

APPENDIX B: .....	1
SUPPORTING DATA TABLES AND FIGURES FOR PARAMETER .....	1
DISTRIBUTIONS AND PROBABILISTIC DOSE ANALYSES .....	1
<b>FIGURE B.1 Sampling Frequency and Probability Density of the Parameter Density of Contaminated Zone .....</b>	<b>22</b>
<b>FIGURE B.2 Sampling Frequency and Probability Density of the Parameter Density of Saturated Zone .....</b>	<b>22</b>
<b>FIGURE B.3 Sampling Frequency and Probability Density of the Parameter Density of Unsaturated Zone .....</b>	<b>23</b>
<b>FIGURE B.4 Sampling Frequency and Probability Density of the Parameter Density of Depth of Roots .....</b>	<b>23</b>
<b>FIGURE B.5 Sampling Frequency and Probability Density of the Parameter Saturated Zone Effective Porosity .....</b>	<b>24</b>
<b>FIGURE B.6 Sampling Frequency and Probability Density of the Parameter Unsaturated Zone Effective Porosity .....</b>	<b>24</b>
<b>FIGURE B.7 Sampling Frequency and Probability Density of the Parameter Unsaturated Zone Hydraulic Conductivity .....</b>	<b>25</b>
<b>FIGURE B.8 Sampling Frequency and Probability Density of the Parameter Saturated Zone Hydraulic Conductivity .....</b>	<b>25</b>
<b>FIGURE B.9 Sampling Frequency and Probability Density of the Parameter Saturated Zone Total Porosity .....</b>	<b>26</b>
<b>FIGURE B.10 Sampling Frequency and Probability Density of the Parameter Contaminated Zone Total Porosity .....</b>	<b>26</b>
<b>FIGURE B.11 Sampling Frequency and Probability Density of the Parameter Unsaturated Zone Total Porosity .....</b>	<b>27</b>
<b>FIGURE B.12 Sampling Frequency and Probability Density of the Parameter Unsaturated Zone Thickness .....</b>	<b>27</b>
<b>FIGURE B.13 Sampling Frequency and Probability Density of the Parameter Unsaturated Zone b Parameter .....</b>	<b>28</b>
<b>FIGURE B.14 Sampling Frequency and Probability Density of the Parameter Contaminated Zone b Parameter .....</b>	<b>28</b>
<b>FIGURE B.15 Sampling Frequency and Probability Density of the Saturated Zone b Parameter .....</b>	<b>29</b>
<b>FIGURE B.16 Sampling Frequency and Probability Density of the Parameter Aquatic Food Contaminated Fraction .....</b>	<b>29</b>
<b>FIGURE B.17 Sampled Cumulative Probability and the Cumulative Distribution Function of the Parameter Erosion Rate .....</b>	<b>30</b>

<b>FIGURE B.18 Sampling Frequency and Probability Density of the Parameter Contaminated Zone Hydraulic Conductivity</b>	30
<b>FIGURE B.19 Sampling Frequency and Probability Density of the Parameter Evapotranspiration Coefficient</b>	31
<b>FIGURE B.20 Sampling Frequency and Probability Density of the Parameter Indoor Dust Filtration Factor</b>	31
<b>FIGURE B.21 Sampling Frequency and Probability Density of the Parameter Runoff Coefficient</b>	32
<b>FIGURE B.22 Sampling Frequency and Probability Density of the Parameter Saturated Zone Hydraulic Gradient</b>	32
<b>FIGURE B.23 Sampling Frequency and Probability Density of the Parameter Weathering Removal Constant</b>	33
<b>FIGURE B.24 Sampling Frequency and Probability Density of the Parameter Wet Foliar Interception Fraction of Leafy Vegetables</b>	33
<b>FIGURE B.25 Sampling Frequency and Probability Density of the Parameter Wind Speed</b>	34
<b>FIGURE B.26 Sampling Frequency and Probability Density of the Parameter Well Pump Intake Depth</b>	34
<b>FIGURE B.27 Sampling Frequency and Probability Density of the Parameter Mass Loading for Inhalation</b>	35
<b>FIGURE B.28 Sampling Frequency and Probability Density of the Parameter External Gamma Shielding Factor</b>	35
<b>FIGURE B.30 Sampling Frequency and Probability Density of the Parameter Wet Weight Crop Yields for Non-Leafy Vegetables</b>	36
<b>FIGURE B.29 Sampling Frequency and Probability Density of the Parameter Depth of Soil Mixing Layer</b>	36
<b>FIGURE B.31 Sampling Frequency and Probability Density of the Parameter Thickness of Evasion Layer of C-14</b>	37
<b>FIGURE B.32 Sampling Frequency and Probability Density of the Parameter Absolute Humidity</b>	37
<b>FIGURE B.33 Sampled Cumulative Probability and the Cumulative Distribution Function of the Parameter Resuspension Rate</b>	38
<b>FIGURE B.34 Sampling Frequency and Probability Density of the Parameter Room Area</b>	38
<b>FIGURE B.35 Sampling Frequency and Probability Density of the Parameter Room Height</b>	39
<b>FIGURE B.36 Sampling Frequency and Probability Density of the Parameter Shielding Thickness</b>	39
<b>FIGURE B.37 Sampling Frequency and Probability Density of the Parameter Shielding Density</b>	40
<b>FIGURE B.38 Sampling Frequency and Probability Density of the Parameter Source Density, Volume Source</b>	40
<b>FIGURE B.39 Sampling Frequency and Probability Density of the Parameter</b>	

<b>Source Thickness, Volume Source</b> .....	41
<b>FIGURE B.40 Sampling Frequency and Probability Density of the Parameter</b>	
<b>Source Erosion Rate, Volume Source</b> .....	41
<b>FIGURE B.41 Sampling Frequency and Probability Density of the Parameter</b>	
<b>Removable Fraction</b> .....	42
<b>FIGURE B.42 Sampling Frequency and Probability Density of the Parameter</b>	
<b>Source Lifetime</b> .....	42
<b>FIGURE B.43 Sampling Frequency and Probability Density of the Parameter</b>	
<b>Humidity</b> .....	43
<b>FIGURE B.44 Sampling Frequency and Probability Density of the Parameter</b>	
<b>Water Fraction Available for Evaporation</b> .....	43
<b>FIGURE B.45 Sampling Frequency and Probability Density of the Parameter</b>	
<b>Source Porosity</b> .....	44
<b>FIGURE B.46 Sampling Frequency and Probability Density of the</b>	
<b>Parameter Volumetric Water Content</b> .....	44
<b>FIGURE B.47 Sampling Frequency and Probability Density of the Parameter</b>	
<b>Wet + Dry Zone Thickness</b> .....	45

B.1 Assigned Distribution Types and Distribution's Statistical Parameters for RESRAD and RESRAD-BUILD Parameters .....	4
B.2 Parameter Values and Distribution Types Used in the Probabilistic Dose Analysis for the RESRAD Code .....	8
B.3 Parameter Values and Distribution Types Used in the Probabilistic Dose Analysis for RESRAD- BUILD Code .....	18
B.4 Four Most Sensitive Parameters Based on PRCC for a Source of 100-m <sup>2</sup> Area and 15-cm Thickness in the Residential Scenario .....	46
B.5 Four Most Sensitive Parameters Based on PRCC for a Source of 2,400-m <sup>2</sup> Area and 15-cm Thickness in Residential Scenario .....	50
B.5 (Cont.) .....	51
B.6 Four Most Sensitive Parameters Based on PRCC for a Source of 10,000-m <sup>2</sup> Area and 2-m Thickness in Residential Scenario .....	54
B.6 (Cont.) .....	55
B.7 First Four Most Sensitive Parameters Based on SRRC for a 36-m <sup>2</sup> Volume Source in the Building Occupancy Scenario .....	58
B.7 (Cont.) .....	59
B.8 First Four Most Sensitive Parameters Based on SRRC for a 200-m <sup>2</sup> Volume Source in the Building Occupancy Scenario .....	61
B.8 (Cont.) .....	62
B.9 First Four Most Sensitive Parameters Based on SRRC for a 900-m <sup>2</sup> Volume Source in the Building Occupancy Scenario .....	64
B.9 (Cont.) .....	65

B.10 First Four Most Sensitive Parameters Based on SRRC for a 36-m<sup>2</sup> Area Source in the Building Occupancy Scenario ..... 67

B.10 (Cont.) ..... 68

B.11 First Four Most Sensitive Parameters Based on SRRC for a 200-m<sup>2</sup> Area Source in the Building Occupancy Scenario ..... 70

B.12 First Four Most Sensitive Parameters Based on SRRC for a 900-m<sup>2</sup> Area Source in the Building Occupancy Scenario ..... 73

B.12 (Cont.) ..... 74

**APPENDIX B**

**PARAMETER DISTRIBUTIONS USED IN  
PROBABILISTIC DOSE ANALYSES**



## APPENDIX B

### PARAMETER DISTRIBUTIONS USED IN PROBABILISTIC DOSE ANALYSES

This appendix contains data tables and figures for parameter distribution and probabilistic dose analyses. Table B.1 provides the assigned distribution types and each distribution's statistical parameters for the RESRAD and RESRAD-BUILD codes on the basis of the Parameter Distribution Report (Biwer et al., 2000). Tables B.2 and B.3 list the parameter values, type, and distribution types used in the

probabilistic dose analysis for the RESRAD and RESRAD-BUILD codes, respectively. Figures B.1 through B.48 provide the sampling frequency or the cumulative probability of the physical parameter values based on Latin hypercube sampling and the probability density or the cumulative distribution function of the parameter for the residential and building occupancy scenarios.

Table B.1. Assigned Distribution Types and Distribution's Statistical Parameters for RESRAD and RESRAD-BUILD Parameters						
Parameter	Name <sup>a</sup>	Assigned Distribution Type	Distribution's Statistical Parameters <sup>b</sup>			
			1	2	3	4
<b>RESRAD</b>						
Density of contaminated zone (g/cm <sup>3</sup> )	DENSCZ	Normal (truncated)	1.52	0.23	0.001	0.999
Density of cover material (g/cm <sup>3</sup> )	DENSCV	Normal (truncated)	1.52	0.23	0.001	0.999
Density of saturated zone (g/m <sup>3</sup> )	DENSAQ	Normal (truncated)	1.52	0.23	0.001	0.999
Depth of roots (m)	DROOT	Uniform	0.3	4.0		
Distribution coefficients (contaminated zone, unsaturated zones, and saturated zone)(cm <sup>3</sup> /g)	DCACTC, DCACTU, DCACTS	Lognormal-n (truncated)	Radionuclide specific (Table 3.9-1, Biwer et al., 2000)			
Saturated zone effective porosity	EPSZ	Normal (truncated)	0.355	0.0906	0.001	0.999
Saturated zone hydraulic conductivity (m/yr)	HCSZ	Lognormal-n (bounded)	2.3	2.11	0.004	9250
Saturated zone total porosity	TPSZ	Normal (truncated)	0.425	0.0867	0.001	0.999
Transfer factors for plants	BRTF(1)	Lognormal-n (truncated)	Element specific (Table 6.2-1, Biwer et al., 2000)			
Unsaturated zone thickness (m)	H	Lognormal-n (bounded)	2.296	1.276	0.18	320
Aquatic food contaminated fraction	FR9	Triangular	0	1	0.39	
Bioaccumulation factors for fish [(pCi/kg)/(pCi/L)]	BBIO(1)	Lognormal-n	Element specific (Table 6.8-1, Biwer et al., 2000)			
C-14 evasion layer thickness in soil (m)	DMC	Triangular	0.2	0.6	0.3	
Contaminated zone b parameter	BCZ	Lognormal-n (bounded)	1.06	0.66	0.5	30
Inhalation rate (m <sup>3</sup> /yr)	INHALAR	Triangular	4380	13100	8400	



Table B.1. Assigned Distribution Types and Distribution's Statistical Parameters for RESRAD and RESRAD-BUILD Parameters (Continued)						
Parameter	Name <sup>a</sup>	Assigned Distribution Type	Distribution's Statistical Parameters <sup>b</sup>			
			1	2	3	4
Contaminated zone erosion rate (m/yr)	VCZ	Empirical	Defined by cumulative probability (Table 3.8-1, Biwer et al., 2000)			
Contaminated zone hydraulic conductivity (m/yr)	HCCZ	Lognormal-n (bounded)	2.3	2.11	0.004	9250
Contaminated zone total porosity	TPCZ	Normal (truncated)	0.425	0.0867	0.001	0.999
Cover depth (m)	COVER0	None recommended				
Cover erosion rate (m/yr)	VCV	Empirical	Defined by cumulative probability (Table 3.8-1, Biwer et al., 2000)			
Depth of soil mixing layer (m)	DM	Triangular	0	0.6	0.15	
Drinking water intake (L/yr)	DWI	Lognormal-n (truncated)	6.015	0.489	0.001	0.999
Evapotranspiration coefficient	EVAPTR	Uniform	0.5	0.75		
External gamma shielding factor	SHF1	Lognormal-n (bounded)	-1.3	0.59	0.044	1.0
Fruit, vegetables, and grain consumption (kg/yr)	DIET(1)	Triangular	135	318	178	
Indoor dust filtration factor	SHF3	Uniform	0.15	0.95		
Mass loading for inhalation ( $\mu\text{g}/\text{m}^3$ )	MLINH	Empirical	Defined by cumulative probability (Table 4.6-1, Biwer et al., 2000)			
Milk consumption (L/yr)	DIET(3)	Triangular	60	200	102	
Runoff coefficient	RUNOFF	Uniform	0.1	0.8		
Saturated zone b parameter	BSZ	Lognormal-n (bounded)	1.06	0.66	0.5	30
Saturated zone hydraulic gradient	HGWT	Lognormal-n (bounded)	-5.11	1.77	7E-5	0.5

<b>Table B.1. Assigned Distribution Types and Distribution's Statistical Parameters for RESRAD and RESRAD-BUILD Parameters (Continued)</b>						
<b>Parameter</b>	<b>Name<sup>a</sup></b>	<b>Assigned Distribution Type</b>	<b>Distribution's Statistical Parameters<sup>b</sup></b>			
			<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
Soil ingestion rate (g/yr)	SOIL	Triangular	0	36.5	18.3	
Transfer factors for meat [(pCi/kg)/(pCi/d)]	BRTF(2)	Lognormal-n (truncated)	Element specific (Table 6.3-1, Biwer et al., 2000)			
Transfer factors for milk [(pCi/L)/(pCi/d)]	BRTF(3)	Lognormal-n (truncated)	Element specific (Table 6.4-1, Biwer et al., 2000)			
Unsaturated zone density (g/cm <sup>3</sup> )	DENSUZ	Normal (truncated)	1.52	0.23	0.001	0.999
Unsaturated zone effective porosity	EPUZ	Normal (truncated)	0.355	0.0906	0.001	0.999
Unsaturated zone hydraulic conductivity (m/yr)	HCUZ	Lognormal-n (bounded)	2.3	2.11	0.004	9250
Unsaturated zone, soil-b parameter	BUZ	Lognormal-n (bounded)	1.06	0.66	0.5	30
Unsaturated zone total porosity	TPUZ	Normal (truncated)	0.425	0.0867	0.001	0.999
Weathering removal constant (1/yr)	WLAM	Triangular	5.1	84	18	
Well pumping rate (m <sup>3</sup> /yr)	UW	None recommended				
Well pump intake depth (below water table) (m)	DWIBWT	Triangular	6	30	10	
Wet foliar interception fraction for leafy vegetables	RWET(2)	Triangular	0.06	0.95	0.67	
Wet-weight crop yields for non-leafy vegetables (kg/m <sup>2</sup> )	YU(1)	Lognormal-n (truncated)	0.56	0.48	0.001	0.999
Wind speed (m/s)	WIND	Lognormal-n (bounded)	1.445	0.2419	1	16
Humidity	HUMIDITY	Lognormal-n (truncated)	1.98	0.334	0.001	0.999

Table B.1. Assigned Distribution Types and Distribution's Statistical Parameters for RESRAD and RESRAD-BUILD Parameters (Continued)						
Parameter	Name <sup>a</sup>	Assigned Distribution Type	Distribution's Statistical Parameters <sup>b</sup>			
			1	2	3	4
Indoor fraction	FTIN	Empirical	Defined by cumulative probability (Table 7.6-1, Biwer et al., 2000)			
<b>RESRAD-BUILD</b>						
Removable fraction	RMVFR	Triangular	0.0	1.0	0.2	
Resuspension rate (1/s)	DKSUS	Loguniform	2.8E-10	1.4E-5		
Shielding density (g/cm <sup>3</sup> )	DSDEN	Uniform	2.2	2.6		
Source density, volume source (g/cm <sup>3</sup> )	DENSIO	Uniform	2.2	2.6		
Air exchange rate for building and room (1/h)	LAMBDAT	Lognormal-n (truncated)	0.4187	0.88	0.001	0.999
Air release fraction	AIRFR	Triangular	1E-6	1	0.07	
Deposition velocity (m/s)	UD	Loguniform	2.7E-6	2.7E-3		
Direct ingestion rate (g/h for volume source and 1/h for all other sources)	INGE1	None recommended				
Humidity (g/m <sup>3</sup> )	HUMIDITY	Uniform	6.5	13.1		
Indoor fraction	FTIN	Empirical	Defined by cumulative probability (Table 7.6-1, Biwer et al., 2000)			
Receptor indirect ingestion rate (m <sup>2</sup> /h)	INGE2	Loguniform	2.8E-5	2.9E-4		
Receptor inhalation rate (m <sup>3</sup> /d)	BRTRATE	Triangular	12	46	33.6	
Room area (m <sup>2</sup> )	AREA	Triangular	3	900	36	
Room height (m)	H	Triangular	2.4	9.1	3.7	
Shielding thickness (cm)	DSTH	Triangular	0.0	30	0.0	
Source erosion rate, volume source (cm/d)	EROS0	Triangular	0.0	5.6E-7	0.0	
Source porosity	H3POROSITY	Uniform	0.04	0.25		
Source thickness, volume source (cm)	THICK	Triangular	2.5	30	15	

**Table B.1. Assigned Distribution Types and Distribution's Statistical Parameters for RESRAD and RESRAD-BUILD Parameters (Continued)**

Parameter	Name <sup>a</sup>	Assigned Distribution Type	Distribution's Statistical Parameters <sup>b</sup>			
			1	2	3	4
Time for source removal or source lifetime (d)	RF0	Triangular	1,000	100,000	10,000	
Volumetric water content	H3VOLFRACT	Uniform	0.04	0.25		
Water fraction available for evaporation	H3RMFR	Triangular	0.5	1.0	0.75	
Wet + dry zone thickness (cm)	H3THICK	Uniform	5	30		

<sup>a</sup> Name of the parameter by which parameters are identified in sensitivity tables.

<sup>b</sup> For normal and lognormal distribution, statistical parameter 1 is the mean, 2 is the standard deviation, 3 is the lower quantile value, and 4 is the upper quantile. For the bounded lognormal distribution, parameters 3 and 4 are the actual lower and upper bounds. Parameters for element specific or distribution defined by cumulative probability distributions are not provided in this table (see Parameter Distribution Report [Biber et al., 2000]). For uniform distribution, statistical parameter 1 is the minimum and parameter 2 is the maximum of the distribution. For triangular distribution, parameter 1 is the minimum value, parameter 2 is the maximum value, and parameter 3 is the most likely value of the distribution.

