrahydrofuran	U	U	U	U	U	U	U
Toluene	65	7.0	U	U	U	U	47
Trichloroethene	U	U	U	U	U	U	U
Vinyl Chloride	1200	660	1300	U	U	U	68
m,p-Xylene	280	10	U	U	U	U	2300
o-Xylene	180	16	U	U	U	U	800

1 The acceptable QC limits for percent recovery of teh surrogate 4-bromofluorobenzene in samples 12961, 12962, 12963, 12967, 12969, 12970 12971, 12973, 12974, 12976, 12977, 12979, and 12980 were exceeded. The data for 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 1,4-dichlorobenzene, 4-ethyltoluene, chlorobenzene, ethyl benzene, styrene, tetrachloroethene, m,p-xylene, and o-xylene should be regarded as estimates in these samples.

2 Amb = ambient

3 U = not detected

4 E = estimated because the concentration exceeded the calibration range

continued

Table 1. Summary of VOCs from July 2002 SUMMA Sampling at the Sommersworth Landfill, Somersworth NH (continued) October 2002

	Concentration in parts per billion by volume						
Sample Number	**12968**	**12969[1]**	**12970[1]**	**12971[1]**	**12972**	**12973[1]**	**12974[1]**
Sample Location	**PV2A Amb**	**Grid Node 89**	**Grid Node 113**	**Grid Node 113 Dup**	**Grid WW**	**Grid IG**	**SGP 5**
1,1-Dichloroethene	U	U	U	U	U	U	U
cis-1,2-Dichloroethene	U	84	9.7	9.2	U	U	8.3
trans-1,2-Dichloroethene	U	U	U	U	U	U	U
1,1-Dichloroethane	U	57	U	U	U	U	U
1,2-Dichloroethane	U	U	U	U	U	U	U
1,4-Dichloroebenzene	U	2000	36	36	U	5.5	26
1,2,4-Trimethylbenzene	U	1100	190	190	U	2.6	U
1,3,5-Trimethylbenzene	U	380	88	89	U	2.3	U
2-Butanone (methyl ethyl ketone)	U	48	U	U	38	U	U
2-Propanol	U	62	U	U	7	U	U
4-Ethyltoluene	U	530	170	180	U	U	U
Acetone	9.5	160	51	U	430 E	8.5	75
Benzene	U	240	120	120	1.1	U	38
Carbon Tetrachloride	U	U	U	U	U	U	U
Chlorobenzene	U	20	U	U	1.4	U	U
Chloroethane	U	520	380	370	2.6	U	U
Chloroform	U	U	U	U	U	U	U
Cyclohexane	U	1500	1700	1600	25	22	280
Ethyl Benzene	U	1300	2400	2400	U	U	64
Freon 11	U	U	U	U	U	U	U
Freon 12	U	430	48	48	19	9.0	480
Freon 113	U	130	U	U	U	19	U
Freon 114	U	160	55	55	6.0	14	150
Heptane	U	2700	2300	2200	U	U	370
Hexane	U	2500	1700	1600	31	U	1200
Methylene Chloride	7.1	38	U	U	16	2.2	7.8
Styrene	U	36	U	U	5.8	U	U
Tetrachloroethene	1.5	13	U	U	U	U	U
Tetrahydrofuran	U	U	U	U	1200 E	U	U
Toluene	U	4500	560	540	2.4	1.6	26
Trichloroethene	U	59	U	U	U	3.1	U
Vinyl Chloride	U	540	170	160	U	U	280
m,p-Xylene	U	1400	2100	2100	U	U	42
o-Xylene	U	560	700	700	U	U	10

[1] The acceptable QC limits for percent recovery of teh surrogate 4-bromofluorobenzene in samples 12961, 12962, 12963, 12967, 12969, 12970 12971, 12973, 12974, 12976, 12977, 12979, and 12980 were exceeded. The data for 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 1,4-dichlorobenzene, 4-ethyltoluene, chlorobenzene, ethyl benzene, styrene, tetrachloroethene, m,p-xylene, and o-xylene should be regarded as estimates in these samples.

[2] Amb = ambient

[3] U = not detected

[4] E = estimated because the concentration exceeded the calibration range

continued

Table 1. Summary of VOCs from July 2002 SUMMA Sampling at the Sommersworth Landfill, Somersworth NH (continued)

October 2002

	Concentration in parts per billion by volume						
Sample Number	**12975**	**12976[1]**	**12977[1]**	**12978**	**12979[1]**	**12980[1]**	**12981**
Sample Location	**SGP 6**	**SGP 6 Dup**	**SGP 14**	**SGP 13**	**SGP 4**	**SGP 3**	**SGP 11**
1,1-Dichloroethene	3.1	2.7	U	U	U	U	U
cis-1,2-Dichloroethene	4.0	3.8	U	U	U	33	U
trans-1,2-Dichloroethene	U	U	U	U	U	U	U
1,1-Dichloroethane	U	U	U	U	U	U	U
1,2-Dichloroethane	U	U	U	U	U	U	U
1,4-Dichloroebenzene	U	U	U	U	10	39	U
1,2,4-Trimethylbenzene	U	U	U	U	U	U	U
1,3,5-Trimethylbenzene	U	U	U	U	U	21	U
2-Butanone (methyl ethyl ketone)	U	U	U	U	U	U	U
2-Propanol	U	U	U	U	U	U	U
4-Ethyltoluene	U	U	U	U	U	U	U
Acetone	72	65	20	130	U	130	7.1
Benzene	9.0	7.8	2.6	U	69	77	U
Carbon Tetrachloride	U	U	U	U	U	U	U
Chlorobenzene	U	U	U	U	U	U	U
Chloroethane	36	34	U	U	U	U	U
Chloroform	U	U	U	U	U	U	U
Cyclohexane	U	U	U	U	82	560	U
Ethyl Benzene	U	U	U	U	8.6	200	U
Freon 11	U	U	U	18	U	6000	U
Freon 12	32	28	18	460	100	2400	23
Freon 113	U	U	U	U	U	U	U
Freon 114	96	84	58	14	64	35	5.4
Heptane	U	U	U	U	U	1600	U
Hexane	U	22	7.3	U	600	1500	U
Methylene Chloride	U	U	U	47	U	100	5.3
Styrene	U	U	U	U	U	U	U
Tetrachloroethene	U	U	U	U	U	U	U
Tetrahydrofuran	U	U	U	U	U	U	U
Toluene	2.4	2.2	U	4.0	12	290	2
Trichloroethene	U	U	U	U	U	U	U
Vinyl Chloride	360	320	33	U	10	220	U
m,p-Xylene	U	U	U	U	U	190	1
o-Xylene	U	U	U	U	U	52	U

[1] The acceptable QC limits for percent recovery of teh surrogate 4-bromofluorobenzene in samples 12961, 12962, 12963, 12967, 12969, 12970 12971, 12973, 12974, 12976, 12977, 12979, and 12980 were exceeded. The data for 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 1,4-dichlorobenzene, 4-ethyltoluene, chlorobenzene, ethyl benzene, styrene, tetrachloroethene, m,p-xylene, and o-xylene should be regarded as estimates in these samples.

[2] Amb = ambient

[3] U = not detected

[4] E = estimated because the concentration exceeded the calibration range

continued

Table 1. Summary of VOCs from July 2002 SUMMA Sampling at the Sommersworth Landfill, Somersworth NH (concluded)

October 2002

	Concentration in parts per billion by volume						
Sample Number	**12982**	**12983**	**12984**	**12985**	**12986**	**12987**	**12988**
Sample Location	**SGP 10**	**SGP 2**	**SGP 9**	**SGP 1A**	**SGP 8**	**RST**	**TRIP**
1,1-Dichloroethene	U	U	1.5	U	U	U	U
cis-1,2-Dichloroethene	U	90	3.2	U	U	U	U
trans-1,2-Dichloroethene	U	U	9.5	U	U	U	U
1,1-Dichloroethane	U	U	7.1	U	U	U	U
1,2-Dichloroethane	U	U	40	U	U	U	U
1,4-Dichloroebenzene	U	U	U	U	U	U	U
1,2,4-Trimethylbenzene	1.3	240	1.6	U	1.1	U	U
1,3,5-Trimethylbenzene	U	130	U	U	U	U	U
2-Butanone (methyl ethyl ketone)	U	U	6.5	U	U	U	U
2-Propanol	U	U	U	U	U	U	U
4-Ethyltoluene	U	230	U	U	U	U	U
Acetone	6	U	78	5.3	39	5.4	U
Benzene	U	590	2.5	U	U	U	U
Carbon Tetrachloride	U	U	4.8	U	U	U	U
Chlorobenzene	U	U	1.6	U	U	U	U
Chloroethane	U	U	32	U	U	U	U
Chloroform	U	U	14	1.5	U	U	U
Cyclohexane	U	1700	U	U	U	U	U
Ethyl Benzene	U	4000	2.3	U	1.2	U	U
Freon 11	U	U	U	1.3	U	U	U
Freon 12	28	U	28	7.1	2.4	U	U
Freon 113	U	U	0.99	U	U	U	U
Freon 114	8.2	190	18	26	4.1	U	U
Heptane	U	3600	U	U	U	U	U
Hexane	U	2100	U	U	U	8.7	U
Methylene Chloride	6.4	U	U	4.4	22	29	9.1
Styrene	U	U	U	U	U	U	U
Tetrachloroethene	2.4	U	U	U	U	U	U
Tetrahydrofuran	U	U	U	U	U	U	U
Toluene	1.6	1900	8.3	U	4.3	3.2	U
Trichloroethene	U	U	U	U	U	U	U
Vinyl Chloride	U	1300	25	U	U	U	U
m,p-Xylene	1.3	10,000	8	U	3.6	U	U
o-Xylene	U	2200	2.2	U	1	U	U

[1] The acceptable QC limits for percent recovery of teh surrogate 4-bromofluorobenzene in samples 12961, 12962, 12963, 12967, 12969, 12970 12971, 12973, 12974, 12976, 12977, 12979, and 12980 were exceeded. The data for 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 1,4-dichlorobenzene, 4-ethyltoluene, chlorobenzene, ethyl benzene, styrene, tetrachloroethene, m,p-xylene, and o-xylene should be regarded as estimates in these samples.

[2] Amb = ambient

[3] U = not detected

[4] E = estimated because the concentration exceeded the calibration range

Table 2. Summary of Fixed Gas and NMOCs from July 2002 Sampling at the Somersworth Landfill, Somersworth NH

October 2002

Sample Number	12961	12962	12963	12964	12965	12966	12967
Sample Location	Grid Node 42	Grid Node 26	Grid Node 43	Grid Node 42 Amb[1]	Grid Node 42 Amb Dup	Grid Node 43 Amb	PV2A
Oxygen (%)	0.6	0.95	0.91	20	20	21	0.17
Nitrogen (%)	13	55	51	81	82	82	2.5
Methane (%)	53	31	36	U[2]	U	U	64
Carbon Dioxide (%)	30	14	13	U	U	U	34
NMOC (ppmvC)[3]	2200	970	1100	U	U	U	2000

Sample Number	12968	12969	23970	12971	12972	12973	12974
Sample Location	PV2A Amb	Grid Node 89	Grid Node 113	Grid Node 113 Dup	Grid WW	Grid IG	SGP 5
Oxygen (%)	20	0.41	0.57	U	18	16	2.9
Nitrogen (%)	82	13	2.2	0.95	80	79	53
Methane (%)	U	50	54	54	1.7	U	20
Carbon Dioxide (%)	U	37	48	47	4	3.2	25
NMOC (ppmvC)	U	2800	1800	1800	150	160	900

Sample Number	12975	12976	12977	12978	12979	12980	12981
Sample Location	SGP 6	SGP 6 Dup	SGP 14	SGP 13	SGP 4	SGP 3	SGP 11
Oxygen (%)	1.2	2.7	4.6	17	1.4	3.9	16
Nitrogen (%)	72	74	82	79	66	48	78
Methane (%)	13	12	2.4	U	10	21	U
Carbon Dioxide (%)	9.8	9.2	9.2	3.6	23	25	4.2
NMOC (ppmvC)	490	460	270	99	820	1100	120

Sample Number	12982	12983	12984	12985	12986	12987	12988
Sample Location	SGP 10	SGP 2	SGP 9	SGP 1A	SGP 8	RST	TRIP
Oxygen (%)	9.5	0.24	10	12	15	U	U
Nitrogen (%)	76	2.7	78	78	77	70	0.3
Methane (%)	U	54	U	U	U	15	U
Carbon Dioxide (%)	11	45	11	8	6.3	15	U
NMOC (ppmvC)	270	2300	250	190	160	520	U

1 Amb = ambient
2 U = not detected
3 ppmvC = parts per million by volume carbon

Appendix D
LandGEM Model Runs

Contents

Table D1. Methane Emission Rate from Year 1959 to 2202.

```
Source: H:\3000\030177~1.000\030177~1.002\SOMMER~1\SOMERSWORTH.PRM

================================================================================
                              Model Parameters
================================================================================
Lo : 170.00 m^3 / Mg ***** User Mode Selection *****
k : 0.0500 1/yr ***** User Mode Selection *****
NMOC : 2380.00 ppmv ***** User Mode Selection *****
Methane : 58.0000 % volume
Carbon Dioxide : 42.0000 % volume

================================================================================
                             Landfill Parameters
================================================================================
Landfill type : Co-Disposal
Year Opened : 1958    Current Year : 2003  Closure Year: 2003
Capacity : 300000 Mg
Average Acceptance Rate Required from
         Current Year to Closure Year : 0.00 Mg/year

================================================================================
                               Model Results
================================================================================
                                            Methane Emission Rate
Year     Refuse In Place (Mg)             (Mg/yr)          (Cubic m/yr)
================================================================================
```

Year	Refuse In Place (Mg)	Methane Emission Rate (Mg/yr)	Methane Emission Rate (Cubic m/yr)
1959	1.304E+04	7.397E+01	1.109E+05
1960	2.609E+04	1.443E+02	2.163E+05
1961	3.913E+04	2.113E+02	3.167E+05
1962	5.217E+04	2.749E+02	4.121E+05
1963	6.522E+04	3.355E+02	5.028E+05
1964	7.826E+04	3.931E+02	5.892E+05
1965	9.130E+04	4.479E+02	6.713E+05
1966	1.043E+05	5.000E+02	7.495E+05
1967	1.174E+05	5.496E+02	8.238E+05
1968	1.304E+05	5.967E+02	8.945E+05
1969	1.435E+05	6.416E+02	9.617E+05
1970	1.565E+05	6.843E+02	1.026E+06
1971	1.696E+05	7.249E+02	1.087E+06
1972	1.826E+05	7.635E+02	1.144E+06
1973	1.957E+05	8.002E+02	1.199E+06
1974	2.087E+05	8.352E+02	1.252E+06
1975	2.217E+05	8.684E+02	1.302E+06
1976	2.348E+05	9.000E+02	1.349E+06
1977	2.478E+05	9.301E+02	1.394E+06
1978	2.609E+05	9.587E+02	1.437E+06
1979	2.739E+05	9.859E+02	1.478E+06
1980	2.870E+05	1.012E+03	1.517E+06
1981	3.000E+05	1.036E+03	1.553E+06
1982	3.000E+05	9.859E+02	1.478E+06
1983	3.000E+05	9.378E+02	1.406E+06
1984	3.000E+05	8.920E+02	1.337E+06
1985	3.000E+05	8.485E+02	1.272E+06
1986	3.000E+05	8.072E+02	1.210E+06
1987	3.000E+05	7.678E+02	1.151E+06
1988	3.000E+05	7.303E+02	1.095E+06
1989	3.000E+05	6.947E+02	1.041E+06
1990	3.000E+05	6.608E+02	9.905E+05
1991	3.000E+05	6.286E+02	9.422E+05
1992	3.000E+05	5.980E+02	8.963E+05
1993	3.000E+05	5.688E+02	8.526E+05
1994	3.000E+05	5.410E+02	8.110E+05
1995	3.000E+05	5.147E+02	7.714E+05
1996	3.000E+05	4.896E+02	7.338E+05
1997	3.000E+05	4.657E+02	6.980E+05
1998	3.000E+05	4.430E+02	6.640E+05
1999	3.000E+05	4.214E+02	6.316E+05
2000	3.000E+05	4.008E+02	6.008E+05
2001	3.000E+05	3.813E+02	5.715E+05
2002	3.000E+05	3.627E+02	5.436E+05
2003	3.000E+05	3.450E+02	5.171E+05
2004	3.000E+05	3.282E+02	4.919E+05
2005	3.000E+05	3.122E+02	4.679E+05

continued

Table D1. Methane Emission Rate from Year 1959 to 2202 (continued)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2006	3.000E+05	2.969E+02	4.451E+05
2007	3.000E+05	2.825E+02	4.234E+05
2008	3.000E+05	2.687E+02	4.027E+05
2009	3.000E+05	2.556E+02	3.831E+05
2010	3.000E+05	2.431E+02	3.644E+05
2011	3.000E+05	2.313E+02	3.466E+05
2012	3.000E+05	2.200E+02	3.297E+05
2013	3.000E+05	2.092E+02	3.136E+05
2014	3.000E+05	1.990E+02	2.983E+05
2015	3.000E+05	1.893E+02	2.838E+05
2016	3.000E+05	1.801E+02	2.700E+05
2017	3.000E+05	1.713E+02	2.568E+05
2018	3.000E+05	1.630E+02	2.443E+05
2019	3.000E+05	1.550E+02	2.324E+05
2020	3.000E+05	1.475E+02	2.210E+05
2021	3.000E+05	1.403E+02	2.102E+05
2022	3.000E+05	1.334E+02	2.000E+05
2023	3.000E+05	1.269E+02	1.902E+05
2024	3.000E+05	1.207E+02	1.810E+05
2025	3.000E+05	1.148E+02	1.721E+05
2026	3.000E+05	1.092E+02	1.637E+05
2027	3.000E+05	1.039E+02	1.558E+05
2028	3.000E+05	9.884E+01	1.482E+05
2029	3.000E+05	9.402E+01	1.409E+05
2030	3.000E+05	8.943E+01	1.341E+05
2031	3.000E+05	8.507E+01	1.275E+05
2032	3.000E+05	8.092E+01	1.213E+05
2033	3.000E+05	7.698E+01	1.154E+05
2034	3.000E+05	7.322E+01	1.098E+05
2035	3.000E+05	6.965E+01	1.044E+05
2036	3.000E+05	6.626E+01	9.931E+04
2037	3.000E+05	6.302E+01	9.447E+04
2038	3.000E+05	5.995E+01	8.986E+04
2039	3.000E+05	5.703E+01	8.548E+04
2040	3.000E+05	5.425E+01	8.131E+04
2041	3.000E+05	5.160E+01	7.734E+04
2042	3.000E+05	4.908E+01	7.357E+04
2043	3.000E+05	4.669E+01	6.998E+04
2044	3.000E+05	4.441E+01	6.657E+04
2045	3.000E+05	4.225E+01	6.332E+04
2046	3.000E+05	4.019E+01	6.024E+04
2047	3.000E+05	3.823E+01	5.730E+04
2048	3.000E+05	3.636E+01	5.450E+04
2049	3.000E+05	3.459E+01	5.184E+04
2050	3.000E+05	3.290E+01	4.932E+04
2051	3.000E+05	3.130E+01	4.691E+04
2052	3.000E+05	2.977E+01	4.462E+04
2053	3.000E+05	2.832E+01	4.245E+04
2054	3.000E+05	2.694E+01	4.038E+04
2055	3.000E+05	2.562E+01	3.841E+04
2056	3.000E+05	2.437E+01	3.653E+04
2057	3.000E+05	2.319E+01	3.475E+04
2058	3.000E+05	2.205E+01	3.306E+04
2059	3.000E+05	2.098E+01	3.145E+04
2060	3.000E+05	1.996E+01	2.991E+04
2061	3.000E+05	1.898E+01	2.845E+04
2062	3.000E+05	1.806E+01	2.707E+04
2063	3.000E+05	1.718E+01	2.575E+04
2064	3.000E+05	1.634E+01	2.449E+04
2065	3.000E+05	1.554E+01	2.330E+04
2066	3.000E+05	1.478E+01	2.216E+04
2067	3.000E+05	1.406E+01	2.108E+04
2068	3.000E+05	1.338E+01	2.005E+04
2069	3.000E+05	1.272E+01	1.907E+04
2070	3.000E+05	1.210E+01	1.814E+04
2071	3.000E+05	1.151E+01	1.726E+04
2072	3.000E+05	1.095E+01	1.642E+04
2073	3.000E+05	1.042E+01	1.562E+04
2074	3.000E+05	9.910E+00	1.485E+04
2075	3.000E+05	9.426E+00	1.413E+04
2076	3.000E+05	8.967E+00	1.344E+04

continued

Table D1. Methane Emission Rate from Year 1959 to 2202 (continued)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2077	3.000E+05	8.529E+00	1.278E+04
2078	3.000E+05	8.113E+00	1.216E+04
2079	3.000E+05	7.718E+00	1.157E+04
2080	3.000E+05	7.341E+00	1.100E+04
2081	3.000E+05	6.983E+00	1.047E+04
2082	3.000E+05	6.643E+00	9.957E+03
2083	3.000E+05	6.319E+00	9.471E+03
2084	3.000E+05	6.011E+00	9.009E+03
2085	3.000E+05	5.717E+00	8.570E+03
2086	3.000E+05	5.439E+00	8.152E+03
2087	3.000E+05	5.173E+00	7.754E+03
2088	3.000E+05	4.921E+00	7.376E+03
2089	3.000E+05	4.681E+00	7.016E+03
2090	3.000E+05	4.453E+00	6.674E+03
2091	3.000E+05	4.236E+00	6.349E+03
2092	3.000E+05	4.029E+00	6.039E+03
2093	3.000E+05	3.832E+00	5.745E+03
2094	3.000E+05	3.646E+00	5.464E+03
2095	3.000E+05	3.468E+00	5.198E+03
2096	3.000E+05	3.299E+00	4.944E+03
2097	3.000E+05	3.138E+00	4.703E+03
2098	3.000E+05	2.985E+00	4.474E+03
2099	3.000E+05	2.839E+00	4.256E+03
2100	3.000E+05	2.701E+00	4.048E+03
2101	3.000E+05	2.569E+00	3.851E+03
2102	3.000E+05	2.444E+00	3.663E+03
2103	3.000E+05	2.325E+00	3.484E+03
2104	3.000E+05	2.211E+00	3.314E+03
2105	3.000E+05	2.103E+00	3.153E+03
2106	3.000E+05	2.001E+00	2.999E+03
2107	3.000E+05	1.903E+00	2.853E+03
2108	3.000E+05	1.810E+00	2.714E+03
2109	3.000E+05	1.722E+00	2.581E+03
2110	3.000E+05	1.638E+00	2.455E+03
2111	3.000E+05	1.558E+00	2.336E+03
2112	3.000E+05	1.482E+00	2.222E+03
2113	3.000E+05	1.410E+00	2.113E+03
2114	3.000E+05	1.341E+00	2.010E+03
2115	3.000E+05	1.276E+00	1.912E+03
2116	3.000E+05	1.214E+00	1.819E+03
2117	3.000E+05	1.154E+00	1.730E+03
2118	3.000E+05	1.098E+00	1.646E+03
2119	3.000E+05	1.044E+00	1.566E+03
2120	3.000E+05	9.935E-01	1.489E+03
2121	3.000E+05	9.451E-01	1.417E+03
2122	3.000E+05	8.990E-01	1.348E+03
2123	3.000E+05	8.551E-01	1.282E+03
2124	3.000E+05	8.134E-01	1.219E+03
2125	3.000E+05	7.738E-01	1.160E+03
2126	3.000E+05	7.360E-01	1.103E+03
2127	3.000E+05	7.001E-01	1.049E+03
2128	3.000E+05	6.660E-01	9.983E+02
2129	3.000E+05	6.335E-01	9.496E+02
2130	3.000E+05	6.026E-01	9.033E+02
2131	3.000E+05	5.732E-01	8.592E+02
2132	3.000E+05	5.453E-01	8.173E+02
2133	3.000E+05	5.187E-01	7.774E+02
2134	3.000E+05	4.934E-01	7.395E+02
2135	3.000E+05	4.693E-01	7.035E+02
2136	3.000E+05	4.464E-01	6.692E+02
2137	3.000E+05	4.247E-01	6.365E+02
2138	3.000E+05	4.039E-01	6.055E+02
2139	3.000E+05	3.842E-01	5.759E+02
2140	3.000E+05	3.655E-01	5.479E+02
2141	3.000E+05	3.477E-01	5.211E+02
2142	3.000E+05	3.307E-01	4.957E+02
2143	3.000E+05	3.146E-01	4.715E+02
2144	3.000E+05	2.992E-01	4.485E+02
2145	3.000E+05	2.847E-01	4.267E+02
2146	3.000E+05	2.708E-01	4.059E+02
2147	3.000E+05	2.576E-01	3.861E+02

continued

Table D1. Methane Emission Rate from Year 1959 to 2202 (concluded)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2148	3.000E+05	2.450E-01	3.672E+02
2149	3.000E+05	2.331E-01	3.493E+02
2150	3.000E+05	2.217E-01	3.323E+02
2151	3.000E+05	2.109E-01	3.161E+02
2152	3.000E+05	2.006E-01	3.007E+02
2153	3.000E+05	1.908E-01	2.860E+02
2154	3.000E+05	1.815E-01	2.721E+02
2155	3.000E+05	1.726E-01	2.588E+02
2156	3.000E+05	1.642E-01	2.462E+02
2157	3.000E+05	1.562E-01	2.342E+02
2158	3.000E+05	1.486E-01	2.227E+02
2159	3.000E+05	1.414E-01	2.119E+02
2160	3.000E+05	1.345E-01	2.015E+02
2161	3.000E+05	1.279E-01	1.917E+02
2162	3.000E+05	1.217E-01	1.824E+02
2163	3.000E+05	1.157E-01	1.735E+02
2164	3.000E+05	1.101E-01	1.650E+02
2165	3.000E+05	1.047E-01	1.570E+02
2166	3.000E+05	9.961E-02	1.493E+02
2167	3.000E+05	9.475E-02	1.420E+02
2168	3.000E+05	9.013E-02	1.351E+02
2169	3.000E+05	8.574E-02	1.285E+02
2170	3.000E+05	8.155E-02	1.222E+02
2171	3.000E+05	7.758E-02	1.163E+02
2172	3.000E+05	7.379E-02	1.106E+02
2173	3.000E+05	7.019E-02	1.052E+02
2174	3.000E+05	6.677E-02	1.001E+02
2175	3.000E+05	6.351E-02	9.520E+01
2176	3.000E+05	6.042E-02	9.056E+01
2177	3.000E+05	5.747E-02	8.614E+01
2178	3.000E+05	5.467E-02	8.194E+01
2179	3.000E+05	5.200E-02	7.795E+01
2180	3.000E+05	4.947E-02	7.414E+01
2181	3.000E+05	4.705E-02	7.053E+01
2182	3.000E+05	4.476E-02	6.709E+01
2183	3.000E+05	4.257E-02	6.382E+01
2184	3.000E+05	4.050E-02	6.070E+01
2185	3.000E+05	3.852E-02	5.774E+01
2186	3.000E+05	3.664E-02	5.493E+01
2187	3.000E+05	3.486E-02	5.225E+01
2188	3.000E+05	3.316E-02	4.970E+01
2189	3.000E+05	3.154E-02	4.728E+01
2190	3.000E+05	3.000E-02	4.497E+01
2191	3.000E+05	2.854E-02	4.278E+01
2192	3.000E+05	2.715E-02	4.069E+01
2193	3.000E+05	2.582E-02	3.871E+01
2194	3.000E+05	2.456E-02	3.682E+01
2195	3.000E+05	2.337E-02	3.502E+01
2196	3.000E+05	2.223E-02	3.332E+01
2197	3.000E+05	2.114E-02	3.169E+01
2198	3.000E+05	2.011E-02	3.014E+01
2199	3.000E+05	1.913E-02	2.867E+01
2200	3.000E+05	1.820E-02	2.728E+01
2201	3.000E+05	1.731E-02	2.595E+01
2202	3.000E+05	1.647E-02	2.468E+01

