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ATOMIC ENERGY
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ENERGIE ATOMIQUE
DU CANADA LIMITEE
Société de Recherche

A CRITICAL COMPILATION AND REVIEW OF DEFAULT SOIL SOLID/LIQUID PARTITION COEFFICIENTS, K_d, FOR USE IN ENVIRONMENTAL ASSESSMENTS

COMPILATION ET EXAMEN CRITIQUES DES COEFFICIENTS MANQUANTS DE PARTAGE, K_d, SOLIDES/LIQUIDES DU SOL POUR EMPLOI EN EVALUATIONS ENVIRONNEMENTALES

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RÉSUMÉ

Les évaluations en matière d'environnement du Concept canadien d'évacuation (stockage permanent) des déchets de combustible nucléaire en formations de roche plutonique demandent des analyses de la migration des nucléides d'une enceinte d'évacuation à la biosphère. En analyses de la migration des nucléides entraînés par les eaux souterraines à travers la géosphère, les morts-terrains et le sol meubles, on se sert de modèles demandant des coefficients de partage (K_d) solides/liquides pour décrire l'interaction des nucléides et des matières solides. Ce rapport présente des coefficients de partage solides/liquides spécifiques des éléments; les coefficients s'appuyent sur une étude bibliographique détaillée. Les valeurs pour les argiles, le limon (silt), le sable et les sols organiques y sont résumés. Les coefficients de partage des éléments suivants y sont présentés: américium, antimoine, arsenic, baryum, bore, cadmium, calcium, carbone, cérium, césium, chrome, cobalt, cuivre, europium, iode, fer, plomb, lithium, manganèse, molybdène, septunium, nickel, niobium, palladium, phosphore, plutonium, polonium, radium, ruthénium, samarium, sélénium, argent, strontium, technétium, tellurium, terbium, thorium, étain, tritium, uranium, zinc et zirconium. On compare les valeurs compilées en cette étude avec les ensembles précédents de valeurs de K_d; ces valeurs sont celles recommandées pour emploi avec les modèles de sol, sédiments à grande profondeur et morts-terrains de l'Étude d'Impact sur l'Environnement du Concept canadien d'évacuation des déchets de combustible nucléaire.

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ABSTRACT

Environmental assessments of the Canadian concept for disposal of nuclear fuel waste in plutonic rock formations require analyses of the migration of nuclides from the disposal vault to the biosphere. Analyses of nuclide migration via groundwater through the geosphere, unconsolidated overburden and soil use models requiring solid/liquid partition coefficients (K_d) to describe the interaction of the nuclides with the solid materials. This report presents element-specific soil solid/liquid partition coefficients based on a detailed survey of the literature. Values for clays, silt, sand and organic soils are summarized. Partition coefficients for the following elements are presented: americium, antimony, arsenic, barium, boron, cadmium, calcium, carbon, cerium, cesium, chromium, cobalt, copper, curium, europium, iodine, iron, lead, lithium, manganese, molybdenum, neptunium, nickel, niobium, palladium, phosphorus, plutonium, polonium, radium, ruthenium, samarium, selenium, silver, strontium, technetium, tellurium, terbium, thorium, tin, tritium, uranium, zinc, and zirconium. The values compiled in this study are compared with earlier K_d value compendiums and are the values recommended for use in the soil, deep sediment and overburden models for the Environmental Impact Statement on the concept for disposal of Canada's nuclear fuel waste.

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1. INTRODUCTION

Canada is considering geological containment in a vault deep in plutonic rock in the Canadian Shield as a method for disposal of its nuclear fuel waste. Assessment of the integrity of geological containment requires pathways analysis to determine the travel time from the vault to and through the biosphere of all the elements associated with the waste (Mehta and Goodwin 1988). The travel time and the predicted element concentrations in the biosphere will depend upon the interaction of the elements with their surroundings as they migrate. This interaction has been described using a solid/liquid partition coefficient, K_d, for unconsolidated regolith, soil and rock (Gillham et al. 1981a and 1981b, Vandergraaf 1982). This report documents K_d values for soil, according to the four major soil types found on the Canadian Shield. The K_d values are required for the soil, deep sediment and overburden assessment models used in the Canadian Nuclear Fuel Waste Management Program (Goodwin et al. 1987, Sheppard in preparation, Bird et al. in preparation).

Details of the chemistry of these elements can be found in the references listed in Appendix A. Details of the soils and experiments for the K_d value database compiled here are presented in table form in Appendix B.

2. METHODS

The data were extracted from the literature. The complete list of references are shown in Appendix A. The data were accumulated in a computerized spreadsheet (Appendix B). Only one value was entered for each soil reported in the literature. For example, where K_d values for a range of soil to solution ratios, competing cations, contact solution concentrations or pH values were reported for the same soil, the geometric mean of these results were recorded for that soil. Geometric as opposed to arithmetic means are required because K_d values are lognormally distributed (Sheppard and Evenden 1989). The single values for each soil's values were used to obtain geometric means for each element and soil type.

The mineral soils were categorized by texture into sand, clay and loam. The soils that contained ≥ 70% sand-sized particles were classed as sand soils and those containing ≥ 35% clay-sized particles were classed as clay soils. Loam soils had an even distribution of sand-, clay-, and silt-sized particles or consisted of up to 80% silt-size particles. Organic soils contained > 30% organic matter and were either classic peat or muck soils or the litter horizon of a mineral soil.

If no data existed in the literature for a given element, then the soil-to-plant concentration ratio (CR) was used as an indicator of the element's bioavailability and a means to predict a default K_d value (Baes et al. 1984). The CR values used for each element are from Baes et al. (1984), and are shown in Table 1. Because of the strong negative correlation between CR and K_d values, this technique is successful. The model used was

$$\ln K_d = a + stex + b\ (\ln CR).$$

The values for the coefficients are

$$\ln K_d = [4.62 + stex - 0.56(\ln CR)]$$

where, if the soil = sand, stex = -2.51,
if the soil = loam, stex = -1.26,
if the soil = clay, stex = -0.84, and
if the soil = organic, stex = 0.

The regression analysis was carried out using the Reg procedure in SAS (Statistical Analysis Systems). The observed and predicted values and their residuals from the regression analysis are shown in Appendix C.

Appendices A, B and C can be obtained on diskette from the authors.

3. RESULTS AND DISCUSSIONS

Baes and Sharp (1983) compiled soil K_d values for several elements relevant to the nuclear industry (Table 2). Similarly, Coughtrey et al. (1985) have reported best estimates and ranges for soil K_d values (Table 3). Earlier, we compiled a literature search of data for the elements relevant to the Canadian Nuclear Fuel Waste Management Program for each of the four major soil types found on the Canadian Shield (Sheppard et al. 1984). This present compendium includes our earlier data and additional data obtained through a more recent literature search. The data are presented for each element by soil type in Tables 4 through 7, and the geometric mean K_d values are summarized by soil type in Table 8.

The data from our study and the studies of Baes and Sharp (1983), and Coughtrey et al. (1985) are shown in Table 9.

The database from Coughtrey et al. (1985) is not very complete and will not be discussed in detail. To compare Baes and Sharp (1983) with our study (Table 10), we used only our data for silt and clay, which tend to represent the agricultural soils of Baes and Sharp. Their best estimates (exp (μ)) are generally lower than those in our study for silt and clay, except for Cr, Po, Pu, Sr, U and Th, which are higher. The use of the lower K_d values of Baes and Sharp would lead to lower soil concentrations in assessment models, and might result in the underprediction of doses in some pathways. Table 11 compares the ranges of only the silt and clay values of our study with the ranges of Baes and Sharp (1983). This comparison clearly shows that even the range of values reported by Baes and Sharp is generally lower than the range of values in our study.

We grouped the elements by K_d value and highlighted Tc, I, U and Np, some of the more mobile elements, to illustrate the dependence on soil type. Generally the K_d values are lower in sandy soils than in either loam or clay soils. Iodine K_d values are unaffected by mineral grain-size but increase dramatically as organic matter content increases. Other elements that have higher mean values for organic soils than for clay soils are Ag, Ni, Am, and Th.

4. CONCLUSIONS

This compendium updates our earlier study (Sheppard et al. 1984) and also that of Baes and Sharp (1983). It provides the latest K_d data found in the international literature, including major studies carried out in the U.S., Europe and Asia since the 1950s. This database will be used for the Environmental Impact Statement on the concept for disposal of Canada's nuclear fuel waste.

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* Unrestricted, unpublished report available from SDDO, Atomic Energy of Canada Limited Research Company, Chalk River, Ontario, K0J 1J0.

TABLE 2

ESTIMATES OF THE DISTRIBUTION OF K_d FOR VARIOUS ELEMENTS IN AGRICULTURAL SOILS AND CLAYS OF pH 4.5 TO 9.0
(from Baes and Sharp, 1983, Table 4)

Element	Number of Observations	μ[a]	σ[b]	exp (μ) (0.50)[c] ($L\ kg^{-1}$)	Observed range ($L\ kg^{-1}$)
Ag	16	4.7	1.3	110	10 to 1 000
Am	46	6.7	3.0	810	1.0 to 47 230
As(III)	19	1.2	0.61	3.3	1.0 to 8.3
As(V)	37	1.9	0.52	6.7	1.9 to 18
Ca	10	1.4	0.78	4.1	1.2 to 9.8
Cd	28	1.9	0.86	6.7	1.26 to 26.8
Ce	16	7.0	1.3	1 100	58 to 6 000
Cm	31	8.1	1.9	3 300	93.3 to 51 900
Co	57	4.0	2.3	55	0.2 to 3 800
Cr(II)	15	7.7	1.2	2 200	470 to 150 000
Cr(VI)	18	3.6	2.2	37	1.2 to 1 800
Cs	135	7.0	1.9	1 110	10 to 52 000
Cu	55	3.1	1.1	22	1.4 to 333
Fe	30	4.0	1.7	55	1.4 to 1 000
K	10	1.7	0.49	5.5	2.0 to 9.0
Mg	58	1.7	0.52	5.5	1.6 to 13.5
Mn	45	5.0	2.7	150	0.2 to 10 000
Mo	17	3.0	2.1	20	0.37 to 400
Np	44	2.4	2.3	11	0.16 to 929
Pb	125	4.6	1.7	99	1.5 to 7 640
Po	6	6.3	0.65	540	196 to 1 063
Pu	40	7.5	2.3	1 800	11 to 300 000
Ru	17	5.4	1.0	220	48 to 1 000
Se(IV)	19	1.0	0.65	2.7	1.2 to 8.6
Sr	218	3.3	2.0	27	0.15 to 3 300
Tc	24	-3.4	1.1	0.033	0.0029 to 0.28
Th	17	11	1.5	60 000	2 000 to 510 000
U	24	3.8	1.3	45	10.5 to 4 400
Zn	146	2.8	1.9	16	0.1 to 8 000

[a] The mean of the logarithms of the observed values.

[b] The standard deviation of the logarithms of the observed values.

[c] Percent cumulative probability.

TABLE 3

BEST ESTIMATE AND CALCULATED RANGE OF K_d VALUES
(from Coughtrey et al. 1985)[a]

Element	Best Estimate ($L\ kg^{-1}$)	Calculated Range ($L\ kg^{-1}$)
Ag	50	ND[b]
Am	~ 2 000	1 200 - 8 700
Br	< 2	ND
Cd	32 - 50	ND
Ce	ND	ND
Cl	ND	ND
Cm and higher actinides	ND	98 - 52 000
Co	ND	ND
Cr	ND	ND
Cs	1000	1 000 - 10 000
Fe	9 (soluble form)	4 - 9 (soluble form)
I	~ 6	ND
Lanthanides (other than Ce)	ND	ND
Mn	20	19 - 99
Mo	9	ND
Na	ND	ND
Nb	ND	ND
Ni	~ 20	ND
Np	~ 50	0.16 - 929
Pu	5 000	18 - 10 000
Rb	ND	ND
Ru	1 - 20	ND
S	ND	ND
Sb	ND	ND
Se	> 9	ND
Sn	ND	ND
Sr	ND	ND
Tc	0.11	ND
Te	ND	ND
Zn	≥ 20	ND
Zr	ND	ND

[a] From section entitled "Environmental data for radioisotopes. Parameters for soils, plants and aquatic ecosystems".

[b] ND = no data

TABLE 4

SAND SOIL K_d VALUES (L kg^{-1})

Element	Number of Observations	μ[a]	σ[b]	exp (μ)[c]	Range
Ac		6.1[d]		450	
Ag	12	4.5	1.8	90	2.7 to 1 000
Am	29	7.6	2.6	1900	8.2 to 300 000
Be		5.5		250	
Bi		4.6		100	
Br		2.7		15	
C	3	1.1	0.8	5	1.7 to 7.1
Ca		1.8		5	
Cd	14	4.3	1.5	80	2.7 to 625
Ce	12	6.2	1.6	500	40 to 3 968
Cm	2	8.4	2.4	4000	780 to 22 970
Co	33	4.1	2.8	60	.07 to 9 000
Cr	15	4.2	2.1	70	1.7 to 1 729
Cs	81	5.6	2.5	280	0.2 to 10 000
Fe	16	5.4	2.6	220	5 to 6 000
H	3	-2.7	0.4	0.06	0.04 to 0.1
Hf		6.1		450	
Ho		5.5		250	
I	22	0.04	2.2	1.0	0.04 to 81
K		2.6		15	
Mn	54	3.9	1.4	50	6.4 to 5 000
Mo	15	2.0	1.1	10	1.0 to 52
Nb		5.1		160	
Ni	11	6.0	1.5	400	60 to 3 600
Np	16	1.4	1.7	5	0.5 to 390
P		1.8		5	
Pa		6.3		550	
Pb	3	5.6	2.3	270	19 to 1 405
Pd		4.0		55	
Po	36	5.0	1.6	150	9 to 7 020
Pu	39	6.3	1.7	550	27 to 36 000
Ra	3	6.2	3.2	500	57 to 21 000
Rb		4.0		55	
Re		2.3		10	
Ru	7	4.0	1.4	55	5 to 490
Sb	1	3.8		45	
Se		5.0		150	
Si		3.5		35	
Sm		5.5		245	
Sn		4.9		130	
Sr	81	2.6	1.6	15	0.05 to 190
Ta		5.4		220	
Tc	19	-2.0	1.8	0.1	0.01 to 16
Te		4.8		125	
Th	10	8.0	2.1	3 200	207 to 150 000
U	24	3.5	3.2	35	0.03 to 2 200
Y		5.1		170	
Zn	22	5.3	2.6	200	0.1 to 8 000
Zr		6.4		600	

[a] Mean of the logarithms of the observed values.
[b] Standard deviation of the logarithms of the observed values.
[c] Geometric mean rounded to two significant digits.
[d] Nuclides with no observations have predicted default values for μ and exp (μ) using plant/soil concentration ratios (CRs).

TABLE 5

SILT SOIL K_d VALUES (L kg^{-1})

Element	Number of Observations	μ[a]	σ[b]	exp (μ)[c]	Range
Ac		7.3[d]		1 500	
Ag	4	4.8	1.1	120	28 to 333
Am	20	9.2	1.4	9 600	400 to 48 309
Be		6.7		800	
Bi		6.1		450	
Br		3.9		50	
C		2.9		20	
Ca		3.4		30	
Cd	8	3.7	1.6	40	7.0 to 962
Ce	5	9.0	1.5	8 100	1200 to 56 000
Cm	4	9.8	0.7	18 000	7666 to 44 260
Co	23	7.2	1.3	1 300	100 to 9 700
Cr	4	3.4	2.9	30	2.2 to 1 000
Cs	54	8.4	1.3	4 600	560 to 61 287
Fe	18	6.7	0.7	800	290 to 2 240
H		3.0		20	
Hf		7.3		1 500	
Ho		6.7		800	
I	33	1.5	2.0	5	0.1 to 43
K		4.0		55	
Mn	38	6.6	2.6	750	40 to 77 079
Mo		4.8		125	
Nb		6.3		550	
Ni		5.7		300	
Np	11	3.2	1.2	25	1.3 to 79
P		3.2		25	
Pa		7.5		1 800	
Pb	3	9.7	1.4	16 000	3500 to 59 000
Pd		5.2		180	
Po	13	6.0	1.3	400	24 to 1 830
Pu	21	7.1	1.2	1 200	100 to 5 933
Ra	3	10.5	3.1	36 000	1262 to 530 000
Rb		5.2		180	
Re		3.7		40	
Ru	2	6.9	0.0	1 000	0
Sb		5.0		150	
Se		6.2		500	
Si		4.7		110	
Sm		6.7		800	
Sn		6.1		450	
Sr	43	3.0	1.7	20	0.01 to 300
Ta		6.8		900	
Tc	10	-2.3	1.1	0.1	0.01 to 0.4
Te		6.3		500	
Th		8.1		3 300	
U	8	2.5	3.3	15	0.2 to 4 500
Y		6.6		720	
Zn	12	7.2	2.4	1 300	3.6 to 11 000
Zr		7.7		2 200	

[a] Mean of the logarithms of the observed values.
[b] Standard deviation of the logarithms of the observed values.
[c] Geometric mean rounded to two significant digits.
[d] Nuclides with no observations have predicated default values for μ and exp (μ) using plant/soil concentration ratios (CRs).

TABLE 6

CLAY SOIL K_d VALUES (L kg^{-1})

Element	Number of Observations	μ[a]	σ[b]	exp (μ)[c]	Range
Ac		7.8[d]		2 400	
Ag	5	5.2	0.4	180	100 to 300
Am	11	9.0	2.6	8 400	25 to 400 000
Be		7.2		1 300	
Bi		6.4		600	
Br		4.3		75	
C		0.8		1	
Ca		3.9		50	
Cd	10	6.3	0.9	560	112 to 2 450
Ce	4	9.9	0.5	20 000	12 000 to 31 623
Cm		8.7		6 000	
Co	15	6.3	1.8	550	20 to 14 000
Cr		7.3		1 500	
Cs	28	7.5	1.6	1 900	37 to 31 500
Fe	7	5.1	1.6	165	15 to 2 121
H		3.3		30	
Hf		7.8		2 400	
Ho		7.2		1 300	
I	8	0.5	1.5	1	0.2 to 29
K		4.3		75	
Mn	23	5.2	2.0	180	23.6 to 48 945
Mo	7	4.5	1.2	90	13 to 400
Nb		6.8		900	
Ni	10	6.5	0.7	650	305 to 2 467
Np	4	4.0	3.8	55	0.4 to 2 575
P		3.5		35	
Pa		7.9		2 700	
Pb		6.3		550	
Pd		5.6		270	
Po		8.0		3 000	
Pu	18	8.5	2.1	5 100	316 to 190 000
Ra	8	9.1	1.3	9100	696 to 56 000
Rb		5.6		270	
Re		4.1		60	
Ru	1	6.7		800	0
Sb		5.5		250	
Se		6.6		740	
Si		5.2		180	
Sm		7.2		1 300	
Sn		6.5		670	
Sr	24	4.7	2.0	110	3.6 to 32 000
Ta		7.1		1 200	
Tc	4	0.2	0.06	1	1.16 to 1.32
Te		6.6		720	
Th	5	8.6	2.6	5 800	244 to 160 000
U	7	7.3	2.9	1 600	46 to 395 100
Y		6.9		1 000	
Zn	23	7.8	1.4	2 400	200 to 100 000
Zr		8.1		3 300	

[a] Mean of the logarithms of the observed values.
[b] Standard deviation of the logarithms of the observed values.
[c] Geometric mean rounded to two significant digits.
[d] Nuclides with no observations have predicted default values for μ and exp (μ) using plant/soil concentration ratios (CRs).

TABLE 7

ORGANIC SOIL K_d VALUES (L kg^{-1})

Element	Number of Observations	μ[a]	σ[b]	exp (μ)[c]	Range
Ac		8.6[d]		5 400	
Ag	4	9.6	0.9	15 000	4 400 to 33 000
Am	5	11.6	1.7	112 000	6 398 to 450 000
Be		8.0		3 000	
Bi		7.3		1 500	
Br		5.2		180	
C		4.2		70	
Ca		4.5		90	
Cd	9	6.7	2.3	800	23 to 17 000
Ce	1	8.1		3 300	0
Cm	1	8.7		6 000	0
Co	6	6.9	1.5	1 000	120 to 4 500
Cr	4	5.6	2.7	270	6.0 to 2 517
Cs	9	5.6	3.6	270	0.4 to 145 000
Fe	1	6.4		600	0
H		4.3		75	
Hf		8.6		5 400	
Ho		8.0		3 000	
I	9	3.3	2.0	25	1.4 to 368
K		5.3		200	
Mn	1	5.0		150	0
Mo	3	3.3	0.5	25	18 to 50
Nb		7.6		2 000	
Ni	6	7.0	0.9	1 100	360 to 4 700
Np	3	7.1	0.4	1 200	857 to 1 900
P		4.5		90	
Pa		8.8		6 600	
Pb	6	10.0	0.5	22 000	9 000 to 31 590
Pd		6.5		670	
Po		8.9		7 300	
Pu	7	7.5	2.6	1 900	60 to 62 000
Ra		7.8		2 400	
Rb		6.5		670	
Re		5.0		150	
Ru	5	11.1	0.3	66 000	39 000 to 87 000
Sb		6.3		550	
Se		7.5		1 800	
Si		6.0		400	
Sm		8.0		3 000	
Sn		7.4		1 600	
Sr	12	5.0	1.8	150	8 to 4 800
Ta		8.1		3 300	
Tc	24	0.4	1.8	1	0.02 to 340
Te		7.5		1 900	
Th	3	11.4	4.6	89 000	1 579 to13 000 000
U	6	6.0	2.5	410	33 to 7 350
Y		7.9		2 600	
Zn	8	7.4	1.6	1 600	70 to 13 000
Zr		8.9		7 300	

[a] Mean of the logarithms of the observed values.
[b] Standard deviation of the logarithms of the observed values.
[c] Geometric mean rounded to two significant digits.
[d] Nuclides with no observations have predicted default values for μ and exp (μ) using plant/soil concentration ratios (CRs).

TABLE 8

SUMMARY OF GM[a] K_d VALUES ($L\ kg^{-1}$) FOR EACH ELEMENT BY SOIL TEXTURE

Element	Sand	Silt	Clay	Organic
Ac	450[b]	1 500	2 400	5 400
Ag	***90***	***120***	***180***	***15 000***
Am	***1 900***	***9 600***	***8 400***	***112 000***
Be	250	800	1 300	3 000
Bi	100	450	600	1 500
Br	15	50	75	180
C	***5***	20	1	70
Ca	5	30	50	90
Cd	***80***	***40***	***560***	***800***
Ce	***500***	***8 100***	***20 000***	***3 300***
Cm	***4 000***	***18 000***	6 000	***6 000***
Co	***60***	***1 300***	***550***	***1 000***
Cr	***70***	***30***	1 500	***270***
Cs	***280***	***4 600***	***1 900***	***270***
Fe	***220***	***800***	***165***	***600***
H	***.1***	20	30	75
Hf	450	1 500	2 400	5 400
Ho	250	800	1 300	3 000
I	***1***	***5***	***1***	***25***
K	15	55	75	200
Mn	***50***	***750***	***180***	***150***
Mo	***10***	125	***90***	***25***
Nb	160	550	900	2 000
Ni	***400***	300	***650***	***1 100***
Np	***5***	***25***	***55***	***1 200***
P	5	25	35	90
Pa	550	1 800	2 700	6 600
Pb	***270***	***16 000***	550	***22 000***
Pd	55	180	270	670
Po	***150***	***400***	3 000	7 300
Pu	***550***	***1 200***	***5 100***	***1 900***
Ra	***500***	***36 000***	***9 100***	2 400
Rb	55	180	270	670
Re	10	40	60	150
Ru	***55***	***1 000***	***800***	***66 000***
Sb	***45***	150	250	550
Se	150	500	740	1 800
Si	35	110	180	400
Sm	245	800	1 300	3 000
Sn	130	450	670	1 600
Sr	***15***	***20***	***110***	***150***
Ta	220	900	1 200	3 300
Tc	***.1***	***.1***	***1***	***1***
Te	125	500	720	1 900
Th	***3 200***	3 300	***5 800***	***89 000***
U	***35***	***15***	***1 600***	***410***
Y	170	720	1 000	2 600
Zn	***200***	***1 300***	***2 400***	***1 600***
Zr	600	2 200	3 300	7 300

[a] GM = geometric mean rounded to two significant digits.

[b] Values with italic bold numbering come from the *literature*.
Values with regular numbering are predicted using plant/soil concentration ratios (CRs).

TABLE 9

COMPARISON OF OUR COMPILATION WITH THOSE OF BAES AND SHARP (1983) AND COUGHTREY ET AL. (1985)

Element	This Study[a]								Baes & Sharp[b]		Coughtrey et al.[c]	
	Sand		Silt		Clay		Organic		Agricultural soils and clays of pH 4.5 to 9.0			
	exp(μ)	Range	exp(μ)	Range	exp(μ)	Range	exp(μ)	Range	exp(μ)	Range	Best Estimate	Range
Ac	450		1500		2400		5400				50	ND[d]
Ag	90	2.7-1000	120	28-333	180	100-300	15000	4400-33000	110	10-1000	~ 2000	1200-8700
Am	1900	8.2-300000	9600	400-48309	8400	25-400000	112000	6398-450000	810	1.0-47230		
As(III)									3.3	1.0-8.3		
As(V)									6.7	1.9-18		
Be	250		800		1300		3000					
Bi	100		450		600		1500					
Br	15		50		75		180				< 2	ND
C	5	1.7-7.1	20		1		70					
Ca	5		30		50		90		4.1	1.2-9.8		
Cd	80	2.7-625	40	7.0-962	560	112-2450	800	23-17000	6.7	1.26-26.8	32-50	ND
Ce	500	40-3968	8100	1200-56000	20000	12000-31623	3300	0	1100	58-6000	ND	ND
Cl											ND	ND
Cm	4000	780-22970	18000	7666-44260	6000		6000	0	3300	93.3-51900	ND	98-52000
Co	60	.07-9000	1300	100-9700	550	20-14000	1000	120-4500	55	0.2-3800	ND	ND
Cr	70	1.7-1729	30	2.2-1000	1500		270	6-2517			ND	ND
Cr(II)									2200	470-150000		
Cr(VI)									37	1.2-1800		
Cs	280	0.2-10000	4600	560-61287	1900	37-31500	270	.4-145000	1100	10-52000	1000	1000-10000
Cu									22	1.4-333		
Fe	220	5-6000	800	290-2240	165	15-2121	600	0	55	1.4-1000	9	4-9
H	.06	.04-.1	20		30		75					
Hf	450		1500		2400		5400					
Ho	250		800		1300		3000					
I	1	.04-81	5	0.1-43	1	.2-29	25	1.4-368			~ 6	ND
K									5.5	2.0-9.0		
Mg									5.5	1.6-13.5		
Mn	50	6.4-5000	750	40-77079	180	23.6-48945	150	0	150	0.2-10000	20	19-99

continued...

TABLE 9 (concluded)

Element	This Study[a]								Baes & Sharp[b]		Coughtrey et al.[c]	
	Sand		Silt		Clay		Organic		Agricultural soils and clays of pH 4.5 to 9.0			
	exp(μ)	Range	exp(μ)	Range	exp(μ)	Range	exp(μ)	Range	exp(μ)	Range	Best Estimate	Range
Mo	10	1.0-52	125		90	13-400	25	18-50	20	0.37-400	9	ND
Na											ND	ND
Nb	160		550		900		2000				ND	ND
Ni	400	60-3600	300		650	305-2467	1100	360-4700			~ 20	ND
Np	5	0.5-390	25	1.3-79	55	.4-2575	1200	857-1900	11	0.16-929	~ 50	0.16-929
P	5		25		35		90					
Pa	550		1800		2700		6600					
Pb	270	19-1405	16000	3500-59000	550		22000	9000-31590	99	4.5-7640		
Pd	55		180		270		670					
Po	150	9-7020	400	24-1830	3000		7300		540	196-1063		
Pu	550	27-36000	1200	100-5933	5100	316-190000	1900	60-62000	1800	11-300000	5000	18-10000
Ra	500	57-21000	36000	1262-530000	9100	696-56000	2400					
Rb	55		180		270		670				ND	ND
Ru	55	5-490	1000	0	800	0	66000	39000-87000	220	48-1000	1-20	ND
S											ND	ND
Sb	45		150		250		550				ND	ND
Se	150		500		740		1800				> 9	ND
Se(IV)									2.7	1.2-8.6		
Si	35		110		180		400					
Sm	245		800		1300		3000					
Sn	130		450		670		1600				ND	ND
Sr	15	.05-190	20	.01-300	110	3.6-32000	150	8-4800	27	0.15-3300	ND	ND
Ta	220		900		1200		3300					
Te											ND	ND
Tc	.1	.01-16	0.1	.01-.4	1	1.16-1.32	1	.02-340	.033	.0029-0.28	0.11	ND
Th	3200	207-150000	3300		5800	244-160000	89000	1579-13000000	60000	2000-510000		
U	35	.03-2200	15	.2-4500	1600	46-395100	410	33-7350	45	10.5-4400		
Y									510*	160-1640*		
Zn	200	.1-8000	1300	3.6-11000	2400	200-100000	1600	70-13000	16	0.1-8000	=> 20	ND
Zr	600		2200		3300		7300				ND	ND

[a] From our study, Tables 4 to 7. [b] Baes and Sharp (1983). [c] Coughtrey et al. (1985). [d] No data available.
* From Baes et al. (1984, Table 2.13).

TABLE 10

GROUPING OF ELEMENTS BY K_d AND SOIL TEXTURE USING GEOMETRIC MEAN K_d's FROM THIS STUDY AND HIGHLIGHTING MAJOR TRENDS IN THE DATA. PREDICTED VALUES NOT USED.

	This study				Baes and Sharp (1983)
K_d Values exp (μ)	Sand	Silt	Clay	Organic	Agricultural soils and clays of pH 4.5 to 9.0
< 1	H (Tc)*	(Tc)			(Tc)
1-10	▽I Mo, [Np]	▽I	▽I (Tc)	(Tc)	Cd
10-100	Ag,Cd,Co, Cr,Mn,Ru, Sr△U	Cd,Cr [Np] Sr△U	Mo [Np]	▽I Mo	Co,Fe,Mo [Np] Pb,Sr△U Zn
100-1000	Ce,Cs,Fe, Ni,Pb,Po, Pu,Ra,Zn	Ag,Fe,Mn, Po	Ag,Cd,Co, Fe,Mn,Ni, Sr	Cd,Co,Cr, Cs,Sr△U	Ag,Am,Mn Po Ru
1000-10 000	Am,Cm,Th	Am,Ce,Co, Cs,Pu,Zn Zn	Am,Cs,Pu, Ra,Th△U	Ni [Np] Pu, Zn	Ce,Cm,Cs,Pu
> 10 000		Cm,Pb,Ra	Ce	Ag,Am,Pb, Ru,Th	Th

* Tc, I, U and Np - highlighted to illustrate the dependence on soil type.

TABLE 11

COMPARISON OF RANGES OF K_d (FROM TABLE 9) OF BAES AND SHARP (1983) AND SILT AND CLAY SOILS FROM THIS STUDY

Elements	This Study: Silt and Clay	Baes and Sharp: Agricultural Soils and Clays of pH 4.5 to 9.0	Rating of Baes and Sharp Data
Ag	28 - 333	10 - 1 000	high
Am	25 - 400 000	1 - 47 230	low
Cd	7 - 2 450	1.26 - 26.8	low
Ce	1 200 - 56 000	58 - 6 000	low
Cm	7 666 - 44 260	93.3 - 51 900	low & wider
Co	20 - 14 000	.2 - 3 800	low
Cs	37 - 61 287	10 - 52 000	equal
Fe	15 - 2 240	1.4 - 1 000	low
Mn	23.6 - 77 079	.2 - 10 000	very low
Mo	13 - 400	.37 - 400	equal
Np	1.3 - 2 575	.16 - 929	low
Pb	3 500 - 59 000	4.5 - 7 640	very low
Po	24 - 1 830	196 - 1 063	low & narrow
Pu	100 - 190 000	11 - 300 000	high
Sr	.01 - 1.32	15 - 3 300	very high
Tc	.01 - 1.32	.0029 - .28	equal
Th	244 - 160 000	2000 - 510 000	very high
U	.2 - 395 100	10.5 - 4 400	very low
Zn	3.6 - 100 000	.1 - 8 000	very low

APPENDIX A

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(Arranged Alphabetically by Element Name)

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APPENDIX B

DETAILS OF SOILS AND EXPERIMENTS FOR THE K_d VALUE DATABASE COMPILATION

LITERATURE SURVEY SUMMARIES

(The tables are arranged alphabetically by element name)

TABLE B-1

AMERICIUM K_d VALUES

MAT	ITEM	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	SAT PASTE pH	EQ pH (=)	CEC meq/ 100g	% exch ions FROM OXIDES	COMP cation	% COMP CATION	NUCLIDE CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Am	241	silt loam	10	56	25	7 8		5 9 5 41		20	7 20	0 05			24800	Sharpsburg series	Tab 2	Hoshiya et al , 1981
Am	241	silt loam	10	46	25	7 8		6 56		20	1 20	0 06			17780	Sharpsburg series	% main clay minerals	Hoshiya et al , 1981
Am	241	sandy loam	54	33	12	7 8		5 3 4 30		15	1 64	0 05			9635	Malbis (Louisiana)		Hoshiya et al , 1981
Am	241	sandy loam	55	33	12	7 4		5 31		15	1 65	0 05			8063	Malbis (Louisiana)		Hoshiya et al , 1981
Am	241	sandy loam	65	33	2	5 7		5 0 4 58		15	1 52	0 04			1540	Lynn (Maine)	Soil properties see Wallace et al , 1979	Hoshiya et al , 1981
Am	241	sandy loam	65	33	2	5 7		6 17		15	1 52	0 04			187	Lynn (Maine)		Hoshiya et al , 1981
Am	241	clay loam	29	39	32	0 6		7 8 7 12		30	1 20	0 04			35630	Holtville (calcareous + 12% CaCO3)	Hoshiya, 1981 (Tab 3-a 61) (Extract) there prob	Hoshiya et al , 1981
Am	241	clay loam	29	39	32	0 6		8 04		30	1 20	0 04			47230	Holtville (calcareous + 12% CaCO3)	Hoshiya, 1981 (Tab 7 - nuclide conc)	Hoshiya et al , 1981
Am	241	sandy loam	70	28	2	8 4		6 0 5 71		15	5 20	0 10			21870	Aiken (California)		Hoshiya et al , 1981
Am	241	sandy loam	70	28	2	N 4		6 72		15	5 20	0 10			10860	Aiken (California)		Hoshiya et al , 1981
Am	241	silt loam	27	58	15	2 5		6 7 6 12		25	2 41	0 08			20810	Yolo (California)		Hoshiya et al , 1981
Am	241	silt loam	27	58	15	2 5		6 98		25	2 41	0 08			20210	Yolo (California)		Hoshiya et al , 1981
Am	241	muck	70	30	0	40 8		7 9 6 14		60	1 57	0 10			7266	Egbert		Hoshiya et al , 1981
Am	243	muck	70	30	0	40 8		7 54 Extrac pH		60	1 57	0 10 mg e m(+)			5570	Egbert		Hoshiya et al , 1981
Am		loamy sand	(84 4)	10 1	0 5	—	0 8	7 0						Initial log Am (moles/l)				
Am		sand	(59 2)	3 6	37 2		<0 2	4 9 5 1			-6 15				1200-8700	Burbank (Wash) (subsoil)	(ref Newman et al , 1977) ( )% cal from silt/clay	Ka et al , 1981
Am		silt loam	12 6	65 8	21 6	3 61		5 3			2 5 -7 32				1-67	S Carolina (subsoil)	(ref Rantavaa et al , 1977) ( )% cal from silt/clay	Ka et al , 1981
Am		loamy sand	76 0	21 2	2 8	0 43		8 1			-7 52				48309	Newcastle	(ref Skeegard et al , 1976 Clover et al , 1977)	Ka et al , 1981
Am		silt loam	37 0	56 0	17 0	0 84		6 5			-7 52				7143	Burbank	(ref Skeegard et al , 1976 Clover et al , 1977)	Ka et al , 1981
Am		sand	94 6	1 6	3 8	0 21		5 7			-7 52				9700	Waitsville	(ref Skeegard et al , 1976 Clover et al , 1977)	Ka et al , 1981
Am		sandy loam	65 2	29 0	5 8	0 65		8 1			-7 52				2498	Fokaby (F3) South Carolina	(ref Skeegard et al , 1976 Clover et al , 1977)	Ka et al , 1981
Am		loam	42 6	34 4	18 0	0 66		8 3			15 04 -7 52				1250	Hanford (HF-A)	(ref Skeegard et al , 1976 Clover et al , 1977)	Ka et al , 1981
Am	241	peat						4 0							39716	Idaho Falls (ID-A)		Schell et al , 1985
Am	241	peat						4 0							0 85 ×10e5 -- 0 43	(6-8 cm) (0 13 d) Lofgrens Bog, MT	Tab 5a (Pd)	Schell et al , 1985
Am	241	peat						4 0							1 6 ×10e5 -- 0 95	(6-8 cm) (1 d) Lofgrens Bog, MT	Tab 6 = conversion 5 g/kg, dry	Schell et al , 1985
Am	241	peat						4 0							2 3 ×10e5 -- 1 1	(6-8 cm) (4 d) Lofgrens Bog, MT		Schell et al , 1985
Am	241	peat						4 0							3 1 ×10e5 -- 1 8	(6-8 cm) (10 d) Lofgrens Bog, MT		Schell et al , 1985
Am	241	peat						4 0							4 b ×10e5 -- 2 64	(6-8 cm) (15 d) Lofgrens Bog, MT		Schell et al , 1985
Am	241	peat						4 0							----------	(6-8 cm) (23 d) Lofgrens Bog, MT		Schell et al , 1985
Am	241	peat						4 0							----------	(20-21 cm) (0 13 d) Lofgrens Bog, MT		Schell et al , 1985
Am	241	peat						4 0							1 8 ×10e5 -- 0 6	(20-21 cm) (1 d) Lofgrens Bog, MT		Schell et al , 1985
Am	241	peat						4 0							2 3 ×10e5 -- 0 95	(20-21 cm) (4 d) Lofgrens Bog, MT		Schell et al , 1985
Am	241	peat						4 0							2 9 ×10e5 -- 1 1	(20-21 cm) (10 d) Lofgrens Bog, MT		Schell et al , 1985
Am	241	peat						4 0							4 5 ×10e5 -- 2 3	(20-21 cm) (15 d) Lofgrens Bog, MT		Schell et al , 1985
Am	241	peat						4 0							3 a ×10e5 -- 1 3	(20-21 cm) (23 d) Lofgrens Bog, MT		Schell et al , 1985
Am	241	muck						4 0							0 87 ×10e5 -- 0 4	(6-8 cm) (0 13 d) Sruce Flats Bog, PA (contains illite)		Schell et al , 1985
Am	241	muck						4 0							1 3 ×10e5 -- 0 5	(6-8 cm) (1 d) Sruce Flats Bog, PA (contains illite)		Schell et al , 1985
Am	241	muck						4 0							78 ×10e5 -- 0 4	(6-8 cm) (4 d) Sruce Flats Bog, PA (contains illite)		Schell et al , 1985
Am	241	muck						4 0							1 5 ×10e5 -- 0 58	(6-8 cm) (10 d) Sruce Flats Bog, PA (contains illite)		Schell et al , 1985
Am	241	peat						4 0							----------	(20-22 cm) (0 13 d) Sruce Flats Bog, PA (contains illite)		Schell et al , 1985
Am	241	peat						4 0							2 2 ×10e5 -- 1 3	(20-22 cm) (1 d) Sruce Flats Bog PA (contains illite)		Schell et al , 1985
Am	241	peat						4 0							1 7 ×10e5 -- 0 9	(20-22 cm) (4 d) Sruce Flats Bog, PA (contains illite)		Schell et al , 1985
Am	241	peat						4 0							1 7 ×10e5 -- 0 97	(20-22 cm) (10 d) Sruce Flats Bog, PA (contains illite)		Schell et al , 1985
Am	242	Bentonite - brine B						7 3							9500		(Tab 1- pH after equilation)	Nomph, 1980
Am	243	10% Bentonite - sand - brine B						7 3							9500		= Kd clair based on bentonite mass - mixture of bentonite charcoal, montmorillonite & Nationsalz = effective backfill: 6550	Nomph, 1980
Am		sand	90	3	8										300,000 (140,000)	Beatty 1, Nevada	Abst = Kd highest in alkaline Alluvial Basin deposits high in montmorillonite and zeolites	Neuhauser, 1983
Am		sand	91	2	7										250 000	Beatty 2, Nevada		Neuhauser, 1983
Am		sand	83	2	15										100,000	Beatty 5, Nevada		Neuhauser, 1983
Am		clayey sand	58	6	36										56,000	Barnwell 4, S Carolina	Tab1 Kds mineral phase char Tab2- Relationships- texture, surface area & clay min comp Tabl- soil test & min comp	Neuhauser, 1983
Am		clayey sand	68	11	21										65,000	Barnwell 12, S Carolina	Tab4 Kds & radionuclides Fig- text diagram	Neuhauser, 1983

continued...

TABLE B-1 (continued)

Ref.	ID #	Soil type	% sand	% silt	% clay	% OM	% CaCO3	pH: sat. paste	Eh (mV)	CEC meq/100g	Temp. (deg. Celsius)	Cmpt: cation	% Cmpt: cation	Mineral contamination	Kd (mL/g)	Site location or description	Other information	Reference
Am		clayey sand	73	9	18										130,000 (120,000)	Neptunite 14, 5 turalites	Final Kd vs. sensitive materials Kd column = ( ) = reducing conditions	Rutherford, 1983
Am	241	glauconitic sand	91.1	2.9	6.0	0	0	6.5 (5)	431	3.7 (14 wks)				1 M	1000 A-B	N.E. Netherlands	(Appendix 3) (O.M. = Py Mg-Fe)	Prons et al., 1986
Am	241	glauconitic sand	91.1	2.9	6.0	0	0	6.1 (5)	449	3.7 (14 wks)				1.0 M	1830 A-B	N.E. Netherlands	This report is a problem - 1000's of Kd values	Prons et al., 1986
Am	241	glauconitic sand	91.1	2.9	6.0	0	0	6.1 (5)	458	3.7 (14 wks)				1.0 M	1780 A-B	N.E. Netherlands	Kd's function of pH, Eh, M & time = appendices	Prons et al., 1986
Am	241	glauconitic sand	91.1	2.9	6.0	0	0	7.1 (8)	421	3.7 (14 wks)				1 M	3090 A-B	N.E. Netherlands	Ox. = Aerobic	Prons et al., 1986
Am	241	glauconitic sand	91.1	2.9	6.0	0	0	6.6 (6)	420	3.7 (14 wks)				1.0 M	3815 A-B	N.E. Netherlands	pH in [ ] = initial pH	Prons et al., 1986
Am	241	glauconitic sand	91.1	2.9	6.0	0	0	6.7 (6)	409	3.7 (14 wks)				2.0 M	3950 A-B	N.E. Netherlands	A = aerobic - Kd column	Prons et al., 1986
Am	241	glauconitic sand	91.1	2.9	6.0	0	0	6.2 (5)	17	3.7 (8 wks)				0.1 M	2100 AM-B	N.E. Netherlands	AN = anaerobic - Kd column	Prons et al., 1986
Am	241	glauconitic sand	91.1	2.9	6.0	0	0	5.7 (5)	0	3.7 (8 wks)				1.0 M	470 AM-B	N.E. Netherlands	B = batch - Kd column	Prons et al., 1986
Am	241	glauconitic sand	91.1	2.9	6.0	0	0	5.8 (5)	5	3.7 (8 wks)				2.0 M	245 AM-B	N.E. Netherlands	C = column - Kd column	Prons et al., 1986
Am	241	glauconitic sand	91.1	2.9	6.0	0	0	6.4 (6)	-67	3.7 (8 wks)				0.1 M	1720 AM-B	N.E. Netherlands	M = molarity - Rock salt (anhydrite)	Prons et al., 1986
Am	241	glauconitic sand	91.1	2.9	6.0	0	0	6.7 (6)	-73	3.7 (8 wks)				1.0 M	1580 AM-B	N.E. Netherlands	(another salt down)	Prons et al., 1986
Am	241	glauconitic sand	91.1	2.9	6.0	0	0	6.6 (6)	66	3.7 (8 wks)				2.0 M	2600 AM-B	N.E. Netherlands		Prons et al., 1986
Am	241	glauconitic sand	91.1	2.9	6.0	0	0	6.37 (5)	66	3.7 (18 wks)				0.1 M	1240 AM-C	N.E. Netherlands		Prons et al., 1986
Am	241	glauconitic sand	91.1	2.9	6.0	0	0	5.8 (5)	216	3.7 (18 wks)				1.0 M	225 AM-C	N.E. Netherlands		Prons et al., 1986
Am	241	glauconitic sand	91.1	2.9	6.0	0	0	5.7 (5)	-59	3.7 (18 wks)				2.0 M	315 AM-C	N.E. Netherlands		Prons et al., 1986
Am	241	glauconitic sand	91.1	2.9	6.0	0	0	6.4 (6)	-7	3.7 (18 wks)				0.1 M	6530 AM-C	N.E. Netherlands		Prons et al., 1986
Am	241	glauconitic sand	91.1	2.9	6.0	0	0	6.4 (6)	32	3.7 (18 wks)				1.0 M	2085 AM-C	N.E. Netherlands		Prons et al., 1986
Am	241	glauconitic sand	91.1	2.9	6.0	0	0	6.6 (6)	18	3.7 (18 wks)				2.0 M	1605 AM-C	N.E. Netherlands		Prons et al., 1986
Am		sand (Coby 1017)						6.2 (5)	78	155Ca++/Zeks]				0.012 M	445 AM-M	Caribbean (TRC)		Prons et al., 1986
Am		sand (Coby 1017)						7.8 (7)	12	155Ca++/Zeks]				0.012 M	970 AM-M	Caribbean (TRC)		Prons et al., 1986
Am		sand (Coby 1017)						6.1 (5)	25	155Ca++/Zeks]				0% M	520 AM-M	Caribbean (TRC)		Prons et al., 1986
Am		sand (Coby 1017)						7.3 (7)	19	155Ca++/Zeks]				05 M	185 AM-M	Caribbean (TRC)		Prons et al., 1986
Am		sand (Coby 2120)						7.4 (6.8)	3	1.18Ca++/Zeks]				1.0 M	940 AM-M	Caribbean (TRC)		Prons et al., 1986
Am		sand (Coby 2120)						7.2 (6.8)	-29	1.18Ca++/Zeks]				2.5 M	2645 AM-M	Caribbean (TRC)		Prons et al., 1986
Am	111	sandy clay	60.4	19.4	20.2	0.18		8.4		10.44					42500 (DF)		DF = owl filtration method ? - Kd column	Sheppard, J.C., 1981
Am	111	sandy clay	60.4	19.4	20.2	0.18		8.4		10.44					1600 (C)	10-M	C = centrifugation " - Kd column	Sheppard, J.C., 1981
Am	111	silt loam	32.0	56.0	12.0	0.84		6.5		10.76					3850 (DF)	M117	Lab 3 = Am-Kd	Sheppard, J.C., 1981
Am	111	silt loam	32.0	56.0	12.0	0.84		6.5		10.76					1380 (C)	M117	Lab 2 = diffusion factor (D)	Sheppard, J.C., 1981
Am	111	silt loam	32.0	56.0	12.0	0.84		6.5		10.76					35700 (DF)	AM4	p.13 = conclusion	Sheppard, J.C., 1981
Am	111	silt loam	32.0	56.0	12.0	0.84		6.5		10.76					10700 (C)	AM4		Sheppard, J.C., 1981
Am	111	silt loam	32.0	56.0	12.0	0.84		6.5		10.76					25800 (DF)	AM5		Sheppard, J.C., 1981
Am	111	silt loam	32.0	56.0	12.0	0.84		6.5		10.76					1200 (C)	AM5		Sheppard, J.C., 1981
Am		clay						3.8		64.26					2.5 log	Bentonite	(Tab 2 = Am-Kd)	Billon, 1982
Am		clay						4.3		64.26					2.7 log	Bentonite		Billon, 1982
Am		clay						5.5		64.26					3.3 log	Bentonite		Billon, 1982
Am		clay						5.7		64.26					3.0 log	Bentonite		Billon, 1982
Am		clay						6.1		64.26					3.5 log	Bentonite		Billon, 1982
Am		clay						6.3		64.26					3.7 log	Bentonite		Billon, 1982
Am		clay						6.5		64.26					3.7 log	Bentonite		Billon, 1982
Am		clay						7.0		64.26					4.7 log	Bentonite		Billon, 1982
Am		clay						7.7		64.26					5.2 log	Bentonite		Billon, 1982
Am		clay						7.4		64.26					4.8 log	Bentonite		Billon, 1982
Am		clay						9.0		64.26					5.2 log	Bentonite		Billon, 1982
Am		clay						12.4		64.26					5.2 log	Bentonite		Billon, 1982
Am		fine sandy loam				2.4	-	5.3 (4.39)	-	15		1.65	-		6.635x10E3	Malbis (Louisiana)	When the value is bracketed, it is the pH of the extract.	Hoskins et al., 1970
Am		fine sandy loam				2.4	-	5.8 (5.71)	-	15		1.65	-		8.063x10E3	Malbis (Louisiana)		Hoskins et al., 1970
Am		fine sandy loam				5.7	-	5.0 (4.58)	-	15		1.57	-		1.549x10E3	Lyman (Maine)		Hoskins et al., 1970
Am		fine sandy loam				5.7	-	5.0 (6.17)	-	15		1.57	-		1.992x10E2	Lyman (Maine)		Hoskins et al., 1970
Am		light loam				8.4	-	6.0 (5.72)	-	15		5.20	-		2.187x10E4	Aiken (California)		Hoskins et al., 1970
Am		light loam				8.4	-	6.0 (6.27)	-	15		5.20	-		1.066x10E4	Aiken (California)		Hoskins et al., 1970
Am		coarse sand				-	-	7.0	-	-		-	-	Mg (90% sat solution)	4x10E	(Netherlands)		Nyambara & Verhoef, 1977
Am		clay																
Am			78	21.2	2.8	0.43	-	8.1	-	5.94		-	-		7.14x10E2	(Richland, Washington)		Amin & Rai, 1978
Am			91.2	7.8	1	1.19	-	4.0	-	7.01		-	-		4.76x10E2	Fontana (Barnwell,SC) 0-5 c		Amin & Rai, 1978
Am			91.6	5.4	3	0.99	-	6.2	-	1.79		-	-		4.37x10E2	Fontana (Barnwell,SC) 5-25 c		Amin & Rai, 1978
Am			94.6	1.6	3.8	0.21	-	5.2	-	0.69		-	-		7.49x10E2	Fontana (Barnwell,SC) 25-50 c		Amin & Rai, 1978
Am			95.2	2.9	1.8	0.45	-	8.1	-	6.14		-	-		1.25x10E2	Hanford A		Amin & Rai, 1978
Am			93.5	17.6	3.6	0.17	-	9.4	-	4.96		-	-		8.33x10E2	Hanford B		Amin & Rai, 1978
Am			47.6	30.4	18	0.6	-	8.6	-	15.04		-	-		3.92x10E3	Idaho A		Amin & Rai, 1978
Am			60.4	19.4	20.2	0.18	-	8.4	-	10.44		-	-		4.35x10E4	Idaho B		Amin & Rai, 1978
Am			80.4	8.8	7.9	0.15	-	8.4	-	9.38		-	-		3.7x10E4	Idaho C		Amin & Rai, 1978
Am			49.7	28.4	27.4	0.98	-	7.7	-	18.36		-	-		1.09x10E4	Idaho D		Amin & Rai, 1978

continued...