**Table B.2. Parameter Values and Distribution Types Used in the Probabilistic Dose Analysis for the RESRAD Code**

RESRAD Parameter	Unit	Parameter Type <sup>a</sup>	Parameter Value/ Distribution Type Used	Source	Distribution's Statistical Parameters <sup>b</sup>			
					1	2	3	4
Nuclide concentration	pCi/g	P	1		NR <sup>c</sup>	NR	NR	NR
Distribution coefficients (contaminated zone, unsaturated zones, and saturated zones)	cm <sup>3</sup> /g	P	Lognormal-n (truncated)	Biwer et al., 2000	Element specific	Element specific	Element specific	Element specific
Number of unsaturated zones	- <sup>d</sup>	P	1	RESRAD	NR	NR	NR	NR
Time since placement of material	yr	P	0	RESRAD	NR	NR	NR	NR
Groundwater concentration	pCi/L	P	0	RESRAD	NR	NR	NR	NR
Leach rate	1/yr	P	0	RESRAD	NR	NR	NR	NR
Solubility limit	mol/L	P	0	RESRAD	NR	NR	NR	NR
Use plant/soil ratio	check box	NA <sup>e</sup>	NA	RESRAD	NR	NR	NR	NR
Basic radiation dose limit	mrem/yr	NA	25	DandD	NR	NR	NR	NR
Times for calculations	yr	P	1, 3, 10, 30, 100, 300, 1000	RESRAD	NR	NR	NR	NR
Area of contaminated zone	m <sup>2</sup>	P	100, 2400, 10,000	RESRAD	NR	NR	NR	NR
Thickness of contaminated zone	m	P	0.15, 0.15, 2.0	RESRAD	NR	NR	NR	NR
Length parallel to aquifer flow	m	P	10, 49, 100	RESRAD	NR	NR	NR	NR
Cover depth	m	P	0	RESRAD	NR	NR	NR	NR
Density of cover material	g/cm <sup>3</sup>	P	Normal (truncated)	Biwer et al., 2000	1.52	0.23	0.001	0.999
Cover erosion rate	m/yr	P, B	NA	Biwer et al., 2000	NR	NR	NR	NR

B-9

**Table B.2. Parameter Values and Distribution Types Used in the Probabilistic  
Dose Analysis for the RESRAD Code (Continued)**

RESRAD Parameter	Unit	Parameter Type <sup>a</sup>	Parameter Value/ Distribution Type Used	Source	Distribution's Statistical Parameters <sup>b</sup>			
					1	2	3	4
Density of contaminated zone	g/cm <sup>3</sup>	P	Normal (truncated)	Biwer et al., 2000	1.52	0.23	0.001	0.999
Contaminated zone total porosity	-	P	Normal (truncated)	Biwer et al., 2000	0.425	0.0867	0.001	0.999
Contaminated zone field capacity	-	P	0.2	RESRAD	NR	NR	NR	NR
Contaminated zone erosion rate	m/yr	P, B	Defined by cumulative probability	Biwer et al., 2000				
Contaminated zone hydraulic conductivity	m/yr	P	Lognormal-n (bounded)	Biwer et al., 2000	2.3	2.11	0.004	9250
Contaminated zone b parameter	-	P	Lognormal-n (bounded)	Biwer et al., 2000	1.06	0.66	0.5	30
Humidity in air	g/m <sup>3</sup>	P	Lognormal-n (truncated)	Biwer et al., 2000	1.98	0.334	0.001	0.999
Evapotranspiration coefficient	-	P	Uniform	Biwer et al., 2000	0.5	0.75		
Wind speed	m/s	P	Lognormal-n (bounded)	Biwer et al., 2000	1.445	0.2419	1	16
Precipitation rate	m/yr	P	1.0	RESRAD	NR	NR	NR	NR
Irrigation rate	m/yr	B	0.1125	Calculated based on DandD default	NR	NR	NR	NR
Irrigation mode	-	B	Overhead	RESRAD	NR	NR	NR	NR
Runoff coefficient	-	P	Uniform	Biwer et al., 2000	0.1	0.8		
Watershed area for nearby stream or pond	m <sup>2</sup>	P	1,000,000	RESRAD	NR	NR	NR	NR
Accuracy for water soil computation	-	NA	0.001	RESRAD	NR	NR	NR	NR

**Table B.2. Parameter Values and Distribution Types Used in the Probabilistic Dose Analysis for the RESRAD Code (Continued)**

RESRAD Parameter	Unit	Parameter Type <sup>a</sup>	Parameter Value/ Distribution Type Used	Source	Distribution's Statistical Parameters <sup>b</sup>			
					1	2	3	4
Density of saturated zone	g/cm <sup>3</sup>	P	Normal (truncated)	Biwer et al., 2000	1.52	0.23	0.001	0.999
Saturated zone total porosity	-	P	Normal (truncated)	Biwer et al., 2000	0.425	0.0867	0.001	0.999
Saturated zone effective porosity	-	P	Normal (truncated)	Biwer et al., 2000	0.355	0.0906	0.001	0.999
Saturated zone field capacity	-	P	0.2	RESRAD	NR	NR	NR	NR
Saturated zone hydraulic conductivity	m/yr	P	Lognormal-n (bounded)	Biwer et al., 2000	2.3	2.11	0.004	9250
Saturated zone hydraulic gradient	-	P	Lognormal-n (bounded)	Biwer et al., 2000	-5.11	1.77	7E-5	0.5
Saturated zone b parameter	-	P	Lognormal-n (bounded)	Biwer et al., 2000	1.06	0.66	0.5	30
Water table drop rate	m/yr	P	0.001	RESRAD	NR	NR	NR	NR
Well pump intake depth (below water table)	m	P	Triangular	Biwer et al., 2000	6	30	10	
Model: nondispersion (ND) or mass-balance (MB)	-	NA	ND	RESRAD	NR	NR	NR	NR
Well pumping rate	m <sup>3</sup> /yr	B, P	409.3, 668, 1523	Biwer et al., 2000				
Unsaturated zone thickness	m	P	Defined by cumulative probability	Biwer et al., 2000				
Unsaturated zone density	g/cm <sup>3</sup>	P	Normal (truncated)	Biwer et al., 2000	1.52	0.23	0.001	0.999
Unsaturated zone total porosity	-	P	Normal (truncated)	Biwer et al., 2000	0.425	0.0867	0.001	0.999
Unsaturated zone effective porosity	-	P	Normal (truncated)	Biwer et al., 2000	0.355	0.0906	0.001	0.999
Unsaturated zone field capacity	-	P	0.2	RESRAD	NR	NR	NR	NR

**Table B.2. Parameter Values and Distribution Types Used in the Probabilistic Dose Analysis for the RESRAD Code (Continued)**

RESRAD Parameter	Unit	Parameter Type <sup>a</sup>	Parameter Value/ Distribution Type Used	Source	Distribution's Statistical Parameters <sup>b</sup>			
					1	2	3	4
Unsaturated zone, soil-specific b parameter		P	Lognormal-n (bounded)	Biwer et al., 2000	1.06	0.66	0.5	30
Unsaturated zone hydraulic conductivity	m/yr	P	Lognormal-n (bounded)	Biwer et al., 2000	2.3	2.11	0.004	9250
Inhalation rate	m <sup>3</sup> /yr	M, B	8400	Biwer et al., 2000	NR	NR	NR	NR
Mass loading for inhalation	μ/m <sup>3</sup>	P, B	Defined by cumulative probability	Biwer et al., 2000				
Exposure duration	yr	B	30	RESRAD	NR	NR	NR	NR
Indoor dust filtration factor	-	P, B	Uniform	Biwer et al., 2000	0.15	0.95		
External gamma shielding factor	-	P	Lognormal-n (bounded)	Biwer et al., 2000	-1.4	0.84	0	1
Indoor time fraction	-	B	0.65	Beyeler et al., 1999	NR	NR	NR	NR
Outdoor time fraction	-	B	0.12	Beyeler et al., 1999	NR	NR	NR	NR
Shape of the contaminated zone (shape factor flag)	-	P	Circular	RESRAD	NR	NR	NR	NR
Fruit, vegetables, and grain consumption	kg/yr	M, B	178	Biwer et al., 2000	NR	NR	NR	NR
Leafy vegetable consumption	kg/yr	M, B	21.4	DandD	NR	NR	NR	NR
Milk consumption	L/yr	M, B	102	Biwer et al., 2000	NR	NR	NR	NR
Meat and poultry consumption	kg/yr	M, B	65.1	DandD	NR	NR	NR	NR
Fish consumption	kg/yr	M, B	20.6	DandD	NR	NR	NR	NR
Other seafood consumption	kg/yr	M, B	0.9	RESRAD	NR	NR	NR	NR

B-12



**Table B.2. Parameter Values and Distribution Types Used in the Probabilistic Dose Analysis for the RESRAD Code (Continued)**

RESRAD Parameter	Unit	Parameter Type <sup>a</sup>	Parameter Value/ Distribution Type Used	Source	Distribution's Statistical Parameters <sup>b</sup>			
					1	2	3	4
Soil ingestion rate	g/yr	M, B	18.3	Biwer et al., 2000	NR	NR	NR	NR
Drinking water intake	L/yr	M, B	461.5	Biwer et al., 2000	NR	NR	NR	NR
Drinking water contaminated fraction	-	B, P	1	RESRAD	NR	NR	NR	NR
Household water contaminated fraction	-	B, P	1	RESRAD	NR	NR	NR	NR
Livestock water contaminated fraction	-	B, P	1	RESRAD	NR	NR	NR	NR
Irrigation water contaminated fraction	-	B, P	1	RESRAD	NR	NR	NR	NR
Aquatic food contaminated fraction	-	B, P	Triangular	Biwer et al., 2000	0	1	0.39	
Plant food contaminated fraction	-	B, P	-1	RESRAD	NR	NR	NR	NR
Meat contaminated fraction	-	B, P	-1	RESRAD	NR	NR	NR	NR
Milk contaminated fraction	-	B, P	-1	RESRAD	NR	NR	NR	NR
Livestock fodder intake for meat	kg/d	M	68	RESRAD	NR	NR	NR	NR
Livestock fodder intake for milk	kg/d	M	55	RESRAD	NR	NR	NR	NR
Livestock water intake for meat	L/d	M	50	RESRAD	NR	NR	NR	NR
Livestock water intake for milk	L/d	M	160	RESRAD	NR	NR	NR	NR
Livestock intake of soil	kg/d	M	0.5	RESRAD	NR	NR	NR	NR
Mass loading for foliar deposition	g/m <sup>3</sup>	P	4E-4	DandD	NR	NR	NR	NR
Depth of soil mixing layer	m	P	Triangular	Biwer et al., 2000	0	0.6	0.15	

B-13

**Table B.2. Parameter Values and Distribution Types Used in the Probabilistic Dose Analysis for the RESRAD Code (Continued)**

RESRAD Parameter	Unit	Parameter Type <sup>a</sup>	Parameter Value/ Distribution Type Used	Source	Distribution's Statistical Parameters <sup>b</sup>			
					1	2	3	4
Depth of roots	m	P	Uniform	Biwer et al., 2000	0.3	4.0		
Groundwater fractional usage for drinking water	-	B, P	1	RESRAD	NR	NR	NR	NR
Groundwater fractional usage for household water	-	B, P	1	RESRAD	NR	NR	NR	NR
Groundwater fractional usage for livestock water	-	B, P	1	RESRAD	NR	NR	NR	NR
Groundwater fractional usage for irrigation water	-	B, P	1	RESRAD	NR	NR	NR	NR
Wet-weight crop yields for non-leafy vegetables	kg/m <sup>2</sup>	P	Lognormal-n (truncated)	Biwer et al., 2000	0.56	0.48	0.001	0.999
Wet-weight crop yields for leafy vegetables	kg/m <sup>2</sup>	P	2.9	Beyeler et al., 1999	NR	NR	NR	NR
Wet-weight crop yields for fodder	kg/m <sup>2</sup>	P	1.8868	Beyeler et al., 1999	NR	NR	NR	NR
Length of growing season for non-leafy vegetables	yr	P	0.2466	Beyeler et al., 1999	NR	NR	NR	NR
Length of growing season for leafy vegetables	yr	P	0.123	Beyeler et al., 1999	NR	NR	NR	NR
Length of growing season for fodder	yr	P	0.082	Beyeler et al., 1999	NR	NR	NR	NR
Translocation factor for non-leafy vegetables	-	P	0.1	DandD	NR	NR	NR	NR
Translocation factor for leafy vegetables	-	P	1	DandD	NR	NR	NR	NR
Translocation factor for fodder	-	P	1	DandD	NR	NR	NR	NR
Weathering removal constant	1/yr	P	Triangular	Biwer et al., 2000	5.1	84	18	

B-14

**Table B.2. Parameter Values and Distribution Types Used in the Probabilistic  
Dose Analysis for the RESRAD Code (Continued)**

RESRAD Parameter	Unit	Parameter Type <sup>a</sup>	Parameter Value/ Distribution Type Used	Source	Distribution's Statistical Parameters <sup>b</sup>			
					1	2	3	4
Wet foliar interception fraction for non-leafy vegetables	-	P	0.35	Beyeler et al., 1999	NR	NR	NR	NR
Wet foliar interception fraction for leafy vegetables	-	P	Triangular	Biwer et al., 2000	0.06	0.95	0.67	
Wet foliar interception fraction for fodder	-	P	0.35	Beyeler et al., 1999	NR	NR	NR	NR
Dry foliar interception fraction for non-leafy vegetables	-	P	0.35	Beyeler et al., 1999	NR	NR	NR	NR
Dry foliar interception fraction for leafy vegetables	-	P	0.35	Beyeler et al., 1999	NR	NR	NR	NR
Dry foliar interception fraction for fodder	-	P	0.35	Beyeler et al., 1999	NR	NR	NR	NR
Cover total porosity	-	P	NA	RESRAD	NR	NR	NR	NR
Cover volumetric water content	-	P	NA	RESRAD	NR	NR	NR	NR
Cover radon diffusion coefficient	m <sup>2</sup> /s	P	NA	RESRAD	NR	NR	NR	NR
Building foundation thickness	m	P	0.15	RESRAD	NR	NR	NR	NR
Building foundation density	g/cm <sup>3</sup>	P	2.4	RESRAD	NR	NR	NR	NR
Building foundation total porosity	-	P	0.1	RESRAD	NR	NR	NR	NR
Building foundation volumetric water content	-	P	0.03	RESRAD	NR	NR	NR	NR
Building foundation radon diffusion coefficient	m <sup>2</sup> /s	P	3.0E-7	RESRAD	NR	NR	NR	NR

**Table B.2. Parameter Values and Distribution Types Used in the Probabilistic Dose Analysis for the RESRAD Code (Continued)**

RESRAD Parameter	Unit	Parameter Type <sup>a</sup>	Parameter Value/ Distribution Type Used	Source	Distribution's Statistical Parameters <sup>b</sup>			
					1	2	3	4
Contamination radon diffusion coefficient	m <sup>2</sup> /s	P	2.0E-6	RESRAD	NR	NR	NR	NR
Radon vertical dimension of mixing	m	P	2	RESRAD	NR	NR	NR	NR
Building air exchange rate	1/h	P, B	0.5	RESRAD	NR	NR	NR	NR
Building height	m	P	2.5	RESRAD	NR	NR	NR	NR
Building indoor area factor	-	P	0	RESRAD	NR	NR	NR	NR
Foundation depth below ground surface	m	P	-1	RESRAD	NR	NR	NR	NR
Radon-222 emanation coefficient	-	P	0.25	RESRAD	NR	NR	NR	NR
Radon-220 emanation coefficient	-	P	0.15	RESRAD	NR	NR	NR	NR
Storage times for fruits, non-leafy vegetables, and grain	d	B	14	RESRAD	NR	NR	NR	NR
Storage times for leafy vegetables	d	B	1	RESRAD	NR	NR	NR	NR
Storage times for milk	d	B	1	RESRAD	NR	NR	NR	NR
Storage times for meat	d	B	20	RESRAD	NR	NR	NR	NR
Storage times for fish	d	B	7	RESRAD	NR	NR	NR	NR
Storage times for crustacea and mollusks	d	B	7	RESRAD	NR	NR	NR	NR
Storage times for well water	d	B	1	RESRAD	NR	NR	NR	NR
Storage times for surface water	d	B	1	RESRAD	NR	NR	NR	NR
Storage times for livestock fodder	d	B	45	RESRAD	NR	NR	NR	NR
C-12 concentration in local water	g/cm <sup>3</sup>	P	2E-5	RESRAD	NR	NR	NR	NR

**Table B.2. Parameter Values and Distribution Types Used in the Probabilistic Dose Analysis for the RESRAD Code (Continued)**

RESRAD Parameter	Unit	Parameter Type <sup>a</sup>	Parameter Value/ Distribution Type Used	Source	Distribution's Statistical Parameters <sup>b</sup>			
					1	2	3	4
C-12 concentration in contaminated soil	g/g	P	0.03	RESRAD	NR	NR	NR	NR
Fraction of vegetation carbon absorbed from soil	-	P	0.02	RESRAD	NR	NR	NR	NR
Fraction of vegetation carbon absorbed from air	-	P	0.98	RESRAD	NR	NR	NR	NR
C-14 evasion layer thickness in soil	m	P	Triangular	Biwer et al., 2000	0.2	0.6	0.3	
C-14 evasion flux rate from soil	1/s	P	7E-07	RESRAD	NR	NR	NR	NR
C-12 evasion flux rate from soil	1/s	P	1E-10	RESRAD	NR	NR	NR	NR
Grain fraction in livestock feed	-	B	0.25 (beef cattle) 0.1 (cow)	Beyeler et al., 1999	NR	NR	NR	NR
Inhalation dose conversion factors	mrem/pCi	M	Nuclide specific	RESRAD	NR	NR	NR	NR
Ingestion dose conversion factors	mrem/pCi	M	Nuclide specific	RESRAD	NR	NR	NR	NR
Slope factor - external	(risk/yr)/ (pCi/g)	M	Nuclide specific	RESRAD	NR	NR	NR	NR
Slope factor - inhalation	risk/pCi	M	Nuclide specific	RESRAD	NR	NR	NR	NR
Slope factor - ingestion	risk/pCi	M	Nuclide specific	RESRAD	NR	NR	NR	NR
Plant transfer factor	-	P	Lognormal (truncated)	Biwer et al., 2000	Element specific	Element specific	Element specific	Element specific
Meat transfer factor	(pCi/kg)/ (pCi/d)	P	Lognormal (truncated)	Biwer et al., 2000	Element specific	Element specific	Element specific	Element specific
Milk transfer factor	(pCi/L)/ (pCi/d)	P	Lognormal (truncated)	Biwer et al., 2000	Element specific	Element specific	Element specific	Element specific
Bioaccumulation factor for fish	(pCi/kg)/ (pCi/L)	P	Lognormal (truncated)	Biwer et al., 2000	Element specific	Element specific	Element specific	Element specific

B-17

**Table B.2. Parameter Values and Distribution Types Used in the Probabilistic Dose Analysis for the RESRAD Code (Continued)**

RESRAD Parameter	Unit	Parameter Type <sup>a</sup>	Parameter Value/ Distribution Type Used	Source	Distribution's Statistical Parameters <sup>b</sup>			
					1	2	3	4
Bioaccumulation factor for crustacea and mollusks	(pCi/kg)/ (pCi/L)	P	Element specific	RESRAD	NR	NR	NR	NR
<p><sup>a</sup> P = physical, B = behavioral, and M = metabolic; when more than one parameter type is listed, the first is primary and next is secondary (Kamboj et al., 1999).</p> <p><sup>b</sup> For normal and lognormal distribution, distribution parameter 1 is the mean, 2 is the standard deviation, 3 is the lower quantile value, and 4 is the upper quantile. For bounded lognormal distribution, parameters 3 and 4 are the actual lower and upper bounds. Parameters for element-specific values or distribution defined by cumulative probability distributions are not provided in this table (see the Parameter Distribution Report [Biber et al., 2000]). For uniform distribution, parameter 1 is the minimum and parameter 2 is the maximum of the distribution. For triangular distribution, parameter 1 is the minimum value, parameter 2 is the maximum value, and parameter 3 is the most likely value of the distribution.</p> <p><sup>c</sup> NR = not required (RESRAD parameters for which distributions are not developed and for which statistical parameters are not required).</p> <p><sup>d</sup> Hyphen indicates that the parameter is dimensionless.</p> <p><sup>e</sup> NA = not applicable.</p>								

**Table B.3. Parameter Values and Distribution Types Used in the Probabilistic Dose Analysis for the RESRAD-BUILD Code**

Parameter	Units	Parameter Type <sup>a</sup>	Parameter Value/Distribution Type Used	Source	Distribution's Statistical Parameters <sup>b</sup>			
					1	2	3	4
External dose conversion factor	(mrem/yr)/(pCi/g)	M	Nuclide specific	RESRAD-BUILD	NR <sup>c</sup>	NR	NR	NR
Inhalation dose conversion factor	mrem/pCi	M	Nuclide specific	RESRAD-BUILD	NR	NR	NR	NR
Ingestion dose conversion factors	mrem/pCi	M	Nuclide specific	RESRAD-BUILD	NR	NR	NR	NR
Air Submersion dose conversion factors	(mrem/yr)/(pCi/m <sup>3</sup> )	M	Nuclide specific	RESRAD-BUILD				
Exposure duration	d	B	365	RESRAD-BUILD	NR	NR	NR	NR
Indoor fraction	- <sup>d</sup>	B	0.365	Biwer et al., 2000	NR	NR	NR	NR
Number of evaluation times	-	P	2	RESRAD-BUILD	NR	NR	NR	NR
Time	yr	P	1	RESRAD-BUILD	NR	NR	NR	NR
Number of rooms	-	P	1	RESRAD-BUILD	NR	NR	NR	NR
Deposition velocity	m/s	P	Loguniform	Biwer et al., 2000	2.7E-6	2.7E-3		
Resuspension rate	1/s	P, B	Loguniform	Biwer et al., 2000	2.8E-10	1.4E-5		
Room height	m	P	Triangular	Biwer et al., 2000	2.4	9.1	3.7	
Room area	m <sup>2</sup>	P	Triangular	Biwer et al., 2000	3	900	36	
Air exchange rate for building and room	1/h	B	1.52	Biwer et al., 2000	NR	NR	NR	NR
Net flow	m <sup>3</sup> /h	B	0	RESRAD-BUILD	NR	NR	NR	NR

Outdoor inflow	m <sup>3</sup> /h	B, P	60	RESRAD-BUILD	NR	NR	NR	NR
<b>Table B.3. Parameter Values and Distribution Types Used in the Probabilistic Dose Analysis for the RESRAD-BUILD Code (Continued)</b>								
Parameter	Units	Parameter Type <sup>a</sup>	Parameter Value/Distribution Type Used	Source	Distribution's Statistical Parameters <sup>b</sup>			
					1	2	3	4
Number of receptors	-	B	1	RESRAD-BUILD	NR	NR	NR	NR
Receptor room	-	B	1	RESRAD-BUILD	NR	NR	NR	NR
Receptor location	m	B	1,1,1 (Cartesian coordinates)	RESRAD-BUILD	NR	NR	NR	NR
Receptor time fraction	-	B	1	RESRAD-BUILD	NR	NR	NR	NR
Receptor inhalation rate	m <sup>3</sup> /d	M, B	33.6	Biwer et al., 2000	NR	NR	NR	NR
Receptor indirect ingestion rate	m <sup>2</sup> /h	B	1.1E-4	Biwer et al., 2000	NR	NR	NR	NR
Number of sources	-	P	1	RESRAD-BUILD	NR	NR	NR	NR
Source type	-	P	Area, volume	RESRAD-BUILD	NR	NR	NR	NR
Source room or primary room	-	P	1	RESRAD-BUILD	NR	NR	NR	NR
Source direction	-	P	X	RESRAD-BUILD	NR	NR	NR	NR
Source location	-	P	0,0,0	RESRAD-BUILD	NR	NR	NR	NR
Source length or area	m or m <sup>2</sup>	P	36	RESRAD-BUILD	NR	NR	NR	NR
Air release fraction	-	B	0.07	Biwer et al., 2000	NR	NR	NR	NR
Direct ingestion rate	g/h (volume) and 1/h (other)	B	0	Biwer et al., 2000	NR	NR	NR	NR



**Table B.3. Parameter Values and Distribution Types Used in the Probabilistic Dose Analysis for the RESRAD-BUILD Code (Continued)**

Parameter	Units	Parameter Type <sup>a</sup>	Parameter Value/Distribution Type Used	Source	Distribution's Statistical Parameters <sup>b</sup>			
					1	2	3	4
Removable fraction	-	P, B	Triangular	Biwer et al., 2000	0.0	1.0	0.2	
Time for source removal or source lifetime	d	P, B	Triangular	Biwer et al., 2000	1000	100,000	10,000	
Radon release fraction	-	P, B	0	RESRAD-BUILD	NR	NR	NR	NR
Radionuclide concentration	pCi/g, dpm/cm <sup>2</sup>	P	1 (Co-60)	RESRAD-BUILD	NR	NR	NR	NR
Number of regions in volume source	-	P	1	RESRAD-BUILD	NR	NR	NR	NR
Contaminated region-volume source	-	P	1	RESRAD-BUILD	NR	NR	NR	NR
Source thickness, volume source	cm	P	Triangular	Biwer et al., 2000	2.5	30	15	
Source density, volume source	g/cm <sup>3</sup>	P	Uniform	Biwer et al., 2000	2.2	2.6		
Source erosion rate, volume source	cm/d	P, B	Triangular	Biwer et al., 2000	0.0	5.6E-7	0.0	NR
Source porosity	-	P	Uniform	Biwer et al., 2000	0.04	0.25		
Radon effective diffusion coefficient	m <sup>2</sup> /s	P	3E-7	RESRAD-BUILD	NR	NR	NR	NR
Radon emanation coefficient	-	P	0	RESRAD-BUILD	NR	NR	NR	NR
Shielding thickness	cm	P, B	Triangular	Biwer et al., 2000	0.0	30	0.0	
Shielding density	g/cm <sup>3</sup>	P	Uniform	Biwer et al., 2000	2.2	2.6		
Shielding material	-	P	Concrete	RESRAD-BUILD	NR	NR	NR	NR

**Table B.3. Parameter Values and Distribution Types Used in the Probabilistic Dose Analysis for the RESRAD-BUILD Code (Continued)**

Parameter	Units	Parameter Type <sup>a</sup>	Parameter Value/Distribution Type Used	Source	Distribution's Statistical Parameters <sup>b</sup>			
					1	2	3	4
Dry zone thickness	cm	P	0	RESRAD-BUILD	NR	NR	NR	NR
Wet + dry zone thickness	cm	P	Uniform	Biwer et al., 2000	5	30		
Volumetric water content	-	P	Uniform	Biwer et al., 2000	0.04	0.25		

**Table B.3. Parameter Values and Distribution Types Used in the Probabilistic Dose Analysis for the RESRAD-BUILD Code (Continued)**

Parameter	Units	Parameter Type <sup>a</sup>	Parameter Value/Distribution Type Used	Source	Distribution's Statistical Parameters <sup>b</sup>			
					1	2	3	4
Water fraction available for evaporation	-	P	Triangular	Biwer et al., 2000	0.5	1.0	0.75	
Humidity	g/m <sup>3</sup>	P, B	Uniform	Biwer et al., 2000	6.5	13.1		

<sup>a</sup> P = physical, B = behavioral, and M = metabolic; when more than one parameter type is listed, the first is primary and next is secondary (Kamboj et al., 1999).

