## Geoprobe in D&A Compost Area

Samples were collected in the DeRuyter compost areas to determine subsurface soil types, moisture content, and nutrient concentrations. In addition, continuous core samples were collected to allow analysis on 1 foot intervals. This detailed analysis was performed to allow precise characterization of subsurface migration pathways and a detailed description of chemical processes in the subsurface. The yellow highlighted columns in the following table (see below) summarizes all the data collected during this investigation. The brown shading highlights soil intervals with concentrations greater than 100 mg/kg with darker brown representing concentrations greater than 200 mg/kg.

Given the nitrate concentrations in the subsurface and the laboratory moisture content, nitrate concentrations in the soil moisture (pore water) can be calculated using a reference partitioning coefficient for the nitrate contaminant. The last column in the table provides the nitrate concentration in pore water migrating down to ground water. With pore water concentrations as high as 3,000 mg/l, it is readily apparent that ground water concentrations in the 200 mg/l range could originate from the composting operation. Also, under unsaturated flow conditions, the decreasing soil concentrations do not represent the lack of migration, but rather the decrease in soil moisture typical with coarser grained soils.

Data from the table are presented in the following graphs. The correlation between soil moisture and nitrate is a direct indication that the soil moisture is transporting the nitrate into the subsurface. While the soil descriptions show that the silt is retaining moisture to saturated or near saturated conditions, until the liquid breaks through the coarser grained material, most likely under finger flow conditions.

Dave Erickson – Water & Environmental Technologies

Second Supplemental Report
Community Association for Restoration of the Environment, Inc.
and Center for Food Safety, Inc. v.
George & Margaret, LLC, George DeRuyter & Son Dairy, LLC, D & A Dairy, and D & A Dairy, LLC.

Boring				Pore water					
ID		Soil  Moisture content Concentration (C <sub>t</sub> )							Concentration (C <sub>w</sub> )
	Interval	Weight	$\theta_{\rm w}$	Chloride	Phos	Ammonia		TKN	Nitrate
	(ft)	(%)	(-)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/L)
DA-SB-02	0-1	20.4	0.388	404	95	12	158	896	
	1-2	17.3	0.329	243	58	21	72	560	
	2-3	12.4	0.236	407	14	13	76	448	
	3-4	11.4	0.217	303	4	8	43	280	
	4-5	13.8	0.262	374	4	11	160	224	
	5-6	12.7	0.241	320	2	9	252	56	
	6-7	14.6	0.277	282	3	104	403	112	2,760
	7-8	15.1	0.287	257	4	6	466	112	3,086
	8-9	15.2	0.289	220	3	5	464	112	3,053
	9-10	13.8	0.262	150	3	5	322	112	2,333
	10-11	16.9	0.321	324	47	8		672	1,337
	13-14	17	0.323	236	3	5	88	224	518
	14-15	20.4	0.388	299	4	4	36	168	176
	15-16	19.8	0.376	247	4	5	29	168	146
	16-17	14.6	0.277	150	8	5	19	336	130
	17-18	13.6	0.258	236	14	5	30	336	
	18-19	5.9	0.112	87	3	4	11	112	186
	19-20	7.8	0.148	66	2	4	11	168	
DA-SB-03	0-1	14.4	0.274	135	97	8	43	168	299
	1-2	15.5	0.295	135	31	4	19	560	123
	2-3	14.9	0.283	191	21	4	82	336	550
	3-4	12.5	0.238	303	34	3	117	504	936
	4-5	12.8	0.243	285	2	3	113	224	883
	5-6	13.9	0.264	326	8	3	175	224	1,259
	6-7	17.1	0.325	341	7	4	216	224	1,263
	7-8	17.8	0.338	294	15	4	217	280	1,219
	8-9	13.9	0.264	130	5	4	93	224	669
	9-10	17.6	0.334	119	3	5	117	672	665
	10-11	21.9	0.416	148	4	5	214	168	
	11-12	20.2	0.384	143		2	221	168	
	12-13	19.6	0.372	152	3	4	256	168	
	13-14	17.1	0.325	142	3	7	237	168	
	14-15	19.8	0.376	158	3	5	242	168	
	15-16	17.8	0.338	109	4	4	162	112	910
	16-17	13.5	0.257	89	4	4	101	112	748
	17-18	12	0.228	68	11	5	80	224	
	18-19	9.1	0.173	86		5	98	224	
	19-20	5.5	0.105	0	2	5	46	112	836