

3.0 WATER QUALITY

3.1 BACKGROUND GROUNDWATER QUALITY

Prior to any landfill construction related activities (April and May 1985), 14 monitoring wells were installed at the North County Regional Resource Recovery Facility (NCRRRF) for the purpose of establishing background groundwater quality data. These wells were abandoned in accordance with South Florida Water Management District guidelines after construction of the landfill began. Four of the background wells were installed to a depth of 120 and 130 feet below ground surface and the remaining 10 wells were installed to a depth of approximately 20 feet below ground surface. The approximate locations of the 14 background wells are presented on Figure 3-1. Survey data and construction data for the 14 wells are presented on Page 2-14 of Appendix A.

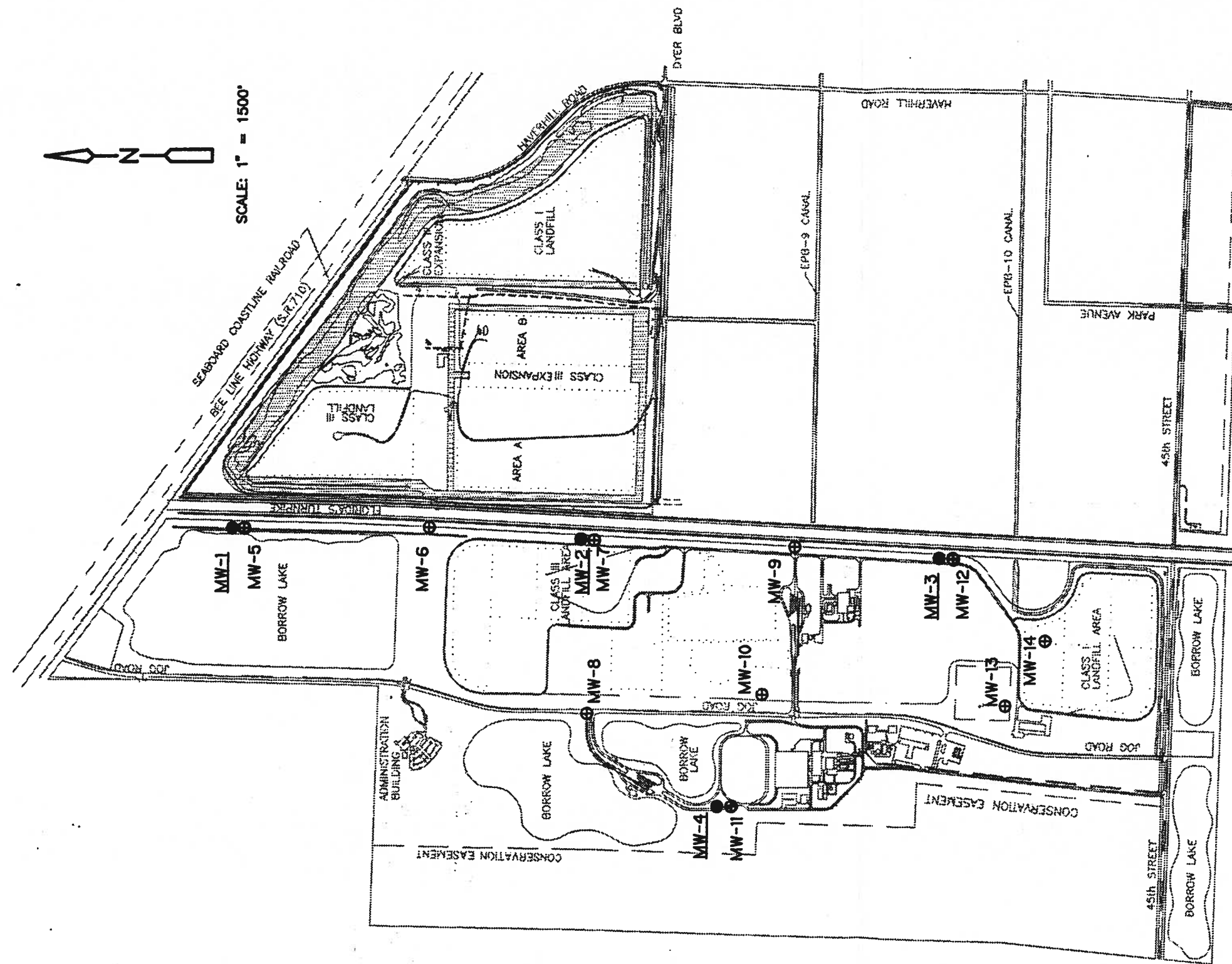
Water samples were collected from all 14 monitoring wells on one occasion (in May 1985) following the performance of the short-term aquifer performance tests. The water samples were analyzed for the State of Florida primary and secondary drinking water parameters. Additionally, the water samples from 9 of the 14 wells were analyzed for purgeable organics, base neutral extractables, acid extractable organics, pesticides, and polychlorinated biphenyls. The results of the water quality analysis are presented in Appendix A.

