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January 27, 1993

Mr. Roger Klett
Wisconsin Department of Natural Resources
4041 N. Richard Street
P.O. Box 12436
Milwaukee, WI 53212

Job # 2096

Subject: Groundwater Monitoring of Off-site Private Wells (December 1992 Sampling), Sanitary Transfer and Landfill Delafield, Wisconsin

Dear Mr. Klett:

Enclosed please find groundwater quality test results for the referenced project. Our groundwater monitoring program consisted of sampling twenty off-site private wells, PW-5, PW-91, PW-94, PW-95, PW-96, PW-97, PW-99, and PW-100 on December 22, 1992; and PW-4, PW-11, PW-13, PW-14, PW-15, PW-16, PW-17, PW-54, PW-55, PW-101, PW-102, and PW-105 on December 28, 1992. Groundwater samples not passed through domestic filters were collected for the laboratory analyses. Groundwater quality test results for 1992 are summarized in Table 1. Table 1 also includes Enforcement Standard (ES) and Preventive Action Limit (PAL) for dissolved metals, chloride, and nitrate plus nitrite nitrogen in accordance with NR 140. Our comments are as follows:

1. The concentration of total manganese exceeds the PAL for dissolved manganese in PW-5, PW-94, PW-95, PW-96, PW-97, PW-99, and PW-100. Test results are comparable to the previous round of test results.

2. The concentration of total iron exceeds the PAL for dissolved iron in PW-54, PW-94, PW-95, PW-97, and PW-99. Most of the test results are comparable to the previous round of test results.

3. The concentration of chloride in PW-91, PW-96, PW-97, PW-99, and PW-100 exceeds its Preventive Action Limit (125 mg/l). Test results are comparable to the previous round of test results.

4. The concentration of nitrate and nitrite nitrogen exceeds its PAL in PW-11, PW-55, PW-101, and PW-105. Test results are comparable to the previous round of test results.

Table 1
Groundwater Quality Test Results

Well Name	Date	Total Mn (mg/l)	Total Fe (mg/l)	COD (mg/l)	TKN (mg/l)	$NO_2 + NO_3$-N (mg/l)	Hardness (mg/l)	Chloride (mg/l)	Alkalinity (mg/l)	pH (SU)	Conductivity (micro mho)
PW-4	06/24/92	0.016	0.06	< 1	0.213	1.50	412	34.6	363	7.5	720
	09/29/92	< 0.01	0.02	< 1	1.17	1.42	427	45.0	388	7.7	730
	12/28/92	< 0.02	< 0.05	< 1	0.28	1.29	344	49.0	347	7.8	740
PW-5	06/26/92	0.051	0.22	4	0.692	1.12	410	39.1	356	7.4	640
	12/22/92	0.05	0.13	7	0.78	0.50	348	33.0	359	7.6	660
PW-11	06/24/92	< 0.005	0.06	3	0.213	3.75	340	79.8	285	7.9	770
	09/29/92	< 0.01	0.04	8	0.85	0.44	354	75.0	320	8.0	780
	12/28/92	< 0.02	0.06	12	< 0.1	4.15	352	87.0	288	7.8	800
PW-13	06/24/92	0.011	0.69	< 1	0.958	< 0.05	186	30.4	335	8.3	570
	09/29/92	0.02	0.04	122	0.84	0.70	319	5.0	331	7.8	580
	12/28/92	< 0.02	0.07	4	< 0.1	0.07	196	7.0	324	7.4	600
PW-14	06/26/92	0.008	< 0.05	< 1	0.319	< 0.05	315	15.6	324	7.6	670
	12/28/92	< 0.02	0.06	9	< 0.1	0.49	276	14.0	326	7.5	650
PW-15	06/26/92	0.013	< 0.05	< 1	< 0.05	0.54	350	8.84	298	7.6	680
	12/28/92	< 0.02	< 0.05	8	< 0.1	0.62	354	11.0	300	7.5	660
PW-16	06/26/92	0.024	< 0.05	2	0.319	< 0.05	329	29.8	312	7.8	700
	12/28/92	< 0.02	0.11	5	< 0.1	0.33	346	31.0	307	7.6	730
PW-17	06/26/92	0.04	0.12	11	0.139	< 0.05	450	27.6	397	7.5	820
	12/28/92	< 0.02	0.31	6	< 0.1	0.38	464	30.0	420	7.6	810

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Table 1 (Cont.)
Groundwater Quality Test Results