Table D2. NMOC Emission Rate from Year 1959 to 2202

Source: H:\3000\030177~1.000\030177~1.002\SOMMER~1\SOMERSWORTH.PRM

Model Parameters

Lo : 170.00 m^3 / Mg ***** User Mode Selection *****
k : 0.0500 1/yr ***** User Mode Selection *****
NMOC : 2380.00 ppmv ***** User Mode Selection *****
Methane : 58.0000 % volume
Carbon Dioxide : 42.0000 % volume

Landfill Parameters

Landfill type : Co-Disposal
Year Opened : 1958 Current Year : 2003 Closure Year: 2003
Capacity : 300000 Mg
Average Acceptance Rate Required from
Current Year to Closure Year : 0.00 Mg/year

Model Results

Year	Refuse In Place (Mg)	NMOC Emission Rate (Mg/yr)	NMOC Emission Rate (Cubic m/yr)
1959	1.304E+04	1.631E+00	4.549E+02
1960	2.609E+04	3.182E+00	8.877E+02
1961	3.913E+04	4.658E+00	1.299E+03
1962	5.217E+04	6.061E+00	1.691E+03
1963	6.522E+04	7.396E+00	2.063E+03
1964	7.826E+04	8.666E+00	2.418E+03
1965	9.130E+04	9.874E+00	2.755E+03
1966	1.043E+05	1.102E+01	3.075E+03
1967	1.174E+05	1.212E+01	3.380E+03
1968	1.304E+05	1.316E+01	3.670E+03
1969	1.435E+05	1.415E+01	3.946E+03
1970	1.565E+05	1.509E+01	4.209E+03
1971	1.696E+05	1.598E+01	4.459E+03
1972	1.826E+05	1.683E+01	4.696E+03
1973	1.957E+05	1.764E+01	4.922E+03
1974	2.087E+05	1.841E+01	5.137E+03
1975	2.217E+05	1.915E+01	5.341E+03
1976	2.348E+05	1.984E+01	5.536E+03
1977	2.478E+05	2.051E+01	5.721E+03
1978	2.609E+05	2.114E+01	5.897E+03
1979	2.739E+05	2.174E+01	6.064E+03
1980	2.870E+05	2.231E+01	6.223E+03
1981	3.000E+05	2.285E+01	6.375E+03
1982	3.000E+05	2.174E+01	6.064E+03
1983	3.000E+05	2.068E+01	5.768E+03
1984	3.000E+05	1.967E+01	5.487E+03
1985	3.000E+05	1.871E+01	5.219E+03
1986	3.000E+05	1.780E+01	4.965E+03
1987	3.000E+05	1.693E+01	4.722E+03
1988	3.000E+05	1.610E+01	4.492E+03
1989	3.000E+05	1.532E+01	4.273E+03
1990	3.000E+05	1.457E+01	4.065E+03
1991	3.000E+05	1.386E+01	3.866E+03
1992	3.000E+05	1.318E+01	3.678E+03
1993	3.000E+05	1.254E+01	3.498E+03
1994	3.000E+05	1.193E+01	3.328E+03
1995	3.000E+05	1.135E+01	3.166E+03
1996	3.000E+05	1.079E+01	3.011E+03
1997	3.000E+05	1.027E+01	2.864E+03
1998	3.000E+05	9.766E+00	2.725E+03
1999	3.000E+05	9.290E+00	2.592E+03
2000	3.000E+05	8.837E+00	2.465E+03
2001	3.000E+05	8.406E+00	2.345E+03
2002	3.000E+05	7.996E+00	2.231E+03
2003	3.000E+05	7.606E+00	2.122E+03
2004	3.000E+05	7.235E+00	2.018E+03
2005	3.000E+05	6.882E+00	1.920E+03

continued

Table D2. NMOC Emission Rate from Year 1959 to 2202 (continued)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2006	3.000E+05	6.547E+00	1.826E+03
2007	3.000E+05	6.227E+00	1.737E+03
2008	3.000E+05	5.924E+00	1.653E+03
2009	3.000E+05	5.635E+00	1.572E+03
2010	3.000E+05	5.360E+00	1.495E+03
2011	3.000E+05	5.098E+00	1.422E+03
2012	3.000E+05	4.850E+00	1.353E+03
2013	3.000E+05	4.613E+00	1.287E+03
2014	3.000E+05	4.388E+00	1.224E+03
2015	3.000E+05	4.174E+00	1.165E+03
2016	3.000E+05	3.971E+00	1.108E+03
2017	3.000E+05	3.777E+00	1.054E+03
2018	3.000E+05	3.593E+00	1.002E+03
2019	3.000E+05	3.418E+00	9.534E+02
2020	3.000E+05	3.251E+00	9.069E+02
2021	3.000E+05	3.092E+00	8.627E+02
2022	3.000E+05	2.942E+00	8.206E+02
2023	3.000E+05	2.798E+00	7.806E+02
2024	3.000E+05	2.662E+00	7.425E+02
2025	3.000E+05	2.532E+00	7.063E+02
2026	3.000E+05	2.408E+00	6.719E+02
2027	3.000E+05	2.291E+00	6.391E+02
2028	3.000E+05	2.179E+00	6.079E+02
2029	3.000E+05	2.073E+00	5.783E+02
2030	3.000E+05	1.972E+00	5.501E+02
2031	3.000E+05	1.876E+00	5.233E+02
2032	3.000E+05	1.784E+00	4.977E+02
2033	3.000E+05	1.697E+00	4.735E+02
2034	3.000E+05	1.614E+00	4.504E+02
2035	3.000E+05	1.536E+00	4.284E+02
2036	3.000E+05	1.461E+00	4.075E+02
2037	3.000E+05	1.389E+00	3.876E+02
2038	3.000E+05	1.322E+00	3.687E+02
2039	3.000E+05	1.257E+00	3.508E+02
2040	3.000E+05	1.196E+00	3.336E+02
2041	3.000E+05	1.138E+00	3.174E+02
2042	3.000E+05	1.082E+00	3.019E+02
2043	3.000E+05	1.029E+00	2.872E+02
2044	3.000E+05	9.792E-01	2.732E+02
2045	3.000E+05	9.314E-01	2.598E+02
2046	3.000E+05	8.860E-01	2.472E+02
2047	3.000E+05	8.428E-01	2.351E+02
2048	3.000E+05	8.017E-01	2.236E+02
2049	3.000E+05	7.626E-01	2.127E+02
2050	3.000E+05	7.254E-01	2.024E+02
2051	3.000E+05	6.900E-01	1.925E+02
2052	3.000E+05	6.563E-01	1.831E+02
2053	3.000E+05	6.243E-01	1.742E+02
2054	3.000E+05	5.939E-01	1.657E+02
2055	3.000E+05	5.649E-01	1.576E+02
2056	3.000E+05	5.374E-01	1.499E+02
2057	3.000E+05	5.112E-01	1.426E+02
2058	3.000E+05	4.862E-01	1.357E+02
2059	3.000E+05	4.625E-01	1.290E+02
2060	3.000E+05	4.400E-01	1.227E+02
2061	3.000E+05	4.185E-01	1.168E+02
2062	3.000E+05	3.981E-01	1.111E+02
2063	3.000E+05	3.787E-01	1.056E+02
2064	3.000E+05	3.602E-01	1.005E+02
2065	3.000E+05	3.426E-01	9.559E+01
2066	3.000E+05	3.259E-01	9.093E+01
2067	3.000E+05	3.100E-01	8.649E+01
2068	3.000E+05	2.949E-01	8.228E+01
2069	3.000E+05	2.805E-01	7.826E+01
2070	3.000E+05	2.669E-01	7.445E+01
2071	3.000E+05	2.538E-01	7.082E+01
2072	3.000E+05	2.415E-01	6.736E+01
2073	3.000E+05	2.297E-01	6.408E+01
2074	3.000E+05	2.185E-01	6.095E+01
2075	3.000E+05	2.078E-01	5.798E+01
2076	3.000E+05	1.977E-01	5.515E+01

continued

Table D2. NMOC Emission Rate from Year 1959 to 2202 (continued)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2077	3.000E+05	1.880E-01	5.246E+01
2078	3.000E+05	1.789E-01	4.990E+01
2079	3.000E+05	1.702E-01	4.747E+01
2080	3.000E+05	1.619E-01	4.515E+01
2081	3.000E+05	1.540E-01	4.295E+01
2082	3.000E+05	1.465E-01	4.086E+01
2083	3.000E+05	1.393E-01	3.886E+01
2084	3.000E+05	1.325E-01	3.697E+01
2085	3.000E+05	1.261E-01	3.517E+01
2086	3.000E+05	1.199E-01	3.345E+01
2087	3.000E+05	1.141E-01	3.182E+01
2088	3.000E+05	1.085E-01	3.027E+01
2089	3.000E+05	1.032E-01	2.879E+01
2090	3.000E+05	9.817E-02	2.739E+01
2091	3.000E+05	9.338E-02	2.605E+01
2092	3.000E+05	8.883E-02	2.478E+01
2093	3.000E+05	8.449E-02	2.357E+01
2094	3.000E+05	8.037E-02	2.242E+01
2095	3.000E+05	7.645E-02	2.133E+01
2096	3.000E+05	7.273E-02	2.029E+01
2097	3.000E+05	6.918E-02	1.930E+01
2098	3.000E+05	6.580E-02	1.836E+01
2099	3.000E+05	6.260E-02	1.746E+01
2100	3.000E+05	5.954E-02	1.661E+01
2101	3.000E+05	5.664E-02	1.580E+01
2102	3.000E+05	5.388E-02	1.503E+01
2103	3.000E+05	5.125E-02	1.430E+01
2104	3.000E+05	4.875E-02	1.360E+01
2105	3.000E+05	4.637E-02	1.294E+01
2106	3.000E+05	4.411E-02	1.231E+01
2107	3.000E+05	4.196E-02	1.171E+01
2108	3.000E+05	3.991E-02	1.113E+01
2109	3.000E+05	3.797E-02	1.059E+01
2110	3.000E+05	3.611E-02	1.008E+01
2111	3.000E+05	3.435E-02	9.584E+00
2112	3.000E+05	3.268E-02	9.116E+00
2113	3.000E+05	3.108E-02	8.672E+00
2114	3.000E+05	2.957E-02	8.249E+00
2115	3.000E+05	2.813E-02	7.847E+00
2116	3.000E+05	2.675E-02	7.464E+00
2117	3.000E+05	2.545E-02	7.100E+00
2118	3.000E+05	2.421E-02	6.754E+00
2119	3.000E+05	2.303E-02	6.424E+00
2120	3.000E+05	2.190E-02	6.111E+00
2121	3.000E+05	2.084E-02	5.813E+00
2122	3.000E+05	1.982E-02	5.529E+00
2123	3.000E+05	1.885E-02	5.260E+00
2124	3.000E+05	1.793E-02	5.003E+00
2125	3.000E+05	1.706E-02	4.759E+00
2126	3.000E+05	1.623E-02	4.527E+00
2127	3.000E+05	1.544E-02	4.306E+00
2128	3.000E+05	1.468E-02	4.096E+00
2129	3.000E+05	1.397E-02	3.897E+00
2130	3.000E+05	1.329E-02	3.706E+00
2131	3.000E+05	1.264E-02	3.526E+00
2132	3.000E+05	1.202E-02	3.354E+00
2133	3.000E+05	1.144E-02	3.190E+00
2134	3.000E+05	1.088E-02	3.035E+00
2135	3.000E+05	1.035E-02	2.887E+00
2136	3.000E+05	9.842E-03	2.746E+00
2137	3.000E+05	9.362E-03	2.612E+00
2138	3.000E+05	8.906E-03	2.485E+00
2139	3.000E+05	8.471E-03	2.363E+00
2140	3.000E+05	8.058E-03	2.248E+00
2141	3.000E+05	7.665E-03	2.138E+00
2142	3.000E+05	7.291E-03	2.034E+00
2143	3.000E+05	6.936E-03	1.935E+00
2144	3.000E+05	6.598E-03	1.841E+00
2145	3.000E+05	6.276E-03	1.751E+00
2146	3.000E+05	5.970E-03	1.665E+00
2147	3.000E+05	5.679E-03	1.584E+00

continued

Table D2. NMOC Emission Rate from Year 1959 to 2202 (concluded)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2148	3.000E+05	5.402E-03	1.507E+00
2149	3.000E+05	5.138E-03	1.433E+00
2150	3.000E+05	4.888E-03	1.364E+00
2151	3.000E+05	4.649E-03	1.297E+00
2152	3.000E+05	4.422E-03	1.234E+00
2153	3.000E+05	4.207E-03	1.174E+00
2154	3.000E+05	4.002E-03	1.116E+00
2155	3.000E+05	3.806E-03	1.062E+00
2156	3.000E+05	3.621E-03	1.010E+00
2157	3.000E+05	3.444E-03	9.609E-01
2158	3.000E+05	3.276E-03	9.140E-01
2159	3.000E+05	3.116E-03	8.694E-01
2160	3.000E+05	2.964E-03	8.270E-01
2161	3.000E+05	2.820E-03	7.867E-01
2162	3.000E+05	2.682E-03	7.483E-01
2163	3.000E+05	2.552E-03	7.118E-01
2164	3.000E+05	2.427E-03	6.771E-01
2165	3.000E+05	2.309E-03	6.441E-01
2166	3.000E+05	2.196E-03	6.127E-01
2167	3.000E+05	2.089E-03	5.828E-01
2168	3.000E+05	1.987E-03	5.544E-01
2169	3.000E+05	1.890E-03	5.273E-01
2170	3.000E+05	1.798E-03	5.016E-01
2171	3.000E+05	1.710E-03	4.772E-01
2172	3.000E+05	1.627E-03	4.539E-01
2173	3.000E+05	1.548E-03	4.317E-01
2174	3.000E+05	1.472E-03	4.107E-01
2175	3.000E+05	1.400E-03	3.907E-01
2176	3.000E+05	1.332E-03	3.716E-01
2177	3.000E+05	1.267E-03	3.535E-01
2178	3.000E+05	1.205E-03	3.362E-01
2179	3.000E+05	1.146E-03	3.198E-01
2180	3.000E+05	1.091E-03	3.042E-01
2181	3.000E+05	1.037E-03	2.894E-01
2182	3.000E+05	9.868E-04	2.753E-01
2183	3.000E+05	9.387E-04	2.619E-01
2184	3.000E+05	8.929E-04	2.491E-01
2185	3.000E+05	8.493E-04	2.369E-01
2186	3.000E+05	8.079E-04	2.254E-01
2187	3.000E+05	7.685E-04	2.144E-01
2188	3.000E+05	7.310E-04	2.039E-01
2189	3.000E+05	6.954E-04	1.940E-01
2190	3.000E+05	6.615E-04	1.845E-01
2191	3.000E+05	6.292E-04	1.755E-01
2192	3.000E+05	5.985E-04	1.670E-01
2193	3.000E+05	5.693E-04	1.588E-01
2194	3.000E+05	5.416E-04	1.511E-01
2195	3.000E+05	5.151E-04	1.437E-01
2196	3.000E+05	4.900E-04	1.367E-01
2197	3.000E+05	4.661E-04	1.300E-01
2198	3.000E+05	4.434E-04	1.237E-01
2199	3.000E+05	4.218E-04	1.177E-01
2200	3.000E+05	4.012E-04	1.119E-01
2201	3.000E+05	3.816E-04	1.065E-01
2202	3.000E+05	3.630E-04	1.013E-01

Table D3. 1,1-Dichloroethene Emission Rate from Year 1959 to 2202

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Source: H:\3000\030177~1.000\030177~1.002\SOMMER~1\SOMERSWORTH.PRM

================================================================================
                              Model Parameters
================================================================================
Lo : 170.00 m^3 / Mg ***** User Mode Selection *****
k : 0.0500 1/yr ***** User Mode Selection *****
NMOC : 2380.00 ppmv ***** User Mode Selection *****
Methane : 58.0000 % volume
Carbon Dioxide : 42.0000 % volume
Air Pollutant : 1,1-Dichloroethene (HAP/VOC)
Molecular Wt =   96.94     Concentration =      0.001520 ppmV

================================================================================
                            Landfill Parameters
================================================================================
Landfill type : Co-Disposal
Year Opened : 1958    Current Year : 2003   Closure Year: 2003
Capacity : 300000 Mg
Average Acceptance Rate Required from
         Current Year to Closure Year : 0.00 Mg/year