The quality of groundwater beneath the site is good; it is characteristically hard for water in a carbonate-based environment. The deep wells produce water samples with a higher average total hardness than the shallow wells; the total hardness (as calcium carbonate) range for all wells was from 164 to 467 milligrams per liter (mg/l). The pH of all samples ranged from 6.8 to 7.2 as measured in the field. The concentrations of total dissolved solids (TDS) in the deep wells ranged from 370 to 522 mg/l. The TDS range for samples from the shallow wells was from 235 to 485 mg/l. The chloride concentrations ranged from 24.2 to 65.4 mg/l in the deep wells. In the shallow wells, chloride concentrations ranged from 5.8 to 35.9 mg/l.

SOLID WASTE AUTHORITY OF PALM BEACH COUNTY

LOCATION OF PREDEVELOPMENT
BACKGROUND MONITORING WELLS

Figure No. 3-1



- LEGEND:**
- MW-14 ⊕ LOCATION OF SHALLOW MONITORING WELL
 - MW-3 ● LOCATION OF DEEP MONITORING WELL

MONITORING WELL ID	WELL DEPTH (feet below ground)	SCREEN INTERVAL (feet below ground)
MW-1	88	79-88
MW-2	90	60-90
MW-3	90	60-90
MW-4	90	60-90
MW-5	15	5-15
MW-6	15	5-15
MW-7	15	5-15
MW-8	15	5-15
MW-9	15	5-15
MW-10	15	5-15
MW-11	15	5-15
MW-12	15	5-15
MW-13	15	5-15
MW-14	15	5-15

None of the 130 analyzed priority pollutants were detected in any of the samples with the exception of zinc. Where detected, the concentrations of zinc were 0.01 mg/l which is the limit of detection. There were no instances where the measured concentration exceeded any of the primary drinking water standards.

There were several instances where the maximum contaminant levels (MCLs) of the secondary drinking water standards were exceeded. The parameters are saturation index, color, odor threshold, turbidity, TDS, manganese, and iron. The amounts by which these parameters exceeded the MCLs is not significant in that such concentrations are natural and can be reduced by common treatment processes.

3.2 BACKGROUND SURFACE WATER QUALITY

According to the site certification report, the background surface water quality of the site was established by analysis of surface waters at 12 selected sample locations (SW-1 through SW-12) at the site. The water samples were analyzed for the State of Florida primary and secondary drinking water parameters. The locations of the 11 sites are shown on Figure 3-1. The results of the chemical analysis are presented in Tables 2.3-7a through 2.3-7d in Appendix A.

According to the water quality data, the surface water quality meets the Class III surface water standards (Section 17-302.560, Florida Administrative Code [FAC]) and State of Florida Drinking Water Standards (Chapter 17-550, FAC). The measured concentrations of the analyzed organic constituents and metals were below the standards described above. Only color and turbidity exceeded their respective standards for some of the sample locations (SW-3, SW-4, SW-5, SW-6, SW-9, SW-10, and SW-12). There were also three exceedances for coliforms at SW-4, SW-6, and SW-10.