TABLE B-1 (concluded)

MIX	ISO	SOIL type	% SAND	% SILT	% CLAY	% ORG.	% CaCO3	SAT PASTE	pH (+)	CEC meq/ 100g	% EXCH CATION UNITES	EXCH CATION	% EXCH CATION	NUCLIDE CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Am			44	29	26	2.4	9.4	5.7		0.41	29.9				2.5x10E3- 210-	(Colorado A (Rocky Flats)		Clover et al., 1976
Am			64	14	22	3.4	2.3	5.5		0.59	17.5				6.0x10E3-24	(Colorado B (Super. Fe	~ Kd val. det. with ext. Ac conc of 10E-1Mmol/L	Clover et al., 1976
Am			44	24	32	0.2	7.3	8.3		0.43	13.8				3.0x10E9-.10-	(Idaho A	~ Kd val. determined with ext. Ac conc of calcium and	Clover et al., 1976
Am			46	11 PP	23	0.3	5.2	8.0		0.47	8.2				8.2x10E2-.43-	(Idaho C	sodium in competing ions over 2 orders of magnitude are	Clover et al., 1976
Am			38	32	30	0.1	0	7.5		0.45	17.4				1.0x10E4-1.5x10E4+	(Idaho D	reported in Routson et al., 1976	Clover et al., 1976
Am			74	12	14	0.3	0.6	8.0		0.43	6.4				1.2x10E2-.2-	(Washington A (Hanford)		Clover et al., 1976
Am			74	12	14	0.1	0	8.2		0.44	5.8				2.3x10E2-.5-	(Washington B (Hanford)		Clover et al., 1976
Am			78	7	20	0.7	0.2	5.4		0.54	7.9				9.2x10E1-1.1x10	(S. Carolina (Barnwell)		Clover et al., 1976
Am			48	34.0?	18	0.7	0.2	6.4		0.49	7.0				4.0x10E2-.11-	(New Mexico (Los Alamos)		Clover et al., 1976
Am			82	9	9	0.6	0.7	4.8		0.47	3.8				3.0x10E2-.20-	(Arkansas B		Clover et al., 1976
Am		Silty clay loam				2.8		5.9 (5.41)			30	1.23			2.9E+1E4	(Skargaburg (Iowa)	When the value is bracketed, it is the pH of the extract	Hinkata et al., 1970
Am		Silty clay loam				2.8		5.9 (6.56)			20	1.33			1.79E+10E4	(Skarenberg (Iowa)		Hinkata et al., 1970
Am		loam				1.5		6.7 (6.10)			25	2.41			2.38E+10E4	(Yolo (California)		Hinkata et al., 1970
Am		loam				2.5		8.7 (6.98)			25	2.41			2.02E+10E4	(Yolo (California)		Hinkata et al., 1970
Am			16	50	34	0.6	1.72	7.8		0.44	14.5				5.0x10E3-230-	(Idaho A	~ Kd val. det. with ext. Ac conc of 10E-1Mmol/L	Clover et al., 1976
Am			9	54	37	2.3	0.6	2.3		0.57	18.7				1.0x10E3-	(Arkansas C		Clover et al., 1976
Am			31	53	16	3.6	0.7	3.6		0.56	17.4				1.6x10E3-.190-	(Illinois		Clover et al., 1976
Am		Clay				0.6		7.8 (7.17)			30	1.2			3.5A3x10E4	(Hollowville	When the value is bracketed, it is the pH of the extract	Hinkata et al., 1970
Am		clay				0.6		7.8 (8.04)			30	1.2			4.723x10E4	(Hollowville		Hinkata et al., 1970
Am		clay				-		7 - 8			-			(100% not extraction)	5x10E4	(Netherlands)		Hamaker & Jackson, 1977
Am			5	31	44	0.7	2.8	7.9		0.42	20.6	-			5.2x10E3-.070-	(Colorado C (Rocky Flats)	~ Kd val. det. with ext. Ac conc of 10E-1Mmol/L	Clover et al., 1976
Am			32	32	36	1	0	4.8		0.40	20.5	-			2.6x10E3-.470-	(Tennessee (Oak Ridge)		Clover et al., 1976
Am			32	32	36	2.7	0	5.4		0.45	18.9	-			9.2x10E3-.070-	(New York (Kent Valley)		Clover et al., 1976
Am			10	34	46	3.2	0.9	6.2		0.52	34.4				7.9x10E3-.190-	(Arkansas A		Clover et al., 1976
Am		abernal red clay				-		2.7			-			0.68 meq/l HCl	25.1			Erickson, 1980
Am		abernal red clay				-		6.9			-			0.68 meq/l HCl	4.0x10E5			Freeman, 1980
Am		organic				40.8		7.2 (7.14)			60	1.57			7.296x10E3	(ubrek	When the value is bracketed, it is the pH of the extract	Hinkata et al., 1970
Am		organic				40.8		7.2 (7.54)			60	1.57			5.579x10E3	(ubrek		Hinkata et al., 1970

TABLE B-2

ANTIMONY K_d VALUES

MIX	ISO	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	SAT PASTE	pH (+)	CEC meq/ 100g	% EXCH CATION UNITES	EXCH CATION	% EXCH CATION	NUCLIDE CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Sb	125						3.11								<10000-7	SRP - Savannah River Plant	(5-g 17 g 44 mL/pH)	Hoeffner, 1984
Sb	125						3-6								<10000-<1000	SRP - Savannah River Plant	at pH 6-8 Kd 600-40 mL/g nearly all Sb removed from soil	Hoeffner, 1984
Sb	125	SRP burial ground					3.4								14000	SRP - Savannah River Plant	(Tab 1)	Stone et al., 1984
Sb	125	SRP burial ground					4.7								3800	SRP - Savannah River Plant		Stone et al., 1984
Sb	125	SRP burial ground					5.3								2300	SRP - Savannah River Plant		Stone et al., 1984
Sb	125	SRP burial ground					7.2								180	SRP - Savannah River Plant		Stone et al., 1984

TABLE B-3

ARSENIC K_d VALUES

NUC	ISO	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	pH SAT	pH PASTE	EH (v)	CEC meq/100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	NUCLIDE CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
As		fine sandstone and silty sand						2 0								0	Jeffrey City, Wyoming	(As) Tab 4	Hayi-Djafari et al., 1981
As		fine sandstone and silty sand						4 5								25		p 226 : site geology	Hayi-Djafari et al., 1981
As		fine sandstone and silty sand						5 75								200		p 230 : split rock formation	Hayi-Djafari et al., 1981
As		fine sandstone and silty sand						7 0								300			Hayi-Djafari et al., 1981

TABLE B-4

BARIUM K_d VALUES

NUC	ISO	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	pH SAT	pH PASTE	EH (v)	CEC meq/100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	NUCLIDE CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Ba		Sand	74	3	23			4 78)	4 28F							0 4	SE coastal plain - sandy clay loam - SP83	Tab 1:soil properties Tab 4: hydraulic conductivity	Eichholz & Whang, 1987
Ba		Sand						4 78)	4 25F							0 4		Tab 5: transport parameters & Kd	Eichholz & Whang, 1987
Ba		Sand						4 78)	4 27F							0 5		Tab 3: sol 1 to 4 - pH and Kd	Eichholz & Whang, 1987
Ba		Solution 1						2 31								1 0			Eichholz & Whang, 1987
Ba		Solution 2						4 04								2 0			Eichholz & Whang, 1987
Ba		Solution 3						6 95								6 3			Eichholz & Whang, 1987
Ba		Solution 4						10 40								644 3			Eichholz & Whang, 1987
Ba		Smectite Clay						7.5 - 7 8							1 7x10E/mMol/L	(9 3- 0 7)x10E4	20 degrees C Core LL44-CPC 2, Pacific Ocean, depth: 5821m	(Ba) Batch (Lab 1: Kd vs temp) Smectite subseabed clay	Kenna, 1980
Ba		Smectite Clay						7 5 - 7 8							1 7x10E/mMol/L	(5 5- 0 3)x10E4	60 degrees C Core LL44-CPC-2, Pacific Ocean, depth: 5821m		Kenna, 1980

TABLE B-5

CADMIUM K_d VALUES

ELE	ISO	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	SAT PASTE	pH	FM (%)	CEC meq/ 100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	NUCLIDE CONCENTRATION	Kd (ml/g)	SOIL LOCATION or DESCRIPTION	DOSE INFORMATION	REFERENCE
Cd	109	loamy sand					1 1	7 0								<1000	1) Gleysol	Cd 109 (Fig 2) Tagged	Bunzl and Schimmack, 1988
Cd	109	loamy peat					0 5	6 8								1000	2) Spodic Histosol,strongly humified	Fig 4 & 5	Bunzl and Schimmack, 1988
Cd	109	sandy loam					(100)	5 7								100-1000	3) Cambisol,brown soil from loess		Bunzl and Schimmack, 1988
Cd	109	sandy loam					(63)	7 1								<1000->1000	4) Cambisol,brown soil		Bunzl and Schimmack, 1988
Cd	109	loamy sand					(5)	4 6								100	5) Acrisol, parabrown soil, Ah		Bunzl and Schimmack, 1988
Cd	109	loamy sand					23	4 6								100	6) Acrisol, parabrown soil, B-horizon		Bunzl and Schimmack, 1988
Cd	109															<1000	7) Bentonite,Sud-chemie AG Munchen		Bunzl and Schimmack, 1988
Cd	109															1000	P1 Spag. peat (high moor) Steinhuder Meer,Hannover		Bunzl and Schimmack, 1988
Cd	109															>1000	P2 Spag. peat (high moor) Neu-gedorf,Bavaria		Bunzl and Schimmack, 1988
Cd		sand 2A	92 3	0 4	6 6	7 7		4 0			9 4		(10E-2M CaCl2)			10-370		(abstract) (TAB 1 = soil prop -other info)	Christensen, 1987
Cd		sand 2SB	88 5	7 2	7 7	1 6		5 0			7 0		(10E-2M CaCl2)			(sol Pb range 3 7 5 0)		Stab 1=Freundlich-Kd for Lomm,CD, 1971, 1=Anshelm-Kt for	Christensen, 1987
Cd		sand 2SC	86 3	7 7	5 3	0 7		4 7			5 2		(10E-2M CaCl2)					silensteel F5,F031 (Fig 1=Kd=solute conc vs soil conc)	Christensen, 1987
Cd		sand 2BA	83 6	7 5	4 9	4 0		4 8			10 8		(10E-2M CaCl2)					(Fig 2=Kd=solute conc vs soil conc)	Christensen, 1987
Cd		sand 2BB	89 0	4 7	6 1	1 7		5 1			6 5		(10E-2M CaCl2)					(Fig 3=Kd=solute vs soil=comparison Co-Ni-Zn-Cs-Cu-Pb	Christensen, 1987
Cd		sand 2BC	93 4	2 6	2 9	0 8		5 1			2 6		(10E-2M CaCl2)					other metals compared for Cd most=low sites) (Fig 4=Kd vs pH	Christensen, 1987
Cd		sand 5GA	72 2	13 3	11 2	3 3		4 0			17 2		(10E-2M CaCl2)					9 soils) (=exchange = 30?) 2A to 5GC = topsoil	Christensen, 1987
Cd		sand 5GB	64 8	17 7	14 7	3 3		4 3			9 5		(10E-2M CaCl2)					110C to 167C = subsoil (0 5 to 1 0m)	Christensen, 1987
Cd		sand 5GC	51 0	23 5	23 2	2 3		4 2			8 4		(10E-2M CaCl2)						Christensen, 1987
Cd		sand 110C	88 8	8 0	8 1	0 3		4 4			4 7		(10E-2M CaCl2)			130-1700		(= Ni,Co,Zn Kd=3-14 times lower)	Christensen, 1987
Cd		sand 163C	86 4	9 8	7 4	0 4		5 3			2 6		(10E-2M CaCl2)			(Cd only)			Christensen, 1987
Cd		sand 167C	75 0	10 8	14 0	0 3		6 4			8 0		(10E-2M CaCl2)						Christensen, 1987
Cd		clay minerals (more silt and sand than clay)	24 5	54 5	21 0			5 1		70	115meq/kg	13 3g/kg				nono quasm * can calculate	Al-Montmorrillonite, Vermiculite, Kaolinite CEC = wMc/Mg	(abstract) (tab 1=soil prop <2mm frac on)	Zaborsh and Zatosk., 1987
Cd																from adsorption data	Fe = g/Mg	(fig 1=adsorption relati	Zaborsh and Zatosk., 1987
Cd		clay minerals (more silt and sand than clay)	22 5	47 5	30 0			5 3		44	74meq/kg	17 1g/kg				(fig)	EC=Vermiculite, Chlorite	(fig 2=difference=MgNO3 - nitrate leach) (fig 3 = metal adsorption vs reaction to metal ion activity)	Zaborsh and Zatosk., 1987 Zaborsh and Zatosk., 1987
Cd		clay minerals (more silt and sand than clay)	50 5	38 5	11 0			5 7		0 03	46meq/kg	11 5g/kg					C=Chlorite, Vermiculite, Illite, Illite-Verm., Kaolinite		Zaborsh and Zatosk., 1987 Zaborsh and Zatosk., 1987
Cd					13 0			6 2			117					10-1000	Mean of 32 Danish soils		Andersen and Christensen, 1988
																		(tab 3 = soil char - Kd correlations) (tab 4 = Regression coeff)	Andersen and Christensen, 1988
																		if m 1 = log Kd for Cd = function of pH (tab 2 = soil prop) Conclusions	Andersen and Christensen, 1988 Andersen and Christensen, 1988
Cd		sand	96 4	0 8	2 4	0 4		5 3			2 6		CaCl2			?	Soil B163C		
		sandy loam	75.0	10 8	14 0	0.3		6 4			8 0		CaCl2			?	Soil B167 C	Soil depth = 50-100 cm (fig 1,3 = Kd vs Zn conc)	Christensen, 1987
Cd	109		80	17	3		0	3.7			125mm/Kg		CaCl2			97 (42-222)		Tab 1 = Kd (Cd) = Kd (Zn), Rem (Conclusions) Soil properties =@ 11-44tab 1 Christensen, 1987 Kd column ( ) = Kd range Tab1 = soil prop tab 2 = Kd	Christensen, 1987 Christensen, 1987 Schimmack et al., 1987
Cd		PA (0-30 cm)				31 7		5			134	0 88 (1 40)	0 1M Ca(NO3)2			0 67 (lg-1)	Aquod (N Germany), Drg/Si-cate Clay (Dh 2 1)	tab 1 = soil prop also mineralogy of clay soil,CECE pH 5.7	Tiller et al., 1984
Cd		PA (0-30 cm)				31 7		6			134	0 88 (1 40)	0 1M Ca(NO3)2			1 67 (lg-1)	Aquod (N Germany), Drg/Si-cate Clay (Dh 2 1)	*m % Fe, Mn = wg/g tab 2 = clay constituents	Tiller et al., 1984
Cd		PA (0-30 cm)				31 7		7			134	0 88 (2 40)	0 1M Ca(NO3)2			5 01 (lg-1)	Aquod (N Germany), Drg/Si-cate Clay (Dh 2 1)	tab 5 = Kd (lg-1), cd-Mn-Zn solution conc=10 -6 molar	Tiller et al., 1984
Cd		LA (0-30 cm)				5		5			65	1 18 (2 62)	0 1M Ca(NO3)2			0 10 (lg-1)	Adalf (N Germany), Si-cate clay (2 1)	(0 M = Mn, Fe) (CEC used ch 7)	Tiller et al., 1984
Cd		LA (0-30 cm)				5		6			65	1 18 (2 62)	0 1M Ca(NO3)2			0 30 (lg-1)	Adalf (N Germany), Si-cate clay (2 1)		Tiller et al., 1984
Cd		LA (0-30 cm)				5		7			65	1 18 (2 62)	0 1M Ca(NO3)2			1 33 (lg-1)	Adalf (N Germany), Si-cate clay (2 1)		Tiller et al., 1984
Cd		PEL (0-15 cm)				3 1		5			90	0 45 (1 81)	0 1M Ca(NO3)2			0 16 (lg-1)	Paltustert (Australia), Si-cate clay (2 1)		Tiller et al., 1984
Cd		PEL (0-15 cm)				3 1		6			90	0 45 (1 81)	0 1M Ca(NO3)2			0 34 (lg-1)	Paltustert (Australia), Si-cate clay (2 1)		Tiller et al., 1984
Cd		PEL (0-15 cm)				3 1		7			90	0 45 (1 81)	0 1M Ca(NO3)2			0 83 (lg-1)	Paltustert (Australia), Si-cate clay (2 1)		Tiller et al., 1984
Cd		PAS (0-15 cm)				2 4		5			70	0 9 (0 55)	0 1M Ca(NO3)2			0 53 (lg 1)	Paltustert (Australia), Si-cate clay (2 1)		Tiller et al., 1984
Cd		PAS (0-15 cm)				2 4		6			70	0 9 (0 55)	0 1M Ca(NO3)2			0 93 (lg-1)	Paltustert (Australia), Si-cate clay (2 1)		Tiller et al., 1984
Cd		PAS (0-15 cm)				2 4		7			70	0 9 (0 55)	0 1M Ca(NO3)2			1 48 (lg-1)	Paltustert (Australia), Si-cate clay (2 1)		Tiller et al., 1984
Cd		BB (40-60 cm)				1 0		5			53	4 (2 76)	0 1M Ca(NO3)2			0 10 (lg-1)	Aquolf (N Germany), Si-cate clay (2 1)		Tiller et al., 1984
Cd		BB (40-60 cm)				1 0		6			53	4 (2 76)	0 1M Ca(NO3)2			0 30 (lg-1)	Aquolf (N Germany), Si-cate clay (2 1)		Tiller et al., 1984
Cd		BB (40-60 cm)				1 0		7			53	4 (2 76)	0 1M Ca(NO3)2			0 87 (lg-1)	Aquolf (N Germany), Si-cate clay (2 1)		Tiller et al., 1984
Cd		PS B (20-30 cm)				0 8		5			24	09 (4 79)	0 1M Ca(NO3)2			006 (lg-1)	Paleoxeralf (N Germany), Si-cate clay from oxide (1 1/Fe)		Tiller et al., 1984
Cd		PS B (20-30 cm)				0 8		6			24	09 (4 79)	0 1M Ca(NO3)2			0 03 (lg-1)	Paleoxeralf (N Germany), Si-cate clay from oxide (1 1/Fe)		Tiller et al., 1984
Cd		PS B (20-30 cm)				0 8		7			24	09 (4 79)	0 1M Ca(NO3)2			0 30 (lg-1)	Paleoxeralf (N Germany), Si-cate clay from oxide (1 1/Fe)		Tiller et al., 1984

continued...

TABLE B-5 (concluded)

MAT	ISO	SOIL type	% SAND	% SILT	% CLAY	% ORG.	% CaCO3	pH SAT PASTE	FH (+)	CEC meq/ 100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	NUCLIDE (CHEMICAL FORM)	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Cd		sa (40-60 cm)				1.0		5		5.3	4 (2.5%)	0.1M Ca(NO3)2			0.10 (1g-1)	Aquolf (N Germany), Silicate clay (2 1)		Tiller et al., 1984
Cd		sa (60-80 cm)				1.0		6		5.3	4 (2.5%)	0.1M Ca(NO3)2			0.30 (Fe-1)	Aquolf (N Germany), Silicate clay (2 1)		Tiller et al., 1984
Cd		sa (80-100 cm)				1.0		7		5.3	5 (2.5%)	0.1M Ca(NO3)2			0.61 (Fe-1)	Aquolf (N Germany), Silicate clay (2 1)		Tiller et al., 1984
Cd		ps R (20-30 cm)				0.8		5		24	09 (4.5%)	0.1M Ca(NO3)2			0.96 (1g-1)	Paleosolf (N Germany), Silicate clay from oxide (1 1/Fe)		Tiller et al., 1984
Cd		ps R (30-50 cm)				0.8		6		24	09 (4.5%)	0.1M Ca(NO3)2			0.03 (1g-1)	Paleosolf (N Germany), Silicate clay from oxide (1 1/Fe)		Tiller et al., 1984
Cd		ps R (50-80 cm)				0.8		7		24	09 (4.5%)	0.1M Ca(NO3)2			0.30 (1g-1)	Paleosolf (N Germany), Silicate clay from oxide (1 1/Fe)		Tiller et al., 1984
Cd		w (0-15 cm)				4.9		5		32	.77 (19.3)	0.1M Ca(NO3)2			0.89 (1g-1)	Haplaborolls (Australia), Iron oxide/silicate clay (Fe/1 1)		Tiller et al., 1984
Cd		w (0-15 cm)				4.9		6		32	.77 (19.3)	0.1M Ca(NO3)2			0.45 (1g-1)	Haplaborolls (Australia), Iron oxide/silicate clay (Fe/1 1)		Tiller et al., 1984
Cd		w (0-15 cm)				4.9		7		32	.77 (19.3)	0.1M Ca(NO3)2			0.43 (1g-1)	Haplaborolls (Australia), Iron oxide/silicate clay (Fe/1 1)		Tiller et al., 1984
Cd		LB (30-50 cm)				1.1		5		53	54 (6.0)	0.1M Ca(NO3)2			0.03 (Fe-1)	Udolf (N Germany), Silicate clay/Iron oxide (2 1)		Tiller et al., 1984
Cd		LB (30-50 cm)				1.1		6		53	54 (6.0)	0.1M Ca(NO3)2			.075 (1g-1)	Udolf (N Germany), Silicate clay/Iron oxide (2 1)		Tiller et al., 1984
Cd		LB (50-80 cm)				1.1		7		53	54 (6.0)	0.1M Ca(NO3)2			0.43 (1g-1)	Udolf (N Germany), Silicate clay/Iron oxide (2 1)		Tiller et al., 1984
Cd		PB (50-80 cm)				16.5		5		87	5.20 (7.3%)	0.1M Ca(NO3)2			.042 (1g-1)	Aquod (N Germany), Silicate clay/Iron oxide (2 1/Fe)		Tiller et al., 1984
Cd		PB (50-80 cm)				16.5		6		87	5.20 (7.3%)	0.1M Ca(NO3)2			0.33 (Fe-1)	Aquod (N Germany), Silicate clay/Iron oxide (2 1/Fe)		Tiller et al., 1984
Cd		PB (50-80 cm)				16.5		7		87	5.20 (7.3%)	0.1M Ca(NO3)2			3.04 (1g-1)	Aquod (N Germany), Silicate clay/Iron oxide (2 1/Fe)		Tiller et al., 1984
Cd		Goethite (Tab)						5							.054 (1g-1)	Goethite (Tab prep.)		Tiller et al., 1984
Cd		Goethite (Tab)						8							.565 (1g-1)	Goethite (Tab prep.)		Tiller et al., 1984
Cd		Goethite (Tab)						7							3.35 (1g-1)	Goethite (Tab prep.)		Tiller et al., 1984
Cd		Kaolinite, 83																Tiller et al., 1984
Cd		Montmorillonite, 82%			<2 wt					117meq/Kg		1M NaNO3					CEC = meq/kg-1 (Cd (NO3)2)	Cancio-Miranaya, 1983
					<2 wt					860meq/Kg		1M NaNO3				Birch Pit, Macon Georgia	(0.N = Zn) (Fig 2,3 = Kd of Cd - Zn)	
																Urban, Wyoming		
Cd		Sandy sand	86.3	6.8	6.2	0.7		6.0		7.5		.001 M CaCl2						
Cd		sandy loam	69.5	12.0	18.8	0.5		5.5		17.6		.001 M CaCl2			nn Kd	Denmark	(Tab 1 = soil prop.) Batch (Cd)	Christensen, 1984
															nn Kd	Denmark	(Tab 2 = % Cd sorption = 20h, 35 wh, 67 wks)	Christensen, 1984
Cd		sand	96.4	0.8	2.4	0.4		6.65		2.6		.001 M CaCl2			780	163 x C-horizon Denmark	(Fig 2 to 5 = sorption isotherms)	
Cd		sandy loam	74.9	10.8	14.0	0.3		6.65		2.6		.001 M CaCl2			250	167 x C-horizon Denmark	(Cd) (Tab - soil prop.) Batch	Christensen, 1985
Cd		sandy loam	74.9	10.8	14.0	0.3		8.0		9.0		.001 M CaCl2			1700	167 x C-horizon Denmark	Tab 3 = Kd's	Christensen, 1985
Cd		sand	96.4	0.8	2.4	0.4		6.65		2.6		.001 M CaCl2			225	167 x C-horizon Denmark	Tab 2 = Waste leachate characteristics	Christensen, 1985
Cd		sand	96.4	0.8	2.4	0.4		5.5		2.6		Compost A			3.5	163 x C-horizon Denmark	Fig 2 to 6 = sorption isotherms	Christensen, 1985
Cd		sandy loam	74.9	10.8	14.0	0.3		6.65		2.6		Compost A			1.2	163 x C-horizon Denmark		Christensen, 1985
Cd		sandy loam	74.9	10.8	14.0	0.3		8.0		9.0		Compost A			6.5	167 x C-horizon Denmark		Christensen, 1985
Cd		sand	96.4	0.8	2.4	0.4		5.5		2.6		Compost A			5.2	167 x C-horizon Denmark		Christensen, 1985
Cd		sand	96.4	0.8	2.4	0.4		6.65		2.6		Compost B			4.9	163 x C-horizon Denmark		Christensen, 1985
Cd		sandy loam	74.9	10.8	14.0	0.3		5.5		2.6		Compost B			1.1	163 x C-horizon Denmark		Christensen, 1985
Cd		sandy loam	74.9	10.8	14.0	0.3		6.65		9.0		Compost B			13	167 x C-horizon Denmark		Christensen, 1985
Cd		sandy loam	74.9	10.8	14.0	0.3		8.0		9.0		Compost B			3.3	167 x C-horizon Denmark		Christensen, 1985
Cd		sand	96.4	0.8	2.4	0.4		6.65		2.6		Slag			10	163 x C-horizon Denmark		Christensen, 1985
Cd		sandy loam	74.9	10.8	14.0	0.3		5.5		2.6		Slag			ND	163 x C-horizon Denmark		Christensen, 1985
Cd		sandy loam	74.9	10.8	14.0	0.3		6.65		9.0		Slag			26	167 x C-horizon Denmark		Christensen, 1985
Cd		sand	96.4	0.8	2.4	0.4		5.5		9.0		Slag			ND	167 x C-horizon Denmark		Christensen, 1985
Cd		sand	96.4	0.8	2.4	0.4		6.65		2.6		Sewage sludge			25	163 x C-horizon Denmark		Christensen, 1985
Cd		sand	96.4	0.8	2.4	0.4		5.5		2.6		Sewage sludge			ND	163 x C-horizon Denmark		Christensen, 1985
Cd		sandy loam	74.9	10.8	14.0	0.3		6.65		8.0		Sewage sludge			21	167 x C-horizon Denmark		Christensen, 1985
Cd		sandy loam	74.9	10.8	14.0	0.3		5.5		8.0		Sewage sludge			ND	167 x C-horizon Denmark		Christensen, 1985
Cd		sandy loam	74.9	10.8	14.0	0.3		6.4 (5.5)		8.0		CaCl2		20 mg Cd/L	175	167 x C-horizon Denmark	(Cd) (Fig 3 = Cd Kd vs Zn conc.)	Christensen, 1985
								6.4 (5.5)		8.0		CaCl2		800 ug Cd/L	100		(Fig 4 = Zn Kd vs Zn conc.)	
																	(Fig 1 & 2 = Sorption isotherms)	
Cd		Hollandale fine sand															(ON = Zn)	
Cd		Plantation Muck - bottom layer			14 %g/Kg			8.20		1.13meq/g					0.072 L/g	Pompano Beach, Florida	Tab 1 = cations in soil Tab 2 = soil charact.	Wong et al., 1983
Cd		Plantation Muck - middle layer			27 %g/Kg			7.30		1.58meq/g					0.033 L/g	Pompano Beach, Florida	Tab 3 = Assay details on soil Tab 4 = linear Kd (L/g)	Wong et al., 1983
Cd		Plantation Muck - top layer			670 %g/K			7.70		4.09meq/g					0.193 L/g	Pompano Beach, Florida	Tab 5 = Langmuir coeff. Fig 1 & 2 = isotherms = Cr, Ni	Wong et al., 1983
					705.2g/K			7.10		4.53meq/g					0.504 L/g	Pompano Beach, Florida	(0.N = Cu, Zn, Mn, Ni, Fe, Cr, Cd)	Wong et al., 1983
Cd		Sand				-		6.5	-	31.6	-				66.7%	Sandy soil (Braunschweig) 0-20 cm	no 1 week equilibration	Poelstra et al., 1979
Cd		Sand				-		6.5	-	31.5	-				47.6%	Sandy soil (Braunschweig) 30-40 cm	no 1 week equilibration	Poelstra et al., 1979
Cd		Sand			0	3.5	-	4.5 - 5.0	-	72	-	[Ca2+] = 0.015 mol/L			2.62x10E2	Soil C, sandy soil		Cornelis et al., 1987
Cd		Sand			20	2.5	-	7.5 - 8.0	-	16	-	[Ca2+] = 0.015 mol/l			5.0x10E2	Soil D, sandy soil		Cornelis et al., 1987
Cd		Fine sand				1.4	-	8.2	-	11	-				72	Hollandale fine sand		Wong et al., 1983
Cd		Silt		<74 mm		0.72	-	8.4	-	60	1.07				76	Imperial (California)		Cancio-Miranaya, 1983
				<74 mm		1.8	-	6.0	-	25	1.07				0.8	Ellsenhaue (California)		Cancio-Miranaya, 1983
Cd		Clay				7.5	-	5.8	-	29	8.29				16	Moomer (California)		Cancio-Miranaya, 1983
Cd		Organic			23	6	trace	7.4	-	-	-				825%	(Vollberg) 0-30 cm	no 1 week equilibration	Cancio-Miranaya, 1983
Cd		Peat				16.3	-	5.2	-	33.8	-				23%	organic		Poelstra et al., 1979
						90	-	5.1 (H20)	-	-	-				37%	(Schmoorbuhl), peat	no 1 week equilibration	Cancio-Miranaya, 1983
						80		4.5				[Ca2+] = 0.015 mol/L			1.44x10E3	Soil A		Poelstra et al., 1979
						>90		4 to 5				[Ca2+] = 0.015 mol/L			0.0+10E3	Peat A		Cornelis et al., 1987
						>90		4.2				[Ca2+] = 0.015 mol/l			5.76+10E3	Soil B		Cornelis et al., 1987
Cd		Sphagnum peat				-	-	4 to 5	-	-	-				1.7x10E4	Peat		Wolf et al., 1977
Cd		Sphagnum peat				-	-	4 to 5				0.02% as Ca2+/mL sol			3.x10E1	Peat		Wolf et al., 1977
Cd		Plantation muck				47	-	7.7	-	34	-				341	average of 3 layers		Wong et al., 1983

TABLE B-6

CALCIUM K_d VALUES

NUC	ISE	SOIL Type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	pH SAT	pH PASTE	TH (+)	CEC meq/100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	NUCLIDE CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Ca		Hollandale fine sand				14 5g/Kg		8 20			1 13mmol/g					1 117 L/g	Pompano Beach, Florida	Tab 1 - cations in soil Tab 2 - soil charact	Wong et al. 1983
Ca		Plantation Muck - bottom layer				27 9g/Kg		7 30			1 58mmol/g					2 164 L/g	Pompano Beach, Florida	Tab 3 - heavy metals in soil Tab 4 - linear Kd (L/g)	Wong et al. 1983
Ca		Plantation Muck - middle layer				670 7g/Kg		7 20			4 09mmol/g					2 784 L/g	Pompano Beach, Florida	Tab 5 - Langmuir coeff Fig 1 & 2 - isotherms - Cr, Ni	Wong et al. 1983
Ca		Plantation Muck - top layer				795 7g/Kg		7 10			4 53mmol/g					0 751 L/g	Pompano Beach, Florida	ID N - Cu, Zn, Mn, Ni, Cd, Cr	Wong et al. 1983

TABLE B-7

CARBON K_d VALUES

MLC	ISE	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	pH SAT PASTE	EH (v)	CEC meq/ 100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	NUCLIDE CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
C	sandy		sandy moraine					H14CO3										
C	sandy		sandy moraine					H14CO3							0 8 x 10e3 (ml/Kg)	sandy moraine, Sweden	(contact time 3d)	Anderson et al , 1982
C	sandy		sandy moraine					H14CO3							1 1 x 10e3 "	sandy moraine, Sweden	(contact time 1e)	Anderson et al , 1982
C	sandy		sandy moraine					H14CO3							2 6 x 10e3 "	sandy moraine, Sweden	(contact time 5e)	Anderson et al , 1982
C	clay		clayish moraine					H14CO3							2 2 x 10e3 "	sandy moraine, Sweden	(contact time 6a)	Anderson et al , 1982
C	clay		clayish moraine					H14CO3							1 3 x 10e3 "	clay moraine, Sweden	(contact time 3d)	Anderson et al , 1982
C	clay		clayish moraine					H14CO3							2 0 x 10e3 "	clay moraine, Sweden	(contact time 1e)	Anderson et al , 1982
C	clay		clayish moraine					H14CO3							3 0 x 10e3 "	clay moraine, Sweden	(contact time 5e)	Anderson et al , 1982
C	sand							H14CO3							2 3 x 10e3 "	clay moraine, Sweden	(contact time 6a)	Anderson et al , 1982
C	sand														6 90	Mississippi, Core 10, Section 1	Pers comm Sections = 3 0 cm thick	Sheppard, 1986
C	sand														9 24	Mississippi, Core 10, Section 2		Sheppard, 1986
C	sand														4 60	Mississippi, Core 10, Section 3		Sheppard, 1986
C	sand														3 64	Mississippi, Core 10, Section 4		Sheppard, 1986
C	sand														3 96	Mississippi, Core 10, Section 5		Sheppard, 1986
C	sand														7 20	Mississippi, Core 10, Section 6		Sheppard, 1986
C	sand														5 24	Mississippi, Core 10, Section 7		Sheppard, 1986
C	sand														5 69	Mississippi, Core 10, Section 9		Sheppard, 1986
C	sand														7 64	Mississippi, Core 10, Section 10		Sheppard, 1986
C	sand														6 35	Mississippi, Core 10, Section 11		Sheppard, 1986
C	sand														9 47	Mississippi, Core 10, Section 13		Sheppard, 1986
C	sand														9 33	Mississippi, Core 10, Section 15		Sheppard, 1986
C	sand														15 47	Mississippi, Core 10, Section 17		Sheppard, 1986
C	sand														9 89	Mississippi, Core 10, Section 18		Sheppard, 1986
C	sand														5 48	Mississippi, Core 12, Section 1		Sheppard, 1986
C	sand														6 55	Mississippi, Core 12, Section 2		Sheppard, 1986
C	sand														4 68	Mississippi, Core 12, Section 3		Sheppard, 1986
C	sand														3 19	Mississippi, Core 12, Section 4		Sheppard, 1986
C	sand														7 74	Mississippi, Core 12, Section 5		Sheppard, 1986
C	sand														8 39	Mississippi, Core 12, Section 6		Sheppard, 1986
C	sand														7 35	Mississippi, Core 12, Section 7		Sheppard, 1986
C	sand														7 05	Mississippi, Core 12, Section 9		Sheppard, 1986
C	sand														4 77	Mississippi, Core 12, Section 10		Sheppard, 1986
C	sand														5 93	Mississippi, Core 12, Section 11		Sheppard, 1986
C	sand														3 43	Mississippi, Core 12, Section 13		Sheppard, 1986
C	sand														6 53	Mississippi, Core 12, Section 15		Sheppard, 1986
C	sand														7 34	Mississippi, Core 12, Section 17		Sheppard, 1986
C	sand														6 54	Mississippi, Core 12, Section 18		Sheppard, 1986
C	sand														0 25	Milner Ridge, Core 15, Section 9		Sheppard, 1986
C	sand														0 27	Milner Ridge, Core 15, Section 10		Sheppard, 1986
C	sand														0 37	Milner Ridge, Core 15, Section 12		Sheppard, 1986
C	sand														1 00	Milner Ridge, Core 15, Section 13		Sheppard, 1986
C	sand														1 17	Milner Ridge, Core 15, Section 14		Sheppard, 1986
C	sand														3 20	Milner Ridge, Core 15, Section 15		Sheppard, 1986
C	sand														4 37	Milner Ridge, Core 15, Section 16		Sheppard, 1986
C	sand														0 81	Milner Ridge, Core 15, Section 17		Sheppard, 1986
C	sand														1 41	Milner Ridge, Core 15, Section 18		Sheppard, 1986
C	sand														0 86	Milner Ridge, Core 15, Section 19		Sheppard, 1986
C	sand														2 61	Milner Ridge, Core 15, Section 20		Sheppard, 1986
C	sand														0 65	Milner Ridge, Core 20, Section 3		Sheppard, 1986
C	sand														0 53	Milner Ridge, Core 20, Section 9		Sheppard, 1986
C	sand														0 70	Milner Ridge, Core 20, Section 11		Sheppard, 1986
C	sand														1 60	Milner Ridge, Core 20, Section 12		Sheppard, 1986
C	sand														1 37	Milner Ridge, Core 20, Section 13		Sheppard, 1986
C	sand														1 94	Milner Ridge, Core 20, Section 14		Sheppard, 1986
C	sand														1 56	Milner Ridge, Core 20, Section 16		Sheppard, 1986
C	sand														1 66	Milner Ridge, Core 20, Section 17		Sheppard, 1986
C	sand														1 13	Milner Ridge, Core 20, Section 18		Sheppard, 1986
C	sand														4 11	Milner Ridge, Core 20, Section 19		Sheppard, 1986
C	sand														7 03	Milner Ridge, Core 20, Section 20		Sheppard, 1986

TABLE B-8

CERIUM Kd VALUES

	ISE	Soil type	% SAND	% SILT	% CLAY	% OMC	% CaCO3	pH SAT PASTE	FW (+)	CEC meq/ 100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	MAJOR CONTAMINATION	Kd (ML/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
r	139	Sand					1 1	7 0							1000	1 Glaymor		
r	139	Org					0 5	6 8							>1000	2 Saprir Historol-strongly humified	Fig 1	Muir, F & Schimmack, 1986
r	139	Sand					?(100)	5 7							1000	3 Cambisol, brown soil from loess		Bunzl & Schimmack 1988
r	139	S ~d					?(63)	7 1							1000-10000	4 Cambisol,brown soil		Bunzl & Schimmack, 1988
r	139	Sand					?(5)	4 6							<1000	5 Aerosol,parabrown soil Ah		Bunzl & Schimmack 1988
r	139	Sand					?(23)	4 6							>100	6 Aerosol,parabrown soil (Ah)orrigo		Bunzl & Schimmack, 1988
r	139	Clay						8 0(0 1NCaNo3)		0 7 meq/g					10000-100000	M-Horizon-te,Sud-Chevre AC Horizon		Bunzl & Schimmack, 1988
r	139	Org						6 0(0 1NCaNo3)		2 1 meq/g					1000-10000	PT Sahara sand,Steinhuder Meer,Hannover		Bunzl & Schimmack, 1988
r	139	Org						7 0(0 1NCaNo3)		0 65 meq/g					>10000	P2-Sahara sand,Kemig sand,Navarra		Bunzl & Schimmack, 1988
r	144	SRP burial ground						8 95							100 (1)	SRP (burial ground)		Bunzl & Schimmack, 1988
r	144	SRP burial ground						4 12							07 (2)	SRP (burial ground)	SRP = Savannah River Plant, (burial ground)	Hoeffner, 1985
r	144	SRP burial ground						----							75 (4)	SRP (burial ground)	Tab 7	Hoeffner, 1985
r	144	SRP burial ground						4 29							40 (7)	SRP (burial ground)	( ) = Kd cal = equil time in days	Hoeffner, 1985
Ce	141		50 7	28 4	12 0		0 2	6 7 CaCl2		8 7					620-25400	Alf.sol, parabrown earth (0 30 cm) (Ap-horizon)	Kd=(100 N) (mean=4700)	Hoeffner, 1985
Ce	139		80	17	3		0	3 7 CaCl2							316 (110 740)			Hoeffner, 1985
Ce	141	Ap				1 19		8 3 (solution)		16 4					>10000	Auenrendzina (Bibl-a) (0 29 cm)		Bunzl et al , 1995
Ce	141	C				1 35		8 3 (solution)		17 7					>10000	Auenrendzina (Bibl-a) (29 35 cm)		Schimmack et al , 1987
Ce	141	Cc				1 01		8 2 (solution)		16 2					>10000	Auenrendzina (Bibl-a) (35 47 cm)		Bunzl et al , 1984
Ce	141	2Cc				0 25		8 1 (solution)		8 5					>10000	Auenrendzina (Bibl-a) (47-92 cm)		Bunzl et al , 1984
Ce	141	2fC-				0 14		8 2 (solution)		6 4					>10000	Auenrendzina (Bibl-a) (92-190 cm)		Bunzl et al , 1984
Ce	141	3C-				0 07		8 2 (solution)		6 7					>10000	Auenrendzina (Bibl-a) (190-229 cm)		Bunzl et al , 1984
Ce	141	Ap				2 41		7 3 (solution)		8 7					>10000	Auenrendzina (Bibl-a) (229-272 cm)		Bunzl et al , 1984
Ce	140	A:				0 71		7 4 (solution)		9 5					>10000	Paragrower (Escheso-ler) (0-31 cm)		Bunzl et al , 1984
Ce	141	BLA1				0 34		7 2 (solution)		8 3					>70000	Paragrower (Escheso-ler) (31-57 cm)		Bunzl et al , 1984
Ce	141	A1Bt				0 30		6 8 (solution)		8 3					>70000	Parabrown (Escheso-ler) (57-62 cm)		Bunzl et al , 1984
Ce	141	BL1				0 30		6 7 (solution)		12 5					>10000	Parabrown (Escheso-ler) (62-73 cm)		Bunzl et al , 1984
Ce	141	BL2				0 25		6 2 (solution)		13 2					>10000	Parabrown (Escheso-ler) (73-88 cm)		Bunzl et al , 1984
Ce	143	heavy clay		15	85			8 2 (7 3 -- 7)		26 -- 2					>10000	Parabrown (Escheso-ler) (>88 cm)		Bunzl et al , 1984
Ce	141	heavy clay		11	89			8 4 (7 1 -- 1)		21 -- 2					12000 -- 1000	Lakkasuo, Finland (0 04-0 11 m)	(Tab 13 = Ce Kd - pH)	Bunzl et al , 1994
Ce	141	heavy clay		10	89			8 0 (7 2 -- 1)		25 -- 1					15000 -- 1000	Ulkuluoto suo, Finland (2 00-2 15 m)	pH in Tab 13 - ( ) in pH column	Nikula, 1982
Ce	143	silty clay loam		02	98			7 0 (7 3 -- 1)		17 -- 1					27000 -- 5000	Salo suo, Finland (6 79-6 85 m)	(Sh = Sr-Ca-Co-Mn-Zn)	Nikula, 1982
Ce	141	loamy sand	78	21				6 4 (7 0 -- 1)		2 8 -- 07					12000 -- 2000	Jamsa suo, Finland (2 24-3 31 m)	in Finnish with English summary	Nikula, 1982
Ce	141	sandy loam	65	35				6 4 (7 2 -- 1)		3 2 -- 2					2000 -- 700	Loviisa moreen, Finland (4 00 m)	(Fig 8 = Ce Kd vs CEC)	Nikula, 1982
Ce	141	loamy sand	73	27				6 8 (7 6 -- 1)		2 1 -- 3					1200 -- 300	Ulkuluoto moreen, Finland (1 5 m)		Nikula, 1982
Ce	141	sandy loam	66	34				6 2 (7 0 -- 1)		2 3 -- 3					970 -- 140	Jamsa moreen, Finland (3 5-4 0 m)		Nikula, 1982
Ce	141	loam	41	37	22			9 7 (8 4 -- 1)		18 -- 5					2700 -- 900	Parkola moreen, Finland (7 2-7 5 m)		Nikula, 1982
Ce	141	sandy loam	57	29	14			9 9 (8 1 -- 1)		40 -- 4					13000 -- 3000	Rokola kalliomaa, Finland (44 m)		Nikula, 1982
															56000 -- 24000	Helsaara kalliomaa, Finland (24 m)		Nikula, 1982
																		Nikula, 1982
Ce		sandy subsoil																Nikula, 1982
														10E-6MMOL	1100			Nikula, 1982
																	(0 M = Sr, Cs, Ru)	Schwarzer et al , 1982

TABLE B-9

CESIUM K_d VALUES

MUC	ISB	SOIL type	% SAND	% SILT	% CLAY	% OMC	% CaCO3	SAT PASTE	pH	Eh (+)	CEC meq/ 100g	% FREE IRON OXIDES	CHIEF CATION	% CHIEF CATION	WASHLIN CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Cs		sand	74	3	23		5 60	(5 43)								404 8	SE coastal plain, sandy clay loam, (SP §3)	(Lab Tr unit prosorption)(Lab 4= hydraulic conductivity)	Echholz and Wang, 1987
Cs		sand	74	3	23		5 60	(5 36)								416 7	SE coastal plain, sandy clay loam, (SP §3)	(wt in ( ): final pH)(Lab Sr transport parameters = Kd)	Echholz and Wang, 1987
Cs		sand	74	3	23		5 60	(5 36)								401 7	SE coastal plain, sandy clay loam, (SP §5)		Echholz and Wang, 1987
Cr	137 silt															3021	sandy soil with fine silt	(Lab 3)	Ohnuk, and Wadachi, 1983
Cs	137 clay						6 0			-200 mV						7500	glacial till	(Cs-137)	Bell and Bates, 1988
Cs	137 sand						6 0			-200 mV						3800	fine-coarse sand (Cl 2)	(Lab.) = Chl concentration) Chlgroundwater	Bell and Bates, 1988
Cs	137 sand						6 0			-200 mV						2600	med-coarse sand (C3)	(Lab.2 = soil description)	Bell and Bates, 1988
Cs	137 sand						6 0			-200 mV						2800	coarse sand (C5)	(good conclusions) (Lab kinds)	Bell and Bates, 1988
Cs	137 sand						6 0			-200 mV						1700	medium sand	(tab 3 = interlab) (Ba)	Bell and Bates, 1988
Cs	134 clay															"37	>2 mm size	clay peerkite	Carlson and Bo, 1987
Cs	134 clay															6.3 = 10e1	<2 mm size	(Cs-134) (s 101) = DIFFICULT =	Carlson and Bo, 1987
Cs		clay														>10e5 (log)	Bentonite, Sud-Chemie, AG Moschen (montmorillonite 50% and 10% kaolinite)	(? log=6)	Bunzl and Schimmack, 1988
Cs		loamy sand							1 1	7 0	(base satu)					10e3-10e5 (log)	1 Cleysol, permanent grassland	(Fig 4=5) also nr	Bunzl and Schimmack, 1988
Cs		loamy peat							0 5	6 8	(base satu)					10e3-10e5 (log)	2 Peat land (basaric Histosol), strongly humified		Bunzl and Schimmack, 1988
Cs		sandy loam								5 7	(base satu)					10e3-10e5 (log)	3 (podzol, brown soil from loess		Bunzl and Schimmack, 1988
Cs		sandy loam								7 1	(base satu)					10e3-10e5 (log)	4 (combined,brown soil		Bunzl and Schimmack, 1988
Cs		loamy sand								4 6	(base satu)					10e3 .0e5 (log)	5 Acrisol, parabrown soil, Ah		Bunzl and Schimmack, 1988
Cs		loamy sand								4 6	(base satu)					10e3-10e5 (log)	6 Acrisol, parabrown soil, O-horizon		Bunzl and Schimmack, 1988
																			Bunzl and Schimmack, 1988
																			Bunzl and Schimmack, 1988
Cs		fibric organic					6 0				2 1	meq/g	(0 1N CaNO3)			>10 log	P1, Sphag peat (high moor), Steinhauder Moor, Hannover 0 36% ash	(P1 and P2 = slightly decomposed, shredded 0 3-0 8 mm)	Bunzl and Schimmack, 1988
Cs		fibric organic					7 0				0 65	meq/g	(0 1N CaNO3)			>10 log	P2, Sphag peat (high moor),Komgendorf,Bavaria, 1 0% ash	(1-6) 0-90 cm and sieved to 2mm, Freising, Bavaria	Bunzl and Schimmack, 1988
Cs		clay					5-10						0 03 M	NaCl		1000	Montmorillonite clay, Bellepoerchi S D		Ges et al , 1983
Cs		clay					5-10						0 1	M NaCl		1000		(Kd = from fig 2 p 208)	Ges et al , 1983
Cs		clay					5-10						1	M NaCl		100		(better to refer to Relyea & Sibley, 1981 ENL-2898, Fig 2)	Ges et al , 1983
Cs		clay					5-10						1 0	M NaCl		>10			Ges et al , 1983
Cs	137 peat						4 0									02 = 10e4 -- 005	(1 day) (6-8 cm) Lofgrens Bog, NY		Schell et al , 1985
Cs	137 peat						4 0									029 = 10e4 -- 006	(4 day) (6-8 cm) Lofgrens Bog, NY		Schell et al , 1985
Cs	137 peat						4 0									012 = 10e4 -- 003	(8 day) (6-8 cm) Lofgrens Bog, NY	(Lab.Sc) (Cs-137) (Pd)	Schell et al , 1985
Cs	137 peat						4 0										(11 day) (6-8 cm) Lofgrens Bog, NY	(tab B = comparison = Sibley, 1982)	Schell et al , 1985
Cs	137 peat						4 0									04 = 10e4 -- 008	(15 day) (6-8 cm) Lofgrens Bog, NY		Schell et al , 1985
Cs	137 peat						4 0									05 = 10e4 -- 009	(30 day) (6-8 cm) Lofgrens Bog, NY		Schell et al , 1985
Cs	137 peat						4 0									017 = 10e4 -- 003	(1 day) (20-21 cm) Lofgrens Bog, NY		Schell et al , 1985
Cs	137 peat						4 0									006 = 10e4 -- 002	(4 day) (20-21 cm) Lofgrens Bog, NY		Schell et al , 1985
Cs	137 peat						4 0										(8 day) (20-21 cm) Lofgrens Bog, NY		Schell et al , 1985
Cs	137 peat						4 0									027 = 10e4 -- 005	(11 day) (20-21 cm) Lofgrens Bog, NY		Schell et al , 1985
Cs	137 peat						4 0									02 = 10e4 -- 004	(15 day) (20-21 cm) Lofgrens Bog, NY		Schell et al , 1985
Cs	137 peat						4 0									007 = 10e4 -- 002	(30 day) (20-21 cm) Lofgrens Bog, NY		Schell et al , 1985
Cs	137 peat						4 0									2 0 = 10e4 -- 65	(1 day) (6-8 cm) Spruce Flats Bog, PA		Schell et al , 1985
Cs	137 peat						4 0									3 6 = 10e4 -- 79	(4 day) (6-8 cm) Spruce Flats Bog, PA		Schell et al , 1985
Cs	137 peat						4 0									4 1 = 10e4 -- 91	(8 day) (6-8 cm) Spruce Flats Bog, PA		Schell et al , 1985
Cs	137 peat						4 0									10 2 = 10e4 -- 3 0	(15 day) (6-8 cm) Spruce Flats Bog, PA		Schell et al , 1985
Cs	137 peat						4 0									14 5 = 10e4 -- 4 2	(30 day) (6-8 cm) Spruce Flats Bog, PA		Schell et al , 1985
Cs	137 peat						4 0									1 0 = 10e4 -- 2	(1 day) (20-22 cm) Spruce Flats Bog, PA		Schell et al , 1985
Cs	137 peat						4 0									1 1 = 10e4 -- 2	(4 day) (20-22 cm) Spruce Flats Bog, PA		Schell et al , 1985
Cs	137 peat						4 0									1 0 = 10e4 -- 41	(8 day) (20-22 cm) Spruce Flats Bog, PA		Schell et al , 1985
Cs	137 peat						4 0									1 1 = 10e4 -- 22	(15 day) (20-22 cm) Spruce Flats Bog, PA		Schell et al , 1985
Cs	137 peat						4 0									1 4 = 10e4 -- 3	(30 day) (20-22 cm) Spruce Flats Bog, PA		Schell et al , 1985
Cs	137 SRP						3 95									>1250 (1d)	SRP soil = Savannah River Plant		Hoeffner, 1985
Cs	137 SRP						4 17									>1250 (3d)	SRP soil = Savannah River Plant	( ) = Equil. time days = Kd column	Hoeffner, 1985
Cs	137 SRP															>1250 (4d)	SRP soil = Savannah River Plant	(Lab 7) (b A3) -- see Co --	Hoeffner, 1985
Cs	137 SRP						4 20									>1250 (7d)	SRP soil = Savannah River Plant		Hoeffner, 1985
Cs	134 SRP						3 95									>500 (1d)	SRP soil = Savannah River Plant		Hoeffner, 1985
Cs	134 SRP						4 17									>500 (2d)	SRP soil = Savannah River Plant		Hoeffner, 1985
Cs	134 SRP															>500 (4d)	SRP soil = Savannah River Plant		Hoeffner, 1985

continued...

TABLE B-9 (continued)

MUC	ISO	SOIL type	% SAND	% SILT	% CLAY	% OM	% $CaCO_3$	pH SAT PASTE	Eh (v)	CEC meq/ 100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	MOLLICOL CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Cs	134 SM							4 29							>500 (Eq)	SRP soil - Savannah River Plant		Hoeffner, 1985
Cs								7 10						5 x 10E -4 M	>10 <100 log	SRP soil - Savannah River Plant	(1xCs conc)	Hoeffner, 1985
Cs								2-8						5 x 10E -6 M	>10-<1000 log	SRP soil - Savannah River Plant		Hoeffner, 1985
Cs								2-8						5 x 10E -8 M	>100 >1000 log	SRP soil - Savannah River Plant		Hoeffner, 1985
Cs								5 2 5 4							410	normal Obs (CM pH 5.2 5.4)		Hoeffner, 1985
Cs								5 2 5 4							170	CM = 25 ppm K		Hoeffner, 1985
Cs								5 2 5 4							105	CM = 50 ppm K		Hoeffner, 1985
Cs								5 2-5 4							90	CM = 37 ppm K	(Fig 14, p 51 = oM-Kd-conc)	Hoeffner, 1985
Cs								5 2-5 4								Cs sorption very dependent on pH		Hoeffner, 1985
Cs															320	CM = 40 ppm Cs		Hoeffner, 1985
Cs								5 2 5 4							300	CM = 30 ppm Mg	(Tab 15 m 53)	Hoeffner, 1985
Cs								4 6							160	CM = 85 ppm Fe		Hoeffner, 1985
Cs								4 6							327	Ca only		Hoeffner, 1985
Cs								5 2-5 4							420	Ca = 25 ppm Na		Hoeffner, 1985
Cs								5 6							540	CM = 70 ppm carbonates		Hoeffner, 1985
Cs								5 2-5 4							3200	De-ionized water		Hoeffner, 1985
Cs								5 2-5 4							920	De-ionized water + 0.3 ppm K		Hoeffner, 1985
Cs		A4		39 7	40.2	17 5	0 17	39	7 80 (8 50)		5 3		CaCl2		3529 (Tab 6)	upper Oxidized Soil		Johnston et al 1985 (Cherry)
Cs		A8		37 5	34 2	14 6	0 2	43	7 90 (8 60)		3 4		CaCl2		1557 (Tab 6)	upper Oxidized Soil		Johnston et al 1985 (Cherry)
Cs		D6		29 4	38 7	27 2	0 29	43	7 89 (8 45		6 2		CaCl2		17026 (Tab 6)	upper Oxidized Soil		Johnston et al 1985 (Cherry)
Cs		A15		37 5	35 8	13 9	0 21	44	7 78 (8 78)		2 5		CaCl2		597 (Tab 6)	lower Unweathered Soil	Tab 6	Johnston et al 1985 (Cherry)
Cs		A23		32 8	37 0	13 3	0 20	46	8 08 (8 82)		2 8		CaCl2		611 (Tab 6)	lower Unweathered Soil	Tab 7	Johnston et al 1985 (Cherry)
Cs		A32		36 1	35 8	10 6	0 10	45	8 14 (8 98)		2 0		CaCl2		692 (Tab 6)	lower Unweathered Soil	good continuum	Johnston et al 1985 (Cherry)
Cs		A38		35 7	31 2	9 1	0 18	23	8 20 (8 98)		2 2		CaCl2		751 (Tab 6)	lower Unweathered Soil	pH col = no-1 paste pH in CaCl2 and (H20) in brackets	Johnston et al 1985 (Cherry)
Cs		D14		37 8	36 9	11 1	0 27	39	8 10 (8 70)		3 1		CaCl2		1948 (Tab 6)	lower Unweathered Soil	% organic = % carbonate content = Tab 1	Johnston et al 1985 (Cherry)
Cs		D23		36 6	41 8	8 7	0 24	44	8 18 (8 92)		2 1		CaCl2		1000 (Tab 6)	lower Unweathered Soil	Tab 1 = % sand, silt, clay = <100%	Johnston et al 1985 (Cherry)
Cs		D28		31 8	36 7	11 4	0 23	42	8 30 (8 93)		2 1		CaCl2		1019 (Tab 6)	lower Unweathered Soil	Tab 2 = chem prop	Johnston et al 1985 (Cherry)
Cs		D33		36 9	37 7	11 1	0 16	48	8 30 (8 95)		2 0		CaCl2		953 (Tab 6)	lower Unweathered Soil	Tab 8 = EM -/_ lab & field pH	Johnston et al 1985 (Cherry)
Cs		D38		36 3	34 5	8 8	0 33	53	8 31 (8 02		6 3		CaCl2		1180 (Tab 6)	lower Unweathered Soil		Johnston et al 1985 (Cherry)
Cs		BC-26		—	-----	-----	0 17	41	7 75 (8 60)		0 8		CaCl2		285 (Tab 7)	sand		Johnston et al 1985 (Cherry)
Cs		C7 22		—	-----	-----	0 23	52	7 62 (8 54)		0 8		CaCl2		544 (Tab 7)	sand		Johnston et al 1985 (Cherry)
Cs		C9		—	-----	-----	0 13	65	8 26 (8 97)		0 9		CaCl2		372 (Tab 7)	sand		Johnston et al 1985 (Cherry)
Cs		C10		—	-----	-----	0 15	58	8 29 8 75		0 9		CaCl2		85 (Tab 7)	sand		Johnston et al 1985 (Cherry)
Cs		C12		—	-----	-----	0 19	56	8 05 8 70		0 7		CaCl2		166 (Tab 7)	sand		Johnston et al 1985 (Cherry)
Cs		D17		—	-----	-----	0 16	61	8 14 8 72		0 8		CaCl2		337 (Tab 7)	sand		Johnston et al 1985 (Cherry)
Cs		W22		—	-----	-----	0 22	21	8 15 ____		0 9		CaCl2		303 (Tab 7)	sand		Johnston et al 1985 (Cherry)
Cs		clay = Na-bentonite														Kazadzye, Turkey	(p 206=adsorption primarily a surface phenomenon)	Erlsen et al 1988
Cs		clay = Ca-bentonite														Cureson, Turkey	(Fig.2=mics) (Tab.2,Bsorption/cation conc) Conclusions.	Erlsen et al 1988
Cs		clay = kaolinite														Mihalicacik, Turkey	(Tab.4 = 13 elements in 4 clays)	Erlsen et al 1988
Cs		clay = kaolinite-glauite														Sivaarga, Turkey	(p 270-intro) (Tab 1=Cs conc 'q)	Erlsen et al 1988
Cs		clay = kaolin ta														kara, Turkey	(4 days to equilibrate) (Rd-sorb.-refun) (-g ^::.12.13))	Erlsen et al 1988
Cs		Fanmay loamy sand													no Kd	(Ap-horizon) Barnwell	(Tab 1=Chem + physical prop.)	Easington et al 1981
Cs		Fayette silt loam													no Kd	(Ap-horizon) Illinois	(Tab 4 = Absorption = Fe,Mn,U,Cs)	Easington et al 1981
Cs		Carya loam													no Kd	(B-horizon) clayey		Easington et al 1981
Cs		Poya silty loam													no Kd	(C-horizon)		Easington et al 1981
Cs	137 Ap-horizon			50 7	29 4	12 0	C+2 4	0 2	6 7		8 7		CaCl2		(5700-16500)	Alfisol (Parabrown earth), (0-30 cm)	(Tab 3 = Kd) (Tab 1 = soil prop.)	Bunzl et al 1985
Cs	137 SynthAstic mordenite + Brine A								6 7						17		(Tab 2 = Sc, CEC, pH, by horizon)(Kds log N)(Kd sc = 8900)	
Cs	137 SynthAstic mordenite + J13 A								7 3						12000		(Tab 3) (illite from Silver Falls, Montana)	Nowak, 1980
Cs	137 Synthetic mordenite + Brine B								6 6						74		Synthetic mordenite = Norton Zeolon 900	Nowak, 1980
Cs	137 SynthAstic illite + Brine B								5 6						115			Nowak, 1980
Cs		sand		80	3	8									3300 (4300)	Beatty 1, Nevada	(Tab 1= Kd= mineral phase char)	Rechard, 1983
Cs		sand		91	2	7									4500	Beatty 2, Nevada	tab2=rock-mineralogy-texture surf area & clay mineral content	Rechard, 1983
Cs		sand		83	2	15									8000	Beatty 5, Nevada	tab 3= soil text, & minera- content	Rechard, 1983
Cs		clayey sand		58	6	36									3500	Barnwell 6, South Carolina	tab 4= Kd= 6 radionuclides	Rechard, 1983
Cs		clayey sand		68	11	21									3100	Barnwell 12, South Carolina	(Fig 6= text diagram)(Fig 7 Adsn sorption mirrors s)	Rechard, 1983
Cs		clayey sand		73	8	19									1500 (900)	Barnwell 14, South Carolina		Rechard, 1983

continued...