Well Name	Date	Total Mn (mg/l)	Total Fe (mg/l)	COD (mg/l)	TKN (mg/l)	NO_2 + NO_3-N (mg/l)	Hardness (mg/l)	Chloride (mg/l)	Alkalinity (mg/l)	pH (SU)	Conductivity (micro mho)
PW-21	06/26/92	0.013	< 0.05	4	0.213	3.93	338	65.7	294	7.8	710
	09/29/92	< 0.01	0.05	2	0.64	1.93	313	60.0	315	8.0	730
	12/30/92	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
PW-54	06/26/92	0.011	0.11	3	0.851	< 0.05	245	14.1	349	7.6	750
	12/28/92	< 0.02	1.4	< 1	< 0.1	0.13	332	32.0	324	7.7	740
PW-55	06/26/92	0.022	< 0.05	2	0.426	1.5	335	20.7	295	7.5	860
	12/28/92	< 0.02	< 0.05	9	< 0.1	2.35	2	29.0	290	7.5	850
PW-91	06/24/92	0.019	0.06	< 1	0.24	< 0.05	368	172	368	8.0	1,100
	09/29/92	< 0.01	0.05	3	0.53	0.78	572	238	396	7.8	1,090
	12/22/92	< 0.02	< 0.05	< 1	0.22	0.96	552	250	375	7.7	1,110
PW-94	06/24/92	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	09/29/92	0.07	0.75	4	0.32	0.04	558	80.0	500	7.5	1,100
	12/22/92	0.07	0.50	9	< 0.1	0.03	548	86.0	464	7.7	1,030
PW-95	06/26/92	2.8	0.49	4	0.426	< 0.05	580	36.3	513	7.5	1,020
	12/22/92	0.56	0.35	12	0.11	0.10	592	36.0	516	7.3	1,040
PW-96	06/24/92	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	09/29/92	0.56	0.22	7	< 0.05	0.08	618	278	485	7.4	1,350
	12/22/92	0.46	< 0.05	18	< 0.1	< 0.01	622	286	452	7.4	1,300
PW-97	06/26/92	0.74	0.20	13	9.36	1.3	527	115	506	7.2	1,340
	12/22/92	0.72	0.37	26	8.5	0.57	544	130	504	7.4	1,320

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Table 1 (Cont.)
Groundwater Quality Test Results

Well Name	Date	Total Mn (mg/l)	Total Fe (mg/l)	COD (mg/l)	TKN (mg/l)	NO_2 + NO_3-N (mg/l)	Hardness (mg/l)	Chloride (mg/l)	Alkalinity (mg/l)	pH (SU)	Conductivity (micro mho)
PW-99	06/26/92	0.76	0.43	16	8.83	1.5	528	116	508	7.3	1490
	12/22/92	0.67	0.19	22	8.50	0.38	558	140	516	7.5	1400
PW-100	06/26/92	0.034	0.07	4	0.426	2.25	538	117	438	7.0	980
	12/22/92	0.03	0.14	9	0.11	1.38	268	128	429	7.2	940
PW-101	06/26/92	0.014	0.07	2	0.213	4.12	454	87.9	399	7.5	800
	12/28/92	< 0.02	< 0.05	15	< 0.1	2.98	478	100	411	7.6	790
PW-102	06/26/92	0.019	0.09	4	0.851	< 0.05	355	51.0	361	7.5	780
	12/28/92	< 0.02	< 0.05	12	< 0.1	0.48	340	47.0	355	7.5	780
PW-105	06/26/92	0.019	0.12	2	0.692	3.94	405	86.5	349	7.5	890
	12/28/92	< 0.02	< 0.05	10	< 0.1	4.88	437	97.0	367	7.5	900
	ES	0.05	0.30	NE	NE	10.0	NE	250	NE	NE	NE
	PAL	0.025	0.15	NE	NE	2.0	NE	125	NE	NE	NE

Note: ES = Enforcement Standards; PAL = Preventive Action Limit; NT = Not Tested because the owners did not allow an access; NE = Not Established

5. Chemical oxygen demand (COD), total alkalinity, total kjeldahl nitrogen, and total hardness were also determined for on-site wells. The ES and PAL of these test parameters should be established in accordance with NR 140. Review of five year data will be used to calculate and establish the Enforcement and PAL of these test parameters.

In general, groundwater quality data is comparable to previous years of data. No significant changes relative to increase in the concentration of the waste constituents appear to have taken place. A comparison of 1992 groundwater quality with respect to existing data will be submitted to WDNR after completing the groundwater sampling scheduled in March 1993.

Please call us if you have any questions regarding this submittal.

Sincerely,

K. SINGH & ASSOCIATES, INC.

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Encls: Turn around document & test results
cc: Marie Stewart, SW/3, WDNR, Madison