3.3 OPERATIONAL GROUNDWATER QUALITY

To evaluate any changes in groundwater quality that may have occurred as a result of landfilling operations, a review was completed of the most recent groundwater quality data. Leachate indicator parameters were selected for this purpose. Ammonia (NH₃), chloride (Cl⁻), sulfate (SO₄) and specific conductance are widely recognized as good indicators of leachate contamination. Groundwater quality data for 1993 and 1994 were used for this review.

A total of 30 wells were sampled within the Dyer Boulevard Landfill and 25 wells were sampled within the NCRRRF during 1993. The wells are installed in both the shallow and deeper units of the surficial aquifer system. Chloride concentrations ranged from 6 to 207 mg/l, with an average value of 51 mg/l. Ammonia concentrations ranged from 0.2 to 78.4 mg/l, with an average value of 4.5 mg/l. Sulfate concentrations ranged from less than 10 mg/l to 284 mg/l, with an average value of 66 mg/l. Specific conductance ranged from 347 millisiemens (mS) to 2,270 mS, with an average value of 901 mS. A summary of groundwater indicator parameter concentrations for 1993 is presented in Table 3-1.

A total of 34 wells were sampled within the Dyer Boulevard Landfill and 25 wells were sampled within the NCRRRF during the first two quarters of 1994. The wells are installed in both the shallow and deeper units of the surficial aquifer system. Chloride concentrations ranged from 7 to 221 mg/l, with an average value of 57 mg/l. Ammonia concentrations ranged from 0.2 to 79 mg/l, with an average value of 5 mg/l. Sulfate concentrations ranged from less than 10 mg/l to 244 mg/l, with an average value of 60 mg/l. Specific conductance ranged from 349 mS to 2,200 mS, with an average value of 882 mS. A summary of groundwater indicator parameter concentrations for 1994 is presented in Table 3-2.

Table 3-1

North County Regional Resource Recovery Facility and Dyer Boulevard Landfill
Summary of Indicator Parameter Concentrations - 1993

Well ID	Chloride		Ammonia (NH ₃)		Sulfate (SO ₄)		Specific Conductance	
	Minimum (mg/l)	Maximum (mg/l)	Minimum (mg/l)	Maximum (mg/l)	Minimum (mg/l)	Maximum (mg/l)	Minimum (mS)	Maximum (mS)
DW-1R	24	115	7.7	43.1	<10	78.4	1446	1664
DW-2R	41	95	5.1	37.8	284.0	70.4	2270	2270
DW-5AR	6	9	0.2	0.4	175.0	0.5	698	889
DW-5BR	99	113	0.9	0.9	<10	0.9	1116	1178
DW-16AR	25	26	0.6	0.8	16.0	0.9	577	581
DW-16R	20	26	4.5	5.9	113.0	7.4	1330	1428
DW-17	16	18	0.2	0.6	27.0	0.9	549	573
DW-17A	41	42	1.9	2.1	30.0	2.3	742	766
DW-18AR	84	91	4.8	5.1	<10	5.4	1370	1385
DW-18R	121	123	13.9	18.7	14.0	23.4	1907	1979
DW-19	14	16	15.7	16.9	<10	18.0	834	845
DW-19A	20	27	1.6	1.7	<10	1.7	600	615
DW-20	27	35	1.1	1.2	69.0	1.2	886	895
DW-20A	41	49	0.9	1.0	<10	1.1	600	600
DW-21	19	19	7.8	10.5	22.0	13.1	1190	1204
DW-21A	49	49	1.0	1.6	19.0	2.1	851	884
DW-22AR	25	31	0.7	0.8	<10	0.8	596	599
DW-22R	11	12	0.4	0.4	17.0	0.5	610	612
DW-23	32	38	0.6	0.7	<10	0.7	617	659
DW-23A	27	32	0.7	0.7	<10	0.7	700	719
DW-24A	71	91	2.9	3.1	60.0	3.2	1016	1048
DW-24B	133	159	1.2	1.4	28.0	1.6	1196	1283
DW-25A	8	10	0.3	0.7	37.0	1.0	635	649
DW-25B	40	41	2.2	2.4	41.0	2.6	858	863