<sup>b</sup> For normal and lognormal distribution, distribution parameter 1 is the mean, 2 is the standard deviation, 3 is the lower quantile value, and 4 is the upper quantile. For bounded lognormal distribution, parameters 3 and 4 are the actual lower and upper bounds. Parameters for element-specific values or distribution defined by cumulative probability distributions are not provided in this table (see the Parameter Distribution Report [Biwer et al., 2000]). For uniform distribution, parameter 1 is the minimum and parameter 2 is the maximum of the distribution. For triangular distribution, parameter 1 is the minimum value, parameter 2 is the maximum value, and parameter 3 is the most likely value of the distribution.

<sup>c</sup> NR = not required (RESRAD parameters for which distributions are not developed and for which statistical parameters are not required).

<sup>d</sup> A hyphen indicates that the parameter is dimensionless.

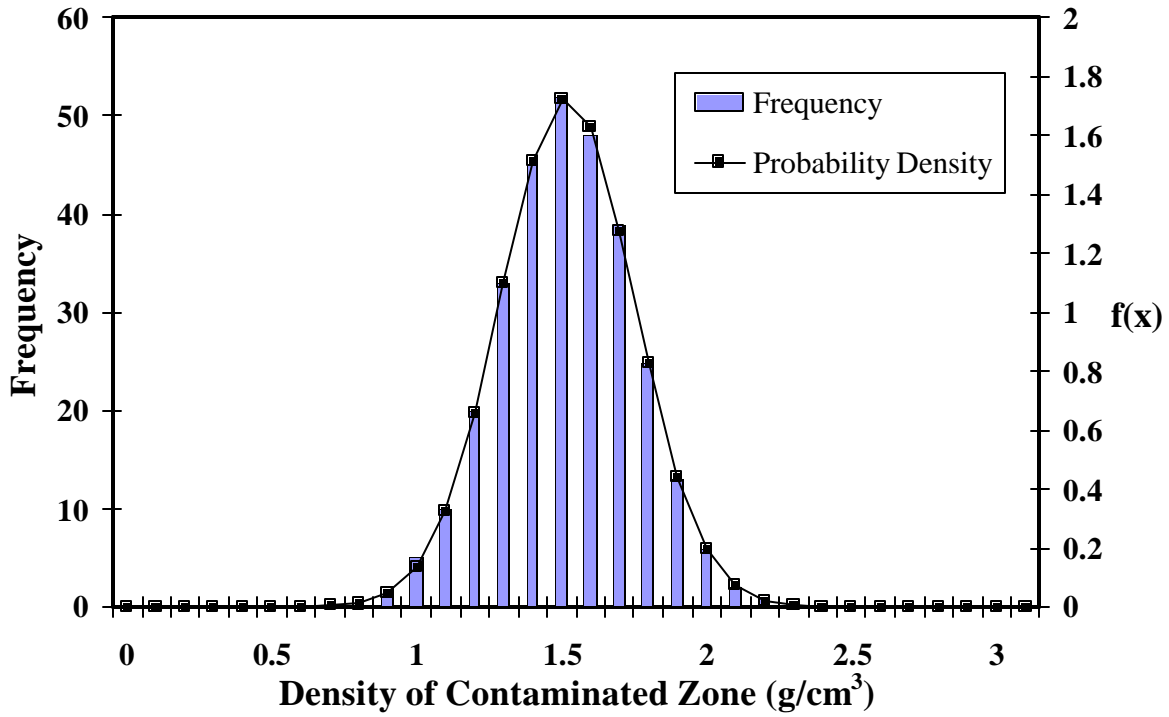


Figure B.1 Sampling Frequency and Probability Density of the Density of Contaminated Zone

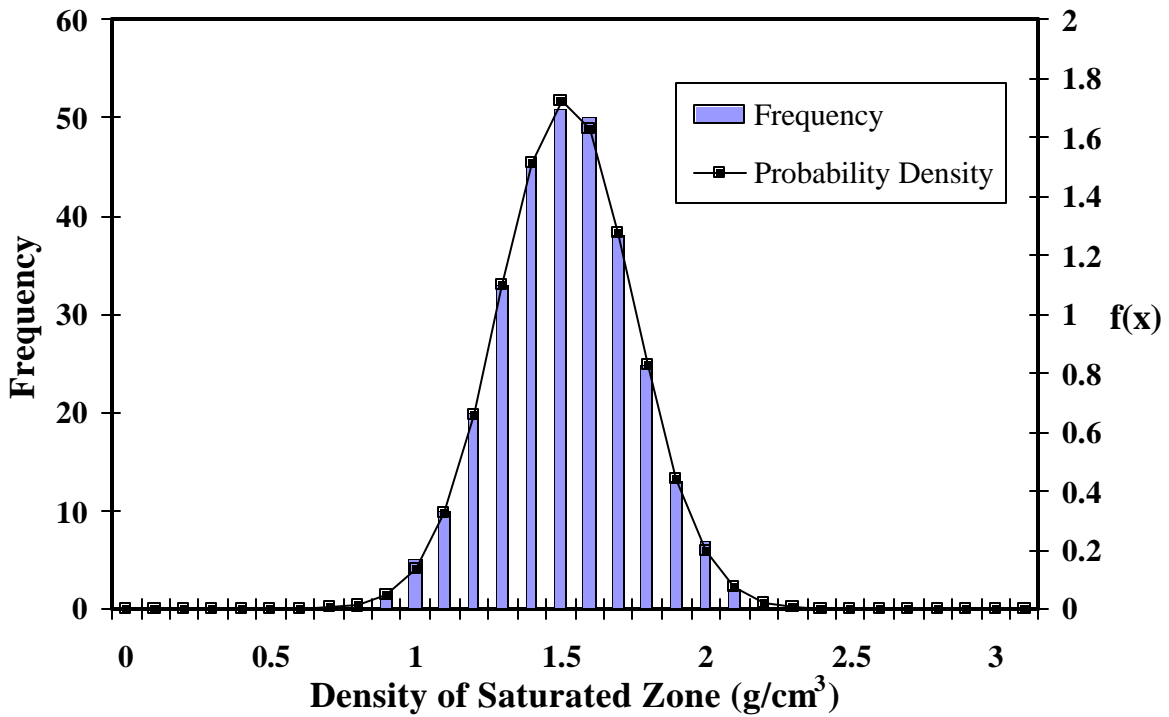


Figure B.2 Sampling Frequency and Probability Density of the Density of Saturated Zone

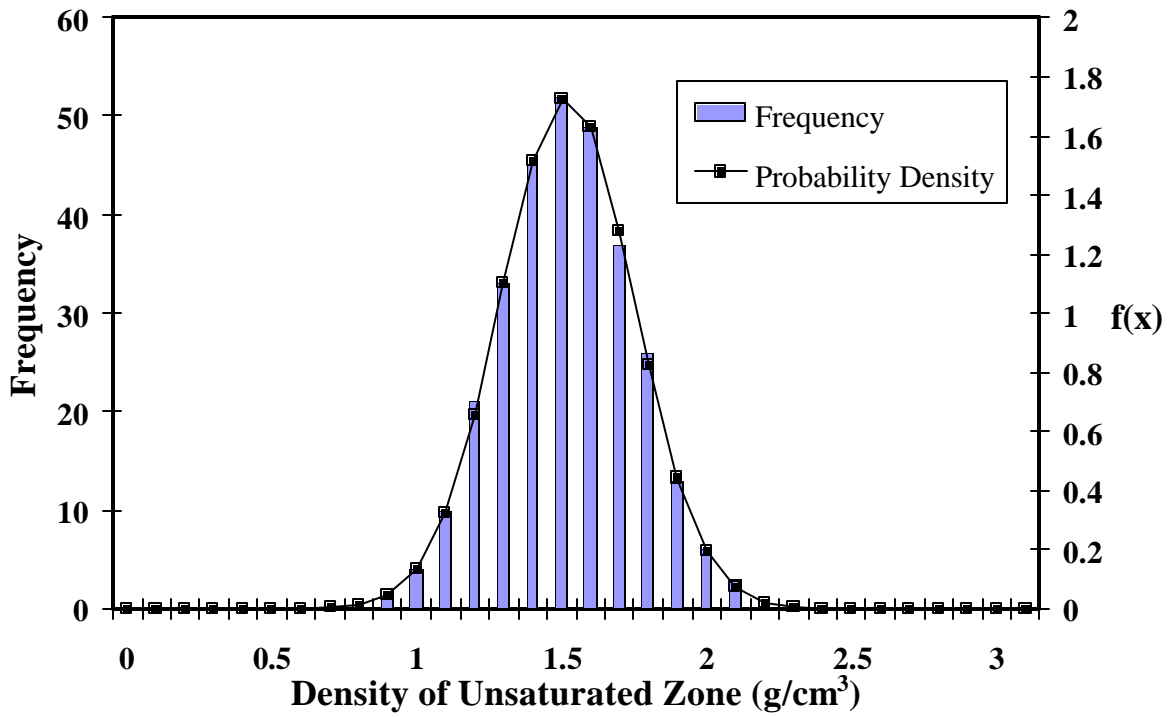


Figure B.3 Sampling Frequency and Probability Density of the Density of Unsaturated Zone

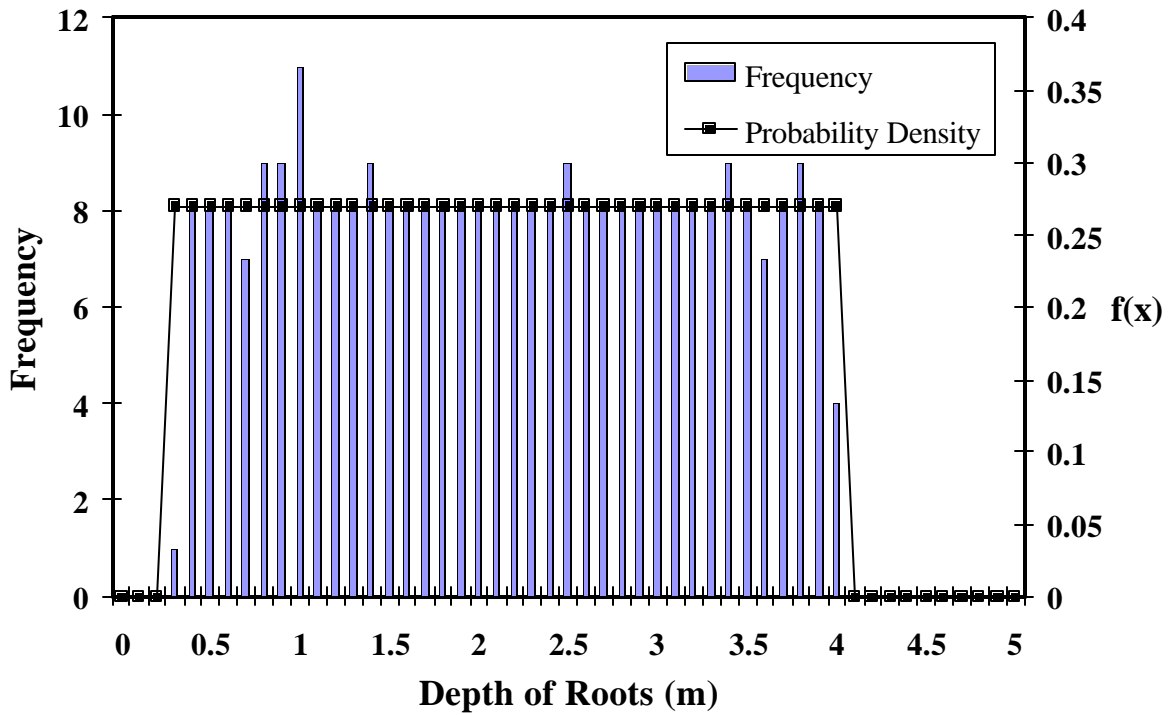


Figure B.4 Sampling Frequency and Probability Density of the Depth of Roots

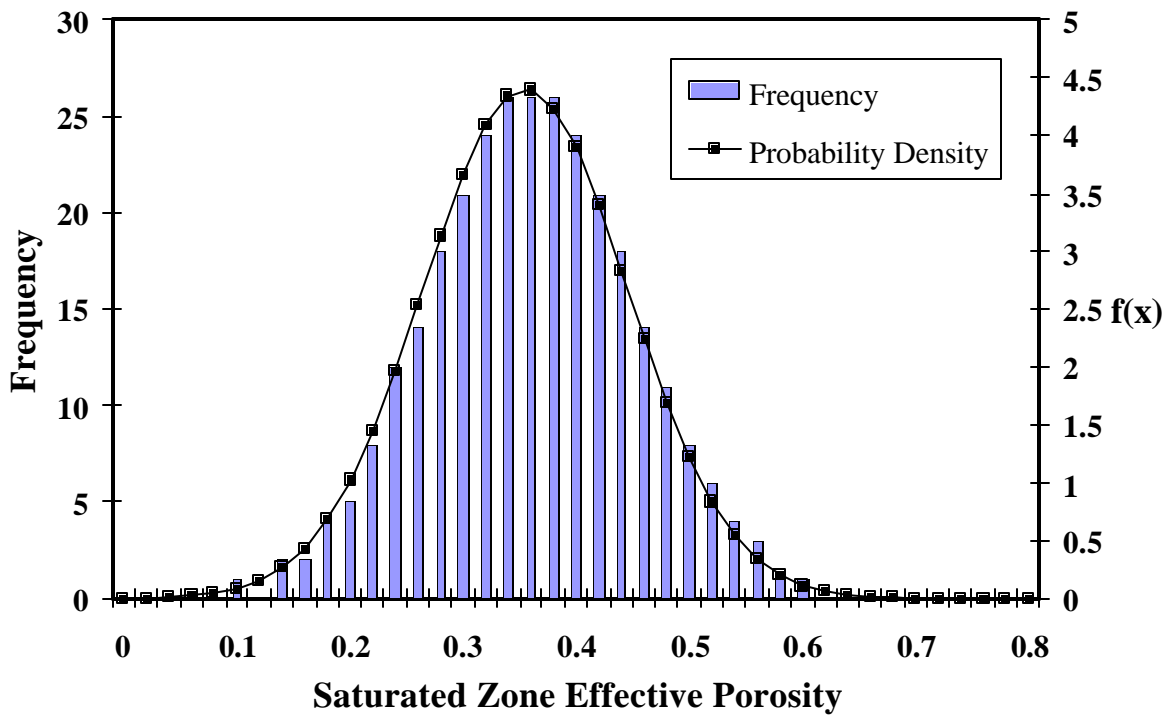


Figure B.5 Sampling Frequency and Probability Density of the Saturated Zone Effective Porosity

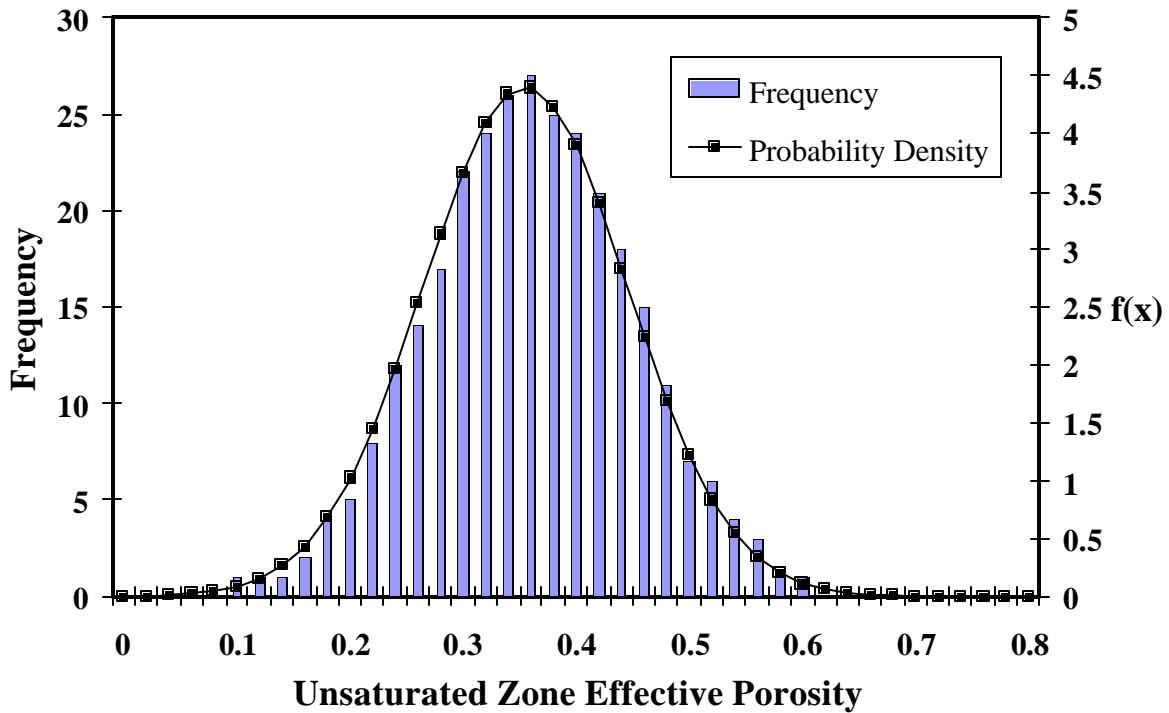


Figure B.6 Sampling Frequency and Probability Density of the Unsaturated Zone Effective Porosity

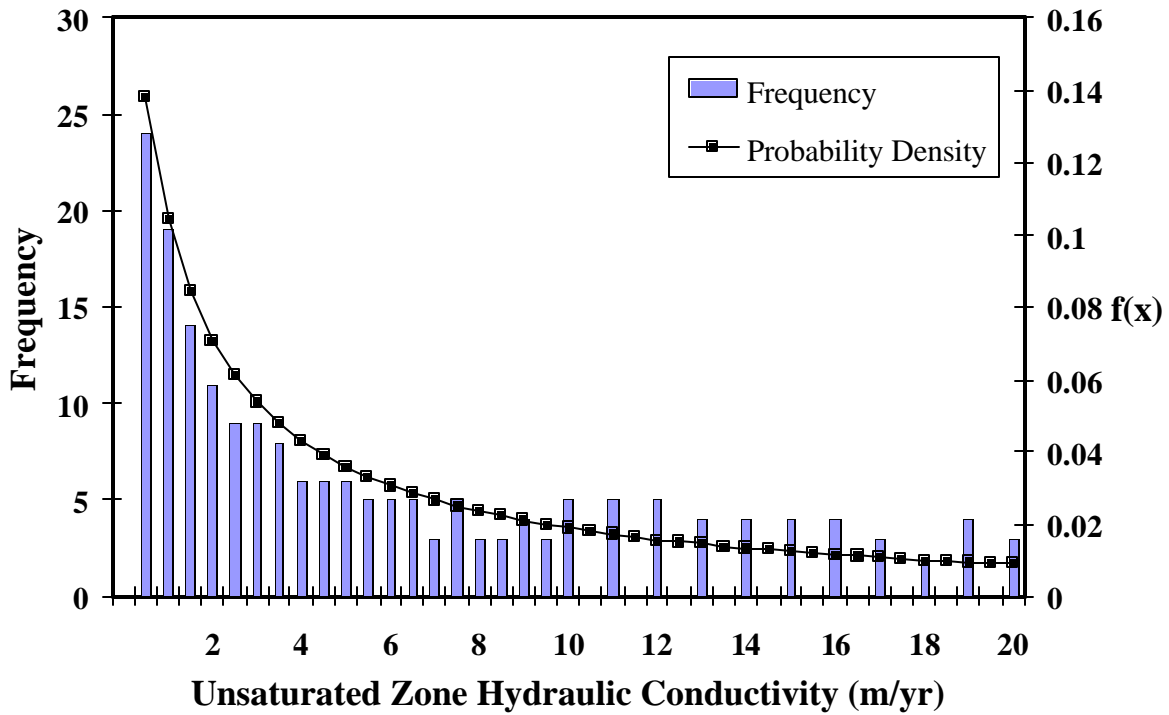


Figure B.7 Sampling Frequency and Probability Density of the Unsaturated Zone Hydraulic Conductivity