================================================================================
                               Model Results
================================================================================
                                1,1-Dichloroethene (HAP/VOC) Emission Rate
Year     Refuse In Place (Mg)          (Mg/yr)          (Cubic m/yr)
================================================================================
```

Year	Refuse In Place (Mg)	1,1-Dichloroethene (HAP/VOC) Emission Rate (Mg/yr)	1,1-Dichloroethene (HAP/VOC) Emission Rate (Cubic m/yr)
1959	1.304E+04	1.172E-06	2.906E-04
1960	2.609E+04	2.286E-06	5.669E-04
1961	3.913E+04	3.346E-06	8.298E-04
1962	5.217E+04	4.354E-06	1.080E-03
1963	6.522E+04	5.313E-06	1.318E-03
1964	7.826E+04	6.226E-06	1.544E-03
1965	9.130E+04	7.094E-06	1.759E-03
1966	1.043E+05	7.919E-06	1.964E-03
1967	1.174E+05	8.705E-06	2.159E-03
1968	1.304E+05	9.452E-06	2.344E-03
1969	1.435E+05	1.016E-05	2.520E-03
1970	1.565E+05	1.084E-05	2.688E-03
1971	1.696E+05	1.148E-05	2.847E-03
1972	1.826E+05	1.209E-05	2.999E-03
1973	1.957E+05	1.267E-05	3.143E-03
1974	2.087E+05	1.323E-05	3.281E-03
1975	2.217E+05	1.375E-05	3.411E-03
1976	2.348E+05	1.425E-05	3.535E-03
1977	2.478E+05	1.473E-05	3.654E-03
1978	2.609E+05	1.518E-05	3.766E-03
1979	2.739E+05	1.562E-05	3.873E-03
1980	2.870E+05	1.603E-05	3.974E-03
1981	3.000E+05	1.642E-05	4.071E-03
1982	3.000E+05	1.561E-05	3.873E-03
1983	3.000E+05	1.485E-05	3.684E-03
1984	3.000E+05	1.413E-05	3.504E-03
1985	3.000E+05	1.344E-05	3.333E-03
1986	3.000E+05	1.278E-05	3.171E-03
1987	3.000E+05	1.216E-05	3.016E-03
1988	3.000E+05	1.157E-05	2.869E-03
1989	3.000E+05	1.100E-05	2.729E-03
1990	3.000E+05	1.047E-05	2.596E-03
1991	3.000E+05	9.956E-06	2.469E-03
1992	3.000E+05	9.471E-06	2.349E-03
1993	3.000E+05	9.009E-06	2.234E-03
1994	3.000E+05	8.569E-06	2.125E-03
1995	3.000E+05	8.151E-06	2.022E-03
1996	3.000E+05	7.754E-06	1.923E-03
1997	3.000E+05	7.376E-06	1.829E-03
1998	3.000E+05	7.016E-06	1.740E-03
1999	3.000E+05	6.674E-06	1.655E-03
2000	3.000E+05	6.348E-06	1.574E-03
2001	3.000E+05	6.039E-06	1.498E-03
2002	3.000E+05	5.744E-06	1.425E-03
2003	3.000E+05	5.464E-06	1.355E-03

continued

Table D3. 1,1-Dichloroethene Emission Rate from Year 1959 to 2202 (continued)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2004	3.000E+05	5.198E-06	1.289E-03
2005	3.000E+05	4.944E-06	1.226E-03
2006	3.000E+05	4.703E-06	1.166E-03
2007	3.000E+05	4.474E-06	1.110E-03
2008	3.000E+05	4.255E-06	1.055E-03
2009	3.000E+05	4.048E-06	1.004E-03
2010	3.000E+05	3.850E-06	9.550E-04
2011	3.000E+05	3.663E-06	9.084E-04
2012	3.000E+05	3.484E-06	8.641E-04
2013	3.000E+05	3.314E-06	8.220E-04
2014	3.000E+05	3.153E-06	7.819E-04
2015	3.000E+05	2.999E-06	7.437E-04
2016	3.000E+05	2.853E-06	7.075E-04
2017	3.000E+05	2.713E-06	6.730E-04
2018	3.000E+05	2.581E-06	6.401E-04
2019	3.000E+05	2.455E-06	6.089E-04
2020	3.000E+05	2.335E-06	5.792E-04
2021	3.000E+05	2.222E-06	5.510E-04
2022	3.000E+05	2.113E-06	5.241E-04
2023	3.000E+05	2.010E-06	4.985E-04
2024	3.000E+05	1.912E-06	4.742E-04
2025	3.000E+05	1.819E-06	4.511E-04
2026	3.000E+05	1.730E-06	4.291E-04
2027	3.000E+05	1.646E-06	4.082E-04
2028	3.000E+05	1.565E-06	3.883E-04
2029	3.000E+05	1.489E-06	3.693E-04
2030	3.000E+05	1.417E-06	3.513E-04
2031	3.000E+05	1.347E-06	3.342E-04
2032	3.000E+05	1.282E-06	3.179E-04
2033	3.000E+05	1.219E-06	3.024E-04
2034	3.000E+05	1.160E-06	2.876E-04
2035	3.000E+05	1.103E-06	2.736E-04
2036	3.000E+05	1.049E-06	2.603E-04
2037	3.000E+05	9.982E-07	2.476E-04
2038	3.000E+05	9.495E-07	2.355E-04
2039	3.000E+05	9.032E-07	2.240E-04
2040	3.000E+05	8.592E-07	2.131E-04
2041	3.000E+05	8.173E-07	2.027E-04
2042	3.000E+05	7.774E-07	1.928E-04
2043	3.000E+05	7.395E-07	1.834E-04
2044	3.000E+05	7.034E-07	1.745E-04
2045	3.000E+05	6.691E-07	1.660E-04
2046	3.000E+05	6.365E-07	1.579E-04
2047	3.000E+05	6.054E-07	1.502E-04
2048	3.000E+05	5.759E-07	1.428E-04
2049	3.000E+05	5.478E-07	1.359E-04
2050	3.000E+05	5.211E-07	1.292E-04
2051	3.000E+05	4.957E-07	1.229E-04
2052	3.000E+05	4.715E-07	1.169E-04
2053	3.000E+05	4.485E-07	1.112E-04
2054	3.000E+05	4.266E-07	1.058E-04
2055	3.000E+05	4.058E-07	1.007E-04
2056	3.000E+05	3.860E-07	9.575E-05
2057	3.000E+05	3.672E-07	9.108E-05
2058	3.000E+05	3.493E-07	8.663E-05
2059	3.000E+05	3.323E-07	8.241E-05
2060	3.000E+05	3.161E-07	7.839E-05
2061	3.000E+05	3.007E-07	7.457E-05
2062	3.000E+05	2.860E-07	7.093E-05
2063	3.000E+05	2.720E-07	6.747E-05
2064	3.000E+05	2.588E-07	6.418E-05
2065	3.000E+05	2.462E-07	6.105E-05
2066	3.000E+05	2.341E-07	5.807E-05
2067	3.000E+05	2.227E-07	5.524E-05
2068	3.000E+05	2.119E-07	5.255E-05
2069	3.000E+05	2.015E-07	4.998E-05
2070	3.000E+05	1.917E-07	4.755E-05
2071	3.000E+05	1.824E-07	4.523E-05
2072	3.000E+05	1.735E-07	4.302E-05
2073	3.000E+05	1.650E-07	4.092E-05
2074	3.000E+05	1.570E-07	3.893E-05

continued

Table D3. 1,1-Dichloroethene Emission Rate from Year 1959 to 2202 (continued)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2075	3.000E+05	1.493E-07	3.703E-05
2076	3.000E+05	1.420E-07	3.522E-05
2077	3.000E+05	1.351E-07	3.350E-05
2078	3.000E+05	1.285E-07	3.187E-05
2079	3.000E+05	1.222E-07	3.032E-05
2080	3.000E+05	1.163E-07	2.884E-05
2081	3.000E+05	1.106E-07	2.743E-05
2082	3.000E+05	1.052E-07	2.609E-05
2083	3.000E+05	1.001E-07	2.482E-05
2084	3.000E+05	9.520E-08	2.361E-05
2085	3.000E+05	9.055E-08	2.246E-05
2086	3.000E+05	8.614E-08	2.136E-05
2087	3.000E+05	8.194E-08	2.032E-05
2088	3.000E+05	7.794E-08	1.933E-05
2089	3.000E+05	7.414E-08	1.839E-05
2090	3.000E+05	7.052E-08	1.749E-05
2091	3.000E+05	6.708E-08	1.664E-05
2092	3.000E+05	6.381E-08	1.583E-05
2093	3.000E+05	6.070E-08	1.505E-05
2094	3.000E+05	5.774E-08	1.432E-05
2095	3.000E+05	5.492E-08	1.362E-05
2096	3.000E+05	5.225E-08	1.296E-05
2097	3.000E+05	4.970E-08	1.233E-05
2098	3.000E+05	4.727E-08	1.172E-05
2099	3.000E+05	4.497E-08	1.115E-05
2100	3.000E+05	4.278E-08	1.061E-05
2101	3.000E+05	4.069E-08	1.009E-05
2102	3.000E+05	3.870E-08	9.599E-06
2103	3.000E+05	3.682E-08	9.131E-06
2104	3.000E+05	3.502E-08	8.686E-06
2105	3.000E+05	3.331E-08	8.262E-06
2106	3.000E+05	3.169E-08	7.859E-06
2107	3.000E+05	3.014E-08	7.476E-06
2108	3.000E+05	2.867E-08	7.111E-06
2109	3.000E+05	2.727E-08	6.765E-06
2110	3.000E+05	2.594E-08	6.435E-06
2111	3.000E+05	2.468E-08	6.121E-06
2112	3.000E+05	2.348E-08	5.822E-06
2113	3.000E+05	2.233E-08	5.538E-06
2114	3.000E+05	2.124E-08	5.268E-06
2115	3.000E+05	2.021E-08	5.011E-06
2116	3.000E+05	1.922E-08	4.767E-06
2117	3.000E+05	1.828E-08	4.534E-06
2118	3.000E+05	1.739E-08	4.313E-06
2119	3.000E+05	1.654E-08	4.103E-06
2120	3.000E+05	1.574E-08	3.903E-06
2121	3.000E+05	1.497E-08	3.712E-06
2122	3.000E+05	1.424E-08	3.531E-06
2123	3.000E+05	1.354E-08	3.359E-06
2124	3.000E+05	1.288E-08	3.195E-06
2125	3.000E+05	1.226E-08	3.039E-06
2126	3.000E+05	1.166E-08	2.891E-06
2127	3.000E+05	1.109E-08	2.750E-06
2128	3.000E+05	1.055E-08	2.616E-06
2129	3.000E+05	1.003E-08	2.489E-06
2130	3.000E+05	9.544E-09	2.367E-06
2131	3.000E+05	9.079E-09	2.252E-06
2132	3.000E+05	8.636E-09	2.142E-06
2133	3.000E+05	8.215E-09	2.037E-06
2134	3.000E+05	7.814E-09	1.938E-06
2135	3.000E+05	7.433E-09	1.844E-06
2136	3.000E+05	7.071E-09	1.754E-06
2137	3.000E+05	6.726E-09	1.668E-06
2138	3.000E+05	6.398E-09	1.587E-06
2139	3.000E+05	6.086E-09	1.509E-06
2140	3.000E+05	5.789E-09	1.436E-06
2141	3.000E+05	5.507E-09	1.366E-06
2142	3.000E+05	5.238E-09	1.299E-06
2143	3.000E+05	4.983E-09	1.236E-06
2144	3.000E+05	4.740E-09	1.175E-06
2145	3.000E+05	4.508E-09	1.118E-06

continued

Table D3. 1,1-Dichloroethene Emission Rate from Year 1959 to 2202 (concluded)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2146	3.000E+05	4.289E-09	1.064E-06
2147	3.000E+05	4.079E-09	1.012E-06
2148	3.000E+05	3.880E-09	9.624E-07
2149	3.000E+05	3.691E-09	9.155E-07
2150	3.000E+05	3.511E-09	8.708E-07
2151	3.000E+05	3.340E-09	8.284E-07
2152	3.000E+05	3.177E-09	7.880E-07
2153	3.000E+05	3.022E-09	7.495E-07
2154	3.000E+05	2.875E-09	7.130E-07
2155	3.000E+05	2.735E-09	6.782E-07
2156	3.000E+05	2.601E-09	6.451E-07
2157	3.000E+05	2.474E-09	6.137E-07
2158	3.000E+05	2.354E-09	5.837E-07
2159	3.000E+05	2.239E-09	5.553E-07
2160	3.000E+05	2.130E-09	5.282E-07
2161	3.000E+05	2.026E-09	5.024E-07
2162	3.000E+05	1.927E-09	4.779E-07
2163	3.000E+05	1.833E-09	4.546E-07
2164	3.000E+05	1.744E-09	4.324E-07
2165	3.000E+05	1.659E-09	4.114E-07
2166	3.000E+05	1.578E-09	3.913E-07
2167	3.000E+05	1.501E-09	3.722E-07
2168	3.000E+05	1.428E-09	3.541E-07
2169	3.000E+05	1.358E-09	3.368E-07
2170	3.000E+05	1.292E-09	3.204E-07
2171	3.000E+05	1.229E-09	3.047E-07
2172	3.000E+05	1.169E-09	2.899E-07
2173	3.000E+05	1.112E-09	2.757E-07
2174	3.000E+05	1.058E-09	2.623E-07
2175	3.000E+05	1.006E-09	2.495E-07
2176	3.000E+05	9.569E-10	2.373E-07
2177	3.000E+05	9.102E-10	2.258E-07
2178	3.000E+05	8.658E-10	2.147E-07
2179	3.000E+05	8.236E-10	2.043E-07
2180	3.000E+05	7.835E-10	1.943E-07
2181	3.000E+05	7.452E-10	1.848E-07
2182	3.000E+05	7.089E-10	1.758E-07
2183	3.000E+05	6.743E-10	1.672E-07
2184	3.000E+05	6.414E-10	1.591E-07
2185	3.000E+05	6.102E-10	1.513E-07
2186	3.000E+05	5.804E-10	1.439E-07
2187	3.000E+05	5.521E-10	1.369E-07
2188	3.000E+05	5.252E-10	1.302E-07
2189	3.000E+05	4.996E-10	1.239E-07
2190	3.000E+05	4.752E-10	1.179E-07
2191	3.000E+05	4.520E-10	1.121E-07
2192	3.000E+05	4.300E-10	1.066E-07
2193	3.000E+05	4.090E-10	1.014E-07
2194	3.000E+05	3.891E-10	9.649E-08
2195	3.000E+05	3.701E-10	9.178E-08
2196	3.000E+05	3.520E-10	8.731E-08
2197	3.000E+05	3.349E-10	8.305E-08
2198	3.000E+05	3.185E-10	7.900E-08
2199	3.000E+05	3.030E-10	7.515E-08
2200	3.000E+05	2.882E-10	7.148E-08
2201	3.000E+05	2.742E-10	6.800E-08
2202	3.000E+05	2.608E-10	6.468E-08

Table D4. Chlorobenzene Emission Rate from Year 1959 to 2202

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Source: H:\3000\030177~1.000\030177~1.002\SOMMER~1\SOMERSWORTH.PRM

================================================================================
                               Model Parameters
================================================================================
Lo : 170.00 m^3 / Mg ***** User Mode Selection *****
k : 0.0500 1/yr ***** User Mode Selection *****
NMOC : 2380.00 ppmv ***** User Mode Selection *****
Methane : 58.0000 % volume
Carbon Dioxide : 42.0000 % volume
Air Pollutant : Chlorobenzene (HAP/VOC)
Molecular Wt =  112.56     Concentration =      0.020800 ppmV

================================================================================
                             Landfill Parameters
================================================================================
Landfill type : Co-Disposal
Year Opened : 1958    Current Year : 2003  Closure Year: 2003
Capacity : 300000 Mg
Average Acceptance Rate Required from
        Current Year to Closure Year : 0.00 Mg/year

================================================================================
                               Model Results
================================================================================
                                    Chlorobenzene (HAP/VOC) Emission Rate
Year     Refuse In Place (Mg)            (Mg/yr)          (Cubic m/yr)
================================================================================
1959        1.304E+04                   1.861E-05          3.976E-03
1960        2.609E+04                   3.632E-05          7.758E-03
1961        3.913E+04                   5.316E-05          1.136E-02
1962        5.217E+04                   6.919E-05          1.478E-02
1963        6.522E+04                   8.443E-05          1.803E-02
1964        7.826E+04                   9.892E-05          2.113E-02
1965        9.130E+04                   1.127E-04          2.408E-02
1966        1.043E+05                   1.258E-04          2.688E-02
1967        1.174E+05                   1.383E-04          2.954E-02
1968        1.304E+05                   1.502E-04          3.208E-02
1969        1.435E+05                   1.615E-04          3.449E-02
1970        1.565E+05                   1.722E-04          3.678E-02
1971        1.696E+05                   1.824E-04          3.897E-02
1972        1.826E+05                   1.921E-04          4.104E-02
1973        1.957E+05                   2.014E-04          4.302E-02
1974        2.087E+05                   2.102E-04          4.489E-02
1975        2.217E+05                   2.185E-04          4.668E-02
1976        2.348E+05                   2.265E-04          4.838E-02
1977        2.478E+05                   2.341E-04          5.000E-02
1978        2.609E+05                   2.413E-04          5.153E-02
1979        2.739E+05                   2.481E-04          5.300E-02
1980        2.870E+05                   2.546E-04          5.439E-02
1981        3.000E+05                   2.608E-04          5.571E-02
1982        3.000E+05                   2.481E-04          5.299E-02
1983        3.000E+05                   2.360E-04          5.041E-02
1984        3.000E+05                   2.245E-04          4.795E-02
1985        3.000E+05                   2.135E-04          4.561E-02
1986        3.000E+05                   2.031E-04          4.339E-02
1987        3.000E+05                   1.932E-04          4.127E-02
1988        3.000E+05                   1.838E-04          3.926E-02
1989        3.000E+05                   1.748E-04          3.734E-02
1990        3.000E+05                   1.663E-04          3.552E-02
1991        3.000E+05                   1.582E-04          3.379E-02
1992        3.000E+05                   1.505E-04          3.214E-02
1993        3.000E+05                   1.431E-04          3.057E-02
1994        3.000E+05                   1.362E-04          2.908E-02
1995        3.000E+05                   1.295E-04          2.767E-02
1996        3.000E+05                   1.232E-04          2.632E-02
1997        3.000E+05                   1.172E-04          2.503E-02
1998        3.000E+05                   1.115E-04          2.381E-02
1999        3.000E+05                   1.060E-04          2.265E-02
2000        3.000E+05                   1.009E-04          2.155E-02
2001        3.000E+05                   9.595E-05          2.049E-02
2002        3.000E+05                   9.127E-05          1.950E-02
2003        3.000E+05                   8.682E-05          1.854E-02
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continued

Table D4. Chlorobenzene Emission Rate from Year 1959 to 2202 (continued)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2004	3.000E+05	8.259E-05	1.764E-02
2005	3.000E+05	7.856E-05	1.678E-02
2006	3.000E+05	7.473E-05	1.596E-02
2007	3.000E+05	7.108E-05	1.518E-02
2008	3.000E+05	6.762E-05	1.444E-02
2009	3.000E+05	6.432E-05	1.374E-02
2010	3.000E+05	6.118E-05	1.307E-02
2011	3.000E+05	5.820E-05	1.243E-02
2012	3.000E+05	5.536E-05	1.182E-02
2013	3.000E+05	5.266E-05	1.125E-02
2014	3.000E+05	5.009E-05	1.070E-02
2015	3.000E+05	4.765E-05	1.018E-02
2016	3.000E+05	4.532E-05	9.681E-03
2017	3.000E+05	4.311E-05	9.209E-03
2018	3.000E+05	4.101E-05	8.760E-03
2019	3.000E+05	3.901E-05	8.333E-03
2020	3.000E+05	3.711E-05	7.926E-03
2021	3.000E+05	3.530E-05	7.540E-03
2022	3.000E+05	3.358E-05	7.172E-03
2023	3.000E+05	3.194E-05	6.822E-03
2024	3.000E+05	3.038E-05	6.489E-03
2025	3.000E+05	2.890E-05	6.173E-03
2026	3.000E+05	2.749E-05	5.872E-03
2027	3.000E+05	2.615E-05	5.586E-03
2028	3.000E+05	2.487E-05	5.313E-03
2029	3.000E+05	2.366E-05	5.054E-03
2030	3.000E+05	2.251E-05	4.808E-03
2031	3.000E+05	2.141E-05	4.573E-03
2032	3.000E+05	2.037E-05	4.350E-03
2033	3.000E+05	1.937E-05	4.138E-03
2034	3.000E+05	1.843E-05	3.936E-03
2035	3.000E+05	1.753E-05	3.744E-03
2036	3.000E+05	1.667E-05	3.561E-03
2037	3.000E+05	1.586E-05	3.388E-03
2038	3.000E+05	1.509E-05	3.223E-03
2039	3.000E+05	1.435E-05	3.065E-03
2040	3.000E+05	1.365E-05	2.916E-03
2041	3.000E+05	1.299E-05	2.774E-03
2042	3.000E+05	1.235E-05	2.638E-03
2043	3.000E+05	1.175E-05	2.510E-03
2044	3.000E+05	1.118E-05	2.387E-03
2045	3.000E+05	1.063E-05	2.271E-03
2046	3.000E+05	1.011E-05	2.160E-03
2047	3.000E+05	9.620E-06	2.055E-03
2048	3.000E+05	9.151E-06	1.955E-03
2049	3.000E+05	8.704E-06	1.859E-03
2050	3.000E+05	8.280E-06	1.769E-03
2051	3.000E+05	7.876E-06	1.682E-03
2052	3.000E+05	7.492E-06	1.600E-03
2053	3.000E+05	7.127E-06	1.522E-03
2054	3.000E+05	6.779E-06	1.448E-03
2055	3.000E+05	6.448E-06	1.377E-03
2056	3.000E+05	6.134E-06	1.310E-03
2057	3.000E+05	5.835E-06	1.246E-03
2058	3.000E+05	5.550E-06	1.186E-03
2059	3.000E+05	5.280E-06	1.128E-03
2060	3.000E+05	5.022E-06	1.073E-03
2061	3.000E+05	4.777E-06	1.020E-03
2062	3.000E+05	4.544E-06	9.706E-04
2063	3.000E+05	4.323E-06	9.233E-04
2064	3.000E+05	4.112E-06	8.783E-04
2065	3.000E+05	3.911E-06	8.354E-04
2066	3.000E+05	3.720E-06	7.947E-04
2067	3.000E+05	3.539E-06	7.559E-04
2068	3.000E+05	3.366E-06	7.191E-04
2069	3.000E+05	3.202E-06	6.840E-04
2070	3.000E+05	3.046E-06	6.506E-04
2071	3.000E+05	2.897E-06	6.189E-04
2072	3.000E+05	2.756E-06	5.887E-04
2073	3.000E+05	2.622E-06	5.600E-04
2074	3.000E+05	2.494E-06	5.327E-04

continued

Table D4. Chlorobenzene Emission Rate from Year 1959 to 2202 (continued)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2075	3.000E+05	2.372E-06	5.067E-04
2076	3.000E+05	2.257E-06	4.820E-04
2077	3.000E+05	2.146E-06	4.585E-04
2078	3.000E+05	2.042E-06	4.361E-04
2079	3.000E+05	1.942E-06	4.149E-04
2080	3.000E+05	1.848E-06	3.946E-04
2081	3.000E+05	1.757E-06	3.754E-04
2082	3.000E+05	1.672E-06	3.571E-04
2083	3.000E+05	1.590E-06	3.397E-04
2084	3.000E+05	1.513E-06	3.231E-04
2085	3.000E+05	1.439E-06	3.073E-04
2086	3.000E+05	1.369E-06	2.923E-04
2087	3.000E+05	1.302E-06	2.781E-04
2088	3.000E+05	1.238E-06	2.645E-04
2089	3.000E+05	1.178E-06	2.516E-04
2090	3.000E+05	1.121E-06	2.394E-04
2091	3.000E+05	1.066E-06	2.277E-04
2092	3.000E+05	1.014E-06	2.166E-04
2093	3.000E+05	9.645E-07	2.060E-04
2094	3.000E+05	9.174E-07	1.960E-04
2095	3.000E+05	8.727E-07	1.864E-04
2096	3.000E+05	8.301E-07	1.773E-04
2097	3.000E+05	7.897E-07	1.687E-04
2098	3.000E+05	7.511E-07	1.604E-04
2099	3.000E+05	7.145E-07	1.526E-04
2100	3.000E+05	6.797E-07	1.452E-04
2101	3.000E+05	6.465E-07	1.381E-04
2102	3.000E+05	6.150E-07	1.314E-04
2103	3.000E+05	5.850E-07	1.250E-04
2104	3.000E+05	5.565E-07	1.189E-04
2105	3.000E+05	5.293E-07	1.131E-04
2106	3.000E+05	5.035E-07	1.075E-04
2107	3.000E+05	4.789E-07	1.023E-04
2108	3.000E+05	4.556E-07	9.731E-05
2109	3.000E+05	4.334E-07	9.257E-05
2110	3.000E+05	4.122E-07	8.805E-05
2111	3.000E+05	3.921E-07	8.376E-05
2112	3.000E+05	3.730E-07	7.967E-05
2113	3.000E+05	3.548E-07	7.579E-05
2114	3.000E+05	3.375E-07	7.209E-05
2115	3.000E+05	3.210E-07	6.858E-05
2116	3.000E+05	3.054E-07	6.523E-05
2117	3.000E+05	2.905E-07	6.205E-05
2118	3.000E+05	2.763E-07	5.902E-05
2119	3.000E+05	2.629E-07	5.614E-05
2120	3.000E+05	2.500E-07	5.341E-05
2121	3.000E+05	2.378E-07	5.080E-05
2122	3.000E+05	2.262E-07	4.832E-05
2123	3.000E+05	2.152E-07	4.597E-05
2124	3.000E+05	2.047E-07	4.373E-05
2125	3.000E+05	1.947E-07	4.159E-05
2126	3.000E+05	1.852E-07	3.956E-05
2127	3.000E+05	1.762E-07	3.763E-05
2128	3.000E+05	1.676E-07	3.580E-05
2129	3.000E+05	1.594E-07	3.405E-05
2130	3.000E+05	1.517E-07	3.239E-05
2131	3.000E+05	1.443E-07	3.081E-05
2132	3.000E+05	1.372E-07	2.931E-05
2133	3.000E+05	1.305E-07	2.788E-05
2134	3.000E+05	1.242E-07	2.652E-05
2135	3.000E+05	1.181E-07	2.523E-05
2136	3.000E+05	1.123E-07	2.400E-05
2137	3.000E+05	1.069E-07	2.283E-05
2138	3.000E+05	1.017E-07	2.171E-05
2139	3.000E+05	9.670E-08	2.065E-05
2140	3.000E+05	9.198E-08	1.965E-05
2141	3.000E+05	8.750E-08	1.869E-05
2142	3.000E+05	8.323E-08	1.778E-05
2143	3.000E+05	7.917E-08	1.691E-05
2144	3.000E+05	7.531E-08	1.609E-05
2145	3.000E+05	7.164E-08	1.530E-05

continued

Table D4. Chlorobenzene Emission Rate from Year 1959 to 2202 (concluded)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2146	3.000E+05	6.814E-08	1.455E-05
2147	3.000E+05	6.482E-08	1.385E-05
2148	3.000E+05	6.166E-08	1.317E-05
2149	3.000E+05	5.865E-08	1.253E-05
2150	3.000E+05	5.579E-08	1.192E-05
2151	3.000E+05	5.307E-08	1.134E-05
2152	3.000E+05	5.048E-08	1.078E-05
2153	3.000E+05	4.802E-08	1.026E-05
2154	3.000E+05	4.568E-08	9.757E-06
2155	3.000E+05	4.345E-08	9.281E-06
2156	3.000E+05	4.133E-08	8.828E-06
2157	3.000E+05	3.931E-08	8.397E-06
2158	3.000E+05	3.740E-08	7.988E-06
2159	3.000E+05	3.557E-08	7.598E-06
2160	3.000E+05	3.384E-08	7.228E-06
2161	3.000E+05	3.219E-08	6.875E-06
2162	3.000E+05	3.062E-08	6.540E-06
2163	3.000E+05	2.912E-08	6.221E-06
2164	3.000E+05	2.770E-08	5.918E-06
2165	3.000E+05	2.635E-08	5.629E-06
2166	3.000E+05	2.507E-08	5.354E-06
2167	3.000E+05	2.385E-08	5.093E-06
2168	3.000E+05	2.268E-08	4.845E-06
2169	3.000E+05	2.158E-08	4.609E-06
2170	3.000E+05	2.052E-08	4.384E-06
2171	3.000E+05	1.952E-08	4.170E-06
2172	3.000E+05	1.857E-08	3.967E-06
2173	3.000E+05	1.767E-08	3.773E-06
2174	3.000E+05	1.680E-08	3.589E-06
2175	3.000E+05	1.598E-08	3.414E-06
2176	3.000E+05	1.520E-08	3.248E-06
2177	3.000E+05	1.446E-08	3.089E-06
2178	3.000E+05	1.376E-08	2.939E-06
2179	3.000E+05	1.309E-08	2.795E-06
2180	3.000E+05	1.245E-08	2.659E-06
2181	3.000E+05	1.184E-08	2.529E-06
2182	3.000E+05	1.126E-08	2.406E-06
2183	3.000E+05	1.071E-08	2.289E-06
2184	3.000E+05	1.019E-08	2.177E-06
2185	3.000E+05	9.695E-09	2.071E-06
2186	3.000E+05	9.222E-09	1.970E-06
2187	3.000E+05	8.772E-09	1.874E-06
2188	3.000E+05	8.344E-09	1.782E-06
2189	3.000E+05	7.937E-09	1.695E-06
2190	3.000E+05	7.550E-09	1.613E-06
2191	3.000E+05	7.182E-09	1.534E-06
2192	3.000E+05	6.832E-09	1.459E-06
2193	3.000E+05	6.499E-09	1.388E-06
2194	3.000E+05	6.182E-09	1.320E-06
2195	3.000E+05	5.880E-09	1.256E-06
2196	3.000E+05	5.593E-09	1.195E-06
2197	3.000E+05	5.321E-09	1.136E-06
2198	3.000E+05	5.061E-09	1.081E-06
2199	3.000E+05	4.814E-09	1.028E-06
2200	3.000E+05	4.580E-09	9.782E-07
2201	3.000E+05	4.356E-09	9.305E-07
2202	3.000E+05	4.144E-09	8.851E-07

Table D5. Benzene Emission Rate from Year 1959 to 2202

```
Source: H:\3000\030177~1.000\030177~1.002\SOMMER~1\SOMERSWORTH.PRM

================================================================================
                                Model Parameters
================================================================================
Lo : 170.00 m^3 / Mg ***** User Mode Selection *****
k : 0.0500 1/yr ***** User Mode Selection *****
NMOC : 2380.00 ppmv ***** User Mode Selection *****
Methane : 58.0000 % volume
Carbon Dioxide : 42.0000 % volume
Air Pollutant : Benzene (HAP/VOC)
Molecular Wt =   78.12     Concentration =      0.244000 ppmV

================================================================================
                              Landfill Parameters
================================================================================
Landfill type : Co-Disposal
Year Opened : 1958    Current Year : 2003   Closure Year: 2003
Capacity : 300000 Mg
Average Acceptance Rate Required from
         Current Year to Closure Year : 0.00 Mg/year