TABLE B-9 (continued)

MAT	ISO	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	pH SAT. PASTE	EH (+)	CEC meq/ 100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	NUCLIDE (ENGLISH/NATION)	Kd (ml/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Ca																	(Fig 1,2 - Kd vs Ca conc.) Many fancy formulas	Bunzl and Schultz, 1985
																	Low soils = bentonite and humic	Bunzl and Schultz, 1985
																		Bunzl and Schultz, 1985
Ca		organic LFH-Ah						5.2		81 7cmol/kg					43 8 (--)	O-4 cm	Kd column leachate - no [ ] CV - [ ]	Shepard et al , 1987
Ca		sand - Ae						5.1		2 9cmol/kg					37.4 (0.3)	4-15 cm	CEC = cmol/kg	Shepard et al , 1987
Ca		sand - Bf,-Bfjg						5.2		2 1cmol/kg					17.2 (--)	15-45 cm		Shepard et al , 1987
Ca		sand C-Cgj						6.2		1 7cmol/kg					6.5 (1.5)	>45 cm		Shepard et al , 1987
Cs	137	loamy sand	80	17	3			3.7		125 meq/l		CaCl2			3100 (0.5-10500)		Kd column: [ ]= Kd range, (Cs-137)	Schmoack et al , 1987
Cs																	Lab 1 = soil prop Lab 2 = Kd	Schmoack et al , 1987
Cs	137	O				--		3.7		--					350	(0 cm) (C-I-K) Ranker (Treheit), FRG		Backhuber et al , 1987
Cs	137	Ah			17	3.7		3.9							120	(4 cm) (C-I-K) Ranker (Treheit), FRG	Tab 1 = soil prop.	Backhuber et al , 1987
Cs	137	C			0.4	4.3		2.6							840	(15 cm) (C-I-K) Ranker (Treheit), FRG	C = chlorite, I = illite, K = kaolinite	Backhuber et al , 1987
Cs	137	Ol				4.0									320	(0 cm) (C-I-K) Podsol (Gorleben), FRG	M = montmorillonite	Backhuber et al , 1987
Cs	137	Ah			7.0	3.5		7.8							70	(3 cm) (C-I-K) Podsol (Gorleben), FRG	tab 2 = Kd - pH	Backhuber et al , 1987
Cs	137	E			2.1	4.3		5.8							90	(23 cm) (C-I-K) Podsol (Gorleben), FRG	tab 3 = water vel., Dx = Dispersion length	Backhuber et al , 1987
Cs	137	Bh,fe			4.3	3.9		36.2							14	(27 cm) (C-I-K) Podsol (Gorleben), FRG	tab 4 = retardation factors	Backhuber et al , 1987
Cs	137	Bfe			1.6	4.0		4.8							170	(37 cm) (C-I-K) Podsol (Gorleben), FRG	tab 5 = migration rates	Backhuber et al , 1987
Cs	137	BC			0.2	4.6		2.6							100	(42 cm) (C-I-K) Podsol (Gorleben), FRG	Fig 2 = breakthrough curves	Backhuber et al , 1987
Cs	137	C				4.5									1020	(100 cm) (C-I-K) Podsol (Gorleben), FRG	Fig 3 = sorption isotherm	Backhuber et al , 1987
Cs	137	Ah			7.4	4.4		7.8							60	(0 cm) (C-I-K-M) Brown (Brunkendorf)	Fig 4 = time intervals	Backhuber et al , 1987
Cs	137	Bv			0.3	4.5		3.0							700	(9 cm) (C-I-K-M) Brown (Brunkendorf)	Fig 6 = comparisons of batch, column and fallout Kd's	Backhuber et al , 1987
Cs	137	BC			0.05	4.6		4.7							360	(48 cm) (C-I-K-M) Brown (Brunkendorf)	X-reference #4-46	Backhuber et al , 1987
Cs	137	C			--	6.3									390	(95 cm) (C-I-K-M) Brown (Brunkendorf)		Backhuber et al , 1987
Cs	137	Ae			1.19	8.3	(solution)	18.4							>100000	(0-22 cm) Apanrendzinas (Rohlm)	(Lab 1)	Bunzl et al , 1984
Cs	137	C			1.15	8.3	(solution)	17.7							>100000	(22-30 cm) Apanrendzinas (Rohlm)	Fig 1,2 = Kd-soil horizon	Bunzl et al , 1984
Cs	137	Cc			1.01	8.2	(solution)	16.2							>100000	(30-47 cm) Apanrendzinas (Rohlm)	Fig 3 = Kd vs Cs + Ks ions	Bunzl et al , 1984
Cs	137	FeCc			0.25	8.1	(solution)	8.5							100000	(47-90 cm) Apanrendzinas (Rohlm)	Fig 4 = Kd-conversion column - batch	Bunzl et al , 1984
Cs	137	FeCr			0.14	8.2	(solution)	6.4							30000	(90-120 cm) Apanrendzina (Rohlm)	Fig 5 = Kd - 5 soils (A-horiz.)	Bunzl et al , 1984
Cs	137	3Cr			0.02	8.2	(solution)	0.7							>1000	(120-132 cm) Apanrendzina (Rohlm)	Fig 6 = Kd - 5 soils (3 0 m)	Bunzl et al , 1984
Cs	137	Ae			2.41	7.3	(solution)	8.7							<10000	(0-21 cm) Parabrown (Escheveler)	Abstract	Bunzl et al , 1984
Cs	137	Al			0.73	7.4	(solution)	9.5							>10000	(21-52 cm) Parabrown (Escheveler)		Bunzl et al , 1984
Cs	137	BtAl			0.34	7.2	(solution)	8.3							>10000	(52-67 cm) Parabrown (Escheveler)		Bunzl et al , 1984
Cs	137	AlBt			0.30	6.8	(solution)	8.3							>10000	(67-73 cm) CBMR/Parabrown (Escheveler)		Bunzl et al , 1984
Cs	137	Bt1			0.30	6.7	(solution)	12.5							>10000	(73-98 cm) Parabrown (Escheveler)		Bunzl et al , 1984
Cs	137	Bt2			0.25	8.2	(solution)	13.2							<100000	(>98 cm) Parabrown (Escheveler)		Bunzl et al , 1984
Co		- red-brown clayey				5.4	-- 0.7								AV = 3.3 m3 (H = 1.1 KA) (L = 1.1 S2)	Chestnut Ridge, ORNL	(Co -) (Lab 18)	Seeley and Kolmers, 1984
																	(O M - U-Sr-Co-Eu-Th-Ic-I)	Seeley and Kolmers, 1984
																	BS-5 mg Co/L = conc Report has 100s of Kds	Seeley and Kolmers, 1984
Co	134	Heavy clay		15	85			8.2	(7 5-- 7)	26--2					4700--300	Lovisa Sav., Finland (0 (U - 9 11 m)	(Tab 1=soil prop - pH)	Nikula, 1982
Co	134	Heavy clay		10	81			8.2	(7 4-- 2)						4400- 100	Lovisa Sav., Finland (0 73 - 9 80 m)	(Tab 0. Sr Kd - pH) (pH = Tab 9 - [ ] = pH column)	Nikula, 1982
Co	134	Heavy clay		11	89			8.4	(7 4-- 1)	23--2					1400--30	Otkiluoto Sav., Finland (7 09 - 7 15 m)	(O M = Sr,Co,Mn,Zn,Cs) Tab 7=CEC Tab 2=soil prop	Nikula, 1982
Co	134	Heavy clay		12	88			8.8	(7 4-- 1)	5 1--2					600--40	Otkiluoto Sav., Finland (7 40 - 7 56 m)	Fin=ph =>in English summary Fig 11 = Cs Kd vs Of	Nikula, 1982
Co	134	Heavy clay		12	88			8.0	(7 5-- 2)	23--1					18000--3000	Salo Sav., Finland (6 78 - 6 85 m)	Fig 2 = Cs Kd vs NaCl Fig 5 = Cs Kd vs Cs conc	Nikula, 1982
Co	134	Silty clay loam		62	38			7.0	(7 4-- 2)	17--5					6000--400	Jomas Sav., Finland (7 26 - 7 31 m)	Fig 7 = Cs Kd vs pH Fig 13 = Cs Kd vs Of	Nikula, 1982
Co	134	Loamy sand	79	21	79			6.4	(7 0-- 1)	2 8--2					560--70	Lovisa moraen., Finland (4 m)	(pH in [ ] = Kd function of pH from Tab 10)	Nikula, 1982
Co	164	Sandy loam	65	35	65			6.4	(7 2-- 2)	3 2--2					2100--100	Otkiluoto moraen., Finland (1 5 m)		Nikula, 1982
Co	134	Loamy sand	83	27	13			6.9	(7 5-- 2)	2 3-- 3					700--10	Jouko moraen., Finland (5 5 - 6 0 m)		Nikula, 1982
Co	134	Sandy loam	66	34	66			6.7	(6 9-- 1)	2 3-- 3					560--60	Partala moraen., Finland (2 2 -2 5 m)		Nikula, 1982
Co	134	Loam	41	37	22			4.7	(8 1-- 2)	18--5					3600--800	Rahola Kallioesav., Finland (44 m)		Nikula, 1982
Co	134	Sandy loam	57	29	14			4.9	(8 5-- 1)	40--4					970- 90	Heinaaara Kalliosav., Finland (24 m)		Nikula, 1982
Co	134														12000--300	Otkiluoden sediment	Tab 14 = Sr - Cs Kd = NaCl (M) Otkiluoden sediment	Nikula, 1982
Co	134											Otm NaCl			980--30	Otkiluoden sediment		Nikula, 1982
Co	134											DBM NaCl			380--10	Otkiluoden sediment		Nikula, 1982
Co	134											5 M NaCl			140--10	Otkiluoden sediment		Nikula, 1982
Co	134											1 0 M NaCl			3600--300	Otkiluoden sediment		Nikula, 1982
Co	134											0 1M NaCl			2800--200	Lovisaan sediment	Tab 15 = Sr - Cs Kd = NaCl (M) Lovisaan sediment	Nikula, 1982
Co	134											05M NaCl				Lovisaan sediment		Nikula, 1982

continued...

TABLE B-9 (continued)

NUC	ISO	Soil type	% SAND	% SILT	% CLAY	% OMC	% CaCO3	pH SAT PASTE	Eh (mV)	CEC meq/ 100g	% EXCH IONS UNIDES	COMP CATION	% COMP CATION	NUCLIDE CONCENTRATION	Kd (mL/g)	Soil LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Cs	132											1 M NaCl			7100--700	Lovrisan sediment		Nikula, 1987
Cs	134											5 M Na Cl			1000--100	Lovrisan sediment		Nikula, 1987
Cs	134													3.0x10E-7M Cs	70000--6000	Salen savessa		Nikula, 1987
Cs	134													3.1x10E-7M Cs	7300U--6000	Salen savessa	Tab 17 : Cs conc . Kd = Salen savessa	Nikula, 1987
Cs	134													4.0x10E-7M Cs	30000--2000	Salen savessa	Tab 19 - Cs Kd = pH = Lovrisan savessa	Nikula, 1987
Cs	134													1.2x10E-6M Cs	18000--3000	Salen savessa		Nikula, 1987
Cs	134													1.0x10E-5M Cs	1300--100	Salen savessa		Nikula, 1987
Cs	134													1.0x10E-4M Cs	270--10	Salen savessa		Nikula, 1987
Cs	134													1.0x10E-3M Cs	74--2	Salen savessa		Nikula, 1987
Cs	134						(3.6)								800--330	Lovrisan savessa, Finland		Nikula, 1987
Cs	134						(4.7)								810--40	Lovrisan savessa, Finland	(Tab 19 = Cs Kd = pH = Lovrisan savesta)	Nikula, 1987
Cs	134						(5.5)								890--10	Lovrisan savessa, Finland	(pH in ( ) = Kd function of pH from Tab 19)	Nikula, 1987
Cs	134						(6.4)								980--130	Lovrisan savessa, Finland		Nikula, 1987
Cs	134						(7.1)								1040--190	Lovrisan savessa, Finland		Nikula, 1987
Cs	134						(7.2)								1120--40	Lovrisan savessa, Finland		Nikula, 1987
Cs	134						(8.1)								1280--40	Lovrisan savessa, Finland		Nikula, 1987
Cs	134						(8.9)								1330--90	Lovrisan savessa, Finland		Nikula, 1987
Cs	137	Loam	45.0	35.0	20.0	3.0		7.2 (in H2O)		30.0					13310	Fucelia (F), Po Valley, Italy		Nikula, 1987
Cs	137	Sandy loam	70.0	20.0	10.0	2.5		6.0 (in H2O)		7.2					1405	Vercelli (V), Po Valley, Italy	Conc =290 Bq/mC-/mg - uses conc for other nuclides	Carini et al., 1985
Cs	137	Silty loam	74.2	14.0	11.8	1.94		7.8 (in H2O)		6.3					2071	Carmagnola (C), Po Valley, Italy	(D.W = Cs,Mn,Fe,I) Tab 1 : worst prop	Carini et al., 1985
Cs	137	Clay loam	36.8	27.5	35.7	2.8		7.6 (in H2O)		22.1					10914	Villanova (VC), Po Valley, Italy	Tab 3 = Kd = 72 hours	Carini et al., 1985
Cs	137	Sandy loam	51.4	34.2	32.4	3.5		7.7 (in H2O)		39.3					22752	Sarmola (S), Po Valley, Italy		Carini et al., 1985
Cs	137	Sandy loam	56.1	27.5	16.4	1.34		7.9 (in H2O)		15.0					5031	Montanelli (M), Po Valley, Italy		Carini et al., 1985
Cs	137	Clay loam	64.0	23.5	12.5	1.21		6.8 (in H2O)		4.4					401.3	5 Po Valley, Italy		Carini et al., 1985
Cs	137	Clay loam	32.5	30.0	37.5	4.04		7.6 (in H2O)		35.4					1389	15 Po Valley, Italy		Carini et al., 1985
Cs	137	Clay loam	39.5	27.0	33.5	2.49		7.9 (in H2O)		24.1					14116	17 Po Valley, Italy		Carini et al., 1985
Cs	137	Clay loam	31.5	29.0	39.5	2.91		7.7 (in H2O)		33.5					16212	19 Po Valley, Italy		Carini et al., 1985
Cs	137	Clay loam	37.0	32.0	31.0	1.64		6.4 (in H2O)		24.5					1427	41 Po Valley, Italy		Carini et al., 1985
Cs	137	Sand	88.5	6.2	5.3	1.54		7.5 (in H2O)		7.1					789.7	55 Po Valley, Italy		Carini et al., 1985
Cs	137	Loam	31.0	44.0	25.0	2.68		7.9 (in H2O)		22.6					7206	61 Po Valley, Italy		Carini et al., 1985
Cs	137	Sandy clay loam	50.5	19.5	30.0	4.09		6.4 (in H2O)		26.8					2788	65 Po Valley, Italy		Carini et al., 1985
Cs	137	Sandy loam	59.0	22.0	19.0	1.67		8.0 (in H2O)		18.5					1736	73 Po Valley, Italy		Carini et al., 1985
Cs	137	Loam	42.5	43.5	14.0	1.67		7.9 (in H2O)		23.2					81787	77 Po Valley, Italy		Carini et al., 1985
Cs	137	Clay	24.5	24.5	51.0	3.85		7.1 (in H2O)		34.9					8538	81 Po Valley, Italy		Carini et al., 1985
Cs	137	Sandy subsoil						7.5 (in H2O)		35.1					11521	93 Po Valley, Italy		Carini et al., 1985
														10E-4M HNO3	25	Carleton site, PNC	(D.W = Sr,Ce,Ru)(Fig 3&4:Kd vs HNO3-NaNO3 pol) (Kd vals from Fig 3 & R210/4) S formulas (Fig 5 = adsorp + desorp kdat MAFIS code	Schwarzer et al., 1982
Cs	137	Sand								(11.3)					500	A	(Tab 2= soil type) (Tab 5= CEC - Kd) (== JAP)	Inoue & Morisawa, 1976
Cs	137	Silt-clay								(241.7)					2000	B	CEC = ( ) - meq/g % (Tab. 2 /g	Inoue & Morisawa, 1976
Cs	137	Gravel-sand								(55.6)					2500	C	(D.W = Sr,Cs,Mn Zn,Ag,Fe,Mo)	Inoue & Morisawa, 1976
Cs	137	Silt-clay								(66.5)					3000	D		Inoue & Morisawa, 1976
Cs	137	Silt-sand								(167.0)					5000	E		Inoue & Morisawa, 1976
Cs	137	Gravel								(47.8)					1700	F		Inoue & Morisawa, 1976
Cs	137	Silt clay								(28.4)					1000	G		Inoue & Morisawa, 1976
Cs	137	Silt-clay								(117.0)					1300	H		Inoue & Morisawa, 1976
Cs	137	Silt-clay								(140.5)					1000	I		Inoue & Morisawa, 1976
Cs	137	Fine sand								(246.0)					7000	J		Inoue & Morisawa, 1976
Cs	137	Silt								(60.3)					700	K		Inoue & Morisawa, 1976
Cs	137	Sand								(149.0)					8000	L		Inoue & Morisawa, 1976
Cs	137	Gravel								(24.3)					1500	M		Inoue & Morisawa, 1976
Cs	137	Fine sand								(27.1)					300	N		Inoue & Morisawa, 1976
Cs	137	Fine sand								(122.8)					3000	O		Inoue & Morisawa, 1976
Cs	137	Silt-clay								(86.6)					1500	P		Inoue & Morisawa, 1976
Cs		Smectite clay						7.5 7.8		(200.1)					2000	Q		Inoue & Morisawa, 1976
														3x10E-7uMol/L	1100--24	60 degrees C, Core LL44-PPC-3 Pacific Ocean, depth= 5401m	(Batch) (Tab 1 - kd vs temp degrees C)	Hanna, 1980

continued...

TABLE B-9 (concluded)

NUC	ISO	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	pH SAT. PASTE	EH (+)	CEC meq/ 100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	NUCLIDE CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Co		Smectite clay						7.5 - 7.8						3x10E-7xMol/L	343- 10	20 degrees C, Core LL44-ETC-2 Pacific Ocean, depths 5021m		Kanna, 1980
Co		Ea-Ba						5.7		81.2meq/kg					- (0.4)--2.77)	0-6 cm Gleyed Dystric Brunisol	Smectite subsoiled clay	Sheppard, 1989
Co		Ap						5.1		7.9meq/kg					173.2--2.8 (0.25--1.04)	4-15 cm Gleyed Dystric Brunisol	Para. comm. (0 % :), Cr, Tc, U, Th, Pu, Np)	Sheppard, 1989
Co		Bf-Bf(g)						5.2		2.1meq/kg					50.9--0.6 (0.20--1.52)	15-45 cm Gleyed Dystric Brunisol	Kds Leach : no ( ) Kds Ox: ( )	Sheppard, 1989
Co		C-clay						6.2		1.7meq/kg					14.2--1.3 (0.34--1.42)	45 cm Gleyed Dystric Brunisol	soil type, pH, CEC, soil desc from BLG-11 (JEQ(6(3))	Sheppard, 1989
Co		Sand	100	-	-	0.03	41.3	8.3 (CaCl2)	-	1.4	-	see ref			1.10x10E2	Soil #4 (NWRE)		Sheppard, 1989
Co			93	5	2	0.05	40.8	7.8 (CaCl2)	-	1.2	-	see ref			1.37x10E3	Soil #6 (Leamington)		Gilthee et al., 1981a
Co			96	4	0	0.51	0	6.3 (CaCl2)	-	1.1	-	see ref			7.4x10E1	Soil #7 (CRNL) Chalk River Nuclear Lab., Chalk River, Ontario		Gilthee et al., 1981a
Co			55	45	0	0.08	0	5.0 (CaCl2)	-	1.6	-	see ref			1x10E4	Soil #8 (North Bay)		Gilthee et al., 1981a
Co			58	24	17	0.4	0	6.5 (CaCl2)	-	1.0	-	see ref			1x10E3	Soil #10 (NWRE)		Gilthee et al., 1981a
Co			62	31	7	0.38	19.4	7.6 (CaCl2)	-	2.2	-	see ref			1x10E4	Soil #11 (NWRE)		Gilthee et al., 1981a
Co			52	39	9	0.33	43.4	8.0 (CaCl2)	-	0.7	-	see ref			1.5x10E2	Soil #12 (BNPD)- Bruce Nuclear Power Development		Gilthee et al., 1981a
Co			86	7	7	0.3	(1.1	8.0 (CaCl2)	-	0.4	-	see ref			5x10E2	Soil #13 (C.F.B. Borden)		Gilthee et al., 1981a
Co			60	22	18	2.05	7.1	7.8 (CaCl2)	-	21.2	-	see ref			1x10E2	Soil #16 (Alberta)		Gilthee et al., 1981a
Co			87	9	4	0.1	0.29 (CaCl2)	-	5	-	see ref			1.5x10E4--370	Sediment B (Solution I)		Gilthee et al., 1981a
Co			-	-	-	-	-	-	-	-	-	SOIL			18	Iron and silty sands		Serne et al., 1978
Co		(10 074mm)	92	6	-	-	-	-	-	-	-	-			9.5x10E2	Composite soil		Tyuchonrcz, 1981
Co		river sand			-	-	-	7.8	-	-	-	90%NaCl sol			10	River sand		Schwartz, 1972
Co		subsoil sand			-	-	2	9.6	-	5	-	4 mol/l NaCl			16.4	Hanford subsoil		Hamatsu & Yanbert, 1977
Co		Climpt-Tolite			-	-	-	-	-	-	-	-			4.7x10E3	Climpt-Tolite (Idaho)		Rhodes, 1957
Co		Burbank soil			-	-	-	-	-	-	-	groundwater			9x10E3	Burbank soil		Wildung & Rhodes, 1963
Co		Burbank soil			-	-	-	-	-	-	-	3 mol/L NaNO			4.66x10E2	Burbank soil		Hajek & Amos, 1968
Co		Burbank soil			-	-	-	-	-	-	-	0.5mol/L NaCl			1.09x10E3	Burbank soil		Hajek & Amos, 1968
Co			84	13	3	0.16	2.8	-	-	5.1	0.83	25mol/L CaCl2			5.21x10E3	Burbank soil		Hajek & Amos, 1968
Co												0.2mol/l NaCl			2.40x10E3	Burbank sand (average profile)		Hajek & Amos, 1968
Co			63	32	5	0.21	1.36	-	-	5.3	1.02	see ref						
Co												0.2mol/l NaCl see ref			3.51x10E3	Ephrata sand (average profile)		Rowlson, 1973
Co		sand			-	-	-	7.0	-	-	-	-			98m	Four mile creek		Rowlson, 1973
Co		sand			-	-	-	7.0	-	-	-	-			84m	Fen Branch	*also data for sorption vs. pH, see reference	Zelazny et al., 1978
Co		sand			-	-	-	7.0	-	-	-	-			40m	Par Pond		Zelazny et al., 1978
Co		Silt	36	35	29	0.43	31.6	8.1 (CaCl2)	-	8.4	-	see ref			1.78x10E4	Soil #1 (NWRE)		Zelazny et al., 1978
Co			24	35	31	0.4	24.1	8.1 (CaCl2)	-	8.6	-	see ref			3.84x10E4	Soil #3 (NWRE)		Gilthee et al., 1981a
Co			28	41	31	1.27	21.2	7.7 (CaCl2)	-	5.0	-	see ref			1.81x10E3	Soil #5 (Leamington)		Gilthee et al., 1981a
Co			12	55	33	0.35	0	6.7 (CaCl2)	-	10.2	-	see ref			2x10E4	Soil #9 (North Bay)		Gilthee et al., 1981a
Co			34	34	32	0.95	5.1	7.7 (CaCl2)	-	12.7	-	see ref			1x10E4	Soil #14 (Alberta)		Gilthee et al., 1981a
Co			45	44	11	0.14	1.4	6.83 (CaCl2)	-	12	-	see ref			3.35x10E4--474	Sediment A (Solution I)		Serne et al., 1978
Co		alluvial silt loam (Ap)						-	-	-	-	-			3x10E4	Cowlitz silt loam, Ap		Rogowski & Tamura, 1965
Co		medium loam						-	-	-	-	0.1mol/L NaNO3			6.5x10E2	Podzolic soil		Aleksakhov, 1965
Co			31	69	0	-	-	-	-	2.6	-	-			5.37x10E3	alluvial soil (Cedarocks)		Rancon, 1972
Co			100	82	0	-	-	-	-	2.7	-	-			9.55x10E3	alluvial soil (Cedarocks)		Rancon, 1972
Co			78	66	16	-	-	-	-	6.3	-	-			1.04x10E4	Windermere sand (Cedarocks)		Rancon, 1972
Co			45	45	15	-	-	-	-	1.8	-	-			1.14x10E4	Windermere sand (Cedarocks)		Rancon, 1972
Co			34	52	14	-	-	-	-	4.9	-	-			7.3x10E3	Windermere sand (Cedarocks)		Rancon, 1972
Co			45	47	8	-	-	-	-	1.5	-	-			6.2x10E3	Windermere sand (Cedarocks)		Rancon, 1972
Co			7	69	1	-	-	-	-	4.7	-	-			2.07x10E4	sandy-clay soil (Durrance R.)		Rancon, 1972
Co			18	71	11	-	-	-	-	3.5	-	-			1.52x10E4	sandy-clay soil (Durrance R.)		Rancon, 1972
Co			3	86	1	-	-	-	-	5.9	-	-			2.0x10E4	sandy-clay soil (Durrance R.)		Rancon, 1972
Co		silty clay, OM 3			3	-	-	-	-	-	-	-			3.0x10E3	silty clay (Idaho)		Rancon, 1972
Co		silty clay, PC 2			2	-	-	-	-	-	-	-			2.7x10E3	silty clay (Idaho)		Wildung & Rhodes, 1963
Co		Clay	44	50	6	0.73	3.8	-	-	11	1.21	0.2mol/L NaCl			3.48x10E3	Naterville silt (avg profile)		Rowlson, 1973
Co		10% < 0.02 mm	31	34	35	0.91	5.7	7.8 (CaCl2)	-	31.5	-	see ref			1.0x10E4	Soil #15 (Alberta)		Gilthee et al., 1981a
Co		clay						7.8	-	35	-	-			3.35x10E4	very fine suspended sediments (Durrance River)		Rancon, 1972
Co		Savannah River sed (<100 um)						-	-	-	-	90% NaCl sol			2x10E2	clay		Hamatsu & Yanbert, 1977
Co		Savannah River sed (<100 um)						7.0				NaCl			65 (m=8)	Savannah River sediments		Eberaec et al., 1977
															130m	Savannah River clay	* Also data for sorption versus pH, see ref	Zelazny et al., 1978

TABLE B-10

CHROMIUM K_d VALUES

Ref	ISA	Soil type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	SAT PASTE pH	Eh (v)	CEC meq/100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	NUCLIDE CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
C+		loam								600meq/kg					1000	Orthic Black Chernozem	(Tab 1) ((CEC - meq kg 1)	Sheppard and Sheppard, 1985
C+		sand								16meq/kg					100	Orthic Regosol		Sheppard and Sheppard, 1985
C+		organic - LFH Ah						5.7		81.7meq/kg					767.9 (6.0)	LFH-Ah Ped on Clayed Dystric Brunisol	Kd column - no ( ) ; leachate	Sheppard et al., 1987
C+		sand - Ae						5.1		2.9meq/kg					91.1 (35.0)	Ae 4-14 cm Clayed Dystric Brunisol	Kd column - ( ) ; groundwater	Sheppard et al., 1987
C+		sand - Bf_1-$Bf_{2(g)}$						5.2		2.1meq/kg					134.5 (160.2)	Bf_1-$Bf_{2(g)}$ 15-45 cm Clayed Dystric Brunisol	soil type, pH, CEC & soil description	Sheppard et al., 1987
C+	C	sand - C-$C_{(g)}$						6.2		1.7meq/kg					53.1 (8.9)	C-$C_{(g)}$ 145 cm Clayed Dystric Brunisol		Sheppard et al., 1987
C+	F	sand	95.7	3.3	1.0	0.1		6.45 (paste)			0.4 meq/L				59 (8)	Telfordite alluvium, Colorado	Cr (6) diluvial aquifer	Sheppard et al., 1987
C+	G	sand	95.7	3.3	1.0	0.1		6.45 (paste)			1409 meq/L				1.7 (8)	Telfordite alluvium, Colorado	8 figures + 7 calculate Kd's	Staffeneck and Grove, 1985
C+	G	sand	95.7	3.3	1.0	0.1		6.45 (paste)			2.95 meq/kg				2.3 (C)	Telfordite alluvium, Colorado	batch & two column exp's	Staffeneck and Grove, 1985
																	(S Q m + 1g K_d 1 leaching 450 C)	
																	(% S/S/C - calculated from grain size distrib + Tab 1)	
																	(C W pH + 6 B + Tab 3)	
																	B + Batch	
																	C + column	
																	(C+CH+ conc)	
C+																		
C+															8.4	Bayamon series	(C+)	
															11C.4	Toa series	Ramirez et al., 1995	
																	Ramirez et al., 1995	
																	0084034 t/g	
																	1104353 t/g	
																	(F-g 1 + Lan-Gus-Amundson linear isotherm)	
C+		LFH-Ah						5.7		81.7meq/kg					7517.2+-1.7(-)	A-4 cm Clayed Dystric Brunisol	(F-g 2 + Langmuir monolinear isotherm)	
C+		Ae						5.1		2.9meq/kg					814.4+-0.0(-)	4-14 cm Clayed Dystric Brunisol	Ferb Comm (Dis Mg, I, Cs, Ic, U, Th, Mo)	Sheppard 1987
C+		Bf_1-$Bf_{1(g)}$						5.2		2.1meq/kg					426.2+-0.4(-)	15-45 cm Clayed Dystric Brunisol	Kd= reach + no ( ) KDs Dis ( )	Sheppard, 1989
C+		C-$C_{(g)}$						6.2		1.7meq/kg					685.1+-0.9(-)	45 Clayed Dystric Brunisol	Soil type, pH, CEC, soil desc from BLG-3Y (ICD(3))	Sheppard, 1989
C+		Hgf/podzolic fine sand				14 Kg/Kg		8.20		1.13meq/g					1.720 L/g	Pompano Beach, Florida		Sheppard, 1989
C+		Plantation Muck - bottom layer				22 Kg/Kg		7.30		1.58meq/g					0.343 L/g	Pompano Beach, Florida	Tab 1+ columns on soil Tab 2+ soil charact	Wong et al., 1983
C+		Plantation Muck - middle layer				670 Tg/Kg		7.20		4.0meq/g					0.865 L/g	Pompano Beach, Florida	Tab 3+ heavy metals in soil Tab 4+ linear Kd(L/g)	Wong et al., 1983
C+		Plantation Muck - top layer				705.2g/kg		7.10		4.53meq/g					2.905 L/g	Pompano Beach, Florida	Tab 5+ Langmuir coeff (Dis Cu, Zn, Fe, Mn, Ni, Cd, Co)	Wong et al., 1983
C+		clayey				0.24		5.1		3.72meq-/Kg	10.2				Cec -		Fig 1&2+ isotherm Cr, Ni	Wong et al., 1983
C+		fine silty				0.46		6.4		8.31meq-/Kg	1.14				approx 3.6	Olivier	Cecile Institutic, Chernoz Tyrec Mandadelta	
C+		mixed				0.02		5.4		1.20meq-/Kg	2.20				approx 2.2	Windsor	Olivierre mixed, Chernoz Amoic Fragiudolfs	Selim & Amacher
																	Windsore mixed Tyrec Udipsamments	Selim & Amacher
																	(CEC+ meq[-]/kg Fe2O3s & Kd calculated from Fig 6	
																	7 Tabs , 11 Figs	

TABLE B-11

COBALT K_d VALUES

ELE	ATO	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	SAT PASTE	pH	EH (v)	CEC meq/ 100g	% FeMn OXIDES	COMP CATION	% COMP CATION	MEDIUM CONCENTRATION	Kd (ml/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Co	57	loam sand					1 1	7 0								<100->100 fog	Clay soil	(Fig 2) (Co57)	Bunzl & Schimack, 1980
Co	57	loam peat					0 5	6 8								>100 fog	7 Senric Histosol, strongly humified		Bunzl & Schimack, 1980
Co	57	sandy loam						5 7								<100->100 fog	3 Cambisol, brown soil from loess		Bunzl & Schimack, 1980
Co	57	sandy loam						7 1								100 fog	4 Cambisol		Bunzl & Schimack, 1980
Co	57	sandy loam						4 6								100 fog	5 Aerosol, parabrown soil, Ah-horizon		Bunzl & Schimack, 1980
Co	57	loamy sand						4 6								<100 fog	6 Aerosol, parabrown soil, B-horizon		Bunzl & Schimack, 1980
Co	57	loamy sand						4 6								1000-10000 fog	8 - Bentonite, Sud-Chemie AG Moorchen		Bunzl & Schimack, 1980
Co	57	clay						8 0								100 fog	P1 - Sohmp peat (high moor), Steinhuder Meer, Hannover		Bunzl & Schimack, 1980
Co	57	fibric organic						6 0			2 1 meq/g		0 1N CaCl2			1000 fog	P2 - Sohmp peat (high moor), Moosgrabe-F, Bavaria		Bunzl & Schimack, 1980
Co	57	fibric organic						7 0			0 65 meq/g		0 1N CaCl2			1000-10000 fog	T2 - Sohmp peat (high moor), Moosgrabe-F, Bavaria		Bunzl & Schimack, 1980
Co	57	Organic - peat						4 0								3 9±1000-- 75	(6-8cm)(1 day) Lofgrens Bog, NY (higher org cont than PA)	(Co-57) (Tab 5d (Rd)) (Tab 8- comparison Sibley '82)	Schell et al., 1985
Co	57	Organic - peat						4 0								3 7±1000-- 73	(6-8cm)(4 days) Lofgrens Bog, NY (higher org cont than PA)		Schell et al., 1985
Co	57	Organic - peat						4 0								3 4±1000-- 66	(6-8cm)(8 days) Lofgrens Bog, NY (higher org cont than PA)		Schell et al., 1985
Co	57	Organic - peat						4 0									(6-8cm)(11 days) Lofgrens Bog, NY (higher org cont than PA)		Schell et al., 1985
Co	57	Organic - peat						4 0								3 8±1000-- 77	(6-8cm)(15 days) Lofgrens Bog, NY (higher org cont than PA)		Schell et al., 1985
Co	57	Organic - peat						4 0								2 9±1000-- 59	(6-8cm)(30 days) Lofgrens Bog, NY (higher org cont than PA)		Schell et al., 1985
Co	57	Organic - peat						4 0								6 4±1000 -1 3	(20-21cm)(1 day) Lofgrens Bog, NY (higher org cont than PA)		Schell et al., 1985
Co	57	Organic - peat						4 0								6 4±1000--1 3	(20-21cm)(4 days) Lofgrens Bog, NY (higher org cont than PA)		Schell et al., 1985
Co	57	Organic - peat						4 0									(20-21cm)(8 days) Lofgrens Bog, NY (higher org cont than PA)		Schell et al., 1985
Co	57	Organic - peat						4 0								7 2±1000--1 4	(20-21cm)(11 days) Lofgrens Bog, NY (higher org cont than PA)		Schell et al., 1985
Co	57	Organic - peat						4 0								5 1±1000--1 0	(20-21cm)(15 days) Lofgrens Bog, NY (higher org cont than PA)		Schell et al., 1985
Co	57	Organic - peat						4 0								4 5±1000-- 89	(20-21cm)(30 days) Lofgrens Bog, NY (higher org cont than PA)		Schell et al., 1985
Co	57	Organic - peat						4 0								7%±1000-- 05	(6-8cm)(1 day) Spruce Flats Bog,PA		Schell et al., 1985
Co	57	Organic - peat						4 0								7%±1000-- 08	(6-8cm)(4 days) Spruce Flats Bog,PA		Schell et al., 1985
Co	57	Organic - peat						4 0								10±1000-- 006	(6-8cm)(8 days) Spruce Flats Bog,PA		Schell et al., 1985
Co	57	Organic - peat						4 0								43±1000-- 08	(6-8cm)(15 days) Spruce Flats Bog,PA		Schell et al., 1985
Co	57	Organic - peat						4 0								20±1000-- 04	(6-8cm)(30 days) Spruce Flats Bog,PA		Schell et al., 1985
Co	57	Organic - peat						4 0								25±1000-- 05	(20-21cm)(1 day) Spruce Flats Bog, PA		Schell et al., 1985
Co	57	Organic - peat						4 0								26±1000-- 05	(20-21cm)(4 days) Spruce Flats Bog, PA		Schell et al., 1985
Co	57	Organic - peat						4 0								23±1000-- 05	(20-21cm)(8 days) Spruce Flats Bog, PA		Schell et al., 1985
Co	57	Organic - peat						4 0								18±1000-- 04	(20-21cm)(15 days) Spruce Flats Bog, PA		Schell et al., 1985
Co	57	Organic - peat						4 0								12±1000-- 03	(20-21cm)(30 days) Spruce Flats Bog, PA		Schell et al., 1985
Co		Sand	89	2	9			4 5								4 6	SRP soil) (0-15 ft)		Hoeffner 1985
Co		Sand	72	5	23			5 0								29 0	SRP soil (Blend of 4u-48 ft)		Hoeffner 1985
Co	60	Sand						4 96	(final)						2 5M±10E4 NaCl	26	SRP soil	(Tab 6) (In addition to soil also GROUNDWATER & TRENCHWATER)	Hoeffner, 1985
Co	60	Sand						4 93	(final)						25M±10E4 NaCl	28	SRP soil	Barnwell branchwater Kd = 15 ml/g	Hoeffner, 1985
Co	60	Sand						4 92	(final)						2 5M±10E4 NaNO3	24	SRP soil	Synthetic branchwater + Kd = 1000 ml/g	Hoeffner, 1985
Co	60	Sand						4 93	(final)						25M±10E4 NaNO3	24	SRP soil	Lab Kd = 5-30 for Barnwell sediment	Hoeffner, 1985
Co	60	Sand						4 91	(final)						2 5M±10E4 KCl	21	SRP soil	Omitted Tab 7 = effect of Fe ion on Co	Hoeffner, 1985
Co	60	Sand						4 78	(final)						25M±10E4 KCl	9	SRP soil		Hoeffner, 1985
Co	60	Sand						4 93	(final)						2 5M±10E4 KNO3	22	SRP soil		Hoeffner, 1985
Co	60	Sand						4 93	(final)						25M±10E4 KNO3	11	SRP soil		Hoeffner, 1985
Co	60	Sand						4 76	(final)						No salt	26	SRP soil		Hoeffner, 1985
Co	60	Sand						4 96	(final)						2 5M±10E4 MgCl2	16	SRP soil		Hoeffner, 1985
Co	60	Sand						4 95	(final)						25M±10E4 MgCl2	5	SRP soil		Hoeffner, 1985
Co	60	Sand						4 68	(final)						2 5M±10E4 Mg(NO3)2	17	SRP soil		Hoeffner, 1985
Co	60	Sand						4 93	(final)						25M±10E4 Mg(NO3)2	8	SRP soil		Hoeffner, 1985
Co	60	Sand						4 65	(final)						2 5M±10E4 CaCl2	17	SRP soil		Hoeffner, 1985
Co	60	Sand						4 91	(final)						25M±10E4 CaCl2	4	SRP soil		Hoeffner, 1985
Co	60	Sand						4 66	(final)						2 5M±10E4 MgSO4	48	SRP soil		Hoeffner, 1985
Co	60	Sand						4 59	(final)						25M±10E4 MgSO4	62	SRP soil		Hoeffner, 1985
Co	60	Sand						5 3K	(final)						(HCO3- & OH-)	2-10000	SRP soil	FIG 1 Effect of Cobalt Kd	Hoeffner, 1985
Co	60	Sand						3-7							(H, Ca & Mg)	2-10000	SRP soil	FIG 2 Effect of H, Ca and Mg on Cobalt	Hoeffner, 1985
Co	60	SRP						5-7								2-10000	SRP soil		Hoeffner, 1985
Co	60	SRP						4 4								3 5	SRP=Savannah River Plant - burial ground	Co-60 (Tab 7)	Stone et al., 1988
Co	60	SRP						4 3								10	SRP=Savannah River Plant - burial ground		Stone et al., 1988
Co	60	SRP						4 3								70	SRP=Savannah River Plant - burial ground		Stone et al., 1988
Co	60	SRP						7 2								>10000	SRP=Savannah River Plant - burial ground		Stone et al., 1988

continued...

TABLE B-11 (concluded)

NUC	ITEM	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	SAT PASTE	pH	Eh (mV)	FE(OH)3 (WT%)	% FREE IRON OXIDES	COMP CATION	% OTHER CATION	NUCLIDE CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Co		Sand	90	3	8											2900 (1900)	Healy 1, Nevada	[1=reducing conditions Reality New Harwell], SC , W Valley, NY	Nowlin et al. 1983
Co		Sand	91	2	7											870	Healy 2, Nevada	(about >Kds highest -> alkaline alluvial basin deposits high	Nowlin et al. 1983
Co		Sand	83	2	15											9000	Healy 5, Nevada	-> montmorillonite and zeolites) Table4:Mineral phase char	Nowlin et al. 1983
Co		Clayey Sand	58	6	36											46	Harwell 4, South Carolina	lab 2=reflux=high=texture/surface area + clay mineral comp	Nowlin et al. 1983
Co		Clayey Sand	68	11	21											136	Barnwell 12, South Carolina	Tab 3 = Kd = f(radionuclides	Nowlin et al. 1983
Co		Clayey Sand	73	8	19											24 (130)	Barnwell 14, South Carolina	Fig 6= test diagram (Fig 7= Kd vs sorptive minerals)	Nowlin et al. 1983
Co					13.0				6.9		112					10-1000	Mean of 39 Danish soils	Tab 3= Soil char - Kd correlations Tab 4= Regression coeff	Anderson & Christenson 1988
Co	57		89	17	3		0	3.7 (CaCl2)			125mole-1							Fig 1=Log Kd for Cd=function of pH Tab 2= soil prop.	
Co	--	Red-brown clayey						6.0--1.0								41 (17-80)		Kd column [ ]= Kd range Tab 1=soil properties Tab 2= Kd	Schramke et al. 1987
Co	--															(4V)1 OES		Tab 1R=Kd Report had 10% of Kds PS = Smq Co/l = conc	Seeley & Reimers 1984
Co	--															(N)7 OES		(D N =)1.Sr,Cs,Eu,Th,Tc,I)	Seeley & Reimers 1984
Co	--															(L)7 IC)		Atr Average, Hr High, Lr Low	Seeley & Reimers 1984
Co	58	Heavy clay - 1		15	85			8.2 (7.5-- 9)			26--2					2700--700	Loviisa Sav. Finland (9.04 - 9.11 m)	Co-58	Seeley & Reimers 1984
Co	58	Heavy clay - 2		19	81			8.2 (7.3-- 9)								1800--700	Loviisa Sav. Finland (9.73 - 9.80 m)	(Tab 11 = Co Kd = pH) (D N = Cs,Sr,Mn,Zn,Co)	Nikula, 1982
Co	58	Heavy clay - 3		11	89			8.4 (7.3-- 9)			21--9					950	Olkiluoto Sav. Finland (9.08 - 9.15 m)	In Finnish with English Summary, 13 Figures	Nikula, 1982
Co	58	Heavy clay - 4		12	88			8.2 (7.4-- 9)			9.7--2					410--30	Olkiluoto Sav. Finland (9.49 - 9.56 m)	(pH in Tab 11 = ( ) in pH column) (Fig 11 = Co Kd vs pH)	Nikula, 1982
Co	58	Heavy clay - 5		32	68			8.0 (7.3-- 11			25--1					14000	Sala Sav. Finland (6.78 - 6.35 m)		Nikula, 1982
Co	58	Silty clay loam - A		62	38			7.0 (7.3-- 7			17--4					4500--500	Jamsa Sav. Finland (7.24 - 7.32 m)		Nikula, 1982
Co	58	Loamy sand - 2	79	21				6.4 (7.5-- 11			2.8--.2					160--10	Loviisa moreen. Finland (4 m)		Nikula, 1982
Co	58	Sandy loam - B	65	35				6.4 (7.4-- 11			3.1--.2					180--20	Olkiluoto moreen. Finland (1.5 m)		Nikula, 1982
Co	58	Loamy sand - 9	73	27				8.0 (8.0-- 11			2.1--.3					400--30	Jamsa moreen. Finland (3.5 - 4.5 m)		Nikula, 1982
Co	58	Sandy loam - 17	66	34				6.9 (6.8-- 11			2.2--.3					880	Parkala moreen. Finland (2.2 - 2.5 m)		Nikula, 1982
Co	--	Loam - 11	41	32	27			7.0 (6.7-- 11			15--.5					9700--700	Hakala Kalliosav. Finland (44 m)		Nikula, 1982
Co	60	Sandy loam - 17	57	29	14			8.0 (8.3-- 7)			40--4					2900--400	Maissaare kalliosav. Finland (24 m)		Nikula, 1982
Co	60	Sand	91.7	7	1.8											07--0.01	B - Robert sand		Nikula, 1982
Co	60	Sand	91.7	7	1.8											09--0.02	B - Robert Sand	(Co-60E)1A)(Tab 5=Kd;column - batch) Kd not in [ ] = colum	Jones et al. 1980
Co	60	Loamy-sand	81.2	15	3.8											10	A - From Emerald Formation	lmo Hanford sediments As from Emerald geologic formation	Jones et al. 1980
																		B=from surface, Rupert sand (typical correspondence)	Jones et al. 1980
Co	58	Loam	45.0	35.0	20.0	3.0		7.7 (in H20)			30.9					2495	Faenza (F), Po Valley, Italy	(D N = Tc,I,S--3H)	
Co	58	Sandy loam	70.0	20.0	10.0	2.5		6.0 (in H20)			7.2					232.2	Ravenna (R), Po Valley, Italy	(Conc 329.33 uCi/ml - same conc for D N)	Carini et al. 1985
Co	58	Sandy Loam	74.2	14.0	11.8	1.04		7.8 (in H20)			6.3					956.2	Carpetano (C), Po Valley, Italy	(D N = Cs,Mn Fe,I)	Carini et al. 1985
Co	58	Clay loam	36.8	27.5	36.2	2.8		7.8 (in H20)			32.3					3728	Vallemaggi (V), Po Valley, Italy	Tab 1= soil properties	Carini et al. 1985
Co	58	Clay loam	31.4	36.2	32.4	3.5		7.7 (in H20)			38.3					3859	Sermella (S), Po Valley, Italy	Tab 3= Kd = f(hours	Carini et al. 1985
Co	58	Sandy loam	58.1	27.5	16.4	1.34		7.9 (in H20)			15.0					4313	Montecatini (M), Po Valley, Italy		Carini et al. 1985
Co	58	Sandy loam	64.0	23.5	12.5	1.21		6.8 (in H20)			4.4					1047	5 Po Valley, Italy		Carini et al. 1985
Co	58	Clay loam	32.5	30.0	37.5	4.08		7.6 (in H20)			35.4					1617	15 Po Valley, Italy		Carini et al. 1985
Co	58	Clay loam	29.5	37.0	33.5	2.54		7.8 (in H20)			26.1					3204	17 Po Valley, Italy		Carini et al. 1985
Co	58	Clay loam	31.5	29.0	39.5	2.91		7.7 (in H20)			33.5					5843	19 Po Valley, Italy		Carini et al. 1985
Co	58	Clay loam	37.0	32.0	31.0	1.94		6.4 (in H20)			24.5					2557	41 Po Valley, Italy		Carini et al. 1985
Co	58	Sand	88.5	6.7	5.3	1.54		7.5 (in H20)			7.1					547.0	55 Po Valley, Italy		Carini et al. 1985
Co	58	Loam	31.0	44.0	25.0	2.68		7.9 (in H20)			29.6					2291	83 Po Valley, Italy		Carini et al. 1985
Co	58	Sandy clay loam	50.5	19.5	30.0	4.08		6.4 (in H20)			26.9					980.3	65 Po Valley, Italy		Carini et al. 1985
Co	58	Sandy loam	59.0	22.0	19.0	1.67		6.0 (in H20)			18.5					701.3	73 Po Valley, Italy		Carini et al. 1985
Co	58	Loam	42.5	43.5	14.0	1.67		7.8 (in H20)			28.7					2590	77 Po Valley, Italy		Carini et al. 1985
Co	58	Loam	43.0	27.5	29.5	6.3		7.1 (in H20)			34.9					1373	81 Po Valley, Italy		Carini et al. 1985
Co	58	Clay	24.5	24.5	51.0	3.85		7.5 (in H20)			35.1					4610	93 Po Valley, Italy		Carini et al. 1985
Co	60	Sand									(31.3)					100	A		
Co	60	Silt clay									(241.7)					150	B	(Tab 2= soil type) (Tab 5= CEC + Kd) (in JAP)	Inoue & Morisawa, 1976
Co	60	Silt clay									(55.6)					250	C	CEC= [ ] = meq/g	Inoue & Morisawa, 1976
Co	60	Gravel-sand									(69.5)					400	D	(D N = Co,Mn,Zn,Ag,Fe,Mo)	Inoue & Morisawa, 1976
Co	60	Silt-clay									(167.9)					350	E	9 Tab 3 Fig	Inoue & Morisawa, 1976
Co	60	Silt-sand									(47.8)					250	F		Inoue & Morisawa, 1976
Co	60	Gravel									(28.9)					200	G		Inoue & Morisawa, 1976
Co	60	Silt-clay									(117.6)					400	H		Inoue & Morisawa, 1976
Co	60	Silt-clay									(140.5)					20	I		Inoue & Morisawa, 1976
Co	60	Silt-clay									(246.0)					150	J		Inoue & Morisawa, 1976
Co	60	Fine sand									(69.3)					10	K		Inoue & Morisawa, 1976
Co	60	Silt									(143.0)					100	L		Inoue & Morisawa, 1976
Co	60	Sand									(29.3)					200	M		Inoue & Morisawa, 1976
Co	60	Gravel									(27.1)					180	N		Inoue & Morisawa, 1976
Co	60	Fine sand									(122.8)					400	O		Inoue & Morisawa, 1976
Co	60	Silt-clay									(38.6)					100	P		Inoue & Morisawa, 1976
Co	60	Sand									(20.1)					80	Q		Inoue & Morisawa, 1976
Co	60	Sandy						8.0								4500 (-)	Co Hanford site	(Co -60 and Co-60E)1A)(Tab 1: Batch - col : Kd) (D N =3H)	Jones et al. 1983
Co	60	Sandy						8.0								1.0 (0.1)	Co/E)1A - Hanford site	F) - = Kd column Col method Batch= 7 days	Jones et al. 1983
Co	60																	Fig 1= Co vs col depth Fig 2 Co-60E)1A vs 3H mobility	
																		Fig 3= Co-60E)1A vs 3 soils	