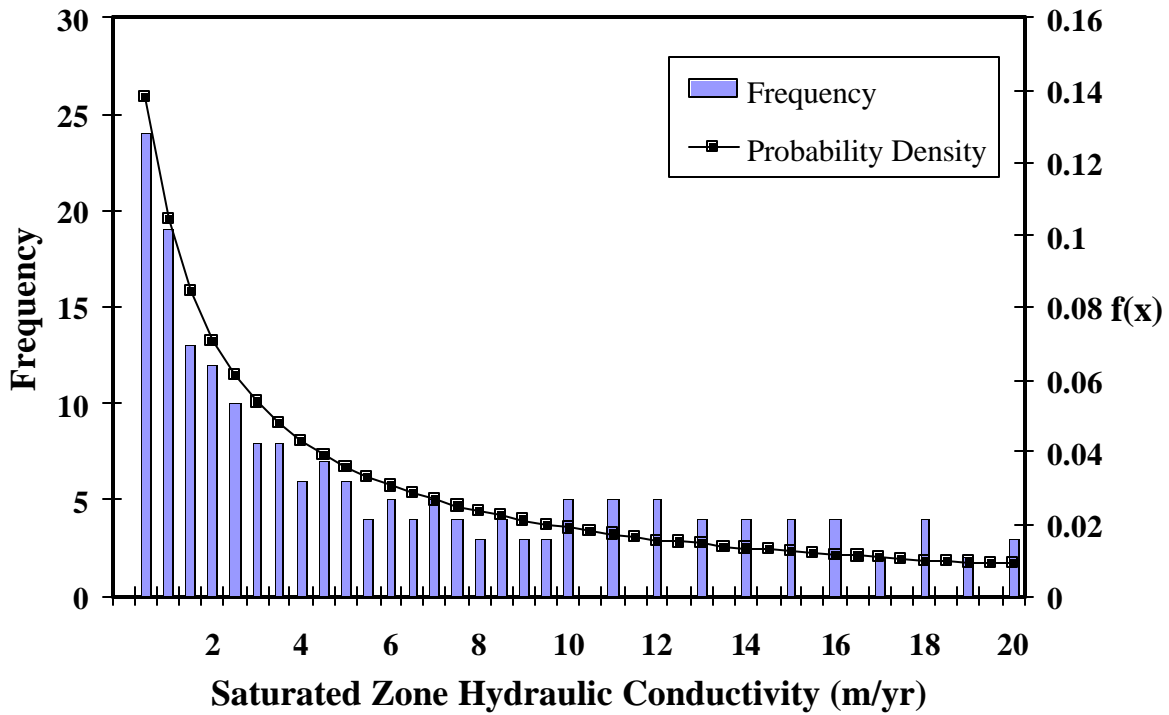


Figure B.8 Sampling Frequency and Probability Density of the Saturated Zone Hydraulic Conductivity

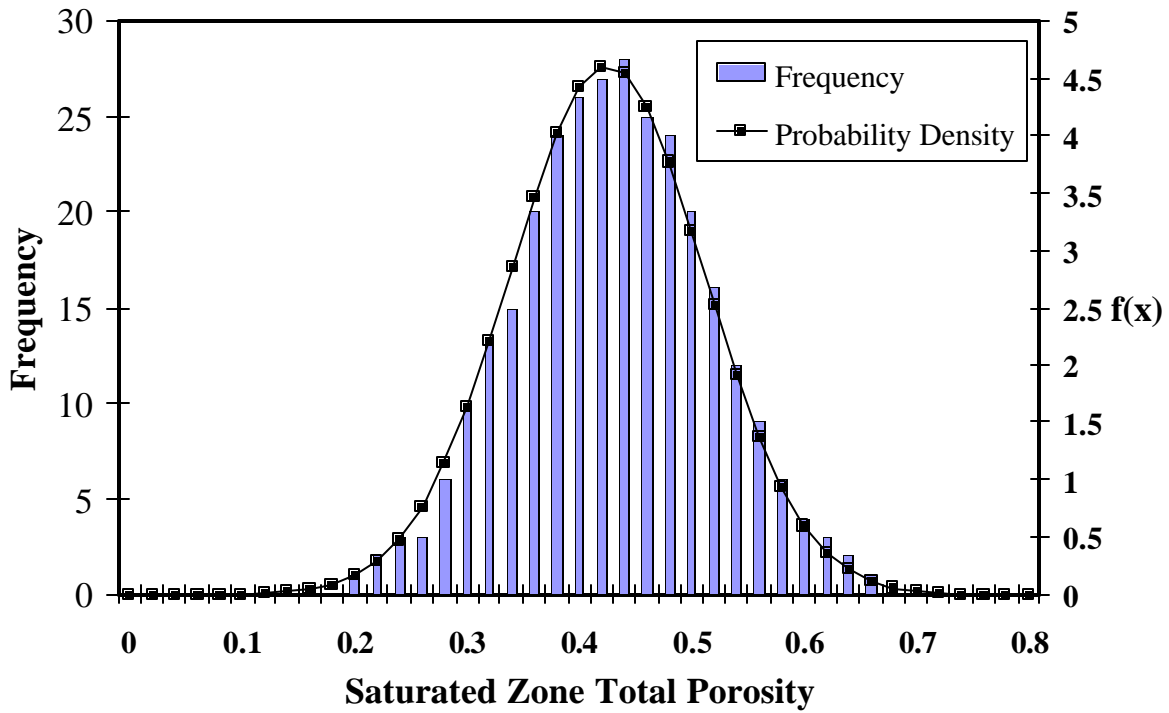


Figure B.9 Sampling Frequency and Probability Density of the Saturated Zone Total Porosity

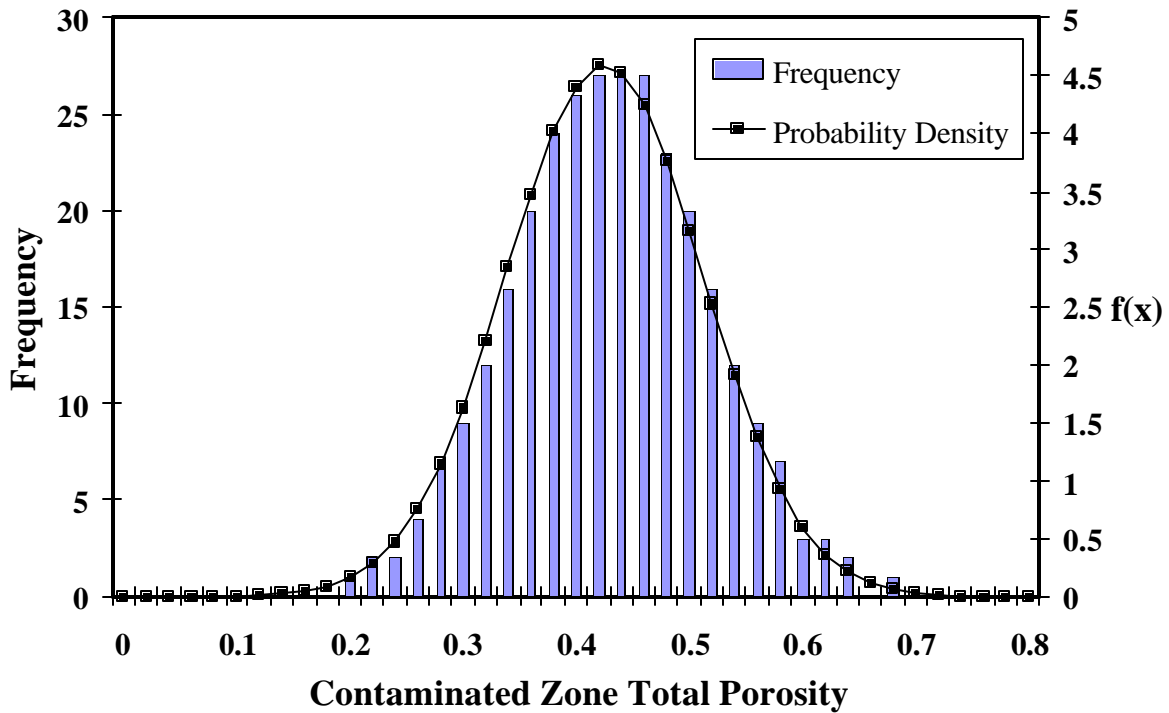


Figure B.10 Sampling Frequency and Probability Density of the Contaminated Zone Total Porosity



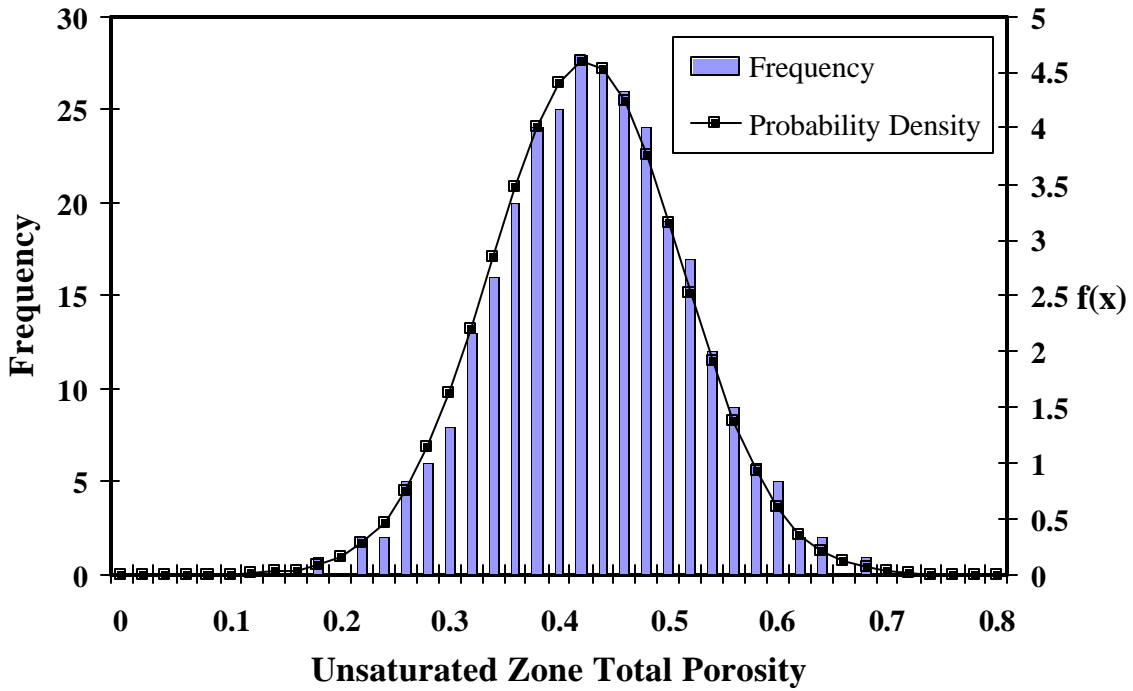


Figure B.11 Sampling Frequency and Probability Density of the Unsaturated Zone Total Porosity

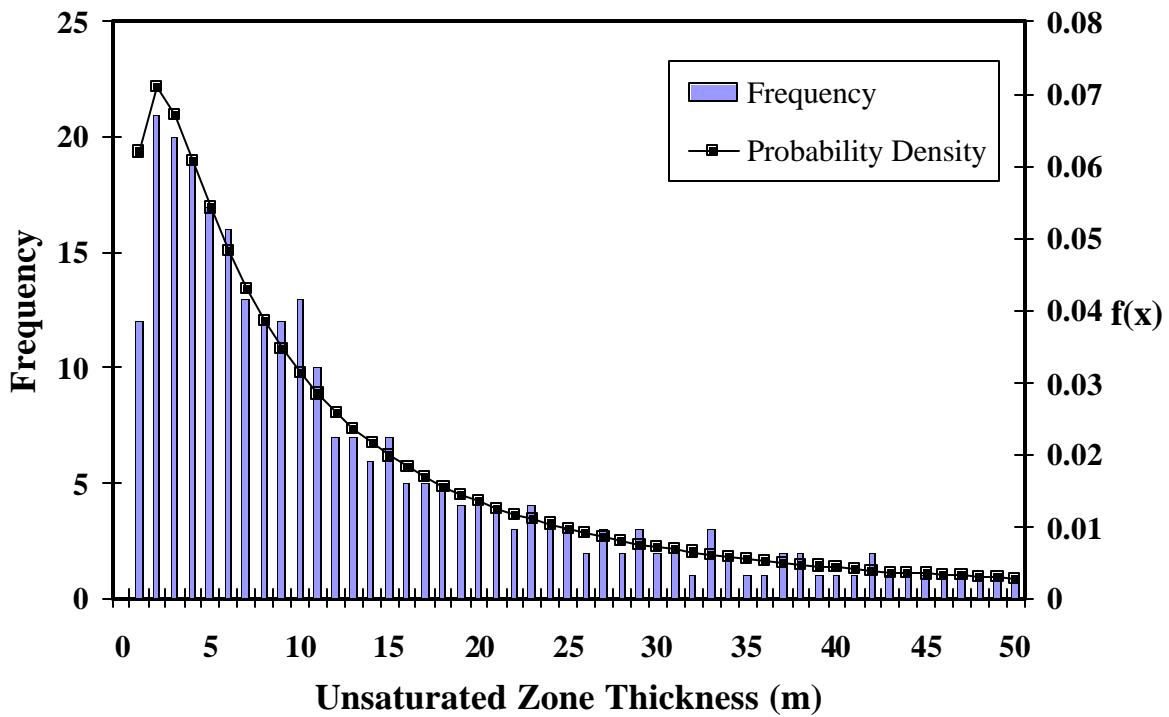


Figure B.12 Sampling Frequency and Probability Density of the Unsaturated Zone Thickness

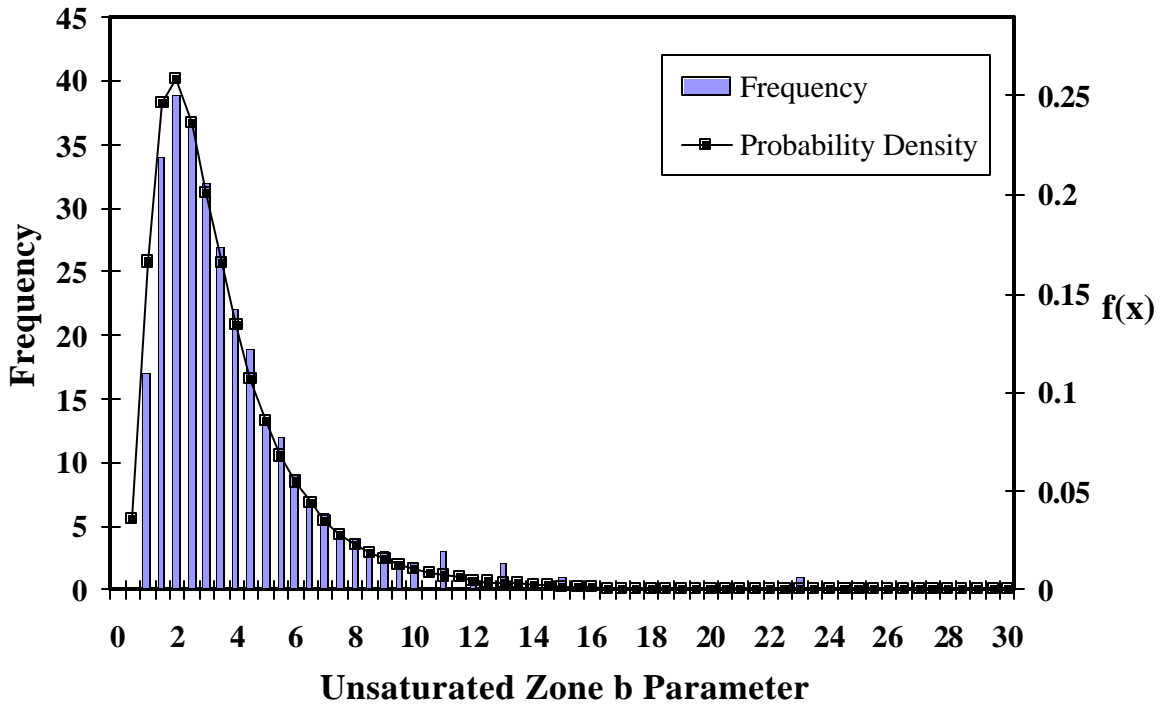


Figure B.13 Sampling Frequency and Probability Density of the Unsaturated Zone b Parameter

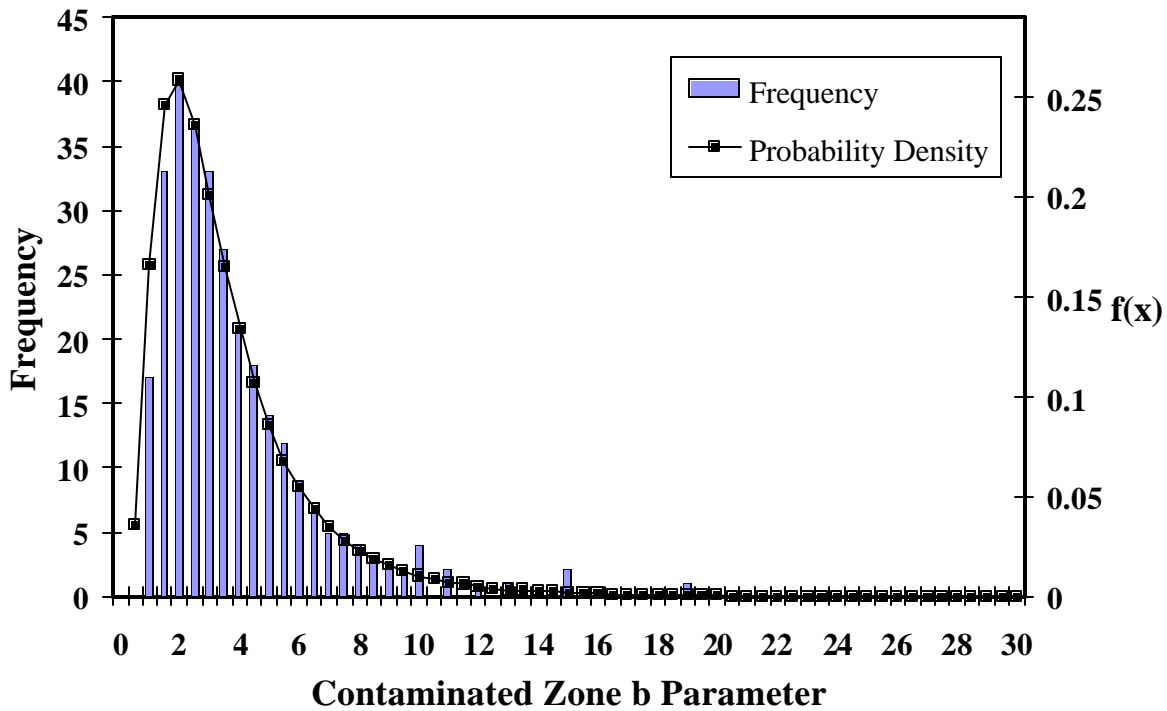
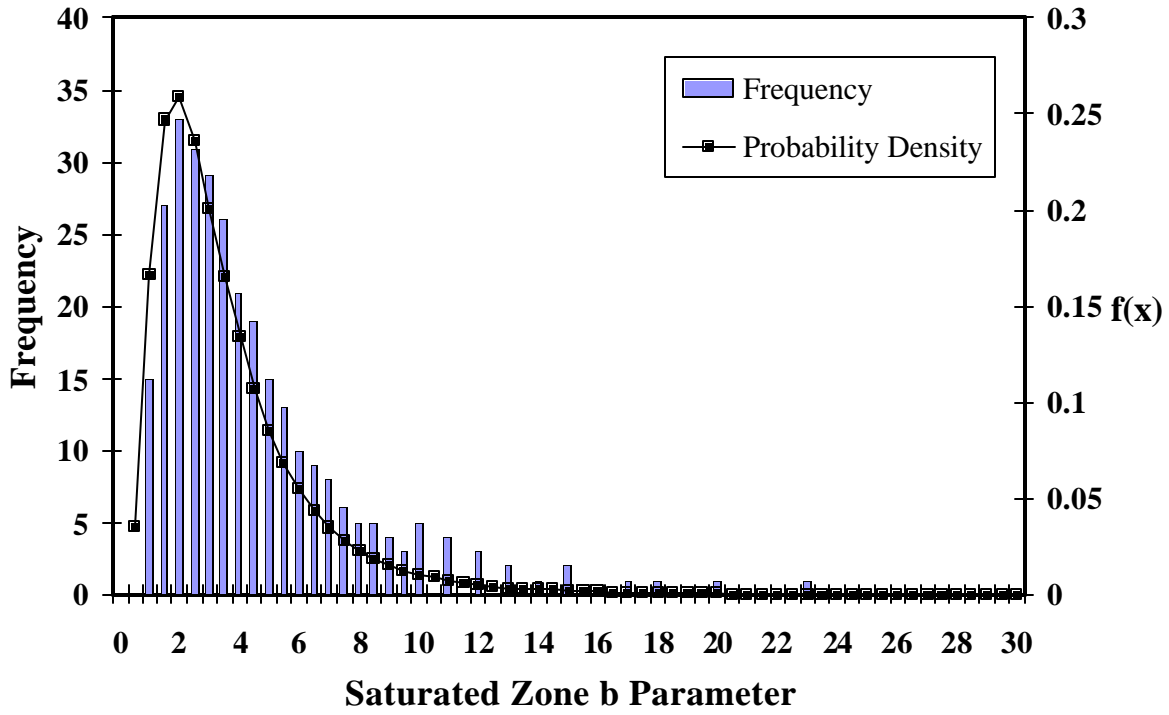
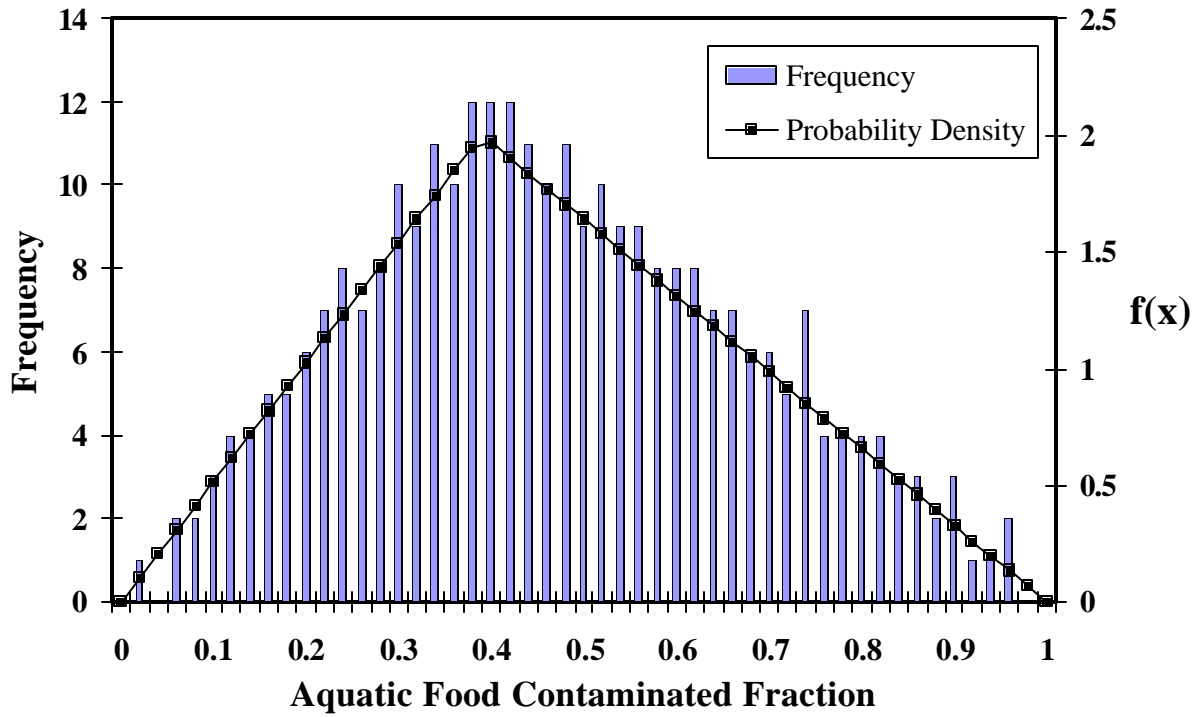