Table 3-1

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Summary of Indicator Parameter Concentrations - 1993

Well ID	Chloride			Ammonia (NH ₃)			Sulfate (SO ₄)			Specific Conductance		
	Minimum (mg/l)	Mean (mg/l)	Maximum (mg/l)	Minimum (mg/l)	Mean (mg/l)	Maximum (mg/l)	Minimum (mg/l)	Mean (mg/l)	Maximum (mg/l)	Minimum (mS)	Mean (mS)	Maximum (mS)
DW-28	28	34	40	12.8	13.5	14.1	<10		19.0	1093	1101	1108
DW-28A	19	22	25	1.1	1.1	1.1	136.0	139.0	141.0	854	862	870
DW-29	26	29	33	0.3	0.4	0.4	49.0	63.0	77.0	849	871	893
DW-29A	26	27	29	0.8	0.8	0.8	14.0	14.0	14.0	556	567	577
IW-1	137	137	137	9.4	9.4	9.4	<10	<10	<10	1707	1707	1707
IW-2	108	108	108	35.6	35.6	35.6	10.0	10.0	10.0	1516	1516	1516
IW-3	95	95	95	1.1	1.1	1.1	36.0	36.0	36.0	1071	1071	1071
IW-4	33	33	33	1.4	1.4	1.4	140.0	140.0	140.0	981	981	981
IW-4.5	36	36	36	0.9	0.9	0.9	55.0	55.0	55.0	802	802	802
IW-5	83	83	83	1.0	1.0	1.0	38.0	38.0	38.0	902	902	902
IW-5.5	49	49	49	0.9	0.9	0.9	159.0	159.0	159.0	981	981	981
IW-6	59	59	59	1.0	1.0	1.0	49.0	49.0	49.0	775	775	775
S7W-1	54	54	54	1.4	1.4	1.4	<10	<10	<10	558	558	558
S7W-1A	46	46	46	0.8	0.8	0.8	<10	<10	<10	637	637	637
S7W-2	66	66	66	1.8	1.8	1.8	<10	<10	<10	540	540	540
S7W-2A	46	46	46	1.0	1.0	1.0	<10	<10	<10	396	396	396
S7W-3	46	46	46	1.2	1.2	1.2	<10	<10	<10	726	726	726
S7W-3A	115	115	115	0.9	0.9	0.9	13.0	13.0	13.0	1178	1178	1178
S7W-4	9	9	9	0.6	0.6	0.6	61.0	61.0	61.0	933	933	933

Table 3-1

North County Regional Resource Recovery Facility and Dyer Boulevard Landfill
Summary of Indicator Parameter Concentrations - 1993

Well ID	Chloride			Ammonia (NH ₃)			Sulfate (SO ₄)			Specific Conductance		
	Minimum (mg/l)	Mean (mg/l)	Maximum (mg/l)	Minimum (mg/l)	Mean (mg/l)	Maximum (mg/l)	Minimum (mg/l)	Mean (mg/l)	Maximum (mg/l)	Minimum (mS)	Mean (mS)	Maximum (mS)
S7W-4A	31	31	31	0.7	0.7	0.7	35.0	35.0	35.0	816	816	816
S7W-5	13	13	13	0.3	0.3	0.3	<10	<10	<10	347	347	347
S7W-5A	23	23	23	1.4	1.4	1.4	20.0	20.0	20.0	575	575	575
S7W-6	27	27	27	0.9	0.9	0.9	200.0	200.0	200.0	944	944	944
S7W-6A	40	40	40	1.1	1.1	1.1	13.0	13.0	13.0	751	751	751
S7W-7	24	24	24	0.6	0.6	0.6	145.0	145.0	145.0	817	817	817
S7W-7A	57	57	57	1.2	1.2	1.2	<10	<10	<10	842	842	842
S7W-8	46	46	46	0.6	0.6	0.6	<10	<10	<10	549	549	549
S7W-8A	49	49	49	0.9	0.9	0.9	13.0	13.0	13.0	716	716	716
S7W-102	52	52	52	1.3	1.3	1.3	<10	<10	<10	637	637	637
S7W-104	8	8	8	0.8	0.8	0.8	37.0	37.0	37.0	557	557	557
S7W-106	60	60	60	5.0	5.0	5.0	80.0	80.0	80.0	729	729	729
Minimum	6	8	8	0.2	0.3	0.3	<10	<10	<10	347	347	347
Average	46	51	56	3.0	4.5	6.0	60.1	65.9	70.9	882	901	919
Maximum	137	159	207	35.6	43.1	78.4	284.0	284.0	284.0	2270	2270	2270