TABLE B-12

COPPER K_d VALUES

MLC	ISE	SOIL type	% SAND	% SILT	% CLAY	% OMC	% CaCO3	SAT PASTE	pH (-)	CEC meq/ 100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	PESTICIDE CONCENTRATION	Kd (ml/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Cu																A1		Zabowski and Zasoski, 1987
Cu																A1		Zabowski and Zasoski, 1987
Cu																B2		Zabowski and Zasoski, 1987
Cu																B2		Zabowski and Zasoski, 1987
Cu																C		Zabowski and Zasoski, 1987
Cu																C		Zabowski and Zasoski, 1987
Cu																C		Zabowski and Zasoski, 1987
Cu																C		Zabowski and Zasoski, 1987
Cu																C		Zabowski and Zasoski, 1987
Cu		Hollandale fine sand				14 Kg/Kg		8 20		1 13meq/g					0 206 L/g	Pomona Beach, Florida	Tab 1 = cations in soil Tab 2 = soil charact.	Wong et al., 1983
Cu		Plantation Muck - bottom layer				27 Kg/Kg		7 20		1 50meq/g					0 766 L/g	Pomona Beach, Florida	Tab 3 = heavy metals in soil Tab 4 = Freund Kd (L/g)	Wong et al., 1983
Cu		Plantation Muck - middle layer				670 Kg/Kg		7 20		4 00meq/g					0 076 L/g	Pomona Beach, Florida	Tab 5 = Langmuir coeff Fig 1 & 2 = isotherms = Cr, Ni,	Wong et al., 1983
Cu		Plantation Muck - top layer				705 2g/Kg		7 10		4 53meq/g					0 748 L/g	Pomona Beach, Florida	(O M = Zn, Fe, Mn, Mn, Cd, Cr, Cu)	Wong et al., 1983

TABLE B-13

CURIUM K_d VALUES

NUC	ISO	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	pH SAT PASTE	EH (v)	CEC meq/ 100g	% FREE IRON OXIDES	CLAY MINERALOGY	% FINE FRACTION	NUCLIDE CONCENTRATION	Kd (ml/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Cm	244	silty loam	19	56	25	3.9	5.0	6.41		20	1.79		2.96		95350	Chehalis silt loam series	0.4 mm fine material, <2 mm	Routson et al., 1981
Cm	244	silty loam						6.56							13840		Cores: Carbon - Na4P2O7 extract	Routson et al., 1981
Cm	244	sandy loam	55	33	12	2.4	5.3	6.30		15	1.55		0.06		9503	Malbin series	Wallace et al., 1976 soil properties	Routson et al., 1981
Cm	244	sandy loam						5.71							4000		Routson, 1981	Routson et al., 1981
Cm	244	sandy loam	64	33	3	4.2	5.0	4.58		14	1.52		0.04		1374	Lymer series	(Tab 1 = Fig. (Extract) chem. prop	Routson et al., 1981
Cm	244	sandy loam						6.12							196		(Tab 2 purified conc.)	Routson et al., 1981
Cm	244	clay loam	29	39	32	0.6	7.8	7.10		30	1.20		0.04		36620	Haploxeralfic soil		Routson et al., 1981
Cm	244	clay loam						8.04							41900	Calcareous	17 % CaCO3	Routson et al., 1981
Cm	244	sandy loam	70	28	2	8.4	6.0	6.71		15	4.29		0.10		30920	Aiken series		Routson et al., 1981
Cm	244	sandy loam						6.77							14070			Routson et al., 1981
Cm	244	silt loam	27	58	15	7.5	6.7	6.12		25	2.41		0.08		21180	Yolo series		Routson et al., 1981
Cm	244	silt loam						6.98							17090			Routson et al., 1981
Cm	244	muck	70	30	0	40.8	7.2	7.14		60	1.47		0.10		6717	Egbert series		Routson et al., 1981
Cm	244	muck						7.54 Extract pH					Mn 4 M HNO3 Extract		5656			Routson et al., 1981
Cm	244	sediment					3.0								1730 (filtered)	Pond B, SRP	Batch	Adriano, D.C. et al., 1981
Cm	244	sediment					3.0								1070 (dialyzed)	Pond B, SRP	Tab B = Kd's	Adriano, D.C. et al., 1981
Cm	244	sediment					3.0								1750 (dialyzed)	Pond B, SRP	SRP = Savanna River Plant	Adriano, D.C. et al., 1981
Cm	244	sediment					3.0								940 (filt.)	Par Pond, SRP		Adriano, D.C. et al., 1981
Cm	244	sediment					3.0								920 (dialyz.)	Par Pond, SRP		Adriano, D.C. et al., 1981
Cm	244	sediment					3.0								1540 (carbon)	Par Pond, SRP		Adriano, D.C. et al., 1981
Cm	244	sediment					5.0								37400 (filt.)	Par Pond, SRP		Adriano, D.C. et al., 1981
Cm	244	sediment					5.0								17500 (dialys.)	Par Pond, SRP		Adriano, D.C. et al., 1981
Cm	244	sediment					5.0								74500 (carbon)	Par Pond, SRP		Adriano, D.C. et al., 1981

TABLE B-14

EUROPIUM K_d VALUES

NUC	ISO	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	pH SAT PASTE	EH (v)	CEC meq/ 100g	% FREE IRON OXIDES	CLAY MINERALOGY	% FINE FRACTION	NUCLIDE CONCENTRATION	Kd (ml/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Eu	154	Clay													approx. 1E	42cm mixed, predominantly	Tab 1 [illegible]	Carlson & Bo, 1982
Eu	154	Clay													5.6x10E3	42cm mixed, predominantly		Carlson & Bo, 1982
Es	154	Red-brown clayey						4.0-10.1							Kd = f(pH) (pH = 6.1E4) (r = 5.4E3)	Fresh soil Rocky Flats,	Tab 1&2: Kd. Report had 95% of Kds	Sasser & Nevens, 1984
Eu	154	Smectite clay						7.5 - 7.8							(1)=0.23x10E7	20 degrees C Core LL44 (PC 2, Pacific Ocean, depth= 5021m	(1) Na = 1.0 Sr Eu Cm Th Pu (1)	Kenna, 1988
Eu	154	Smectite clay						7.5 - 7.8							(1)=0.31x10E7	60 degrees C Core LL44 (PC 2, Pacific Ocean, depth= 5021m	Ca-bentonite core	Kenna, 1988

TABLE B-15

IODINE K_d VALUES

KEY	SOIL ISO Name	% SAND	% SILT	% CLAY	% ORG	% $CaCO_3$	pH SAT PASTE	EH (mV)	CEC meq/ 100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	MOLAR CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
	197													No Data			Boone et al., 1985
	127 Fine Gr						> 7							367 R (10% D)	Gravel	1-129 Kd = formula p 410	Sheppard et al., 1987
	127 Ap	Sand					> 1		2 meq/Kg					60 / (R 2)	4.1% re	1 127 Tab 3: soil properties	Sheppard et al., 1987
	127 Bfe,Bhfe,Bs	Sand					> 2		2 meq/Kg					0 7 (0 8)	15.45 re	( ) = Kd column = leachate (L)	Sheppard et al., 1987
	127 C (Cg)	Sand					6.2		1.7 meq/Kg					0.5 (0.1)	>85 re	CEC = meq/Kg Tab 4= Kd comp. Field = batch	Sheppard et al., 1987
	131	85	17	3		0	3.7		175ug/Kg		CaCl2			30(17-46)		Kd cat 1.3-36 range Tab 3: soil prop Tab 2: Kd	Schmeaks et al., 1987
	131 Ae				3.10		8.3	melation	16.4					>10	(0-22cm) Auenrendzina (Ribbis), FRC	(1-131) From 182 : Kd = soil horizon	Bunzl et al., 1984
	131 C				1.15		8.3	melation	17.7					10	(22-30cm) Auenrendzina (Ribbis), FRC	Fig 3: Kd vs Ca + Na conc	Bunzl et al., 1984
	131 Cc				1.01		8.2	melation	16.2					<100	(30-47cm) Auenrendzina (Ribbis), FRC	Fig 4: Kd - comparison column - batch	Bunzl et al., 1984
	131 fG-Cc				0.25		8.1	melation	8.5					>10	(47-90cm) Auenrendzina (Ribbis), FRC	Fig 5: Kd - 6 soils (A-horizon)	Bunzl et al., 1984
	131 2fG-				0.14		8.2	melation	6.4					<10	(90-128cm) Auenrendzina (Ribbis), FRC	Fig 6: Kd - 5 soils (C-hor).	Bunzl et al., 1984
	133 3G-				0.09		8.2	melation	8.7					<10	(128-132cm) Auenrendzina (Ribbis), FRC	Abstract	Bunzl et al., 1984
	131 Ap				2.41		7.3	melation	8.7					>1 0	(0-31cm) Parabrown (Escheveiler), FRC		Bunzl et al., 1984
	131 A1				0.71		7.4	melation	9.5					>0 1	(31-52cm) Parabrown (Escheveiler), FRC		Bunzl et al., 1984
	131 BtAt				0.34		7.2	melation	8.3					0 1	(52-67cm) Parabrown (Escheveiler), FRC		Bunzl et al., 1984
	131 AtBt				0.30		6.8	melation	9.3					0 1	(67-73cm) Parabrown (Escheveiler), FRC		Bunzl et al., 1984
	131 2tC				0.30		6.7	melation	12.5					>0 1	(73-88cm) Parabrown (Escheveiler), FRC		Bunzl et al., 1984
	131 BtC				0.25		6.2	melation	13.7					0 1	(88cm+) Parabrown (Escheveiler), FRC		Bunzl et al., 1984
	red brown clayey						5.8	~0.6						AV = 1.8E-1	Chestnut Ridge, ORNL	Tab 18: Kd Report Kd ICRP's of Kds	Seeley & Kelmers, 1984
														(M = 1.8E0)		(0 N = H,Si,Fe Ca,Eu,Cr,Tc)	Seeley & Kelmers, 1984
														(L = 1.6E-2)		PS = Sand F/L = conc	Seeley & Kelmers, 1984
	sand	74	3	23			5.65	(5.21)						3.6	SE Coastal Plain (Sandy clay loam) (SP43)	see Fig/11 (Pa/ml)	Eichholz & Mhang, 1987
	sand	74	3	23			5.65	(5.39)						5.5	SE Coastal Plain (Sandy clay loam) (SP43)	( ) = pH columns = Fig: pH	Eichholz & Mhang, 1987
	sand	74	3	23			4.65	(5.24)						4.5	SE Coastal Plain (Sandy clay loam) (SP43)		Eichholz & Mhang, 1987
	organic						6.28	-0.11						2.3 to 43.8	sphagnum peat (0-40cm)	(Tab 4=comparing insitu & lab Kd) (Nirdung et al., 1974)	Shepard, DHI, 1988
	organic						6.00	-0.04						0.2 to 64.1	sphagnum peat (40-80cm)	Kd column = 6%	Shepard, DHI, 1988
	organic						5.34	to 5.82						2.4 to 37.8	reed/sedge peat (0-26 cm)		Shepard, DHI, 1988
	clay						7.28	-0.08						0.1 to 3.1	ISEE) >26cm		Shepard, DHI, 1988
	loamy sand	84.7	10.0	5.7	1.4		6.5				KCl			17.5 - 0.8	Podsol	Tab 15	Bors et al., 1987
	clay silt	4.6	71.0	23.5	2.4		7.5				KCl			27.6 - 1.4	Chernozem	Fig 3: KTA vs Kd values in podzol + chernozem	Bors et al., 1987
	loamy sand					1.1	7.0							<10 <1000	log		
	loamy peat					0.5	6.8							<10 <1000	log		Bunzl & Schmeack, 1988
	sandy loam						5.7							>1 <1000	log		Bunzl & Schmeack, 1988
	sandy loam						7.1							>1 <1000	log		Bunzl & Schmeack, 1988
	loamy sand						4.5							10 <100	log		Bunzl & Schmeack, 1985
	loamy sand						4.6							approx 10	log		Bunzl & Schmeack, 1989
	clay						8.0							>1	log		Bunzl & Schmeack, 1989
	fabric organic						6.0		0.7meq/g		0.1MCaNO3			approx 100	log	P1 - Sohap peat (high moor), Steinhuder Meer, Hannover	Bunzl & Schmeack, 1988
	fabric organic						7.0		2.1meq/g		0.1MCaNO3			100-1000	log	P2 - Sohap peat (high moor) Koenigsmoor, Bavaria	Bunzl & Schmeack, 1988
	fabric organic								0.65meq/g		0.1MCaNO3					P3 - Sohap peat (high moor) Koenigsmoor, Bavaria	Bunzl & Schmeack, 1988
	SSM												5 ppm I	19.0		SSM = Savannah River Plant soil + burial ground	
	SSM												50 ppm I	5.35		SSM = Savannah River Plant soil + burial ground	(Tab 14) (p. 50) (1-127)
	SSM												500 ppm I	3.62		SSM = Savannah River Plant soil + burial ground	Tarbo, Stone et al., 1984 See Co/I (1-77))
	A0-horizon	59.7	29.4	12.0		0.2	6.7		8.7		CaCl2			5.2-18 A=0.8	8	10-30cm) Alf-soil (parabrown earth)	Hoeffner, 1985
	Charcoal81 - Brine A						6.6							35			Hoeffner, 1985
	Charcoal82 - Brine A						6.7							53			Hoeffner, 1985
	Charcoal83 - Brine A						6.5							18			Bunzl et al., 1985
														No Kd	Tokai soil	(Tab basant properties) (Fig breakthrough curves)	Bonal, 1990
														No Kd	Nakamagio soil	(Fig 2=breakthrough curves) (Fig 3&4=radiation curves)	Bonal, 1990
														No Kd	Toyoura sand	(Fig 5=vermiculite-sand) Abstract (Sodium/Kd)	Uchida & Nomada, 1983
	Sand	91.2	7	1.8										(C 5- 0.2)	B - Hanford sand		Uchida & Nomada, 1983
	Sand	91.2	7	1.8										04 (0 5-0.61	B - Hanford sand	Tab 5: Kds column-1 (1) - batch(Kd in (1))	Jones et al., 1980
	Loamy sand	81.2	15	3.8										05 (0 7-0.31	A - from Ringold formation	Two Hanford sediments A: from Ringold geological formation,	Jones et al., 1980
	Loamy sand	81.2	15	3.8										(0 2-0.1)	A - from Ringold formation	B: from surface, Hanford sand (typical correspondent)	Jones et al., 1980
	Loam	45.0	35.0	20.0	3.0		7.2	(in H20)	30.9					34.94	Isella (P), Po Valley, Italy	(P N = Tc,I,Cs,Sr,3H)	Jones et al., 1980
	Sandy loam	70.0	22.0	10.0	2.5		6.0	(in H20)	7.2					21.92	Cavarzere (V), Po Valley, Italy	(conc ≤370 kB u Curie - same conc for other nuclides)	Carini et al., 1985
																(0 N aCa Cn,Mn,Fe) Tab 15 soil properties	Carini et al., 1985

continued...

TABLE B-15 (concluded)

MAP	ISB	SOIL type	% SAND	% SILT	% CLAY	% ORG	% $CaCO_3$	pH SAT PASTE	EH (v)	CEC meq/ 100g	% FREE FROM DAIRIS	EXCH CATION	% EXCH CATION	WATER EXTR CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
1	125	Sandy Loam	74 2	18.0	11 8	1 48		7 8 (in H20)		6 3					24 64	Carpaneto (C), Po Valley, Italy	Tab 3 + Kd - 72 hours	Carmi. et al., 1985
1	175	Clay loam	36 3	37 5	36 2	3 8		7 8 (in H20)		32 3					31 93	Villanova (V.), Po Valley, Italy		Carmi. et al., 1985
1	175	Clay loam	31 4	36 2	32 4	3 5		7 7 (in H20)		30 3					36 37	Sarmato (S), Po Valley, Italy		Carmi. et al., 1985
1	125	Sandy loam	56 1	27 5	16 4	1 34		7 9 (in H20)		14 0					18 03	Montanelli, (M), Po Valley, Italy		Carmi. et al., 1985
1	125	Sandy loam	64 0	23 5	12 5	1 23		6 8 (in H20)		6 6					9 86	5 Po Valley, Italy		Carmi. et al., 1985
1	125	Clay loam	32 4	30 0	37 5	4 98		7 6 (in H20)		35 4					32 54	15 Po Valley, Italy		Carmi. et al., 1985
1	175	Clay loam	38 5	27 0	33 5	2 54		7 8 (in H20)		24 1					27 89	17 Po Valley, Italy		Carmi. et al., 1985
1	125	Clay loam	33 5	28 0	38 5	2 91		7 7 (in H20)		33 5					25 10	19 Po Valley, Italy		Carmi. et al., 1985
1	125	Clay loam	37 0	32 0	31 0	1 64		6 4 (in H20)		24 5					33 56	41 Po Valley, Italy		Carmi. et al., 1985
1	125	Sand	88 5	6 2	5 3	1 54		7 5 (in H20)		7 1					23 16	55 Po Valley, Italy		Carmi. et al., 1985
1	125	Loam	31 0	44 0	25 0	2 68		7 0 (in H20)		22 6					34 58	61 Po Valley, Italy		Carmi. et al., 1985
1	125	Sandy clay loam	50 5	19 5	30 0	4 08		6 4 (in H20)		26 8					20 00	65 Po Valley, Italy		Carmi. et al., 1985
1	125	Sandy loam	58 0	22 0	19 0	1 67		6 0 (in H20)		12 5					a 17	73 Po Valley, Italy		Carmi. et al., 1985
1	125	Loam	42 5	42 5	14 0	1 67		7 P (in H20)		20 2					17 95	77 Po Valley, Italy		Carmi. et al., 1985
1	125	Loam	43 0	29 5	29 5	2 3		7 1 (in H20)		24 9					43 37	81 Po Valley, Italy		Carmi. et al., 1985
1	175	Clay	24 5	24 5	51 0	3 85		7 5 (in H20)		35 1					29 11	93 Po Valley, Italy		Carmi. et al., 1985
1		Organic				100		6 3 (CaCl)				6M K			1 36 L/kg	Sphagnum moss, U.R.L., Lac du Bonnet, Manitoba	(Kd from plot) (Dist groundwater) Table Kd as depth & dis	Sheppard, Dahl, Paul 1988
1		Organic						4 8							137(rainfall)	Commercial Sphagnum moss	Table 6 (Kd in ml/g for two Kd vs. log (K))	Sheppard & Evenden, 1988
1		Organic						4 8							40(Fall 1)	Commercial Sphagnum moss	(U N + Sr, Cs, Pb, U)	Sheppard & Evenden, 1988
1		Lit-Mn						5 7							- (1 0--2 0)	0-4 cm Gleyed Dystric Brunisol	Fore Comm (U N + Mo, Cr, Co, Ic, U, Th, Mo)	Sheppard 1989
1		Mn						5 1							- (0 1--0 7)	4-15 cm Gleyed Dystric Brunisol	Kdr Leachate + mg ( ) Kd Groundwater + ( )	Sheppard 1989
1		Mn-Mn02						5 2		7 1cmol/Kg					- (.06--0 4)	15 45 cm Gleyed Dystric Brunisol	Soil type, Ph, CEC & soil orgc from BLG-17(AECL6(3))	Sheppard, 1989
1		C-Clay						6 2		1 7cmol/Kg					- (.04--0 4)	>45 cm Gleyed Dystric Brunisol		Sheppard, 1989
1		Sand		31	7	0 36									0 23	Soil # 31 (NARE)		Gilham et al., 1981a
1				39	8	0 33									0 29	Soil # 32 (BNPD)		Gilham et al., 1981a
1				27	10	2 05									0 59	Soil # 35 (Alberta)		Gilham et al., 1981a
1				29	5 8	0 45									0 2	Hanford A		Amer & Rai, 1978
1				35 4	18	0 6									0 55	Idaho A		Amer & Rai, 1978
1				29 4	22 4	0 98									0 7	Idaho B		Glover et al., 1976
1				29	36	2 7									1 21	Colorado A		Glover et al., 1976
1		Silt		49	34	0 8									1	Idaho A		Glover et al., 1976
1				34	37	2 3									1 23	Arkansas C		Glover et al., 1976
1				58	18	3 6									0 79	Illinois		Glover et al., 1976
1				35	26	0 45									0 83	Soil # 1 (NARE)		Gilham et al., 1981a
1				36	28	0 41									0 107	Soil # 2 (NARE)		Gilham et al., 1981a
1				36	29	0 41									0 88	Soil # 3 (NARE)		Gilham et al., 1981a
1				31	31	0 4									0 96	Soil # 4 (Lexington)		Gilham et al., 1981a
1				41	31	1 27									0 63	Soil # 5 (Lexington)		Gilham et al., 1981a
1				39	33	0 36									0 63	Soil # 9 (North Bay)		Gilham et al., 1981a
1				34	37	0 84									0 44	Soil # 34 (Alberta)		Gilham et al., 1981a
1					29 1	1 1									1 5	Hermosa silt (average profile)		Jub & Hamber, 1972
1				50	6	0 23									0 18	Hatzville silt		Routson, 1973
1		Clay		34	34	0 41									1 03	Soil # 33 (Alberta)		Gilham et al., 1981a
1				37	36	1									1 04	Tennessee (Oak Ridge)		Glover et al., 1976
1				37	36	2 7									1 24	New York (Lost Valley)		Glover et al., 1976
1				34	46	3 7									1 82	Arkansas A		Glover et al., 1976

TABLE B-16

IRON K_d VALUES

MAT	ISO	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	pH SAT PASTE	Fe (v)	CEC meq/ 100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	NUCLIDE CONCENTRATION	Kd (ml/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Fe		Sand	89	3	9										1200 (800)	Beatty 1, Nevada	Beatty, Nevada Barnwell, S Carolina West Valley, N Y	Meyhausel, 1983
Fe		Sand	91	2	7										6000	Beatty 2, Nevada	(plant = Mdh highest in alkaline Alluvial Basin deposits high	Meyhausel, 1983
Fe		Sand	83	2	15										1800	Beatty 3, Nevada	in montmor.-ilonite & zeolites)	Meyhausel, 1983
Fe		Clayey Sand	58	6	36										6000	Barnwell 4, South Carolina	lab 1=Kd=mineral phase char Kd cnl >( )=reducing cond=Lipon	Meyhausel, 1983
Fe		Clayey Sand	68	11	21										6000	Barnwell 12, South Carolina	lab2=Relationships=texture, surface area & clay mineral comps	Meyhausel, 1983
Fe		Clayey Sand	73	8	19										600 (580)	Barnwell 14, South Carolina	lab 3= Soil test & mineral comps Tab.4=Kd=6 radionuclides	Meyhausel, 1983
Fe		Loam															Fig 6=text diagram Fig 7=Kd vs sorptive minerals	Meyhausel, 1983
Fe		Sand								600mmol/kg					490	Orthic Black Chernozem	(lab 1) (CEC= mmol kg-1)	Sheppard & Sheppard, 1987
Fe	48	Loam	45.0	35.0	20.0	3.0		7.7 (in H20)		160mol/kg 30.9						Orthic Regosol		Sheppard & Sheppard, 1987
Fe	49	Sandy loam	70.0	20.0	10.0	2.5		6.0 (in H20)		7.2					515.5	Fossalta (F), Po Valley, Italy	(Conc = 370.33 uCi/mg - same concentration for O M)	Carini et al., 1985
Fe	50	Sandy loam	74.2	14.0	11.8	1.74		7.8 (in H20)		6.3					294.4	Vervelli (V), Po Valley, Italy	(O M = Ca,Cs,Mn,I)	Carini et al., 1985
Fe	50	Clay loam	36.3	27.5	36.2	2.8		7.8 (in H20)		32.3					375.1	Carpstano (C), Po Valley, Italy	lab 1= soil properties	Carini et al., 1985
Fe	50	Clay loam	31.4	36.2	32.4	3.5		7.7 (in H20)		30.3					1259	Villanova (Vi), Po Valley, Italy	lab 3= Kd = 72 hours	Carini et al., 1985
Fe	50	Sandy loam	56.1	27.5	16.4	1.34		7.9 (in H20)		15.0					1154.	Sarmeta (S), Po Valley, Italy		Carini et al., 1985
Fe	50	Sandy loam	64.0	23.5	12.5	1.21		6.8 (in H20)		9.4					803.8	Monticelli (M), Po Valley, Italy		Carini et al., 1985
Fe	50	Clay loam	32.5	30.0	37.5	4.96		7.6 (n H20)		35.4					290.5	5 Po Valley, Italy		Carini et al., 1985
Fe	50	Clay loam	39.5	27.0	33.5	2.54		7.8 (in H20)		24.1					1185	15 Po Valley, Italy		Carini et al., 1985
Fe	50	Clay loam	31.5	29.0	39.5	2.91		7.7 (in H20)		33.5					2078	17 Po Valley, Italy		Carini et al., 1985
Fe	50	Clay loam	37.0	32.0	31.0	1.94		6.4 (in H20)		24.5					2240	19 Po Valley, Italy		Carini et al., 1985
Fe	53	Sand	88.5	6.2	5.3	1.54		7.5 (in H20)		7.1					567.2	43 Po Valley, Italy		Carini et al., 1985
Fe	50	Loam	31.0	44.0	25.0	2.68		7.9 (in H20)		22.6					424.1	55 Po Valley, Italy		Carini et al., 1985
Fe	50	Sandy clay loam	50.5	19.5	30.0	4.08		6.4 (in H20)		26.8					2231	61 Po Valley, Italy		Carini et al., 1985
Fe	50	Sandy loam	59.0	22.0	19.0	1.67		6.0 (in H20)		13.5					409.3	65 Po Valley, Italy		Carini et al., 1985
Fe	50	Loam	42.5	43.5	14.0	1.67		7.8 (in H20)		23.2					542.9	73 Po Valley, Italy		Carini et al., 1985
Fe	50	Loam	43.0	27.5	29.5	6.3		7.1 (in H20)		34.9					2012	77 Po Valley, Italy		Carini et al., 1985
Fe	50	Clay	24.5	24.5	51.0	3.85		7.5 (in H20)		35.1					1796	81 Po Valley, Italy		Carini et al., 1985
Fe	50	Sand								(11.3)					2121.	93 Po Valley, Italy		Carini et al., 1985
Fe	50	Silt-clay								(241.7)					8	A		Inoue & Morisawa, 1976
Fe	50	Silt-clay								(55.6)					500	B	(Tab 2= soil type) (Tab 5= CEC - Kd) (in JAP)	Inoue & Morisawa, 1976
Fe	50	Gravel-sand								(69.5)					100	C	CEC = ( ) = meq/g 9 tables, 3 figures	Inoue & Morisawa, 1976
Fe	50	Silt-clay								(167.9)					500	D		Inoue & Morisawa, 1976
Fe	50	Silt-sand								(47.8)					120	E		Inoue & Morisawa, 1976
Fe	50	Gravel								(28.9)					200	F		Inoue & Morisawa, 1976
Fe	50	Silt-clay								(117.9)					5	,		Inoue & Morisawa, 1976
Fe	50	Silt-clay								(140.5)					60			Inoue & Morisawa, 1976
Fe	50	Silt-clay								(246.0)					250			Inoue & Morisawa, 1976
Fe	50	Fine sand								(60.3)					-			Inoue & Morisawa, 1976
Fe	50	Silt								(144.0)					5			Inoue & Morisawa, 1976
Fe	50	Sand								(24.3)					1000			Inoue & Morisawa, 1976
Fe	50	Gravel								(22.1)					-	,		Inoue & Morisawa, 1976
Fe	50	Fine sand								(172.8)					40	M		Inoue & Morisawa, 1976
Fe	50	Fine sand								(38.6)					250	O		Inoue & Morisawa, 1976
Fe	50	Silt-clay								(200.1)					5	P		Inoue & Morisawa, 1976
Fe		Hallandale fine sand				14 kg/Kg		8.20							15	Q		Inoue & Morisawa, 1976
Fe		Plantation Muck - bottom layer				27 kg/Kg		7.32		1.13meq/g					0.616 L/g	Pompano Beach, Florida	Tab 1 = cations in soil Tab 2 = soil charact	Wong et al., 1983
Fe		Plantation Muck - middle layer				670 kg/kg		7.70		1.58meq/g					0.159 K/g	Pompano Beach, Florida	Tab 3 = heavy metals in soil Tab 4 = linear Kd (L/g)	Wong et al., 1983
Fe		Plantation Muck - top layer				705.2g/kg		7.10		4.04meq/g					1.127 L/g	Pompano Beach, Florida	Tab 5 = langmuir coeff Fig 1 & 2 = isotherms = Cr, Mn	Wong et al., 1983
										4.53meq/g					0.521 L/g	Pompano Beach, Florida	(O M = Cu, Zn, Mn, Ni, Cd, Cr, Co)	Wong et al., 1983

TABLE B-17

LEAD K_d VALUES

NUC	ISO	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	pH SAT PASTE	EH (v)	CEC meq/100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	NUCLIDE CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Pb	210	fine sandstone - silty sand						2 0							20		(Pb - 210) lab 4	Hajj-Djafari et al , 1981
Pb	210	fine sandstone - silty sand						4 5							100		p 226 - Site geology	Hajj-Djafari et al , 1981
Pb	210	fine sandstone - silty sand						5 75							1500		p 230 - Split Rock Formation	Hajj-Djafari et al , 1981
Pb	210	fine sandstone - silty sand						7 0							4000			Hajj-Djafari et al , 1981
Pb		organic				100		4 8							9000 (all)	commercial sphagnum peat	(Pb) (lab 6) (fig 12 = log Kd vs log cr)	Sheppard and Evenden, 1988
Pb		Loam			15			7 3		17					21000 L/Kg	2 Port Hope, Ontario	lab 6 = Kd = CR (geometric mean)	Sheppard and Evenden, 1988
Pb		Medium sand			2			4 9		5 8					19 L/Kg	3 Port Hope, Ontario	(D N = 1h, U) Port Hope soils Pars comm	Sheppard, WCE & RJP, 1989
Pb		Organic			<1			5 5		120					30000 L/Kg	4 Port Hope, Ontario	lab 1: soil charact lab 11: Kd (L/Kg)	Sheppard, WCE & RJP, 1989
Pb		Fine sandy loam			11			7 4		8 7					59000 L/Kg	6 Port Hope, Ontario	4 soils , remainder = ND	Sheppard, WCE & RJP, 1989
Pb		Sand	-	-	0	3 5	-	4 5 - 5 0	-	22	-	[Ca2+] = 0 0 015 mol/L			2 8x10E2	Soil C		Gerritse et al , 1987
Pb				-	0	3 5	-	4 5 - 5 0	-	22	-	[Ca2+] = 0-0 015 mol/L			1 3x10E3	Soil C		Gerritse et al , 1987
Pb			-	-	20	2 5	-	7.5 - 8 0	-	16	-	[Ca2+] = 0-0 015 mol/L			3 5x10E3	Soil D		Gerritse et al , 1987
Pb		Unpolluted organic soil				90	-	4 5	-	-	-	-			2 52x10E4	Soil A		Gerritse et al , 1987
Pb		Unpolluted peat				>90	-	4 - 5	-	-	-	[Ca2+] = 0-0 015 mol/L			1 8x10E2	Peat A		Gerritse et al , 1987
Pb		Unpolluted peat				>90	-	4 - 5	-	-	-	[Ca2+] = 0-0 015 mol/L			6 3x10E4	Peat A		Gerritse et al , 1987
Pb		Polluted peat				>90		6 2		-	-	-			2 34x10E4	Soil B		Gerritse et al , 1987
Pb		Sphagnum peat				-	-	4 - 5	-	-	-	-			6x10E4	- -		Wolf et al , 1977
Pb		Sphagnum peat				-	-	4 - 5	-	-	-	0 025 meq Ca2+/mL			2x10E2	- -		Wolf et al , 1977

TABLE B-18

LITHIUM K_d VALUES

NUC	ISO	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	pH SAT PASTE	EH (v)	CEC meq/100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	NUCLIDE CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Li		Bandelier tuff (silicic glass)										0 01 N CaCl2					No Kd is determined used Kd = 0 08 in model calculations (13 figures)	Knighton & Wagner, 1986

TABLE B-19

MANGANESE K_d VALUES

MUC	ISU	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	pH SAT PASTE	FM (v)	CEC meq/ 100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	NUCLIDE CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Pa	S4	Heavy clay -1		35	65			8 2(7 1- 7)		26--2					1000--200	(0 04 - 0 2) m) Lavrea Ser., Finland	(Mn-54) (Tab 10 = Mn Kd = pH)	Nikula, 1987
Pa	S4	Heavy clay -3		11	89			8 4(7 3-- 7)		27+-2					96--1	(2 08 - 2 15 m) Oli-lumia Ser., Finland	(pH in Tab 10 - ( ) in pH column)	Nikula, 1987
Pa	S4	Heavy clay -4		32	68			8 3(7 1- 7)		5 7--2					34--5	(2 40 - 2 56 m) Oli-lumia Ser., Finland	(0 N = Sr,Cs,Co,Zn,Cu) (Fig 1) = Mn Kd vs pH)	Nikula, 1987
Pa	S4	Heavy clay -5		32	68			8 0(7 0+- 1)		25--1					4100--1200	(5 28 - 6 35 m) Sala Ser., Finland	Soil type classified by UHT from texture triangle.	Nikula, 1987
Pa	S4	Silty clay loam -6		62	38			7 0(7 2-- 1)		12--5					430--70	(2 74 - 3 31 m) Jumis Ser., Finland		Nikula, 1987
Pa	S4	Loamy sand -7	79	21				6 4(7 1-- 1)		2 8-- 2					86--3	(4 m) Loam-rab moreen., Finland		Nikula, 1987
Pa	S4	Sandy loam -8	65	35				6 4(7 3+-.1)		3 2-- 2					49--3	(1.5 m) Oli-lumia moreen., Finland		Nikula, 1987
Pa	S4	Loamy sand -9	73	27				6 8(7 0+-.1)		2 1--.3					160--10	(0 5 - 4 0 m) Jyska moreen., Finland		Nikula, 1987
Pa	S4	Sandy loam -10	66	34				6 2(7 0-- 1)		2 3--.3					130--10	(2 9 - 2 5 m) Portals moreen., Finland		Nikula, 1987
Pa	S4	Loam -11	61	37	22			9 7(8.3+ 2)		18--5					4300--300	(44 m) Makola Kaolinsav., Finland		Nikula, 1987
Pa	S4	Sandy loam -12	57	29	14			9 9(8.1+- 2)		40--4					2700--100	(24 m) Metsasra kaolinsav., Finland		Nikula, 1987
Pa	S4	Loam	45 0	35.0	20 0	3.0		7 7 (in H20)		30 9					16851	Pecetta (P), Po Valley, Italy	(Mn-54)	Nikula, 1987
Pa	S4	Sandy loam	70 0	20 0	10 0	2.5		6 0 (in H20)		7 7					108 1	Verzuolo (V), Po Valley, Italy	(Conc = 329 33=C-/ml = same conc for other elements)	Carini et al , 1985
Pa	S4	Sandy Loam	72 0	14 0	11 8	1 4a		7 8 (in H20)		6 3					11002	Cargalano (C), Po Valley, Italy	(0 N = Co,Cs,Fe,I) Tab 3 = soil properties	Carini et al , 1985
Pa	S4	Clay loam	36.3	27 5	36.2	2 8		7 8 (in H20)		32 3					54118	Villanova (V), Po Valley, Italy	Tab 3 = Kd = 72 hours	Carini et al , 1985
Pa	S4	Clay loam	31 4	36 2	32 4	3 5		7 7 (in H20)		39.3					37370	Sannata (S), Po Valley, Italy		Carini et al , 1985
Pa	S4	Sandy loam	56 1	27 5	16 4	1.34		7 0 (in H20)		15 0					24325	Monticelli (M), Po Valley, Italy		Carini et al , 1985
Pa	S4	Sandy loam	64 0	23 5	12 5	1 21		6 8 (in H20)		4 4					573 4	5 Po Valley, Italy		Carini et al , 1985
Pa	S4	Clay loam	32 5	30.0	37.5	4 48		7 6 (in H20)		35 4					23563	15 Po Valley, Italy		Carini et al , 1985
Pa	S4	Clay loam	39 5	27.0	33.5	2 54		7 8 (in H20)		24 1					77076	17 Po Valley, Italy		Carini et al , 1985
Pa	S4	Clay loam	31 5	29 0	39 5	2 91		7 7 (in H20)		33 5					57215	39 Po Valley, Italy		Carini et al , 1985
Pa	S4	Clay loam	37 0	32 0	31 0	7 qz		6 4 (in H20)		24 5					1029	41 Po Valley, Italy		Carini et al , 1985
Pa	S4	Sand	88 5	6 0	5 5	1 54		7 5 (in H20)		7 1					3513	55 Po Valley, Italy		Carini et al , 1985
Pa	S4	Loam	33 0	44 0	25 0	2 68		7 9 (in H20)		22 6					33726	61 Po Valley, Italy		Carini et al , 1985
Pa	S4	Sandy clay loam	50 5	19 5	30 0	4 08		6 4 (in H20)		26 8					457 2	65 Po Valley, Italy		Carini et al , 1985
Pa	S4	Sandy loam	56 0	22 0	19 0	1 67		6 0 (in H20)		18 5					523 6	73 Po Valley, Italy		Carini et al , 1985
Pa	S4	Loam	42 5	43 5	14 0	1 67		7 8 (in H20)		23 2					47960	77 Po Valley, Italy		Carini et al , 1985
Pa	S4	Loam	43 0	27 5	29 5	6 3		7 1 (in H20)		34 9					486 9	81 Po Valley, Italy		Carini et al , 1985
Pa	S4	Clay	24 5	24 5	51.0	3 85		7 5 (in H20)		35.1					48045	93 Po Valley, Italy		Carini et al , 1985
Pa	S4	Sand								(11.3)					150	A		Inoue & Morisawa, 1976
Pa	S4	Silt-clay								(741 7)					2100	B	(0 N = Sr, Cs, Co, Zn, Ag, Fe, Mn) (in JAP)	Inoue & Morisawa, 1976
Pa	S4	Silt-clay								(55 6)					250	C	Tab 7= soil type Tab 5= CEC - Kd	Inoue & Morisawa, 1976
Pa	S4	Gravel-sand								(60 5)					5000	D	CEC - ( ) = meq/g	Inoue & Morisawa, 1976
Pa	S4	Silt-clay								(167 9)					10000	E	= = Mn-56 was used instead of Mn-54, - = not determined	Inoue & Morisawa, 1976
Pa	S4	Silt-sand								(47 8)					30	F		Inoue & Morisawa, 1976
Pa	S4	Crawl								(28 9)					500	G		Inoue & Morisawa, 1976
Pa	S4	Silt-clay								(117 9)					700	H		Inoue & Morisawa, 1976
Pa	S4	Silt-clay								(140 5)					70	I		Inoue & Morisawa, 1976
Pa	S4	Silt-clay								(246 0)					-	J		Inoue & Morisawa, 1976
Pa	S4	Fine sand								(60 3)					50	K		Inoue & Morisawa, 1976
Pa	S4	Silt								(140 0)					250	L		Inoue & Morisawa, 1976
Pa	S4	Sand								(24 3)					14 e	M		Inoue & Morisawa, 1976
Pa	S4	Gravel								(27 1)					800	N		Inoue & Morisawa, 1976
Pa	S4	Fine sand								(122 8)					2000	O		Inoue & Morisawa, 1976
Pa	S4	Fine sand								(38 6)					70	P		Inoue & Morisawa, 1976
Pa	S4	Silt-clay								(700 3)					100	Q		Inoue & Morisawa, 1976
Pr		Hollandale fine sand					14 5g/kg		8 20	1 13um/g					971 L/g	Pompano Beach, Florida	Tab 1 = cations in soil Tab 2 = soil charact.	Wang et al , 1983
Pr		Plantation Muck - bottom layer					27 4g/kg		7 30	1 58um/g					186 L/g	Pompano Beach, Florida	Tab 3 = heavy metals in soil Tab 4 = linear Kd (L/g)	Wang et al , 1983
Pr		Plantation Muck - middle layer					610 2g/kg		7 90	4 04um/g					036 L/g	Pompano Beach, Florida	Tab 5 = Langmuir coeff Fig 1 & 2 = isotherm = Cr, Ni	Wang et al , 1983
Pr		Plantation Muck - top layer					706 2g/kg		7 10	4 53um/g					276 L/g	Pompano Beach, Florida	(0 N = Cu, Zn, Fe, Ni, Cd, Cr, Co)	Wang et al , 1983
Pa			88 03	8 67	3.3	1 41			6 1						24 95374	1 Norfolk County, Ontario	Kd = linKd (Pers communication)	Sheppard, 1989
Pa			83 84	10.91	5 25	1 23			6 8						29 86283	2 Oxford County, Ontario	Kd = linKd (Pers communication)	Sheppard, 1989
Pa			80	6 66	3 42	1 54			6 9						30 39845	3 Norfolk County, Ontario	Kd = linKd (Pers communication)	Sheppard, 1989
Pa			97 09	5 41	2 5	1 61			6 3						18 18359	4 Norfolk County, Ontario	Kd = linKd (Pers communication)	Sheppard, 1989
Pa			83 49	9 9	6 6	3 5			6 2						34 38714	5 Norfolk County, Ontario	Kd = linKd (Pers communication)	Sheppard, 1989
Pa			90 44	6 23	3 32	2 02			7 2						41 88678	6 (Dundave 870119)	Kd = linKd (Pers communication)	Sheppard, 1989

continued...

TABLE B-19 (concluded)

NUC	ISO	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	pH SAT PASTE	EH (+)	CEC meq/ 100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	NUCLIDE CONCENTRATION	Rd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Rn			90 49	5 47	5 05	7 15		7 7							35 07686	7 Norfolk County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			90 37	6 28	3 35	3 21		6 6							21 73977	8 Norfolk County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			93 98	0 64	0 38	5 9		7 1							75 87942	9 Norfolk County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			90 95	5 75	3 29	2 55		5 6							14 41641	10 Norfolk County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			68 7	24 58	6 77	0 87		6							6 436572	11 Norfolk County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			82 68	16 47	0 84	1 75		6 2							19 57014	12 Norfolk County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			93 9	4 88	1 22	1 48		6 1							14 53838	13 Norfolk County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			91 39	4 92	3 69	1 99		6 5							30 98643	14 Brant County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			89 3	5 76	4 94	2 08		5 8							18 27498	15 Brant County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			88 12	9 42	2 46	1 68		6 7							29 74582	16 Brant County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn				20 26	18 54	6 50		6 8							72 45494	17 Kent County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn				5 43	5 01	7 62		7 1							63 99133	18 Elgin County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			84 [illegible]	9 06	6 12	0 5		6 2							29 17709	19 Middlesex County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			88 96	8 56	2 45	1 48		6 4							16 17490	20 Middlesex County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			75 37	14 95	9 68	13 18		6							94 174	21 Middlesex County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			71 93	21 59	6 48	5 51		7							210 94	22 Middlesex County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			93 04	4 91	2 05	1 48		6 5							39 832	23 Middlesex County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			91 96	6 32	1 69	1 14		6 5							37 26216	24 Middlesex County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			91 07	4 87	4 06	1 75		6							31 91192	25 Elgin County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			95 3	2 99	1 71	2 49		6 9							74 02016	26 Elgin County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			20 98	33 34	45 68	3 09		6							46 53332	27 Elgin County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			83 84	11 74	4 61	1 87		7 1							45 09288	28 Elgin County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			84 68	9 52	5 8	0 2		6 6							88 09434	29 Kent County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			91 78	3 7	4 59	2 84		6 1							22 65781	30 Kent County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			30 99	73 21	45 91	5 78		7 1							68 27606	31 Kent County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			80 4	17 87	12 93	14 79		6 6							57 09289	32 Kent County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			91 36	5 74	2 87	1 66		6 1							8 74671	33 Elgin County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			22 08	49 55	28 37	3 01		7 1							34 29927	34 Bruce County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			39 54	40 84	19 57	3 5		7 9							60 6383	35 Kent County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			92 95	3 32	3 73	1 68		6 7							18 09019	36 Elgin County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			91 51	6 56	1 93	0 74		6 7							19 99183	37 Elgin County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			88 47	7 84	3 69	2 87		6 9							58 76449	38 Norfolk County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			98 86	7 02	4 12	0		0							19 21843	39 Norfolk County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			91 01	5 72	3 27	1 95		5 6							13 7643	40 Elgin County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			82 42	8 79	8 79	5 78		7 2							74 79869	41 Elgin County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			61 84	25 22	12 89	4 64		6 9							37 05058	42 Oxford County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			83 77	10 4	5 83	3 24		6 3							34 08741	43 Oxford County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			20 38	53 39	26 23	5 65		6 8							71 2223	44 Oxford County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			33 56	45 44	21	4 98		6 6							58 78855	45 Oxford County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			28 29	37 83	33 98	13 04		7							147 235	46 Waterloo County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			19 11	43 36	37 53	3 9		7 1							56 23789	47 Wellington County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			91 33	4 96	3 72	2 22		7 1							46 84859	48 Elgin County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			21 25	28 06	50 69	4 5		5 5							23 37529	49 Essex County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			28 06	33 04	38 9	4 03		6 8							46 88011	50 Essex County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			3 91	50 73	45 37	5 92		7 4							74 83125	51 Kent County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			60 17	25	14 83	4 64		7 2							67 35873	52 Wellington County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			49 59	32 51	17 5	9 28		7 2							137 347	53 Dufferin County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			24 33	49 15	26 5	5 85		7 4							82 9041	54 Dufferin County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			23 92	50 69	25 39	8 34		7 3							258 5596	55 Grey County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			56 69	30 87	12 5	3 09		7 2							68 42676	56 Grey County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			23 99	36 71	39 3	7 66		6 6							63 41777	57 Bruce County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			39 73	41 71	20 06	0 79		7 7							85 66531	58 Perth County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			29 85	44 11	21 05	3 5		7							42 01284	59 Perth County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			74 6	58 2	17 7	3 83		7							72 14470	60 Huron County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			26 58	45 97	27 5	17 91		7 2							116 4782	61 Huron County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			24 84	35 71	39 45	2 02		7 5							49 45202	62 Huron County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			14 93	38 49	46 57	0		0							63 69554	63 Lambton County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			29 85	33 84	36 31	4 64		6 7							75 61783	64 Lambton County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			37 58	34 6	22 87	3 03		7 4							86 58794	65 Wellington County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			43 57	27 08	28 46	0		0							346 4575	66 Wellington County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			40 37	38 03	21 6	0		0							238 8713	67 Wellington County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			40 64	29 45	20 9	5 24		7 2							40 17307	68 Wellington County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989
Rn			89 13	6 69	4 18	4 1		5 8							24 92567	69 Essex County, Ontario	Rd = Linkd (Pers. communication)	Sheppard, 1989

TABLE B-20

MOLYBDENUM K_d VALUES

MIX	ISO	SOIL type	% SAND	% SILT	% CLAY	% ORG	% $CaCO_3$	SAT PASTE pH	EH (v)	CEC meq/ 100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	NUCLIDE CONCENTRATION	K_d (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Mo		LSAnAh						5 2		81 7cmol$_k$g^{-1}					50 3 (70 8)	0-4 cm Gleyed Dystric Brunisol		
Mo		Ae						5 1		2 9cmol$_k$g^{-1}					26 1 (15 8)	4 15 cm Gleyed Dystric Brunisol	Tab IX soil group BLG-IY	Sheppard et al , 1987
Mo		Bf$_j$-Bf$_{jgj}$						5 2		2 1cmol$_k$g^{-1}					51 9 (7 7)	15-45 cm Gleyed Dystric Brunisol	Kd: Leach = no ( ) Kd: Dn ( )	Sheppard et al , 1987
Mo		C-Cg$_j$						6 2		1 7cmol$_k$g^{-1}					14 2 (14 2)	>45 Gleyed Dystric Brunisol	CEC= cmol$_k$g-1	Sheppard et al , 1987
Mo	99	sand								(11 3)ueq/g					(	d		Sheppard et al , 1987
Mo	99	s-lt-clay								(241 7)ueq/g					140	M	(Mo-99) Tab 7 = soil type	Inoue and Morisawa, 1976
Mo	99	s-lt-clay								(55 6)ueq/g					40	C	Tab 5 = CEC & Kd	Inoue and Morisawa, 1976
Mo	99	gravel-sand								(69 5)ueq/g					6	D	(ON = Ca,Co,Mn,Zn,Ag,Fe)	Inoue and Morisawa, 1976
Mo	99	s-lt-clay								(167 9)ueq/g					160	E	CEC = ( ) = ueq/g (= JAP)	Inoue and Morisawa, 1976
Mo	99	s-lt-sand								(47 8)ueq/g					60	F	d Tabs 5 f/g	Inoue and Morisawa, 1976
Mo	99	gravel								(28 9)ueq/g					60	G		Inoue and Morisawa, 1976
Mo	99	s-lt clay								(317 9)ueq/g					5	C		Inoue and Morisawa, 1976
Mo	99	s-lt clay								(140 5)ueq/g					13	H		Inoue and Morisawa, 1976
Mo	99	s-lt-clay								(246 0)ueq/g					400	I		Inoue and Morisawa, 1976
Mo	99	fine sand								(60 3)ueq/g					200	J		Inoue and Morisawa, 1976
Mo	99	s-lt								(149 0)ueq/g					70	K		Inoue and Morisawa, 1976
Mo	99	sand								(24 3)ueq/g					270	L		Inoue and Morisawa, 1976
Mo	99	gravel								(27 1)ueq/g					---	M		Inoue and Morisawa, 1976
Mo	99	fine sand								(122 8)ueq/g					1 3	N		Inoue and Morisawa, 1976
Mo	99	fine sand								(36 6)ueq/g					8	O		Inoue and Morisawa, 1976
Mo	99	s-lt clay								(200 1)ueq/g					1 8	P		Inoue and Morisawa, 1976
Mo		LSAnAh						5 2		81 7cmol$_k$g^{-1}					40	Q		Inoue and Morisawa, 1976
Mo		Ae						5 1		2 9cmol$_k$g					18 3--0 7(-)	0-4 cm Gleyed Dystric Brunisol	Para Comp (O N - Mg, I, Cs, Cr, Tc, U, Th)	Sheppard, 1989
Mo		Bf$_j$-Bf$_{jgj}$						5 2		2 1cmol$_k$g					10 2--0 7(-)	4-15 cm Gleyed Dystric Brunisol	Kd: Leachate = mg ( ) Kd: Groundwater = ( )	Sheppard, 1989
Mo		C-Cg$_j$						6 2		1 7cmol$_k$g					5 1--0 3(-)	15-45 cm Gleyed Dystric Brunisol	Soil type, Ph, CEC & soil desc (from BLG-1YLJED16(31)	Sheppard, 1989
															13 3--0 8( )	>45 cm Gleyed Dystric Brunisol		Sheppard, 1989

TABLE B-21

NEPTUNIUM K_d VALUES

TYPE	ITEM	SOIL type	% SAND	% SILT	% CLAY	% ORG	% $CaCO_3$	SOIL PASTE pH	EH (v)	CEC meq/100g	% ORG/INORG CMPDS	CMPD CATION	% CMPD CATION	REDOX CONCENTRATION	Kd (ml/g)	SOIL IDENTIFICATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Ne	237	silt loam	19	46	35	2 8		5 9 (5 83)		20	1 29	Na, Ca, Mg	88		55	Sharpsburg series, (Aeric Typic Argiaquolls)	Wp 340 (Lab 2)	Hinkle et al 1981
Ne	237	silt loam				2 8		(6 66)				NH4Cl			95		on pH column ( ) = extract pH	Hinkle et al 1981
Ne	237	sandy loam	55	33	12	2 4		5 3 (6 08)		15	1 65	Na, Ca, Mg	95		3	Wallkill series, (Fluvaquentic Endoaquolls)	Soil properties: pH, CEC from Wallace et al 1979	Hinkle et al 1981
Ne	237	sandy loam				2 4		(5 57)				NH4Cl			18		Soil type and % main clay minerals from Hinkle, 1981 (1 21%)	Hinkle et al 1981
Ne	237	sandy loam	64	33	3	5 7		6 0 (6 42)		15	1 52	Na, Ca, Mg	84		3	Lyman series, (Typic Haplargids)		Hinkle et al 1981
Ne	237	sandy loam				5 7		(6 06)				NH4Cl			35			Hinkle et al 1981
Ne	237	clay loam	29	39	32	0 6		7 8 (7 29)		30	1 20	Na, Ca	84		41	Haltwell silty clay loam, 3-6% slopes, (Typic Argiaquolls)		Hinkle et al 1981
Ne	237	clay loam				0 6		(8 28)				NH4Cl			117			Hinkle et al 1981
Ne	237	sandy loam	70	28	2	0 4		6 0 (5 56)		15	5 29	Na, Ca	30		24	Aiken series, (Aeric Haplaquepts)		Hinkle et al 1981
Ne	237	sandy loam				0 4		(6 57)				NH4Cl			198			Hinkle et al 1981
Ne	237	silt loam	22	58	14	2 5		6 7 (6 14)		25	2 41	Na, Ca, Mg	88		52	Valo series, (Typic Vaporthents)		Hinkle et al 1981
Ne	237	silt loam				2 5		(6 83)				NH4Cl			81			Hinkle et al 1981
Ne	237	muck	70	30	0	40 8		7 2 (6 74)		60	1 57	Na, Ca, Mg	10		785	Fabert series, (Histosols (not class-fied)		Hinkle et al 1981
Ne	237	muck				40 8		(7 25)				NH4Cl			990			Hinkle et al 1981
Ne	237	organic						6 28(0 11)							1000(-- 700)	FCC (0 40 cm)		Hinkle et al 1981
Ne	237	organic						6 08(0 04)							1900(-- 400)	FCC (40-80 cm)	(n 651) (wo Lab) (SD - +/)	Sheppard and Thibault, 1988
Ne	237	organic						5 94(7 28)							30	SCT (0 40cm)		Sheppard and Thibault, 1988
Ne		L=Sat = LEW Ab						5 2							- (-)	0 - 4 cm		Sheppard and Thibault, 1988
Ne		Ab = Ae						5 1							4 7 (5 8)	4 - 15 cm	Lab 1 = soil only CEC=(cmol/kg)	Sheppard et al 1987
Ne		Ae = Bw						5 2							1 5 (0 8)	15 - 45 cm	pH in ( ) = CaCl2 leachate - on 1)	Sheppard et al 1987
Ne		Bw - R = C-Cg						6 0							0 6 (0 5)	45 cm		Sheppard et al 1987
Ne	237	Gloucester sand	91 1	2 9	6 0			6 6 (5)	395 mV	3 7				1 M	13 7 (A-B)	(30 weeks) N E Netherlands	Ohp 232) (Appendix 3) (0 N - Ae,Fe,Tr)	Prins et al 1986
Ne	237	Gloucester sand	91 1	2 9	6 0			6 6 (5)	386 mV	3 7				1 M	12 6 (A-B)	(30 weeks) N E Netherlands	This report - a problem Kd=1000's	Prins et al 1986
Ne	237	Gloucester sand	91 1	2 9	6 0			6 5 (5)	388 mV	3 7				2 M	15 6 (A-B)	(30 weeks) N E Netherlands	Kds function of pH (E, M & Lime - AMENDED)CES	Prins et al 1986
Ne	237	Gloucester sand	91 1	2 9	6 0			6 5 (6)	380 mV	3 7				1 M	37 3 (A-B)	(30 weeks) N E Netherlands	Ads - Aerobic pH in ( ) = initial pH	Prins et al 1986
Ne	237	Gloucester sand	91 1	2 9	6 0			7 0 (6)	391 mV	3 7				1 M	14 4 (A-B)	(30 weeks) N E Netherlands	In Kd column, A= aerobic, An= anaerobic, Bc batch, Cx column	Prins et al 1986
Ne	237	Gloucester sand	91 1	2 9	6 0			6 0 (6)	384 mV	3 7				2 M	24 7 (A-B)	(30 weeks) N E Netherlands	An anaerobic - Equilib with (anhydrite)	Prins et al 1986
Ne	237	Gloucester sand	91 1	2 9	6 0			5 8 (5)	10 mV	3 7				1 M	7 9 (AN-B)	(6 weeks) N E Netherlands	Tauntown - soft deep	Prins et al 1986
Ne	237	Gloucester sand	91 1	2 9	6 0			5 9 (5)	1 mV	3 7				1 M	1 4 (AN-B)	(6 weeks) N E Netherlands		Prins et al 1986
Ne	237	Gloucester sand	91 1	2 9	6 0			5 9 (5)	11 mV	3 7				2 M	1 6 (AN-B)	(6 weeks) N E Netherlands		Prins et al 1986
Ne	237	Gloucester sand	91 1	2 9	6 0			6 4 (6)	5 mV	3 7				1 M	8 0 (AN-B)	(6 weeks) N E Netherlands		Prins et al 1986
Ne	237	Gloucester sand	91 1	2 9	6 0			6 5 (6)	21 mV	3 7				1 M	4 8 (AN-B)	(6 weeks) N E Netherlands		Prins et al 1986
Ne	237	Gloucester sand	91 1	2 9	6 0			6 7 (6)	-7 mV	3 7				2 M	5 7 (AN-B)	(6 weeks) N E Netherlands		Prins et al 1986
Ne	237	Gloucester sand	91 1	2 9	6 0			5 5 (5)	198 mV	3 7				1 M	1 4 (AN-C)	(8 5 weeks) N E Netherlands		Prins et al 1986
Ne	237	Gloucester sand	91 1	2 9	6 0			5 7 (5)	114 mV	3 7				1 M	1 2 (AN-C)	(8 5 weeks) N E Netherlands		Prins et al 1986
Ne	237	Gloucester sand	91 1	2 9	6 0			5 8 (5)	35 mV	3 7				2 M	1 9 (AN-C)	(8 5 weeks) N E Netherlands		Prins et al 1986
Ne	237	Gloucester sand	91 1	2 9	6 0			6 4 (6)	191 mV	3 7				1 M	3 9 (AN-C)	(8 5 weeks) N E Netherlands		Prins et al 1986
Ne	237	Gloucester sand	91 1	2 9	6 0			6 7 (6)	101 mV	3 7				1 M	8 8 (AN-C)	(8 5 weeks) N E Netherlands		Prins et al 1986
Ne	237	Sand, Coby 1012						6 3 (6)	-7 mV	3 7				2 M	6 6 (AN-C)	(8 5 weeks) N E Netherlands		Prins et al 1986
Ne	237	Sand, Coby 1012							(5)	-15 mV	155/Ca--			01M	(AN-B)	(6 weeks) Corleben, FRG		Prins et al 1986
Ne	237	Sand, Coby 1012						7 5 (7)	0 mV	155/Ca--					25 8 (AN-B)	(6 weeks) Corleben, FRG		Prins et al 1986
Ne	237	Sand, Coby 1012						6 0 (5)	15 mV	155/Ca--					30 5 (AN-B)	(6 weeks) Corleben, FRG		Prins et al 1986
Ne	237	Sand, Coby 2129						5 9 (5)	10 mV	1 183/Ca--				04 M	59 0 (AN-B)	(6 weeks) Corleben, FRG		Prins et al 1986
Ne	237	Sand, Coby 2129						7 4 (6 8)	2% mV	1 183/Ca--				1 M	66 0 (AN-B)	(6 weeks) Corleben, FRG		Prins et al 1986
Ne	237	Sand, Coby 2129						5 9 (5)	21 mV	1 183/Ca--				1 M	66 0 (AN-B)	(6 weeks) Corleben, FRG		Prins et al 1986
Ne	237	Sand, Coby 2129						7 5 (6 9)	10 mV	1 183/Ca--				2 5 M	32 0 (AN-B)	(6 weeks) Corleben, FRG		Prins et al 1986
Ne		(Mix-Ab						5 7		81 9cmol/kg				2 5 M	38 0 (AN-B)	(6 weeks) Corleben, FRG		Prins et al 1986
Ne		Ae						5 1		2 9mol/kg					-	0-4 cm Clayey Dystric Brunnsol		Sheppard, 1989
Ne		Bfj Bf(ps)						5 2		2 1cmol/kg					- (2 3--0 9)	4-15 cm Clayed Dystric Brunnsol	Pore (cmm (0 N - I, Ca, Cr, Fe, U, Th, Mn)	Sheppard, 1989
Ne		C-Cgj						6 7		1 7cmol/kg				1 R--0 4	(1 5--0 8)	15-45 cm Clayed Dystric Brunnsol	Kd (Leachate - on 1) Kd= Groundwater - ( )	Sheppard, 1989
Ne	237	Clay (Fraction)						6 5				Ca++(BASIS)?		2 5--0 7	(5 0--0 9)	45 cm Clayed Dystric Brunnsol	Soil type, Th, CEC & soil descr from BGS INF(82)16(31)	Sheppard, 1989
															990	(2-cm fraction (clay) of silt loam	Mn(6) 237 Tab2- Kd (0 N - Fe, Th, U)	Sheppard, 1989
																		Dahlman et al 1974

continued...