Figure B.14 Sampling Frequency and Probability Density of the Contaminated Zone b Parameter



**Figure B.15 Sampling Frequency and Probability Density of the Saturated Zone b Parameter**



**Figure B.16 Sampling Frequency and Probability Density of the Aquatic Food Contaminated Fraction**

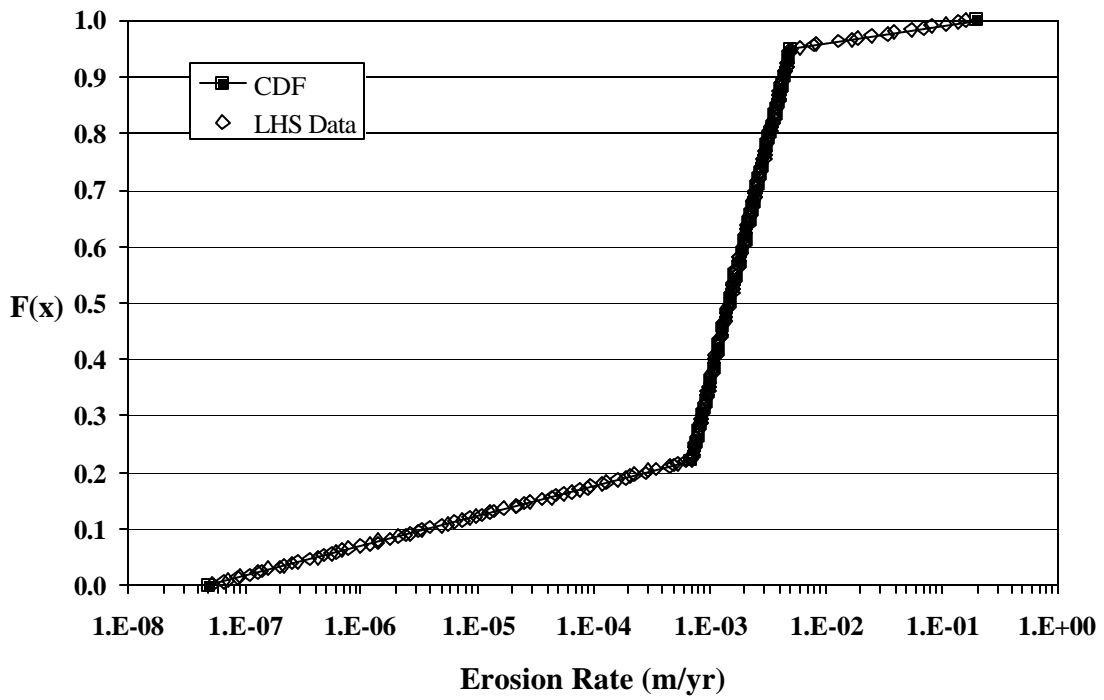


Figure B.17 Sampled Cumulative Probability and the Cumulative Distribution Function of the Erosion Rate

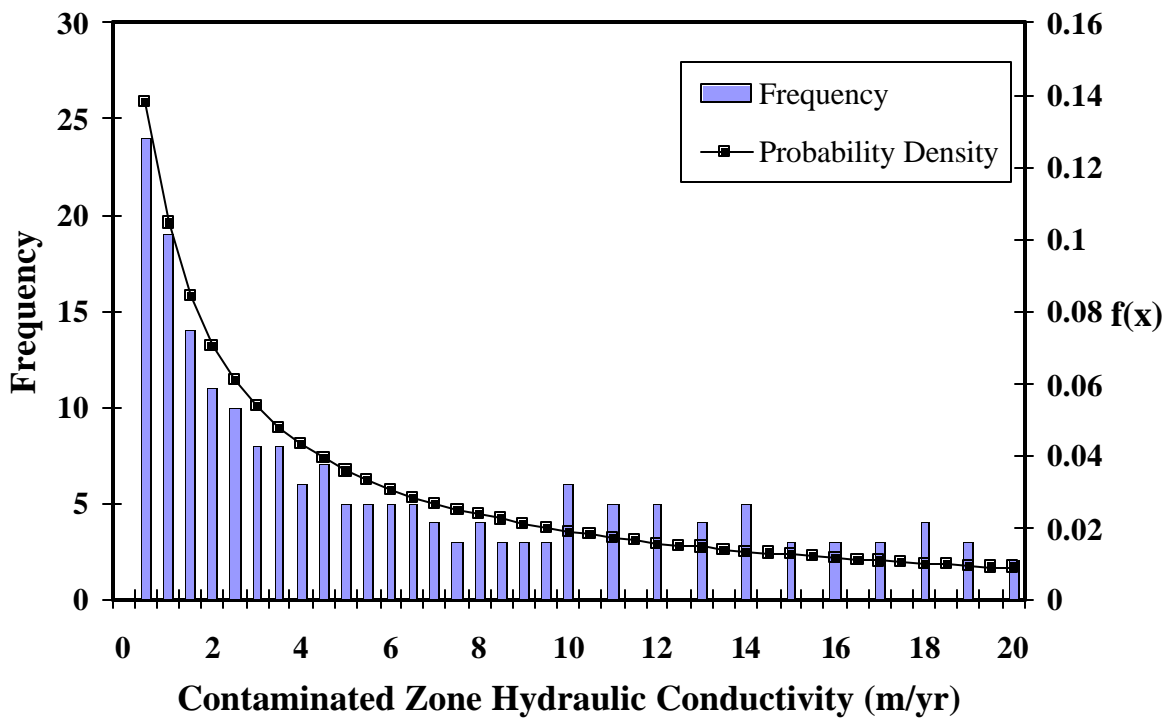


Figure B.18 Sampling Frequency and Probability Density of the Contaminated Zone Hydraulic Conductivity

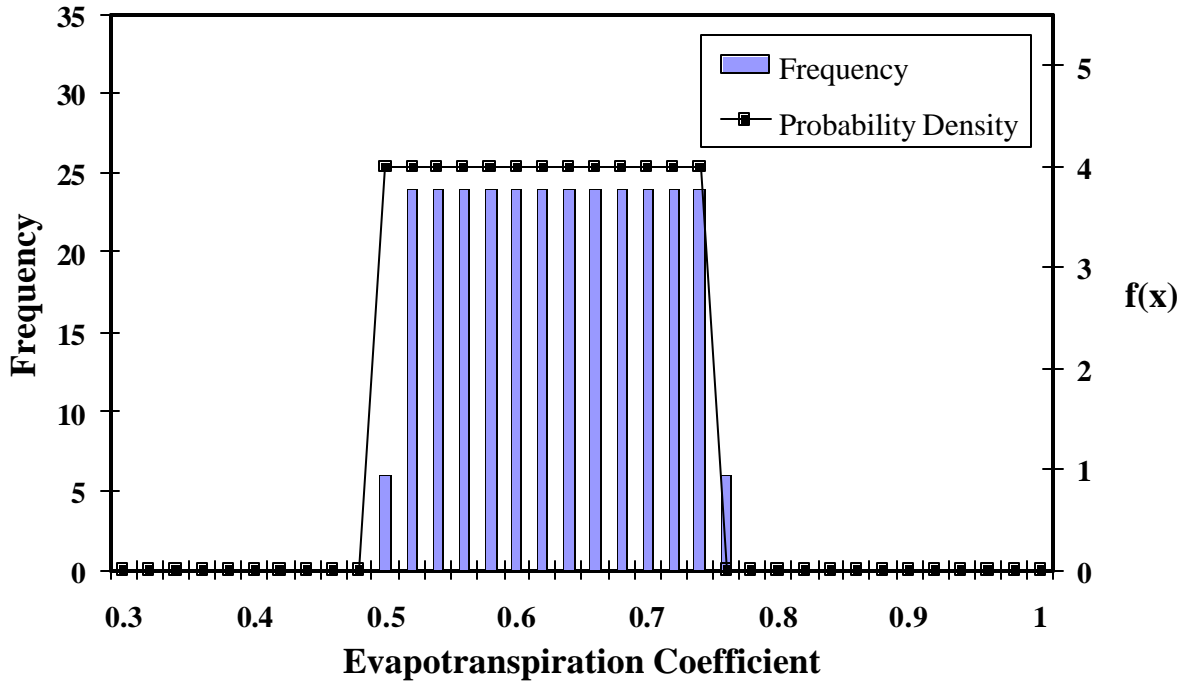


Figure B.19 Sampling Frequency and Probability Density of the Evapotranspiration Coefficient

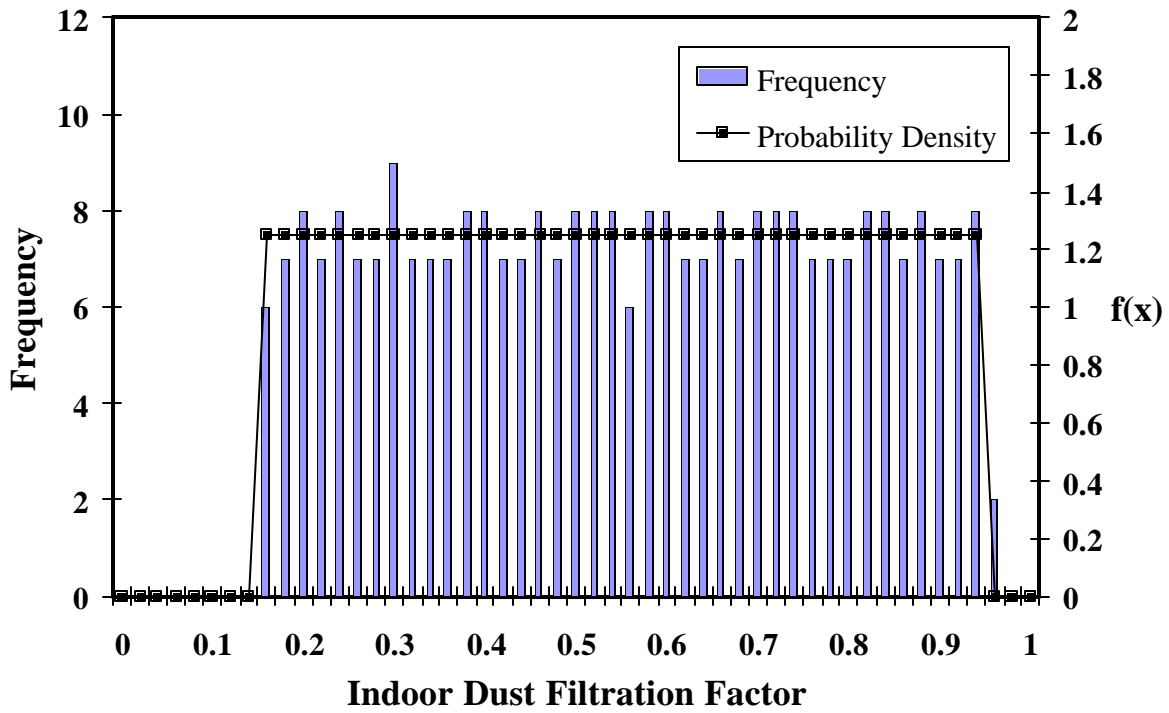


Figure B.20 Sampling Frequency and Probability Density of the Indoor Dust Filtration Factor

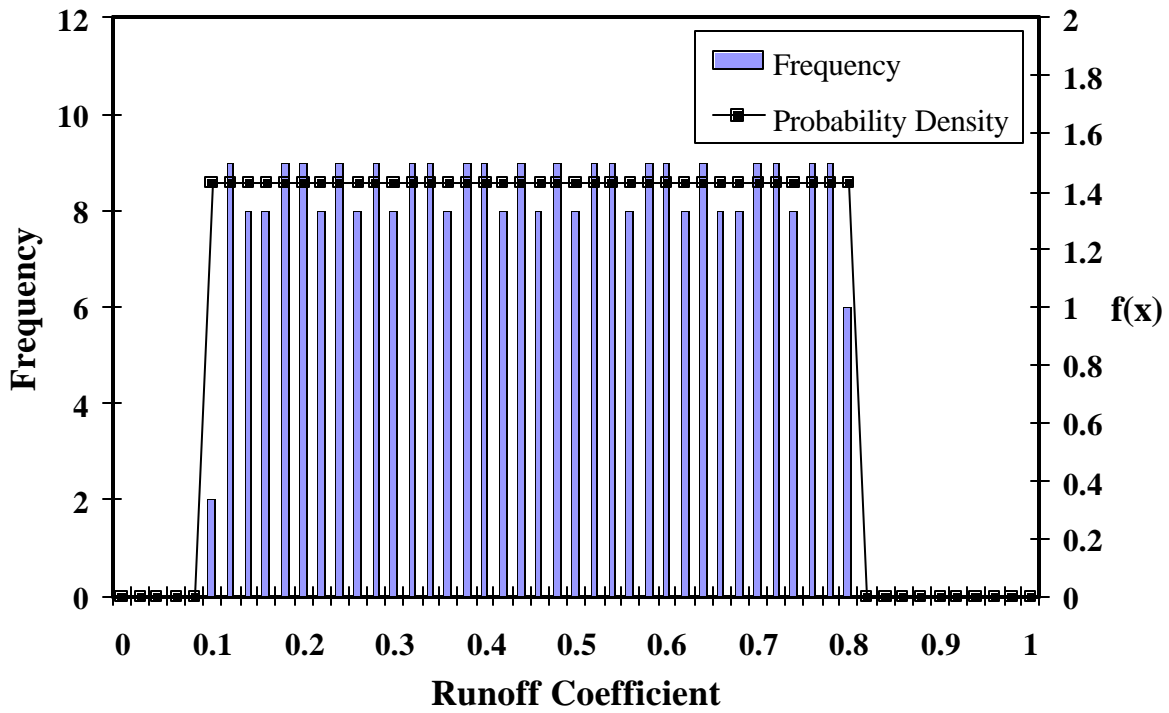


Figure B.21 Sampling Frequency and Probability Density of the Runoff Coefficient

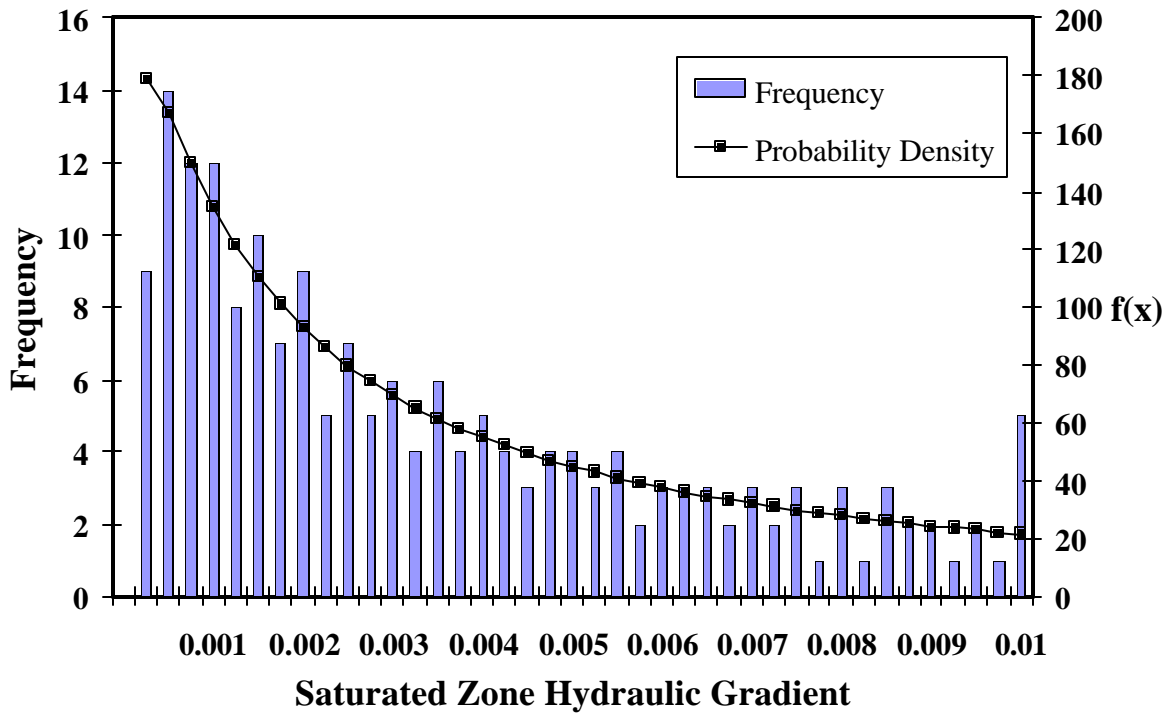
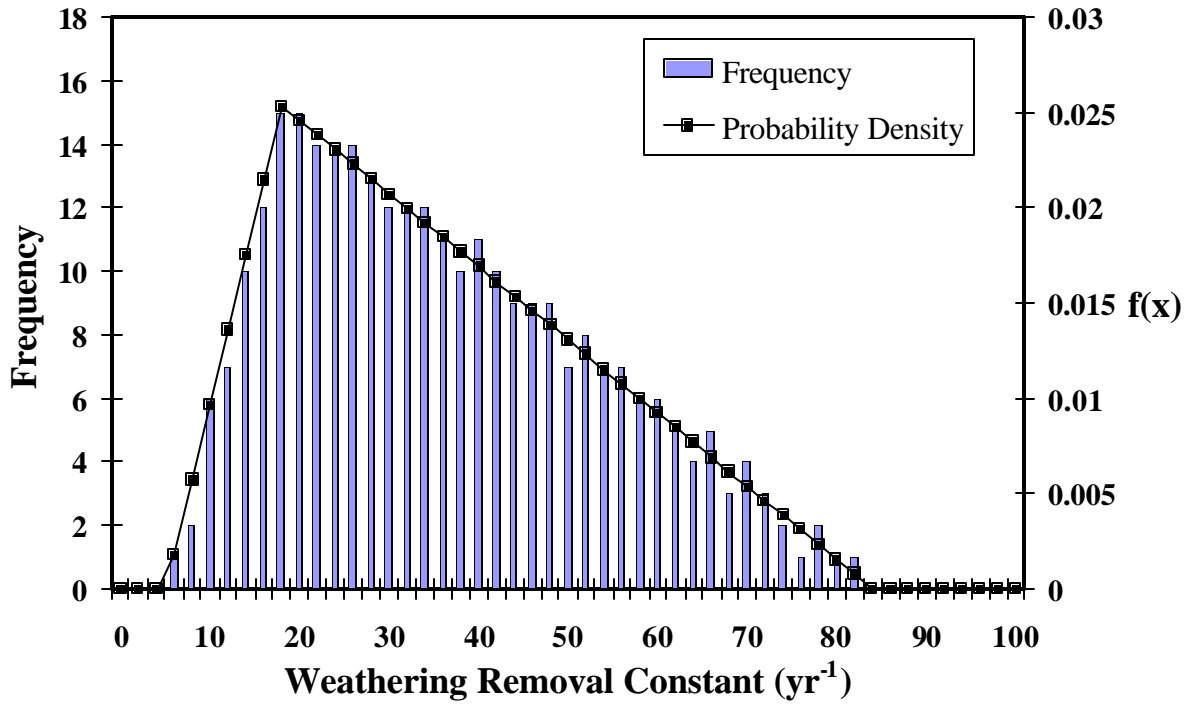
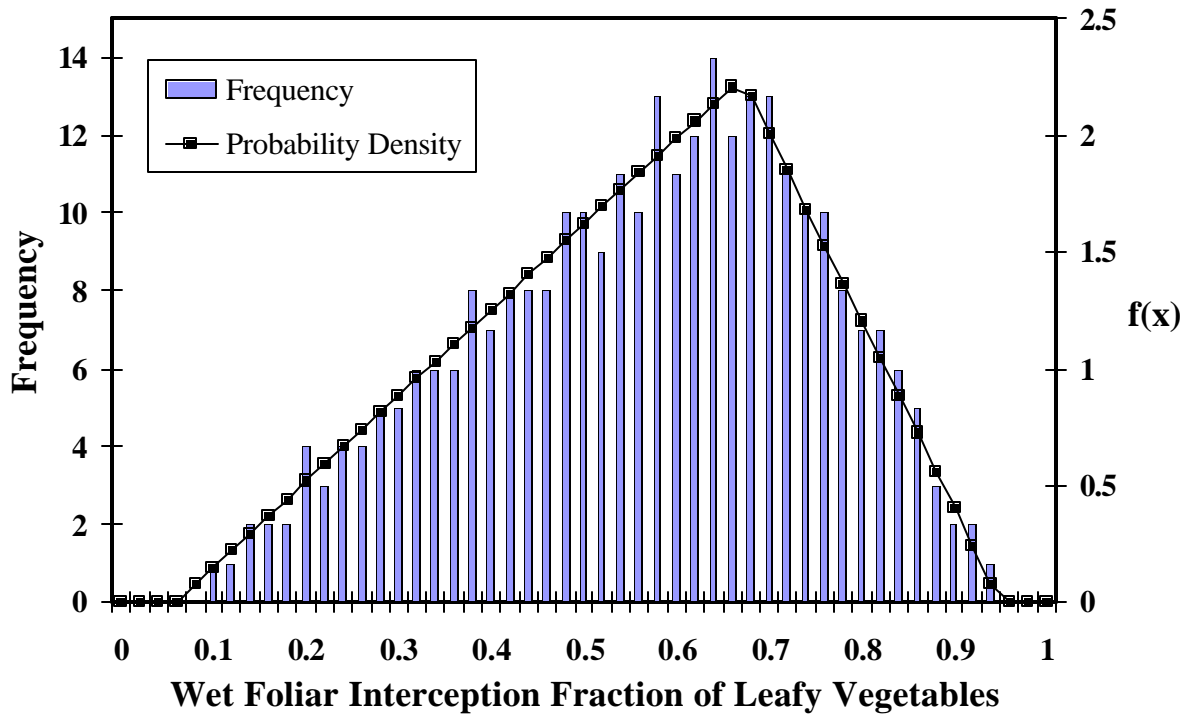