================================================================================
                                 Model Results
================================================================================
```

Year	Refuse In Place (Mg)	Benzene (HAP/VOC) Emission Rate (Mg/yr)	Benzene (HAP/VOC) Emission Rate (Cubic m/yr)
1959	1.304E+04	1.515E-04	4.664E-02
1960	2.609E+04	2.957E-04	9.101E-02
1961	3.913E+04	4.328E-04	1.332E-01
1962	5.217E+04	5.633E-04	1.734E-01
1963	6.522E+04	6.874E-04	2.115E-01
1964	7.826E+04	8.054E-04	2.479E-01
1965	9.130E+04	9.177E-04	2.824E-01
1966	1.043E+05	1.024E-03	3.153E-01
1967	1.174E+05	1.126E-03	3.466E-01
1968	1.304E+05	1.223E-03	3.763E-01
1969	1.435E+05	1.315E-03	4.046E-01
1970	1.565E+05	1.402E-03	4.315E-01
1971	1.696E+05	1.485E-03	4.571E-01
1972	1.826E+05	1.564E-03	4.814E-01
1973	1.957E+05	1.640E-03	5.046E-01
1974	2.087E+05	1.711E-03	5.266E-01
1975	2.217E+05	1.779E-03	5.476E-01
1976	2.348E+05	1.844E-03	5.675E-01
1977	2.478E+05	1.906E-03	5.865E-01
1978	2.609E+05	1.964E-03	6.045E-01
1979	2.739E+05	2.020E-03	6.217E-01
1980	2.870E+05	2.073E-03	6.380E-01
1981	3.000E+05	2.123E-03	6.535E-01
1982	3.000E+05	2.020E-03	6.217E-01
1983	3.000E+05	1.921E-03	5.913E-01
1984	3.000E+05	1.828E-03	5.625E-01
1985	3.000E+05	1.739E-03	5.351E-01
1986	3.000E+05	1.654E-03	5.090E-01
1987	3.000E+05	1.573E-03	4.841E-01
1988	3.000E+05	1.496E-03	4.605E-01
1989	3.000E+05	1.423E-03	4.381E-01
1990	3.000E+05	1.354E-03	4.167E-01
1991	3.000E+05	1.288E-03	3.964E-01
1992	3.000E+05	1.225E-03	3.771E-01
1993	3.000E+05	1.165E-03	3.587E-01
1994	3.000E+05	1.109E-03	3.412E-01
1995	3.000E+05	1.054E-03	3.245E-01
1996	3.000E+05	1.003E-03	3.087E-01
1997	3.000E+05	9.541E-04	2.937E-01
1998	3.000E+05	9.076E-04	2.793E-01
1999	3.000E+05	8.633E-04	2.657E-01
2000	3.000E+05	8.212E-04	2.527E-01
2001	3.000E+05	7.812E-04	2.404E-01
2002	3.000E+05	7.431E-04	2.287E-01
2003	3.000E+05	7.068E-04	2.175E-01

continued

Table D5. Benzene Emission Rate from Year 1959 to 2202 (continued)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2004	3.000E+05	6.724E-04	2.069E-01
2005	3.000E+05	6.396E-04	1.968E-01
2006	3.000E+05	6.084E-04	1.872E-01
2007	3.000E+05	5.787E-04	1.781E-01
2008	3.000E+05	5.505E-04	1.694E-01
2009	3.000E+05	5.236E-04	1.612E-01
2010	3.000E+05	4.981E-04	1.533E-01
2011	3.000E+05	4.738E-04	1.458E-01
2012	3.000E+05	4.507E-04	1.387E-01
2013	3.000E+05	4.287E-04	1.319E-01
2014	3.000E+05	4.078E-04	1.255E-01
2015	3.000E+05	3.879E-04	1.194E-01
2016	3.000E+05	3.690E-04	1.136E-01
2017	3.000E+05	3.510E-04	1.080E-01
2018	3.000E+05	3.339E-04	1.028E-01
2019	3.000E+05	3.176E-04	9.775E-02
2020	3.000E+05	3.021E-04	9.298E-02
2021	3.000E+05	2.874E-04	8.845E-02
2022	3.000E+05	2.734E-04	8.413E-02
2023	3.000E+05	2.600E-04	8.003E-02
2024	3.000E+05	2.474E-04	7.613E-02
2025	3.000E+05	2.353E-04	7.241E-02
2026	3.000E+05	2.238E-04	6.888E-02
2027	3.000E+05	2.129E-04	6.552E-02
2028	3.000E+05	2.025E-04	6.233E-02
2029	3.000E+05	1.926E-04	5.929E-02
2030	3.000E+05	1.832E-04	5.640E-02
2031	3.000E+05	1.743E-04	5.365E-02
2032	3.000E+05	1.658E-04	5.103E-02
2033	3.000E+05	1.577E-04	4.854E-02
2034	3.000E+05	1.500E-04	4.617E-02
2035	3.000E+05	1.427E-04	4.392E-02
2036	3.000E+05	1.357E-04	4.178E-02
2037	3.000E+05	1.291E-04	3.974E-02
2038	3.000E+05	1.228E-04	3.780E-02
2039	3.000E+05	1.168E-04	3.596E-02
2040	3.000E+05	1.111E-04	3.421E-02
2041	3.000E+05	1.057E-04	3.254E-02
2042	3.000E+05	1.006E-04	3.095E-02
2043	3.000E+05	9.566E-05	2.944E-02
2044	3.000E+05	9.100E-05	2.801E-02
2045	3.000E+05	8.656E-05	2.664E-02
2046	3.000E+05	8.234E-05	2.534E-02
2047	3.000E+05	7.832E-05	2.410E-02
2048	3.000E+05	7.450E-05	2.293E-02
2049	3.000E+05	7.087E-05	2.181E-02
2050	3.000E+05	6.741E-05	2.075E-02
2051	3.000E+05	6.412E-05	1.974E-02
2052	3.000E+05	6.100E-05	1.877E-02
2053	3.000E+05	5.802E-05	1.786E-02
2054	3.000E+05	5.519E-05	1.699E-02
2055	3.000E+05	5.250E-05	1.616E-02
2056	3.000E+05	4.994E-05	1.537E-02
2057	3.000E+05	4.750E-05	1.462E-02
2058	3.000E+05	4.519E-05	1.391E-02
2059	3.000E+05	4.298E-05	1.323E-02
2060	3.000E+05	4.089E-05	1.258E-02
2061	3.000E+05	3.889E-05	1.197E-02
2062	3.000E+05	3.700E-05	1.139E-02
2063	3.000E+05	3.519E-05	1.083E-02
2064	3.000E+05	3.348E-05	1.030E-02
2065	3.000E+05	3.184E-05	9.800E-03
2066	3.000E+05	3.029E-05	9.322E-03
2067	3.000E+05	2.881E-05	8.868E-03
2068	3.000E+05	2.741E-05	8.435E-03
2069	3.000E+05	2.607E-05	8.024E-03
2070	3.000E+05	2.480E-05	7.632E-03
2071	3.000E+05	2.359E-05	7.260E-03
2072	3.000E+05	2.244E-05	6.906E-03
2073	3.000E+05	2.134E-05	6.569E-03
2074	3.000E+05	2.030E-05	6.249E-03

continued

Table D5. Benzene Emission Rate from Year 1959 to 2202 (continued)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2075	3.000E+05	1.931E-05	5.944E-03
2076	3.000E+05	1.837E-05	5.654E-03
2077	3.000E+05	1.748E-05	5.378E-03
2078	3.000E+05	1.662E-05	5.116E-03
2079	3.000E+05	1.581E-05	4.867E-03
2080	3.000E+05	1.504E-05	4.629E-03
2081	3.000E+05	1.431E-05	4.403E-03
2082	3.000E+05	1.361E-05	4.189E-03
2083	3.000E+05	1.295E-05	3.984E-03
2084	3.000E+05	1.231E-05	3.790E-03
2085	3.000E+05	1.171E-05	3.605E-03
2086	3.000E+05	1.114E-05	3.429E-03
2087	3.000E+05	1.060E-05	3.262E-03
2088	3.000E+05	1.008E-05	3.103E-03
2089	3.000E+05	9.591E-06	2.952E-03
2090	3.000E+05	9.123E-06	2.808E-03
2091	3.000E+05	8.678E-06	2.671E-03
2092	3.000E+05	8.255E-06	2.541E-03
2093	3.000E+05	7.852E-06	2.417E-03
2094	3.000E+05	7.469E-06	2.299E-03
2095	3.000E+05	7.105E-06	2.187E-03
2096	3.000E+05	6.759E-06	2.080E-03
2097	3.000E+05	6.429E-06	1.979E-03
2098	3.000E+05	6.115E-06	1.882E-03
2099	3.000E+05	5.817E-06	1.790E-03
2100	3.000E+05	5.533E-06	1.703E-03
2101	3.000E+05	5.264E-06	1.620E-03
2102	3.000E+05	5.007E-06	1.541E-03
2103	3.000E+05	4.763E-06	1.466E-03
2104	3.000E+05	4.530E-06	1.394E-03
2105	3.000E+05	4.309E-06	1.326E-03
2106	3.000E+05	4.099E-06	1.262E-03
2107	3.000E+05	3.899E-06	1.200E-03
2108	3.000E+05	3.709E-06	1.142E-03
2109	3.000E+05	3.528E-06	1.086E-03
2110	3.000E+05	3.356E-06	1.033E-03
2111	3.000E+05	3.193E-06	9.825E-04
2112	3.000E+05	3.037E-06	9.346E-04
2113	3.000E+05	2.889E-06	8.890E-04
2114	3.000E+05	2.748E-06	8.457E-04
2115	3.000E+05	2.614E-06	8.044E-04
2116	3.000E+05	2.486E-06	7.652E-04
2117	3.000E+05	2.365E-06	7.279E-04
2118	3.000E+05	2.250E-06	6.924E-04
2119	3.000E+05	2.140E-06	6.586E-04
2120	3.000E+05	2.036E-06	6.265E-04
2121	3.000E+05	1.936E-06	5.959E-04
2122	3.000E+05	1.842E-06	5.669E-04
2123	3.000E+05	1.752E-06	5.392E-04
2124	3.000E+05	1.667E-06	5.129E-04
2125	3.000E+05	1.585E-06	4.879E-04
2126	3.000E+05	1.508E-06	4.641E-04
2127	3.000E+05	1.434E-06	4.415E-04
2128	3.000E+05	1.365E-06	4.200E-04
2129	3.000E+05	1.298E-06	3.995E-04
2130	3.000E+05	1.235E-06	3.800E-04
2131	3.000E+05	1.174E-06	3.615E-04
2132	3.000E+05	1.117E-06	3.438E-04
2133	3.000E+05	1.063E-06	3.271E-04
2134	3.000E+05	1.011E-06	3.111E-04
2135	3.000E+05	9.616E-07	2.959E-04
2136	3.000E+05	9.147E-07	2.815E-04
2137	3.000E+05	8.701E-07	2.678E-04
2138	3.000E+05	8.276E-07	2.547E-04
2139	3.000E+05	7.873E-07	2.423E-04
2140	3.000E+05	7.489E-07	2.305E-04
2141	3.000E+05	7.123E-07	2.192E-04
2142	3.000E+05	6.776E-07	2.085E-04
2143	3.000E+05	6.446E-07	1.984E-04
2144	3.000E+05	6.131E-07	1.887E-04
2145	3.000E+05	5.832E-07	1.795E-04

continued

Table D5. Benzene Emission Rate from Year 1959 to 2202 (concluded)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2146	3.000E+05	5.548E-07	1.707E-04
2147	3.000E+05	5.277E-07	1.624E-04
2148	3.000E+05	5.020E-07	1.545E-04
2149	3.000E+05	4.775E-07	1.470E-04
2150	3.000E+05	4.542E-07	1.398E-04
2151	3.000E+05	4.321E-07	1.330E-04
2152	3.000E+05	4.110E-07	1.265E-04
2153	3.000E+05	3.909E-07	1.203E-04
2154	3.000E+05	3.719E-07	1.145E-04
2155	3.000E+05	3.537E-07	1.089E-04
2156	3.000E+05	3.365E-07	1.036E-04
2157	3.000E+05	3.201E-07	9.851E-05
2158	3.000E+05	3.045E-07	9.370E-05
2159	3.000E+05	2.896E-07	8.913E-05
2160	3.000E+05	2.755E-07	8.479E-05
2161	3.000E+05	2.621E-07	8.065E-05
2162	3.000E+05	2.493E-07	7.672E-05
2163	3.000E+05	2.371E-07	7.298E-05
2164	3.000E+05	2.256E-07	6.942E-05
2165	3.000E+05	2.146E-07	6.603E-05
2166	3.000E+05	2.041E-07	6.281E-05
2167	3.000E+05	1.941E-07	5.975E-05
2168	3.000E+05	1.847E-07	5.683E-05
2169	3.000E+05	1.757E-07	5.406E-05
2170	3.000E+05	1.671E-07	5.143E-05
2171	3.000E+05	1.589E-07	4.892E-05
2172	3.000E+05	1.512E-07	4.653E-05
2173	3.000E+05	1.438E-07	4.426E-05
2174	3.000E+05	1.368E-07	4.210E-05
2175	3.000E+05	1.301E-07	4.005E-05
2176	3.000E+05	1.238E-07	3.810E-05
2177	3.000E+05	1.178E-07	3.624E-05
2178	3.000E+05	1.120E-07	3.447E-05
2179	3.000E+05	1.065E-07	3.279E-05
2180	3.000E+05	1.013E-07	3.119E-05
2181	3.000E+05	9.641E-08	2.967E-05
2182	3.000E+05	9.170E-08	2.822E-05
2183	3.000E+05	8.723E-08	2.685E-05
2184	3.000E+05	8.298E-08	2.554E-05
2185	3.000E+05	7.893E-08	2.429E-05
2186	3.000E+05	7.508E-08	2.311E-05
2187	3.000E+05	7.142E-08	2.198E-05
2188	3.000E+05	6.794E-08	2.091E-05
2189	3.000E+05	6.462E-08	1.989E-05
2190	3.000E+05	6.147E-08	1.892E-05
2191	3.000E+05	5.847E-08	1.800E-05
2192	3.000E+05	5.562E-08	1.712E-05
2193	3.000E+05	5.291E-08	1.628E-05
2194	3.000E+05	5.033E-08	1.549E-05
2195	3.000E+05	4.787E-08	1.473E-05
2196	3.000E+05	4.554E-08	1.402E-05
2197	3.000E+05	4.332E-08	1.333E-05
2198	3.000E+05	4.121E-08	1.268E-05
2199	3.000E+05	3.920E-08	1.206E-05
2200	3.000E+05	3.728E-08	1.147E-05
2201	3.000E+05	3.547E-08	1.092E-05
2202	3.000E+05	3.374E-08	1.038E-05

Table D6. Chloroethane Emission Rate from Year 1959 to 2202

Source: H:\3000\030177~1.000\030177~1.002\SOMMER~1\SOMERSWORTH.PRM

```
================================================================================
                              Model Parameters
================================================================================
Lo : 170.00 m^3 / Mg ***** User Mode Selection *****
k : 0.0500 1/yr ***** User Mode Selection *****
NMOC : 2380.00 ppmv ***** User Mode Selection *****
Methane : 58.0000 % volume
Carbon Dioxide : 42.0000 % volume
Air Pollutant : Chloroethane (HAP/VOC)
Molecular Wt =   64.52     Concentration =      0.408000 ppmV

================================================================================
                            Landfill Parameters
================================================================================
Landfill type : Co-Disposal
Year Opened : 1958    Current Year : 2003   Closure Year: 2003
Capacity : 300000 Mg
Average Acceptance Rate Required from
         Current Year to Closure Year : 0.00 Mg/year

================================================================================
                               Model Results
================================================================================
```

Year	Refuse In Place (Mg)	Chloroethane (HAP/VOC) Emission Rate (Mg/yr)	Chloroethane (HAP/VOC) Emission Rate (Cubic m/yr)
1959	1.304E+04	2.093E-04	7.799E-02
1960	2.609E+04	4.084E-04	1.522E-01
1961	3.913E+04	5.978E-04	2.227E-01
1962	5.217E+04	7.779E-04	2.899E-01
1963	6.522E+04	9.493E-04	3.537E-01
1964	7.826E+04	1.112E-03	4.145E-01
1965	9.130E+04	1.267E-03	4.722E-01
1966	1.043E+05	1.415E-03	5.272E-01
1967	1.174E+05	1.555E-03	5.795E-01
1968	1.304E+05	1.689E-03	6.292E-01
1969	1.435E+05	1.815E-03	6.765E-01
1970	1.565E+05	1.936E-03	7.215E-01
1971	1.696E+05	2.051E-03	7.643E-01
1972	1.826E+05	2.160E-03	8.050E-01
1973	1.957E+05	2.264E-03	8.438E-01
1974	2.087E+05	2.363E-03	8.806E-01
1975	2.217E+05	2.457E-03	9.156E-01
1976	2.348E+05	2.547E-03	9.490E-01
1977	2.478E+05	2.632E-03	9.807E-01
1978	2.609E+05	2.713E-03	1.011E+00
1979	2.739E+05	2.790E-03	1.040E+00
1980	2.870E+05	2.863E-03	1.067E+00
1981	3.000E+05	2.933E-03	1.093E+00
1982	3.000E+05	2.790E-03	1.039E+00
1983	3.000E+05	2.654E-03	9.888E-01
1984	3.000E+05	2.524E-03	9.406E-01
1985	3.000E+05	2.401E-03	8.947E-01
1986	3.000E+05	2.284E-03	8.511E-01
1987	3.000E+05	2.173E-03	8.096E-01
1988	3.000E+05	2.067E-03	7.701E-01
1989	3.000E+05	1.966E-03	7.325E-01
1990	3.000E+05	1.870E-03	6.968E-01
1991	3.000E+05	1.779E-03	6.628E-01
1992	3.000E+05	1.692E-03	6.305E-01
1993	3.000E+05	1.609E-03	5.997E-01
1994	3.000E+05	1.531E-03	5.705E-01
1995	3.000E+05	1.456E-03	5.427E-01
1996	3.000E+05	1.385E-03	5.162E-01
1997	3.000E+05	1.318E-03	4.910E-01
1998	3.000E+05	1.253E-03	4.671E-01
1999	3.000E+05	1.192E-03	4.443E-01
2000	3.000E+05	1.134E-03	4.226E-01
2001	3.000E+05	1.079E-03	4.020E-01
2002	3.000E+05	1.026E-03	3.824E-01
2003	3.000E+05	9.762E-04	3.638E-01

continued

Table D6. Chloroethane Emission Rate from Year 1959 to 2202 (continued)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2004	3.000E+05	9.286E-04	3.460E-01
2005	3.000E+05	8.833E-04	3.291E-01
2006	3.000E+05	8.402E-04	3.131E-01
2007	3.000E+05	7.992E-04	2.978E-01
2008	3.000E+05	7.602E-04	2.833E-01
2009	3.000E+05	7.232E-04	2.695E-01
2010	3.000E+05	6.879E-04	2.563E-01
2011	3.000E+05	6.543E-04	2.438E-01
2012	3.000E+05	6.224E-04	2.319E-01
2013	3.000E+05	5.921E-04	2.206E-01
2014	3.000E+05	5.632E-04	2.099E-01
2015	3.000E+05	5.357E-04	1.996E-01
2016	3.000E+05	5.096E-04	1.899E-01
2017	3.000E+05	4.848E-04	1.806E-01
2018	3.000E+05	4.611E-04	1.718E-01
2019	3.000E+05	4.386E-04	1.634E-01
2020	3.000E+05	4.172E-04	1.555E-01
2021	3.000E+05	3.969E-04	1.479E-01
2022	3.000E+05	3.775E-04	1.407E-01
2023	3.000E+05	3.591E-04	1.338E-01
2024	3.000E+05	3.416E-04	1.273E-01
2025	3.000E+05	3.249E-04	1.211E-01
2026	3.000E+05	3.091E-04	1.152E-01
2027	3.000E+05	2.940E-04	1.096E-01
2028	3.000E+05	2.797E-04	1.042E-01
2029	3.000E+05	2.660E-04	9.914E-02
2030	3.000E+05	2.531E-04	9.430E-02
2031	3.000E+05	2.407E-04	8.970E-02
2032	3.000E+05	2.290E-04	8.533E-02
2033	3.000E+05	2.178E-04	8.117E-02
2034	3.000E+05	2.072E-04	7.721E-02
2035	3.000E+05	1.971E-04	7.344E-02
2036	3.000E+05	1.875E-04	6.986E-02
2037	3.000E+05	1.783E-04	6.645E-02
2038	3.000E+05	1.696E-04	6.321E-02
2039	3.000E+05	1.614E-04	6.013E-02
2040	3.000E+05	1.535E-04	5.720E-02
2041	3.000E+05	1.460E-04	5.441E-02
2042	3.000E+05	1.389E-04	5.175E-02
2043	3.000E+05	1.321E-04	4.923E-02
2044	3.000E+05	1.257E-04	4.683E-02
2045	3.000E+05	1.195E-04	4.454E-02
2046	3.000E+05	1.137E-04	4.237E-02
2047	3.000E+05	1.082E-04	4.031E-02
2048	3.000E+05	1.029E-04	3.834E-02
2049	3.000E+05	9.787E-05	3.647E-02
2050	3.000E+05	9.310E-05	3.469E-02
2051	3.000E+05	8.856E-05	3.300E-02
2052	3.000E+05	8.424E-05	3.139E-02
2053	3.000E+05	8.013E-05	2.986E-02
2054	3.000E+05	7.622E-05	2.840E-02
2055	3.000E+05	7.250E-05	2.702E-02
2056	3.000E+05	6.897E-05	2.570E-02
2057	3.000E+05	6.560E-05	2.445E-02
2058	3.000E+05	6.240E-05	2.325E-02
2059	3.000E+05	5.936E-05	2.212E-02
2060	3.000E+05	5.647E-05	2.104E-02
2061	3.000E+05	5.371E-05	2.002E-02
2062	3.000E+05	5.109E-05	1.904E-02
2063	3.000E+05	4.860E-05	1.811E-02
2064	3.000E+05	4.623E-05	1.723E-02
2065	3.000E+05	4.398E-05	1.639E-02
2066	3.000E+05	4.183E-05	1.559E-02
2067	3.000E+05	3.979E-05	1.483E-02
2068	3.000E+05	3.785E-05	1.410E-02
2069	3.000E+05	3.600E-05	1.342E-02
2070	3.000E+05	3.425E-05	1.276E-02
2071	3.000E+05	3.258E-05	1.214E-02
2072	3.000E+05	3.099E-05	1.155E-02
2073	3.000E+05	2.948E-05	1.098E-02
2074	3.000E+05	2.804E-05	1.045E-02

continued

Table D6. Chloroethane Emission Rate from Year 1959 to 2202 (continued)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2075	3.000E+05	2.667E-05	9.939E-03
2076	3.000E+05	2.537E-05	9.455E-03
2077	3.000E+05	2.413E-05	8.993E-03
2078	3.000E+05	2.296E-05	8.555E-03
2079	3.000E+05	2.184E-05	8.138E-03
2080	3.000E+05	2.077E-05	7.741E-03
2081	3.000E+05	1.976E-05	7.363E-03
2082	3.000E+05	1.880E-05	7.004E-03
2083	3.000E+05	1.788E-05	6.662E-03
2084	3.000E+05	1.701E-05	6.338E-03
2085	3.000E+05	1.618E-05	6.028E-03
2086	3.000E+05	1.539E-05	5.734E-03
2087	3.000E+05	1.464E-05	5.455E-03
2088	3.000E+05	1.392E-05	5.189E-03
2089	3.000E+05	1.325E-05	4.936E-03
2090	3.000E+05	1.260E-05	4.695E-03
2091	3.000E+05	1.198E-05	4.466E-03
2092	3.000E+05	1.140E-05	4.248E-03
2093	3.000E+05	1.084E-05	4.041E-03
2094	3.000E+05	1.032E-05	3.844E-03
2095	3.000E+05	9.812E-06	3.656E-03
2096	3.000E+05	9.334E-06	3.478E-03
2097	3.000E+05	8.879E-06	3.308E-03
2098	3.000E+05	8.446E-06	3.147E-03
2099	3.000E+05	8.034E-06	2.994E-03
2100	3.000E+05	7.642E-06	2.848E-03
2101	3.000E+05	7.269E-06	2.709E-03
2102	3.000E+05	6.915E-06	2.577E-03
2103	3.000E+05	6.577E-06	2.451E-03
2104	3.000E+05	6.257E-06	2.331E-03
2105	3.000E+05	5.951E-06	2.218E-03
2106	3.000E+05	5.661E-06	2.110E-03
2107	3.000E+05	5.385E-06	2.007E-03
2108	3.000E+05	5.122E-06	1.909E-03
2109	3.000E+05	4.873E-06	1.816E-03
2110	3.000E+05	4.635E-06	1.727E-03
2111	3.000E+05	4.409E-06	1.643E-03
2112	3.000E+05	4.194E-06	1.563E-03
2113	3.000E+05	3.989E-06	1.487E-03
2114	3.000E+05	3.795E-06	1.414E-03
2115	3.000E+05	3.610E-06	1.345E-03
2116	3.000E+05	3.434E-06	1.280E-03
2117	3.000E+05	3.266E-06	1.217E-03
2118	3.000E+05	3.107E-06	1.158E-03
2119	3.000E+05	2.955E-06	1.101E-03
2120	3.000E+05	2.811E-06	1.048E-03
2121	3.000E+05	2.674E-06	9.965E-04
2122	3.000E+05	2.544E-06	9.479E-04
2123	3.000E+05	2.420E-06	9.017E-04
2124	3.000E+05	2.302E-06	8.577E-04
2125	3.000E+05	2.189E-06	8.159E-04
2126	3.000E+05	2.083E-06	7.761E-04
2127	3.000E+05	1.981E-06	7.382E-04
2128	3.000E+05	1.884E-06	7.022E-04
2129	3.000E+05	1.793E-06	6.680E-04
2130	3.000E+05	1.705E-06	6.354E-04
2131	3.000E+05	1.622E-06	6.044E-04
2132	3.000E+05	1.543E-06	5.749E-04
2133	3.000E+05	1.468E-06	5.469E-04
2134	3.000E+05	1.396E-06	5.202E-04
2135	3.000E+05	1.328E-06	4.948E-04
2136	3.000E+05	1.263E-06	4.707E-04
2137	3.000E+05	1.202E-06	4.478E-04
2138	3.000E+05	1.143E-06	4.259E-04
2139	3.000E+05	1.087E-06	4.051E-04
2140	3.000E+05	1.034E-06	3.854E-04
2141	3.000E+05	9.838E-07	3.666E-04
2142	3.000E+05	9.358E-07	3.487E-04
2143	3.000E+05	8.902E-07	3.317E-04
2144	3.000E+05	8.467E-07	3.155E-04
2145	3.000E+05	8.054E-07	3.001E-04

continued

Table D6. Chloroethane Emission Rate from Year 1959 to 2202 (concluded)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2146	3.000E+05	7.662E-07	2.855E-04
2147	3.000E+05	7.288E-07	2.716E-04
2148	3.000E+05	6.933E-07	2.583E-04
2149	3.000E+05	6.594E-07	2.457E-04
2150	3.000E+05	6.273E-07	2.337E-04
2151	3.000E+05	5.967E-07	2.223E-04
2152	3.000E+05	5.676E-07	2.115E-04
2153	3.000E+05	5.399E-07	2.012E-04
2154	3.000E+05	5.136E-07	1.914E-04
2155	3.000E+05	4.885E-07	1.820E-04
2156	3.000E+05	4.647E-07	1.732E-04
2157	3.000E+05	4.420E-07	1.647E-04
2158	3.000E+05	4.205E-07	1.567E-04
2159	3.000E+05	4.000E-07	1.490E-04
2160	3.000E+05	3.805E-07	1.418E-04
2161	3.000E+05	3.619E-07	1.349E-04
2162	3.000E+05	3.443E-07	1.283E-04
2163	3.000E+05	3.275E-07	1.220E-04
2164	3.000E+05	3.115E-07	1.161E-04
2165	3.000E+05	2.963E-07	1.104E-04
2166	3.000E+05	2.819E-07	1.050E-04
2167	3.000E+05	2.681E-07	9.991E-05
2168	3.000E+05	2.550E-07	9.504E-05
2169	3.000E+05	2.426E-07	9.040E-05
2170	3.000E+05	2.308E-07	8.599E-05
2171	3.000E+05	2.195E-07	8.180E-05
2172	3.000E+05	2.088E-07	7.781E-05
2173	3.000E+05	1.986E-07	7.401E-05
2174	3.000E+05	1.889E-07	7.040E-05
2175	3.000E+05	1.797E-07	6.697E-05
2176	3.000E+05	1.710E-07	6.370E-05
2177	3.000E+05	1.626E-07	6.060E-05
2178	3.000E+05	1.547E-07	5.764E-05
2179	3.000E+05	1.471E-07	5.483E-05
2180	3.000E+05	1.400E-07	5.216E-05
2181	3.000E+05	1.331E-07	4.961E-05
2182	3.000E+05	1.266E-07	4.719E-05
2183	3.000E+05	1.205E-07	4.489E-05
2184	3.000E+05	1.146E-07	4.270E-05
2185	3.000E+05	1.090E-07	4.062E-05
2186	3.000E+05	1.037E-07	3.864E-05
2187	3.000E+05	9.863E-08	3.675E-05
2188	3.000E+05	9.382E-08	3.496E-05
2189	3.000E+05	8.925E-08	3.326E-05
2190	3.000E+05	8.489E-08	3.163E-05
2191	3.000E+05	8.075E-08	3.009E-05
2192	3.000E+05	7.681E-08	2.862E-05
2193	3.000E+05	7.307E-08	2.723E-05
2194	3.000E+05	6.950E-08	2.590E-05
2195	3.000E+05	6.611E-08	2.464E-05
2196	3.000E+05	6.289E-08	2.344E-05
2197	3.000E+05	5.982E-08	2.229E-05
2198	3.000E+05	5.691E-08	2.121E-05
2199	3.000E+05	5.413E-08	2.017E-05
2200	3.000E+05	5.149E-08	1.919E-05
2201	3.000E+05	4.898E-08	1.825E-05
2202	3.000E+05	4.659E-08	1.736E-05

Table D7. Dichlorobenzene Emission Rate from Year 1959 to 2202

```
Source: H:\3000\030177~1.000\030177~1.002\SOMMER~1\SOMERSWORTH.PRM

===============================================================================
                            Model Parameters
===============================================================================
Lo : 170.00 m^3 / Mg ***** User Mode Selection *****
k : 0.0500 1/yr ***** User Mode Selection *****
NMOC : 2380.00 ppmv ***** User Mode Selection *****
Methane : 58.0000 % volume
Carbon Dioxide : 42.0000 % volume
Air Pollutant : Dichlorobenzene (VOC/HAP for 1,4 isomer)
Molecular Wt =  147.00     Concentration =      0.428800 ppmV

===============================================================================
                          Landfill Parameters
===============================================================================
Landfill type : Co-Disposal
Year Opened : 1958    Current Year : 2003  Closure Year: 2003
Capacity : 300000 Mg
Average Acceptance Rate Required from
         Current Year to Closure Year : 0.00 Mg/year