Table 3-2

North County Regional Resource Recovery Facility and Dyer Boulevard Landfill
Summary of Indicator Parameter Concentrations - 1994

Well ID	Chloride		Ammonia (NH ₃)		Sulfate (SO ₄)		Specific Conductance	
	Minimum (mg/l)	Maximum (mg/l)	Minimum (mg/l)	Maximum (mg/l)	Minimum (mg/l)	Maximum (mg/l)	Minimum (mS)	Maximum (mS)
DW-1R	49	49	7.2	7.2	179.0	179.0	1469	1469
DW-2R	221	221	78.9	78.9	<10	<10	2200	2200
DW-5AR	7	7	0.1	0.1	69.0	69.0	724	724
DW-5BR	113	113	0.9	0.9	11.0	11.0	1050	1050
DW-14	134	134	13.9	13.9	11.0	11.0	1679	1679
DW-15	23	23	1.1	1.1	82.0	82.0	653	653
DW-16AR	27	27	1.0	1.0	13.0	13.0	557	557
DW-16R	25	25	6.0	6.0	104.0	104.0	1355	1355
DW-17	16	16	0.3	0.3	29.0	29.0	512	512
DW-17A	49	49	2.6	2.6	21.0	21.0	790	790
DW-18AR	104	104	7.9	7.9	<10	<10	1372	1372
DW-18R	97	97	16.9	16.9	31.0	31.0	1688	1688
DW-19	41	41	16.5	16.5	16.0	16.0	710	710
DW-19A	76	76	1.8	1.8	10.0	10.0	602	602
DW-20	60	60	1.0	1.0	88.0	88.0	871	871
DW-20A	45	45	1.0	1.0	<10	<10	600	600
DW-21	70	70	18.6	18.6	28.0	28.0	1150	1150
DW-21A	159	159	2.9	2.9	13.0	13.0	851	851
DW-22AR	33	33	0.9	0.9	11.0	11.0	597	597
DW-22R	15	15	0.6	0.6	23.0	23.0	533	533
DW-23	<1	<1	0.7	0.7	10.0	10.0	552	552
DW-23A	29	29	0.8	0.8	<10	<10	717	717
DW-24A	104	104	5.1	5.1	68.0	68.0	1058	1058
DW-24B	187	187	1.2	1.2	22.0	22.0	1254	1254
DW-25A	10	10	0.2	0.2	11.0	11.0	427	427