TABLE B-21 (concluded)

NUM	ISA	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CACO3	pH SAT PASTE	Eh (v)	CEC mmol/100g	% EPU (Pcm/100g)	CONC CATION	% COMP CATION	NUCLIDE CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Np		fine sandy loam				2.6	-	5.5 (4.08)		15	1.65				3	Malbin (Louisiana)	When value is bracketed it is extract pH	Nishita et al., 1979
Np		fine sandy loam				2.4		5.3 (5.57)	-	15	1.65				18	Malbin (Louisiana)		Nishita et al., 1979
Np		fine sandy loam				5.7	-	5.0 (4.42)	-	15	1.52				3	Lyman (Maine)		Nishita et al., 1979
Np		fine sandy loam				5.7	-	5.0 (6.06)	-	15	1.52				37	Lyman (Maine)		Nishita et al., 1979
Np		light loam				8.4		6.0 (5.56)		15	5.29				25	Aiken (California)		Nishita et al., 1979
Np		light loam				8.4	-	6.0 (6.57)	-	15	5.29				108	Aiken (California)		Nishita et al., 1979
Np		sand				-		2.5 - 3.1		-		0.002mol/L Ca			2.37	Burbank (Washington)		Houston et al., 1977
Np		sand				-		2.5 - 3.1				0.2mol/L Ca			0.36	Burbank (Washington)		Houston et al., 1977
Np		sand						2.5 - 3.1				0.01mol/L Na			3.9	Burbank (Washington)		Houston et al., 1977
Np		sand						2.5 - 3.1				3.0mol/L Na			3.2	Burbank (Washington)		Houston et al., 1977
Np		sandy clay						2.5 - 3.1				0.002mol/L Ca			0.25	South Carolina		Houston et al., 1977
Np		sandy clay				-		2.5 - 3.1		-		0.1mol/L Ca			0.16	South Carolina		Houston et al., 1977
Np		sandy clay				-		2.5 - 3.1				0.01mol/L Na			0.7	South Carolina		Houston et al., 1977
Np		sandy clay						2.5 - 3.1				3.0mol/L Na			0.4	South Carolina		Houston et al., 1977
Np			16	21.2	2.8	0.83	-	8.1		5.94					15.4	Burbank (Richland, Washington)		Ames & Rai, 1978
Np			44.6	1.6	3.8	0.21	-	5.2		0.69	-				37.4	Fomay (5.40 cm)		Ames & Rai, 1978
Np		sand				0.39		8.1	0 mal						390--16	N.E. Irish Sea Sediment		Lester & Ashton, 1982
Np		silty clay loam				2.8		5.9 (5.83)		20	1.29				35	Sharpsburg (Iowa)	When value is bracketed it is extract pH	Nishita et al., 1979
Np		silty clay loam				2.8		5.9 (6.80)		20	1.29				95	Sharpsburg (Iowa)		Nishita et al., 1979
Np		loam				2.5	-	6.7 (6.13)		25	2.41				52	Yolo (California)		Nishita et al., 1979
Np		loam				2.5		6.7 (6.83)		25	2.41				81	Yolo (California)		Nishita et al., 1979
Np			12.6	65.8	21.6	3.61	-	5.3		16.88					1.27	Pencatine		Ames & Rai, 1978
Np			32	56	12	0.84		6.5		10.76					20.2	Ritzville		Ames & Rai, 1978
Np		clay				0.6		7.8 (7.29)		30	1.20				41	Ritzville	When value is bracketed it is extract pH	Nishita et al., 1979
Np		clay				0.6		7.8 (8.28)		30	1.20				117	Ritzville		Nishita et al., 1979
Np		clay				0.86		8.1	0 mal						1950--310	NW Mediterranean sea sediment		Lester & Ashton, 1982
Np		clay				0.29		8.1	0 mal						3200--980	NW Atlantic sea sediment		Lester & Ashton, 1982
Np		organic				40.8		7.9 (6.24)		60	1.57				786	Egbert	When value is bracketed it is extract pH	Nishita et al., 1979
Np		organic				40.8		7.9 (7.25)		60	1.57				929	Egbert		Nishita et al., 1979

TABLE B-22

NICKEL K_d VALUES

NUC	ISO	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	pH SAT PASTE	EH (V)	CEC meq/ 100g	% EXPT (NOM) OXIDES	COMP CATION	% COMP CATION	NUCLIDE CONCENTRATION	Kd (ml/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Ni		sand	88	5	7										2100 (1/001)	Nearby 1, Nevada		Meinhardt, 1983
Ni		sand	91	2	7										3700	Nearby 2, Nevada		Meinhardt, 1983
Ni		sand	83	2	15										3600	Nearby 3, Nevada		Meinhardt, 1983
Ni		clayey sand	58	6	36										135	Barnwell 8, South Carolina	Tab2-Mn/Fe/aluminosilicate/pure, surface area & clay mineral comp	Meinhardt, 1983
Ni		clayey sand	68	11	21										170	Barnwell 12, South Carolina	Tab3: soil text & mineral. Tab4: Kds for 6 radionuclides	Meinhardt, 1983
Ni		clayey sand	73	8	19										116 (1501	Barnwell 14, South Carolina	Fig5: text diagram f-of Kd vs sorption minerals	Meinhardt, 1983
					13			6 2		112					10 1000	mean of 32 Danish soils		Meinhardt, 1983
																	Tab.3: Soil char - Kd correlations Tab 4: Regress coeff	Anderson and Dunn, 1980
Ni		clay	40 3	16 3	43 6	2 00		6 70		16 99			15 0				Fig1-3 Kd for Cd-function of pH Tab2from1 from CONCLUS	Anderson and Dunn, 1980
Ni															388	Marklenberg clay	(KR:37-44c/not included in KCAD Table. Cd-Cu-rel	Anderson and Dunn, 1980
Ni		loam	45 9	34 6	19 6	2 75		6 80		12 51			11 7				(Tab 1 = soil prop) (Tab 3 = Kd)	Reddy and Dunn 1986
		sand	63 4	21 5	15 2	7 68		5 67		6 02			5 1		772	Wilkes loam		Reddy and Dunn, 1986
															152	Iredell sandy loam	(Fig 3,4 = Kd vs metal conc)	Reddy and Dunn, 1986
																	(Tab 4 = regression analysis result)	Reddy and Dunn, 1986
																	Abstr and Conclusions	Reddy and Dunn, 1986
																		Reddy and Dunn, 1986
Ni		PA (0-30 cm)				31 7	5			134	C 88 (1 40)	0 1N Ca(NO3)2			0 72 (lg-1)	Aquad (= Germany) Org/silicate clay (DM/2 1)	Tab 5: Kd(lg-1): Fd, Ni, 2= solution	Tiller et al , 1984
Ni		PA (0-30 cm)				31 7	6			124	0 88 (1 40)	0 1N Ca(NO3)2			1 84 (lg-1)	Aquad (= Germany) Org/silicate clay (DM/2 1)	(Kref = Cd, 2=) Tab 2= clay composition	Tiller et al , 1984
Ni		PA (0-30 cm)				31 7	7			134	0 88 (1 40)	0 1N Ca(NO3)2			4 97 (lg-1)	Aquad (= Germany) Org/silicate clay (DM/2 1)	Tab 1= soil prop also mineralogy of clay soil, CEC,	Tiller et al , 1984
Ni		LA (0-30 cm)				5	5			65	1 18 (2 62)	0 1N Ca(NO3)2			0 17 (lg-1)	Adolf (N Germany) Silicate clay (2 1)	pH 5 & 7	Tiller et al , 1984
Ni		LA (0-30 cm)				5	6			65	1 18 (2 62)	0 1N Ca(NO3)2			0 48 (lg-1)	Adolf (N Germany) Silicate clay (2 1)		Tiller et al , 1984
Ni		LA (0-30 cm)				5	7			65	1 18 (2 62)	0 1N Ca(NO3)2			1 84 (lg-1)	Adolf (N Germany) Silicate clay (2 1)		Tiller et al , 1984
Ni		PEL (0-15 cm)				3 1	5			84	0 45 (1 61)	0 1N Ca(NO3)2			0 15 (lg-1)	Pellustert (Australia) Silicate clay (2 1)		Tiller et al , 1984
Ni		PEL (0-15 cm)				3 1	6			90	0 45 (1 61)	0 1N Ca(NO3)2			0 34 (lg-1)	Pellustert (Australia) Silicate clay (2 1)		Tiller et al , 1984
Ni		PEL (0-15 cm)				3 1	7			93	0 45 (1 61)	0 1N Ca(NO3)2			0 80 (lg-1)	Pellustert (Australia) Silicate clay (2 1)		Tiller et al , 1984
Ni		E46 (0-15 cm)				7 4	5			70	0 9 (0 55)	0 1N Ca(NO3)2			0 25 (lg-1)	Pelleverert (Australia) Silicate clay (2 1)		Tiller et al , 1984
Ni		E46 (0-15 cm)				7 4	6			70	0 9 (0 55)	0 1N Ca(NO3)2			0 51 (lg-1)	Pelleverert (Australia) Silicate clay (2 1)		Tiller et al , 1984
Ni		E46 (0-15 cm)				7 4	7			70	0 9 (0 55)	0 1N Ca(NO3)2			1 11 (lg-1)	Pelleverert (Australia) Silicate clay (2 1)		Tiller et al , 1984
Ni		BH (40-60 cm)				1 0	5			53	4 (2 26)	0 1N Ca(NO3)2			075 (lg-1)	Amself (N Germany) Silicate clay (2 1)		Tiller et al , 1984
Ni		BH (40-60 cm)				1 0	6			53	4 (2 26)	0 1N Ca(NO3)2			0 21 (lg-1)	Amself (N Germany) Silicate clay (2 1)		Tiller et al , 1984
Ni		BH (40-60 cm)				1 0	7			53	4 (2 26)	0 1N Ca(NO3)2			0 AB (lg-1)	Amself (N Germany) Silicate clay (2 1)		Tiller et al , 1984
Ni		PA B (20-30 cm)				0 8	5			74	09 (4 79)	0 1N Ca(NO3)2			909 (lg-1)	Paleorealf (N Germany) silicate clay/iron oxide (1 1/Fe)		Tiller et al , 1984
Ni		PA B (20-30 cm)				0 8	6			74	09 (4 79)	0 1N Ca(NO3)2			067 (lg-1)	Paleorealf (N Germany) silicate clay/iron oxide (1 1/Fe)		Tiller et al , 1984
Ni		PA B (20-30 cm)				0 8	7			74	09 (4 79)	0 1N Ca(NO3)2			1 01 (lg-1)	Paleorealf (N Germany) silicate clay/iron oxide (1 1/Fe)		Tiller et al , 1984
Ni		W (0-15 cm)				4 9	5			32	77 (19 3)	0 1N Ca(NO3)2			0 10 (lg-1)	Haplohumox (Australia) iron oxide/silicate clay (Fe/1 1)		Tiller et al , 1984
Ni		W (0-15 cm)				4 9	6			32	77 (19 3)	0 1N Ca(NO3)2			0 49 (lg-1)	Haplohumox (Australia) iron oxide/silicate clay (Fe/1 1)		Tiller et al , 1984
Ni		W (0-15 cm)				4 9	7			32	77 (19 3)	0 1N Ca(NO3)2			2 67 (lg-1)	Haplohumox (Australia) iron oxide/silicate clay (Fe/1 1)		Tiller et al , 1984
Ni		LB (30-50 cm)				1 1	5			53	54 (6 0)	0 1N Ca(NO3)2			076 (lg-1)	Udolf (N Germany) silicate clay/iron oxide (2 1/Fe)		Tiller et al , 1984
Ni		LB (30-50 cm)				1 1	6			53	54 (6 0)	0 1N Ca(NO3)2			0 11 (lg-1)	Udolf (N Germany) silicate clay/iron oxide (2 1/Fe)		Tiller et al , 1984
Ni		LB (30-50 cm)				1 1	7			53	54 (6 0)	0 1N Ca(NO3)2			0 78 (lg-1)	Udolf (N Germany) silicate clay/iron oxide (2 1/Fe)		Tiller et al , 1984
Ni		PB (50-60 cm)				16 5	5			87	5 20 (7 37)	0 1N Ca(NO3)2			053 (lg-1)	Amsed (N Germany) silicate clay/iron oxide (2 1/Fe)		Tiller et al , 1984
Ni		PB (50-60 cm)				16 5	6			87	5 20 (7 37)	0 1N Ca(NO3)2			0 47 (lg-1)	Amsed (N Germany) silicate clay/iron oxide (2 1/Fe)		Tiller et al , 1984
Ni		PB (50-60 cm)				16 5	7			87	5 20 (7 37)	0 1N Ca(NO3)2			3 70 (lg-1)	Amsed (N Germany) silicate clay/iron oxide (2 1/Fe)		Tiller et al , 1984
Ni		Goethite (lab)										0 1N Ca(NO3)2			0 23 (lg-1)	Goethite (lab prep)		Tiller et al , 1984
Ni		Goethite (lab)										0 1N Ca(NO3)2			0 63 (lg-1)	Goethite (lab prep)		Tiller et al , 1984
Ni		Goethite (lab)										0 1N Ca(NO3)2			< 40 (lg-1)	Goethite (lab prep)		Tiller et al , 1984
																		Tiller et al , 1984
Ni		Hollandale fine sand				14 5g/kg		8 20		1 13ueq/g						1) Glycol		Bunt and Schumack , 1989
Ni		Plantation Muck bottom layer				27 9g/kg		7 30		1 58ueq/g					0 604 L/g	Pompano Beach, Florida	(Fig 3)	Wang et al , 1983
Ni		Plantation Muck middle layer				670 2g/kg		7 20		4 09ueq/g					7 378 L/g	Pompano Beach, Florida	Tab 1 = ratio=s in soil Tab 2 = soil charact	Wang et al , 1983
Ni		Plantation Muck Low layer				705 2g/kg		7 10		4 53ueq/g					1 090 L/g	Pompano Beach, Florida	Tab 3 = heavy metals in soil Tab 4 = linear Kd (L/g)	Wang et al , 1983
															0 892 L/g	Pompano Beach, Florida	Tab 5 : Langmuir coeff Fig 1,& 2 : isotherms (Cr M	Wang et al , 1983
																	(0 N = Cu, /= Mn, N= Cd Co)	Wang et al , 1983

TABLE B-23

PHOSPHORUS K_d VALUES

NUC	ISI	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CACO3	pH SAT	pH PASTE	Fe (%)	CEC meq/100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	NUCLIDE CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
F								7.6					[illegible]			approx [illegible]1500	#1: Red Yellow Latosols & Regosols #2: Dark-Red Latosols #3: Dark Red Latosols & Terra Rosa Legitima #4: Terra Rosa Estructurada	Concl: high correlation Kd: %clay, %Al, %Fe & P cont. in soil Miyake, 1987 Fig 2,3,4: soil fert diagram Fig 5: Kd vs %clay Fig 6: Kd vs %Al Fig 7: Kd vs %Fe Fig 8: Kd vs total P Good paper #1 sandy, #2 sandy (carbonated) #3&4 clay >30%clay, >1 8%Fe, >40mgP/100g, >2mg SiO2/100g, Kd>1000 Fig 1: %clay vs. P-soration coeff Miyake, 1979 Fig 2: %Fe vs P-soration coeff Fig 3: Ca vs P-soration coeff Fig 4: Al vs P-soration coeff Fig 5: %C vs P-soration coeff Fig 6: 1 Dose P vs 4000ppm P	
F																			

TABLE B-24

PLUTONIUM K_d VALUES

wtr	ISO	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	SAT PASTE pH	Eh (v)	CEC meq/ 100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	MEDIUM CONCENTRATION	Kd (ml/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Pu	239	silt loam	19	46	35	7 8		6 6 (5 83)		20	1 29		0 06		6307	Sharpsburg series	Base clay minerals Table 2	Nishita et al . 1981
Pu	239	silt loam	19	56	25	9 8		(6 85)							3024	Sharpsburg series	vs mm Hg)) **	Nishita et al . 1981
Pu	239	sandy loam	55	35	10	2 4		6 3 (6 08)		15	3 65		0 05		850	Malbis series	Nishita 1-215 1981 (Tab 1 p 61)	Nishita et al . 1981
Pu	239	sandy loam	55	33	12	2 4		(5 57)							1515	Malbis series	(Extract) chro prop	Nishita et al . 1981
Pu	239	sandy loam	65	33	2	5 7		5 0 (4 62)		15	3 52		0 04		958	Lapyan series	(Tab 2 - radion conc)	Nishita et al . 1981
Pu	239	sandy loam	65	33	2	5 7		(6 06)							33	Lapyan series	Wallace et al ,1979, NUREG/CR-0701 : sand/silt/clay	Nishita et al . 1981
Pu	239	clay loam	29	36	35	0 6		7 8 (7 29)		35	1 20		0 04		744	Haltom-Ilo series (calcareous - 12% CaCO3)		Nishita et al . 1981
Pu	239	clay loam	29	36	35	0 6		(8 28)							361	Haltom-Ilo series (calcareous - 12% CaCO3)		Nishita et al . 1981
Pu	239	sandy loam	70	28	2	8 4		6 0 (5 56)		15	5 29		0 10		6865	Aiken series		Nishita et al . 1981
Pu	239	sandy loam	70	28	2	8 4		(6 57)							1352	Aiken series		Nishita et al . 1981
Pu	239	silt loam	27	58	15	2 5		6 7 (6 13)		25	2 41		0 08		4938	Yolo series		Nishita et al . 1981
Pu	239	silt loam	27	58	15	2 5		(8 83)							4341	Yolo series		Nishita et al . 1981
Pu	239	muck	70	30	0	40 8		7 7 (6 74)		30	1 57		0 10		2951	Egbert series		Nishita et al . 1981
Pu	239	muck	70	30	0	40 8		(7 75) (extract pH					(as 4 mM Extract		1655	Egbert series		Nishita et al . 1981
																		Nishita et al . 1981
																		Nishita et al . 1981
																		Nishita et al . 1981
Pu		clay	11	11	76			3-8							5-(1000 Pu (2	Savannah River Plant soil	Tab 1 p 10 (maybe that's pH that's needed for Hoeffner 85)	Hoeffner, 1985
Pu		clay	11	11	76			1-4							5-10000 Pu (3)	Savannah River Plant soil	Pu sorption onto SRP soil dependent on pH and oxidation	Hoeffner, 1985
Pu		clay	11	11	76			1-8							100-<10000 Pu (4)	Savannah River Plant soil	state of Pu and moisture content of soil	Hoeffner, 1985
																	moisture content (a 52 % relatively DRY soil,	Hoeffner, 1985
																	Pu Kd > 3000 to 6000 ml/g,	Hoeffner, 1985
																	Fig 15- Pd vs pH (Freud, 1958)	Hoeffner, 1985
																		Hoeffner, 1985
Pu	239	clay						6 0	-200 (m-						7600	glacial till	(Tab 4 - Kd's) (Pu-239)	Bell and Bates, 1988
Pu	239	Cl 2 sand						6 0	-200 (m-						1800	fine-coarse sand (Cl 2)	Tab 3- CV cmpr lab 2+ soil description (good conclusions)	Bell and Bates, 1988
Pu	239	C3 sand						6 0	-200 (m-						180	medium-coarse sand (C3)	Tab 3- activities Bq	Bell and Bates, 1988
Pu	239	C6 sand						6 0	-200 (m-						32	coarse sand (C6)		Bell and Bates, 1988
Pu	239	sand						6 0	-200 (m-						340	medium sand		Bell and Bates, 1988
								(Brunswick loess)										
Pu		typic						1 74 -- 1 0			256 -- 018				66 75 -- 26 84	(0-16 cm) brown	carbonate content in all profiles = negligible	Jakubick and Kahl, 1987
Pu		typic						0 436 4-5 5							106 0 -- 33 71	(0-16 cm) brown		Jakubick and Kahl, 1987
Pu		typic						2 11 -- 1 0			221 -- 063				107 1 -- 73 67	(0-16 cm) Ranker	(Sweet soil) (Soil profile according to Fig 3)	Jakubick and Kahl, 1987
Pu		typic						1 084 3 5-6							13 4 -- 2 10	(0-16 cm) Ranker	(Tab 1 - % Fe - low loss %)	Jakubick and Kahl, 1987
Pu		typic						4 69 -- 1 0			109 -- 015				143 0 -- 50 27	(0-16 cm) Podzol	(Fig 4 - S/C - Kd) (conclusions)	Jakubick and Kahl, 1987
Pu		typic						1 261 3-4 4							100 0 -- 20 86	(0-16 cm) Podzol	Brown/Dunkelbraun	Jakubick and Kahl, 1987
Pu		typic						0 55 -- 1 0			227 -- 016				23 6 -- 2 51	(16-96 cm) brown	Ranker/Iranbraun	Jakubick and Kahl, 1987
Pu		humic/sand						0 058 4-5 5							920 6 -- 183 76	(16-96 cm) brown	Podzol/Gartenboden	Jakubick and Kahl, 1987
Pu		humic/sand						0 053 1 0			252 -- 017				50 4 -- 2 50	(16-96 cm) Ranker		Jakubick and Kahl, 1987
Pu		humic/sand						-- 158 3 5-6							32 9 -- 27 11	(16-96 cm) Ranker		Jakubick and Kahl, 1987
Pu		humic/sand						2 413 -- 1 0			090 -- 018				54 2 -- 20 56	(16-96 cm) Podzol		Jakubick and Kahl, 1987
Pu		humic/sand						0 648 3-4 4							190 7 -- 175 54	(16-96 cm) Podzol		Jakubick and Kahl, 1987
Pu		sand						614 -- 1 0			247 -- 018				20 1 -- 2 26	(96-48 cm) brown		Jakubick and Kahl, 1987
Pu		sand						083 4-5 5							181 7 -- 119 41	(96-48 cm) brown		Jakubick and Kahl, 1987
Pu		sand						918 -- 1 0			741 -- 055				12 8 - 2 39	(96-48 cm) Ranker		Jakubick and Kahl, 1987
Pu		sand						706 3 5-6							192 1 -- 82 98	(96-48 cm) Ranker		Jakubick and Kahl, 1987
Pu		sand						3 119 -- 1 0			308 -- 107				48 5 -- 14 74	(96-48 cm) Podzol		Jakubick and Kahl, 1987
Pu		sand						3 100 3-4 4							407 5 -- 388 57	(96-48 cm) Podzol		Jakubick and Kahl, 1987
Pu	238	Bentonite - brine A						6 7							2900		Pu (4)-238 (Tab 1 - pH after equilibrium)	Nowak, 1980
Pu	238	10% bentonite - sand - brine A						6 7							520		(kd calculated based on bentonite mass) (mixture of	Nowak, 1980
Pu	238	Bentonite - sand - brine A						6 7							5200		bentonite, charcoal, montmorite and Na titanate = effective	Nowak, 1980
Pu	238	Bentonite - brine B						7 1							30000		backfill - p 5501	Nowak, 1980
Pu	238	10% bentonite - sand - brine B						7 1							3600			Nowak, 1980
Pu	238	Bentonite - sand - brine B						7 1							36000			Nowak, 1980
Pu	238	sand	90	5	5										700 (15000)	Beatty 1, Nevada	Beatty, Nevada Barnwell, S Carolina	Reichardt, 1983

continued...

TABLE B-24 (continued)

MAT	ISO	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	SAT	pH PASTE	TH (+)	CEC meq/ 100g	% FREE IRON OXIDES	CORR CATION	% CORR CATION	MULTIPLE CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Pu	238	sand	93	2	7											5600	Beatty 2, Nevada		
Pu	238	sand	83	2	15											1800	Beatty 5, Nevada	Wash Valley, NV (what - Kd's highest in alkaline alluvial basin deposits high in montmorillonite and zeolites)	Meshkovat, 1983
Pu	238	clayey sand	58	6	36											27000	Barnwell 6, South Carolina	(Kd) - Kd - mineral physo chem	Meshkovat, 1983
Pu	238	clayey sand	68	11	21											3100	Barnwell 12, South Carolina	Lab 2 - retardation - texture, surface area - clay	Meshkovat, 1983
Pu	238	clayey sand	73	8	19											135 (120000)	Barnwell 14, South Carolina	mineral comp (Lab 4 - Kd x 6 radionuclides)	Meshkovat, 1983
																		Fig 6 - Lost dispersn (Fig 7 - Kd vs sorbtive minerals)	Meshkovat, 1983
																		kd column - ( ) - reducing conditions	Meshkovat, 1983
Pu	238	sandy loam	74	12	14	0.3	0.6	7.9		0.41	6.4					100	WA-A NC (10x-8)	( ) - vertical Pu conc , M	Polzer and Hines, (2), 1982
Pu	238	sandy loam	74	12	14	0.3	0.6	7.9		0.42	6.4					48	" (10x-7)	(p 4 - Tab 1 - soil text)	Polzer and Hines, (2), 1982
Pu	238	sandy loam	74	12	14	0.3	0.6	7.9		0.44	6.4					35	" (10x-6)	(p 5 - Tab 2 - chem and phys prop)	Polzer and Hines, (2), 1982
Pu	238	clay loam	38	32	30	1.0	0.0	8		0.41	17.5					2000	ID-D Palatine series (10x-8)	(p 17 & 19 - Tab 1 & 2 - Kd's)	Polzer and Hines, (2), 1982
Pu	238	clay loam	38	32	30	1.0	0.0	7.9		0.41	17.5					1500	ID-D Palatine series (10x-7)	(ID - 4, ID - 8, WA - B - 40 cm	Polzer and Hines, (2), 1982
Pu	238	silty clay loam	16	50	34	0.8	1.7	8.4		0.45	15.5					310	ID-D Palatine series (10x-6)	remaining soils - 0-20 cm (surface)(subsurface))	Polzer and Hines, (2), 1982
Pu	238	silty clay loam	16	50	34	0.8	1.7	8		0.46	15.5					1700	ID-A Palatine series (10x-8)	NC = not classified	Polzer and Hines, (2), 1982
Pu	238	silty clay loam	16	50	34	0.8	1.7	7.8		0.46	15.5					4300	ID-A Palatine series (10x-7)	NA = not available	Polzer and Hines, (2), 1982
Pu	238	sandy clay loam	66	11	23	0.3	5.2	8		0.46	8.2					5000	ID-A Palatine series (10x-8)	Tab 3 (p 7 & 8) - % Pu sorbed v time interval	Polzer and Hines, (2), 1982
Pu	238	sandy clay loam	66	11	23	0.3	5.2	8		0.45	8.2					690	ID-C Palatine series (10x-8)	Summary and Conclusions	Polzer and Hines, (2), 1982
Pu	238	sandy clay loam	66	11	23	0.3	5.2	8		0.44	8.2					4100	ID-C Palatine series (10x-7)		Polzer and Hines, (2), 1982
Pu	238	clay loam	44	24	32	0.7	7.0	8.0		0.42	13.7					4000	ID-C Palatine series (10x-6)		Polzer and Hines, (2), 1982
Pu	238	clay loam	44	24	32	0.7	7.0	8.0		0.41	13.7					370	ID-B Palatine series (10x-8)		Polzer and Hines, (2), 1982
Pu	238	clay loam	44	24	32	0.7	7.0	8.0		0.41	13.7					330	ID-B Palatine series (10x-7)		Polzer and Hines, (2), 1982
Pu	238	clay loam	44	24	32	0.7	7.0	8.0		0.40	13.7					140	ID-B Palatine series (10x-6)		Polzer and Hines, (2), 1982
Pu	238	sandy loam	74	12	14	0.1	0.0	7.8		0.50	3.8					430	WA-B NC (10x-8)		Polzer and Hines, (2), 1982
Pu	238	sandy loam	74	12	14	0.1	0.0	7.8		0.45	3.8					600	WA-B NC (10x-7)		Polzer and Hines, (2), 1982
Pu	238	sandy loam	74	12	14	0.1	0.0	7.8		0.43	3.8					680	WA-B NC (10x-6)		Polzer and Hines, (2), 1982
Pu	238	clay	5	31	64	0.7	2.4	8		0.49	29.6					1900	CO-C NC (10x-8)		Polzer and Hines, (2), 1982
Pu	238	clay	5	31	64	0.7	2.4	7.8		.....	29.6					1900	CO-C NC (10x-7)		Polzer and Hines, (2), 1982
Pu	238	clay	5	31	64	0.7	2.4	8.2		.....	29.6					2000	CO-C NC (10x-6)		Polzer and Hines, (2), 1982
Pu	238	sand	78	2	20	0.7	0.2	5.5		0.48	7.0					780	SC Fumsay series (10x-8)		Polzer and Hines, (2), 1982
Pu	238	sand	78	2	20	0.7	0.2	5.2		0.53	7.0					970	SC Fumsay series (10x-7)		Polzer and Hines, (2), 1982
Pu	238	sand	78	2	20	0.7	0.2	5.2		0.53	7.0					1000	SC Fumsay series (10x-6)		Polzer and Hines, (2), 1982
Pu	238	loam	36	47	18	0.7	0.2	6.0		0.48	7.4					170	WA Los Alamos series (10E-8)		Polzer and Hines, (2), 1982
Pu	238	loam	36	47	18	0.7	0.2	6.0		0.47	7.4					200	WA Los Alamos series (10E-7)		Polzer and Hines, (2), 1982
Pu	238	loam	36	47	18	0.7	0.2	6.2		0.51	7.4					270	WA Los Alamos series (10E-6)		Polzer and Hines, (2), 1982
Pu	238	sandy loam	32	32	36	1.0	0.0	6.9		.....	20.5					2600	TW (NA) (10x-8)		Polzer and Hines, (2), 1982
Pu	238	sandy loam	32	32	36	1.0	0.0	6.0		.....	20.5					1200	TW (NA) (10x-7)		Polzer and Hines, (2), 1982
Pu	238	clay loam	44	20	36	2.4	0.4	6.5		0.50	20.0					14000	TW (NA) (10x-6)		Polzer and Hines, (2), 1982
Pu	238	clay loam	44	20	36	2.4	0.4	6.2		.....	20.0					2200	CO-A (NC) (10x-8)		Polzer and Hines, (2), 1982
Pu	238	clay loam	44	20	36	2.4	0.4	6.8		0.43	20.0					2700	CO-A (NC) (10x-7)		Polzer and Hines, (2), 1982
Pu	238	sandy clay loam	64	14	22	3.4	0.3	5.8		0.53	17.5					1200	CO-A (NC) (10x-6)		Polzer and Hines, (2), 1982
Pu	238	sandy clay loam	64	14	22	3.4	0.3	5.8		0.54	17.5					160	CO-B (NA) ((10x-8)		Polzer and Hines, (2), 1982
Pu	238	sandy clay loam	64	14	22	3.4	0.3	5.8		0.53	17.5					150	CO-B (NA) (10x-7)		Polzer and Hines, (2), 1982
Pu	238	clay loam	32	38	30	2.7	0.0	6.0		.....	16.0					43	CO-B (NA) (10x-6)		Polzer and Hines, (2), 1982
Pu	238	clay loam	32	38	30	2.7	0.0	6.0		0.54	16.0					870	MY Fulton series (10x-8)		Polzer and Hines, (2), 1982
Pu	238	clay loam	32	38	30	2.7	0.0	6.1		0.49	16.0					1170	MY Fulton series (10x-7)		Polzer and Hines, (2), 1982
Pu	239	glauconite sand	91	2	6	0.0	0.0	6.3	(5)	438	wv	3.7	(5 wks)		1	M	870	MY Fulton series (10x-6)		Polzer and Hines, (2), 1982
Pu	240	glauconite sand	91	2	6	0.0	0.0	6.0	(5)	462	wv	3.7	(5 wks)		1	M	9280 (AA-B)	NE Netherlands		Polzer and Hines, (2), 1982
Pu		glauconite sand	91	2	6	0.0	0.0	5.7	(5)	457	wv	3.7	(5 wks)		1	M	8435 (AA-B)	NE Netherlands	(Pu 238,240) Appendix 2	Prins et al, 1986
Pu		glauconite sand	91	2	6	0.0	0.0	5.6	(6)	435	wv	3.7	(5 wks)		1	M	9640 (A-B)	NE Netherlands	as are Am/2 as	Prins et al, 1986
Pu		glauconite sand	91	2	6	0.0	0.0	5.6	(6)	435	wv	3.7	(5 wks)		1	M	9775 (AA-B)	NE Netherlands	(D N = Am - Np - Tc)	Prins et al, 1986
Pu		glauconite sand	91	2	6	0.0	0.0	6.4	(6)	423	wv	3.7	(5 wks)		1	M	7810 (AA-B)	NE Netherlands	pH in ( ) = vertical pH	Prins et al, 1986
Pu		glauconite sand	91	2	6	0.0	0.0	6.4	(6)	435	wv	3.7	(5 wks)		1	M	7810 (AA-B)	NE Netherlands	Kd = function of pH, Eh, M, time - Appendices	Prins et al, 1986
Pu		glauconite sand	91	2	6	0.0	0.0	6.1	(5)	98	wv	3.7	(7 wks)		1	M	7900 (A-B)	NE Netherlands	This report is a problem v 1000's of Kd's	Prins et al, 1986
Pu		glauconite sand	91	2	6	0.0	0.0	5.8	(5)	34	wv	3.7	(7 wks)		1	M	4295 (AA-B)	NE Netherlands	Am-241 (depend + I)	Prins et al, 1986
Pu		glauconite sand	91	2	6	0.0	0.0	5.9	(5)	14	wv	3.7	(7 wks)		1	M	4490 (AA-B)	NE Netherlands	(D N = Pu-Np-Tc)	Prins et al, 1986
Pu		glauconite sand	91	2	6	0.0	0.0	6.4	(6)	16	wv	3.7	(7 wks)		1	M	4240 (AA-B)	NE Netherlands		Prins et al, 1986
																	2730 (AA-B)	NE Netherlands		Prins et al, 1986

continued...

TABLE B-24 (concluded)

MAT.	ISO	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	SAT. PASTE pH	EH (+)	CEC meq/100g	% FREE IRON OXIDES	COMP. CATION	% COMP. CATION	NUCLIDE CONCENTRATION	Kd (ml/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Pu		silt loam	41	29	30	0.0	0.0	6.5 (6)	-26 mV	3.7	(7 wks)			1 M	13345 (AN-B)	Nether lands	Key: - Aerobic	Prins et al., 1986
Pu		silt loam	41	29	30	0.0	0.0	6.5 (6)	-69 mV	3.7	(7 wks)			2 M	3515 (AN-B)	N.E. Netherlands	pH in ( ) = original pH	Prins et al., 1986
Pu		silt loam	41	29	30	0.0	0.0	5.37 (5)	66 mV	3.7	(18 wks)			1 M	1700-9000 (AN-C)	N.E. Netherlands	A - aerobic - Kd column	Prins et al., 1986
Pu		silt loam	41	29	30	0.0	0.0	5.8 (5)	216 mV	3.7	(18 wks)			1.0 M	1700-9000 (AN-C)	N.E. Netherlands	AN - anaerobic - Kd column	Prins et al., 1986
Pu		silt loam	41	29	30	0.0	0.0	5.7 (5)	-56 mV	3.7	(18 wks)			2 M	1700-8000 (AN-C)	N.E. Netherlands	B - batch - Kd column	Prins et al., 1986
Pu		silt loam	41	29	30	0.0	0.0	6.4 (6)	-2 mV	3.7	(18 wks)			0.1 M	1700-8000 (AN-C)	N.E. Netherlands	C - column - Kd column	Prins et al., 1986
Pu		silt loam	41	29	30	0.0	0.0	6.4 (6)	-32 mV	3.7	(18 wks)			1 M	1700-8000 (AN-C)	N.E. Netherlands	M = molarity = salt conc	Prins et al., 1986
Pu		silt loam	41	29	30	0.0	0.0	6.6 (6)	18 mV	3.7	(18 wks)			2 M	1700-8000 (AN-C)	N.E. Netherlands		Prins et al., 1986
Pu		sand, Coby 1012						6.1 (5)	49 mv	.155 Cs++(7 wks)				012 M	244 (AN-B)	N.E. Netherlands		Prins et al., 1986
Pu		sand, Coby 1212						7.7 (7)	20 mV	.155 Cs++(7 wks)				012 M	143 (AN-B)	N.E. Netherlands		Prins et al., 1986
Pu		sand, Coby 1012						6.0 (5)	38 mV	155 Cs++(7 wks)				05 M	162 (AN-B)	N.E. Netherlands		Prins et al., 1986
Pu		sand, Coby 1212						7.9 (7)	26 mV	155 Cs++(7 wks)				05 M	126 (AN-B)	N.E. Netherlands		Prins et al., 1986
Pu		sand, Coby 2120						7.3 (6.8)	9 mV	1 183 Cs++(7 wks)				1 M	438 (AN-B)	N.E. Netherlands		Prins et al., 1986
Pu		sand, Coby 2120						7.2 (6.8)	-21 mV	1 183 Cs++(7 wks)				2.5 M	643 (AN-B)	N.E. Netherlands		Prins et al., 1986
Pu	237	Clay (fract-on)						6.5				SrNCa(NO3)2			300000	<2-µm fraction (clay) of silt loam		Prins et al., 1986
Pu		Clay						1.77			84.26			6.45x10E-6M Pu(6)	2.4 log	Bentonite	Tab 2: Kd (D N - Th,U,Np) Pu(41-257	Bolton et al., 1976
Pu		Clay						2.90			84.26			6.46x10E-6M Pu(6)	2.0 log	Bentonite	Pu(6) (Tab 1: Pu Kd) (D N - Am(3))	Bolton, 1987
Pu		Clay						5.73			64.26			6.42x10E-6M Pu(6)	2.8 log	Bentonite		Bolton, 1987
Pu		Clay						6.70			64.26			6.41x10E-6M Pu(6)	2.7 log	Bentonite		Bolton, 1987
Pu		Clay						7.00			64.26			6.40x10E-6M Pu(6)	4.1 log	Bentonite		Bolton, 1987
Pu		Loam						6.52 (5.0)							7.4x10E3	Tokai-mura, Naka-gun, Ibaraki-ken JAPAN		Bolton, 1987
Pu		Loam						6.52 (5.1)							4.6x10E3	Tokai-mura, Naka-gun, Ibaraki-ken JAPAN	(Pu) (Tab 3: Kd, 3 wks)(Tab 2: synthetic CW constituents)	Semmo et al., 1980
Pu		Medium sand						6.52 (5.7)							1.9x10E3	Tokai-mura, Naka-gun, Ibaraki-ken JAPAN	(Fig.3: Kd between glass and liquid stage)	Semmo et al., 1980
Pu		Medium Sand						6.52 (5.8)							9.7x10E2	Tokai-mura, Naka-gun, Ibaraki-ken JAPAN	(Fig.4: Pu concentration from column)	Semmo et al., 1980
																	pH in ( ) = pH after 3 weeks	Semmo et al., 1980
Pu		Fine sandy loam				2.4	-	5.3 (4.08)	-	15	1.65	-			8.5x10E2	Malbis (Louisiana)		
Pu		Fine sandy loam				2.4	-	5.3 (5.57)	-	15	1.65	-			1.515x10E3	Malbis (Louisiana)		Nishita et al., 1970
Pu		Fine sandy loam				5.7	-	5.0 (4.42)	-	15	1.52	-			9.58x10E2	Lyman (Yuma)		Nishita et al., 1970
Pu		Fine sandy loam				5.2	-	5.0 (6.05)	-	15	1.52	-			3.3x10E2	Lyman (Yuma)		Nishita et al., 1970
Pu		Light loam				8.4	-	6.0 (5.56)	-	15	5.79	-			6.85x10E3**	Aiken (California)		Nishita et al., 1970
Pu		Light loam				8.4	-	6.0 (6.57)	-	15	5.79	-			1.352x10E3	Aiken (California)		Nishita et al., 1970
Pu		coarse sand				-	-	7.8	-	-	-		Na (90% sat solution)		2x10E2	(Netherlands)		Nishita et al., 1970
Pu																		Hamstra & Verkerk, 1977
Pu			44	20	36	2.4	0.4	5.7	0.41	20	-	-			2.7x10E3--460-	Colorado A (Rocky Flats)		
Pu			64	14	22	3.4	0.3	5.6	0.52	17.5	-	-			2.0x10E2--24-	Colorado B (Sugar Loaf)		Glover et al., 1976
Pu			66	11	23	0.3	5.2	8.0	0.47	12.8	-	-			3.2x10E2--36-	Idaho B		Glover et al., 1976
Pu			38	32	30	0.3	0	7.5	0.45	17.5	-	-			6.9x10E2--110-	Idaho C		Glover et al., 1976
Pu			74	12	14	0.3	0.6	8.0	0.43	6.4	-	-			2.1x10E3--640-	Idaho D		Glover et al., 1976
Pu			74	12	14	0.1	0	8.2	0.44	5.8	-	-			1.0x10E2--7-	Washington A (Hanford)		Glover et al., 1976
Pu			78	2	20	0.7	0.2	5.4	0.34	2.9	-	-			4.3x10E2--27-	Washington B (Hanford)		Glover et al., 1976
Pu			82	10	8	0.2	0.2	6.4	0.49	7.7	-	-			2.0x10E2--5-	S. Carolina (Barnwell)		Glover et al., 1976
Pu			87	9	9	0.6	0.7	7.8	0.57	3.8	-	-			1.0x10E2--5-	New Mexico (Los Alamos)		Glover et al., 1976
Pu		Subsoil sand				-	2	8.6 (6.5)	-	5	-	-			8.0x10E1--3-	Arkansas B		Glover et al., 1976
Pu		Subsoil sand				-	2	8.6 (9.3)	-	5	-	-			1.314x10E3	Hanford		Glover et al., 1976
Pu		silty clay loam				2.8	-	5.9 (5.83)	-	20	1.29	-			2.0x10E2	Hanford		Rhodes, 1957
Pu		silty clay loam				2.8	-	5.9 (6.85)	-	20	1.29	-			6.302x10E3	Sharpsburg (Iowa)		Rhodes, 1957
Pu		Silt - loam				7.5	-	6.7 (6.13)	-	25	2.41	-			3.074x10E3	Sharpsburg (Iowa)		Rhodes, 1957
Pu		Silt - loam				7.5	-	6.7 (6.83)	-	25	2.41	-			4.938x10E3	Yolo (California)		Nishita et al., 1970
Pu			16	50	34	0.8	17.2	7.8	0.44	15.5	-	-			4.341x10E3	Yolo (California)		Nishita et al., 1970
Pu			9	54.9	37	2.3	0.6	3.3	0.57	16.2	-	-			1.7x10E3--70-	Idaho A		Nishita et al., 1970
Pu			31	53	16	3.6	0.7	5.6	0.56	17.4	-	-			4.3x10E2--28-	Arkansas C		Glover et al., 1976
Pu		Silt - Appended in computer				-	-	-	-	-	-	-			2.3x10E2--10-	Illinois		Glover et al., 1976
Pu		Clay				0.6	-	7.8 (7.79)	-	30	1.2	-			9x10E4			Glover et al., 1976
Pu						0.6	-	7.8 (8.26)	-	30	1.2	-			7.44x10E2	Holtsville		Pillai & Mathew, 1976
Pu						-	-	7.8	-	-	-	-			3.61x10E2	Holtsville		Nishita et al., 1970
Pu													Na (90% sat solution)		1x10E4	(Netherlands)		Nishita et al., 1970
Pu																		Hamstra & Verkerk, 1977
Pu			5	31	64	0.7	2.4	7.0	0.42	29.6	-	-			1.7x10E3--110-	Colorado C (Rocky Flats)		
Pu			32	33	35	1	0	4.8	0.49	20.5	-	-			2.6x10E3--640-	Tennessee (Oak Ridge)		Glover et al., 1976
Pu			32	32	36	2.7	0	5.4	0.45	16	-	-			8.1x10E2--130-	New York (Great Valley)		Glover et al., 1976
Pu			10	34	56	3.2	0.8	5.2	0.57	34.4	-	-			7.1x10E2--36-	Arkansas A		Glover et al., 1976
Pu		treated clay				-	-	6.0	-	-	-	-	5 meq/L Ca2+ (as nitrate)		1.4x10E5	90% Pu(VI)		Glover et al., 1976
Pu		Clay fraction					-	6.5	-	-	-	-	5 meq/L Ca2+ (as nitrate)		1.04x10E5	237Pu(IV)		Bondietti & Reynolds, 1976
Pu		clay fraction					-	6.5	-	-	-	-	5 meq/L Ca2+ (as nitrate)		1.68x10E5	Ca 2a+ soil clay fraction 238Pu(IV)		Bondietti et al., 1975
Pu		Clay fraction					-	6.4	-	-	-	-	5 meq/L Ca2+ (as nitrate)		7.4x10E4	Carbal soil clay fraction 239(IV)		Bondietti et al., 1975
Pu		abyssal red clay						7.2					0.01 M Ca(NO3)2		3.16x10E3	Carbal soil clay fraction		Bondietti et al., 1975
Pu		abyssal red clay						8.0					0.60M NaCl solution		2.5x10E3			Erickson, 1980
Pu		Inceptisol				40.8	-	7.7 (6.74)		60	1.57				7.951x10E3	Fabert		Erickson, 1980
Pu		Organic				40.8	-	7.7 (7.25)		60	1.57				1.655x10E3	Fabert		
Pu		Organic - home charcoal						7.0							6.7x10E4			Nishita et al., 1970
Pu		Organic - record charcoal						7.0							2.4x10E4			Nishita et al., 1970
																		Tamura, 1972
																		Tamura, 1972