===============================================================================
                            Model Results
===============================================================================
                             Dichlorobenzene (VOC/HAP for 1,4 isomer) Emission Ra
Year     Refuse In Place (Mg)            (Mg/yr)          (Cubic m/yr)
===============================================================================
1959         1.304E+04                 5.012E-04          8.197E-02
1960         2.609E+04                 9.779E-04          1.599E-01
1961         3.913E+04                 1.431E-03          2.341E-01
1962         5.217E+04                 1.863E-03          3.047E-01
1963         6.522E+04                 2.273E-03          3.718E-01
1964         7.826E+04                 2.663E-03          4.356E-01
1965         9.130E+04                 3.035E-03          4.963E-01
1966         1.043E+05                 3.388E-03          5.541E-01
1967         1.174E+05                 3.724E-03          6.090E-01
1968         1.304E+05                 4.043E-03          6.613E-01
1969         1.435E+05                 4.347E-03          7.110E-01
1970         1.565E+05                 4.636E-03          7.583E-01
1971         1.696E+05                 4.911E-03          8.033E-01
1972         1.826E+05                 5.173E-03          8.461E-01
1973         1.957E+05                 5.422E-03          8.868E-01
1974         2.087E+05                 5.659E-03          9.255E-01
1975         2.217E+05                 5.884E-03          9.623E-01
1976         2.348E+05                 6.098E-03          9.974E-01
1977         2.478E+05                 6.302E-03          1.031E+00
1978         2.609E+05                 6.496E-03          1.062E+00
1979         2.739E+05                 6.680E-03          1.093E+00
1980         2.870E+05                 6.855E-03          1.121E+00
1981         3.000E+05                 7.022E-03          1.149E+00
1982         3.000E+05                 6.680E-03          1.092E+00
1983         3.000E+05                 6.354E-03          1.039E+00
1984         3.000E+05                 6.044E-03          9.885E-01
1985         3.000E+05                 5.749E-03          9.403E-01
1986         3.000E+05                 5.469E-03          8.945E-01
1987         3.000E+05                 5.202E-03          8.508E-01
1988         3.000E+05                 4.948E-03          8.093E-01
1989         3.000E+05                 4.707E-03          7.699E-01
1990         3.000E+05                 4.478E-03          7.323E-01
1991         3.000E+05                 4.259E-03          6.966E-01
1992         3.000E+05                 4.051E-03          6.626E-01
1993         3.000E+05                 3.854E-03          6.303E-01
1994         3.000E+05                 3.666E-03          5.996E-01
1995         3.000E+05                 3.487E-03          5.703E-01
1996         3.000E+05                 3.317E-03          5.425E-01
1997         3.000E+05                 3.155E-03          5.161E-01
1998         3.000E+05                 3.001E-03          4.909E-01
1999         3.000E+05                 2.855E-03          4.669E-01
2000         3.000E+05                 2.716E-03          4.442E-01
2001         3.000E+05                 2.583E-03          4.225E-01
2002         3.000E+05                 2.457E-03          4.019E-01
2003         3.000E+05                 2.337E-03          3.823E-01
```

continued

Table D7. Dichlorobenzene Emission Rate from Year 1959 to 2202 (continued)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2004	3.000E+05	2.223E-03	3.637E-01
2005	3.000E+05	2.115E-03	3.459E-01
2006	3.000E+05	2.012E-03	3.291E-01
2007	3.000E+05	1.914E-03	3.130E-01
2008	3.000E+05	1.820E-03	2.977E-01
2009	3.000E+05	1.732E-03	2.832E-01
2010	3.000E+05	1.647E-03	2.694E-01
2011	3.000E+05	1.567E-03	2.563E-01
2012	3.000E+05	1.490E-03	2.438E-01
2013	3.000E+05	1.418E-03	2.319E-01
2014	3.000E+05	1.349E-03	2.206E-01
2015	3.000E+05	1.283E-03	2.098E-01
2016	3.000E+05	1.220E-03	1.996E-01
2017	3.000E+05	1.161E-03	1.898E-01
2018	3.000E+05	1.104E-03	1.806E-01
2019	3.000E+05	1.050E-03	1.718E-01
2020	3.000E+05	9.991E-04	1.634E-01
2021	3.000E+05	9.503E-04	1.554E-01
2022	3.000E+05	9.040E-04	1.479E-01
2023	3.000E+05	8.599E-04	1.406E-01
2024	3.000E+05	8.180E-04	1.338E-01
2025	3.000E+05	7.781E-04	1.273E-01
2026	3.000E+05	7.401E-04	1.211E-01
2027	3.000E+05	7.040E-04	1.151E-01
2028	3.000E+05	6.697E-04	1.095E-01
2029	3.000E+05	6.370E-04	1.042E-01
2030	3.000E+05	6.060E-04	9.911E-02
2031	3.000E+05	5.764E-04	9.428E-02
2032	3.000E+05	5.483E-04	8.968E-02
2033	3.000E+05	5.216E-04	8.530E-02
2034	3.000E+05	4.961E-04	8.114E-02
2035	3.000E+05	4.719E-04	7.719E-02
2036	3.000E+05	4.489E-04	7.342E-02
2037	3.000E+05	4.270E-04	6.984E-02
2038	3.000E+05	4.062E-04	6.643E-02
2039	3.000E+05	3.864E-04	6.319E-02
2040	3.000E+05	3.675E-04	6.011E-02
2041	3.000E+05	3.496E-04	5.718E-02
2042	3.000E+05	3.326E-04	5.439E-02
2043	3.000E+05	3.163E-04	5.174E-02
2044	3.000E+05	3.009E-04	4.922E-02
2045	3.000E+05	2.862E-04	4.682E-02
2046	3.000E+05	2.723E-04	4.453E-02
2047	3.000E+05	2.590E-04	4.236E-02
2048	3.000E+05	2.464E-04	4.029E-02
2049	3.000E+05	2.344E-04	3.833E-02
2050	3.000E+05	2.229E-04	3.646E-02
2051	3.000E+05	2.120E-04	3.468E-02
2052	3.000E+05	2.017E-04	3.299E-02
2053	3.000E+05	1.919E-04	3.138E-02
2054	3.000E+05	1.825E-04	2.985E-02
2055	3.000E+05	1.736E-04	2.840E-02
2056	3.000E+05	1.651E-04	2.701E-02
2057	3.000E+05	1.571E-04	2.569E-02
2058	3.000E+05	1.494E-04	2.444E-02
2059	3.000E+05	1.421E-04	2.325E-02
2060	3.000E+05	1.352E-04	2.211E-02
2061	3.000E+05	1.286E-04	2.104E-02
2062	3.000E+05	1.223E-04	2.001E-02
2063	3.000E+05	1.164E-04	1.903E-02
2064	3.000E+05	1.107E-04	1.811E-02
2065	3.000E+05	1.053E-04	1.722E-02
2066	3.000E+05	1.002E-04	1.638E-02
2067	3.000E+05	9.528E-05	1.558E-02
2068	3.000E+05	9.063E-05	1.482E-02
2069	3.000E+05	8.621E-05	1.410E-02
2070	3.000E+05	8.201E-05	1.341E-02
2071	3.000E+05	7.801E-05	1.276E-02
2072	3.000E+05	7.420E-05	1.214E-02
2073	3.000E+05	7.059E-05	1.154E-02
2074	3.000E+05	6.714E-05	1.098E-02

continued

Table D7. Dichlorobenzene Emission Rate from Year 1959 to 2202 (continued)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2075	3.000E+05	6.387E-05	1.045E-02
2076	3.000E+05	6.075E-05	9.937E-03
2077	3.000E+05	5.779E-05	9.452E-03
2078	3.000E+05	5.497E-05	8.991E-03
2079	3.000E+05	5.229E-05	8.552E-03
2080	3.000E+05	4.974E-05	8.135E-03
2081	3.000E+05	4.731E-05	7.739E-03
2082	3.000E+05	4.501E-05	7.361E-03
2083	3.000E+05	4.281E-05	7.002E-03
2084	3.000E+05	4.072E-05	6.661E-03
2085	3.000E+05	3.874E-05	6.336E-03
2086	3.000E+05	3.685E-05	6.027E-03
2087	3.000E+05	3.505E-05	5.733E-03
2088	3.000E+05	3.334E-05	5.453E-03
2089	3.000E+05	3.172E-05	5.187E-03
2090	3.000E+05	3.017E-05	4.934E-03
2091	3.000E+05	2.870E-05	4.694E-03
2092	3.000E+05	2.730E-05	4.465E-03
2093	3.000E+05	2.597E-05	4.247E-03
2094	3.000E+05	2.470E-05	4.040E-03
2095	3.000E+05	2.350E-05	3.843E-03
2096	3.000E+05	2.235E-05	3.655E-03
2097	3.000E+05	2.126E-05	3.477E-03
2098	3.000E+05	2.022E-05	3.308E-03
2099	3.000E+05	1.924E-05	3.146E-03
2100	3.000E+05	1.830E-05	2.993E-03
2101	3.000E+05	1.741E-05	2.847E-03
2102	3.000E+05	1.656E-05	2.708E-03
2103	3.000E+05	1.575E-05	2.576E-03
2104	3.000E+05	1.498E-05	2.450E-03
2105	3.000E+05	1.425E-05	2.331E-03
2106	3.000E+05	1.356E-05	2.217E-03
2107	3.000E+05	1.289E-05	2.109E-03
2108	3.000E+05	1.227E-05	2.006E-03
2109	3.000E+05	1.167E-05	1.908E-03
2110	3.000E+05	1.110E-05	1.815E-03
2111	3.000E+05	1.056E-05	1.727E-03
2112	3.000E+05	1.004E-05	1.642E-03
2113	3.000E+05	9.553E-06	1.562E-03
2114	3.000E+05	9.087E-06	1.486E-03
2115	3.000E+05	8.644E-06	1.414E-03
2116	3.000E+05	8.222E-06	1.345E-03
2117	3.000E+05	7.821E-06	1.279E-03
2118	3.000E+05	7.440E-06	1.217E-03
2119	3.000E+05	7.077E-06	1.157E-03
2120	3.000E+05	6.732E-06	1.101E-03
2121	3.000E+05	6.403E-06	1.047E-03
2122	3.000E+05	6.091E-06	9.962E-04
2123	3.000E+05	5.794E-06	9.476E-04
2124	3.000E+05	5.511E-06	9.014E-04
2125	3.000E+05	5.243E-06	8.575E-04
2126	3.000E+05	4.987E-06	8.156E-04
2127	3.000E+05	4.744E-06	7.759E-04
2128	3.000E+05	4.512E-06	7.380E-04
2129	3.000E+05	4.292E-06	7.020E-04
2130	3.000E+05	4.083E-06	6.678E-04
2131	3.000E+05	3.884E-06	6.352E-04
2132	3.000E+05	3.694E-06	6.042E-04
2133	3.000E+05	3.514E-06	5.748E-04
2134	3.000E+05	3.343E-06	5.467E-04
2135	3.000E+05	3.180E-06	5.201E-04
2136	3.000E+05	3.025E-06	4.947E-04
2137	3.000E+05	2.877E-06	4.706E-04
2138	3.000E+05	2.737E-06	4.476E-04
2139	3.000E+05	2.603E-06	4.258E-04
2140	3.000E+05	2.476E-06	4.050E-04
2141	3.000E+05	2.356E-06	3.853E-04
2142	3.000E+05	2.241E-06	3.665E-04
2143	3.000E+05	2.131E-06	3.486E-04
2144	3.000E+05	2.028E-06	3.316E-04
2145	3.000E+05	1.929E-06	3.154E-04

continued

Table D7. Dichlorobenzene Emission Rate from Year 1959 to 2202 (concluded)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2146	3.000E+05	1.835E-06	3.001E-04
2147	3.000E+05	1.745E-06	2.854E-04
2148	3.000E+05	1.660E-06	2.715E-04
2149	3.000E+05	1.579E-06	2.583E-04
2150	3.000E+05	1.502E-06	2.457E-04
2151	3.000E+05	1.429E-06	2.337E-04
2152	3.000E+05	1.359E-06	2.223E-04
2153	3.000E+05	1.293E-06	2.114E-04
2154	3.000E+05	1.230E-06	2.011E-04
2155	3.000E+05	1.170E-06	1.913E-04
2156	3.000E+05	1.113E-06	1.820E-04
2157	3.000E+05	1.058E-06	1.731E-04
2158	3.000E+05	1.007E-06	1.647E-04
2159	3.000E+05	9.577E-07	1.566E-04
2160	3.000E+05	9.110E-07	1.490E-04
2161	3.000E+05	8.666E-07	1.417E-04
2162	3.000E+05	8.243E-07	1.348E-04
2163	3.000E+05	7.841E-07	1.282E-04
2164	3.000E+05	7.459E-07	1.220E-04
2165	3.000E+05	7.095E-07	1.160E-04
2166	3.000E+05	6.749E-07	1.104E-04
2167	3.000E+05	6.420E-07	1.050E-04
2168	3.000E+05	6.107E-07	9.988E-05
2169	3.000E+05	5.809E-07	9.501E-05
2170	3.000E+05	5.526E-07	9.038E-05
2171	3.000E+05	5.256E-07	8.597E-05
2172	3.000E+05	5.000E-07	8.177E-05
2173	3.000E+05	4.756E-07	7.779E-05
2174	3.000E+05	4.524E-07	7.399E-05
2175	3.000E+05	4.303E-07	7.038E-05
2176	3.000E+05	4.094E-07	6.695E-05
2177	3.000E+05	3.894E-07	6.369E-05
2178	3.000E+05	3.704E-07	6.058E-05
2179	3.000E+05	3.523E-07	5.763E-05
2180	3.000E+05	3.351E-07	5.482E-05
2181	3.000E+05	3.188E-07	5.214E-05
2182	3.000E+05	3.033E-07	4.960E-05
2183	3.000E+05	2.885E-07	4.718E-05
2184	3.000E+05	2.744E-07	4.488E-05
2185	3.000E+05	2.610E-07	4.269E-05
2186	3.000E+05	2.483E-07	4.061E-05
2187	3.000E+05	2.362E-07	3.863E-05
2188	3.000E+05	2.247E-07	3.674E-05
2189	3.000E+05	2.137E-07	3.495E-05
2190	3.000E+05	2.033E-07	3.325E-05
2191	3.000E+05	1.934E-07	3.163E-05
2192	3.000E+05	1.839E-07	3.008E-05
2193	3.000E+05	1.750E-07	2.862E-05
2194	3.000E+05	1.664E-07	2.722E-05
2195	3.000E+05	1.583E-07	2.589E-05
2196	3.000E+05	1.506E-07	2.463E-05
2197	3.000E+05	1.432E-07	2.343E-05
2198	3.000E+05	1.363E-07	2.229E-05
2199	3.000E+05	1.296E-07	2.120E-05
2200	3.000E+05	1.233E-07	2.017E-05
2201	3.000E+05	1.173E-07	1.918E-05
2202	3.000E+05	1.116E-07	1.825E-05

Table D8. Methylene Chloride Emission Rate from Year 1959 to 2202

Source: H:\3000\030177~1.000\030177~1.002\SOMMER~1\SOMERSWORTH.PRM

Model Parameters

Lo : 170.00 m^3 / Mg ***** User Mode Selection *****
k : 0.0500 1/yr ***** User Mode Selection *****
NMOC : 2380.00 ppmv ***** User Mode Selection *****
Methane : 58.0000 % volume
Carbon Dioxide : 42.0000 % volume
Air Pollutant : Methylene Chloride
Molecular Wt = 84.93 Concentration = 0.236000 ppmV

Landfill Parameters

Landfill type : Co-Disposal
Year Opened : 1958 Current Year : 2003 Closure Year: 2003
Capacity : 300000 Mg
Average Acceptance Rate Required from
Current Year to Closure Year : 0.00 Mg/year

Model Results

Year	Refuse In Place (Mg)	Methylene Chloride Emission Rate (Mg/yr)	Methylene Chloride Emission Rate (Cubic m/yr)
1959	1.304E+04	1.594E-04	4.511E-02
1960	2.609E+04	3.109E-04	8.802E-02
1961	3.913E+04	4.551E-04	1.288E-01
1962	5.217E+04	5.923E-04	1.677E-01
1963	6.522E+04	7.228E-04	2.046E-01
1964	7.826E+04	8.469E-04	2.397E-01
1965	9.130E+04	9.649E-04	2.732E-01
1966	1.043E+05	1.077E-03	3.050E-01
1967	1.174E+05	1.184E-03	3.352E-01
1968	1.304E+05	1.286E-03	3.640E-01
1969	1.435E+05	1.382E-03	3.913E-01
1970	1.565E+05	1.474E-03	4.173E-01
1971	1.696E+05	1.562E-03	4.421E-01
1972	1.826E+05	1.645E-03	4.657E-01
1973	1.957E+05	1.724E-03	4.881E-01
1974	2.087E+05	1.799E-03	5.094E-01
1975	2.217E+05	1.871E-03	5.296E-01
1976	2.348E+05	1.939E-03	5.489E-01
1977	2.478E+05	2.004E-03	5.673E-01
1978	2.609E+05	2.065E-03	5.847E-01
1979	2.739E+05	2.124E-03	6.013E-01
1980	2.870E+05	2.180E-03	6.171E-01
1981	3.000E+05	2.233E-03	6.321E-01
1982	3.000E+05	2.124E-03	6.013E-01
1983	3.000E+05	2.020E-03	5.720E-01
1984	3.000E+05	1.922E-03	5.441E-01
1985	3.000E+05	1.828E-03	5.175E-01
1986	3.000E+05	1.739E-03	4.923E-01
1987	3.000E+05	1.654E-03	4.683E-01
1988	3.000E+05	1.573E-03	4.454E-01
1989	3.000E+05	1.497E-03	4.237E-01
1990	3.000E+05	1.424E-03	4.030E-01
1991	3.000E+05	1.354E-03	3.834E-01
1992	3.000E+05	1.288E-03	3.647E-01
1993	3.000E+05	1.225E-03	3.469E-01
1994	3.000E+05	1.166E-03	3.300E-01
1995	3.000E+05	1.109E-03	3.139E-01
1996	3.000E+05	1.055E-03	2.986E-01
1997	3.000E+05	1.003E-03	2.840E-01
1998	3.000E+05	9.544E-04	2.702E-01
1999	3.000E+05	9.078E-04	2.570E-01
2000	3.000E+05	8.636E-04	2.445E-01
2001	3.000E+05	8.214E-04	2.325E-01
2002	3.000E+05	7.814E-04	2.212E-01
2003	3.000E+05	7.433E-04	2.104E-01

continued

Table D8. Methylene Chloride Emission Rate from Year 1959 to 2202 (continued)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2004	3.000E+05	7.070E-04	2.001E-01
2005	3.000E+05	6.725E-04	1.904E-01
2006	3.000E+05	6.397E-04	1.811E-01
2007	3.000E+05	6.085E-04	1.723E-01
2008	3.000E+05	5.789E-04	1.639E-01
2009	3.000E+05	5.506E-04	1.559E-01
2010	3.000E+05	5.238E-04	1.483E-01
2011	3.000E+05	4.982E-04	1.410E-01
2012	3.000E+05	4.739E-04	1.342E-01
2013	3.000E+05	4.508E-04	1.276E-01
2014	3.000E+05	4.288E-04	1.214E-01
2015	3.000E+05	4.079E-04	1.155E-01
2016	3.000E+05	3.880E-04	1.098E-01
2017	3.000E+05	3.691E-04	1.045E-01
2018	3.000E+05	3.511E-04	9.939E-02
2019	3.000E+05	3.340E-04	9.454E-02
2020	3.000E+05	3.177E-04	8.993E-02
2021	3.000E+05	3.022E-04	8.555E-02
2022	3.000E+05	2.875E-04	8.137E-02
2023	3.000E+05	2.734E-04	7.741E-02
2024	3.000E+05	2.601E-04	7.363E-02
2025	3.000E+05	2.474E-04	7.004E-02
2026	3.000E+05	2.353E-04	6.662E-02
2027	3.000E+05	2.239E-04	6.337E-02
2028	3.000E+05	2.129E-04	6.028E-02
2029	3.000E+05	2.026E-04	5.734E-02
2030	3.000E+05	1.927E-04	5.455E-02
2031	3.000E+05	1.833E-04	5.189E-02
2032	3.000E+05	1.743E-04	4.936E-02
2033	3.000E+05	1.658E-04	4.695E-02
2034	3.000E+05	1.578E-04	4.466E-02
2035	3.000E+05	1.501E-04	4.248E-02
2036	3.000E+05	1.427E-04	4.041E-02
2037	3.000E+05	1.358E-04	3.844E-02
2038	3.000E+05	1.292E-04	3.656E-02
2039	3.000E+05	1.229E-04	3.478E-02
2040	3.000E+05	1.169E-04	3.308E-02
2041	3.000E+05	1.112E-04	3.147E-02
2042	3.000E+05	1.057E-04	2.994E-02
2043	3.000E+05	1.006E-04	2.848E-02
2044	3.000E+05	9.568E-05	2.709E-02
2045	3.000E+05	9.102E-05	2.577E-02
2046	3.000E+05	8.658E-05	2.451E-02
2047	3.000E+05	8.236E-05	2.331E-02
2048	3.000E+05	7.834E-05	2.218E-02
2049	3.000E+05	7.452E-05	2.110E-02
2050	3.000E+05	7.088E-05	2.007E-02
2051	3.000E+05	6.743E-05	1.909E-02
2052	3.000E+05	6.414E-05	1.816E-02
2053	3.000E+05	6.101E-05	1.727E-02
2054	3.000E+05	5.804E-05	1.643E-02
2055	3.000E+05	5.521E-05	1.563E-02
2056	3.000E+05	5.251E-05	1.487E-02
2057	3.000E+05	4.995E-05	1.414E-02
2058	3.000E+05	4.752E-05	1.345E-02
2059	3.000E+05	4.520E-05	1.280E-02
2060	3.000E+05	4.299E-05	1.217E-02
2061	3.000E+05	4.090E-05	1.158E-02
2062	3.000E+05	3.890E-05	1.101E-02
2063	3.000E+05	3.701E-05	1.048E-02
2064	3.000E+05	3.520E-05	9.965E-03
2065	3.000E+05	3.348E-05	9.479E-03
2066	3.000E+05	3.185E-05	9.017E-03
2067	3.000E+05	3.030E-05	8.577E-03
2068	3.000E+05	2.882E-05	8.158E-03
2069	3.000E+05	2.741E-05	7.761E-03
2070	3.000E+05	2.608E-05	7.382E-03
2071	3.000E+05	2.481E-05	7.022E-03
2072	3.000E+05	2.360E-05	6.680E-03
2073	3.000E+05	2.244E-05	6.354E-03
2074	3.000E+05	2.135E-05	6.044E-03

continued

Table D8. Methylene Chloride Emission Rate from Year 1959 to 2202 (continued)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2075	3.000E+05	2.031E-05	5.749E-03
2076	3.000E+05	1.932E-05	5.469E-03
2077	3.000E+05	1.838E-05	5.202E-03
2078	3.000E+05	1.748E-05	4.948E-03
2079	3.000E+05	1.663E-05	4.707E-03
2080	3.000E+05	1.582E-05	4.477E-03
2081	3.000E+05	1.505E-05	4.259E-03
2082	3.000E+05	1.431E-05	4.051E-03
2083	3.000E+05	1.361E-05	3.854E-03
2084	3.000E+05	1.295E-05	3.666E-03
2085	3.000E+05	1.232E-05	3.487E-03
2086	3.000E+05	1.172E-05	3.317E-03
2087	3.000E+05	1.115E-05	3.155E-03
2088	3.000E+05	1.060E-05	3.001E-03
2089	3.000E+05	1.009E-05	2.855E-03
2090	3.000E+05	9.593E-06	2.716E-03
2091	3.000E+05	9.125E-06	2.583E-03
2092	3.000E+05	8.680E-06	2.457E-03
2093	3.000E+05	8.257E-06	2.337E-03
2094	3.000E+05	7.854E-06	2.223E-03
2095	3.000E+05	7.471E-06	2.115E-03
2096	3.000E+05	7.107E-06	2.012E-03
2097	3.000E+05	6.760E-06	1.914E-03
2098	3.000E+05	6.431E-06	1.820E-03
2099	3.000E+05	6.117E-06	1.732E-03
2100	3.000E+05	5.819E-06	1.647E-03
2101	3.000E+05	5.535E-06	1.567E-03
2102	3.000E+05	5.265E-06	1.490E-03
2103	3.000E+05	5.008E-06	1.418E-03
2104	3.000E+05	4.764E-06	1.349E-03
2105	3.000E+05	4.532E-06	1.283E-03
2106	3.000E+05	4.311E-06	1.220E-03
2107	3.000E+05	4.100E-06	1.161E-03
2108	3.000E+05	3.900E-06	1.104E-03
2109	3.000E+05	3.710E-06	1.050E-03
2110	3.000E+05	3.529E-06	9.991E-04
2111	3.000E+05	3.357E-06	9.503E-04
2112	3.000E+05	3.193E-06	9.040E-04
2113	3.000E+05	3.038E-06	8.599E-04
2114	3.000E+05	2.889E-06	8.180E-04
2115	3.000E+05	2.749E-06	7.781E-04
2116	3.000E+05	2.614E-06	7.401E-04
2117	3.000E+05	2.487E-06	7.040E-04
2118	3.000E+05	2.366E-06	6.697E-04
2119	3.000E+05	2.250E-06	6.370E-04
2120	3.000E+05	2.141E-06	6.060E-04
2121	3.000E+05	2.036E-06	5.764E-04
2122	3.000E+05	1.937E-06	5.483E-04
2123	3.000E+05	1.842E-06	5.216E-04
2124	3.000E+05	1.753E-06	4.961E-04
2125	3.000E+05	1.667E-06	4.719E-04
2126	3.000E+05	1.586E-06	4.489E-04
2127	3.000E+05	1.508E-06	4.270E-04
2128	3.000E+05	1.435E-06	4.062E-04
2129	3.000E+05	1.365E-06	3.864E-04
2130	3.000E+05	1.298E-06	3.675E-04
2131	3.000E+05	1.235E-06	3.496E-04
2132	3.000E+05	1.175E-06	3.326E-04
2133	3.000E+05	1.117E-06	3.163E-04
2134	3.000E+05	1.063E-06	3.009E-04
2135	3.000E+05	1.011E-06	2.862E-04
2136	3.000E+05	9.618E-07	2.723E-04
2137	3.000E+05	9.149E-07	2.590E-04
2138	3.000E+05	8.703E-07	2.464E-04
2139	3.000E+05	8.278E-07	2.343E-04
2140	3.000E+05	7.875E-07	2.229E-04
2141	3.000E+05	7.491E-07	2.120E-04
2142	3.000E+05	7.125E-07	2.017E-04
2143	3.000E+05	6.778E-07	1.919E-04
2144	3.000E+05	6.447E-07	1.825E-04
2145	3.000E+05	6.133E-07	1.736E-04

continued

Table D8. Methylene Chloride Emission Rate from Year 1959 to 2202 (concluded)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2146	3.000E+05	5.834E-07	1.651E-04
2147	3.000E+05	5.549E-07	1.571E-04
2148	3.000E+05	5.278E-07	1.494E-04
2149	3.000E+05	5.021E-07	1.421E-04
2150	3.000E+05	4.776E-07	1.352E-04
2151	3.000E+05	4.543E-07	1.286E-04
2152	3.000E+05	4.322E-07	1.223E-04
2153	3.000E+05	4.111E-07	1.164E-04
2154	3.000E+05	3.910E-07	1.107E-04
2155	3.000E+05	3.720E-07	1.053E-04
2156	3.000E+05	3.538E-07	1.002E-04
2157	3.000E+05	3.366E-07	9.528E-05
2158	3.000E+05	3.202E-07	9.063E-05
2159	3.000E+05	3.045E-07	8.621E-05
2160	3.000E+05	2.897E-07	8.201E-05
2161	3.000E+05	2.756E-07	7.801E-05
2162	3.000E+05	2.621E-07	7.420E-05
2163	3.000E+05	2.493E-07	7.058E-05
2164	3.000E+05	2.372E-07	6.714E-05
2165	3.000E+05	2.256E-07	6.387E-05
2166	3.000E+05	2.146E-07	6.075E-05
2167	3.000E+05	2.041E-07	5.779E-05
2168	3.000E+05	1.942E-07	5.497E-05
2169	3.000E+05	1.847E-07	5.229E-05
2170	3.000E+05	1.757E-07	4.974E-05
2171	3.000E+05	1.671E-07	4.731E-05
2172	3.000E+05	1.590E-07	4.501E-05
2173	3.000E+05	1.512E-07	4.281E-05
2174	3.000E+05	1.439E-07	4.072E-05
2175	3.000E+05	1.368E-07	3.874E-05
2176	3.000E+05	1.302E-07	3.685E-05
2177	3.000E+05	1.238E-07	3.505E-05
2178	3.000E+05	1.178E-07	3.334E-05
2179	3.000E+05	1.120E-07	3.172E-05
2180	3.000E+05	1.066E-07	3.017E-05
2181	3.000E+05	1.014E-07	2.870E-05
2182	3.000E+05	9.643E-08	2.730E-05
2183	3.000E+05	9.173E-08	2.597E-05
2184	3.000E+05	8.725E-08	2.470E-05
2185	3.000E+05	8.300E-08	2.350E-05
2186	3.000E+05	7.895E-08	2.235E-05
2187	3.000E+05	7.510E-08	2.126E-05
2188	3.000E+05	7.144E-08	2.022E-05
2189	3.000E+05	6.795E-08	1.924E-05
2190	3.000E+05	6.464E-08	1.830E-05
2191	3.000E+05	6.149E-08	1.741E-05
2192	3.000E+05	5.849E-08	1.656E-05
2193	3.000E+05	5.563E-08	1.575E-05
2194	3.000E+05	5.292E-08	1.498E-05
2195	3.000E+05	5.034E-08	1.425E-05
2196	3.000E+05	4.789E-08	1.356E-05
2197	3.000E+05	4.555E-08	1.289E-05
2198	3.000E+05	4.333E-08	1.227E-05
2199	3.000E+05	4.122E-08	1.167E-05
2200	3.000E+05	3.921E-08	1.110E-05
2201	3.000E+05	3.729E-08	1.056E-05
2202	3.000E+05	3.547E-08	1.004E-05

Table D9. Toluene Emission Rate from Year 1959 to 2202

