Appendix C

Travel Time Estimates for Constituents of Concern

This page intentionally left blank

Table C–1. Estimated Contaminant Migration Travel Time from DOE Areas to Monitoring Wells

DOE Area	Monitoring Well	Distance from DOE Area Boundary to Monitoring Well (feet)	Constituent	Kd[a] (ml/g)	Retardation factor[b] (unitless)	Estimated Travel Time Range[c] (years)	
Domestic Septic System-1	UCD1-071	15	Aluminum	9.9	55	28	276
Domestic Septic System-3	UCD1-069	15	Formaldehyde	0.0018	1.0	0.50	5.0
		15	Molybdenum	20	111	55	553
		15	Nitrate	0	1.0	0.50	5.0
		15	Aluminum	9.9	55	28	276
		15	Silver	8.3	47	23	233
Domestic Septic System-4	UCD1-068	60	Selenium	300	1,646	3,293	32,929
		60	Aluminum	9.9	55	111	1,106
		60	Chromium	19	105	210	2,104
		60	Nickel	65	358	715	7,150
Domestic Septic System-5	UCD1-021	130	Aluminum	9.9	55	240	2,396
Domestic Septic System-6	UCD1-072	10	Aluminum	9.9	55	18	184
Dry Wells A through E	UCD1-054	0	Chromium	19	105	0	0
		0	Hexavalent chromium	19	105	0	0
		0	Mercury	52	286	0	0
		0	Molybdenum	20	111	0	0
		0	Silver	8.3	47	0	0
		0	Cesium-137	1,000	5,486	0	0
		0	Strontium-90	35	193	0	0
	UCD1-071	60	Chromium	19	105	210	2,104
		60	Hexavalent chromium	19	105	210	2,104
		60	Mercury	52	286	572	5,724
		60	Molybdenum	20	111	221	2,214
		60	Silver	8.3	47	93	930
		60	Cesium-137	1,000	5,486	10,972	109,715
		60	Strontium-90	35	193	386	3,859

Table C–1 (continued). Estimated Contaminant Migration Travel Time from DOE Areas to Monitoring Wells

DOE Area	Monitoring Well	Distance from DOE Area Boundary to Monitoring Well (feet)	Constituent	Kd[a] (ml/g)	Retardation factor[b] (unitless)	Estimated Travel Time Range[c] (years)	
Radium/Strontium Treatment System	UCD1-021	110	Nitrate	0	1.0	3.7	37
		110	Carbon-14	0	1.0	3.7	37
		110	Radium-226	450	2,469	9,054	90,535
		110	Americium-241	680	3,731	13,679	136,790
	UCD1-068	150	Nitrate	0	1.0	5.0	50
		150	Carbon-14	0	1.0	5.0	50
		150	Radium-226	450	2,469	12,346	123,457
		150	Americium-241	680	3,731	18,653	186,532
	UCD1-072	45	Nitrate	0	1.0	1.5	15
		45	Carbon-14	0	1.0	1.5	15
		45	Radium-226	450	2,469	3,704	37,037
		45	Americium-241	680	3,731	5,596	55,960
Southwest Trenches	UCD1-023	25	Nitrate	0	1.0	0.83	8.3
		25	Carbon-14	0	1.0	0.83	8.3
		25	Mercury	52	286	239	2,385
		25	Zinc	62	341	284	2,842
	UCD1-070	15	Nitrate	0	1.0	0.50	5.0
		15	Carbon-14	0	1.0	0.50	5.0
		15	Mercury	52	286	143	1,431
		15	Zinc	62	341	171	1,705
Eastern Dog Pens	UCD1-13	35	Alpha-Chlordane	140	769	897	8,970
		35	Gamma-Chlordane	280	1,537	1,793	17,929
		35	Dieldrin	43	237	276	2,763

Notes:
[a] Kd values established in DOE Areas Remedial Investigation Report (Weiss 2003).
[b] Retardation factor R = 1 + Kdrb/qs, where Kd is the sorption coefficient, rb is the soil bulk density and qs is the volumetric water content in the saturated zone. Soil bulk density (1.98 g/ml) and porosity (0.361 v/v) values are averages from nine soil samples collected in DOE areas of LEHR (DB Stephens 1996). Volumetric water content in the saturated zone assumed equal to the average soil porosity.
[c] Travel time t = LR/V, where L is the distance traveled, R is the retardation factor, and V is the groundwater seepage velocity (3 to 30 feet per year).

References:
DB Stephens (Daniel B. Stephens & Associates, Inc.), 1996. *Hydraulic Properties of LEHR/UC Davis Soil Samples*, November 12.
Weiss (Weiss Associates), 2003., *DOE Areas Remedial Investigation Report for the Laboratory for Energy-Related Health Research, University of California, Davis*, September 18.