TABLE B-25

POLONIUM K_d VALUES

Rock	ISB	Soil Type	% Sand	% Silt	% Clay	% OMC	% $CaCO_3$	Sat Past	pH (+)	CEC meq/ 100g	% Free Iron Oxides	Comp Cation	% Comp Cation	Nuclide Concentration	K_d (mL/g)	Soil Location or Description	Other Information	Reference
Fe	210	Fine sandstone & silty clay						2 0							0			
Fe	210	Fine sandstone & silty clay						4 5							0		(Fe-210) Tab 2	Mays-Dafarr et al , 1981
Fe	210	Fine sandstone & silty clay						5 75							12		= 226 : Lake Geology	Mays-Dafarr et al , 1981
Fe	210	Fine sandstone & silty clay						7 0							25		= 230 : Lat-1 Rock Formation	Mays-Dafarr et al , 1981
Fe		Sand	47	32	26	6 1	-	7 6	-	22 8	-	-			1200--54	Numa silty clay loam (A1) (Colorado)	* All or terms in this table are standard error of the mean (S E)	Hamon & Watters, 1971
Fe			-	-	-	-	-	-	-	-	-	-			2034--27	Numa silty clay loam (A12) (Colorado)		Hamon & Watters, 1971
Fe			-	-	-	-	-	-	-	-	-	-			3134--41	Numa silty clay loam (B1) (Colorado)		Hansen & Watters, 1971
Fe			-	-	-	-	-	-	-	-	-	-			7484--149	Numa silty clay loam (B26) (Colorado)		Hansen & Watters, 1971
Fe			-	-	-	-	-	-	-	-	-	-			1293--186	Numa silty clay loam (B3Ca) (Colorado)		Hansen & Watters, 1971
Fe			-	-	-	-	-	-	-	-	-	-			643--85	Numa silty clay loam (C Ca) (Colorado)		Hansen & Watters, 1971
Fe			40	31	29	-	-	7 0	-	-	-	-			723--83	Ustodolls silty clay loam (C) (Iowa)		Hansen & Watters, 1971
Fe			45	42	13	2 3	-	6 5	-	5 4	-	-			192--26	Lapeer loam (Aa) (Wisconsin)		Hansen & Watters, 1971
Fe			54	25	24	-	-	6 7	-	-	-	-			906--11	Lapeer loam (B21) (Wisconsin)		Hansen & Watters, 1971
Fe			58	20	21	-	-	5 5	-	-	-	-			508--34	Lapeer loam (B22) (Wisconsin)		Hansen & Watters, 1971
Fe			62	15	23	-	-	5 7	-	-	-	-			814--42	Lapeer loam (B3) (Wisconsin)		Hansen & Watters, 1971
Fe			72	18	10	-	-	7 8	-	-	-	-			275--9	Lapeer loam (C) (Wisconsin)		Hansen & Watters, 1971
Fe			95	4	5	-	-	5 9	-	3 0	-	-			76--7	Adamsville (A1) (Florida)		Hansen & Watters, 1971
Fe			84	6	10	-	-	5 4	-	2 6	-	-			35--3	Elanton (A1) (Florida)		Hansen & Watters, 1971
Fe			95	2	3	-	-	5 5	-	1 8	-	-			25--2	Lakeland (A1) (Florida)		Hansen & Watters, 1971
Fe			97	1	2	-	-	5 5	-	1 5	-	-			17--1	Leon (A1) (Florida)		Hansen & Watters, 1971
Fe			-	-	-	-	-	-	-	-	-	-			15--0 6	Leon (A2) (Florida)		Hansen & Watters, 1971
Fe			-	-	-	-	-	-	-	-	-	-			55--17	Leon (B+) (Florida)		Hansen & Watters, 1971
Fe			-	-	-	-	-	-	-	-	-	-			77--29	Leon (C) (Florida)		Hansen & Watters, 1971
Fe			95	2	2	-	-	5 6	-	4 6	-	-			17--1	Rushin (A1) (Florida)		Hansen & Watters, 1971
Fe			57	30	13	-	-	5 5	-	-	-	-			13--2	Dorling gravelly sandy loam (B2) (Colorado)		Hansen & Watters, 1971
Fe			74	17	9	-	-	5 7	-	-	-	-			30--7	Dorling gravelly sandy loam (B2-r) (Colorado)		Hansen & Watters, 1971
Fe			80	16	4	-	-	6 0	-	-	-	-			66--9	Dorling gravelly sandy loam (C1) (Colorado)		Hansen & Watters, 1971
Fe			74	22	4	-	-	6 0	-	-	-	-			75--8	Dorling gravelly sandy loam (C2) (Colorado)		Hansen & Watters, 1971
Fe			49	39	12	4	-	6 6	-	16 9	-	-			254--27	Goodrich sandy loam (A2) (Wisconsin)		Hansen & Watters, 1971
Fe			57	30	13	-	-	5 8	-	-	-	-			371--36	Goodrich sandy loam (B2r) (Wisconsin)		Hansen & Watters, 1971
Fe			47	29	24	-	-	6 8	-	-	-	-			287--5	Gosnick sandy loam (B3rh) (Wisconsin)		Hansen & Watters, 1971
Fe		Sand	68	27	5	-	-	5 9	-	-	-	-			249--25	Gosnick sandy loam (B3) (Wisconsin)		Hansen & Watters, 1971
Fe			46	44	10	2 4	-	6 8	-	5 1	-	-			297--20	Downey fine sandy loam (Aa) (Wisconsin)		Hansen & Watters, 1971
Fe			48	43	11	-	-	6 0	-	-	-	-			412--150	Downey fine sandy loam (B-rh) (Wisconsin)		Hansen & Watters, 1971
Fe			67	20	13	-	-	8 2	-	-	-	-			2248--1700	Downey fine sandy loam (C1) (Wisconsin)		Hansen & Watters, 1971
Fe			67	20	13	-	-	8 4	-	-	-	-			7020--3600	Downey fine sandy loam (C2) (Wisconsin)		Hansen & Watters, 1971
Fe			82	5	13	-	-	6 3	-	2 7	-	-			76--1	Amite (A1) (Alabama)		Hansen & Watters, 1971
Fe			91	0	9	-	-	5 0	-	1 9	-	-			188--15	Independence (A1) (Alabama)		Hansen & Watters, 1971
Fe			83	27	10	-	-	5 6	-	3 4	-	-			40--3	Wickham (A1) (Alabama)		Hansen & Watters, 1971
Fe		Silt	11	68	21	3 8	-	5 8	-	25 2	-	-			1030--49	Dinsdale silty clay loam (A) (Iowa)		Hansen & Watters, 1971
Fe			17	55	28	-	-	5 6	-	-	-	-			916--127	Dinsdale silty clay loam (B) (Iowa)		Hansen & Watters, 1971
Fe			3	73	24	4 5	-	5 5	-	29 4	-	-			1136--118	Muscatine silty clay loam (A) (Iowa)		Hansen & Watters, 1971
Fe			10	61	29	-	-	5 4	-	-	-	-			968--32	Muscatine silty clay loam (B) (Iowa)		Hansen & Watters, 1971
Fe			11	65	24	-	-	7 8	-	-	-	-			1830--210	Muscatine silty clay loam (C) (Iowa)		Hansen & Watters, 1971
Fe			10	80	10	2 1	-	5 9	-	11 2	-	-			970--150	Fayette silt loam (Aa) (Wisconsin)		Hansen & Watters, 1971
Fe			9	71	21	-	-	6 2	-	-	-	-			122- 3	Fayette silt loam (B1) (Wisconsin)		Hansen & Watters, 1971
Fe			5	66	29	-	-	6 1	-	-	-	-			92--3	Fayette silt loam (B21) (Wisconsin)		Hansen & Watters, 1971
Fe			2	66	32	-	-	5 6	-	-	-	-			507--55	Fayette silt loam (B22) (Wisconsin)		Hansen & Watters, 1971
Fe			5	65	30	-	-	5 3	-	-	-	-			80--2	Fayette silt loam (B23) (Wisconsin)		Hansen & Watters, 1971
Fe			5	66	29	-	-	5 5	-	-	-	-			772--29	Fayette silt loam (C) (Wisconsin)		Hansen & Watters, 1971
Fe			33	52	15	3 8	-	5 1	-	29 0	-	-			24- 1	Darling gravelly sandy loam (A1) (Colorado)		Hansen & Watters, 1971
Fe			27	55	18	-	-	5 5	-	16 4	-	-			405--28	Congaree (A1) Alabama		Hansen & Watters, 1971

TABLE B-26

RADIUM K_d VALUES

NUC	ISO	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	pH SAT PASTE	EH (v)	CEC meq/100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	NUCLIDE CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Ra																		
Ra	226	fine sandstone + silty sand						2 0							0		No Kd reported, but % Ra sorbed in Table 6 (including 14 soils + phys properties) SEDIMENT	Landa and Reid, 1982
Ra	226	fine sandstone + silty sand						4 5							12			Hajj-Djafari et al , 1981
Ra	226	fine sandstone + silty sand						5 75							60		Tab 4 p 226 + site geology	Hajj-Djafari et al , 1981
Ra	226	fine sandstone + silty sand						7 0							100		p 230 + split rock formation	Hajj-Djafari et al , 1981
Ra		Sand	93	5	2	0 05	40 8	7.8(CaCl2)	-	1 19	-	Initial Ra conc before soil contact 1 6x10E-5 mg/L Ca2+ 0 05mol/L			106+-16	Leamington (6) medium sand		Gilham et al 1981b
Ra			91 1	6 8	1 3	3 1	-	5 2		10 9					4x10E3	St Thomas		
Ra			91 1	6 8	1 3	3 1		5 2	-	10 9	-	no Ca			3.8x10E4	St Thomas		Nathean & Phillips, 1979
Ra		Silt	35	36	29	0 41	33 8	8 5(CaCl2)	-	8 32	-	Initial Ra conc before soil contact 4x10E-5 mg/L Ca2+ 0 05mol/L			1252+ 370	WARE-(2) clay loam		Nathean & Phillips, 1979
Ra			6 7	47 9	45 4	16 2	-	5 4	-	34 7	-	no Ca			1 1x10E5	Wendover		Gilham et al 1981b
Ra			6 7	47 9	45 4	16.2	-	5 4	-	34 7	-				9 5x10E5	Wendover		Nathean & Phillips 1979
Ra			43 7	48 9	7 4	1	-	4 3	-	10 4	-	Ca2+ 0 05mol/L			2 0x10E4	Grimsby		Nathean & Phillips 1979
Ra			43 7	48 9	7 4	1	-	4 3	-	10 4	-	no Ca			1 2x10E5	Grimsby		Nathean & Phillips 1979
Ra		Clay	31	34	35	0 81	5 2	7 8(CaCl2)	-	31 4	-	Initial Ra conc before soil contact 3 7x10E-5 mg/L Na+ 288 mg/L Ca2+ 75 mg/L			696+-185	Alberta clay loam		Nathean & Phillips 1979
Ra		Clay				-	-	7 55?	-	-	-				5 6x10E4	clay, mud		Gilham et al 1981b
Ra		Clay sediment					-	-	-	-	-	-			13 3x10E3+	clay sediment (Pacific)		Allard et al , 1977
Ra		Clay sediment					-	-	-	-	-	-			10 5x10E3+	clay sediment (Pacific)	min values reald & data based on desorp of deep sea clays	Cochran & Krishnaswami, 1980
Ra		Clay sediment				-	-	-	-	-	-	-			8x10E3+	clay sediment (Pacific)		Cochran & Krishnaswami, 1980
Ra		Clay sediment				-	-	-	-	-	-	-			4 3x10E3	clay sediment (Pacific)		Cochran & Krishnaswami, 1980
Ra		Clay sediment				-	-	-	-	-	-	-			14 9x10E3+	clay sediment (Pacific)		Cochran & Krishnaswami, 1980
Ra		Clay sediment				-	-	-	-	-	-	-			17 4x10E3+	clay sediment (Pacific)		Cochran & Krishnaswami, 1980
Ra		Clay sediment				-	-	-	-	-	-	-						Cochran & Krishnaswami, 1980

TABLE B-27

RUTHENIUM K_d VALUES

Ref	Seq	Soil type	% SAND	% SILT	% CLAY	% OMC	% CaCO3	SAT PASTE	pH	Eh (v)	CEC meq/ 100g	% EXCH IRON OXIDES	CHEM CATION	% EXC CATION	NUCLIDE CONCENTRATION	Kd (ml/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Ba	100	sandy loam					1 1	7 0								log 1) Cleymal		(Fig 31 (Ku105)	Bunzl & Schmeck, 1980
Ba	101	loamy peat					0 5	6 8							10e1 - <10e3 log 2)	Saprric Histosol,strongly humified			Bunzl & Schmeck, 1980
Ba	102	sandy loam					7(100)	5 7							>10e1 <10e3 log 3)	Camb-sol,brown earth from loess			Bunzl & Schmeck, 1980
Ba	103	sandy loam					7(63)	7 1							>10e1 - <10e3 log 4)	Camb-sol,brown earth			Bunzl & Schmeck, 1980
Ba	104	loamy sand					7(5)	4 6							>10e1 - <10e2 log 5)	Acr-sol, parabrown earth, Ah			Bunzl & Schmeck, 1980
Ba	105	loamy sand					7(23)	4 6							>10e1 - <10e2 log 6)	Acr-sol, parabrown earth, O-horizon			Bunzl & Schmeck, 1980
Ba	106	clay					8 0				0 2 meq/g				>10e3 <10e4 log 7)	Buntsandstein,Sand chalne AC Matchen			Bunzl & Schmeck, 1980
Ba	107	peat													>10e2 - <10e3 log 8)	P1 Spag peat (high moor) Steinhuder Meer,Hannover			Bunzl & Schmeck, 1980
Ba	108	peat													<10e3 log	P2 Spag peat (high moor) Reinigsdorf,Bavaria			Bunzl & Schmeck, 1980
Ba	109	organic peat						4 0							0.38 x 10e4 - -	07 (6-8 cm)(0 13 day) Lofgreen Bog, NY		Tab 5a (Rd) (Ru-106)	Schell et al, 1981
Ba	110	organic peat						4 0							1.3 x 10e4 - -	07 (6-8 cm)(1 day) Lofgreen Bog, NY		(Tab 8 = comparison - Sibley 82)	Schell et al, 1981
Ba	111	organic peat						4 0							3.3 x 10e4 -	91 (6-8 cm)(4 days) Lofgreen Bog, NY			Schell et al, 1981
Ba	112	organic peat						4 0							6.8 x 10e4 -	31 (6-8 cm)(10 days) Lofgreen Bog, NY			Schell et al, 1981
Ba	113	organic peat						4 0							8.0 x 10e4 -	1 8 (6-8 cm)(15 days) Lofgreen Bog, NY			Schell et al, 1981
Ba	114	organic peat						4 0							----------	(6-8 cm)(23 days) Lofgreen Bog, NY			Schell et al, 1981
Ba	115	organic peat						4 0							8.5 x 10e4 - -	1 2 (6-8 cm)(27 days) Lofgreen Bog, NY			Schell et al, 1981
Ba	116	organic peat						4 0							----------	(6-8 cm)(30 days) Lofgreen Bog, NY			Schell et al, 1981
Ba	117	organic peat						4 0							----------	(20-21 cm)(0 13 days) Lofgreen Bog, NY			Schell et al, 1981
Ba	118	organic peat						4 0							1.2 x 10e4 -	07 (20-21 cm)(1 day) Lofgreen Bog, NY			Schell et al, 1981
Ba	119	organic peat						4 0							3.0 x 10e4 -	19 (20-21 cm)(4 days) Lofgreen Bog, NY			Schell et al, 1981
Ba	120	organic peat						4 0							4.3 x 10e4 -	1 1 (20-21 cm)(10 days) Lofgreen Bog, NY			Schell et al, 1981
Ba	121	organic peat						4 0							6.9 x 10e4 -	49 (20-21 cm)(15 days) Lofgreen Bog, NY			Schell et al, 1981
Ba	122	organic peat						4 0							8.7 x 10e4 -	87 (20-21 cm)(23 days) Lofgreen Bog, NY			Schell et al, 1981
Ba	123	organic peat						4 0							----------	(20-21 cm)(27 days) Lofgreen Bog, NY			Schell et al, 1981
Ba	124	organic peat						4 0							9.1 x 10e4 -	84 (20-21 cm)(30 days) Lofgreen Bog, NY			Schell et al, 1981
Ba	125	organic peat						4 0							0.76 x 10e4 - -	05 (6-8 cm)(0 13 days) Spruce Flats Bog, PA			Schell et al, 1981
Ba	126	organic peat						4 0							2.5 x 10e4 -	44 (6-8 cm)(1 day) Spruce Flats Bog, PA			Schell et al, 1981
Ba	127	organic peat						4 0							4.1 x 10e4 -	01 (6-8 cm)(4 days) Spruce Flats Bog, PA			Schell et al, 1981
Ba	128	organic peat						4 0							3.6 x 10e4 -	13 (6-8 cm)(10 days) Spruce Flats Bog, PA			Schell et al, 1981
Ba	129	organic peat						4 0							----------	(6-8 cm)(15 days) Spruce Flats Bog, PA			Schell et al, 1981
Ba	130	organic peat						4 0							----------	(20-21 cm)(0 13 days) Spruce Flats Bog, PA			Schell et al, 1981
Ba	131	organic peat						4 0							1.2 x 10e4 -	05 (20-21 cm)(1 day) Spruce Flats Bog, PA			Schell et al, 1981
Ba	132	organic peat						4 0							3.0 x 10e4 -	37 (20-21 cm)(4 days) Spruce Flats Bog, PA			Schell et al, 1981
Ba	133	organic peat						4 0							5.1 x 10e4 -	11 (20-21 cm)(10 days) Spruce Flats Bog, PA			Schell et al, 1981
Ba	134	organic peat						4 0							5.4 x 10e4 -	54 (20-21 cm)(15 days) Spruce Flats Bog, PA			Schell et al, 1981
Ba	135	SRP soil (bw-sol grad)						3 95								>63	SRP - Savannah River Plant		Hoeffner, 1985
Ba	136	SRP soil (bw-sol grad)						4 72								>63		1 wo time days (Ru 106) (Ru 103)	Hoeffner, 1985
Ba	137	SRP soil (bw-sol grad)						---								>63		2 wo time days (Tab 7, p 43)	Hoeffner, 1985
Ba	138	SRP soil (bw-sol grad)						4 20								>63		4 wo time days (also Stone et al, 1984 (1-77)	Hoeffner, 1985
Ba																100 >00		7 wo time days	Hoeffner, 1985
Ba	193		80	17	3		0	3 7 (CaCl2)			105 meq/:					37 (at 73)		Ksh sandy loam (screen limit, ph 4 to 6, T-p, 13)	Hoeffner, 1985
Ba	102	Ap (0 22 cm)					1 19	8 3 (solution)			15 4					>150	Ausweardzing (B-bl's)	Rd col. (1kRd range Tab Intro: prog. Tab 2-Nr	Schmeck et al, 1987
Ba	103	C (22-33 cm)					1 15	8 3 (solution)			17 7					>100	Ausweardzing (B-bl's)	Fig 1 & 2 : Rd - soil horizon Fig 3 : Rd vs Ca + Mg ions	Bunzl et al, 1984
Ba	103	Cr (30-42 cm)					1 01	8 2 (solution)			15 2					>100	Ausweardzing (B-bl's)	Fig 4 : Rd - comparison column + batch	Bunzl et al, 1984
Ba	103	1 Cr Cr (47 WD cm)					0 25	8 1 (solution)			8 5					1000	Ausweardzing (B-bl's)	Fig 5 : Rd - 6 soils (A-hor.)	Bunzl et al, 1984
Ba	103	2 Cr (90 120 cm)					0 14	8 2 (solution)			6 4					100	Ausweardzing (B-bl's)	Fig 6 : Rd - 5 soils (1 Dm) Abstract	Bunzl et al, 1984
Ba	103	3 Cr (120 129 cm)					0 07	8 2 (solution)			0 1					1000	Ausweardzing na (B-bl's)		Bunzl et al, 1984
Ba	101	Ap (0 31 cm)					2 41	7 3 (solution)			8 7					>100	Parabrown (Lachner-ler)		Bunzl et al, 1984
Ba	101	A1 (31 55 cm)					0 71	7 4 (solution)			9 5					1000	Parabrown (Lachner-ler)		Bunzl et al, 1984
Ba	101	Bt1 (55 87 cm)					0 34	7 2 (solution)			9 2					>1000	Parabrown (Lachner-ler)		Bunzl et al, 1984
Ba	101	Bt2 (87 97 cm)					0 30	6 8 (solution)			8 3					>1000	Parabrown (Lachner-ler)		Bunzl et al, 1984
Ba	101	Bt3 (97 WD cm)					0 30	6 7 (solution)			12 5					>1000	Parabrown (Lachner-ler)		Bunzl et al, 1984
Ba	101	Bt2 (? WD cm)					0 25	6 2 (solution)			13 2					>1000	Parabrown (Lachner-ler)		Bunzl et al, 1984
Ba	104	clay						6 0		-200(mv)						800			Bell and Bates, 1988
Ba	104	C1 2 sand						6 0		-200(mv)						400		(Tab 4 - Rds)(Tab 1 : Ch composition)	Bell and Bates, 1988
Ba	104	C3 sand						6 0		-200(mv)						87		(Tab 7 - Soil Description)(Good correlations)	Bell and Bates, 1988
Ba	104	C4 sand						6 0		-200(mv)						34		(Tab 3 - Activities (Rds))	Bell and Bates, 1988
Ba	104	sand						6 0		-200(mv)						5			Bell and Bates, 1988
Ba	103	Ap horizon	49 7	29 4	19 0	5 2 4	0 2	7 2 (CaCl2)			8 4					23 200 (meq/Kl (AV 93)	Adsorbent (Parabrown earth) (0 30 cm)	(Tab 5 : Rd)(Tab 1 : soil prop.) (Tab 7 : EC (CEC per hor-izon)	Bunzl et al, 1985 Bunzl et al, 1985 Bunzl et al, 1985
Ru	106	Sandy subsoil													10E-000403	90	Caribou site FRC	(0 % Sr, Cs, Co)(Rd values from Fig 3 & 4) (1 g S & A - Rd vs NRDS-Mdy soil (5 formulae) (1 g S adsorb & desorp Rds) NEW15 code	Schwartz et al, 1982

TABLE B-28

SELENIUM Kd VALUES

MAT	ISO	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	pH SAT PASTE	EH (v)	CEC meq/ 100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	NUCLIDE CONCENTRATION	Kd (ml/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Se		sphagnum peat						4.8							[94.1 /Kg	Rainfall		
Se		sphagnum peat						4.8							110 l /Kg	Fall 1	(Tab 6 - Kd, geom. mean)	Sheppard and Evenden, 1988
Se		sphagnum peat						4.8							310 l /Kg	Fall 2	(FM - 1, Ca, Fe, M)	Sheppard and Evenden, 1988
Se		sphagnum peat						4.8							240 L/Kg	Final	(Sphag peat - Fibric Mesisol)	Sheppard and Evenden, 1988
Se		sand			32	3.2		5.3							30	Soil 1		Sheppard and Evenden, 1988
Se		sand			15	3.3		6.0							70	Soil 2	Table 1 - physico - chem prop	Vanni, et al., 1980
Se		sand			10	3.7		6.3							56	Soil 3	Tab 2 - comparison of estimate calc. Kd from this Table	Vanni, et al., 1980
Se		loam			28	4.2		4.5							144	Soil 4	Concentration of element - SHING up Se Kg-1 soil	Vanni, et al., 1980
Se		clay			30	4.5		4.5							120	Soil 5		Vanni, et al., 1980
Se		clay			31	2.8		6.5							90	Soil 6		Vanni, et al., 1980
Se		clay			31	4.0		4.4							96	Soil 7		Vanni, et al., 1980
Se		clay			34	3.0		4.9							36	Soil 8		Vanni, et al., 1980
Se		clay			39	5.6		4.5							210	Soil 9		Vanni, et al., 1980
Se		clay			42	6.8		4.9							76	Soil 10		Vanni, et al., 1980
Se		clay			42	11.0		4.4							180	Soil 11		Vanni, et al., 1980
Se		clay			47	4.6		5.0							140	Soil 12		Vanni, et al., 1980
Se		clay			49	3.4		6.5							80	Soil 13		Vanni, et al., 1980
Se		clay			49	17.4		5.4							80	Soil 14		Vanni, et al., 1980
Se		clay			56	7.3		6.0							110	Soil 15		Vanni, et al., 1980
Se		clay			72	7.8		6.0							176	Soil 16		Vanni, et al., 1980
Se		clay			84	1.0		4.9							246	Soil 17		Vanni, et al., 1981
Se		clay			87	0.0		4.7							170	Soil 18		Vanni, et al., 1982
																		Vanni, et al., 1981

TABLE B-29

SILVER Kd VALUES

MAT	ISO	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	pH SAT PASTE	EH (v)	CEC meq/ 100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	NUCLIDE CONCENTRATION	Kd (ml/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Ag	110m Sand									(1.3)					75	A		
Ag	110m Silt-clay									(241.7)					100	B		Inoue & Morosawa, 1976
Ag	110m Silt-clay									(55.6)					300	C		Inoue & Morosawa, 1976
Ag	110m Gravel-sand									(69.5)					1000	D	(Tab 2 - soil type) (Tab 5 CEC : Kd)	Inoue & Morosawa, 1976
Ag	110m Silt-clay									(167.9)					200	E	(U.N - Cs,Fy = m_/m_Ag,Fy,Mol fm jar)	Inoue & Morosawa, 1976
Ag	110m Silt-sand									(47.8)					350	F	CEC : (meq/g) (9 Tables 3 kg)	Inoue & Morosawa, 1976
Ag	110m Gravel									(28.9)					10	G		Inoue & Morosawa, 1976
Ag	110m Silt-clay									(117.9)					170	H		Inoue & Morosawa, 1976
Ag	110m Silt-clay									(140.5)					200	I		Inoue & Morosawa, 1976
Ag	110m Silt clay									(246.0)						J		Inoue & Morosawa, 1976
Ag	110m Fine sand									(60.3)					70	K		Inoue & Morosawa, 1976
Ag	110m Silt									(149.0)					100	L		Inoue & Morosawa, 1976
Ag	110m Sand									(24.3)						M		Inoue & Morosawa, 1976
Ag	110m Gravel									(37.1)						N		Inoue & Morosawa, 1976
Ag	110m Fine sand									(129.8)					300	O		Inoue & Morosawa, 1976
Ag	110m Fine sand									(88.5)					400	P		Inoue & Morosawa, 1976
Ag	110m Silt-clay									(260.1)					80	Q		Inoue & Morosawa, 1976
															90	R		Inoue & Morosawa, 1976
Ag	Sand		-	-	0	3.5	-	4.5-5.0	-	22					1.6x10E2	Soil E		
Ag			-	-	20	2.5	-	7.5-8.0	-	16					5.6x10E2	Soil D		Garrison et al., 1982
Ag			-	-	-	-	-	4.8		-		C 1mol/L CaCl2			7 /	Fluoride 1 - sand		Garrison et al., 1982
Ag	Silt		-	-	-	-	-	6.2		-		C 1mol/L CaCl2			13.0	Fluoride 2 - sand - organic matter		Graham, 1973
Ag			-	-	-	-	-	5.0		-		D 1mol/L CaCl2			28.0	Manager 23		Graham, 1973
Ag			-	-	-	-	-	7.4		-		E 1mol/L CaCl2			200	Manager 24		Graham, 1973
Ag					-	-	-	6.6				E 1mol/L CaCl2			333	Manager 38		Graham, 1973
Ag	Organic				-	60	-	4.5	-						4.6x10E3	Soil A		Graham, 1973
Ag					-	>2	-	4 to 5							2.7x10E4	Peat A		Garrison et al., 1982
Ag					-	>30	-	6							1.7x10E4	Peat B		Garrison et al., 1982
					-	>60	-	6.7							3.3x10E4	Soil D		Garrison et al., 1982
																		Garrison et al., 1982

TABLE B-30

STRONTIUM K_d VALUES

Nuc	Iso	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	SAT PASTE pH	Eh (v)	CEC meq/ 100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	NUCLIDE CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Sr	90	loam										Na+				USSR	USSR heavy-moraine loam (30% argillaceous particles)	Sobolev,1985
																	more Cl on rear kaolinite, montmorillonite, and hydromica	
																	Kd values affected by deep S deep water tabl. Table4	
Sr	85	clay						6 0	+200 mV						50	glacial till	Tab 4	Bell and Bates 1988
Sr	85	sand						6 0	+200 mV						40	fine-coarse sand (C1-2)		Bell and Bates 1988
Sr	85	sand						6 0	+200 mV						30	medium-coarse sand (C3)		Bell and Bates 1988
Sr	85	sand						6 0	+200 mV						8	coarse sand (C8)		Bell and Bates 1988
Sr	85	sand						6 0	+200 mV						9	medium sand		Bell and Bates 1988
Sr	85	clay													*55	32 um size, smectite		Carlson and Bo, 1982
Sr	85	clay													32 - 10e3	<2 um size, smectite		Carlson and Bo, 1982
Sr	85	loamy sand						1 1	7 0						<50	1) Cleysol	(Sr-90) to 101) difficult	Bunzl and Schimmack, 1988
Sr	85	loamy sand						0 5	6 8						100-150	2) Spodic Histosol,strongly humified	== see Sr/1 == also see fig 4 & 5	Bunzl and Schimmack, 1985
Sr	85	sandy loam						? (100)	5 7						<50	3) Cambosol,brown earth from loess		Bunzl and Schimmack, 1988
Sr	85	sandy loam						? (60)	7 7						<50	4) Cambosol,brown earth		Bunzl and Schimmack, 1988
Sr	85	loamy sand						* (5)	4 6						*50	5) Acrisol, parabrown earth, AA		Bunzl and Schimmack, 1988
Sr	85	loamy sand						* (23)	4 6						*50	6) Acrisol, parabrown earth, B-horizon		Bunzl and Schimmack, 1988
Sr	85	clay							6 0						*50	8 Benlomyka,Sod-chozem AG Rancken		Bunzl and Schimmack, 1988
Sr	85	fibric organic							6 0		0 7 meq/g		0 IN CaMe3		150	P1 Sapg peat (high moor) Steinhuder Meer,Hannover		Bunzl and Schimmack, 1988
Sr	85	fibric organic							7 0		2 1 meq/g		0 IN CaMe3		150	P2 Sapg peat (high moor) Koenigsdorf,Bavaria		Bunzl and Schimmack, 1988
Sr	85	fibric organic							7 0		0 65 meq/g		0 IN CaMe3		100	sandy loam (Poyz)		Bunzl and Schimmack, 1988
Sr	90	sand							6 5 (acid)		5 5		01M CaCl2 pH 6 7		5 5 = 10e-2			Koren,1983
Sr	90	silt							6 1 (acid)		10 2		01M CaCl2 pH 6 7		1 3 = 10e-2	soil loam (Cernozem)	(Tab 1)(selective coeff = 317)(good figures) 01M CaCl2+pH6	Koren,1983
Sr	--	sand							5 5		973				5 1 (3.1)	61 5 feet deep	( ) brackets in Kd column = column breakthrough	Ryan,1987
Sr	--	sand							5 5		973				1 1 (1.3)	62 0 feet deep		Ryan,1987
Sr	--	sand							5 5		973				0 7 (5 6)	63 0 feet deep		Ryan,1932
Sr	--	sand							5 5		973				10 1 (6 3)	63 5 feet deep		Ryan,1987
Sr	--	sand							5 4		(37 0)				5 4 (37 0)	64 0 feet deep		Ryan,1987
Sr	--	sand							5 5		973				10 0	65 0 feet deep		Ryan,1987
Sr	--	sand							5 5		973				5 3 (35 0)	65 5 feet deep		Ryan,1987
Sr	85	organic						peat	4 0						3700 -- .74 (1d)	(6-8 cm) Lafgrens Bog, NY		Schell et al , 1985
Sr	85	organic						peat	4 0						5900 -- .78 (4d)	(6-8 cm) Lafgrens Bog, NY	Lafgrens t org content thr PA (tab Sol (Rd) (Sr-85)	Schell et al , 1985
Sr	85	organic						peat	4 0						3700 -- 65 (8d)	(6-8 cm) Lafgrens Bog, NY	(tab Bicomparison Sibley 82)	Schell et al , 1985
Sr	85	organic						peat	4 0						---------- (11d)	(6-8 cm) Lafgrens Bog, NY		Schell et al , 1985
Sr	85	organic						peat	4 0						1500 -- .66 (15d)	(6-8 cm) Lafgrens Bog, NY		Schell et al , 1985
Sr	85	organic						peat	4 0						3200 -- 65 (30d)	(6-8 cm) Lafgrens, Bog, NY		Schell et al , 1985
Sr	85	organic						peat	4 0						6600 -- 1 4 (1d)	(20-21 cm) Lafgrens Bog, NY		Schell et al , 1985
Sr	85	organic						peat	4 0						7300 -- 1 5 (4d)	(20-21 cm) Lafgrens Bog, NY		Schell et al , 1985
Sr	85	organic						peat	4 0						---------- (8d)	(20-21 cm) Lafgrens Bog, NY		Schell et al , 1985
Sr	85	organic						peat	4 0						8300 -- 1 7 (15d)	(20-21 cm) Lafgrens Bog, NY		Schell et al , 1985
Sr	85	organic						peat	4 0						5400 -- 1 1 (15d)	(20-21 cm) Lafgrens Bog, NY		Schell et al , 1985
Sr	85	organic						peat	4 0						4800 -- .95 (30d)	(20-21 cm) Lafgrens Bog, NY		Schell et al , 1985
Sr	85	organic						peat	4 0						230 -- .03 (1d)	(6-8 cm) Spruce Flats Bog, PA	Spruce Flats t inorganic content than NY	Schell et al , 1985
Sr	85	organic						peat	4 0						180 -- .04 (4d)	(6-8 cm) Spruce Flats Bog, PA	(tab Bicomparison-Sibley 82)	Schell et al , 1985
Sr	85	organic						peat	4 0						---------- (8d)	(6-8 cm) Spruce Flats Bog, PA		Schell et al , 1985
Sr	85	organic						peat	4 0						340 -- .07 (11d)	(6-8 cm) Spruce Flats Bog, PA		Schell et al , 1985
Sr	85	organic						peat	4 0						230 -- .05 (15d)	(6-8 cm) Spruce Flats Bog, PA		Schell et al , 1985
Sr	85	organic						peat	4 0						200 -- .04 (30d)	(6-8 cm) Spruce Flats Bog, PA		Schell et al , 1985
Sr	85	organic						peat	4 0						80 -- .03 (1d)	(20-22 cm) Spruce Flats Bog, PA		Schell et al , 1985
Sr	85	organic						peat	4 0						(0) -- .04 (4d)	(20-22 cm) Spruce Flats Bog, PA		Schell et al , 1985
Sr	85	organic						peat	4 0						---------- (8d)	(20-22 cm) Spruce Flats Bog, PA		Schell et al , 1985
Sr	85	organic						peat	4 0						340 -- .07 (11d)	(20-22 cm) Spruce Flats Bog, PA		Schell et al , 1985
Sr	85	organic						peat	4 0						230 -- .05 (15d)	(20-22 cm) Spruce Flats Bog, PA		Schell et al , 1985
Sr	85	organic						peat	4 0						200 -- .04 (30d)	(20-22 cm) Spruce Flats Bog, PA		Schell et al , 1985
Sr	85	sand	89	2	9				4 5						2 8	Sa-1 1 (B-10*)		Moeffer, 1985
Sr	85	sand	72	5	23				5 0						9 3	Sa-1 2 (blend 40-49*)	a 26 (tab B)	Moeffer, 1985
Sr	85	sand							5 0	fine)			2 5M+1CE4NaCl		26	SRP Soil	(tab B) == see Co ==	Moeffer, 1985
Sr	85	sand							5 0	fine)			25M+3CE4NaCl		23	SRP Soil	Kd changes (= changing clay content) mainly	Moeffer, 1985

continued...

TABLE B-30 (continued)

MAT	ISO	SOIL type	% SAND	% SILT	% CLAY	% ORG	Ca CaCO3	pH SAT PASTE	CM (v)	CEC meq/ 100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	NUCLIDE CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
[illegible]	[illegible]							5.0 final				2.5Mx10E4NaNO3			24	SRP Soil	result of pH changes	Hoeffner, 1985
[illegible]	[illegible]							5.0 final				25Mx10E4NaNO3			72	SRP Soil		Hoeffner, 1985
[illegible]	[illegible]							5.0 final				2.5Mx10E4KCl			20	SRP Soil		Hoeffner, 1985
[illegible]	[illegible]							4.7				25Mx10E4KCl			7	SRP Soil		Hoeffner, 1985
[illegible]	[illegible]							5.0				2.5Mx10E4NaNO3			21	SRP Soil		Hoeffner, 1985
[illegible]	[illegible]							4.8				25Mx10E4NaNO3			7	SRP Soil		Hoeffner, 1985
[illegible]	[illegible]							5.0				no soil			22	SRP Soil		Hoeffner, 1985
[illegible]	[illegible]							4.9 final				2.5Mx10E4MgCl2			75	SRP Soil		Hoeffner, 1985
[illegible]	[illegible]							4.6 final				25Mx10E4MgCl2			5	SRP Soil		Hoeffner, 1985
[illegible]	[illegible]							4.8 final				2.5Mx10E4Mg(NO3)			16	SRP Soil	(Lab 9) Kd does not vary	Hoeffner, 1985
[illegible]	[illegible]							4.5 final				25Mx10E4Mg(NO3)			6	SRP Soil	(25-200 ppm Fe decreased Sr Kd<15-2 ml/g)	Hoeffner, 1985
[illegible]	[illegible]							4.8 final				2.5Mx10E4CaCl2			17	SRP Soil	no Fe>(Kd=25)<top 4	Hoeffner, 1985
[illegible]	[illegible]							4.6 final				25Mx10E4CaCl2			5	SRP Soil		Hoeffner, 1985
[illegible]	[illegible]							5.2 final				2.5Mx10E4NaZSM			52	SRP Soil		Whitley, 1985
[illegible]	[illegible]							5.2 final				25Mx10E4NaZSM			86	SRP Soil		Hoeffner, 1985
[illegible]	[illegible]							4.9 final				no soil			16	SRP Soil		Hoeffner, 1985
[illegible]	[illegible]							2-7			(NaCO3 & OH-)				2-1100		Fig 4 (effect of pH on Sr Kd)	Hoeffner, 1985
[illegible]	[illegible]							2-7			(K,Ca & Mg)				2-1100		Fig 8 (effect of K, Ca or Mg on Sr Kd)	Hoeffner, 1985
[illegible]	[illegible]		79.7	40.2	17.5	0.17	206	7.81 (8.56) water		5.3		CaCl2			12.6	Upper Oxidized Till	Synthetic power for >4hr	Johnston et al., 1985
[illegible]	[illegible]		22.6	34.2	34.6	0.2	436	7.96 (8.66) water		3.4		CaCl2			6.6	Upper Oxidized Till	(25-100) (Lab 3-physical prop.)	Johnston et al., 1985
[illegible]	[illegible]		28.4	38.2	22.2	0.29	436	7.99 (8.45) water		6.2		CaCl2			---	Upper Oxidized Till	sand-silt-clay zones not equal 100%	Johnston et al., 1985
[illegible]	[illegible]		37.5	36.8	11.9	0.21	44	8.68 (8.79)		2.5		CaCl2			---	Lower Unweathered Till		Johnston et al., 1985
[illegible]	[illegible]		32.8	32.0	13.3	0.20	46	8.66 (8.82)		2.8		CaCl2			4.1	Lower Unweathered Till		Johnston et al., 1985
[illegible]	[illegible]		36.1	36.8	10.6	0.10	45	8.14 (9.08)		2.0		CaCl2			4.8	Lower Unweathered Till	(Lab 1 gave Calcite - Dolomite > Mcarb)	Johnston et al., 1985
[illegible]	[illegible]		35.7	31.2	9.7	0.18	29	8.20 (9.08)		2.2		CaCl2			5.8	Lower Unweathered Till	* CaCO2	Johnston et al., 1985
[illegible]	[illegible]		37.8	36.9	11.1	0.27	36	8.10 (9.10)		3.1		CaCl2			---	Lower Unweathered Till	(Lab 2 = chem. prop., cations, CEC)	Johnston et al., 1985
[illegible]	[illegible]		30.8	42.0	9.7	0.24	44	8.10 (9.02)		2.1		CaCl2			4.0	Lower Unweathered Till	at a's cherry	Johnston et al., 1985
[illegible]	[illegible]		37.0	38.7	11.4	0.23	42	8.00 (9.06)		2.1		CaCl2			4.5	Lower Unweathered Till	(Lab 3=groundwater cations/anions, lab = field pH)	Johnston et al., 1985
[illegible]	[illegible]		30.9	37.7	11.1	0.16	48	8.30 (9.05)		2.0		CaCl2			3.7	Lower Unweathered Till		Johnston et al., 1985
[illegible]	[illegible]		28.3	34.5	4.9	0.11	51	8.31 (9.02		6.2		CaCl2			3.6	Lower Unweathered Till	(Lab SrMg-synthetic soil - Ca)	Johnston et al., 1985
[illegible]	[illegible]			----	-----	0.17	41	7.75 (8.64)		0.8		CaCl2			2.5	Sand	good conclusions	Johnston et al., 1985
[illegible]	[illegible]			----	-----	0.28	32	7.90 (8.34)		0.8		CaCl2			2.4	Sand		Johnston et al., 1985
[illegible]	[illegible]			----	-----	0.13	66	8.22 (8.82)		0.9		CaCl2			2.0	Sand	** see Cp **	Johnston et al., 1985
[illegible]	[illegible]			----	-----	0.15	56	8.20 8.75		0.9		CaCl2			1.2	Sand		Johnston et al., 1985
[illegible]	[illegible]			----	-----	0.14	56	8.05 8.70		0.7		CaCl2			2.5	Sand		Johnston et al., 1985
[illegible]	[illegible]			----	-----	0.16	61	8.14 8.72		0.8		CaCl2			2.1	Sand		Johnston et al., 1985
[illegible]	[illegible]			----	-----	0.22	21	8.15		0.9		CaCl2			1.9	Sand		Johnston et al., 1985
[illegible]	[illegible]	A horizon	56.1	39.4	12.0	0.9 4	0.2	6.7 (CaCl2)		8.7		CaCl2			20-25 (log-K^3) (AV=2%)	(0-30 cm) Alfisol (Fernbrook earth)	Tab 3= Kd Tab 1= soil prop. Tab 2= SC,CEC,pH by horizon	Thrall et al., 1985
[illegible]	[illegible]	Sodium titanate + brine A						6.7							125			Nowak, 1980
[illegible]	[illegible]	Sodium titanate + DI A						7.2							100,000		(Lab 3)	Nowak, 1980
[illegible]	[illegible]	Sodium titanate + brine B						7.2-7.5							540		** see Ru/2 amended titanate, synthetic inorganic exchanger	Nowak, 1980
[illegible]	[illegible]							3.4							1.5	SRP/Savannah River Plant - buried ground soil		Stone et al., 1984
[illegible]	[illegible]							4.7							7.5	SRP/Savannah River Plant - buried ground soil	SR-90 (Lab 1)	Stone et al., 1984
[illegible]	[illegible]							5.3							30	SRP/Savannah River Plant - buried ground soil		Stone et al., 1984
[illegible]	[illegible]							7.2							3000	SRP/Savannah River Plant - buried ground soil		Stone et al., 1984
[illegible]	[illegible]	clayey sand				0.607				0.665		CaCl2			25.7	T-1 = 0-45 cm, Tokai		Uchida and Kamada, 1987
[illegible]	[illegible]	fine sand				0.607				0.665		CaCl2			21.3	T-5 = 205 cm, Tokai		Uchida and Kamada, 1987
[illegible]	[illegible]	sandy clay				0.607				0.665		CaCl2			32.9	T-11 = 405-420 cm, Tokai	(Lab 4 = Kd = CaCl2 - CM)	Uchida and Kamada, 1987
[illegible]	[illegible]	loam				0.607				0.665		CaCl2			110.6	T-17 = 650-700 cm, Tokai	(Gr = ground water)	Uchida and Kamada, 1987
[illegible]	[illegible]	clayey sand				0.607				0.665		Gr			26.4	T-1 = 0-45 cm, Tokai	Abstract Good paper	Uchida and Kamada, 1987
[illegible]	[illegible]	fine sand				0.607				0.665		Gr			21.3	T-5 = 205 cm, Tokai	Tab 2 = chem. prop. at 46 m depth	Uchida and Kamada, 1987
[illegible]	[illegible]	sandy clay				0.607				0.665		Gr			33.1	T-11 = 405-420 cm, Tokai	Fig 2-Sr in ground vs Sr in soil for Tokai -	Uchida and Kamada, 1987
[illegible]	[illegible]	loam				0.607				0.665		Gr			99.3	T-17 = 650-700 cm, Tokai	humus horiz	Uchida and Kamada, 1987
[illegible]	[illegible]	loamy sand				0.841				0.948		CaCl2			104.9	Ya-1 = 0-20 cm, Kibawa	Fig 4-Sr variation of Kd vs exchan.	Uchida and Kamada, 1987
[illegible]	[illegible]	loamy sand				0.841				0.948		CaCl2			89.3	Ya-3 = 40-60 cm, Kibawa	Tab 5 = correlation of Kd	Uchida and Kamada, 1987

continued...

TABLE B-30 (continued)

MIC	ISE	SOIL Type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	pH SAT PASTE	Eh (+)	CEC meq/ 100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	MULTIPLE CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Sr	--	loamy gravel				0.691				0.998		CaCl2			117 a	Ya-7 - 120-140 cm Kibuno	Fig 1 - Kd vs soil wt	Uchida and Kawada, 1987
Sr	--	gravel				0.691				0.998		CaCl2			48.0	Ya-14 - 500-520 cm, Kibuno		Uchida and Kawada, 1987
Sr	--	loamy sand				0.691				0.998		Qv			173.5	Ya-1 - 0-20 cm, Kibuno		Uchida and Kawada, 1987
Sr		loamy sand				0.691				0.998		Qv			79.5	Ya-3 - 40-60 cm, Kibuno		Uchida and Kawada, 1987
Sr		loamy gravel				0.691				0.998		Qv			95.9	Ya-7 - 120-140 cm Kibuno		Uchida and Kawada, 1987
Sr		gravel				0.691				0.998		Qv			42.3	Ya-14 - 500-520 cm, Kibuno		Uchida and Kawada, 1987
Sr		loamy loam				0.166				0.294		CaCl2			83.5	Yb-1 (0-20 cm), Kanno		Uchida and Kawada, 1987
Sr		clayey loam				0.166				0.294		CaCl2			29.0	Yb-5 (80-100 cm), Kanno		Uchida and Kawada, 1987
Sr		sandy loam				0.166				0.294		CaCl2			32.4	Yb-20 (380-400 cm), Kanno		Uchida and Kawada, 1987
Sr		sandy loam				0.166				0.294		CaCl2			128.1	Yb-27 (520-540 cm), Kanno		Uchida and Kawada, 1987
Sr		silty loam				0.166				0.294		CaCl2			77.6	Yb-39 (760-780 cm), Kanno		Uchida and Kawada, 1987
Sr		loamy loam				0.166				0.294		Qv			130.2	Yb-1 (0-20 cm), Kanno		Uchida and Kawada, 1987
Sr		clayey loam				0.166				0.294		Qv			71.0	Yb-5 (80-100 cm), Kanno		Uchida and Kawada, 1987
Sr		sandy loam				0.166				0.294		Qv			45.4	Yb-20 (380-400 cm), Kanno		Uchida and Kawada, 1987
Sr		sandy loam				0.166				0.294		Qv			227.6	Yb-27 (520-540 cm), Kanno		Uchida and Kawada, 1987
Sr		silty loam				0.166				0.294		Qv			107.3	Yb-39 (760-780 cm), Kanno		Uchida and Kawada, 1987
Sr		sand	95	3	9										100 (157)	Beatty 1, Nevada		Kaukonsel, 1983
Sr		sand	93	7	7										82	Beatty 2, Nevada	Beatty, Nv., Bernwell, S.C. (Abst = Kds highest in alkaline	Kaukonsel, 1983
Sr		sand	83	2	15										150	Beatty 5, Nevada	Alluvial deposits high in montmorillonite & zeolites	Kaukonsel, 1983
Sr		clayey sand	68	6	26										82	Barnwell 4, South Carolina	Tab 1= Kds= mineral phase char Tab 3= soil text & min comp	Kaukonsel, 1983
Sr		clayey sand	68	11	21										142	Barnwell 12, South Carolina	Tab 2=relationships testers, surf area & clay min. compos	Kaukonsel, 1983
Sr		clayey sand	73	8	19										140 (115)	Barnwell 14, South Carolina	Tab 4=Kds radionuclides Fig 6= text. diagram	Kaukonsel, 1983
																	Fig 7= Kd vs. sorptive minerals Kd vs ( )= reducing cond	Kaukonsel, 1983
																	Fig 3,4= Kd vs Sr conc Tab soil=bentonite -	Oscarl and Schultz, 1985
																	basic Many fancy formulas	
Sr	85		80	17	3			3.7		125 mg/kg		CaCl2			44 (7.5-80)		Kd ( )= range	Schramach et al., 1987
																	(Tab 1=soil group)(Tab 2=Kd)(Kd as ( ) = range)	
Sr	85	C			C-l-M	--				--					8	(0 cm) Ranker (Trebel)	Tab 1= soil group Tab 2= Kd = pH	Backhaker et al, 1982
Sr	85	Ap			C-l-M	1.7				8.9					30	(4 cm) Ranker (Trebel)	Cerchlorite, Illite, Kaolinite, Montmorillonite	Backhaker et al, 1982
Sr	85	C			C-l-M	0.4				2.6					0.8	(15 cm) Ranker (Trebel)	Tab 3= water rel. Ds, dispersion length	Backhaker et al, 1982
Sr	85	O			C-l-M										31	(0 cm) Podsol (Carlsbon)	Tab 4=radionuclides factors Tab 5=migration rates	Backhaker et al, 1982
Sr	85	Ap			C-l-M	1.9				7.8					90	(3 cm) Podsol (Carlsbon)	Fig 1= breakthrough curves. Fig 1= migration isotherm	Backhaker et al, 1982
Sr	85	E			C-l-M	2.1				5.6					8	(22 cm) Podsol (Carlsbon)	Fig 2= time intervals	Backhaker et al, 1982
Sr	85	Bhs,Fe			C-l-M	4.8				30.2					20	(27 cm) Podsol (Carlsbon)	Fig 3= comparisons of batch, columns, and fallout Kds	Backhaker et al, 1982
Sr	85	Bfe			C-l-M	1.6				4.8					1	(32 cm) Podsol (Carlsbon)	x-ref (4)-44	Backhaker et al, 1982
Sr	85	BC			C-l-M	0.2				2.6					0.6	(42 cm) Podsol (Carlsbon)		Backhaker et al, 1982
Sr	85	C			C-l-M										0.6	(180 cm) Podsol (Carlsbon)		Backhaker et al, 1982
Sr	85	Ah			C-l-M-H	7.6				7.8					110	(0 cm) Brown (Carlsbon)		Backhaker et al, 1982
Sr	85	Bv			C-l-M-H	0.3				3.0					3	(9 cm) Brown (Brunkendorf)		Backhaker et al, 1982
Sr	85	C-BC			C-l-M-H	0.05				4.2					1.4	(48 cm) Brown (Brunkendorf)		Backhaker et al, 1982
Sr	85	C			C-l-M-H	--									1.6	(95 cm) Brown (Brunkendorf)		Backhaker et al, 1982
Sr	85	Ap				1.10		8.3 (solution)		16.4					>10	(0-22 cm) Averrendrins, (Bibliu)	(5-85)	Oscarl et al, 1984
Sr	85	C				1.15		8.3 (solution)		17.7					>10	(27-80 cm) Averrendrins, (Bibliu)	Fig 1&2= Kd - surf horizons	Oscarl et al, 1984
Sr	85	Cc				1.03		8.2 (solution)		16.2					>10	(80-87) Averrendrins, (Bibliu)	Fig 3= Kd vs. Ca + Na conc.	Oscarl et al, 1984
Sr	85	Cc/Cc				0.25		8.1 (solution)		8.5					>10	(87-98) Averrendrins, (Bibliu)	Fig 4= Kd - comparison column and batch	Oscarl et al, 1984
Sr	85	2Cg				0.16		4.2 (solution)		6.4					>10	(98-120 cm) Averrendrins, (Bibliu)	Fig 5= Kd - 6 soils (A-horizons)	Oscarl et al, 1984
Sr	85	3C				0.03		8.2 (solution)		0.7					1	(120-132 cm) Averrendrins, (Bibliu)	Fig 6= Kd - 5 soils (I Ox)	Oscarl et al, 1984
Sr	85	Ap				2.41		7.3 (solution)		9.7					>10	(0-31 cm) Parabrown, (Escheveler)	Abstract	Oscarl et al, 1984
Sr	85	Bt				0.21		7.4 (solution)		9.5					>10	(31-52 cm) Parabrown, (Escheveler)		Oscarl et al, 1984
Sr	85	BtAl				0.24		7.2 (solution)		8.5					>10	(52-62 cm) Parabrown, (Escheveler)		Oscarl et al, 1984
Sr	85	AlBt				0.30		6.8 (solution)		8.3					>10	(62-73 cm) Parabrown, (Escheveler)		Oscarl et al, 1984
Sr	85	Bt3				0.30		7.7 (solution)		12.5					>10	(73-98 cm) Parabrown, (Escheveler)		Oscarl et al, 1984
Sr	85	Bt2				0.75		6.2 (solution)		13.2					>10	(> 98 cm) Parabrown, (Escheveler)		Oscarl et al, 1984
																	Good paper, presents arguments	Gallhan and Cherry, 1982

continued...