```
Source: H:\3000\030177~1.000\030177~1.002\SOMMER~1\SOMERSWORTH.PRM

================================================================================
                                Model Parameters
================================================================================
Lo : 170.00 m^3 / Mg ***** User Mode Selection *****
k : 0.0500 1/yr ***** User Mode Selection *****
NMOC : 2380.00 ppmv ***** User Mode Selection *****
Methane : 58.0000 % volume
Carbon Dioxide : 42.0000 % volume
Air Pollutant : Toluene (HAP/VOC)
Molecular Wt =   92.14     Concentration =      1.348000 ppmV

================================================================================
                              Landfill Parameters
================================================================================
Landfill type : Co-Disposal
Year Opened : 1958    Current Year : 2003  Closure Year: 2003
Capacity : 300000 Mg
Average Acceptance Rate Required from
         Current Year to Closure Year : 0.00 Mg/year

================================================================================
                                 Model Results
================================================================================
```

Year	Refuse In Place (Mg)	Toluene (HAP/VOC) Emission Rate (Mg/yr)	(Cubic m/yr)
1959	1.304E+04	9.875E-04	2.577E-01
1960	2.609E+04	1.927E-03	5.028E-01
1961	3.913E+04	2.820E-03	7.359E-01
1962	5.217E+04	3.670E-03	9.577E-01
1963	6.522E+04	4.479E-03	1.169E+00
1964	7.826E+04	5.248E-03	1.369E+00
1965	9.130E+04	5.979E-03	1.560E+00
1966	1.043E+05	6.675E-03	1.742E+00
1967	1.174E+05	7.337E-03	1.915E+00
1968	1.304E+05	7.967E-03	2.079E+00
1969	1.435E+05	8.566E-03	2.235E+00
1970	1.565E+05	9.136E-03	2.384E+00
1971	1.696E+05	9.678E-03	2.525E+00
1972	1.826E+05	1.019E-02	2.660E+00
1973	1.957E+05	1.068E-02	2.788E+00
1974	2.087E+05	1.115E-02	2.909E+00
1975	2.217E+05	1.159E-02	3.025E+00
1976	2.348E+05	1.202E-02	3.135E+00
1977	2.478E+05	1.242E-02	3.240E+00
1978	2.609E+05	1.280E-02	3.340E+00
1979	2.739E+05	1.316E-02	3.435E+00
1980	2.870E+05	1.351E-02	3.525E+00
1981	3.000E+05	1.384E-02	3.611E+00
1982	3.000E+05	1.316E-02	3.434E+00
1983	3.000E+05	1.252E-02	3.267E+00
1984	3.000E+05	1.191E-02	3.108E+00
1985	3.000E+05	1.133E-02	2.956E+00
1986	3.000E+05	1.078E-02	2.812E+00
1987	3.000E+05	1.025E-02	2.675E+00
1988	3.000E+05	9.751E-03	2.544E+00
1989	3.000E+05	9.275E-03	2.420E+00
1990	3.000E+05	8.823E-03	2.302E+00
1991	3.000E+05	8.392E-03	2.190E+00
1992	3.000E+05	7.983E-03	2.083E+00
1993	3.000E+05	7.594E-03	1.981E+00
1994	3.000E+05	7.223E-03	1.885E+00
1995	3.000E+05	6.871E-03	1.793E+00
1996	3.000E+05	6.536E-03	1.705E+00
1997	3.000E+05	6.217E-03	1.622E+00
1998	3.000E+05	5.914E-03	1.543E+00
1999	3.000E+05	5.626E-03	1.468E+00
2000	3.000E+05	5.351E-03	1.396E+00
2001	3.000E+05	5.090E-03	1.328E+00
2002	3.000E+05	4.842E-03	1.263E+00
2003	3.000E+05	4.606E-03	1.202E+00

continued

Table D9. Toluene Emission Rate from Year 1959 to 2202 (continued)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2004	3.000E+05	4.381E-03	1.143E+00
2005	3.000E+05	4.168E-03	1.087E+00
2006	3.000E+05	3.964E-03	1.034E+00
2007	3.000E+05	3.771E-03	9.840E-01
2008	3.000E+05	3.587E-03	9.360E-01
2009	3.000E+05	3.412E-03	8.903E-01
2010	3.000E+05	3.246E-03	8.469E-01
2011	3.000E+05	3.087E-03	8.056E-01
2012	3.000E+05	2.937E-03	7.663E-01
2013	3.000E+05	2.794E-03	7.289E-01
2014	3.000E+05	2.657E-03	6.934E-01
2015	3.000E+05	2.528E-03	6.596E-01
2016	3.000E+05	2.404E-03	6.274E-01
2017	3.000E+05	2.287E-03	5.968E-01
2018	3.000E+05	2.176E-03	5.677E-01
2019	3.000E+05	2.070E-03	5.400E-01
2020	3.000E+05	1.969E-03	5.137E-01
2021	3.000E+05	1.873E-03	4.886E-01
2022	3.000E+05	1.781E-03	4.648E-01
2023	3.000E+05	1.694E-03	4.421E-01
2024	3.000E+05	1.612E-03	4.206E-01
2025	3.000E+05	1.533E-03	4.001E-01
2026	3.000E+05	1.458E-03	3.805E-01
2027	3.000E+05	1.387E-03	3.620E-01
2028	3.000E+05	1.320E-03	3.443E-01
2029	3.000E+05	1.255E-03	3.275E-01
2030	3.000E+05	1.194E-03	3.116E-01
2031	3.000E+05	1.136E-03	2.964E-01
2032	3.000E+05	1.080E-03	2.819E-01
2033	3.000E+05	1.028E-03	2.682E-01
2034	3.000E+05	9.776E-04	2.551E-01
2035	3.000E+05	9.299E-04	2.426E-01
2036	3.000E+05	8.846E-04	2.308E-01
2037	3.000E+05	8.414E-04	2.196E-01
2038	3.000E+05	8.004E-04	2.088E-01
2039	3.000E+05	7.613E-04	1.987E-01
2040	3.000E+05	7.242E-04	1.890E-01
2041	3.000E+05	6.889E-04	1.798E-01
2042	3.000E+05	6.553E-04	1.710E-01
2043	3.000E+05	6.233E-04	1.627E-01
2044	3.000E+05	5.929E-04	1.547E-01
2045	3.000E+05	5.640E-04	1.472E-01
2046	3.000E+05	5.365E-04	1.400E-01
2047	3.000E+05	5.103E-04	1.332E-01
2048	3.000E+05	4.855E-04	1.267E-01
2049	3.000E+05	4.618E-04	1.205E-01
2050	3.000E+05	4.393E-04	1.146E-01
2051	3.000E+05	4.178E-04	1.090E-01
2052	3.000E+05	3.975E-04	1.037E-01
2053	3.000E+05	3.781E-04	9.865E-02
2054	3.000E+05	3.596E-04	9.384E-02
2055	3.000E+05	3.421E-04	8.926E-02
2056	3.000E+05	3.254E-04	8.491E-02
2057	3.000E+05	3.095E-04	8.077E-02
2058	3.000E+05	2.944E-04	7.683E-02
2059	3.000E+05	2.801E-04	7.308E-02
2060	3.000E+05	2.664E-04	6.952E-02
2061	3.000E+05	2.534E-04	6.613E-02
2062	3.000E+05	2.411E-04	6.290E-02
2063	3.000E+05	2.293E-04	5.984E-02
2064	3.000E+05	2.181E-04	5.692E-02
2065	3.000E+05	2.075E-04	5.414E-02
2066	3.000E+05	1.974E-04	5.150E-02
2067	3.000E+05	1.877E-04	4.899E-02
2068	3.000E+05	1.786E-04	4.660E-02
2069	3.000E+05	1.699E-04	4.433E-02
2070	3.000E+05	1.616E-04	4.217E-02
2071	3.000E+05	1.537E-04	4.011E-02
2072	3.000E+05	1.462E-04	3.815E-02
2073	3.000E+05	1.391E-04	3.629E-02
2074	3.000E+05	1.323E-04	3.452E-02

continued

Table D9. Toluene Emission Rate from Year 1959 to 2202 (continued)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2075	3.000E+05	1.258E-04	3.284E-02
2076	3.000E+05	1.197E-04	3.124E-02
2077	3.000E+05	1.139E-04	2.971E-02
2078	3.000E+05	1.083E-04	2.826E-02
2079	3.000E+05	1.030E-04	2.689E-02
2080	3.000E+05	9.801E-05	2.557E-02
2081	3.000E+05	9.323E-05	2.433E-02
2082	3.000E+05	8.868E-05	2.314E-02
2083	3.000E+05	8.436E-05	2.201E-02
2084	3.000E+05	8.024E-05	2.094E-02
2085	3.000E+05	7.633E-05	1.992E-02
2086	3.000E+05	7.261E-05	1.895E-02
2087	3.000E+05	6.907E-05	1.802E-02
2088	3.000E+05	6.570E-05	1.714E-02
2089	3.000E+05	6.249E-05	1.631E-02
2090	3.000E+05	5.945E-05	1.551E-02
2091	3.000E+05	5.655E-05	1.476E-02
2092	3.000E+05	5.379E-05	1.404E-02
2093	3.000E+05	5.117E-05	1.335E-02
2094	3.000E+05	4.867E-05	1.270E-02
2095	3.000E+05	4.630E-05	1.208E-02
2096	3.000E+05	4.404E-05	1.149E-02
2097	3.000E+05	4.189E-05	1.093E-02
2098	3.000E+05	3.985E-05	1.040E-02
2099	3.000E+05	3.791E-05	9.891E-03
2100	3.000E+05	3.606E-05	9.408E-03
2101	3.000E+05	3.430E-05	8.950E-03
2102	3.000E+05	3.263E-05	8.513E-03
2103	3.000E+05	3.103E-05	8.098E-03
2104	3.000E+05	2.952E-05	7.703E-03
2105	3.000E+05	2.808E-05	7.327E-03
2106	3.000E+05	2.671E-05	6.970E-03
2107	3.000E+05	2.541E-05	6.630E-03
2108	3.000E+05	2.417E-05	6.307E-03
2109	3.000E+05	2.299E-05	5.999E-03
2110	3.000E+05	2.187E-05	5.706E-03
2111	3.000E+05	2.080E-05	5.428E-03
2112	3.000E+05	1.979E-05	5.163E-03
2113	3.000E+05	1.882E-05	4.912E-03
2114	3.000E+05	1.791E-05	4.672E-03
2115	3.000E+05	1.703E-05	4.444E-03
2116	3.000E+05	1.620E-05	4.227E-03
2117	3.000E+05	1.541E-05	4.021E-03
2118	3.000E+05	1.466E-05	3.825E-03
2119	3.000E+05	1.394E-05	3.639E-03
2120	3.000E+05	1.326E-05	3.461E-03
2121	3.000E+05	1.262E-05	3.292E-03
2122	3.000E+05	1.200E-05	3.132E-03
2123	3.000E+05	1.142E-05	2.979E-03
2124	3.000E+05	1.086E-05	2.834E-03
2125	3.000E+05	1.033E-05	2.696E-03
2126	3.000E+05	9.827E-06	2.564E-03
2127	3.000E+05	9.347E-06	2.439E-03
2128	3.000E+05	8.891E-06	2.320E-03
2129	3.000E+05	8.458E-06	2.207E-03
2130	3.000E+05	8.045E-06	2.099E-03
2131	3.000E+05	7.653E-06	1.997E-03
2132	3.000E+05	7.280E-06	1.900E-03
2133	3.000E+05	6.925E-06	1.807E-03
2134	3.000E+05	6.587E-06	1.719E-03
2135	3.000E+05	6.266E-06	1.635E-03
2136	3.000E+05	5.960E-06	1.555E-03
2137	3.000E+05	5.669E-06	1.479E-03
2138	3.000E+05	5.393E-06	1.407E-03
2139	3.000E+05	5.130E-06	1.339E-03
2140	3.000E+05	4.880E-06	1.273E-03
2141	3.000E+05	4.642E-06	1.211E-03
2142	3.000E+05	4.415E-06	1.152E-03
2143	3.000E+05	4.200E-06	1.096E-03
2144	3.000E+05	3.995E-06	1.042E-03
2145	3.000E+05	3.800E-06	9.916E-04

continued

Table D9. Toluene Emission Rate from Year 1959 to 2202 (concluded)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2146	3.000E+05	3.615E-06	9.433E-04
2147	3.000E+05	3.439E-06	8.973E-04
2148	3.000E+05	3.271E-06	8.535E-04
2149	3.000E+05	3.111E-06	8.119E-04
2150	3.000E+05	2.960E-06	7.723E-04
2151	3.000E+05	2.815E-06	7.346E-04
2152	3.000E+05	2.678E-06	6.988E-04
2153	3.000E+05	2.547E-06	6.647E-04
2154	3.000E+05	2.423E-06	6.323E-04
2155	3.000E+05	2.305E-06	6.015E-04
2156	3.000E+05	2.193E-06	5.721E-04
2157	3.000E+05	2.086E-06	5.442E-04
2158	3.000E+05	1.984E-06	5.177E-04
2159	3.000E+05	1.887E-06	4.924E-04
2160	3.000E+05	1.795E-06	4.684E-04
2161	3.000E+05	1.708E-06	4.456E-04
2162	3.000E+05	1.624E-06	4.238E-04
2163	3.000E+05	1.545E-06	4.032E-04
2164	3.000E+05	1.470E-06	3.835E-04
2165	3.000E+05	1.398E-06	3.648E-04
2166	3.000E+05	1.330E-06	3.470E-04
2167	3.000E+05	1.265E-06	3.301E-04
2168	3.000E+05	1.203E-06	3.140E-04
2169	3.000E+05	1.145E-06	2.987E-04
2170	3.000E+05	1.089E-06	2.841E-04
2171	3.000E+05	1.036E-06	2.703E-04
2172	3.000E+05	9.852E-07	2.571E-04
2173	3.000E+05	9.371E-07	2.445E-04
2174	3.000E+05	8.914E-07	2.326E-04
2175	3.000E+05	8.480E-07	2.213E-04
2176	3.000E+05	8.066E-07	2.105E-04
2177	3.000E+05	7.673E-07	2.002E-04
2178	3.000E+05	7.298E-07	1.904E-04
2179	3.000E+05	6.943E-07	1.812E-04
2180	3.000E+05	6.604E-07	1.723E-04
2181	3.000E+05	6.282E-07	1.639E-04
2182	3.000E+05	5.976E-07	1.559E-04
2183	3.000E+05	5.684E-07	1.483E-04
2184	3.000E+05	5.407E-07	1.411E-04
2185	3.000E+05	5.143E-07	1.342E-04
2186	3.000E+05	4.892E-07	1.277E-04
2187	3.000E+05	4.654E-07	1.214E-04
2188	3.000E+05	4.427E-07	1.155E-04
2189	3.000E+05	4.211E-07	1.099E-04
2190	3.000E+05	4.006E-07	1.045E-04
2191	3.000E+05	3.810E-07	9.942E-05
2192	3.000E+05	3.624E-07	9.457E-05
2193	3.000E+05	3.448E-07	8.996E-05
2194	3.000E+05	3.279E-07	8.557E-05
2195	3.000E+05	3.119E-07	8.140E-05
2196	3.000E+05	2.967E-07	7.743E-05
2197	3.000E+05	2.823E-07	7.365E-05
2198	3.000E+05	2.685E-07	7.006E-05
2199	3.000E+05	2.554E-07	6.664E-05
2200	3.000E+05	2.429E-07	6.339E-05
2201	3.000E+05	2.311E-07	6.030E-05
2202	3.000E+05	2.198E-07	5.736E-05

Table D10. Trichloroethene Emission Rate from Year 1959 to 2202

```
Source: H:\3000\030177~1.000\030177~1.002\SOMMER~1\SOMERSWORTH.PRM

================================================================================
                              Model Parameters
================================================================================
Lo : 170.00 m^3 / Mg ***** User Mode Selection *****
k : 0.0500 1/yr ***** User Mode Selection *****
NMOC : 2380.00 ppmv ***** User Mode Selection *****
Methane : 58.0000 % volume
Carbon Dioxide : 42.0000 % volume
Air Pollutant : Trichloroethene (HAP/VOC)
Molecular Wt =  131.38     Concentration =      0.014280 ppmV

================================================================================
                              Landfill Parameters
================================================================================
Landfill type : Co-Disposal
Year Opened : 1958    Current Year : 2003  Closure Year: 2003
Capacity : 300000 Mg
Average Acceptance Rate Required from
        Current Year to Closure Year : 0.00 Mg/year

================================================================================
                              Model Results
================================================================================
```

Year	Refuse In Place (Mg)	Trichloroethene (HAP/VOC) Emission Rate (Mg/yr)	Trichloroethene (HAP/VOC) Emission Rate (Cubic m/yr)
1959	1.304E+04	1.492E-05	2.730E-03
1960	2.609E+04	2.911E-05	5.326E-03
1961	3.913E+04	4.260E-05	7.796E-03
1962	5.217E+04	5.544E-05	1.015E-02
1963	6.522E+04	6.765E-05	1.238E-02
1964	7.826E+04	7.927E-05	1.451E-02
1965	9.130E+04	9.032E-05	1.653E-02
1966	1.043E+05	1.008E-04	1.845E-02
1967	1.174E+05	1.108E-04	2.028E-02
1968	1.304E+05	1.203E-04	2.202E-02
1969	1.435E+05	1.294E-04	2.368E-02
1970	1.565E+05	1.380E-04	2.525E-02
1971	1.696E+05	1.462E-04	2.675E-02
1972	1.826E+05	1.540E-04	2.818E-02
1973	1.957E+05	1.614E-04	2.953E-02
1974	2.087E+05	1.684E-04	3.082E-02
1975	2.217E+05	1.751E-04	3.205E-02
1976	2.348E+05	1.815E-04	3.321E-02
1977	2.478E+05	1.876E-04	3.432E-02
1978	2.609E+05	1.933E-04	3.538E-02
1979	2.739E+05	1.988E-04	3.638E-02
1980	2.870E+05	2.040E-04	3.734E-02
1981	3.000E+05	2.090E-04	3.825E-02
1982	3.000E+05	1.988E-04	3.638E-02
1983	3.000E+05	1.891E-04	3.461E-02
1984	3.000E+05	1.799E-04	3.292E-02
1985	3.000E+05	1.711E-04	3.131E-02
1986	3.000E+05	1.628E-04	2.979E-02
1987	3.000E+05	1.548E-04	2.833E-02
1988	3.000E+05	1.473E-04	2.695E-02
1989	3.000E+05	1.401E-04	2.564E-02
1990	3.000E+05	1.333E-04	2.439E-02
1991	3.000E+05	1.268E-04	2.320E-02
1992	3.000E+05	1.206E-04	2.207E-02
1993	3.000E+05	1.147E-04	2.099E-02
1994	3.000E+05	1.091E-04	1.997E-02
1995	3.000E+05	1.038E-04	1.899E-02
1996	3.000E+05	9.873E-05	1.807E-02
1997	3.000E+05	9.391E-05	1.719E-02
1998	3.000E+05	8.933E-05	1.635E-02
1999	3.000E+05	8.497E-05	1.555E-02
2000	3.000E+05	8.083E-05	1.479E-02
2001	3.000E+05	7.689E-05	1.407E-02
2002	3.000E+05	7.314E-05	1.338E-02
2003	3.000E+05	6.957E-05	1.273E-02

continued

Table D10. Trichloroethene Emission Rate from Year 1959 to 2202 (continued)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2004	3.000E+05	6.618E-05	1.211E-02
2005	3.000E+05	6.295E-05	1.152E-02
2006	3.000E+05	5.988E-05	1.096E-02
2007	3.000E+05	5.696E-05	1.042E-02
2008	3.000E+05	5.418E-05	9.915E-03
2009	3.000E+05	5.154E-05	9.432E-03
2010	3.000E+05	4.903E-05	8.972E-03
2011	3.000E+05	4.663E-05	8.534E-03
2012	3.000E+05	4.436E-05	8.118E-03
2013	3.000E+05	4.220E-05	7.722E-03
2014	3.000E+05	4.014E-05	7.345E-03
2015	3.000E+05	3.818E-05	6.987E-03
2016	3.000E+05	3.632E-05	6.646E-03
2017	3.000E+05	3.455E-05	6.322E-03
2018	3.000E+05	3.286E-05	6.014E-03
2019	3.000E+05	3.126E-05	5.721E-03
2020	3.000E+05	2.974E-05	5.442E-03
2021	3.000E+05	2.829E-05	5.176E-03
2022	3.000E+05	2.691E-05	4.924E-03
2023	3.000E+05	2.559E-05	4.684E-03
2024	3.000E+05	2.435E-05	4.455E-03
2025	3.000E+05	2.316E-05	4.238E-03
2026	3.000E+05	2.203E-05	4.031E-03
2027	3.000E+05	2.095E-05	3.835E-03
2028	3.000E+05	1.993E-05	3.648E-03
2029	3.000E+05	1.896E-05	3.470E-03
2030	3.000E+05	1.804E-05	3.301E-03
2031	3.000E+05	1.716E-05	3.140E-03
2032	3.000E+05	1.632E-05	2.986E-03
2033	3.000E+05	1.552E-05	2.841E-03
2034	3.000E+05	1.477E-05	2.702E-03
2035	3.000E+05	1.405E-05	2.570E-03
2036	3.000E+05	1.336E-05	2.445E-03
2037	3.000E+05	1.271E-05	2.326E-03
2038	3.000E+05	1.209E-05	2.212E-03
2039	3.000E+05	1.150E-05	2.105E-03
2040	3.000E+05	1.094E-05	2.002E-03
2041	3.000E+05	1.041E-05	1.904E-03
2042	3.000E+05	9.898E-06	1.811E-03
2043	3.000E+05	9.415E-06	1.723E-03
2044	3.000E+05	8.956E-06	1.639E-03
2045	3.000E+05	8.519E-06	1.559E-03
2046	3.000E+05	8.104E-06	1.483E-03
2047	3.000E+05	7.709E-06	1.411E-03
2048	3.000E+05	7.333E-06	1.342E-03
2049	3.000E+05	6.975E-06	1.276E-03
2050	3.000E+05	6.635E-06	1.214E-03
2051	3.000E+05	6.311E-06	1.155E-03
2052	3.000E+05	6.004E-06	1.099E-03
2053	3.000E+05	5.711E-06	1.045E-03
2054	3.000E+05	5.432E-06	9.941E-04
2055	3.000E+05	5.167E-06	9.456E-04
2056	3.000E+05	4.915E-06	8.995E-04
2057	3.000E+05	4.676E-06	8.556E-04
2058	3.000E+05	4.448E-06	8.139E-04
2059	3.000E+05	4.231E-06	7.742E-04
2060	3.000E+05	4.024E-06	7.364E-04
2061	3.000E+05	3.828E-06	7.005E-04
2062	3.000E+05	3.641E-06	6.664E-04
2063	3.000E+05	3.464E-06	6.339E-04
2064	3.000E+05	3.295E-06	6.030E-04
2065	3.000E+05	3.134E-06	5.735E-04
2066	3.000E+05	2.981E-06	5.456E-04
2067	3.000E+05	2.836E-06	5.190E-04
2068	3.000E+05	2.698E-06	4.937E-04
2069	3.000E+05	2.566E-06	4.696E-04
2070	3.000E+05	2.441E-06	4.467E-04
2071	3.000E+05	2.322E-06	4.249E-04
2072	3.000E+05	2.209E-06	4.042E-04
2073	3.000E+05	2.101E-06	3.845E-04
2074	3.000E+05	1.998E-06	3.657E-04

continued

Table D10. Trichloroethene Emission Rate from Year 1959 to 2202 (continued)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2075	3.000E+05	1.901E-06	3.479E-04
2076	3.000E+05	1.808E-06	3.309E-04
2077	3.000E+05	1.720E-06	3.148E-04
2078	3.000E+05	1.636E-06	2.994E-04
2079	3.000E+05	1.556E-06	2.848E-04
2080	3.000E+05	1.480E-06	2.709E-04
2081	3.000E+05	1.408E-06	2.577E-04
2082	3.000E+05	1.340E-06	2.451E-04
2083	3.000E+05	1.274E-06	2.332E-04
2084	3.000E+05	1.212E-06	2.218E-04
2085	3.000E+05	1.153E-06	2.110E-04
2086	3.000E+05	1.097E-06	2.007E-04
2087	3.000E+05	1.043E-06	1.909E-04
2088	3.000E+05	9.924E-07	1.816E-04
2089	3.000E+05	9.440E-07	1.727E-04
2090	3.000E+05	8.979E-07	1.643E-04
2091	3.000E+05	8.541E-07	1.563E-04
2092	3.000E+05	8.125E-07	1.487E-04
2093	3.000E+05	7.729E-07	1.414E-04
2094	3.000E+05	7.352E-07	1.345E-04
2095	3.000E+05	6.993E-07	1.280E-04
2096	3.000E+05	6.652E-07	1.217E-04
2097	3.000E+05	6.328E-07	1.158E-04
2098	3.000E+05	6.019E-07	1.101E-04
2099	3.000E+05	5.726E-07	1.048E-04
2100	3.000E+05	5.446E-07	9.967E-05
2101	3.000E+05	5.181E-07	9.481E-05
2102	3.000E+05	4.928E-07	9.018E-05
2103	3.000E+05	4.688E-07	8.578E-05
2104	3.000E+05	4.459E-07	8.160E-05
2105	3.000E+05	4.242E-07	7.762E-05
2106	3.000E+05	4.035E-07	7.384E-05
2107	3.000E+05	3.838E-07	7.023E-05
2108	3.000E+05	3.651E-07	6.681E-05
2109	3.000E+05	3.473E-07	6.355E-05
2110	3.000E+05	3.303E-07	6.045E-05
2111	3.000E+05	3.142E-07	5.750E-05
2112	3.000E+05	2.989E-07	5.470E-05
2113	3.000E+05	2.843E-07	5.203E-05
2114	3.000E+05	2.705E-07	4.949E-05
2115	3.000E+05	2.573E-07	4.708E-05
2116	3.000E+05	2.447E-07	4.478E-05
2117	3.000E+05	2.328E-07	4.260E-05
2118	3.000E+05	2.214E-07	4.052E-05
2119	3.000E+05	2.106E-07	3.855E-05
2120	3.000E+05	2.004E-07	3.667E-05
2121	3.000E+05	1.906E-07	3.488E-05
2122	3.000E+05	1.813E-07	3.318E-05
2123	3.000E+05	1.724E-07	3.156E-05
2124	3.000E+05	1.640E-07	3.002E-05
2125	3.000E+05	1.560E-07	2.856E-05
2126	3.000E+05	1.484E-07	2.716E-05
2127	3.000E+05	1.412E-07	2.584E-05
2128	3.000E+05	1.343E-07	2.458E-05
2129	3.000E+05	1.278E-07	2.338E-05
2130	3.000E+05	1.215E-07	2.224E-05
2131	3.000E+05	1.156E-07	2.115E-05
2132	3.000E+05	1.100E-07	2.012E-05
2133	3.000E+05	1.046E-07	1.914E-05
2134	3.000E+05	9.949E-08	1.821E-05
2135	3.000E+05	9.464E-08	1.732E-05
2136	3.000E+05	9.003E-08	1.647E-05
2137	3.000E+05	8.564E-08	1.567E-05
2138	3.000E+05	8.146E-08	1.491E-05
2139	3.000E+05	7.749E-08	1.418E-05
2140	3.000E+05	7.371E-08	1.349E-05
2141	3.000E+05	7.011E-08	1.283E-05
2142	3.000E+05	6.669E-08	1.220E-05
2143	3.000E+05	6.344E-08	1.161E-05
2144	3.000E+05	6.035E-08	1.104E-05
2145	3.000E+05	5.740E-08	1.050E-05

continued

Table D10. Trichloroethene Emission Rate from Year 1959 to 2202 (concluded)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2146	3.000E+05	5.460E-08	9.993E-06
2147	3.000E+05	5.194E-08	9.505E-06
2148	3.000E+05	4.941E-08	9.042E-06
2149	3.000E+05	4.700E-08	8.601E-06
2150	3.000E+05	4.471E-08	8.181E-06
2151	3.000E+05	4.253E-08	7.782E-06
2152	3.000E+05	4.045E-08	7.403E-06
2153	3.000E+05	3.848E-08	7.042E-06
2154	3.000E+05	3.660E-08	6.698E-06
2155	3.000E+05	3.482E-08	6.372E-06
2156	3.000E+05	3.312E-08	6.061E-06
2157	3.000E+05	3.150E-08	5.765E-06
2158	3.000E+05	2.997E-08	5.484E-06
2159	3.000E+05	2.851E-08	5.217E-06
2160	3.000E+05	2.712E-08	4.962E-06
2161	3.000E+05	2.579E-08	4.720E-06
2162	3.000E+05	2.454E-08	4.490E-06
2163	3.000E+05	2.334E-08	4.271E-06
2164	3.000E+05	2.220E-08	4.063E-06
2165	3.000E+05	2.112E-08	3.865E-06
2166	3.000E+05	2.009E-08	3.676E-06
2167	3.000E+05	1.911E-08	3.497E-06
2168	3.000E+05	1.818E-08	3.326E-06
2169	3.000E+05	1.729E-08	3.164E-06
2170	3.000E+05	1.645E-08	3.010E-06
2171	3.000E+05	1.564E-08	2.863E-06
2172	3.000E+05	1.488E-08	2.723E-06
2173	3.000E+05	1.416E-08	2.590E-06
2174	3.000E+05	1.347E-08	2.464E-06
2175	3.000E+05	1.281E-08	2.344E-06
2176	3.000E+05	1.218E-08	2.230E-06
2177	3.000E+05	1.159E-08	2.121E-06
2178	3.000E+05	1.102E-08	2.017E-06
2179	3.000E+05	1.049E-08	1.919E-06
2180	3.000E+05	9.975E-09	1.825E-06
2181	3.000E+05	9.489E-09	1.736E-06
2182	3.000E+05	9.026E-09	1.652E-06
2183	3.000E+05	8.586E-09	1.571E-06
2184	3.000E+05	8.167E-09	1.495E-06
2185	3.000E+05	7.769E-09	1.422E-06
2186	3.000E+05	7.390E-09	1.352E-06
2187	3.000E+05	7.029E-09	1.286E-06
2188	3.000E+05	6.687E-09	1.224E-06
2189	3.000E+05	6.360E-09	1.164E-06
2190	3.000E+05	6.050E-09	1.107E-06
2191	3.000E+05	5.755E-09	1.053E-06
2192	3.000E+05	5.475E-09	1.002E-06
2193	3.000E+05	5.208E-09	9.530E-07
2194	3.000E+05	4.954E-09	9.065E-07
2195	3.000E+05	4.712E-09	8.623E-07
2196	3.000E+05	4.482E-09	8.202E-07
2197	3.000E+05	4.264E-09	7.802E-07
2198	3.000E+05	4.056E-09	7.422E-07
2199	3.000E+05	3.858E-09	7.060E-07
2200	3.000E+05	3.670E-09	6.716E-07
2201	3.000E+05	3.491E-09	6.388E-07
2202	3.000E+05	3.320E-09	6.076E-07

Table D11. Vinyl Chloride Emission Rate from Year 1959 to 2202