Figure B.22 Sampling Frequency and Probability Density of the Saturated Zone Hydraulic Gradient



**Figure B.23 Sampling Frequency and Probability Density of the Weathering Removal Constant**



**Figure B.24 Sampling Frequency and Probability Density of the Wet Foliar Interception Fraction of Leafy Vegetables**

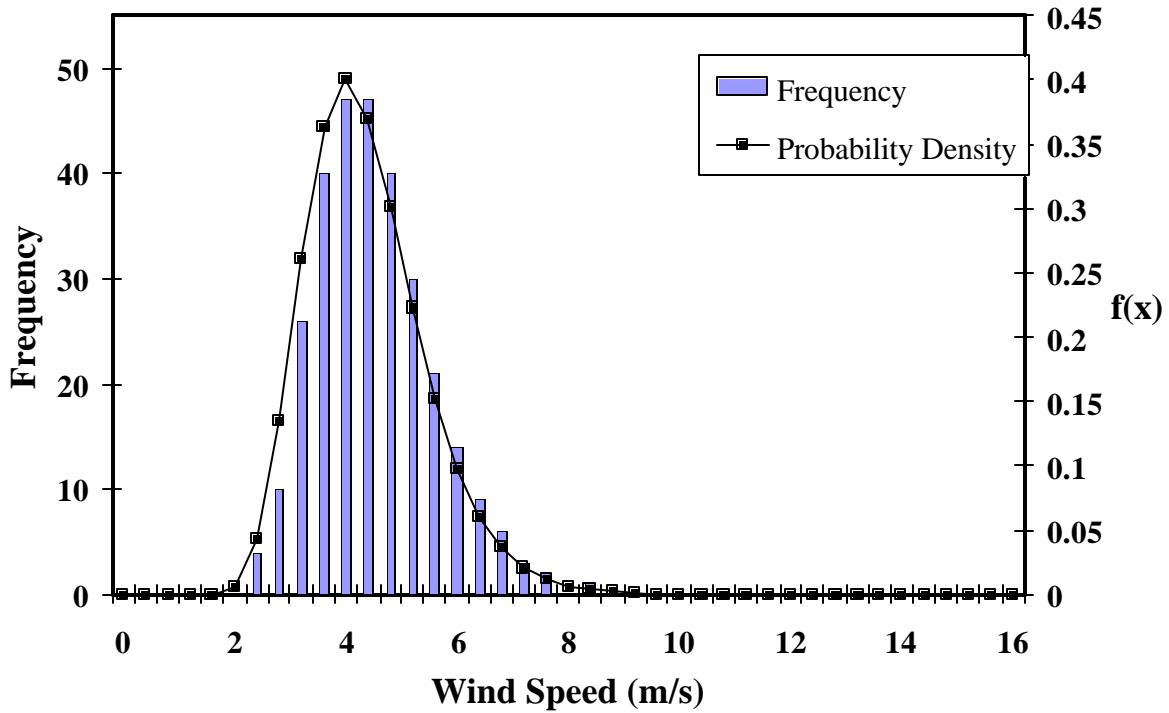


Figure B.25 Sampling Frequency and Probability Density of the Wind Speed

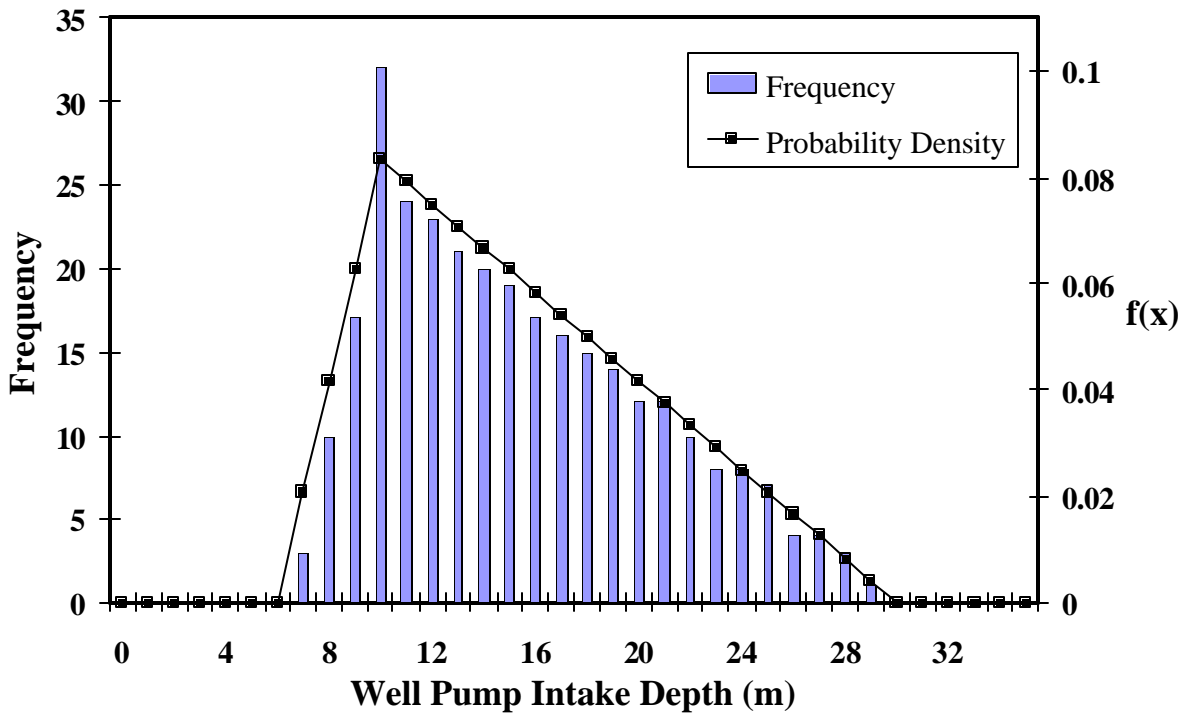
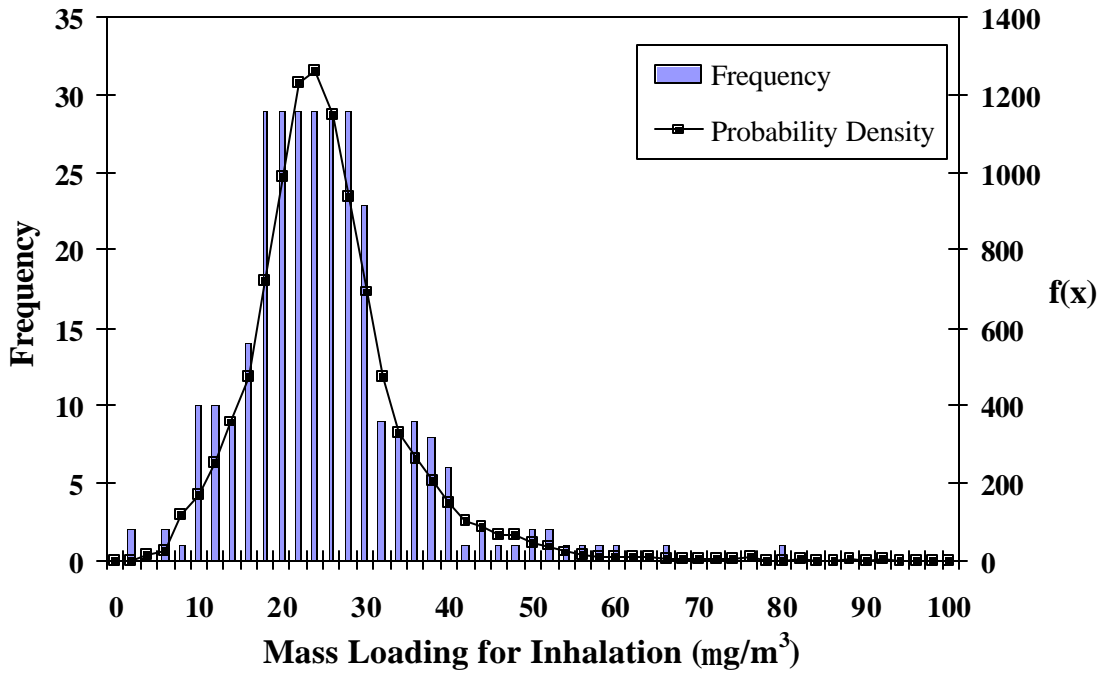
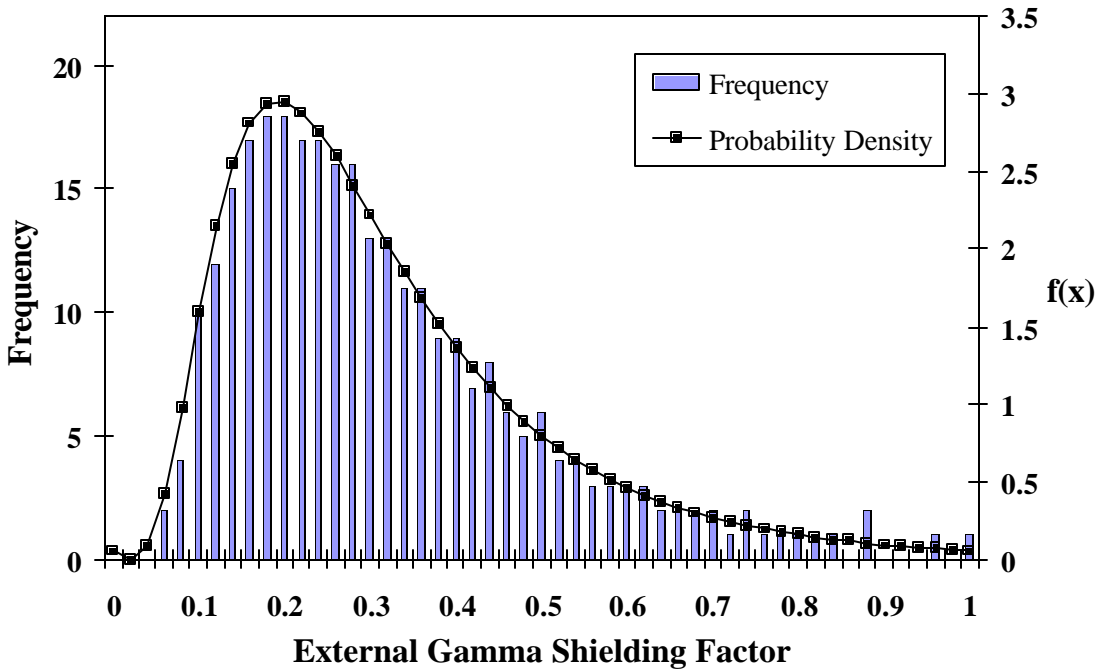


Figure B.26 Sampling Frequency and Probability Density of the Well Pump Intake Depth





**Figure B.27 Sampling Frequency and Probability Density of the Mass Loading for Inhalation**



**Figure B.28 Sampling Frequency and Probability Density of the External Gamma Shielding Factor**

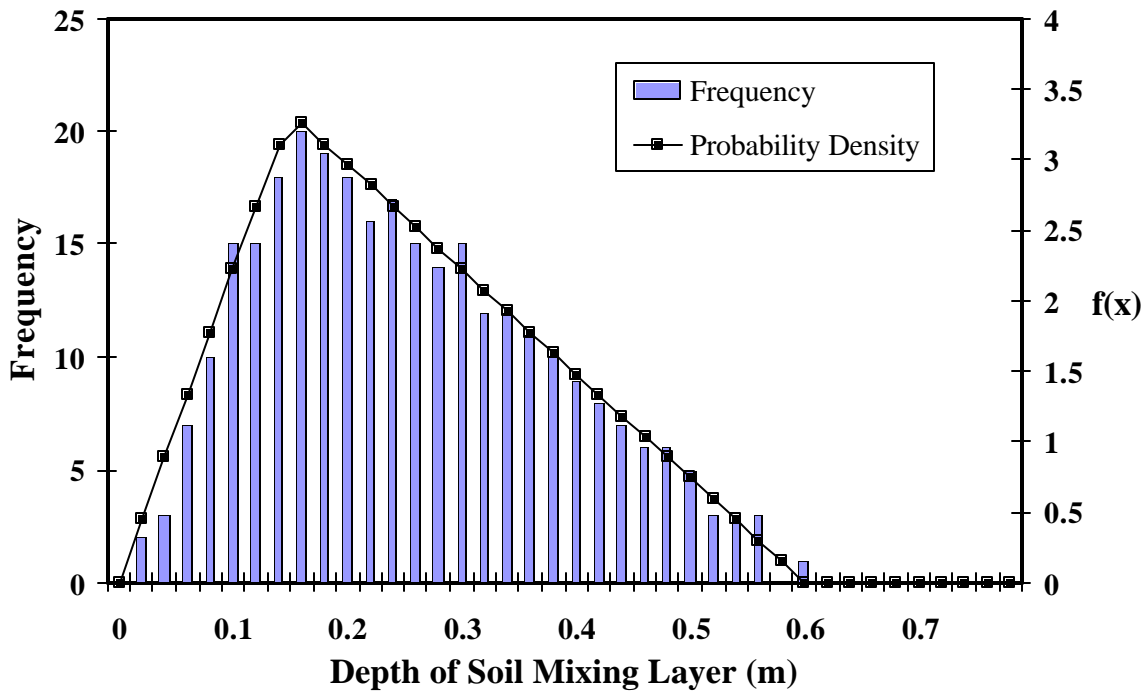


Figure B.29 Sampling Frequency and Probability Density of the Depth of Soil Mixing Layer

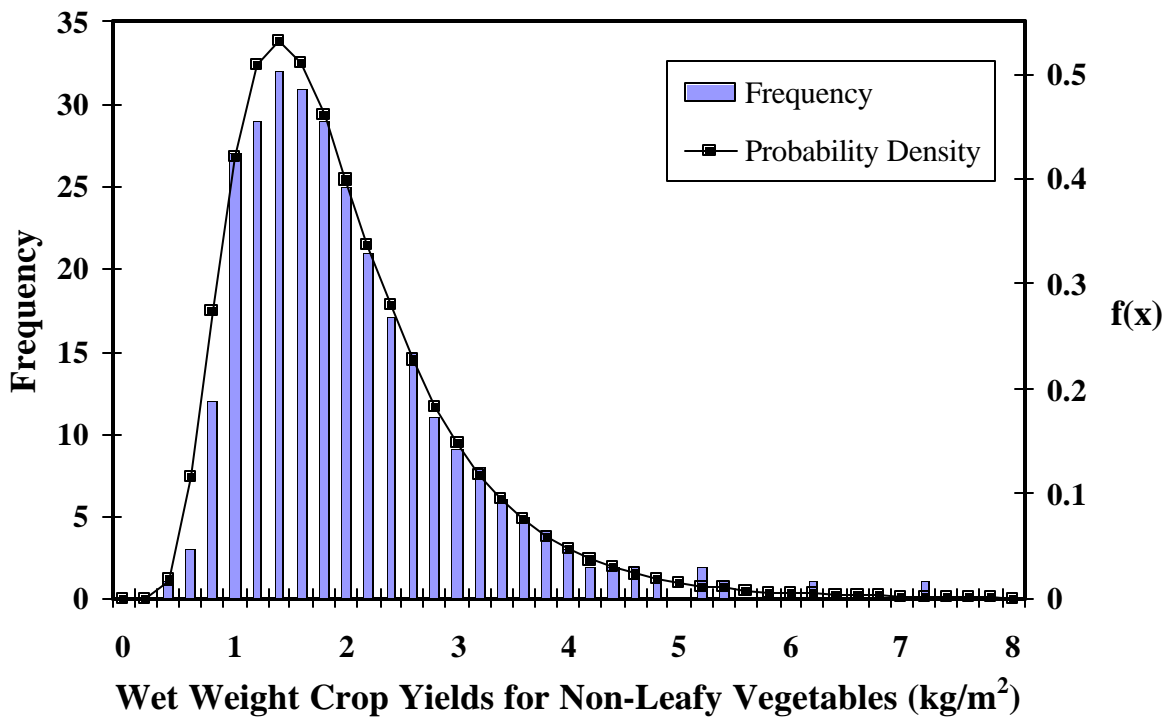


Figure B.30 Sampling Frequency and Probability Density of the Wet Weight Crop Yields for Non-Leafy Vegetables

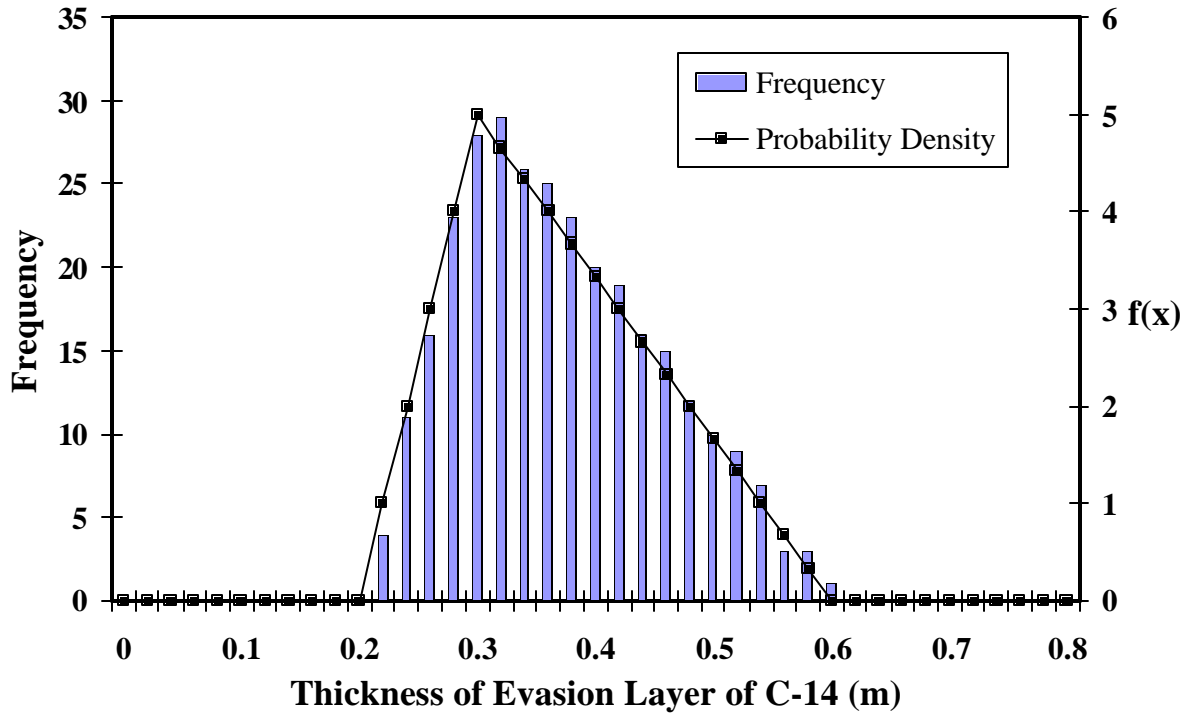


Figure B.31 Sampling Frequency and Probability Density of the Thickness of Evasion Layer of C-14