TABLE B-30 (continued)

NUC	ISO	SOIL type	% SAND	% SILT	% CLAY	% H2O	% CaCO3	SAT PASTE	pH	EH (+)	CEC meq/ 100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	NUCLIDE CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
																		Used for formulas, introduction, discussions	
Sr	Bangalore Soil (volcanic glass)											0 OIN	CaCl2					No Kd's determined. Used Kd=0 MD in model calculation (15 figures)	Kamphius and Vagenet, 1986
Sr	90	Loamy sand		10 1	0 5		0 0(mg/g)	7 0		(pH7.0)	4 0		3 OM	NaNO3		0 49	Berbank, Hanford subsoil	(Sr-90) Tab 1=soil prop Tab 2=Kd vs (M)	Rowston et al , 1984
Sr		Loamy sand		10 1	0 5		0 0(mg/g)	7 0		(pH7 0)	4 0		1 5M	NaNO3		0 6	Berbank, Hanford subsoil	Tab 4 = Kd of soil sediment = not used	Rowston et al , 1984
Sr		Loamy sand		10 1	0 5		0 0(mg/g)	7 0		(pH7 0)	4 0		0 1M	NaNO3		5 6	Berbank, Hanford subsoil	Bar = Batchbar method	Rowston et al , 1984
Sr		Loamy sand		10 1	0 5		0 0(mg/g)	7 0		(pH7 0)	4 0		0 1M	NaNO3			Berbank, Hanford subsoil	P 383 Batch, not-to-scale))	Rowston et al , 1984
Sr		Loamy sand		10 1	0 5		0 0(mg/g)	7 0		(pH7 0)	4 0		0 05M	NaNO3		30 4	Berbank, Hanford subsoil		Rowston et al , 1984
Sr		Loamy sand		10 1	0 5		0 0(mg/g)	7 0		(pH7 0)	4 0		0 01M	NaNO3			Berbank, Hanford subsoil		Rowston et al , 1984
Sr		Loamy sand		10 1	0 5		0 0(mg/g)	7 0		(pH7 0)	4 0		.0015M	NaNO3		173 0	Berbank, Hanford subsoil		Rowston et al , 1984
Sr		Loamy sand		10 1	0 5		0 0(mg/g)	7 0		(pH7 0)	4 0		.001M	NaNO3			Berbank, Hanford subsoil		Rowston et al , 1984
Sr		Sandy loam		29 5	4 0		26 0(mg/g)	8 0		(pH7 0)	4 0		3 OM	NaNO3		0 93	Tank farm, Hanford subsoil		Rowston et al , 1984
Sr		Sandy loam		29 5	4 0		26 0(mg/g)	8 0		(pH7 0)	4 0		1 5M	NaNO3		1 42	Tank farm, Hanford subsoil		Rowston et al , 1984
Sr		Sandy loam		29 5	4 0		26 0(mg/g)	8 0		(pH7 0)	4 0		0 15	NaNO3			Tank farm, Hanford subsoil		Rowston et al , 1984
Sr		Sandy loam		29 5	4 0		26 0(mg/g)	8 0		(pH7 0)	4 0		0 1M	NaNO3		6 74	Tank farm, Hanford subsoil		Rowston et al , 1984
Sr		Sandy loam		29 5	4 0		26 0(mg/g)	8 0		(pH7 0)	4 0		0 05M	NaNO3			Tank farm, Hanford subsoil		Rowston et al , 1984
Sr		Sandy loam		29 5	4 0		26 0(mg/g)	8 0		(pH7 0)	4 0		0 01M	NaNO3		55 4	Tank farm, Hanford subsoil		Rowston et al , 1984
Sr		Sandy loam		29 5	4 0		26 0(mg/g)	8 0		(pH7 0)	4 0		.0015M	NaNO3			Tank farm, Hanford subsoil		Rowston et al , 1984
Sr		Sandy loam		29 5	4 0		29 0(mg/g)	8 0		(pH7 0)	4 0		.001M	NaNO3		146 0	Tank farm, Hanford subsoil		Rowston et al , 1984
Sr		Loamy sand		10 1	0 5		0 0(mg/g)	7 0		(pH7 0)	4 0		1MCa	(NO3)2		0 66	Berbank, Hanford subsoil		Rowston et al , 1984
Sr		Loamy sand		10 1	0 5		0 0(mg/g)	7 0		(pH7 0)	4 0		.1MCa	(NO3)2		1 25	Berbank, Hanford subsoil		Rowston et al , 1984
Sr		Loamy sand		10 1	0 5		0 0(mg/g)	7 0		(pH7 0)	4 0		.05MCa	(NO3)2		1 9	Berbank, Hanford subsoil		Rowston et al , 1984
Sr		Loamy sand		10 1	0 5		0 0(mg/g)	7 0		(pH7 0)	4 0		.01MCa	(NO3)2		7 72	Berbank, Hanford subsoil		Rowston et al , 1984
Sr		Loamy sand		10 1	0 5		0 0(mg/g)	7 0		(pH7 0)	4 0		.005MCa	(NO3)2		11 6	Berbank, Hanford subsoil		Rowston et al , 1984
Sr		Loamy sand		10 1	0 5		0 0(mg/g)	7 0		(pH7 0)	4 0		.002MCa	(NO3)2		12 2	Berbank, Hanford subsoil		Rowston et al , 1984
Sr		Sandy loam		29 5	4 0		26 0(mg/g)	8 0		(pH7 0)	4 0		2MCa	(NO3)2		0 43	Tank farm, Hanford subsoil		Rowston et al , 1984
Sr		Sandy loam		29 5	4 0		26 0(mg/g)	8 0		(pH7 0)	4 0		.1MCa	(NO3)2		1 24	Tank farm, Hanford subsoil		Rowston et al , 1984
Sr		Sandy loam		29 5	4 0		26 0(mg/g)	8 0		(pH7 0)	4 0		05MCa	(NO3)2		2 21	Tank farm, Hanford subsoil		Rowston et al , 1984
Sr		Sandy loam		29 5	4 0		26 0(mg/g)	8 0		(pH7 0)	4 0		01MCa	(NO3)2		5 85	Tank farm, Hanford subsoil		Rowston et al , 1984
Sr		Sandy loam		29 5	4 0		26 0(mg/g)	8 0		(pH7 0)	4 0		005MCa	(NO3)2		17 6	Tank farm, Hanford subsoil		Rowston et al , 1984
Sr		Sandy loam		29 5	4 0		26 0(mg/g)	8 0		(pH7 0)	4 0		002MCa	(NO3)2		29 4	Tank farm, Hanford subsoil		Rowston et al , 1984
		Red-brown clayey					6 0--0 6									AV = 6 462	Chestnut Ridge, ORNL		Switz & Kolmers, 1984
																(N = 1 663)		(0 N =0,Cs,Co,Eu,Am,Th,Ic,I)	Switz & Kolmers, 1984
																(L = 2 052)		(NS = Sno-Sr/I = conc)	Switz & Kolmers, 1984
		Heavy clay -1		15	85		8 2(7.6+- 2)		26+-2							65+-3	(9.01 - 9 11 m) Lavisaa Saar., Finland	(S=85) (Tab 3 = soil prop - pH)	Nikula, 1982
		Heavy clay -2		10	81		8 2(7.7+- 2)									54+-1	(9.73 - 9 80 m) Lavisaa Saar., Finland	(Tab 0 = Sr Kd - pH) (0 N = Ca,Co,Mn,Zn,Cs)	Nikula, 1982
		Heavy clay -4		11	89		8 4(7 5+- 2)		21+-2							8 6+- 1	(2 08 - 2 15 m) Olkiluoto Saar., Finland	(In Finnish with English summary, 11 figures	Nikula, 1982
		Heavy clay -6		32	68		8 3(7.5+-.1)		5 7+-2							3 6+-1	(2 40 - 2 56 m) Olkiluoto Saar., Finland	(pH vs Tab. 0 - ( ) = pH column) (Fig 11 = Sr Kd vs Wt)	Nikula, 1982
		Heavy clay -5		32	68		8 0(7.3+- 1)		25+-1							107+-4	(6.70 - 6 85 m) Salo Saar., Finland	(Fig 2 = Sr Kd vs NaCl) (Fig 4 = Sr Kd vs Sr conc.)	Nikula, 1982
		Silty clay loam -6		62	38		7 0(7.5+- 2)		17+-5							42+-3	(2 24 - 3.31 m) Jumsa Saar., Finland	(Fig 6 = Sr Kd vs pH) (Fig 9 & 10 = Sr Kd vs CEC)	Nikula, 1982
		Loamy sand -7	79	21			6 4(7.1+- 1)		7 8+- 2							24+-5	(4 m) Lavisaa marsesa., Finland	(Fig 12 = Sr Kd vs Wt)	Nikula, 1982
		Sandy loam -8	65	35			6 4(7.2+- 1)		3 2+- 2							13+-1	(1 5 m) Olkiluoto marsesa., Finland	(Tab 14 = Sr - Cs Kd vs NaCl Olkiluodon sediment)	Nikula, 1982
		Loamy sand -9	72	27			6 6(7.5+- 1)		2 1+- 3							15+-1	(3 5 - 4 0 m) Jaaks marsesa., Finland	(Tab 15 = Sr - Cs Kd vs Wet = Lavisaa sediment)	Nikula, 1982
		Sandy loam -10	66	34			6 3(7.0+- 1)		2 3+- 3							10+-1	(7 7 - 7 9 m) Partala marsesa., Finland	(Tab 16 = Sr conc (M) vs Kd w Salon saresaa)	Nikula, 1982
		Loam -11	41	37	22		9 2(8 7+- 1)		18+-5							150+-10	(44 m) Kokola Kallimaaar., Finland	(Tab 18 = Sr Kd vs pH vs Lavisaa saresaa.)	Nikula, 1982
		Sandy loam -12	57	29	14		9 4(8 3+- 2)		40+-8							190+-10	(24 m) Hatsaara kallimaar., Finland	(pH in ( ) = Kd function of pH from Tab 18)	Nikula, 1982
													DIM	NaCl		25+-2	Olkiluodon sediment, Finland	Sect 8 3 to 8 = Imbibe sediment	Nikula, 1982
													0MM	NaCl		6 8+- 4	Olkiluodon sediment, Finland	Sect 8 11 and 12 = Fracture filling	Nikula, 1982
													0 5M	NaCl		3 3+- 2	Olkiluodon sediment, Finland		Nikula, 1982
													1 0M	NaCl		0 5+- 4	Olkiluodon sediment, Finland		Nikula, 1982
													.01M	NaCl		63+-5	Lavisaa sediment, Finland		Nikula, 1982
													05M	NaCl		41+-4	Lavisaa sediment, Finland		Nikula, 1982
													1M	NaCl		30+-1	Lavisaa sediment, Finland		Nikula, 1982
													5M	NaCl		6+-1	Lavisaa sediment, Finland		Nikula, 1982
															2 4x10E-8M Sr	90+-1	Salon saresaa, Finland		Nikula, 1982

continued...

TABLE B-30 (continued)

MIC	ISO	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	pH SAT PASTE	FH (-)	CEC meq/ 100g	% FREE IRON OXIDES	COMP CATION	% COMP. CATION	WHOLE CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
S-														1 0x10E-7M S+	9%--8	Salen savessp., Finland		Mikola, 1982
S-														1 0x10E-6M S+	40--2	Salen savessp., Finland		Mikola, 1982
S-														1 0x10E-5M S+	88--6	Salen savessp., Finland		Mikola, 1982
S-														1 0x10E-4M S+	62--5	Salen savessp., Finland		Mikola, 1982
S-										25--1				1 0x10E-3M S+	16--1	Salen savessp., Finland		Mikola, 1982
S-										25--1				1 0x10E-2M S+	10--1	Salen savessp., Finland		Mikola, 1982
S-								(4.0)							8 4--2	Lavrsan savessp., Finland		Mikola, 1982
S-								(5.5)							11 0--2	Lavrsan savessp., Finland		Mikola, 1982
S-								(6.2)							12 1--2	Lavrsan savessp., Finland		Mikola, 1982
S-								(6.8)							13 3--4	Lavrsan savessp., Finland		Mikola, 1982
S-								(7.2)							12 0--7	Lavrsan savessp., Finland		Mikola, 1982
S-								(7.6)							14 3--5	Lavrsan savessp., Finland		Mikola, 1982
S-								(7.8)							14.1--7	Lavrsan savessp., Finland		Mikola, 1982
S-								(8.6)							14.5--1.5	Lavrsan savessp., Finland		Mikola, 1982
S-		Sand	91.2	7	1.8										- (6.0--1.0)	B-Ruppert sand		Jones et al., 1980
S-		Sand	91.2	7	1.8										0.8 (1.0--0.7)	B-Ruppert sand	Table Kd= col + batch Kd => ( ): batch, mol => ( ): col	Jones et al., 1980
S-																	Two Hanford sediments Arfrow Ringgold geological formation, Rufrow surf. Ruppert sand(Tsarclay=r=seamment EN=Ca,Tc,I,H	Jones et al., 1980
S-															87.55--89.12	(+ Kd=20) Site 1 - 1 ft. depth Bhabha, India	(Sr-90) (Tab 1 = Kd vs depth = Site 1)	Amalraj et al., 1981
S-															108.74--71.46	(+ Kd=20) Site 1 - 3 ft. depth Bhabha, India	(mg gm-) properties table)	Amalraj et al., 1981
S-															106.0--64.67	(+ Kd=10) Site 1 - 5 ft. depth Bhabha, India	(Tab 3 & 4 = velocity vs D)	Amalraj et al., 1981
S-															73.65--10.0	(+ Kd=10) Site 2 - 1 ft. depth Bhabha, India	(Tab 5 & 6 = % leachate vs diff. pH)	Amalraj et al., 1981
S-															63.19--41.91	(+ Kd=5) Site 2 - 3 ft. depth Bhabha, India	Tab. 2 - Site 2 = Kd vs depth	Amalraj et al., 1981
S-															64.34--22.10	(+ kd=4) Site 2 - 5 ft. depth Bhabha, India		Amalraj et al., 1981
S-		Sandy subsoil												IOE-4MMOS	0.6	Gorleben site, FRG	(D M = Cs,Cs,Rb) (Fig 3 & 4 : Kd vs MMOS - MAW soil)	Schwarzer et al., 1982
S-																	Kd values from Fig 3 & 4) 5 formulas	Schwarzer et al., 1982
S-		Sand								(11.3)					32	A	Fig 5: bdMorp & dmorp Kd's MOFIS code	Schwarzer et al., 1982
S-		Silt-clay								(241.7)					30	B	(Tab 2= soil type) Tab 5: CEC - Kd (in JAP)	Inoue & Morisawa, 1976
S-		Silt-clay								(55.6)					40	C	CEC= ( ) = meq/g 9 tabs 3 figs	Inoue & Morisawa, 1976
S-		Gravel-sand								(69.5)					65	D	(D M = Cs,Co,Mn,Zn,Ag,Fe,Ni)	Inoue & Morisawa, 1976
S-		Silt-clay								(167.9)					700	E		Inoue & Morisawa, 1976
S-		Silt-sand								(47.8)					45	F		Inoue & Morisawa, 1976
S-		Gravel								(28.9)					40	G		Inoue & Morisawa, 1976
S-		Silt-clay								(117.9)					270	H		Inoue & Morisawa, 1976
S-		Silt-clay								(140.5)					10	I		Inoue & Morisawa, 1976
S-		Silt-clay								(246.0)					500	J		Inoue & Morisawa, 1976
S-		f-ne sand								(60.3)					10	K		Inoue & Morisawa, 1976
S-		Silt								(149.0)					60	L		Inoue & Morisawa, 1976
S-		Sand								(24.3)					25	M		Inoue & Morisawa, 1976
S-		Gravel								(27.1)					15	N		Inoue & Morisawa, 1976
S-		f-ne sand								(172.8)					150	O		Inoue & Morisawa, 1976
S-		f-ne sand								(38.6)					25	P		Inoue & Morisawa, 1976
S-		Silt-clay								(200.1)					70	Q		Inoue & Morisawa, 1976
S-		Clay						7.5 - 7.8										Inoue & Morisawa, 1976
S-		Clay						7.5 - 7.8						7x10E-7 mMol/L	126--4	(20+C) Core LL44-CPE-2, Pacific Ocean, depth: 5021 m	Batch (Tab 1: Kd vs temp.)	Kemp, 1980
														7x10E-7 mMol/L	170--21	(4+C) Core LL44-CPE-2, Pacific Ocean, depth: 5021 m	smectite submersed clay	Kemp, 1980
S-		Sand	100	-	-	0.03	41.3	8.3(CaCl2)	-	1.4	-	sec ref			2 0x10E1	Soil #4 (WARE)		Gilham et al., 1981a
S-			93	5	2	0.05	40.8	7.8(CaCl2)	-	1.2	-	sec ref			2.5	Soil #6 (Leamington)		Gilham et al., 1981a
S-			96	4	0	0.51	0	6.3(CaCl2)	-	1.1	-	sec ref			2 0x10E1	Soil #7 (CNRL)		Gilham et al., 1981a
S-			52	45	3	0.08	0	5.0(CaCl2)	-	1.5	-	sec ref			1 0x10E2	Soil #8 (North Bay)		Gilham et al., 1981a
S-			59	24	17	0.4	0	6.5(CaCl2)	-	1.9	-	sec ref			2 5x10E1	Soil #10 (WARE)		Gilham et al., 1981a
S-			62	31	7	0.08	10.3	7.6(CaCl2)	-	2.7	-	sec ref			5 0x10E1	Soil #11 (WARE)		Gilham et al., 1981a
S-			86	12	2	0.3	11.1	8.0(CaCl2)	-	0.4	-	sec ref			1 0x10E1	Soil #13 (C F B Border)		Gilham et al., 1981a
S-			60	22	18	2.05	7.1	7.8(CaCl2)	-	21.2	-	sec ref			5 0x10E1	Soil #16 (Alberta)		Gilham et al., 1981a
S-			87	9	4	0.1	0.07	8.23(CaCl2)	-	5.0	-	sec ref			1.14x10E2--a	Sediment B (Solution 1)		Gilham et al., 1981a
S-			64	6	-	-	-	-	-	-	-	-			2 4x10E1	Composite soil (<0.074mm)		Serne et al., 1976
																		Schmitz, 1972

TABLE B-30 (concluded)

NUC	ISO	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	SAT PASTE	pH (v)	CEC meq/ 100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	NATURE OF CONCENTRATION	Kd (ml/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Sr		river sand				-	-	7 - 8	-	-	-	40% NaCl solution			2	River sand		Hamaker & Verloo, 1977
Sr		subsoil sand				-	2	6	-	5	-	4 mol/L Na-0.01mol/L PIPH			1 2x10E1	Hanford subsoil		Rhodes, 1957
Sr		subsoil sand				-	2	8	-	5					8.0x10E1	Hanford subsoil		Rhodes, 1957
Sr		sand			20	2 9	-	6	-	19 2	-	3x10E-3mol/L SrCl2			10	Sydell sand		Joe & Barber, 1970
Sr		Burbank soil				-	-	-	-	-	-	groundwater			4 8x10E1	Burbank soil		Hajek & Ames, 1968
Sr		Burbank soil				-	-	-	-	-	-	3mol/L NaNO3			2 1	Burbank soil		Hajek & Ames, 1968
Sr		Burbank soil				-	-	-	-	-	-	0 5mol/L NaCl			7 3	Burbank soil		Hajek & Ames, 1968
Sr		Burbank soil				-	-	-	-	-	-	3mol/L NaOAc			2 23	Burbank soil		Hajek & Ames, 1968
Sr			84	13	3	0 16	2 8	-	-	5.1	0 63	0 2mol/L NaCl see ref			1 62x10E1	Burbank sand (average profile)		Hajek & Ames, 1968
Sr			63	32	5	0 21	1 36	-	-	5 3	1 02	0 2mol/L NaCl see ref			1.6x10E1	Estrata sand (average profile)		Routson, 1973
Sr		aquifer sand				-	-	5 5	0 42	0.25-0 9		see ref a			1 42x10E1	Chalk River (CR) aquifer sand		Routson, 1973
Sr		aquifer sand				-	-	5.5	0 42	0.25-0 9		see ref a			9 2	Chalk River (RA) aquifer sand	a Data available for competing cations sodium, potassium, magnesium, calcium, barium and hydrogen	Patterson & Spoel, 1981
Sr		aquifer sand				-	-	5 5	0 42	0.25-0 9		see ref a			7 8	Chalk River (O) aquifer sand		Patterson & Spoel, 1981
Sr		aquifer sand				-	-	5 5	0 42	0.25-0 9		see ref a			1.67x10E1	Chalk River (SB) aquifer sand		Patterson & Spoel, 1981
Sr		aquifer sand				-	-	5 5	0 42	0.25-0 9		see ref a			1.13x10E1	Chalk River (N) aquifer sand		Patterson & Spoel, 1981
Sr		aquifer sand				-	-	5.5	0 42	0.25-0 9		see ref a			6 0	Chalk River (HA) aquifer sand		Patterson & Spoel, 1981
Sr		S-TL	36	35	29	0 43	33 6	8.1(CaCl2)	-	8 4	-	see ref			2.0x10E1	Soil B1 (AMRC)		Patterson & Spoel, 1981
Sr			35	36	29	0 41	33 8	8 1(CaCl2)	-	8 3	-	see ref			2 0x10E1	Soil B2 (AMRC)		Griffon et al , 1981a
Sr			34	35	31	0.4	34.1	8 1(CaCl2)	-	8.6	-	see ref			2.0x10E1	Soil B3 (AMRC)		Griffon et al , 1981a
Sr			28	41	31	1 27	21.1	7.7(CACL2)	-	5 9	-	see ref			1 0x10E1	Soil B5 (Lexington)		Griffon et al , 1981a
Sr			32	54	13	0 35	0	6 7(CACL2)	-	10 2	-	see ref			1 0x10E2	Soil B9 (North Bay)		Griffon et al , 1981a
Sr			34	34	32	0 85	5.1	7.7(CACL2)	-	32.7	-	see ref			8 0	Soil B14 (Alberta)		Griffon et al , 1981a
Sr			45	44	11	0.19	1 4	9 8(CACL2)	-	12.0	-	see ref			1 12x10E2--1	Sediment A (Solution 1)		Griffon et al , 1981a
Sr		medium loam			31 6	2 44	-	6 6	-	10 6	-	-			3 0x10E2--60	low ash podzolic (0 01 mm)		Sorby et al , 1970
Sr		medium loam			41.6	1 29	-	8 4	-	15.2	-	-			1 7x10E2--30	Serozem (0.01 mm)		Alekshkin, 1965
Sr			31	69	0	-	-	-	-	2.6	-	-			1 4x10E1	alluvial soil (Cadarache)		Alekshkin, 1965
Sr			30	62	0	-	-	-	-	2.7	-	-			2 3x10E1	alluvial soil (Cadarache)		Rancon, 1972
Sr			18	66	16	-	-	-	-	6.3	-	-			1 6x10E1	Vindobonian sand (Cadarache)		Rancon, 1972
Sr			40	45	15	-	-	-	-	3.8	-	-			1.6x10E1	Vindobonian sand (Cadarache)		Rancon, 1972
Sr			34	52	14	-	-	-	-	4 0	-	-			1 6x10E1	Vindobonian sand (Cadarache)		Rancon, 1972
Sr			45	47	8	-	-	-	-	1 5	-	-			1 4x10E1	Vindobonian sand (Cadarache)		Rancon, 1972
Sr			7	92	1	-	-	-	-	4 2	-	-			2 2x10E1	sandy-clay sand (Durance R.)		Rancon, 1972
Sr			18	71	11	-	-	-	-	3 5	-	-			1.6x10E1	sandy-clay sand (Durance R.)		Rancon, 1972
Sr			3	96	1	-	-	-	-	5 7	-	-			1 6x10E1	sandy-clay sand (Durance R.)		Rancon, 1972
Sr		o-TL			29 1	7 1	-	6	-	39 4	-	3x10E-3mol/L SrCl2+			5 0x10E1	Brookston silt		Rancon, 1972
Sr			44	50	6	0 23	3 8	-	-	11 0	1 21	0.2mol/LNaCl			2 47x10E1	Ritzville silt (two profile)	a Data available for competing cations sodium, potassium, magnesium, calcium, barium and hydrogen	Joe & Barber, 1970
Sr		Clay	31	34	35	0 81	5.2	7 8(CaCl2)	-	31 5	-	see ref			8	Soil B15 (Alberta)		Routson, 1978
Sr		heavy loam			53 4	2 08	-	6 6	-	26.1	-	-			5 7x10E2	Chestnut (0 01 mm)		Griffon et al , 1981a
Sr		heavy loam			46 6	-	-	6 7	-	30 4	-	-			1 15x10E3--140	Leached Chernozem (0 01 mm)		Alekshkin, 1965
Sr		heavy loam			67 0	a 67	-	8 0	-	33 9	-	-			4 3x10E2--30	Southern Chernozem (0 01 mm)		Alekshkin, 1965
Sr		clay			60 7	6 96	-	6 8	-	32 2	-	-			4 9x10E2--50	Thick Chernozem (0 01 mm)		Alekshkin, 1965
Sr					100	-	-	-	-	35	-	-			4 7x10E1	very fine suspended sediment (Durance River) (<0 02 mm)		Rancon, 1977
Sr		Organic muck				49 8	-	7.0	-	70 0	-	3x10E-3mol/L SrCl2			1 5x10E2	Muck		Joe & Barber, 1970

TABLE B-31

TECHNETIUM K_d VALUES

WRC	USS	SOIL type	% SAND	% SILT	% CLAY	% ORG	% $CaCO_3$	SAT PASTE pH	FIELD pH	CEC meq/ 100g	% FREE IRON OXIDES	FOUR CATION	% FOUR CATION	NATURAL CONCENTRATION	K_d (ml/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
1c	00a	Loamy Sand						7 1	7 0						1 (1 -[1op]	1 Gleysol	(0 M Na_2Ca,Sr,Co,Cs,Eu,Eu)	Bunzl & Schimack, 1986
1c	00a	Organic - loamy peat						0 5	6 8						11-10[1op]	2 Sphric Histosol, strongly humified		Bunzl & Schimack, 1986
1c	00a	Sandy loam						7(100)	5 7						1-<10[1op]	3 Cambisol, brown soil from loess		Bunzl & Schimack, 1986
1c	00a	Sandy loam						7(63)	7 1						>0 1->33[1op]	4 Cambisol		Bunzl & Schimack, 1986
1c	00a	Loamy sand						7(5)	4 6						>1->10[1op]	5 Acrisol parabrown soil, Ah-horizon		Bunzl & Schimack, 1986
1c	00a	Loamy sand						7(23)	4 5						>10->100[1op]	6 Acrisol, parabrown soil, B-horizon		Bunzl & Schimack, 1986
1c	00a	Clay							8 0		0 1meq/g		(0 1NCaNo3)		>0 1->1[1op]	8 - Bentonite, Süd-Chemie AG München		Bunzl & Schimack, 1989
1c	00a	Fibric Organic							5 0		2 1meq/g		(0 1NCaNo3)		approx 10[1op]	PJ - Sphagnum peat (high moor), Strothäger Moor, Hannover		Bunzl & Schimack, 1982
1c	00a	Fibric Organic							7 0		2 1meq/g		(0 1NCaNo3)		approx 10[1op]	M2 - Sphagnum peat (high moor), Hemmendorf, Bavaria		Bunzl & Schimack, 1989
1c	00j	SAM													1 16	SRP=Savannah River Plant soil		Hoeffner, 1985
1c	00j	SAM													1 37	SRP=Savannah River Plant soil		Hoeffner, 1985
1c	00j	Clay													3 31	SRP=Savannah River Plant soil		Hoeffner, 1985
1c	00j	SAM													0 23	SRP=Savannah River Plant soil		Hoeffner, 1985
1c	00j	SAM													0 10	SRP=Savannah River Plant soil		Hoeffner, 1985
1c	00j	SAM													0 17	SRP=Savannah River Plant soil		Hoeffner, 1985
1c	00j	SAM													0 23	SRP=Savannah River Plant soil		Hoeffner, 1985
1c	00j	SAM													0 14	SRP=Savannah River Plant soil		Hoeffner, 1985
1c	00p	Ap-horizon(0-20cm)	49 2	28 4	12 0		0 2	6 7		8 7		$CaCl_2$			0 15-0 8	B6(Aeo0 37) Alfisol (Parabrown earth)	(Rd=?1cm-M)(Tab1- soil prop) (Tab2- %, CEC, eq)	Bunzl et al , 1985
1c	00	Fragipan(B) - Brown A						6 3-6 5							380		(Tab 2) (1=0 -90)	Nowak, 1990
1c	00	Fragipan(B) - Brown B						6 6							800			Nowak, 1990
1c	00	Loam								(ROC)					0-0 87	Orthic Black Chernozem	(Tab1) (CEC=meq kg-1)	Sheppard & Sheppard 1987
1c	00	Sand								(16)						Orthic Regosol		Sheppard & Sheppard 1987
1c	00	Z2M-Ah						5 7		81 7cmHkg-1					(-)	D-Alfic Gleyed Dystric Regosol	Tab 1=a \ prop , CEC=cmol kg-1	Sheppard et al , 1987
1c	00	Ap						5 1		2 4cmHkg-1					2 3(-)	4-Alfic Gleyed Dystric Regosol	Ref=Ah CEC (Ch) in Ap soil	Sheppard et al , 1987
1c	00	Bfj Mn-jac						5 2		2 1cmHkg-1					1 4(-)	15-45cm Gleyed Dystric Brunisol	Ref=1V	Sheppard et al , 1987
1c	00	C -gr						6 2		1 2cmHkg-1					0 1(0 2)	24cm Gleyed Dystric Brunisol		Sheppard et al , 1987
1c	00a		82	12	3		0	3 7		175meHg-1		$CaCl_2$			16 (2 7-43)		Kd column ( )=Kd range Tab 1= soil properties Tab 2= Kd	Schimmack, et al , 1987
1c	00a	Ap				1 19		8 3	(solution						>0 1	(0 -12cm) Auenrendzina (Rohböden), FRG	(Tab 1) T-m) & 2= Kd - soil horizon	Bunzl et al , 1984
1c	00a	C				1 15		8 3	(solution						>0 1	(22-30cm) Auenrendzina (Bibling), FRG	Fig 3= Kd vs Ca , Na -ions	Bunzl et al , 1984
1c	00a	Cc				1 01		8 2	(solution						>0 1	(30-47cm) Auenrendzina (Bibling), FRG	Fig 4= Kd - conservation column - batch	Bunzl et al , 1984
1c	00a	AC-Cc				0 25		8 3	(solution						>0 1	(47-90cm) Auenrendzina (Bibling), FRG	Fig 5= Kd - 6 soils (A-horizons)	Bunzl et al , 1984
1c	00a	2Ah				14		8 2	(solution						>0 1	(90-129cm) Auenrendzina (Bibling), FRG	Fig 6= Kd - 7 soils (1 Ah)	Bunzl et al , 1984
1c	00a	2AC				07		8 2	(solution						>0 1	(129-132cm) Auenrendzina (Bibling), FRG	Abstract	Bunzl et al , 1984
1c	00a	Ap				2 41		7 3	(solution						>0 1	(0-31cm) Parabraun (Escherlen), FRG		Bunzl et al , 1984
1c	00a	Ah				71		7 4	(solution						<0 1	(31-52cm) Parabraun (Escherlen), FRG		Bunzl et al , 1984
1c	00a	(M)Al				34		7 2	(solution						<0 1	(52-92cm) Parabraun (Escherlen), FRG		Bunzl et al , 1984
1c	00a	AlBr				30		6 8	(solution						<0 1	(67 -73cm) Parabraun (Escherlen), FRG		Bunzl et al , 1984
1c	00a	Bt1				30		6 7	(solution						<0 1	(73-98cm) Parabraun (Escherlen), FRG		Bunzl et al , 1984
1c	00a	Bt2				29		6 2	(solution						<0 1	(>98cm) Parabraun (Escherlen), FRG		Bunzl et al , 1984
1c	00a	Sphagnum peat				100		5 3	5 4		2 1meq/g		0 1NCaCl2		17 7-<0 7	0 5(dissolved (2=mg/dm3)	Tab 1=Kd vs (2 dissolved Fig 1=Kd vs fc conc	Wolfram & Bunzl, 1986
1c	00a	Sphagnum peat				100		5 3	5 4		2 1meq/g		0 1NCaCl2		10 0->0 3	4 8(dissolved (2=mg/dm3)	Authors referred to ph vs this paper, H Phy 1983	Wolfram & Bunzl, 1986
1c	00a	Sphagnum peat				100		5 3	5 4		2 1meq/g		0 1NCaCl2		5 0->0 7	8 8(dissolved (2=mg/dm3)	Sphagnum peat, Strothäger Moor near Hannover	Wolfram & Bunzl, 1986
1c	00a	Sphagnum peat				100		5 3	5 4		2 1meq/g		CaCl2		41 0->2 0	0 5(dissolved (2=mg/dm3)	p 31= pH 1 6,2 7,4 6,5 4 = no effect on Kd	Wolfram & Bunzl, 1986
1c	00a	Sphagnum peat				100		5 3	5 4		2 1meq/g		CaCl2		21 0->0 0	4 8(dissolved (2=mg/dm3)		Wolfram & Bunzl, 1986
1c	00a	Sphagnum peat				100		5 3	5 4		2 1meq/g		CaCl2		0 7->0 4	8 4(dissolved (2=mg/dm3)		Wolfram & Bunzl, 1986
1c		Red brown clayey						5 1	-0 2						Av < 0	Chestnut Ridge, TNNL	Tab 1@ nor U)? (0 M -U,Sr,Cs,Co,Eu,Th,I)	Seeley & Reisers, 1984
															(N - 1 6)		Ox - hmo fc)= conc	Seeley & Reisers, 1984
															(K - 1 0)			Seeley & Reisers, 1984
1c	00	Glauconite sand	91 1	7 0	6 0			5		438(eH)	3 7			1 M	0 (A-B)	(10 wks) N E Netherlands	(Appendix 4) (0 M - Am,Np,Pu)	Priem, et al , 1986
1c	00	Glauconite sand	91 1	7 0	6 0			5		436(eH)	3 7			1 M	0 (A-B)	(10 wks) N E Netherlands	This report is a problem - Kds(1990)	Priem, et al , 1986
1c	00	Glauconite sand	91 1	7 0	6 0			5		448(eH)	3 7			2 M	0 (A-B)	(10 wks) N E Netherlands	Kds function of pH, Eh, N + time + APPENDICES	Priem, et al , 1986
1c	00	Glauconite sand	91 1	7 0	6 0			6		415(eH)	3 7			1 M	0 (A-B)	(10 wks) N E Netherlands	Aer = Aerobic pH in ( ) = initial pH	Priem, et al , 1986
1c	00	Glauconite sand	91 1	7 0	6 0			6		435(eH)	3 7			1 M	0 (A-B)	(10 wks) N E Netherlands	A aerobic, An= anaerobic, B batch, C= column and	Priem, et al , 1986
1c	00	Glauconite sand	91 1	7 0	6 0			8		421(eH)	3 7			2 M	0 (A-B)	(10 wks) N E Netherlands	M = molarity + salt concentration	Priem, et al , 1986
1c	00	Glauconite sand	91 1	7 0	6 0			5	(5 8)	27(eH)	2 7			1 M	4 6 (aw M)	(7 wks) N E Netherlands		Priem, et al , 1986
1c	00	Glauconite sand	91 1	7 0	6 0			5	(5 4)	64(eH)	3 7			1 M	3 4 (An-M)	(7 wks) N E Netherlands		Priem, et al , 1986

continued...

TABLE B-31 (continued)

No.	Ref.	Soil type	% sand	% silt	% clay	% OM	% CaCO3	pH (soil:water)	CEC (meq/100g)	% OM of CEC (NH4OAc)	Cation	% Cation	Matrix concentration	Kd (ml/g)	Soil location or description	Other information	Reference
1r	86	Clearwater sand	91.1	3.9	4.0			5 (5-5)	41(mV)	3.7			2 M	3.4 (AN B)	(7 obs.) N.F. Netherlands		Prins, et al., 1986
1r	87	Clearwater sand	91.1	3.9	4.0			6 (6 6)	38(mV)	3.7			1 M	4.0 (AN B)	(7 obs.) N.F. Netherlands		Prins, et al., 1986
1r	88	Clearwater sand	91.1	3.9	4.0			6 (6 6)	15(mV)	3.7			3 M	3.0 (AN B)	(7 obs.) N.F. Netherlands		Prins, et al., 1986
1r	89	Clearwater sand	91.1	3.9	4.0			6 (6 5)	-7(mV)	3.7			3 M	3.1 (AN B)	(7 obs.) N.F. Netherlands		Prins, et al., 1986
1r	90	Clearwater sand	91.1	3.9	4.0			5 (5 6)	140(mV)	3.7			1 M	? (AN C)	(7 obs.) N.F. Netherlands		Prins, et al., 1986
1r	91	Clearwater sand	91.1	3.9	4.0			5 (5 7)	178(mV)	3.7			1 M	? (AN C)	(7 obs.) N.F. Netherlands		Prins, et al., 1986
1r	92	Clearwater sand	91.1	3.9	4.0			5 (5 8)	158(mV)	3.7			3 M	? (AN C)	(7 obs.) N.F. Netherlands		Prins, et al., 1986
1r	93	Coby 1017						5 (6 2)	37(mV)	155(Ca++)			012 M	44 (AN C)	(6 obs.) Carlsbad_FMC		Prins, et al., 1986
1r	94	Coby 1017						7 (7 4)	13(mV)	155(Ca++)			012 M	60 (AN C)	(6 obs.) Carlsbad_FMC		Prins, et al., 1986
1r	95	Coby 1017						5 (6 1)	7(mV)	155(Ca++)			05 M	100 (AN C)	(6 obs.) Carlsbad_FMC		Prins, et al., 1986
1r	96	Coby 1017						7 (7 8)	25(mV)	155(Ca++)			05 M	54 (AN C)	(6 obs.) Carlsbad_FMC		Prins, et al., 1986
1r	97	Coby 2120						6 8 (7 3)	-3(mV)	1 183(Ca++)			1 0 M	535 (AN C)	(6 obs.) Carlsbad_FMC		Prins, et al., 1986
1r	98	Coby 2120						5 (5 9)	8(mV)	1 183(Ca++)			1 0 M	484 (AN C)	(6 obs.) Carlsbad_FMC		Prins, et al., 1986
1r	99	Coby 2120						5 8 (7 2)	11(mV)	1 183(Ca++)			2 5 M	500 (AN C)	(6 obs.) Carlsbad_FMC		Prins, et al., 1986
1r	100	Coby 2120						5 (5 7)	23(mV)	1 183(Ca++)			2 5 M	334 (AN C)	(6 obs.) Carlsbad_FMC		Prins, et al., 1986
1r	84	Sand	91.2	7	1.8								03+- 0103 D- 2 0	8	B - Rupert sand	Tab 5:Adsorption - batch Kd in ( ) - batch Kd not in ( ) from	James et al., 1980
1r	85	Loamy sand	81.2	15	3.8									04(-)	A - from Armorel formation	In Hanford sediments A-from Armorel pedological formation, B- from surface, Rupert sand (type correspondent) (U R - Ka (L Sr 34)	James et al., 1980
1r	83	15m Ab						5 7		81 2cm3Kg-1					0 4 cm Cloyed Eyetric Brunisol	Free Fume (O N Mg, I, Cs, Fe, H, Th, Mo)	Sheppard, 1989
1r	83	Ae						5 1		2 9cm3Kg-1					4-15 cm Cloyed Dystric Brunisol		Sheppard, 1989
1r	83	Bf1;Bf2;Bf3						5 2		2 1cm3Kg-1					15-45 cm Cloyed Dystric Brunisol	Kd: leachate - 2 cm ( ) Kd: Groundwater - ( ) Soil type: Pb, 15m A april draw from BLC-19 (n 316(3))	Sheppard, 1989
1r	83	C (Bq)						5 7		1 7cm3Kg-1					145 cm Cloyed Dystric Brunisol		Sheppard, 1989
1r	82	Organic			-	77		5 0						1 3 L/Kg	1 Brunisol profile (H	Tab) - soil properties	Sheppard, MIS & WOE, 1990
1r	83	Sand	95	3	2	0 4		4 6						-0 01 L/Kg	2 Brunisol profile	Tab 7 = gamma mean aerobic Kd for 24 soils	Sheppard, MIS & WOE, 1989
1r	83	Sand	97	1	2	0 1		4 6						0 01 L/Kg	3 Brunisol profile (Bf1/Bf2/Bf3)	Bf1: to 819 refer to sample numbers of Koch and May (1987).	Sheppard, MIS & WOE, 1990
1r	83	Sand	46	29	11	8 1		3 9						-0 05 L/Kg	4 Brunisol under boreal forest	collected at 9 sites in Ontario	Sheppard, MIS & WOE, 1989
1r	83	Loam	15	31	54	7 6		7 3						-0 2 L/Kg	5 Chernozemic		Sheppard, MIS & WOE, 1989
1r	99	Organic				85		4 5						2 7 L/Kg	6 Sedge profile - surface 0-15 cm		Sheppard, MIS & WOE, 1989
1r	98	Organic				4 1		5 6						-0 7 L/Kg	7 Sedge profile - well humified 15-30 cm		Sheppard, MIS & WOE, 1989
1r	96	Clay	40	24	36	2 4		5 5						-0 1 L/Kg	8 Sedge profile - clay mineral subsoil		Sheppard, MIS & WOE, 1989
1r	94	Organic	-	-	-	88		4 6						0 92 L/Kg	9 Sphagnum profile Ap-surface 0-20 cm		Sheppard, MIS & WOE, 1989
1r	93	Organic	-	-	-	98		4 6						3 0 L/Kg	10 Sphagnum profile Ashgrafted 20-40 cm		Sheppard, MIS & WOE, 1989
1r	95	Organic	-	-	-	77		3 7						1 8 L/Kg	11 Sphagnum profile A - 0-20 cm		Sheppard, MIS & WOE, 1989
1r	95	Organic	-	-	-	96		5 0						2 9 L/Kg	12 Sphagnum profile B - 20-40 cm		Sheppard, MIS & WOE, 1989
1r	95	Organic	-	-	-	81		4 2						-0 7 L/Kg	13 Sphagnum profile B - 40-60 cm		Sheppard, MIS & WOE, 1989
1r	95	Organic	-	-	-	61		4 3						0 85 L/Kg	14 Sphagnum profile B - 60-80 cm		Sheppard, MIS & WOE, 1989
1r	95	Organic	-	-	-	79		4 1						0 40 L/Kg	15 Sphagnum profile B - 80-100 cm		Sheppard, MIS & WOE, 1989
1r	95	Organic	-	-	-	72		4 7						1 3 L/Kg	16 Sphagnum profile B - 100-120 cm		Sheppard, MIS & WOE, 1989
1r	95	Organic	-	-	-	78		4 7						0 62 L/Kg	17 Sphagnum profile B - 120-140 cm		Sheppard, MIS & WOE, 1989
1r	95	Organic	-	-	-	49		4 7						0 89 L/Kg	18 Sphagnum profile B - 140-160 cm		Sheppard, MIS & WOE, 1989
1r	95	Organic	85	10	10	7 8		5 4						-0 08 L/Kg	19 Sphagnum profile B - mineral subsoil		Sheppard, MIS & WOE, 1989
1r	95	Organic	-	-	-									-0 3 L/Kg	20 Sphagnum surface		Sheppard, MIS & WOE, 1989
1r	95	Organic	-	-	-	44		4 2						1 3 L/Kg	21 Sphagnum well humified		Sheppard, MIS & WOE, 1989
1r	95	Organic	-	-	-	19		3 8						1 4 L/Kg	22 Organic Fibrous soil-fl or mineral		Sheppard, MIS & WOE, 1989
1r	95	Organic	-	-	-	39		3 8						0 10 L/Kg	23 RK[]: Site #1 Sphagnum 40-80 cm		Sheppard, MIS & WOE, 1989
1r	95	Organic	-	-	-	29		3 8						0 07 L/Kg	24 RK[2 Site #1 grass and Sphagnum 1[- 2[cm		Sheppard, MIS & WOE, 1989
1r	95	Organic	-	-	-	84		3 1						2 1 L/Kg	25 RK[3 Site #2 forested Sphagnum 1[- 12[cm		Sheppard, MIS & WOE, 1989
1r	95	Organic	-	-	-	89		4 8						-0 3 L/Kg	26 RK[4 Site #3 forested organic 40-60 cm		Sheppard, MIS & WOE, 1989
1r	95	Organic	-	-	-	61		5 4						-0 03 L/Kg	27 RK[5 Site #4 forested organic 40-60 cm		Sheppard, MIS & WOE, 1989
1r	95	Organic	-	-	-	57		4 9						-0 03 L/Kg	28 RK[6 Site #5 forested organic 40-60 cm		Sheppard, MIS & WOE, 1989
1r	95	Organic	-	-	-	90		3 4						0 52 L/Kg	29 RK[7 Site #6 Sphagnum 60-80 cm		Sheppard, MIS & WOE, 1989
1r	95	Organic	-	-	-	73		4 7						-0 003 L/Kg	30 RK[8 Site #7 forested organic 10-20 cm		Sheppard, MIS & WOE, 1989
1r	95	Organic	-	-	-	51		5 6						-0 4 L/Kg	31 RK[9 Site #7 forested organic 10-20 cm		Sheppard, MIS & WOE, 1989
1r	95	Organic	-	-	-	80		4 8						-0 3 L/Kg	32 RK[10 Site #8 grass and sedge 14-40 cm		Sheppard, MIS & WOE, 1989
1r	95	Organic	-	-	-	85		5 7						0 40 L/Kg	33 RK[1] Site #9 forest and sedge 10-25 cm		Sheppard, MIS & WOE, 1989
1r	95	Organic	-	-	-	67		5 8						1 2 L/Kg	34 RK[12 Site #3 forested organic 1[- 40 cm		Sheppard, MIS & WOE, 1989

continued...

TABLE B-31 (concluded)

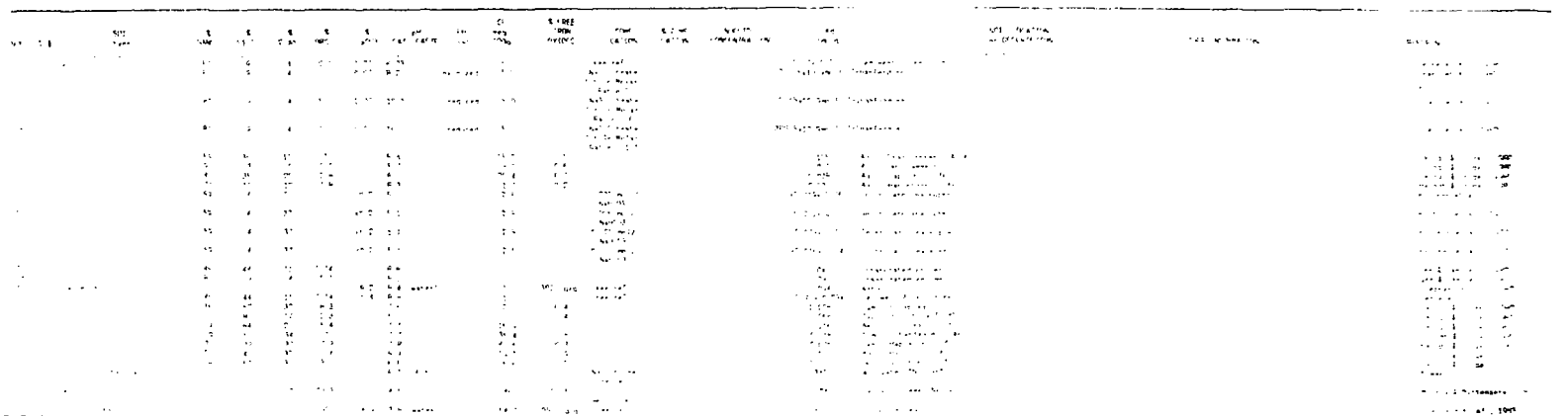

TABLE B-32

THORIUM K_d VALUES

NUC	ISO	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	SAT PASTE pH	EH (mV)	CEC meq/ 100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	NUCLIDE CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
Th	228	clay					6 0		-250 (ox						24000	glacial till	(Tab 4 - Kd's at (Th-228)	Bell and Bates, 1988
Th		silt + sand					6 0		-200 (ox						5800	fine coarse sand	(Tab 1, Ch compos ; (Tab 3 - soil descrip)	Bell and Bates, 1988
Th		silt sand					6 0		-200 (ox						790	medium coarse sand	geoc CONCLUSIONS (Tab 5: Activities)	Bell and Bates, 1988
Th		fine sand					6 0		-200 (ox						5800	coarse sand		Bell and Bates, 1988
Th		sand					6 0		-200 (ox						280	medium sand		Bell and Bates, 1988
Th		Loam					5 2			81 2cmol/Kg					1998 6 (--)	0-4 cm Cloyed Dystric Brunisol	Kd: leach - mc ( ) Kd: Cm ( )	Sheppard et al., 1987
Th		As					5 1			9 9cmol/Kg					1071 0 (--)	4-15 cm Cloyed Dystric Brunisol		Sheppard et al., 1987
Th		Bfj-Mfjgj					5 2			2 1cmol/Kg					---- (--)	15-45 cm Cloyed Dystric Brunisol		Sheppard et al., 1987
Th		C-Cgj					6 2			1 7cmol/Kg					14	45+ cm Cloyed Dystric Brunisol		Sheppard et al., 1987
Th	230	fine sandstone and silty clay					2 0								5470	Jeffrey City, Wyoming	(Th-230) Tab 4	Hays-Dysfarr et al., 1981
Th		fine sandstone and silty clay					4 5								5470	Jeffrey City, Wyoming	e 226: pore geology	Hays-Dysfarr et al., 1981
Th		fine sandstone and silty clay					5 75								11 00	Jeffrey City, Wyoming	e 230: Solid Rock formation	Hays-Dysfarr et al., 1981
Th		fine sandstone and silty clay					7 0								15000	Jeffrey City, Wyoming		Hays-Dysfarr et al., 1981
Th		A- red-brown clayey					4 0 -- 8 3								Av (Pr) TTd) ((+ 5 4 E0)		(Th 4-) (Tab 18 Kd) Regard Age 200k of Kds (Th = U, Sr, Cs, Co: Eu, Ic, I) BS = 5 mg Ta/l conc	Seeley and Reimers, 1984
Th		Loam					5 2			81 2cmol/Kg					1578 (--01)	0-4 cm Cloyed Dystric Brunisol	Perm Comm (Th = mc, I, Cs, Co- Mn, Ic, U)	Sheppard, 1980
Th		As					4 1			9 9cmol/Kg					1962 5--1 21600--01	4-15 cm Cloyed Dystric Brunisol	Kdr leachate - mc ( ) Kdr Groundwater - ( )	Sheppard, 1980
Th		Bfj-Mfjgj					5 2			2 1cmol/Kg					1153 7--1 4 (--)	15-45 cm Cloyed Dystric Brunisol	Soil type, Ph, CEC & sand desc from BLG-197(AECB(3))	Sheppard, 1980
Th		C-Cgj					6 7			1 7cmol/Kg					208 0--0 0 (19807 7- 0 0)	45+ cm Cloyed Dystric Brunisol		Sheppard, 1980
Th		sandstone sand		7			4 9			5 8cmol/Kg					35 L/g	Port Hope, Ontario	(Th-13,98) Port Hope on Ja 3 (Tab 2 soil charact Perm comm	Sheppard, MCE 1 Rpt, 1989
Th		organic		11			5 5			120cmol/Kg					13000 L/g	Port Hope, Ontario	Tab 11 Kd(L/kg) 2 ---- only, other 7- MD	Sheppard, MCE 1 Rpt, 1989
Th		clay (fraction)					6 5							Concentration	166000	<2um fraction (clay) of soil type	Tab 7- Kd (Dr Mn,U,Sr) (Th-U) 234	Dahlman et al., 1976
Th		Sand	45		30	< 1	2%	7 0			-	-	-		5 5x10E5	Cedarbrook sediment		Rancon, 1973
Th			(8 S-D7)				Bicarbonate							1% Conc (1 mM)				
Th		Clay	40		60	0	0	3 7			-	-	-	1% Conc	8	clay subsoil		Rancon, 1973
Th			(8 S-D7)				Bicarbonate							(1 mM)				
Th			40		60	0	0	6 8			-	-	-	1% Conc	1x10E5	clay subsoil		Rancon, 1973
Th			(8 S-D7)				Bicarbonate							(0 1 mM)				
Th		Organic	5	-	12	60	23	6 7			-	-	-	1% Conc	9x10E4	river peat		Rancon, 1973
Th			(8 S-D7)				Bicarbonate							(1 mM)				
Th			5	-	12	60	23	7 4			-	-	-	1% Conc	1 5x10E4	river peat		Rancon, 1973
Th			(8 S-D7)				Bicarbonate							(0 1 mM)				

TABLE B-33

TRITIUM K_d VALUES

NUC	ISO	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	SAT PASTE pH	EH (mV)	CEC meq/ 100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	NUCLIDE CONCENTRATION	Kd (mL/g	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
H	3	sand	91	7	1 8										05 (0 3 - 0 5)	Hanford sand	(H-3 (Tab 5 - Kd (0 6 - Cs, Ic, I, Sr)	Jones et al., 1981
H	3	sand	91	7	1 8										04 (0 2 - 0 3)	Hanford sand	Kd soil = [ ] = aqueous Kd in [ ] = basalt	Jones et al., 1981
H	3	loamy sand	81	15	3 8										06 (-- - 0 7)	Ringold formation	Two Hanford sediments As from Ringold geological formation	Jones et al., 1981
H	3	loamy sand	81	15	3 8										--- (0 1 - 0 8)	Ringold formation	As from surface, Kd=trend (Sr/Ic correlation)	Jones et al., 1981
H	3	sandy					8 0								0 1 (0 0)	Hanford soil	(3H) Tab 3: batch - column Kd	Jones et al., 1981
																	Kd = ( ) = lab method Parenthesis shows hydration vs soil depth	Jones et al., 1981

TABLE B-34

URANIUM K_d VALUES

MJC	ISI	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	SAT PASTE pH	EM (=)	CEC meq/ 100g	% FREE IRON OXIDES	COMP CATION	% COMP CATION	NUCLIDE CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
U	233	clay						6 0	>200(mv)						46			
U		C1 2 sand						6 0							46		(tab 4 = Kd) (Tab 1- Ch composition)	Bell and Bates, 1988
U		C2 sand						6 0							900		(tab 2- soil descr) (good CONCLUSIONS)	Bell and Bates, 1988
U		C6 sand						6 0							2000		(Tab 3- Activities (Bq))	Bell and Bates, 1988
U		sand						6 0							560			Bell and Bates, 1988
U		organic						6 78 +- 0 11										Bell and Bates, 1988
U		organic						6 09 +- 0 04							6200 (13001	PCE (0-40 cm)	(tab 4 = in situ - tab = Kd comparison)	Sheppard and Thibault, 1988
U		organic						5 94 +- 0.05							8503 (2103)	PCE (40-80 cm)		Sheppard and Thibault, 1988
U		organic						6 82 +- 0 12							3000 (2000)	SCE (1-10 cm)		Sheppard and Thibault, 1988
U		clay						7 78 +- 0 09							2500 (2900)	SCE (10-30 cm)		Sheppard and Thibault, 1988
															740 (870)	SCE (30-40 cm) (clay)		Sheppard and Thibault, 1988
U		sand	89	3	8													
U		sand	91	2	7										2 (-)	Beatty 1, NV	( ) = reducing conditions	Reichrest, 1983
U		sand	83	2	15										1	Beatty 2, NV	test Valley, NV (abst sKd's highest in alkaline alluvial	Reichrest, 1983
U		clayey sand	58	6	36										3	Beatty 5, NV	basin deposits high in montmorillonite and zeolites)	Reichrest, 1983
U		clayey sand	68	11	21										750	Barnwell 4, SC	TAB 1 = Kd + mineral phase char	Reichrest, 1983
U		clayey sand	73	8	19										750	Barnwell 12, SC	tab 2 = relationships + texture, surface area + clay	Reichrest, 1983
															550 (-)	Barnwell 14, Sc	mineral comp (tab 4 = Kd + 6 radionuclides)	Reichrest, 1983
																	Fig 6 = text. diagram (Fig 7 = Kd vs sorptive minerals)	
																	kd column = ( ) = reducing conditions	
U		loam							(600)									
U		sand							(16)						2-73	Orthic Black Chernozem	(tab 1) (CEC = cmol Kg -1)	
U		A Ler. LFH-A						5 7	Bl 2cmol/kg						0-0 1	Orthic regosol		Sheppard and Sheppard 1987
U		AE						5 1	2 9cmol/kg						- (--)	0-4 cm Gleyed Dystric Brunisol	BLG-Y)	Sheppard and Sheppard 1987
U		Ae-B, Bf-Bf/g,						5 7	2 1cmol/kg						-- (17) 8)	4-15 cm Gleyed Dystric Brunisol	Ir Kd column, no ( ) = leach ( ) = Ox	Sheppard et al , 1987
L		Ion-B, C-Cg;						6 7	1 7cmol/kg						-- (228 2)	15-45 cm Gleyed Dystric Brunisol		Sheppard et al , 1987
U	239	f-ne sandstone and silty sand						2 0							10 8 (60 7)	>45 cm Gleyed Dystric Brunisol		Sheppard et al , 1987
U	238	f-ne sandstone and silty sand						4 5							100			Sheppard et al , 1987
U	238	f-ne sandstone and silty sand						5 75							200		a 276 = site geology	
U	238	f to sandstone and silty sand						7 0							1000		a 230 = split rock formation	Hajrr-Djafar+ et al , 1981
U		fn -red-brown clayey						5 6 +- 1 0							2000		(U-238) tab 4	Hajrr-Djafar+ et al , 1981
															AV = 3 2 e3	Chestnut Ridge, ORNL		Hajrr-Djafar+ et al , 1981
															(M = 2 5 e4)		(U-6) (tab 1B = Kd)	Seeley and Reimers, 1984
															(L = 2 5 e2)		remark had 100's of Kds	
U		LFH-An															(O M = SR CS-Co-Eu-Th-Tc-)	
U		Ae						5 2	Bl 2cmol/kg								Isotope Li-low 85-5 mg U/L = conc AV=average	
U		Bf-Bf/g)						5 1	2 9cmol/kg						5R A-3 3(47 B-2 2) 0-4 cm Gleyed Dystric Brunisol, S E Manitoba		Form Conn (O M =), Cs, C-, Tc, U, Th, Mo)	
U		C-Cg)						5 7	2 1cmol/kg						7P4 9-3 3(26 5-1 1)4-15 cm Gleyed Dystric Brunisol, S E Manitoba		kd: Leachate = on ( ) kd: Groundwater = ( )	Sheppard, 1989
U		Silty loam clay			36			6 7	1 /cmol/kg						16A--0 8(15 8+ C 9) 15-45 cm Gleyed Dystric Brunisol S E Manitoba		Soil type, Ph, CEC & soil desc from BLG-1Y(JED16(3))	Sheppard, 1989
U		Loam			15			7 0							45 A--0 6(18 3-1 2) >45 cm Gleyed Dystric Brunisol, S E Manitoba			Sheppard, 1989
U		Medium sand			2			7 3							450 L/Kg	1 Port Hope, Ontario	(O M = Th, Pb) Port Hope soils Tab 1= soil charact	Sheppard, 1989
U		Organic			43			4 0							1 2 L/Kg	2 Port Hope, Ontario	Tab 2= Kd(L/Kg) 0 soils Pore conn	Sheppard, MOE & RJP, 1989
U		Fine sandy loam			10			5 5							03 L/Kg	3 Port Hope, Ontario		Sheppard, MOE & RJP, 1989
U		Fine sandy loam			11			7 4							190	4 Port Hope, Ontario		Sheppard, MOE & RJP, 1989
U		Fine sandy loam			10			7 4							2900 L/Kg	4 Port Hope, Ontario		Sheppard, MOE & RJP, 1989
U		Fine sandy loam			10			6 6							1 9 L/Kr	5 Port Hope, Ontario		Sheppard, MOE & RJP, 1989
U		Fine sandy loam			10			6 5							2 4 L/Kg	6 Port Hope, Ontario		Sheppard, MOE & RJP, 1989
U		Fine sandy loam			10			6 5							440 L/KG	7 Port Hope, Ontario		Sheppard, MOE & RJP, 1989
U		Fine sandy loam			12			7 1							4500 L/Kg	8 Port Hope, Ontario		Sheppard, MOE & RJP, 1989
U		clay (fract-on)						6 5							15 L/Kg	9 Port Hope, Ontario		Sheppard, MOE & RJP, 1989
														Sm=Eu(NO3)2	4400	(Sum fraction (clay) of soil loam	Tab 3= Kd (On= Pu,Th,Mo) U(5)-233	Dahlman et al , 1976
U		Sand	6%		50	< 1	25	7 7	-	-	-	-	-	-	16	Cadarache sediment		
			(8 5-02)				Bcarbonate											Rancon, 1973
U		Sand				-	-	-						4 3mEQ3Z-/mL				
U		Silt, alluvial soil				-	-	-						4 3mEQ3Z-/mL	0 13			
U		Clay	40		60	0	0	7 7							0 75			Yamamoto et al , 1973
			(8 5-02)				Bcarbonate								270	altered schist		Yamamoto et al , 1973
U		Abyssal red clay				-	-	2 8										Rancon, 1973
U		Abyssal red clay				-	-	7 1							0 58mol/L NaCl			
U		Organic	5		12	60	23	7 7							0 68mol/L NaCl			Erickson, 1980
			(8 5-02)				Bcarbonate								200			Erickson, 1980
															7 0x10E5			Rancon, 1973
															33	organic peat		