```
Source: H:\3000\030177~1.000\030177~1.002\SOMMER~1\SOMERSWORTH.PRM

================================================================================
                              Model Parameters
================================================================================
Lo : 170.00 m^3 / Mg ***** User Mode Selection *****
k : 0.0500 1/yr ***** User Mode Selection *****
NMOC : 2380.00 ppmv ***** User Mode Selection *****
Methane : 58.0000 % volume
Carbon Dioxide : 42.0000 % volume
Air Pollutant : Vinyl Chloride (HAP/VOC)
Molecular Wt =    62.50     Concentration =      1.220000 ppmV

================================================================================
                              Landfill Parameters
================================================================================
Landfill type : Co-Disposal
Year Opened : 1958    Current Year : 2003  Closure Year: 2003
Capacity : 300000 Mg
Average Acceptance Rate Required from
        Current Year to Closure Year : 0.00 Mg/year

================================================================================
                              Model Results
================================================================================
                                    Vinyl Chloride (HAP/VOC) Emission Rate
Year     Refuse In Place (Mg)           (Mg/yr)          (Cubic m/yr)
================================================================================
```

Year	Refuse In Place (Mg)	Vinyl Chloride (HAP/VOC) Emission Rate (Mg/yr)	Vinyl Chloride (HAP/VOC) Emission Rate (Cubic m/yr)
1959	1.304E+04	6.062E-04	2.332E-01
1960	2.609E+04	1.183E-03	4.550E-01
1961	3.913E+04	1.731E-03	6.661E-01
1962	5.217E+04	2.253E-03	8.668E-01
1963	6.522E+04	2.750E-03	1.058E+00
1964	7.826E+04	3.222E-03	1.239E+00
1965	9.130E+04	3.671E-03	1.412E+00
1966	1.043E+05	4.098E-03	1.576E+00
1967	1.174E+05	4.504E-03	1.733E+00
1968	1.304E+05	4.891E-03	1.881E+00
1969	1.435E+05	5.259E-03	2.023E+00
1970	1.565E+05	5.608E-03	2.157E+00
1971	1.696E+05	5.941E-03	2.285E+00
1972	1.826E+05	6.258E-03	2.407E+00
1973	1.957E+05	6.559E-03	2.523E+00
1974	2.087E+05	6.845E-03	2.633E+00
1975	2.217E+05	7.117E-03	2.738E+00
1976	2.348E+05	7.377E-03	2.838E+00
1977	2.478E+05	7.623E-03	2.932E+00
1978	2.609E+05	7.857E-03	3.023E+00
1979	2.739E+05	8.081E-03	3.108E+00
1980	2.870E+05	8.293E-03	3.190E+00
1981	3.000E+05	8.494E-03	3.268E+00
1982	3.000E+05	8.080E-03	3.108E+00
1983	3.000E+05	7.686E-03	2.957E+00
1984	3.000E+05	7.311E-03	2.813E+00
1985	3.000E+05	6.955E-03	2.675E+00
1986	3.000E+05	6.615E-03	2.545E+00
1987	3.000E+05	6.293E-03	2.421E+00
1988	3.000E+05	5.986E-03	2.303E+00
1989	3.000E+05	5.694E-03	2.190E+00
1990	3.000E+05	5.416E-03	2.084E+00
1991	3.000E+05	5.152E-03	1.982E+00
1992	3.000E+05	4.901E-03	1.885E+00
1993	3.000E+05	4.662E-03	1.793E+00
1994	3.000E+05	4.434E-03	1.706E+00
1995	3.000E+05	4.218E-03	1.623E+00
1996	3.000E+05	4.013E-03	1.544E+00
1997	3.000E+05	3.817E-03	1.468E+00
1998	3.000E+05	3.631E-03	1.397E+00
1999	3.000E+05	3.454E-03	1.329E+00
2000	3.000E+05	3.285E-03	1.264E+00
2001	3.000E+05	3.125E-03	1.202E+00
2002	3.000E+05	2.973E-03	1.143E+00
2003	3.000E+05	2.828E-03	1.088E+00

continued

Table D11. Vinyl Chloride Emission Rate from Year 1959 to 2202 (continued)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2004	3.000E+05	2.690E-03	1.035E+00
2005	3.000E+05	2.558E-03	9.842E-01
2006	3.000E+05	2.434E-03	9.362E-01
2007	3.000E+05	2.315E-03	8.905E-01
2008	3.000E+05	2.202E-03	8.471E-01
2009	3.000E+05	2.095E-03	8.058E-01
2010	3.000E+05	1.993E-03	7.665E-01
2011	3.000E+05	1.895E-03	7.291E-01
2012	3.000E+05	1.803E-03	6.936E-01
2013	3.000E+05	1.715E-03	6.597E-01
2014	3.000E+05	1.631E-03	6.276E-01
2015	3.000E+05	1.552E-03	5.969E-01
2016	3.000E+05	1.476E-03	5.678E-01
2017	3.000E+05	1.404E-03	5.401E-01
2018	3.000E+05	1.336E-03	5.138E-01
2019	3.000E+05	1.271E-03	4.887E-01
2020	3.000E+05	1.209E-03	4.649E-01
2021	3.000E+05	1.150E-03	4.422E-01
2022	3.000E+05	1.094E-03	4.207E-01
2023	3.000E+05	1.040E-03	4.001E-01
2024	3.000E+05	9.895E-04	3.806E-01
2025	3.000E+05	9.412E-04	3.621E-01
2026	3.000E+05	8.953E-04	3.444E-01
2027	3.000E+05	8.516E-04	3.276E-01
2028	3.000E+05	8.101E-04	3.116E-01
2029	3.000E+05	7.706E-04	2.964E-01
2030	3.000E+05	7.330E-04	2.820E-01
2031	3.000E+05	6.973E-04	2.682E-01
2032	3.000E+05	6.633E-04	2.551E-01
2033	3.000E+05	6.309E-04	2.427E-01
2034	3.000E+05	6.001E-04	2.309E-01
2035	3.000E+05	5.709E-04	2.196E-01
2036	3.000E+05	5.430E-04	2.089E-01
2037	3.000E+05	5.165E-04	1.987E-01
2038	3.000E+05	4.914E-04	1.890E-01
2039	3.000E+05	4.674E-04	1.798E-01
2040	3.000E+05	4.446E-04	1.710E-01
2041	3.000E+05	4.229E-04	1.627E-01
2042	3.000E+05	4.023E-04	1.548E-01
2043	3.000E+05	3.827E-04	1.472E-01
2044	3.000E+05	3.640E-04	1.400E-01
2045	3.000E+05	3.463E-04	1.332E-01
2046	3.000E+05	3.294E-04	1.267E-01
2047	3.000E+05	3.133E-04	1.205E-01
2048	3.000E+05	2.980E-04	1.146E-01
2049	3.000E+05	2.835E-04	1.091E-01
2050	3.000E+05	2.697E-04	1.037E-01
2051	3.000E+05	2.565E-04	9.868E-02
2052	3.000E+05	2.440E-04	9.386E-02
2053	3.000E+05	2.321E-04	8.928E-02
2054	3.000E+05	2.208E-04	8.493E-02
2055	3.000E+05	2.100E-04	8.079E-02
2056	3.000E+05	1.998E-04	7.685E-02
2057	3.000E+05	1.900E-04	7.310E-02
2058	3.000E+05	1.808E-04	6.954E-02
2059	3.000E+05	1.719E-04	6.614E-02
2060	3.000E+05	1.636E-04	6.292E-02
2061	3.000E+05	1.556E-04	5.985E-02
2062	3.000E+05	1.480E-04	5.693E-02
2063	3.000E+05	1.408E-04	5.415E-02
2064	3.000E+05	1.339E-04	5.151E-02
2065	3.000E+05	1.274E-04	4.900E-02
2066	3.000E+05	1.212E-04	4.661E-02
2067	3.000E+05	1.153E-04	4.434E-02
2068	3.000E+05	1.096E-04	4.218E-02
2069	3.000E+05	1.043E-04	4.012E-02
2070	3.000E+05	9.920E-05	3.816E-02
2071	3.000E+05	9.436E-05	3.630E-02
2072	3.000E+05	8.976E-05	3.453E-02
2073	3.000E+05	8.538E-05	3.285E-02
2074	3.000E+05	8.122E-05	3.124E-02

continued

Table D11. Vinyl Chloride Emission Rate from Year 1959 to 2202 (continued)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2075	3.000E+05	7.726E-05	2.972E-02
2076	3.000E+05	7.349E-05	2.827E-02
2077	3.000E+05	6.991E-05	2.689E-02
2078	3.000E+05	6.650E-05	2.558E-02
2079	3.000E+05	6.325E-05	2.433E-02
2080	3.000E+05	6.017E-05	2.315E-02
2081	3.000E+05	5.724E-05	2.202E-02
2082	3.000E+05	5.444E-05	2.094E-02
2083	3.000E+05	5.179E-05	1.992E-02
2084	3.000E+05	4.926E-05	1.895E-02
2085	3.000E+05	4.686E-05	1.803E-02
2086	3.000E+05	4.457E-05	1.715E-02
2087	3.000E+05	4.240E-05	1.631E-02
2088	3.000E+05	4.033E-05	1.552E-02
2089	3.000E+05	3.837E-05	1.476E-02
2090	3.000E+05	3.649E-05	1.404E-02
2091	3.000E+05	3.471E-05	1.335E-02
2092	3.000E+05	3.302E-05	1.270E-02
2093	3.000E+05	3.141E-05	1.208E-02
2094	3.000E+05	2.988E-05	1.149E-02
2095	3.000E+05	2.842E-05	1.093E-02
2096	3.000E+05	2.704E-05	1.040E-02
2097	3.000E+05	2.572E-05	9.893E-03
2098	3.000E+05	2.446E-05	9.411E-03
2099	3.000E+05	2.327E-05	8.952E-03
2100	3.000E+05	2.214E-05	8.515E-03
2101	3.000E+05	2.106E-05	8.100E-03
2102	3.000E+05	2.003E-05	7.705E-03
2103	3.000E+05	1.905E-05	7.329E-03
2104	3.000E+05	1.812E-05	6.972E-03
2105	3.000E+05	1.724E-05	6.632E-03
2106	3.000E+05	1.640E-05	6.308E-03
2107	3.000E+05	1.560E-05	6.000E-03
2108	3.000E+05	1.484E-05	5.708E-03
2109	3.000E+05	1.411E-05	5.429E-03
2110	3.000E+05	1.343E-05	5.165E-03
2111	3.000E+05	1.277E-05	4.913E-03
2112	3.000E+05	1.215E-05	4.673E-03
2113	3.000E+05	1.156E-05	4.445E-03
2114	3.000E+05	1.099E-05	4.228E-03
2115	3.000E+05	1.046E-05	4.022E-03
2116	3.000E+05	9.946E-06	3.826E-03
2117	3.000E+05	9.461E-06	3.639E-03
2118	3.000E+05	9.000E-06	3.462E-03
2119	3.000E+05	8.561E-06	3.293E-03
2120	3.000E+05	8.143E-06	3.133E-03
2121	3.000E+05	7.746E-06	2.980E-03
2122	3.000E+05	7.368E-06	2.834E-03
2123	3.000E+05	7.009E-06	2.696E-03
2124	3.000E+05	6.667E-06	2.565E-03
2125	3.000E+05	6.342E-06	2.440E-03
2126	3.000E+05	6.033E-06	2.321E-03
2127	3.000E+05	5.738E-06	2.207E-03
2128	3.000E+05	5.458E-06	2.100E-03
2129	3.000E+05	5.192E-06	1.997E-03
2130	3.000E+05	4.939E-06	1.900E-03
2131	3.000E+05	4.698E-06	1.807E-03
2132	3.000E+05	4.469E-06	1.719E-03
2133	3.000E+05	4.251E-06	1.635E-03
2134	3.000E+05	4.044E-06	1.556E-03
2135	3.000E+05	3.847E-06	1.480E-03
2136	3.000E+05	3.659E-06	1.408E-03
2137	3.000E+05	3.480E-06	1.339E-03
2138	3.000E+05	3.311E-06	1.274E-03
2139	3.000E+05	3.149E-06	1.211E-03
2140	3.000E+05	2.996E-06	1.152E-03
2141	3.000E+05	2.850E-06	1.096E-03
2142	3.000E+05	2.711E-06	1.043E-03
2143	3.000E+05	2.578E-06	9.919E-04
2144	3.000E+05	2.453E-06	9.435E-04
2145	3.000E+05	2.333E-06	8.975E-04

continued

Table D11. Vinyl Chloride Emission Rate from Year 1959 to 2202 (concluded)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2146	3.000E+05	2.219E-06	8.537E-04
2147	3.000E+05	2.111E-06	8.121E-04
2148	3.000E+05	2.008E-06	7.725E-04
2149	3.000E+05	1.910E-06	7.348E-04
2150	3.000E+05	1.817E-06	6.990E-04
2151	3.000E+05	1.728E-06	6.649E-04
2152	3.000E+05	1.644E-06	6.324E-04
2153	3.000E+05	1.564E-06	6.016E-04
2154	3.000E+05	1.488E-06	5.723E-04
2155	3.000E+05	1.415E-06	5.443E-04
2156	3.000E+05	1.346E-06	5.178E-04
2157	3.000E+05	1.280E-06	4.925E-04
2158	3.000E+05	1.218E-06	4.685E-04
2159	3.000E+05	1.159E-06	4.457E-04
2160	3.000E+05	1.102E-06	4.239E-04
2161	3.000E+05	1.048E-06	4.033E-04
2162	3.000E+05	9.972E-07	3.836E-04
2163	3.000E+05	9.485E-07	3.649E-04
2164	3.000E+05	9.023E-07	3.471E-04
2165	3.000E+05	8.583E-07	3.302E-04
2166	3.000E+05	8.164E-07	3.141E-04
2167	3.000E+05	7.766E-07	2.987E-04
2168	3.000E+05	7.387E-07	2.842E-04
2169	3.000E+05	7.027E-07	2.703E-04
2170	3.000E+05	6.684E-07	2.571E-04
2171	3.000E+05	6.358E-07	2.446E-04
2172	3.000E+05	6.048E-07	2.327E-04
2173	3.000E+05	5.753E-07	2.213E-04
2174	3.000E+05	5.473E-07	2.105E-04
2175	3.000E+05	5.206E-07	2.003E-04
2176	3.000E+05	4.952E-07	1.905E-04
2177	3.000E+05	4.710E-07	1.812E-04
2178	3.000E+05	4.481E-07	1.724E-04
2179	3.000E+05	4.262E-07	1.640E-04
2180	3.000E+05	4.054E-07	1.560E-04
2181	3.000E+05	3.856E-07	1.484E-04
2182	3.000E+05	3.668E-07	1.411E-04
2183	3.000E+05	3.489E-07	1.342E-04
2184	3.000E+05	3.319E-07	1.277E-04
2185	3.000E+05	3.157E-07	1.215E-04
2186	3.000E+05	3.003E-07	1.155E-04
2187	3.000E+05	2.857E-07	1.099E-04
2188	3.000E+05	2.718E-07	1.045E-04
2189	3.000E+05	2.585E-07	9.944E-05
2190	3.000E+05	2.459E-07	9.459E-05
2191	3.000E+05	2.339E-07	8.998E-05
2192	3.000E+05	2.225E-07	8.559E-05
2193	3.000E+05	2.116E-07	8.142E-05
2194	3.000E+05	2.013E-07	7.745E-05
2195	3.000E+05	1.915E-07	7.367E-05
2196	3.000E+05	1.822E-07	7.008E-05
2197	3.000E+05	1.733E-07	6.666E-05
2198	3.000E+05	1.648E-07	6.341E-05
2199	3.000E+05	1.568E-07	6.032E-05
2200	3.000E+05	1.491E-07	5.737E-05
2201	3.000E+05	1.419E-07	5.458E-05
2202	3.000E+05	1.350E-07	5.191E-05

Table D12. m,p-Xylene Emission Rate from Year 1959 to 2202

```
Source: H:\3000\030177~1.000\030177~1.002\SOMMER~1\SOMERSWORTH.PRM

================================================================================
                              Model Parameters
================================================================================
Lo : 170.00 m^3 / Mg ***** User Mode Selection *****
k : 0.0500 1/yr ***** User Mode Selection *****
NMOC : 2380.00 ppmv ***** User Mode Selection *****
Methane : 58.0000 % volume
Carbon Dioxide : 42.0000 % volume
Air Pollutant : m,p-Xylene (HAP/VOC)
Molecular Wt =  106.17     Concentration =      2.140000 ppmV

================================================================================
                             Landfill Parameters
================================================================================
Landfill type : Co-Disposal
Year Opened : 1958    Current Year : 2003  Closure Year: 2003
Capacity : 300000 Mg
Average Acceptance Rate Required from
         Current Year to Closure Year : 0.00 Mg/year

================================================================================
                               Model Results
================================================================================
                                      m,p-Xylene (HAP/VOC) Emission Rate
Year     Refuse In Place (Mg)           (Mg/yr)          (Cubic m/yr)
================================================================================
1959         1.304E+04                 1.806E-03           4.091E-01
1960         2.609E+04                 3.525E-03           7.982E-01
1961         3.913E+04                 5.159E-03           1.168E+00
1962         5.217E+04                 6.714E-03           1.520E+00
1963         6.522E+04                 8.193E-03           1.855E+00
1964         7.826E+04                 9.600E-03           2.174E+00
1965         9.130E+04                 1.094E-02           2.477E+00
1966         1.043E+05                 1.221E-02           2.765E+00
1967         1.174E+05                 1.342E-02           3.039E+00
1968         1.304E+05                 1.457E-02           3.300E+00
1969         1.435E+05                 1.567E-02           3.548E+00
1970         1.565E+05                 1.671E-02           3.784E+00
1971         1.696E+05                 1.770E-02           4.009E+00
1972         1.826E+05                 1.865E-02           4.222E+00
1973         1.957E+05                 1.954E-02           4.426E+00
1974         2.087E+05                 2.040E-02           4.619E+00
1975         2.217E+05                 2.121E-02           4.803E+00
1976         2.348E+05                 2.198E-02           4.977E+00
1977         2.478E+05                 2.271E-02           5.144E+00
1978         2.609E+05                 2.341E-02           5.302E+00
1979         2.739E+05                 2.408E-02           5.452E+00
1980         2.870E+05                 2.471E-02           5.596E+00
1981         3.000E+05                 2.531E-02           5.732E+00
1982         3.000E+05                 2.408E-02           5.452E+00
1983         3.000E+05                 2.290E-02           5.186E+00
1984         3.000E+05                 2.179E-02           4.933E+00
1985         3.000E+05                 2.072E-02           4.693E+00
1986         3.000E+05                 1.971E-02           4.464E+00
1987         3.000E+05                 1.875E-02           4.246E+00
1988         3.000E+05                 1.784E-02           4.039E+00
1989         3.000E+05                 1.697E-02           3.842E+00
1990         3.000E+05                 1.614E-02           3.655E+00
1991         3.000E+05                 1.535E-02           3.477E+00
1992         3.000E+05                 1.460E-02           3.307E+00
1993         3.000E+05                 1.389E-02           3.146E+00
1994         3.000E+05                 1.321E-02           2.992E+00
1995         3.000E+05                 1.257E-02           2.846E+00
1996         3.000E+05                 1.196E-02           2.708E+00
1997         3.000E+05                 1.137E-02           2.575E+00
1998         3.000E+05                 1.082E-02           2.450E+00
1999         3.000E+05                 1.029E-02           2.330E+00
2000         3.000E+05                 9.789E-03           2.217E+00
2001         3.000E+05                 9.311E-03           2.109E+00
2002         3.000E+05                 8.857E-03           2.006E+00
2003         3.000E+05                 8.425E-03           1.908E+00
```

continued

Table D12. m,p-Xylene Emission Rate from Year 1959 to 2202 (continued)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2004	3.000E+05	8.014E-03	1.815E+00
2005	3.000E+05	7.624E-03	1.726E+00
2006	3.000E+05	7.252E-03	1.642E+00
2007	3.000E+05	6.898E-03	1.562E+00
2008	3.000E+05	6.562E-03	1.486E+00
2009	3.000E+05	6.242E-03	1.413E+00
2010	3.000E+05	5.937E-03	1.345E+00
2011	3.000E+05	5.648E-03	1.279E+00
2012	3.000E+05	5.372E-03	1.217E+00
2013	3.000E+05	5.110E-03	1.157E+00
2014	3.000E+05	4.861E-03	1.101E+00
2015	3.000E+05	4.624E-03	1.047E+00
2016	3.000E+05	4.398E-03	9.960E-01
2017	3.000E+05	4.184E-03	9.475E-01
2018	3.000E+05	3.980E-03	9.013E-01
2019	3.000E+05	3.786E-03	8.573E-01
2020	3.000E+05	3.601E-03	8.155E-01
2021	3.000E+05	3.425E-03	7.757E-01
2022	3.000E+05	3.258E-03	7.379E-01
2023	3.000E+05	3.100E-03	7.019E-01
2024	3.000E+05	2.948E-03	6.677E-01
2025	3.000E+05	2.805E-03	6.351E-01
2026	3.000E+05	2.668E-03	6.041E-01
2027	3.000E+05	2.538E-03	5.747E-01
2028	3.000E+05	2.414E-03	5.466E-01
2029	3.000E+05	2.296E-03	5.200E-01
2030	3.000E+05	2.184E-03	4.946E-01
2031	3.000E+05	2.078E-03	4.705E-01
2032	3.000E+05	1.976E-03	4.475E-01
2033	3.000E+05	1.880E-03	4.257E-01
2034	3.000E+05	1.788E-03	4.050E-01
2035	3.000E+05	1.701E-03	3.852E-01
2036	3.000E+05	1.618E-03	3.664E-01
2037	3.000E+05	1.539E-03	3.486E-01
2038	3.000E+05	1.464E-03	3.316E-01
2039	3.000E+05	1.393E-03	3.154E-01
2040	3.000E+05	1.325E-03	3.000E-01
2041	3.000E+05	1.260E-03	2.854E-01
2042	3.000E+05	1.199E-03	2.715E-01
2043	3.000E+05	1.140E-03	2.582E-01
2044	3.000E+05	1.085E-03	2.456E-01
2045	3.000E+05	1.032E-03	2.336E-01
2046	3.000E+05	9.814E-04	2.222E-01
2047	3.000E+05	9.336E-04	2.114E-01
2048	3.000E+05	8.880E-04	2.011E-01
2049	3.000E+05	8.447E-04	1.913E-01
2050	3.000E+05	8.035E-04	1.820E-01
2051	3.000E+05	7.643E-04	1.731E-01
2052	3.000E+05	7.271E-04	1.646E-01
2053	3.000E+05	6.916E-04	1.566E-01
2054	3.000E+05	6.579E-04	1.490E-01
2055	3.000E+05	6.258E-04	1.417E-01
2056	3.000E+05	5.953E-04	1.348E-01
2057	3.000E+05	5.662E-04	1.282E-01
2058	3.000E+05	5.386E-04	1.220E-01
2059	3.000E+05	5.123E-04	1.160E-01
2060	3.000E+05	4.874E-04	1.104E-01
2061	3.000E+05	4.636E-04	1.050E-01
2062	3.000E+05	4.410E-04	9.986E-02
2063	3.000E+05	4.195E-04	9.499E-02
2064	3.000E+05	3.990E-04	9.036E-02
2065	3.000E+05	3.796E-04	8.595E-02
2066	3.000E+05	3.610E-04	8.176E-02
2067	3.000E+05	3.434E-04	7.777E-02
2068	3.000E+05	3.267E-04	7.398E-02
2069	3.000E+05	3.108E-04	7.037E-02
2070	3.000E+05	2.956E-04	6.694E-02
2071	3.000E+05	2.812E-04	6.367E-02
2072	3.000E+05	2.675E-04	6.057E-02
2073	3.000E+05	2.544E-04	5.762E-02
2074	3.000E+05	2.420E-04	5.481E-02

continued

Table D12. m,p-Xylene Emission Rate from Year 1959 to 2202 (continued)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2075	3.000E+05	2.302E-04	5.213E-02
2076	3.000E+05	2.190E-04	4.959E-02
2077	3.000E+05	2.083E-04	4.717E-02
2078	3.000E+05	1.981E-04	4.487E-02
2079	3.000E+05	1.885E-04	4.268E-02
2080	3.000E+05	1.793E-04	4.060E-02
2081	3.000E+05	1.705E-04	3.862E-02
2082	3.000E+05	1.622E-04	3.674E-02
2083	3.000E+05	1.543E-04	3.495E-02
2084	3.000E+05	1.468E-04	3.324E-02
2085	3.000E+05	1.396E-04	3.162E-02
2086	3.000E+05	1.328E-04	3.008E-02
2087	3.000E+05	1.263E-04	2.861E-02
2088	3.000E+05	1.202E-04	2.722E-02
2089	3.000E+05	1.143E-04	2.589E-02
2090	3.000E+05	1.087E-04	2.463E-02
2091	3.000E+05	1.034E-04	2.342E-02
2092	3.000E+05	9.840E-05	2.228E-02
2093	3.000E+05	9.360E-05	2.120E-02
2094	3.000E+05	8.903E-05	2.016E-02
2095	3.000E+05	8.469E-05	1.918E-02
2096	3.000E+05	8.056E-05	1.824E-02
2097	3.000E+05	7.663E-05	1.735E-02
2098	3.000E+05	7.289E-05	1.651E-02
2099	3.000E+05	6.934E-05	1.570E-02
2100	3.000E+05	6.596E-05	1.494E-02
2101	3.000E+05	6.274E-05	1.421E-02
2102	3.000E+05	5.968E-05	1.351E-02
2103	3.000E+05	5.677E-05	1.286E-02
2104	3.000E+05	5.400E-05	1.223E-02
2105	3.000E+05	5.137E-05	1.163E-02
2106	3.000E+05	4.886E-05	1.106E-02
2107	3.000E+05	4.648E-05	1.053E-02
2108	3.000E+05	4.421E-05	1.001E-02
2109	3.000E+05	4.206E-05	9.524E-03
2110	3.000E+05	4.000E-05	9.059E-03
2111	3.000E+05	3.805E-05	8.617E-03
2112	3.000E+05	3.620E-05	8.197E-03
2113	3.000E+05	3.443E-05	7.797E-03
2114	3.000E+05	3.275E-05	7.417E-03
2115	3.000E+05	3.116E-05	7.055E-03
2116	3.000E+05	2.964E-05	6.711E-03
2117	3.000E+05	2.819E-05	6.384E-03
2118	3.000E+05	2.682E-05	6.073E-03
2119	3.000E+05	2.551E-05	5.776E-03
2120	3.000E+05	2.426E-05	5.495E-03
2121	3.000E+05	2.308E-05	5.227E-03
2122	3.000E+05	2.196E-05	4.972E-03
2123	3.000E+05	2.088E-05	4.729E-03
2124	3.000E+05	1.987E-05	4.499E-03
2125	3.000E+05	1.890E-05	4.279E-03
2126	3.000E+05	1.798E-05	4.071E-03
2127	3.000E+05	1.710E-05	3.872E-03
2128	3.000E+05	1.626E-05	3.683E-03
2129	3.000E+05	1.547E-05	3.504E-03
2130	3.000E+05	1.472E-05	3.333E-03
2131	3.000E+05	1.400E-05	3.170E-03
2132	3.000E+05	1.332E-05	3.016E-03
2133	3.000E+05	1.267E-05	2.868E-03
2134	3.000E+05	1.205E-05	2.729E-03
2135	3.000E+05	1.146E-05	2.596E-03
2136	3.000E+05	1.090E-05	2.469E-03
2137	3.000E+05	1.037E-05	2.349E-03
2138	3.000E+05	9.865E-06	2.234E-03
2139	3.000E+05	9.384E-06	2.125E-03
2140	3.000E+05	8.926E-06	2.021E-03
2141	3.000E+05	8.491E-06	1.923E-03
2142	3.000E+05	8.077E-06	1.829E-03
2143	3.000E+05	7.683E-06	1.740E-03
2144	3.000E+05	7.308E-06	1.655E-03
2145	3.000E+05	6.952E-06	1.574E-03

continued

Table D12. m,p-Xylene Emission Rate from Year 1959 to 2202 (concluded)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2146	3.000E+05	6.613E-06	1.497E-03
2147	3.000E+05	6.290E-06	1.424E-03
2148	3.000E+05	5.983E-06	1.355E-03
2149	3.000E+05	5.692E-06	1.289E-03
2150	3.000E+05	5.414E-06	1.226E-03
2151	3.000E+05	5.150E-06	1.166E-03
2152	3.000E+05	4.899E-06	1.109E-03
2153	3.000E+05	4.660E-06	1.055E-03
2154	3.000E+05	4.433E-06	1.004E-03
2155	3.000E+05	4.216E-06	9.548E-04
2156	3.000E+05	4.011E-06	9.083E-04
2157	3.000E+05	3.815E-06	8.640E-04
2158	3.000E+05	3.629E-06	8.218E-04
2159	3.000E+05	3.452E-06	7.818E-04
2160	3.000E+05	3.284E-06	7.436E-04
2161	3.000E+05	3.124E-06	7.074E-04
2162	3.000E+05	2.971E-06	6.729E-04
2163	3.000E+05	2.826E-06	6.400E-04
2164	3.000E+05	2.689E-06	6.088E-04
2165	3.000E+05	2.557E-06	5.791E-04
2166	3.000E+05	2.433E-06	5.509E-04
2167	3.000E+05	2.314E-06	5.240E-04
2168	3.000E+05	2.201E-06	4.985E-04
2169	3.000E+05	2.094E-06	4.742E-04
2170	3.000E+05	1.992E-06	4.510E-04
2171	3.000E+05	1.895E-06	4.290E-04
2172	3.000E+05	1.802E-06	4.081E-04
2173	3.000E+05	1.714E-06	3.882E-04
2174	3.000E+05	1.631E-06	3.693E-04
2175	3.000E+05	1.551E-06	3.513E-04
2176	3.000E+05	1.476E-06	3.341E-04
2177	3.000E+05	1.404E-06	3.178E-04
2178	3.000E+05	1.335E-06	3.023E-04
2179	3.000E+05	1.270E-06	2.876E-04
2180	3.000E+05	1.208E-06	2.736E-04
2181	3.000E+05	1.149E-06	2.602E-04
2182	3.000E+05	1.093E-06	2.475E-04
2183	3.000E+05	1.040E-06	2.355E-04
2184	3.000E+05	9.891E-07	2.240E-04
2185	3.000E+05	9.408E-07	2.131E-04
2186	3.000E+05	8.949E-07	2.027E-04
2187	3.000E+05	8.513E-07	1.928E-04
2188	3.000E+05	8.098E-07	1.834E-04
2189	3.000E+05	7.703E-07	1.744E-04
2190	3.000E+05	7.327E-07	1.659E-04
2191	3.000E+05	6.970E-07	1.578E-04
2192	3.000E+05	6.630E-07	1.501E-04
2193	3.000E+05	6.307E-07	1.428E-04
2194	3.000E+05	5.999E-07	1.358E-04
2195	3.000E+05	5.706E-07	1.292E-04
2196	3.000E+05	5.428E-07	1.229E-04
2197	3.000E+05	5.163E-07	1.169E-04
2198	3.000E+05	4.912E-07	1.112E-04
2199	3.000E+05	4.672E-07	1.058E-04
2200	3.000E+05	4.444E-07	1.006E-04
2201	3.000E+05	4.227E-07	9.573E-05
2202	3.000E+05	4.021E-07	9.106E-05

Table D13. o-Xylene Emission Rate from Year 1959 to 2202