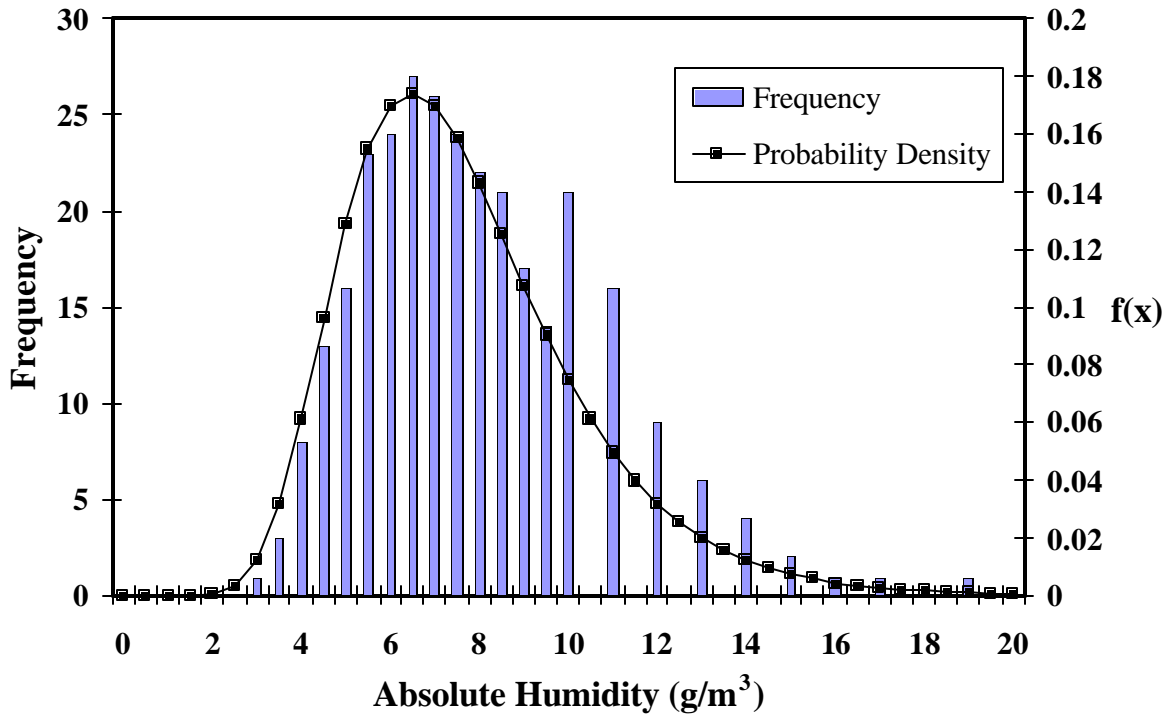
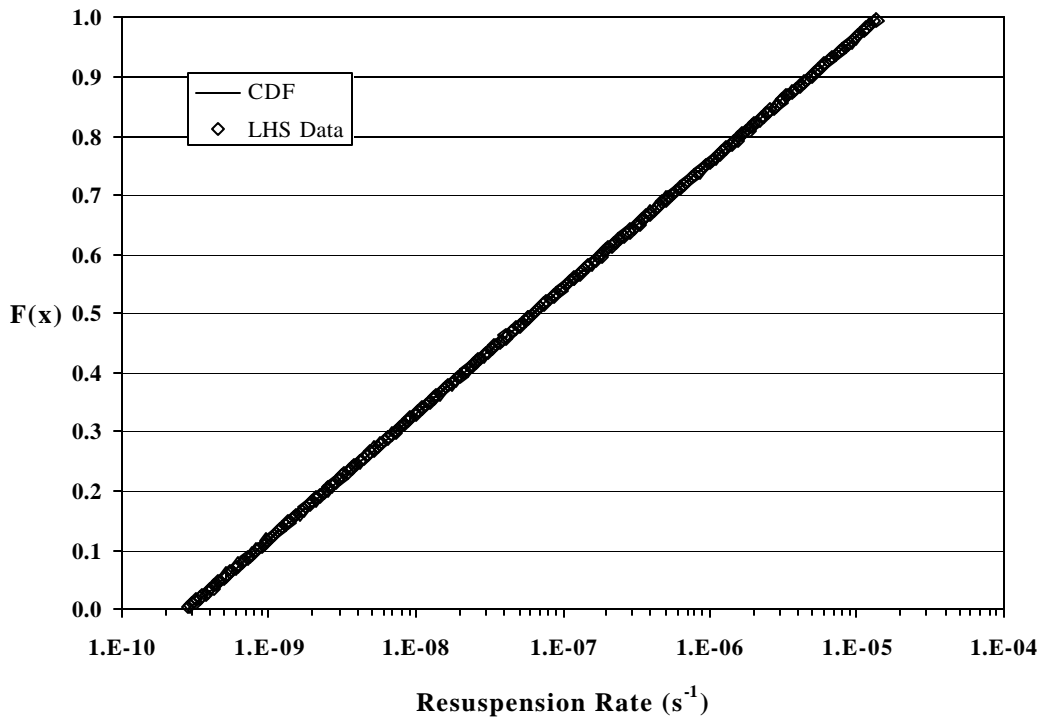
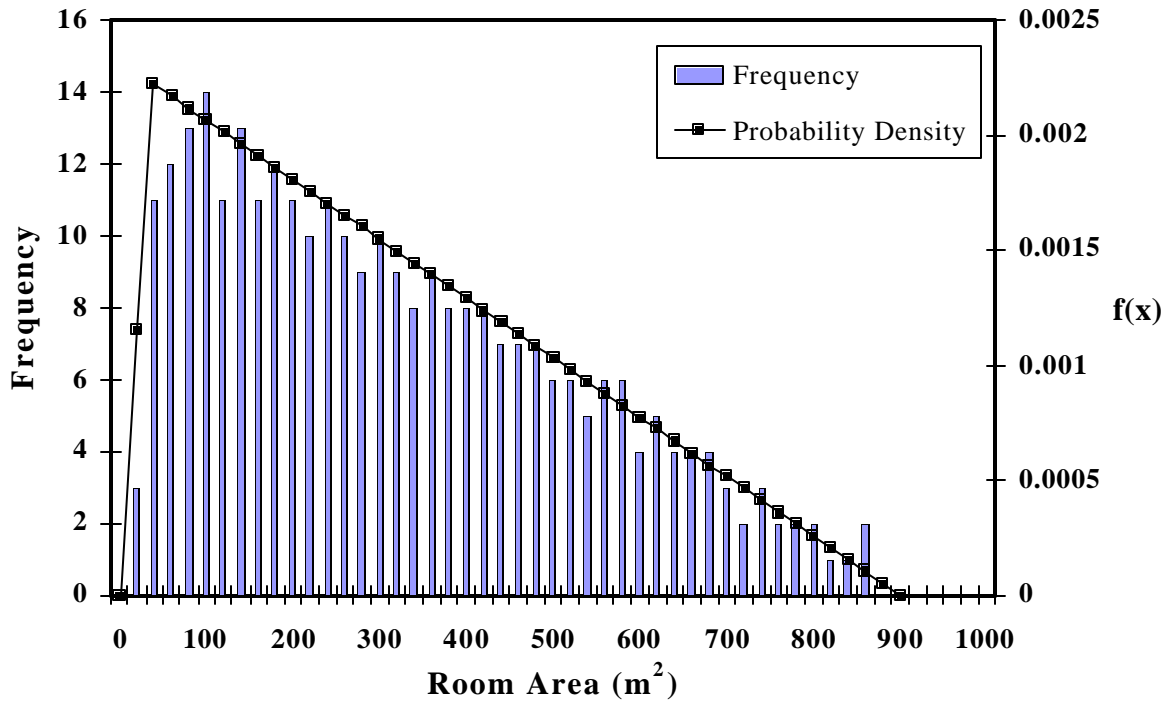


Figure B.32 Sampling Frequency and Probability Density of the Absolute Humidity



**Figure B.33 Sampled Cumulative Probability and the Cumulative Distribution Function of the Resuspension Rate**



**Figure B.34 Sampling Frequency and Probability Density of the Room Area**

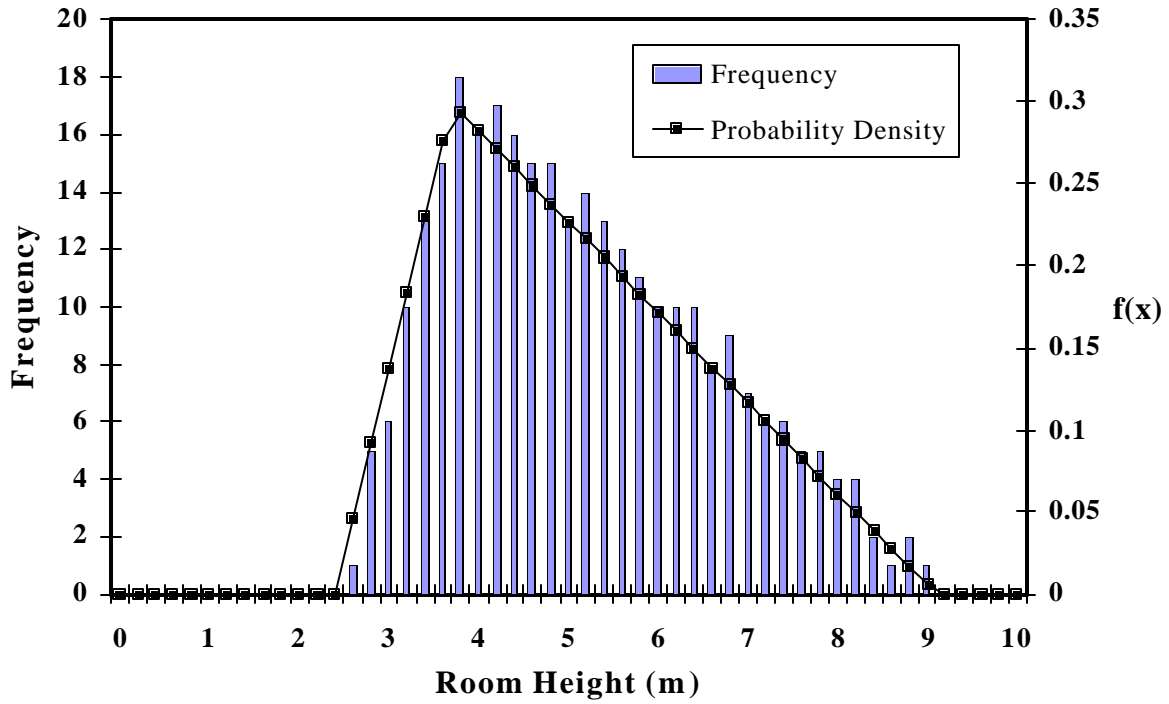


Figure B.35 Sampling Frequency and Probability Density of the Room Height

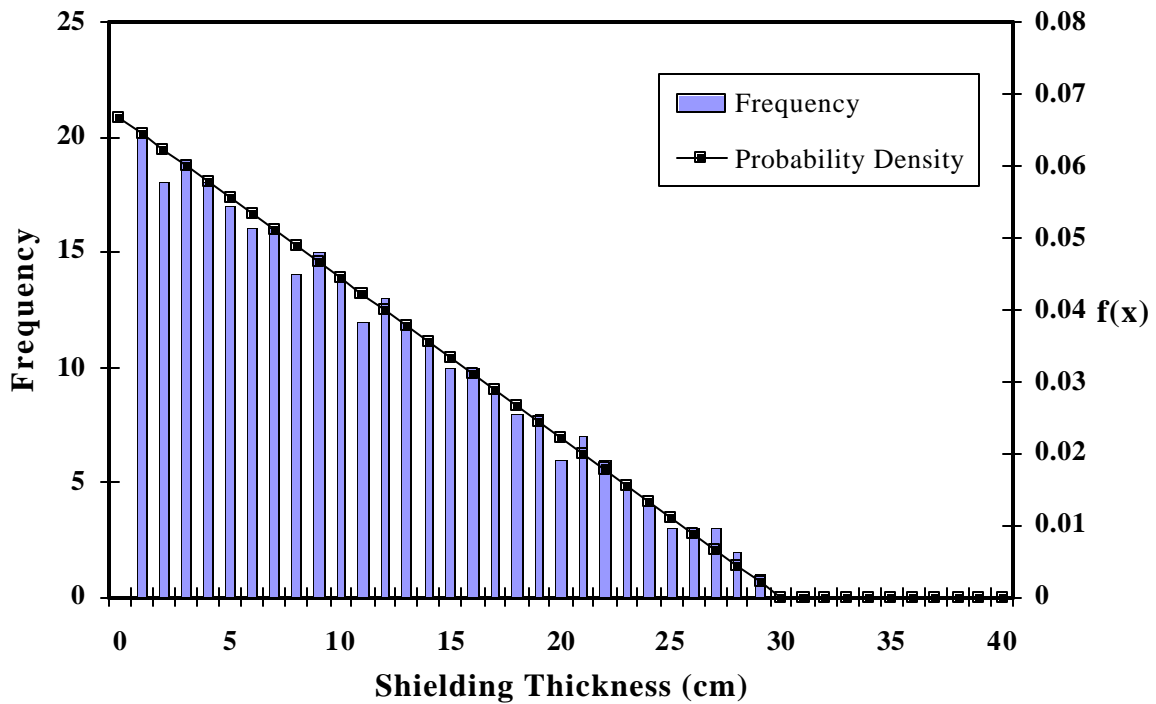
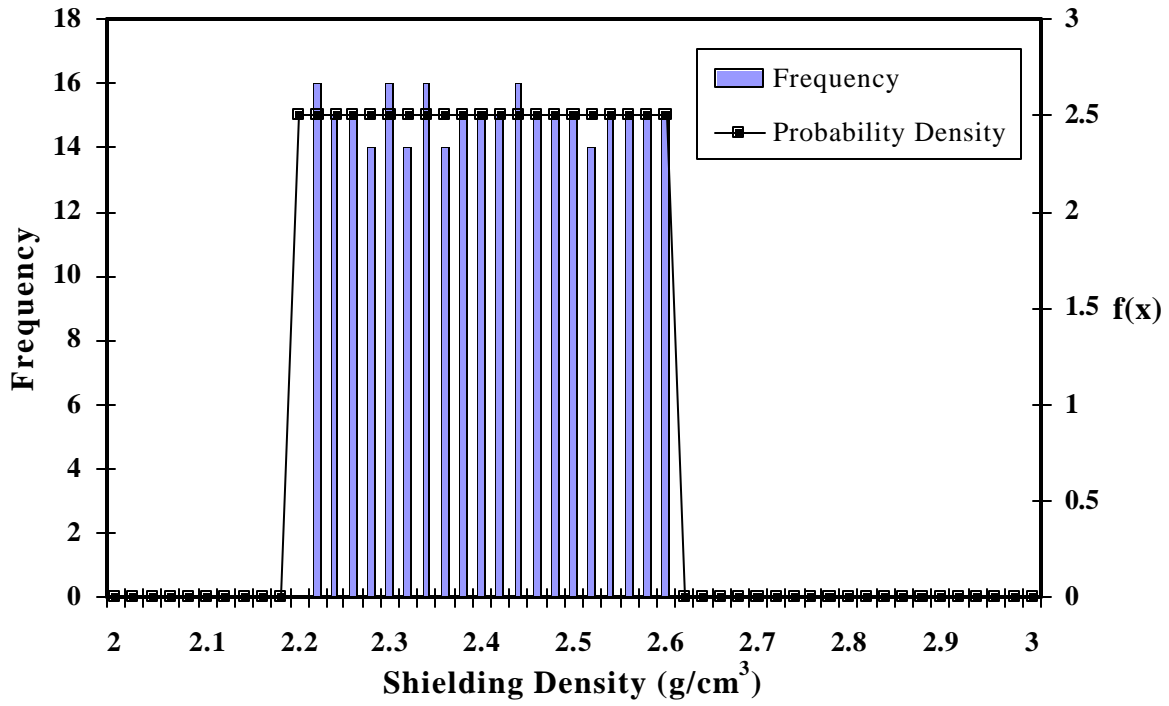
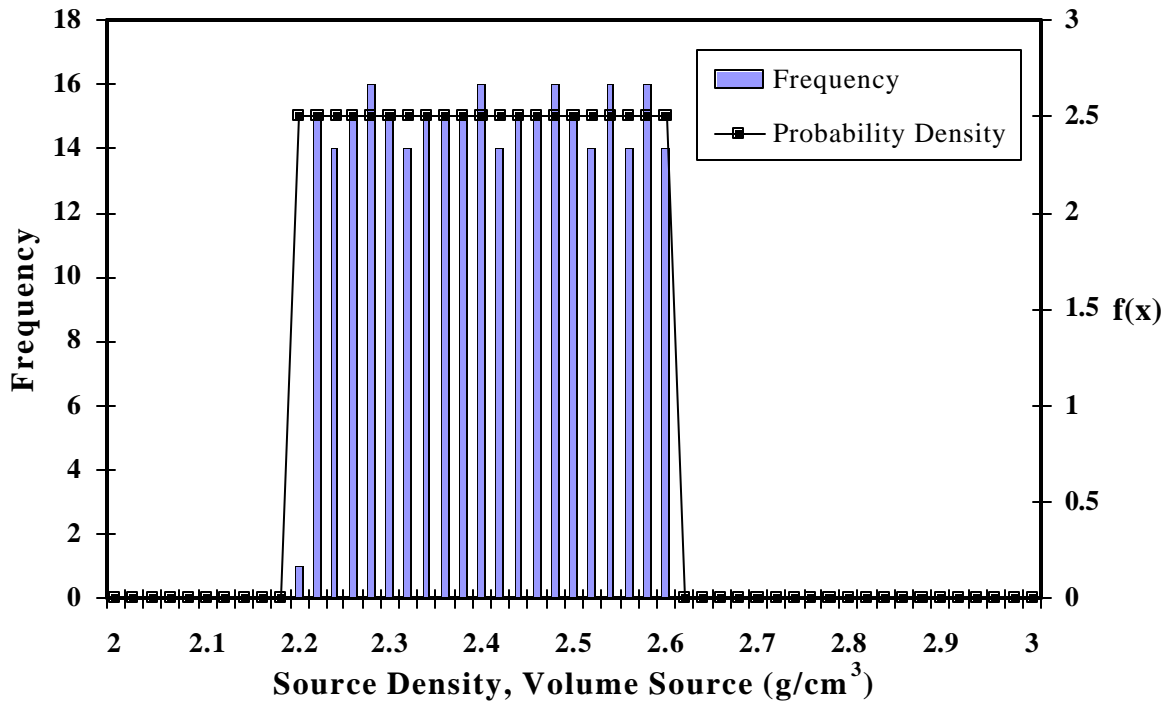


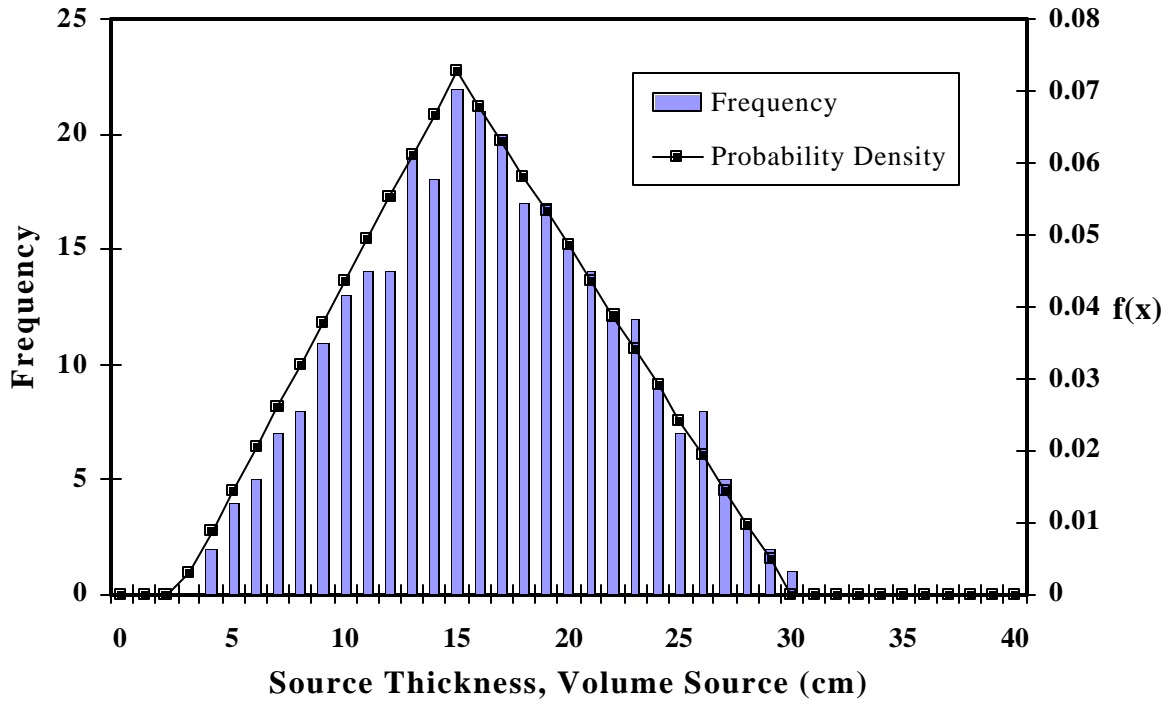
Figure B.36 Sampling Frequency and Probability Density of the Shielding Thickness



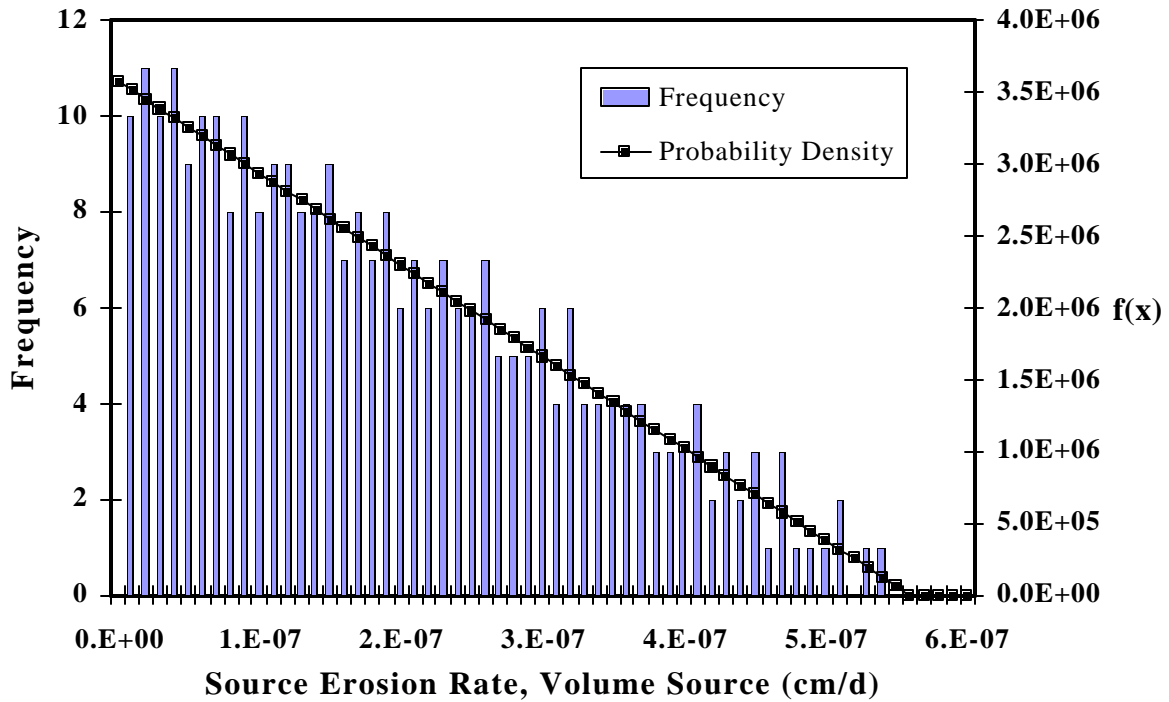
**Figure B.37 Sampling Frequency and Probability Density of the Shielding Density**