TABLE B-35

ZINC K_d VALUES

MIC	TYP	SOIL type	% SAND	% SILT	% CLAY	% ORG	% CaCO3	pH SAT. PASTE	FM (wt	CEC meq/ 100g	% EXCH CATION (NH4Ac)	CHIEF CATION	% CHIEF CATION	NUCLIDE CONCENTRATION	Kd (mL/g)	SOIL LOCATION or DESCRIPTION	OTHER INFORMATION	REFERENCE
/n		loamy sand					1 1	7 0(base satu)							10e3-10e4 (log)	F Grassland, permanent grassland	(Fig 2-5) , sric ac	Bunzl and Schmack 1980
/n		loamy sand					0 5	6 8(base satu)							10e3-10e4 (log)	F Crop land (approx Mussotti), slightly humified		Bunzl and Schmack 1980
/n		sandy loam						5 7(base satu)							10e2-10e3 (log)	S Cambrisol, brown soil from loess		Bunzl and Schmack 1980
/n		sandy loam						7 1(base satu)							10e3-10e4 (log)	A (podzolic)brown soil		Bunzl and Schmack 1980
/n		loamy sand						4 6(base satu)							3E3 (log)	S Arenosol, parabrown soil AA		Bunzl and Schmack 1980
/n		loamy sand						6 8(base satu)							10E2 (log)	S Arenosol, parabrown soil, D horizon		Bunzl and Schmack 1980
/n		loamy sand						6 8(base satu)							10E5 (log)	H Fluvisols, Sod-Fluvic AG Moorgley		Bunzl and Schmack 1980
/n		Clay						0 0		0 8 meq/g		(0 1N BaNO3)			10E3 (log)	H1, Sphag peat (H-soil mostly Steinhuder Meer, Hannover) 0 36% ash	(P1 and P2 = slightly decomposed shredded 0 3-0 8 mol	Bunzl and Schmack 1980
/n		Fibric organic						2 1		meq/g		(0 1N CaNO3)			10E3 (log)	H2, Sphag peat (Moor moor, Ammergau) Bavaria, 1 0% ash	(1 8) 0 20 cm and leaves to 2cm, 4-g kung, Bavaria	Bunzl and Schmack 1980
/n		Fibric organic						3 0		65 meq/kg		(0 1N CaNO3)			1E3 (log)	A1 - montmorillonite, Montmorillo, kaolinite	(Abstract);Tab 1: soil prop , (2mm Fract)	Zabonnik & Zebora 1987
/n		Clay minerals	24 5	54 5	21 0			5 1		70	µg/wet/kg	13 3g/kg				PO Vermiculite, Chlorite	Final adhere waters 1-g2: differences NaNO3 - stange leach	Zabonnik & Zebora , 1987
/n		Clay minerals	22 5	47 5	30 0			5 3		44	meq/kg	17 1g/kg				C Chlorite, Vermiculite Illite Illite Verm -montmorio	Fig3, metal absorption on resulgon to metal on soil-clay	Zaremski & Zebora 1987
/n		Clay minerals	50 5	39 5	11 0			5 7		0 01	meq/kg	11 4g/kg				Mean of 37 Danish soils	Table: soil char - Kd correlations, Table: Regression coeff	Andersen & Christensen 1988
/n								6 7			112				10 - 1000		Figs:Log Kd for Cd - function of pH Fig2c soil prop	
/n																	Conclusions	
/n		Clay	40 1	16 3	43 6	7 0		6 7			15 89		15 9		6Bk	Mecklenberg clay	Table: soil prop Tab 3: Kd Fig 3,4: Kd vs metal conc	Reddy and Dunn 1986
/n		Loam	45 9	34 6	19 6	2 7%		6 8			12 51		11 7		64B	Wilken loam	Tab 4: regression analysis result	Reddy and Dunn 1986
/n		Sand	84 4	9 5	15 7	2 6B		5 8?			8 03		5 1		14D	Lysdal sandy loam	Abstract and Conclusions	Reddy and Dunn 1986
/n		Sand	94 4	0 8	2 4	0 4		5 3			2 6		CaCl2			Soil @ 150C	Soil prop : from Christensen,1987 SB11-44 : Tab 1	Christensen, 1987
/n		Sandy loam	75 0	13 8	14 0	0 3		6 4			6 0		CaCl2			Soil @ 150C	Soil depth:SC-100cm Fig 1,3: Kd vs Zn conc	Christensen, 1987
																	Tab 1: /dKd = Kd/n, R2= Conclusions	
/n	65		80	17	3		0	3 7 (CaCl2)			125meq/kg				41 (18-89)		Kd columns ( ): n Kd range Tab 1: soil prop Tab 2: Kd	Schmack et al , 1987
/n		PA (0-35 cm)				31 7		5			134		0 8M (1 40)	0 1M Ca(NO3)2	0 26 (fig-1)	Rauad (W Germany), Gley/Silicate Clay (DM 2 1)	Lab 1 = soil prop Also mineralogy of clay soil,CECE pH 5,7	Tiller et al , 1984
/n		PA (0-30 cm)				31 7		6			134	0 8M	(1 40)	0 1M Ca(NO3)2	1 37 (fig-1)	Rauad (W Germany), Gley Silicate Clay (DM 2 1)	Log K Fe, Mn = wt/B Tab 2 = clay mineralogy	Tiller et al , 1984
/n		PA (0-35 cm)				31 7		7			134	0 9M	(1 40)	0 1M Ca(NO3)2	7 63 (fig-1)	Rauad (W Germany), Drag/Silicate Clay (DM 2 1)	Lab 5 = Kd (fig 1), cd-Al Zn solution conc=10 -6 molar	Tiller et al , 1984
/n		LA (0-30 cm)				5		5			65	1 1B	(2 62)	0 1M Ca(NO3)2	0 31 (fig-1)	Aqalf (W Germany), Silicate clay (2 1)	(0 N = N=, Zn) (CEC used ph 7)	Tiller et al , 1984
/n		LA (0-30 cm)				5		6			55	1 1B	(2 62)	0 1M Ca(NO3)2	1 99 (fig-1)	Aqalf (W Germany), Silicate clay (2 1)		Tiller et al , 1984
/n		LA (0-30 cm)				5		7			64	1 2B	(2 62)	0 1M Ca(NO3)2	11 20 (fig-1)	Aqalf (W Germany), Silicate clay (2 1)		Tiller et al , 1984
/n		LA (0-30 cm)				5		8			69	0 4S	(1 61)	0 1M Ca(NO3)2	0 69 (fig-1)	Fallagleart (Australia), Silicate clay (2 1)		Tiller et al , 1984
/n		PEL (0-15 cm)				3 1		5			99	0 4S	(1 61)	0 1M Ca(NO3)2	95 (fig-1)	Fallaclaret (Australia), Silicate clay (2 1)		Tiller et al , 1984
/n		PEL (0-15 cm)				3 1		6			99	0 4S	(1 61)	0 1M Ca(NO3)2	2 46 (fig-1)	Fallaclaret (Australia), Silicate clay (2 1)		Tiller et al , 1984
/n		PEL (0-15 cm)				3 1		7			99	0 4S	(1 61)	0 1M Ca(NO3)2	2 04 (fig-1)	Fallaquaret (Australia), Silicate clay (2 1)		Tiller et al , 1984
/n		PAE (0-15 cm)				7 4		5			70	0 9	(0 65)	0 1M Ca(NO3)2	2 72 (fig-1)	Fallaquaret (Australia), Silicate clay (2 1)		Tiller et al , 1984
/n		EAE (0-15 cm)				2 4		6			70	0 9	(0 65)	0 1M Ca(NO3)2	2 72 (fig-1)	Fallaquaret (Australia), Silicate clay (2 1)		Tiller et al , 1984
/n		EAE (0-15 cm)				7 4		7			70	0 9	(0 65)	0 1M Ca(NO3)2	4 85 (fig-1)	Fallaquaret (Australia), Silicate clay (2 1)		Tiller et al , 1984
/n		KA (40-60 cm)				1 0		5			53	4	(2 26)	0 1M Ca(NO3)2	1 05 (fig-1)	Aqualf (W Germany), Silicate clay (2 1)		Tiller et al , 1984
/n		KA (40-60 cm)				1 0		6			53	4	(2 26)	0 1M Ca(NO3)2	1 65 (fig-1)	Aqualf (W Germany), Silicate clay (2 1)		Tiller et al , 1984
/n		KA (40-60 cm)				1 0		7			53	4	(2 26)	0 1M Ca(NO3)2	4 60 (fig-1)	Aqualf (W Germany), Silicate clay (2 1)		Tiller et al , 1984
/n		PA B (20-30 cm)				0 8		5			24	P0	(4 19)	0 1M Ca(NO3)2	057 (fig-1)	Paleoaralf (W Germany), Silicate clay from oxide (1 1/Fe)		Tiller et al , 1984
/n		PA B (20-30 cm)				0 8		6			24	00	(4 19)	0 1M Ca(NO3)2	30 (fig-1)	Paleoaralf (W Germany), Silicate clay from oxide (1 1/Fe)		Tiller et al , 1984
/n		PA B (20-30 cm)				0 8		7			24	00	(4 19)	0 1M Ca(NO3)2	3 44 (fig-1)	Paleoaralf (W Germany), Silicate clay from oxide (1 1/Fe)		Tiller et al , 1984
/n		W (0-15 cm)				4 9		5			37	77	(19 3)	0 1M Ca(NO3)2	0 23 (fig-1)	Haplohumox (Australia), Iron oxide/Silicate clay (Fe/1 1)		Tiller et al , 1984
/n		W (0-15 cm)				4 0		6			32	77	(19 3)	0 1M Ca(NO3)2	1 23 (fig-1)	Haplohumox (Australia), Iron oxide/Silicate clay (Fe/1 1)		Tiller et al , 1984
/n		W (0-15 cm)				4 9		7			32	77	(19 3)	0 1M Ca(NO3)2	8 71 (fig-1)	Haplohumox (Australia), Iron oxide/Silicate clay (Fe/1 1)		Tiller et al , 1984
/n		LB (30-50 cm)				1 1		5			53	54	(6 01)	0 1M Ca(NO3)2	0 17 (fig-1)	Uhalf (W Germany), Silicate clay/Iron oxide (2 1/Fe)		Tiller et al , 1984
/n		LB (30-50 cm)				1 1		6			53	54	(6 01)	0 1M Ca(NO3)2	57 (fig-1)	Uhalf (W Germany), Silicate clay/Iron oxide (2 1/Fe)		Tiller et al , 1984
/n		LB (30-50 cm)				1 1		7			53	54	(6 01)	0 1M Ca(NO3)2	9 88 (fig-1)	Uhalf (W Germany), Silicate clay/Iron oxide (2 1/Fe)		Tiller et al , 1984
/n		PB (50-80 cm)				16 5		5			87	5 20	(7 37)	0 1M Ca(NO3)2	0 17 (fig-1)	Aqualf (W Germany), Silicate clay/Iron oxide (2 1/Fe)		Tiller et al , 1984
/n		PB (50-80 cm)				16 5		6			87	5 20	(7 37)	0 1M Ca(NO3)2	2 19 (fig-1)	Aqualf (W Germany), Silicate clay/Iron oxide (2 1/Fe)		Tiller et al , 1984
/n		PB (50-80 cm)				16 5		7			87	5 20	(7 37)	0 1M Ca(NO3)2	19 56 (fig-1)	Aqualf (W Germany), Silicate clay/Iron oxide (2 1/Fe)		Tiller et al , 1984
/n		Cantkite (lab)						5							380 (fig-1)	Cantkite (lab prep)		Tiller et al , 1984
/n		Cantkite (lab)						6							7 70 (fig-1)	Cantkite (lab prep)		Tiller et al , 1984
/n		Cantkite (lab)						7							16 50 (fig-1)	Cantkite (lab prep)		Tiller et al , 1984
/n		Montmo., B1			(2 yr						11/mmol/Kg			1M NaNO3		Birch Pit, Macon Georgia	CEC = smectite-1 (4= (M3)12)	Carrie Miraglia, 1983
/n		Montmorillonite, B25			(2 yr						18Cmmol/Kg			1M NaNO3		Upton, Wyoming	(0 N = Zn) (5-g 2.5 - Kg of Cd - Zn)	Carrie Miraglia, 1983
/n	64	Heavy clay - 1		15	85			8 7(7 2-- 1)			26--7				14000--1000	(0 04 - 0 11 m) Loviosa Soil, Finland	(4n-65)(Tab 12: (mmol - pH)	Wikula, 1987
/n	65	Heavy clay - 2		10	81			8 7(7 3-- 2)							14200--1300	(0 72 - 0 80 m) Loviosa Soil, Finland	(0 N = Cd,Co Mn,Sr,Cs)(pH -n Tab 12 - ( ) -n pH col)	Wikula, 1987

continued...

TABLE B-35 (concluded)

Ref	ISO	Soil type	% sand	% silt	% clay	% OM	% $CaCO_3$	pH (soil : $CaCl_2$)	Eh (mV)	CEC meq/100g	% other inert materials	other cation	% other cation	water conc.	Kd (cc/g)	soil location or description	other information	reference
1=	65	Heavy clay - 3		11	84			8.4 (7.4 - 1)		31 - 7					5600 - 1500	(7.06 - 7.15 m) Otkiumaki Soil, Finland		Hakala, 1982
2=	65	Heavy clay - 4		32	68			8.3 (7.3 - 2)		5.7 - 2					3000 - 800	(2.40 - 2.56 m) Otkiumaki Soil, Finland	Fig 11 - Zn Kd vs. Mf	Hakala, 1982
3=	65	Heavy clay - 5		32	68			8.0 (7.3 - 1)		25 - 1					28000 - 14000	(6.79 - 6.91 m) Salo Soil, Finland		Hakala, 1982
4=	65	Silty clay loam - 6		62	38			7.0 (7.0 - 2)		17 - 4					9100 - 2400	(7.24 - 7.33 m) Jamsa Soil, Finland		Hakala, 1982
5=	65	Loamy sand - 7	70	21				6.4 (7.1 - 2)		7.4 - 2					5100 - 100	(4 m) Lammi moraan., Finland		Hakala, 1982
6=	65	Sandy loam - 8	65	35				5.4 (7.3 - 2)		9.7 - 5					5100 - 3900	(1.5 m) Otkiumaki moraan., Finland		Hakala, 1982
7=	65	Loamy sand - 9	73	27				6.8 (7.3 - 1)		7.1 - 3					3700 - 100	(3.5 - 4.0 m) Jokke moraan., Finland		Hakala, 1982
8=	65	Sandy loam - 10	66	34				6.7 (6.4 - 1)		2.3 - 3					3700 - 900	(2.7 - 2.5 m) Perapia moraan., Finland		Hakala, 1982
9=	65	Loam - 11	41	37	22			6.7 (6.7 - 1)		18 - 5					11000 - 3000	(44 m) Kokpla Hallitsaari, Finland		Hakala, 1982
10=	65	Sandy loam - 12	57	29	14			6.9 (6.2 - 2)		em - 4					10000 - 1000	(24 m) Metsaaro Hallitsaari, Finland		Hakala, 1982
11=		Sandy loam	74.9	10.8	14.0	0.3		6.4 (5.5)		8.0		$CaCl_2$		20 mol^3/L	80	167C-horizon, Denmark	Fig 6: Zn Kd vs. Zn conc. (0 N x Cd)	Christensen, 1985
12=		Sandy loam	74.9	10.8	14.0	0.3		6.4 (5.4)		8.0		$CaCl_2$		900 mol^3/L	40	167C-horizon, Denmark		Christensen, 1985
13=	65	Sand						(11 3)							100	A		Inoue & Morisawa, 1976
14=	65	Silt-clay						(291 7)							1000	H	(0 N x Sr, Co, Cs, Mn, Ag, Fe, Rb) (in JAP)	Inoue & Morisawa, 1976
15=	65	Silt-clay						(55 6)							4000	I	CEC = ( ) x meq/g 0 Tabs 3 Figs	Inoue & Morisawa, 1976
16=	65	Gravel-sand						(69 5)							9000	D		Inoue & Morisawa, 1976
17=	65	Silt-clay						(167 9)							1800	L		Inoue & Morisawa, 1976
18=	65	Silt-sand						(47 8)							1200	F		Inoue & Morisawa, 1976
19=	65	Gravel						(29 9)							400	C		Inoue & Morisawa, 1976
20=	65	Silt-clay						(117 9)							800	H		Inoue & Morisawa, 1976
21=	65	Silt-clay						(140 5)							700	I		Inoue & Morisawa, 1976
22=	65	Silt-clay						(245 0)							3500	J		Inoue & Morisawa, 1976
23=	65	Fine sand						(50 3)							25	F		Inoue & Morisawa, 1976
24=	65	Silt						(149 0)							2200	L		Inoue & Morisawa, 1976
25=	65	Sand						(21 3)								H		Inoue & Morisawa, 1976
26=	65	Gravel						(27 1)							1900	H		Inoue & Morisawa, 1976
27=	65	Fine sand						(122 8)							2000	D		Inoue & Morisawa, 1976
28=	65	Fine sand						(38 6)							200	F		Inoue & Morisawa, 1976
29=	65	Silt-clay						(200 1)							700	D		Inoue & Morisawa, 1976
30=		Hallandale fine sand				14 kg/Kg		8.50		1.53 meq/g					870 L/g	Pompano Beach, Florida	Tab 1 = cations in soil. Tab 2 = soil charact.	Wong et al., 1983
31=		Plantation muck-bottom layer				27 kg/Kg		7.30		1.58 meq/g					413 L/g	Pompano Beach, Florida	Tab 3 = heavy metals in soil Tab 4 = linear Kd (L/g)	Wong et al., 1983
32=		Plantation muck-middle layer				610 kg/m		7.20		4.09 meq/g					375 L/g	Pompano Beach, Florida	Tab 5 = Langmuir coeff Fig 1 & 2 = isotherm x Cr, Ni,	Wong et al., 1983
33=		Plantation muck-low layer				705 kg/m		7.10		4.53 meq/g					448 L/g	Pompano Beach, Florida	(0 N = Cu, Fe, Mn, Ni, Cd, Cr, Co)	Wong et al., 1983
34=		Sand			3.5	-	4.5 - 5.0	-	22	-	[Ca-2] = 0-0.015 mol/L				7.0x101	Soil C		Corrales et al., 1982
35=		sand			2.5	-	7.5 - 8.0	-	16	-	[Ca2+] = 0-0.015 mol/L				2.12x103	Soil D		Corrales et al., 1982
36=					-	-	4.8	-	-	-	0 1mol/L $CaCl_2$				0.1	Florida 1		Graham, 1973
37=					-	-	6.2	-	-	-	0 1mol/L $CaCl_2$				50	Florida 2		Graham, 1973
38=		fine sand			1.4	-	8.2	-	11	-					870	Hallandale fine sand		Wong et al., 1983
39=		silt loam			-	-	5.0	-	-	-	0 1mol/L $CaCl_2$				3.6	Missouri 23		Graham, 1973
40=		silt loam			-	-	7.4	-	-	-	0 1mol/L $CaCl_2$				100	Missouri 24		Graham, 1973
41=		organic			90	-	4.5	-	-	-	[Ca2-] = 0-0.015 mol/L				1.89x10E3	Soil A		Corrales et al., 1982
42=		organic			>90	-	4-5	-	-	-	[Ca2-] = 0-0.015 mol/L				6.3x10E3	Peat A		Corrales et al., 1982
43=		organic			>90	-	6.7	-	-	-	[Ca2+] = 0-0.015 mol/L				2.88x10E3	Soil D		Corrales et al., 1982
44=		sphagnum peat			-	-	4-5	-	-	-	-				1.3x10E4	Peat		Wolf et al., 1977
45=		sphagnum peat			-	-	4-5	-	-	-	0 05 mm $CaCl_2$/wt soil				7.0x10E1	Peat		Wolf et al., 1977
46=		muck			47	-	7.2	-	34	-	-				417	Plantation muck (average of 3 layers)		Wong et al., 1983

APPENDIX C

PREDICTION OF MISSING K_d VALUES FROM CR VALUES

This appendix provides the input file containing the recommended CR values (Baes et al. 1984) for SAS* regression analysis, and the output file showing the predicted K_d values for each nuclide for each soil. A plot of predicted K_d values versus ln CR values is also shown.

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* SAS User's Guide, Statistics, Version 5, SAS Institute Inc. Cary, North Carolina, 1985.

```
data trnsf1;
input element $ Bvi    19-21  e1 25-26 sakd sikd clkd orkd;
****these kd values are ln-transformed means, not GM*****;
array string[4]  sakd sikd clkd orkd;
Bvi=Bvi*10**e1;
lcr=log(Bvi);
do i=1 to 4;
sand=0;
silt=0;
clay=0;
org=0;
if i=1 then sand=1;
if i=2 then silt=1;
if i=3 then clay=1;
if i=4 then org=1;
kd=string[i];output;end;
cards;
      Ac          8.8x10-4     .     .     .     .
      Am          1.4x10-3    7.6    9.2   9.0   11.6
      Be          2.5x10-3     .     .     .     .
      Br          3.8x10-1     .     .     .     .
      C           1.4x10-0    1.1    .     0.8   .
      Ca          6.8x10-1    7.0    .     .     7.5
      Cd          1.4x10-1    4.3    3.7   6.3   6.7
      Cr          1.9x10-3    4.2    3.4   .     5.6
      Cs          2.0x10-2    5.6    8.4   7.5   5.6
      H           1.2x10-0      -2.6      .     .
      Hf          8.8x10-4     .                .     .
      Ho          2.5x10-3     .     .     .     .
      I           3.8x10-2    .04    1.5   0.5   3.3
      Mo          6.3x10-2    2.0    .     4.5   3.3
      Nb          5.0x10-3     .     .     .     .
      Ni          1.5x10-2    6.0    .     6.5   7.0
      Np          2.5x10-2    1.4    3.2   4.0   7.1
      Pa          6.3x10-4     .     .     .     .
      Pb          1.1x10-2    5.6    9.7   .     10.
      Pd          3.8x10-2     .     .     .     .
      Pu          1.1x10-4    6.3    7.1   8.5   7.5
      Ra          3.3x10-3    6.2    10.5  9.1   .
      Rb          3.8x10-2     .     .     .     .
      Sb          5.0x10-2     .     .     .     .
      Se          6.3x10-3     .     .     .     .
      Si          8.8x10-2     .     .     .     .
      Sm          2.5x10-3     .     .     .     .
      Sn          7.5x10-3     .     .     .     .
      Tc          2.4x10-0    -2.0   -2.3  0.2   0.4
      Th          2.1x10-4    8.0    .     8.6   11.4
      U           2.1x10-3    3.5    2.5   7.3   6.0
      Zr          5.0x10-4     .     .     .     .
      P           8.7x10-1     .     .     .     .
      Ta          2.5x10-3     .     .     .     .
      Bi          8.7x10-3     .     .     .     .
      Po          6.3x10-4    5.0    6.0   .     .
      Sr          6.3x10-1    2.6    3.0   4.7   5.0
      Ag          1.0x10-1    4.5    4.8   5.2   9.6
      Co          5.0x10-3    4.1    7.2   6.3   6.9
      Fe          1.0x10-3    5.4    6.7   5.1   6.4
      Mn          6.3x10-2    3.9    6.6   5.2   5.0
      Ru          1.9x10-2    4.0    6.9   6.7   11.1
      Ce          2.5x10-3    6.2    9.0   9.9   8.1
      Zn          3.8x10-1    5.3    7.2   7.8   7.4
      Cm          2.1x10-3    8.3    9.8   .     8.7
      K           2.5x10-1     .     .     .     .
      Re          3.7x10-1     .     .     .     .
      Te          6.2x10-3     .     .     .     .
      Y           3.7x10-3     .     .     .     .
proc reg;
model kd=sand silt clay org lcr;
output out=try predicted=ykd residual=rkd;
proc print;
proc plot;
plot kd*lcr=i ykd*lcr='*'/overlay hpos=90 vpos=25;
```

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DEP VARIABLE: KD

ANALYSIS OF VARIANCE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PROB>F
MODEL	4	358.02417509	89.50604377	16.466	0.0001
ERROR	87	472.91382056	5.43579104		
C TOTAL	91	830.93799565			

ROOT MSE	2.331478	R-SQUARE	0.4309
DEP MEAN	5.679783	ADJ R-SQ	0.4047
C.V.	41.04872		

NOTE: MODEL IS NOT FULL RANK. LEAST SQUARES SOLUTIONS FOR THE PARAMETERS ARE NOT UNIQUE. SOME STATISTICS WILL BE MISLEADING. A REPORTED DF OF 0 OR B MEANS THAT THE ESTIMATE IS BIASED. THE FOLLOWING PARAMETERS HAVE BEEN SET TO 0, SINCE THE VARIABLES ARE A LINEAR COMBINATION OF OTHER VARIABLES AS SHOWN.

ORG =+1*INTERCEP-1*SAND -1*SILT -1*CLAY

PARAMETER ESTIMATES

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T FOR H0: PARAMETER=0	PROB > |T|
INTERCEP	B	4.40136442	0.61670053	7.137	0.0001
SAND	B	-2.70113	0.66172013	-4.087	0.0001
SILT	B	-1.27478	0.70415839	-1.810	0.0737
CLAY	B	-0.955709	0.70409181	-1.357	0.1782
ORG	0	0	.	.	.
LCR	1	-0.616477	0.0897167	-6.871	0.0001

OBS	ELEMENT	BVI	EI	SAKD	SIKD	CLKD	OPKD	LCR	I	SAND	SILT	CLAY	ORG	KD	YKD	RKD
1	Ac	0.00088	-4	.	.	.	.	-7.0356	1	1	0	0	0	.	6.03452	.
2	Ac	0.00088	-4	.	.	.	.	-7.0356	2	0	1	0	0	.	7.46387	.
3	Ac	0.00088	-4	.	.	.	.	-7.0356	3	0	0	1	0	.	7.78294	.
4	Ac	0.00088	-4	.	.	.	.	-7.0356	4	0	0	0	1	.	8.73865	.
5	Am	0.00140	-3	7.60	9.2	9.0	11.6	-6.5713	1	1	0	0	0	7.60	5.74829	1.8517
6	Am	0.00140	-3	7.60	9.2	9.0	11.6	-6.5713	2	0	1	0	0	9.20	7.17744	2.0224
7	Am	0.00140	-3	7.60	9.2	9.0	11.6	-6.5713	3	0	0	1	0	9.00	7.49670	1.5033
8	Am	0.00140	-3	7.60	9.2	9.0	11.6	-6.5713	4	0	0	0	1	11.60	8.45241	3.1476
9	Be	0.00250	-3	.	.	.	.	-5.9915	1	1	0	0	0	.	5.39084	.
10	Be	0.00250	-3	.	.	.	.	-5.9915	2	0	1	0	0	.	6.82019	.
11	Be	0.00250	-3	.	.	.	.	-5.9915	3	0	0	1	0	.	7.13926	.
12	Be	0.00250	-3	.	.	.	.	-5.9915	4	0	0	0	1	.	8.09497	.
13	Br	0.38000	-1	.	.	.	.	-0.9676	1	1	0	0	0	.	2.29373	.
14	Br	0.38000	-1	.	.	.	.	-0.9676	2	0	1	0	0	.	3.72308	.
15	Br	0.38000	-1	.	.	.	.	-0.9676	3	0	0	1	0	.	4.04215	.
16	Br	0.38000	-1	.	.	.	.	-0.9676	4	0	0	0	1	.	4.99786	.
17	C	1.40000	0	1.10	.	0.8	.	0.3365	1	1	0	0	0	1.10	1.48981	-0.3898
18	C	1.40000	0	1.10	.	0.8	.	0.3365	2	0	1	0	0	.	2.91916	.
19	C	1.40000	0	1.10	.	0.8	.	0.3365	3	0	0	1	0	0.80	3.23823	-2.4382
20	C	1.40000	0	1.10	.	0.8	.	0.3365	4	0	0	0	1	.	4.19394	.
21	Ca	0.88000	-1	7.00	.	.	7.5	-0.1278	1	1	0	0	0	7.00	1.77605	5.2240
22	Ca	0.88000	-1	7.00	.	.	7.5	-0.1278	2	0	1	0	0	.	3.20539	.
23	Ca	0.88000	-1	7.00	.	.	7.5	-0.1278	3	0	0	1	0	.	3.52446	.
24	Ca	0.88000	-1	7.00	.	.	7.5	-0.1278	4	0	0	0	1	7.50	4.48017	3.0198
25	Cd	0.14000	-1	4.30	3.7	6.3	6.7	-1.9661	1	1	0	0	0	4.30	2.90930	1.3907
26	Cd	0.14000	-1	4.30	3.7	6.3	6.7	-1.9661	2	0	1	0	0	3.70	4.33865	-0.6387
27	Cd	0.14000	-1	4.30	3.7	6.3	6.7	-1.9661	3	0	0	1	0	6.30	4.65772	1.6423
28	Cd	0.14000	-1	4.30	3.7	6.3	6.7	-1.9661	4	0	0	0	1	6.70	5.61343	1.0866
29	Cr	0.00190	-3	4.20	3.4	.	5.6	-6.2659	1	1	0	0	0	4.20	5.56003	-1.3600
30	Cr	0.00190	-3	4.20	3.4	.	5.6	-6.2659	2	0	1	0	0	3.40	6.98938	-3.5894
31	Cr	0.00190	-3	4.20	3.4	.	5.6	-6.2659	3	0	0	1	0	.	7.30844	.
32	Cr	0.00190	-3	4.20	3.4	.	5.6	-6.2659	4	0	0	0	1	5.60	8.26415	-2.6642
33	Cs	0.02000	-2	5.60	8.4	7.5	5.6	-3.9120	1	1	0	0	0	5.60	4.10891	1.4911
34	Cs	0.02000	-2	5.60	8.4	7.5	5.6	-3.9120	2	0	1	0	0	8.40	5.53826	2.8617
35	Cs	0.02000	-2	5.60	8.4	7.5	5.6	-3.9120	3	0	0	1	0	7.50	5.85733	1.6427
36	Cs	0.02000	-2	5.60	8.4	7.5	5.6	-3.9120	4	0	0	0	1	5.60	6.81304	-1.2130
37	H	1.20000	0	-2.60	.	.	.	0.1823	1	1	0	0	0	-2.60	2.58484	-4.1848
38	H	1.20000	0	-2.60	.	.	.	0.1823	2	0	1	0	0	.	3.01419	.
39	H	1.20000	0	-2.60	.	.	.	0.1823	3	0	0	1	0	.	3.33326	.
40	H	1.20000	0	-2.60	.	.	.	0.1823	4	0	0	0	1	.	4.28897	.
41	Hf	0.00088	-4	.	.	.	.	-7.0356	1	1	0	0	0	.	6.03452	.
42	Hf	0.00088	-4	.	.	.	.	-7.0356	2	0	1	0	0	.	7.46387	.
43	Hf	0.00088	-4	.	.	.	.	-7.0356	3	0	0	1	0	.	7.78294	.
44	Hf	0.00088	-4	.	.	.	.	-7.0356	4	0	0	0	1	.	8.73865	.
45	Ho	0.00250	-3	.	.	.	.	-5.9915	1	1	0	0	0	.	5.39084	.
46	Ho	0.00250	-3	.	.	.	.	-5.9915	2	0	1	0	0	.	6.82019	.
47	Ho	0.00250	-3	.	.	.	.	-5.9915	3	0	0	1	0	.	7.13926	.
48	Ho	0.00250	-3	.	.	.	.	-5.9915	4	0	0	0	1	.	8.09497	.
49	I	0.03800	-2	0.04	1.5	0.5	3.3	-3.2702	1	1	0	0	0	0.04	3.71122	-3.6732

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OBS	ELEMENT	BVI	E1	SAKD	SIKD	CLKD	ORKD	LCR	I	SAND	SILT	CLAY	ORG	KD	VKD	PKD
50	I	0.03800	-2	0.04	1.5	0.5	3.3	-3.2702	2	0	1	0	0	1.50	5.14257	-3.6426
51	I	0.03800	-2	0.04	1.5	0.5	3.3	-3.2702	3	0	0	1	0	0.50	5.44164	-4.9616
52	I	0.03800	-2	0.04	1.5	0.5	3.3	-3.2702	4	0	0	0	1	3.30	6.41735	-3.1174
53	Mo	0.06300	-2	2.00	.	4.5	3.3	-2.7646	1	1	0	0	0	2.00	3.40157	-1.4016
54	Mo	0.06300	-2	2.00	.	4.5	3.3	-2.7646	2	0	1	0	0	.	4.83091	.
55	Mo	0.06300	-2	2.00	.	4.5	3.3	-2.7646	3	0	0	1	0	4.50	5.14998	-0.6500
56	Mo	0.06300	-2	2.0	.	4.5	3.3	-2.7646	4	0	0	0	1	3.3	6.1057	-2.8057
57	Nb	0.00500	-3	.	.	.	.	-5.2983	1	1	0	0	0	.	4.9635	.
58	Nb	0.00500	-3	.	.	.	.	-5.2983	2	0	1	0	0	.	6.3029	.
59	Nb	0.00500	-3	.	.	.	.	-5.2983	3	0	0	1	0	.	6.7119	.
60	Nb	0.00500	-3	.	.	.	.	-5.2983	4	0	0	0	1	.	7.6677	.
61	Ni	0.01500	-2	6.0	.	6.5	7.0	-4.1997	1	1	0	0	0	6.0	4.2863	1.7137
62	Ni	0.01500	-2	6.0	.	6.5	7.0	-4.1997	2	0	1	0	0	.	5.7156	.
63	Ni	0.01500	-2	6.0	.	6.5	7.0	-4.1997	3	0	0	1	0	6.5	6.0347	0.4653
64	Ni	0.01500	-2	6.0	.	6.5	7.0	-4.1997	4	0	0	0	1	7.0	6.9904	0.0096
65	Np	0.02500	-2	1.4	3.2	4.0	7.1	-3.6889	1	1	0	0	0	1.4	3.9713	-2.5713
66	Np	0.02500	-2	1.4	3.2	4.0	7.1	-3.6889	2	0	1	0	0	3.2	5.4007	-2.2007
67	Np	0.02500	-2	1.4	3.2	4.0	7.1	-3.6889	3	0	0	1	0	4.0	5.7198	-1.7198
68	Np	0.02500	-2	1.4	3.2	4.0	7.1	-3.6889	4	0	0	0	1	7.1	6.6755	0.4245
69	Pa	0.00063	-4	.	.	.	.	-7.3698	1	1	0	0	0	.	6.2405	.
70	Pa	0.00063	-4	.	.	.	.	-7.3698	2	0	1	0	0	.	7.6699	.
71	Pa	0.00063	-4	.	.	.	.	-7.3698	3	0	0	1	0	.	7.9890	.
72	Pa	0.00063	-4	.	.	.	.	-7.3698	4	0	0	0	1	.	8.9447	.
73	Pb	0.01100	-2	5.6	9.7	.	10.0	-4.5099	1	1	0	0	0	5.6	4.4775	1.1225
74	Pb	0.01100	-2	5.6	9.7	.	10.0	-4.5099	2	0	1	0	0	9.7	5.9068	3.7932
75	Pb	0.01100	-2	5.6	9.7	.	10.0	-4.5099	3	0	0	1	0	.	6.2259	.
76	Pb	0.01100	-2	5.6	9.7	.	10.0	-4.5099	4	0	0	0	1	10.0	7.1816	2.8184
77	Pd	0.03800	-2	.	.	.	.	-3.2702	1	1	0	0	0	.	3.7132	.
78	Pd	0.03800	-2	.	.	.	.	-3.2702	2	0	1	0	0	.	5.1426	.
79	Pd	0.03800	-2	.	.	.	.	-3.2702	3	0	0	1	0	.	5.4616	.
80	Pd	0.03800	-2	.	.	.	.	-3.2702	4	0	0	0	1	.	6.4174	.
81	Pu	0.00011	-4	6.3	7.1	8.5	7.5	-9.1150	1	1	0	0	0	6.3	7.3164	-1.0164
82	Pu	0.00011	-4	6.3	7.1	8.5	7.5	-9.1150	2	0	1	0	0	7.1	8.7458	1.6458
83	Pu	0.00011	-4	6.3	7.1	8.5	7.5	-9.1150	3	0	0	1	0	8.5	9.0649	-0.5649
84	Pu	0.00011	-4	6.3	7.1	8.5	7.5	-9.1150	4	0	0	0	1	7.5	10.0206	-2.5206
85	Ra	0.00330	-3	6.2	10.5	9.1	.	-5.7138	1	1	0	0	0	6.2	5.2197	0.9803
86	Ra	0.00330	-3	6.2	10.5	9.1	.	-5.7138	2	0	1	0	0	10.5	6.6490	3.8510
87	Ra	0.00330	-3	6.2	10.5	9.1	.	-5.7138	3	0	0	1	0	9.1	6.9681	2.1319
88	Ra	0.00330	-3	6.2	10.5	9.1	.	-5.7138	4	0	0	0	1	.	7.9238	.
89	Rb	0.03800	-2	.	.	.	.	-3.2702	1	1	0	0	0	.	3.7132	.
90	Rb	0.03800	-2	.	.	.	.	-3.2702	2	0	1	0	0	.	5.1426	.
91	Rb	0.03800	-2	.	.	.	.	-3.2702	3	0	0	1	0	.	5.4616	.
92	Rb	0.03800	-2	.	.	.	.	-3.2702	4	0	0	0	1	.	6.4174	.
93	Sb	0.05000	-2	.	.	.	.	-2.9957	1	1	0	0	0	.	3.5440	.
94	Sb	0.05000	-2	.	.	.	.	-2.9957	2	0	1	0	0	.	4.9734	.
95	Sb	0.05000	-2	.	.	.	.	-2.9957	3	0	0	1	0	.	5.2925	.
96	Sb	0.05000	-2	.	.	.	.	-2.9957	4	0	0	0	1	.	6.2482	.
97	Se	0.00630	-3	.	.	.	.	-5.0672	1	1	0	0	0	.	4.8211	.
98	Se	0.00630	-3	.	.	.	.	-5.0672	2	0	1	0	0	.	6.2504	.
99	Se	0.00630	-3	.	.	.	.	-5.0672	3	0	0	1	0	.	6.5695	.

OBS	ELEMENT	RVI	E1	SAKD	SIKD	CLKD	ORKD	LCR	I	SAND	SILT	CLAY	ORG	KD	YKD	RKD
100	Se	0.00630	-3	.	.	.	.	-5.0672	4	0	0	0	1	.	7.5252	.
101	Si	0.08800	-2	.	.	.	.	-2.4304	1	1	0	0	0	.	3.1955	.
102	Si	0.08800	-2	.	.	.	.	-2.4304	2	0	1	0	0	.	4.6249	.
103	Si	0.08800	-2	.	.	.	.	-2.4304	3	0	0	1	0	.	4.9440	.
104	Si	0.08800	-2	.	.	.	.	-2.4304	4	0	0	0	1	.	5.8997	.
105	Sm	0.00250	-3	.	.	.	.	-5.9915	1	1	0	0	0	.	5.3908	.
106	Sm	0.00250	-3	.	.	.	.	-5.9915	2	0	1	0	0	.	6.8202	.
107	Sm	0.00250	-3	.	.	.	.	-5.9915	3	0	0	1	0	.	7.1393	.
108	Sm	0.00250	-3	.	.	.	.	-5.9915	4	0	0	0	1	.	8.0950	.
109	Sn	0.00750	-3	.	.	.	.	-4.8929	1	1	0	0	0	.	4.7136	.
110	Sn	0.00750	-3	.	.	.	.	-4.8929	2	0	1	0	0	.	6.1429	.
111	Sn	0.00750	-3	.	.	.	.	-4.8929	3	0	0	1	0	.	6.46199	.
112	Sn	0.00750	-3	.	.	.	.	-4.8929	4	0	0	0	1	.	7.41770	.
113	Tc	2.40000	0	-2.0	-2.3	0.2	0.4	0.8755	1	1	0	0	0	-2.0	1.15753	-1.1575
114	Tc	2.40000	0	-2.0	-2.3	0.2	0.4	0.8755	2	0	1	0	0	-2.3	2.58688	-4.8869
115	Tc	2.40000	0	-2.0	-2.3	0.2	0.4	0.8755	3	0	0	1	0	0.2	2.90595	-2.7059
116	Tc	2.40000	0	-2.0	-2.3	0.2	0.4	0.8755	4	0	0	0	1	0.4	3.86166	-3.4617
117	Th	0.00021	-4	8.0	.	8.6	11.4	-8.4684	1	1	0	0	0	8.0	6.91782	1.0822
118	Th	0.00021	-4	8.0	.	8.6	11.4	-8.4684	2	0	1	0	0	.	8.34717	.
119	Th	0.00021	-4	8.0	.	8.6	11.4	-8.4684	3	0	0	1	0	8.6	8.66623	-0.0662
120	Th	0.00021	-4	8.0	.	8.6	11.4	-8.4684	4	0	0	0	1	11.4	9.62194	1.7781
121	U	0.00210	-3	3.5	2.5	7.3	6.0	-6.1658	1	1	0	0	0	3.5	5.49833	-1.9983
122	U	0.00210	-3	3.5	2.5	7.3	6.0	-6.1658	2	0	1	0	0	2.5	6.92768	-4.4277
123	U	0.00210	-3	3.5	2.5	7.3	6.0	-6.1658	3	0	0	1	0	7.3	7.24674	0.0533
124	U	0.00210	-3	3.5	2.5	7.3	6.0	-6.1658	4	0	0	0	1	6.0	8.20245	-2.2025
125	Zr	0.00050	-4	.	.	.	.	-7.6009	1	1	0	0	0	.	6.38302	.
126	Zr	0.00050	-4	.	.	.	.	-7.6009	2	0	1	0	0	.	7.81237	.
127	Zr	0.00050	-4	.	.	.	.	-7.6009	3	0	0	1	0	.	8.13144	.
128	Zr	0.00050	-4	.	.	.	.	-7.6009	4	0	0	0	1	.	9.08715	.
129	P	0.87000	-1	.	.	.	.	-0.1393	1	1	0	0	0	.	1.78309	.
130	P	0.87000	-1	.	.	.	.	-0.1393	2	0	1	0	0	.	3.21244	.
131	P	0.87000	-1	.	.	.	.	-0.1393	3	0	0	1	0	.	3.53151	.
132	P	0.87000	-1	.	.	.	.	-0.1393	4	0	0	0	1	.	4.48722	.
133	Ta	0.00250	-3	.	.	.	.	-5.9915	1	1	0	0	0	.	5.39084	.
134	Ta	0.00250	-3	.	.	.	.	-5.9915	2	0	1	0	0	.	6.82019	.
135	Ta	0.00250	-3	.	.	.	.	-5.9915	3	0	0	1	0	.	7.13926	.
136	Ta	0.00250	-3	.	.	.	.	-5.9915	4	0	0	0	1	.	8.09497	.
137	Bi	0.00870	-3	.	.	.	.	-4.7444	1	1	0	0	0	.	4.62207	.
138	Bi	0.00870	-3	.	.	.	.	-4.7444	2	0	1	0	0	.	6.05142	.
139	Bi	0.00870	-3	.	.	.	.	-4.7444	3	0	0	1	0	.	6.37049	.
140	Bi	0.00870	-3	.	.	.	.	-4.7444	4	0	0	0	1	.	7.32620	.
141	Po	0.00063	-4	5.0	6.0	.	.	-7.3698	1	1	0	0	0	5.0	6.24055	-1.2405
142	Po	0.00063	-4	5.0	6.0	.	.	-7.3698	2	0	1	0	0	6.0	7.66990	-1.6699
143	Po	0.00063	-4	5.0	6.0	.	.	-7.3698	3	0	0	1	0	.	7.98897	.
144	Po	0.00063	-4	5.0	6.0	.	.	-7.3698	4	0	0	0	1	.	8.94467	.
145	Sr	0.63000	-1	2.6	3.0	4.7	5.0	-0.4620	1	1	0	0	0	2.6	1.98207	0.6179
146	Sr	0.63000	-1	2.6	3.0	4.7	5.0	-0.4620	2	0	1	0	0	3.0	3.41142	-0.4114
147	Sr	0.63000	-1	2.6	3.0	4.7	5.0	-0.4620	3	0	0	1	0	4.7	3.73049	0.9695
148	Sr	0.63000	-1	2.6	3.0	4.7	5.0	-0.4620	4	0	0	0	1	5.0	4.68620	0.3138

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OBS	ELEMENT	BVI	EI	SAND	SILD	CLAD	ORED	LCR	I	SAND	SILT	CLAY	ORG	RD	YRD	RRD
149	Ag	0.10000	-1	4.5	4.8	5.2	9.6	-2.3026	1	1	0	0	0	4.5	3.31673	1.3833
150	Ag	0.10000	-1	4.5	4.8	5.2	9.6	-2.3026	2	0	1	0	0	4.8	4.54408	0.2539
151	Ag	0.10000	-1	4.5	4.8	5.2	9.6	-2.3026	3	0	0	1	0	5.2	4.86515	0.3349
152	Ag	0.10000	-1	4.5	4.8	5.2	9.6	-2.3026	4	0	0	0	1	9.6	5.82086	1.7791
153	Co	0.00500	-3	4.1	7.2	6.3	6.9	-5.2983	1	1	0	0	0	4.1	4.96353	0.8635
154	Co	0.00500	-3	4.1	7.2	6.3	6.9	-5.2983	2	0	1	0	0	7.2	6.39288	0.8071
155	Co	0.00500	-3	4.1	7.2	6.3	6.9	-5.2983	3	0	0	1	0	6.3	6.71195	-0.4119
156	Co	0.00500	-3	4.1	7.2	6.3	6.9	-5.2983	4	0	0	0	1	6.9	7.66766	-0.7677
157	Fe	0.00100	-3	5.4	6.7	5.1	6.4	-6.9078	1	1	0	0	0	5.4	5.95571	-0.5557
158	Fe	0.00100	-3	5.4	6.7	5.1	6.4	-6.9078	2	0	1	0	0	6.7	7.38506	0.6851
159	Fe	0.00100	-3	5.4	6.7	5.1	6.4	-6.9078	3	0	0	1	0	5.1	7.70413	-2.6041
160	Fe	0.00100	-3	5.4	6.7	5.1	6.4	-6.9078	4	0	0	0	1	6.4	8.65984	-2.2598
161	Mn	0.06300	-2	3.9	6.6	5.2	5.0	-2.7646	1	1	0	0	0	3.9	3.40157	0.4984
162	Mn	0.06300	-2	3.9	6.6	5.2	5.0	-2.7646	2	0	1	0	0	6.6	4.83091	1.7691
163	Mn	0.06300	-2	3.9	6.6	5.2	5.0	-2.7646	3	0	0	1	0	5.2	5.14998	0.0500
164	Mn	0.06300	-2	3.9	6.6	5.2	5.0	-2.7646	4	0	0	0	1	5.0	6.10569	-1.1057
165	Ru	0.01900	-2	4.0	6.9	6.7	11.1	-3.9633	1	1	0	0	0	4.0	4.14053	-0.2405
166	Ru	0.01900	-2	4.0	6.9	6.7	11.1	-3.9633	2	0	1	0	0	6.9	5.56988	1.33012
167	Ru	0.01900	-2	4.0	6.9	6.7	11.1	-3.9633	3	0	0	1	0	6.7	5.88895	0.81105
168	Ru	0.01900	-2	4.0	6.9	6.7	11.1	-3.9633	4	0	0	0	1	11.1	6.84466	4.25534
169	Ce	0.00250	-3	6.2	9.0	9.9	8.1	-5.9915	1	1	0	0	0	6.2	5.39084	0.80916
170	Ce	0.00250	-3	6.2	9.0	9.9	8.1	-5.9915	2	0	1	0	0	9.0	6.82019	2.17981
171	Ce	0.00250	-3	6.2	9.0	9.9	8.1	-5.9915	3	0	0	1	0	9.9	7.13926	2.76074
172	Ce	0.00250	-3	6.2	9.0	9.9	8.1	-5.9915	4	0	0	0	1	8.1	8.09497	0.00503
173	Zn	0.38000	-1	5.3	7.2	7.8	7.4	-0.9676	1	1	0	0	0	5.3	2.29373	3.00627
174	Zn	0.38000	-1	5.3	7.2	7.8	7.4	-0.9676	2	0	1	0	0	7.2	3.72308	3.47692
175	Zn	0.38000	-1	5.3	7.2	7.8	7.4	-0.9676	3	0	0	1	0	7.8	4.04215	3.75785
176	Zn	0.38000	-1	5.3	7.2	7.8	7.4	-0.9676	4	0	0	0	1	7.4	4.99786	2.40214
177	Cm	0.00021	-4	8.3	9.8	.	8.7	-8.4684	1	1	0	0	0	8.3	6.91782	1.38218
178	Cm	0.00021	-4	8.3	9.8	.	8.7	-8.4684	2	0	1	0	0	9.8	8.34717	1.45283
179	Cm	0.00021	-4	8.3	9.8	.	8.7	-8.4684	3	0	0	1	0	.	8.66623	.
180	Cm	0.00021	-4	8.3	9.8	.	8.7	-8.4684	4	0	0	0	1	8.7	9.62194	-0.92194
181	K	0.25000	-1	.	.	.	.	-1.3863	1	1	0	0	0	.	2.55186	.
182	K	0.25000	-1	.	.	.	.	-1.3863	2	0	1	0	0	.	3.98121	.
183	K	0.25000	-1	.	.	.	.	-1.3863	3	0	0	1	0	.	4.30027	.
184	K	0.25000	-1	.	.	.	.	-1.3863	4	0	0	0	1	.	5.25538	.
185	Re	0.37000	-1	.	.	.	.	-0.9943	1	1	0	0	0	.	2.31017	.
186	Re	0.37000	-1	.	.	.	.	-0.9943	2	0	1	0	0	.	3.73952	.
187	Re	0.37000	-1	.	.	.	.	-0.9943	3	0	0	1	0	.	4.05859	.
188	Re	0.37000	-1	.	.	.	.	-0.9943	4	0	0	0	1	.	5.01430	.
189	Te	0.00620	-3	.	.	.	.	-5.0832	1	1	0	0	0	.	4.83092	.
190	Te	0.00620	-3	.	.	.	.	-5.0832	2	0	1	0	0	.	6.26027	.
191	Te	0.00620	-3	.	.	.	.	-5.0832	3	0	0	1	0	.	6.57934	.
192	Te	0.00620	-3	.	.	.	.	-5.0832	4	0	0	0	1	.	7.53505	.
193	Y	0.00370	-3	.	.	.	.	-5.5994	1	1	0	0	0	.	5.14916	.
194	Y	0.00370	-3	.	.	.	.	-5.5994	2	0	1	0	0	.	6.57851	.
195	Y	0.00370	-3	.	.	.	.	-5.5994	3	0	0	1	0	.	6.89757	.
196	Y	0.00370	-3	.	.	.	.	-5.5994	4	0	0	0	1	.	7.85328	.

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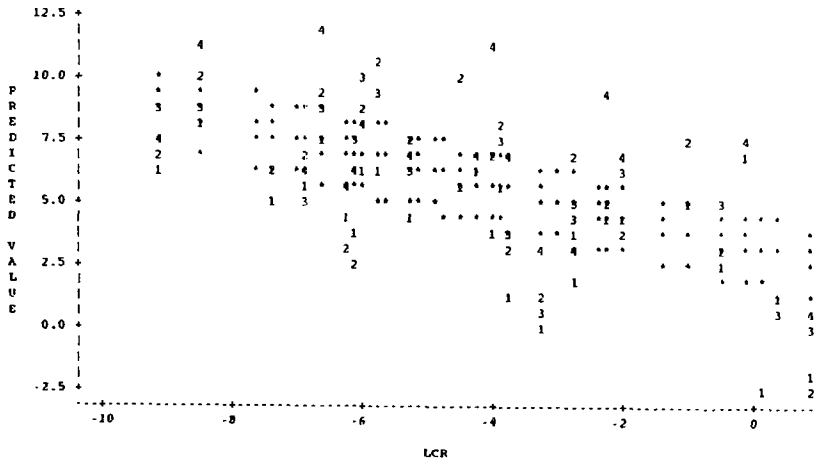
PLOT OF YKD*LCR SYMBOL USED IS *



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