```
Source: H:\3000\030177~1.000\030177~1.002\SOMMER~1\SOMERSWORTH.PRM

================================================================================
                              Model Parameters
================================================================================
Lo : 170.00 m^3 / Mg ***** User Mode Selection *****
k : 0.0500 1/yr ***** User Mode Selection *****
NMOC : 2380.00 ppmv ***** User Mode Selection *****
Methane : 58.0000 % volume
Carbon Dioxide : 42.0000 % volume
Air Pollutant : O-Xylene (HAP/VOC)
Molecular Wt =  106.17     Concentration =      0.720000 ppmV

================================================================================
                            Landfill Parameters
================================================================================
Landfill type : Co-Disposal
Year Opened : 1958    Current Year : 2003  Closure Year: 2003
Capacity : 300000 Mg
Average Acceptance Rate Required from
        Current Year to Closure Year : 0.00 Mg/year

================================================================================
                               Model Results
================================================================================
```

Year	Refuse In Place (Mg)	O-Xylene (HAP/VOC) Emission Rate (Mg/yr)	(Cubic m/yr)
1959	1.304E+04	6.078E-04	1.376E-01
1960	2.609E+04	1.186E-03	2.686E-01
1961	3.913E+04	1.736E-03	3.931E-01
1962	5.217E+04	2.259E-03	5.115E-01
1963	6.522E+04	2.757E-03	6.242E-01
1964	7.826E+04	3.230E-03	7.314E-01
1965	9.130E+04	3.680E-03	8.334E-01
1966	1.043E+05	4.108E-03	9.304E-01
1967	1.174E+05	4.516E-03	1.023E+00
1968	1.304E+05	4.903E-03	1.110E+00
1969	1.435E+05	5.272E-03	1.194E+00
1970	1.565E+05	5.623E-03	1.273E+00
1971	1.696E+05	5.956E-03	1.349E+00
1972	1.826E+05	6.273E-03	1.421E+00
1973	1.957E+05	6.575E-03	1.489E+00
1974	2.087E+05	6.862E-03	1.554E+00
1975	2.217E+05	7.135E-03	1.616E+00
1976	2.348E+05	7.395E-03	1.675E+00
1977	2.478E+05	7.642E-03	1.731E+00
1978	2.609E+05	7.877E-03	1.784E+00
1979	2.739E+05	8.101E-03	1.834E+00
1980	2.870E+05	8.314E-03	1.883E+00
1981	3.000E+05	8.516E-03	1.928E+00
1982	3.000E+05	8.101E-03	1.834E+00
1983	3.000E+05	7.706E-03	1.745E+00
1984	3.000E+05	7.330E-03	1.660E+00
1985	3.000E+05	6.972E-03	1.579E+00
1986	3.000E+05	6.632E-03	1.502E+00
1987	3.000E+05	6.309E-03	1.429E+00
1988	3.000E+05	6.001E-03	1.359E+00
1989	3.000E+05	5.708E-03	1.293E+00
1990	3.000E+05	5.430E-03	1.230E+00
1991	3.000E+05	5.165E-03	1.170E+00
1992	3.000E+05	4.913E-03	1.113E+00
1993	3.000E+05	4.674E-03	1.058E+00
1994	3.000E+05	4.446E-03	1.007E+00
1995	3.000E+05	4.229E-03	9.576E-01
1996	3.000E+05	4.023E-03	9.109E-01
1997	3.000E+05	3.826E-03	8.665E-01
1998	3.000E+05	3.640E-03	8.243E-01
1999	3.000E+05	3.462E-03	7.841E-01
2000	3.000E+05	3.293E-03	7.458E-01
2001	3.000E+05	3.133E-03	7.094E-01
2002	3.000E+05	2.980E-03	6.748E-01
2003	3.000E+05	2.835E-03	6.419E-01

continued

Table D13. o-Xylene Emission Rate from Year 1959 to 2202 (continued)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2004	3.000E+05	2.696E-03	6.106E-01
2005	3.000E+05	2.565E-03	5.808E-01
2006	3.000E+05	2.440E-03	5.525E-01
2007	3.000E+05	2.321E-03	5.256E-01
2008	3.000E+05	2.208E-03	4.999E-01
2009	3.000E+05	2.100E-03	4.756E-01
2010	3.000E+05	1.998E-03	4.524E-01
2011	3.000E+05	1.900E-03	4.303E-01
2012	3.000E+05	1.807E-03	4.093E-01
2013	3.000E+05	1.719E-03	3.893E-01
2014	3.000E+05	1.635E-03	3.704E-01
2015	3.000E+05	1.556E-03	3.523E-01
2016	3.000E+05	1.480E-03	3.351E-01
2017	3.000E+05	1.408E-03	3.188E-01
2018	3.000E+05	1.339E-03	3.032E-01
2019	3.000E+05	1.274E-03	2.884E-01
2020	3.000E+05	1.212E-03	2.744E-01
2021	3.000E+05	1.153E-03	2.610E-01
2022	3.000E+05	1.096E-03	2.483E-01
2023	3.000E+05	1.043E-03	2.362E-01
2024	3.000E+05	9.920E-04	2.246E-01
2025	3.000E+05	9.436E-04	2.137E-01
2026	3.000E+05	8.976E-04	2.033E-01
2027	3.000E+05	8.538E-04	1.933E-01
2028	3.000E+05	8.122E-04	1.839E-01
2029	3.000E+05	7.725E-04	1.749E-01
2030	3.000E+05	7.349E-04	1.664E-01
2031	3.000E+05	6.990E-04	1.583E-01
2032	3.000E+05	6.649E-04	1.506E-01
2033	3.000E+05	6.325E-04	1.432E-01
2034	3.000E+05	6.017E-04	1.362E-01
2035	3.000E+05	5.723E-04	1.296E-01
2036	3.000E+05	5.444E-04	1.233E-01
2037	3.000E+05	5.179E-04	1.173E-01
2038	3.000E+05	4.926E-04	1.116E-01
2039	3.000E+05	4.686E-04	1.061E-01
2040	3.000E+05	4.457E-04	1.009E-01
2041	3.000E+05	4.240E-04	9.601E-02
2042	3.000E+05	4.033E-04	9.133E-02
2043	3.000E+05	3.836E-04	8.688E-02
2044	3.000E+05	3.649E-04	8.264E-02
2045	3.000E+05	3.471E-04	7.861E-02
2046	3.000E+05	3.302E-04	7.477E-02
2047	3.000E+05	3.141E-04	7.113E-02
2048	3.000E+05	2.988E-04	6.766E-02
2049	3.000E+05	2.842E-04	6.436E-02
2050	3.000E+05	2.703E-04	6.122E-02
2051	3.000E+05	2.572E-04	5.823E-02
2052	3.000E+05	2.446E-04	5.539E-02
2053	3.000E+05	2.327E-04	5.269E-02
2054	3.000E+05	2.213E-04	5.012E-02
2055	3.000E+05	2.105E-04	4.768E-02
2056	3.000E+05	2.003E-04	4.535E-02
2057	3.000E+05	1.905E-04	4.314E-02
2058	3.000E+05	1.812E-04	4.104E-02
2059	3.000E+05	1.724E-04	3.904E-02
2060	3.000E+05	1.640E-04	3.713E-02
2061	3.000E+05	1.560E-04	3.532E-02
2062	3.000E+05	1.484E-04	3.360E-02
2063	3.000E+05	1.411E-04	3.196E-02
2064	3.000E+05	1.342E-04	3.040E-02
2065	3.000E+05	1.277E-04	2.892E-02
2066	3.000E+05	1.215E-04	2.751E-02
2067	3.000E+05	1.155E-04	2.617E-02
2068	3.000E+05	1.099E-04	2.489E-02
2069	3.000E+05	1.046E-04	2.368E-02
2070	3.000E+05	9.945E-05	2.252E-02
2071	3.000E+05	9.460E-05	2.142E-02
2072	3.000E+05	8.999E-05	2.038E-02
2073	3.000E+05	8.560E-05	1.938E-02
2074	3.000E+05	8.143E-05	1.844E-02

continued

Table D13. o-Xylene Emission Rate from Year 1959 to 2202 (continued)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2075	3.000E+05	7.745E-05	1.754E-02
2076	3.000E+05	7.368E-05	1.668E-02
2077	3.000E+05	7.008E-05	1.587E-02
2078	3.000E+05	6.667E-05	1.510E-02
2079	3.000E+05	6.341E-05	1.436E-02
2080	3.000E+05	6.032E-05	1.366E-02
2081	3.000E+05	5.738E-05	1.299E-02
2082	3.000E+05	5.458E-05	1.236E-02
2083	3.000E+05	5.192E-05	1.176E-02
2084	3.000E+05	4.939E-05	1.118E-02
2085	3.000E+05	4.698E-05	1.064E-02
2086	3.000E+05	4.469E-05	1.012E-02
2087	3.000E+05	4.251E-05	9.626E-03
2088	3.000E+05	4.043E-05	9.157E-03
2089	3.000E+05	3.846E-05	8.710E-03
2090	3.000E+05	3.659E-05	8.285E-03
2091	3.000E+05	3.480E-05	7.881E-03
2092	3.000E+05	3.311E-05	7.497E-03
2093	3.000E+05	3.149E-05	7.131E-03
2094	3.000E+05	2.995E-05	6.783E-03
2095	3.000E+05	2.849E-05	6.453E-03
2096	3.000E+05	2.710E-05	6.138E-03
2097	3.000E+05	2.578E-05	5.839E-03
2098	3.000E+05	2.452E-05	5.554E-03
2099	3.000E+05	2.333E-05	5.283E-03
2100	3.000E+05	2.219E-05	5.025E-03
2101	3.000E+05	2.111E-05	4.780E-03
2102	3.000E+05	2.008E-05	4.547E-03
2103	3.000E+05	1.910E-05	4.325E-03
2104	3.000E+05	1.817E-05	4.114E-03
2105	3.000E+05	1.728E-05	3.914E-03
2106	3.000E+05	1.644E-05	3.723E-03
2107	3.000E+05	1.564E-05	3.541E-03
2108	3.000E+05	1.488E-05	3.369E-03
2109	3.000E+05	1.415E-05	3.204E-03
2110	3.000E+05	1.346E-05	3.048E-03
2111	3.000E+05	1.280E-05	2.899E-03
2112	3.000E+05	1.218E-05	2.758E-03
2113	3.000E+05	1.158E-05	2.623E-03
2114	3.000E+05	1.102E-05	2.495E-03
2115	3.000E+05	1.048E-05	2.374E-03
2116	3.000E+05	9.971E-06	2.258E-03
2117	3.000E+05	9.485E-06	2.148E-03
2118	3.000E+05	9.022E-06	2.043E-03
2119	3.000E+05	8.582E-06	1.943E-03
2120	3.000E+05	8.164E-06	1.849E-03
2121	3.000E+05	7.765E-06	1.759E-03
2122	3.000E+05	7.387E-06	1.673E-03
2123	3.000E+05	7.027E-06	1.591E-03
2124	3.000E+05	6.684E-06	1.514E-03
2125	3.000E+05	6.358E-06	1.440E-03
2126	3.000E+05	6.048E-06	1.370E-03
2127	3.000E+05	5.753E-06	1.303E-03
2128	3.000E+05	5.472E-06	1.239E-03
2129	3.000E+05	5.205E-06	1.179E-03
2130	3.000E+05	4.951E-06	1.121E-03
2131	3.000E+05	4.710E-06	1.067E-03
2132	3.000E+05	4.480E-06	1.015E-03
2133	3.000E+05	4.262E-06	9.651E-04
2134	3.000E+05	4.054E-06	9.180E-04
2135	3.000E+05	3.856E-06	8.733E-04
2136	3.000E+05	3.668E-06	8.307E-04
2137	3.000E+05	3.489E-06	7.902E-04
2138	3.000E+05	3.319E-06	7.516E-04
2139	3.000E+05	3.157E-06	7.150E-04
2140	3.000E+05	3.003E-06	6.801E-04
2141	3.000E+05	2.857E-06	6.469E-04
2142	3.000E+05	2.717E-06	6.154E-04
2143	3.000E+05	2.585E-06	5.854E-04
2144	3.000E+05	2.459E-06	5.568E-04
2145	3.000E+05	2.339E-06	5.297E-04

continued

Table D13. o-Xylene Emission Rate from Year 1959 to 2202 (concluded)

Year	Refuse In Place (Mg)	(Mg/yr)	(Cubic m/yr)
2146	3.000E+05	2.225E-06	5.038E-04
2147	3.000E+05	2.116E-06	4.793E-04
2148	3.000E+05	2.013E-06	4.559E-04
2149	3.000E+05	1.915E-06	4.336E-04
2150	3.000E+05	1.822E-06	4.125E-04
2151	3.000E+05	1.733E-06	3.924E-04
2152	3.000E+05	1.648E-06	3.732E-04
2153	3.000E+05	1.568E-06	3.550E-04
2154	3.000E+05	1.491E-06	3.377E-04
2155	3.000E+05	1.419E-06	3.213E-04
2156	3.000E+05	1.349E-06	3.056E-04
2157	3.000E+05	1.284E-06	2.907E-04
2158	3.000E+05	1.221E-06	2.765E-04
2159	3.000E+05	1.161E-06	2.630E-04
2160	3.000E+05	1.105E-06	2.502E-04
2161	3.000E+05	1.051E-06	2.380E-04
2162	3.000E+05	9.997E-07	2.264E-04
2163	3.000E+05	9.509E-07	2.153E-04
2164	3.000E+05	9.046E-07	2.048E-04
2165	3.000E+05	8.604E-07	1.949E-04
2166	3.000E+05	8.185E-07	1.853E-04
2167	3.000E+05	7.786E-07	1.763E-04
2168	3.000E+05	7.406E-07	1.677E-04
2169	3.000E+05	7.045E-07	1.595E-04
2170	3.000E+05	6.701E-07	1.517E-04
2171	3.000E+05	6.374E-07	1.443E-04
2172	3.000E+05	6.063E-07	1.373E-04
2173	3.000E+05	5.768E-07	1.306E-04
2174	3.000E+05	5.486E-07	1.242E-04
2175	3.000E+05	5.219E-07	1.182E-04
2176	3.000E+05	4.964E-07	1.124E-04
2177	3.000E+05	4.722E-07	1.069E-04
2178	3.000E+05	4.492E-07	1.017E-04
2179	3.000E+05	4.273E-07	9.676E-05
2180	3.000E+05	4.064E-07	9.204E-05
2181	3.000E+05	3.866E-07	8.755E-05
2182	3.000E+05	3.678E-07	8.328E-05
2183	3.000E+05	3.498E-07	7.922E-05
2184	3.000E+05	3.328E-07	7.536E-05
2185	3.000E+05	3.165E-07	7.168E-05
2186	3.000E+05	3.011E-07	6.819E-05
2187	3.000E+05	2.864E-07	6.486E-05
2188	3.000E+05	2.724E-07	6.170E-05
2189	3.000E+05	2.592E-07	5.869E-05
2190	3.000E+05	2.465E-07	5.583E-05
2191	3.000E+05	2.345E-07	5.310E-05
2192	3.000E+05	2.231E-07	5.051E-05
2193	3.000E+05	2.122E-07	4.805E-05
2194	3.000E+05	2.018E-07	4.571E-05
2195	3.000E+05	1.920E-07	4.348E-05
2196	3.000E+05	1.826E-07	4.136E-05
2197	3.000E+05	1.737E-07	3.934E-05
2198	3.000E+05	1.652E-07	3.742E-05
2199	3.000E+05	1.572E-07	3.560E-05
2200	3.000E+05	1.495E-07	3.386E-05
2201	3.000E+05	1.422E-07	3.221E-05
2202	3.000E+05	1.353E-07	3.064E-05

Appendix E
SCREEN3 Model Runs

Sommersworth UNITY.OUT

03/05/03
09:48:26

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

Somersworth Regional Landfill

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	0.561170E-05
SOURCE HEIGHT (M)	=	0.0000
LENGTH OF LARGER SIDE (M)	=	540.0000
LENGTH OF SMALLER SIDE (M)	=	330.0000
RECEPTOR HEIGHT (M)	=	0.0000
URBAN/RURAL OPTION	=	RURAL

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = 0.000 M**4/S**3; MOM. FLUX = 0.000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
1.	842.4	6	1.0	1.0	10000.0	0.00	30.
100.	907.1	6	1.0	1.0	10000.0	0.00	30.
200.	964.5	6	1.0	1.0	10000.0	0.00	29.
300.	1014.	6	1.0	1.0	10000.0	0.00	28.
400.	483.7	6	1.0	1.0	10000.0	0.00	31.
500.	363.7	6	1.0	1.0	10000.0	0.00	30.
600.	300.9	6	1.0	1.0	10000.0	0.00	30.
700.	259.9	6	1.0	1.0	10000.0	0.00	29.
800.	230.5	6	1.0	1.0	10000.0	0.00	29.
900.	208.6	6	1.0	1.0	10000.0	0.00	28.
1000.	191.6	6	1.0	1.0	10000.0	0.00	27.
1100.	177.9	6	1.0	1.0	10000.0	0.00	27.
1200.	166.4	6	1.0	1.0	10000.0	0.00	26.
1300.	156.6	6	1.0	1.0	10000.0	0.00	25.
1400.	148.1	6	1.0	1.0	10000.0	0.00	24.
1500.	140.5	6	1.0	1.0	10000.0	0.00	24.
1600.	133.8	6	1.0	1.0	10000.0	0.00	23.
1700.	127.7	6	1.0	1.0	10000.0	0.00	22.
1800.	122.2	6	1.0	1.0	10000.0	0.00	21.
1900.	117.2	6	1.0	1.0	10000.0	0.00	19.
2000.	112.8	6	1.0	1.0	10000.0	0.00	19.
2100.	108.7	6	1.0	1.0	10000.0	0.00	17.
2200.	105.1	6	1.0	1.0	10000.0	0.00	14.
2300.	101.8	6	1.0	1.0	10000.0	0.00	14.
2400.	98.67	6	1.0	1.0	10000.0	0.00	11.
2500.	95.71	6	1.0	1.0	10000.0	0.00	0.
2600.	93.03	6	1.0	1.0	10000.0	0.00	0.
2700.	90.43	6	1.0	1.0	10000.0	0.00	0.
2800.	87.94	6	1.0	1.0	10000.0	0.00	0.

Sommersworth UNITY.OUT

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  2900.   85.58         6     1.0     1.0 10000.0    0.00       0.
  3000.   83.33         6     1.0     1.0 10000.0    0.00       0.
  3500.   73.60         6     1.0     1.0 10000.0    0.00       0.
  4000.   65.40         6     1.0     1.0 10000.0    0.00       0.
  4500.   58.44         6     1.0     1.0 10000.0    0.00       0.
  5000.   52.50         6     1.0     1.0 10000.0    0.00       0.
  5500.   47.44         6     1.0     1.0 10000.0    0.00       0.
  6000.   43.10         6     1.0     1.0 10000.0    0.00       0.
  6500.   39.37         6     1.0     1.0 10000.0    0.00       0.
  7000.   36.13         6     1.0     1.0 10000.0    0.00       0.
  7500.   33.41         6     1.0     1.0 10000.0    0.00       0.
  8000.   31.01         6     1.0     1.0 10000.0    0.00       0.
  8500.   28.92         6     1.0     1.0 10000.0    0.00       0.
  9000.   27.03         6     1.0     1.0 10000.0    0.00       0.
  9500.   25.34         6     1.0     1.0 10000.0    0.00       0.
 10000.   23.85         6     1.0     1.0 10000.0    0.00       0.
 15000.   14.49         6     1.0     1.0 10000.0    0.00       0.
 20000.   10.34         6     1.0     1.0 10000.0    0.00       0.
 25000.   7.945         6     1.0     1.0 10000.0    0.00       0.
 30000.   6.401         6     1.0     1.0 10000.0    0.00       0.
 40000.   4.617         6     1.0     1.0 10000.0    0.00       0.
 50000.   3.580         6     1.0     1.0 10000.0    0.00       0.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND     1. M:
   315.   1020.         6     1.0     1.0 10000.0    0.00      31.

     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************

 CALCULATION         MAX CONC     DIST TO    TERRAIN
  PROCEDURE         (UG/M**3)     MAX (M)     HT (M)
--------------     -----------   -------    -------
SIMPLE TERRAIN        1020.          315.         0.
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