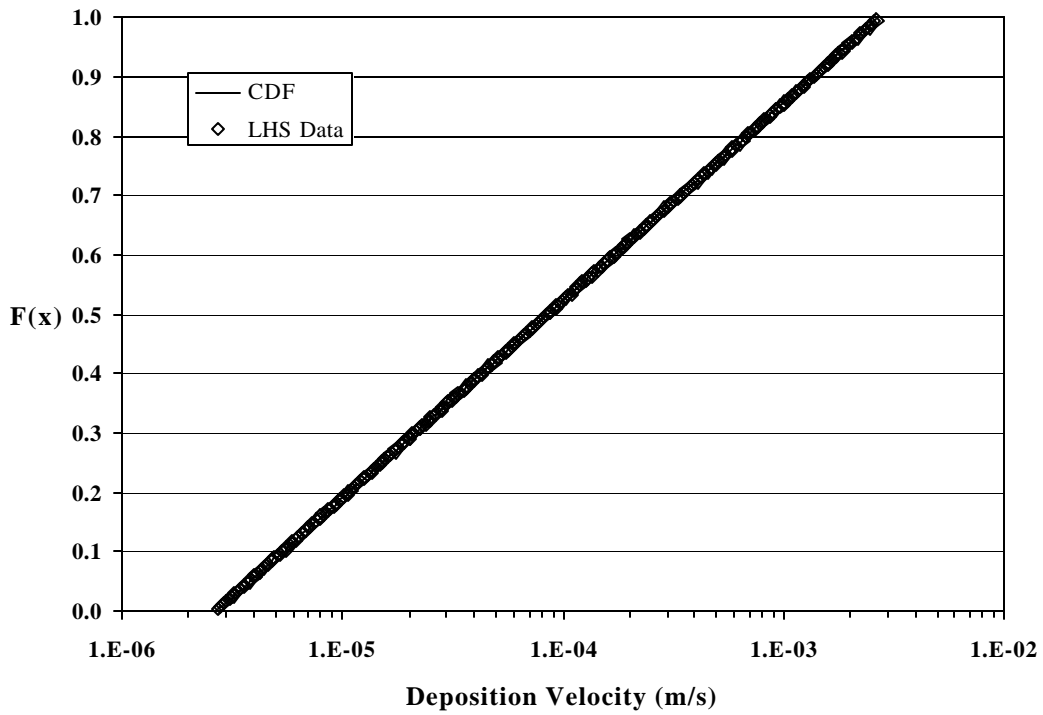
**Figure B.38 Sampling Frequency and Probability Density of the Source Density, Volume Source**



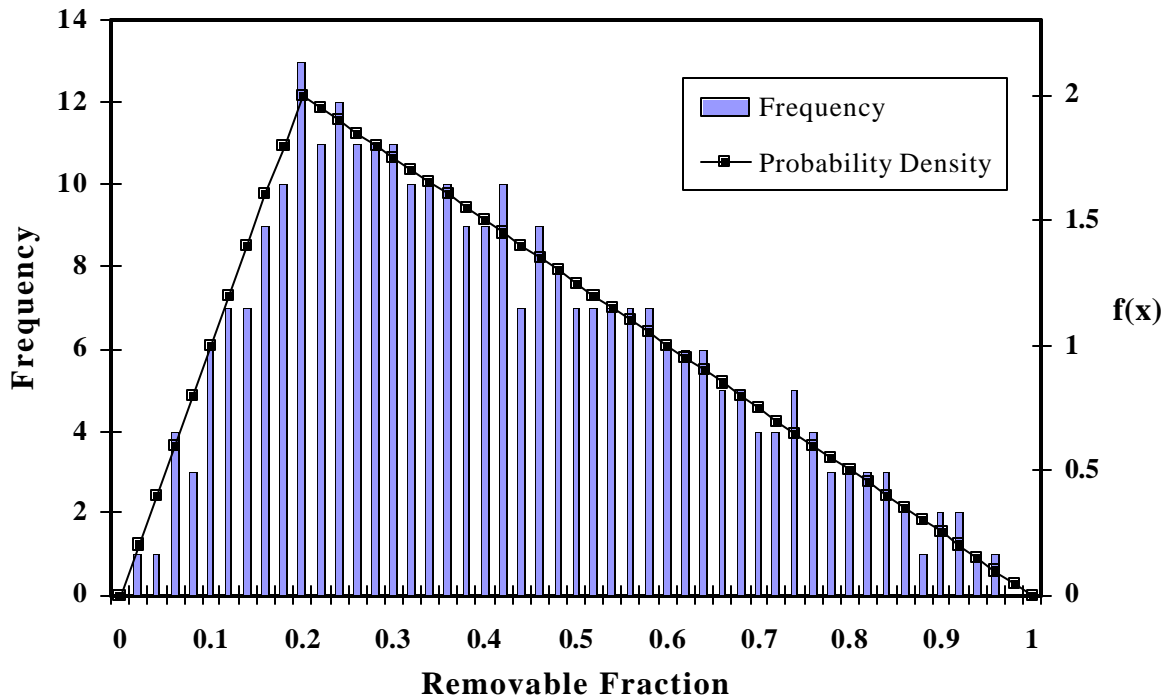
**Figure B.39 Sampling Frequency and Probability Density of the Source Thickness, Volume Source**



**Figure B.40 Sampling Frequency and Probability Density of the Source Erosion Rate, Volume Source**

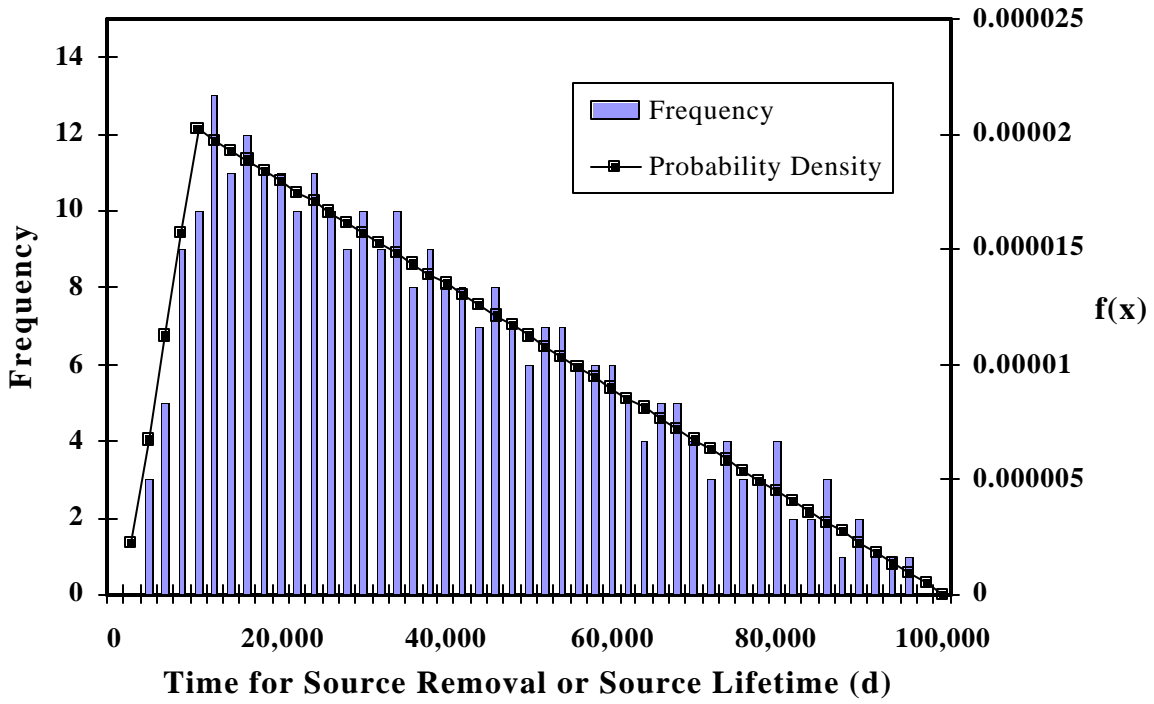


**Figure B.41 Sampled Cumulative Probability and the Cumulative Distribution Function of the Deposition Velocity**

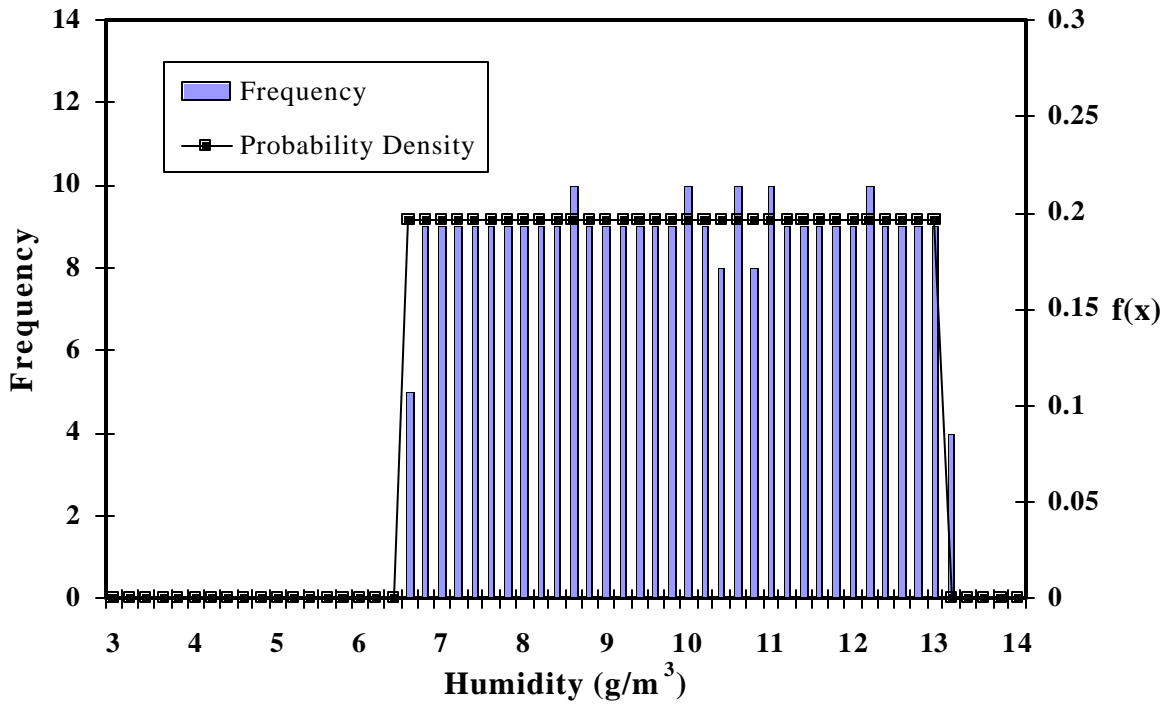


**Figure B.42 Sampling Frequency and Probability Density of the Removable Fraction**

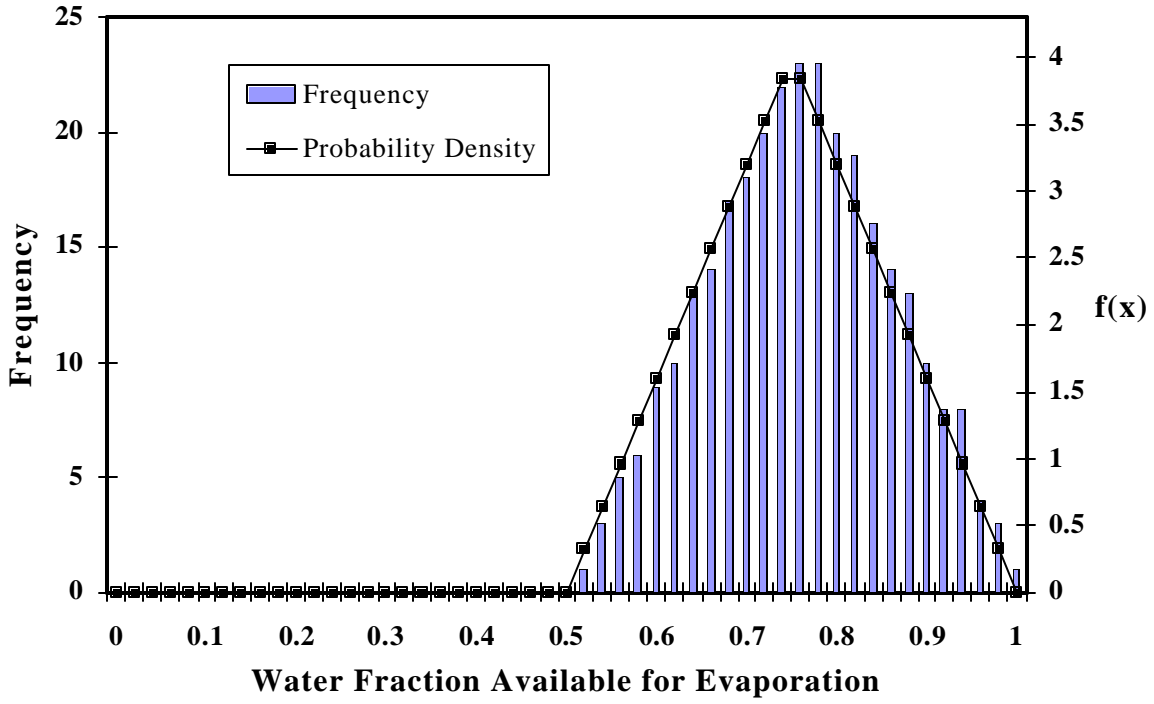




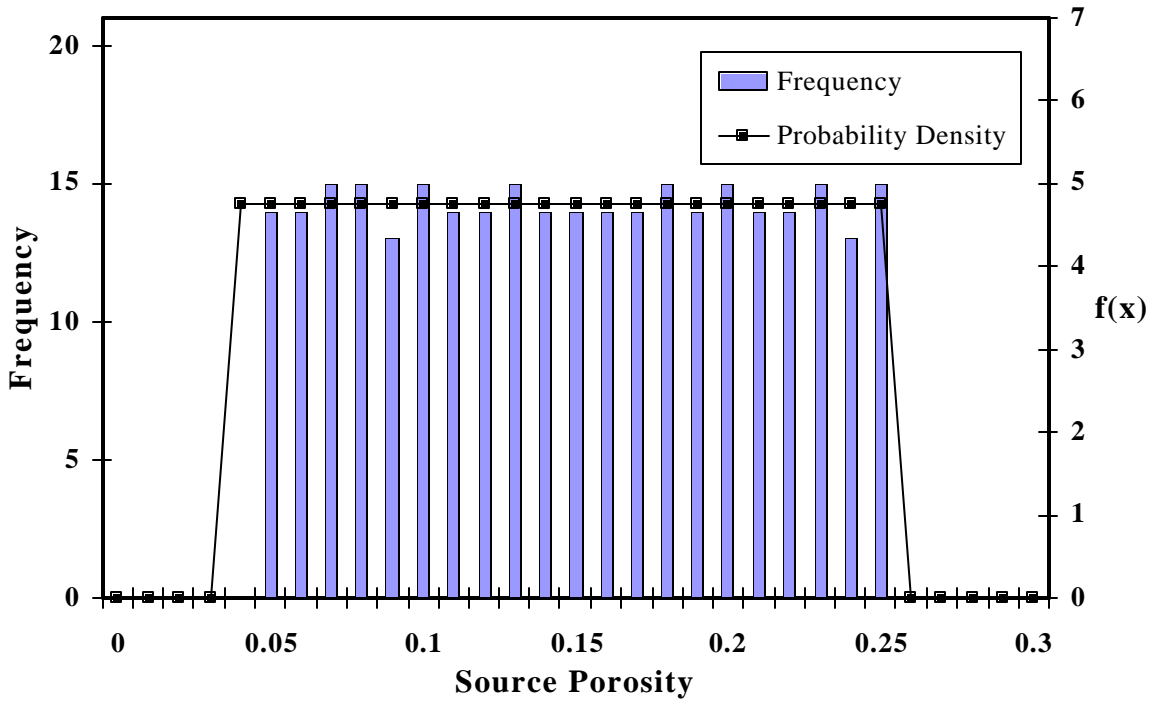
**Figure B.43 Sampling Frequency and Probability Density of the Source Lifetime**



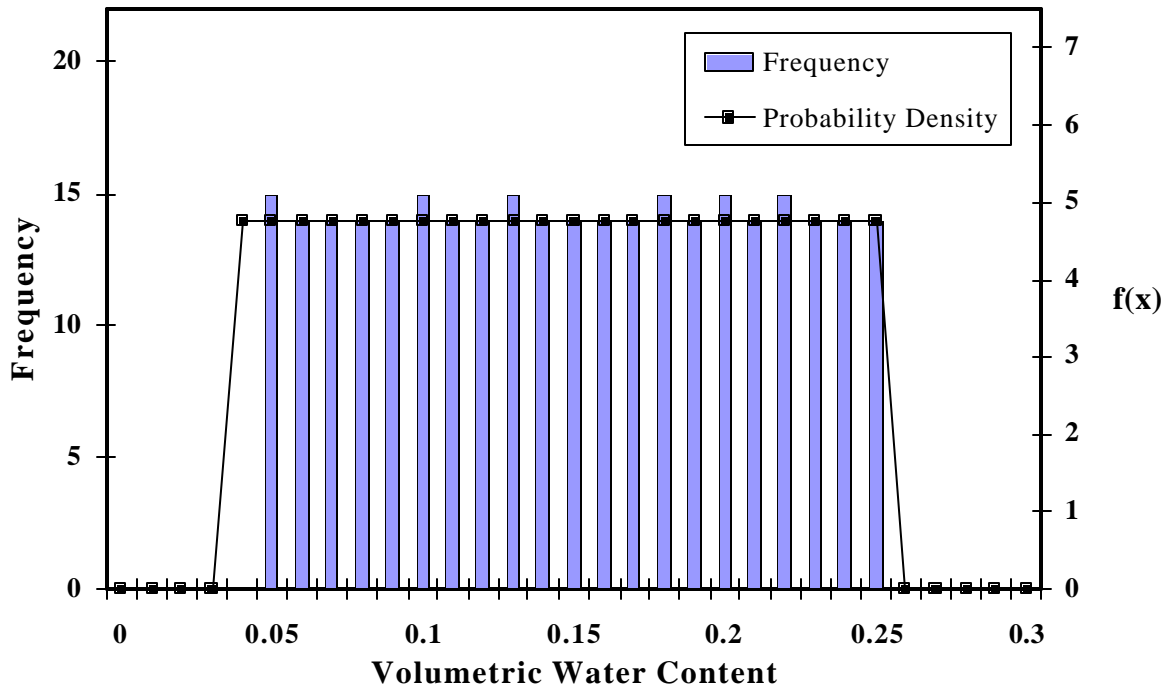
**Figure B.44 Sampling Frequency and Probability Density of the Humidity**



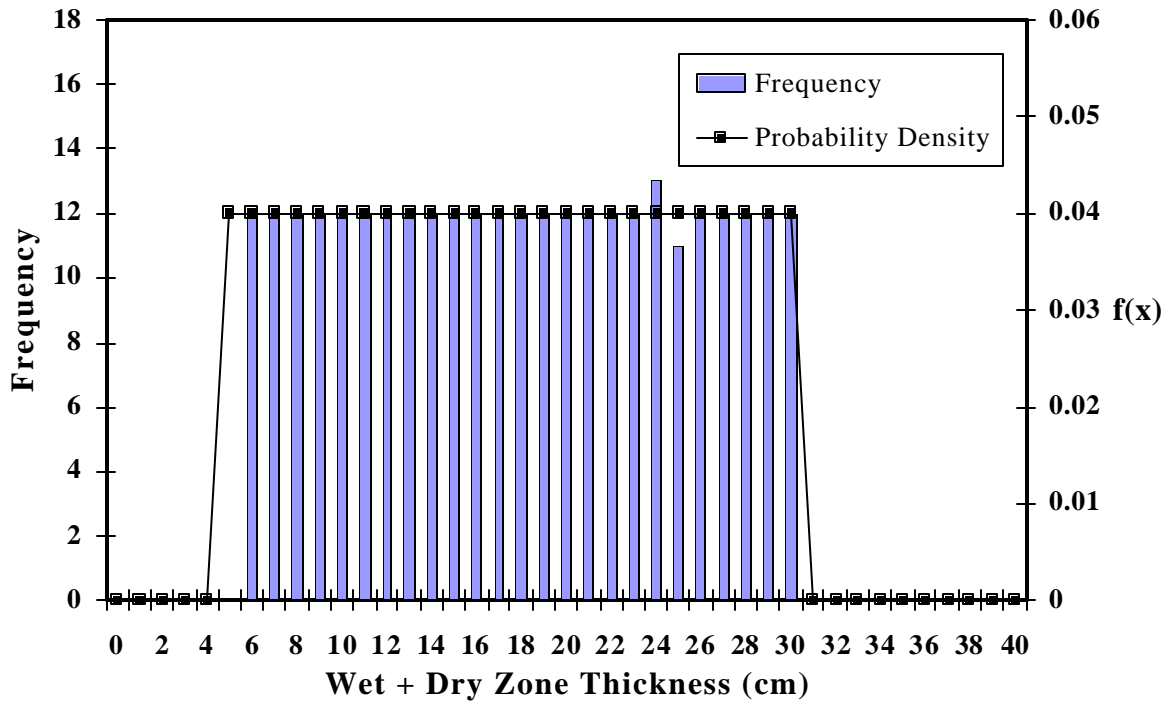
**Figure B.45 Sampling Frequency and Probability Density of the Water Fraction Available for Evaporation**



**Figure B.46 Sampling Frequency and Probability Density of the Source Porosity**



**Figure B.47 Sampling Frequency and Probability Density of the Volumetric Water Content**



**Figure B.48 Sampling Frequency and Probability Density of the Wet + Dry Zone Thickness**

## REFERENCES FOR APPENDIX B

Beyeler, W.E., et al. NUREG/CR-5512, SAND99-2148, Vol. 3, "Residual Radioactive Contamination from Decommissioning: Parameter Analysis," Prepared by Sandia National Laboratories, Albuquerque, N.M., for U.S. Nuclear Regulatory Commission, Washington, D.C. 1999.

Biwier, B.M., et al. "Parameter Distributions for Use in RESRAD and RESRAD-BUILD Computer Codes, Revision 1." Letter report prepared by Argonne National Laboratory, Argonne, Ill., for U.S. Nuclear Regulatory Commission, Washington, D.C. 2000.

Kamboj, S. et al. "Parameters and Parameter Types in RESRAD and RESRAD-BUILD Codes." Letter report prepared by Argonne National Laboratory, Argonne, Ill., for U.S. Nuclear Regulatory Commission, Washington, D.C. 1999.