Table 3-2

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Well ID	Chloride			Ammonia (NH ₃)			Sulfate (SO ₄)			Specific Conductance		
	Minimum (mg/l)	Mean (mg/l)	Maximum (mg/l)	Minimum (mg/l)	Mean (mg/l)	Maximum (mg/l)	Minimum (mg/l)	Mean (mg/l)	Maximum (mg/l)	Minimum (mS)	Mean (mS)	Maximum (mS)
DW-25B	38	38	38	2.7	2.7	2.7	139.0	139.0	139.0	909	909	909
DW-27B	37	37	37	0.3	0.3	0.3	55.0	55.0	55.0	731	731	731
DW-27C	50	50	50	1.2	1.2	1.2	114.0	114.0	114.0	878	878	878
DW-28	55	55	55	13.5	13.5	13.5	24.0	24.0	24.0	1143	1143	1143
DW-28A	19	19	19	1.5	1.5	1.5	154.0	154.0	154.0	848	848	848
DW-29	31	31	31	0.5	0.5	0.5	125.0	125.0	125.0	986	986	986
DW-29A	26	26	26	0.8	0.8	0.8	15.0	15.0	15.0	537	537	537
IW-1	98	98	98	10.7	10.7	10.7	14.0	14.0	14.0	1692	1692	1692
IW-2	152	152	152	49.6	49.6	49.6	<10	<10	<10	1782	1782	1782
IW-3	91	91	91	1.2	1.2	1.2	39.0	39.0	39.0	973	973	973
IW-4.5	37	37	37	0.9	0.9	0.9	58.0	58.0	58.0	802	802	802
IW-5	72	72	72	1.0	1.0	1.0	46.0	46.0	46.0	902	902	902
IW-5.5	57	57	57	0.8	0.8	0.8	134.0	134.0	134.0	949	949	949
IW-6	55	55	55	0.9	0.9	0.9	33.0	33.0	33.0	744	744	744
S7W-1	45	45	45	1.2	1.2	1.2	<10	<10	<10	542	542	542
S7W-1A	46	46	46	0.9	0.9	0.9	<10	<10	<10	602	602	602
S7W-2	45	45	45	2.3	2.3	2.3	<10	<10	<10	452	452	452
S7W-2A	47	47	47	1.0	1.0	1.0	<10	<10	<10	658	658	658
S7W-3	50	50	50	1.1	1.1	1.1	<10	<10	<10	702	702	702
S7W-3A	128	128	128	0.8	0.8	0.8	<10	<10	<10	1124	1124	1124
S7W-4	9	9	9	0.6	0.6	0.6	44.0	44.0	44.0	616	616	616

Table 3-2

North County Regional Resource Recovery Facility and Dyer Boulevard Landfill
Summary of Indicator Parameter Concentrations - 1994

Well ID	Chloride		Ammonia (NH ₃)			Sulfate (SO ₄)			Specific Conductance		
	Minimum (mg/l)	Mean (mg/l)	Maximum (mg/l)	Minimum (mg/l)	Mean (mg/l)	Maximum (mg/l)	Minimum (mg/l)	Mean (mg/l)	Maximum (mg/l)	Minimum (mS)	Maximum (mS)
S7W-4A	36	36	36	0.7	0.7	0.7	35.0	35.0	35.0	820	820
S7W-5	11	11	11	0.3	0.3	0.3	12.0	12.0	12.0	349	349
S7W-5A	26	26	26	1.4	1.4	1.4	23.0	23.0	23.0	582	582
S7W-6	45	45	45	1.1	1.1	1.1	244.0	244.0	244.0	1149	1149
S7W-6A	42	42	42	0.8	0.8	0.8	<10	<10	<10	894	894
S7W-7	30	30	30	0.8	0.8	0.8	170.0	170.0	170.0	902	902
S7W-7A	62	62	62	1.0	1.0	1.0	<10	<10	<10	793	793
S7W-8	37	37	37	0.7	0.7	0.7	<10	<10	<10	421	421
S7W-8A	53	53	53	0.8	0.8	0.8	11.0	11.0	11.0	703	703
S7W-102	62	62	62	1.1	1.1	1.1	<10	<10	<10	525	525
S7W-104	9	9	9	0.9	0.9	0.9	57.0	57.0	57.0	575	575
S7W-106	58	58	58	0.3	0.3	0.3	99.0	99.0	99.0	901	901
S7W-107	21	21	21	2.2	2.2	2.2	138.0	138.0	138.0	894	894
Minimum	<1	<1	<1	0.1	0.1	0.1	<10	<10	<10	349	349
Average	58	58	58	5.0	5.0	5.0	59.8	59.8	59.8	882	882
Maximum	221	221	221	78.9	78.9	78.9	244.0	244.0	244.0	2200	2200