MOVING SITES TO CLOSURE

RBCA TABLES ONE THROUGH FOUR

Tables One through Three

Surface Soil

Table 1

0 – 2 Feet BGS

Residential vs. Commercial

<10 Feet to Groundwater

10 – 20 Feet to Groundwater

>20 Feet to Groundwater

Calculate depth:
Sample depth to water!

Subsurface Soil

Table 2

>2 Feet BGS

Construction Exposure

<10 Feet to Groundwater

10 – 20 Feet to Groundwater

>20 Feet to Groundwater

Calculate depth:
Sample depth to water!

Groundwater

Table 3

Human Health Standards (HHS)

Risk Based Standards

Beneficial Use

MASTER TABLE

Table 4

All Potential Tier 1 RBSLs for Soil

- Leaching 0 – 10 Feet
- Leaching 10 – 20 Feet
- Leaching >20 Feet
- Direct Contact Residential
- Direct Contact Commercial
- Direct Contact Construction

Navigating the Waters

British Petroleum
Deepwater Horizon
Oil Spill

Gulf of Mexico

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Tier I RBCA Evaluation Process Is it a RELEASE?

Table 1

Tier 1

Column 1

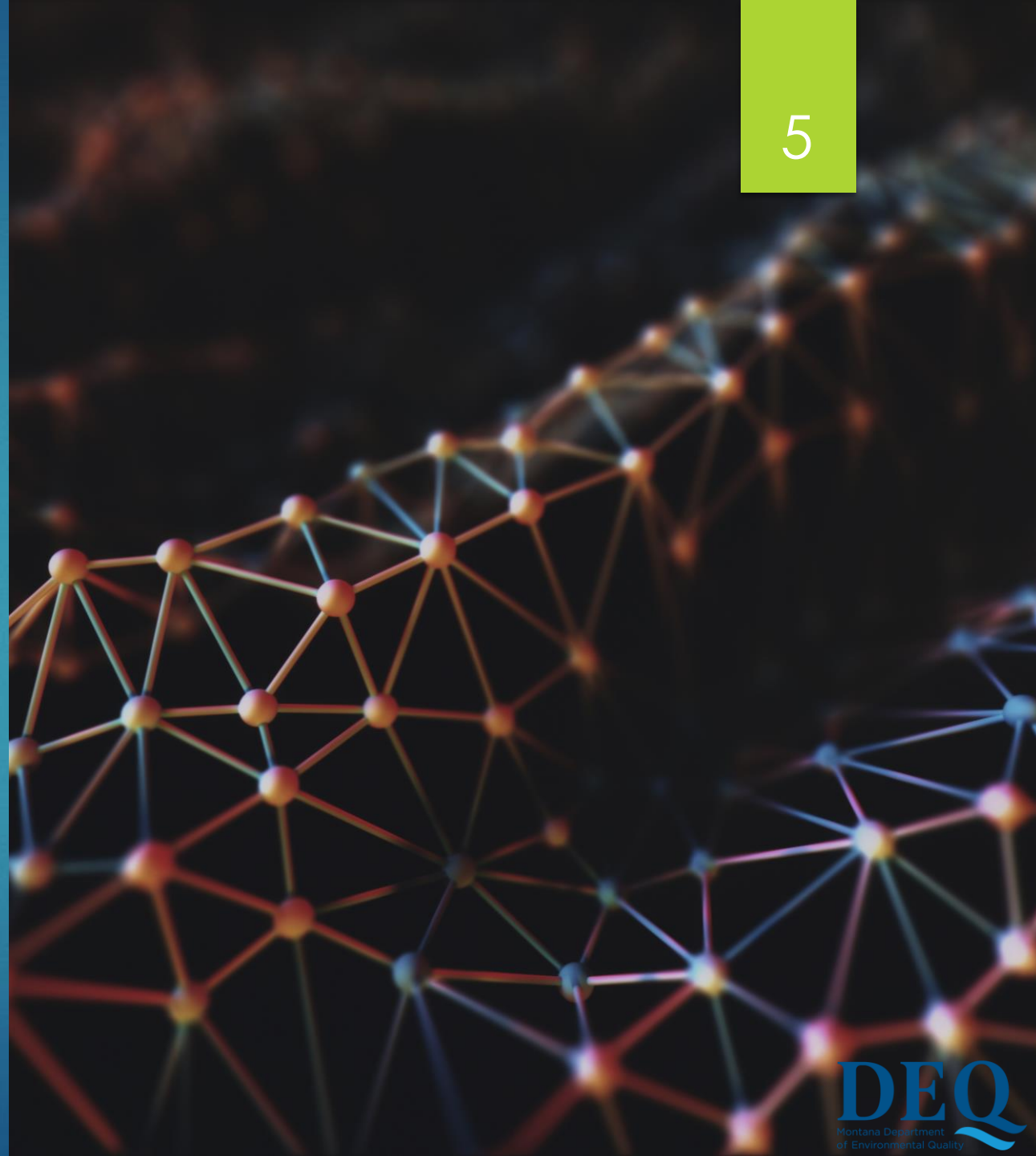

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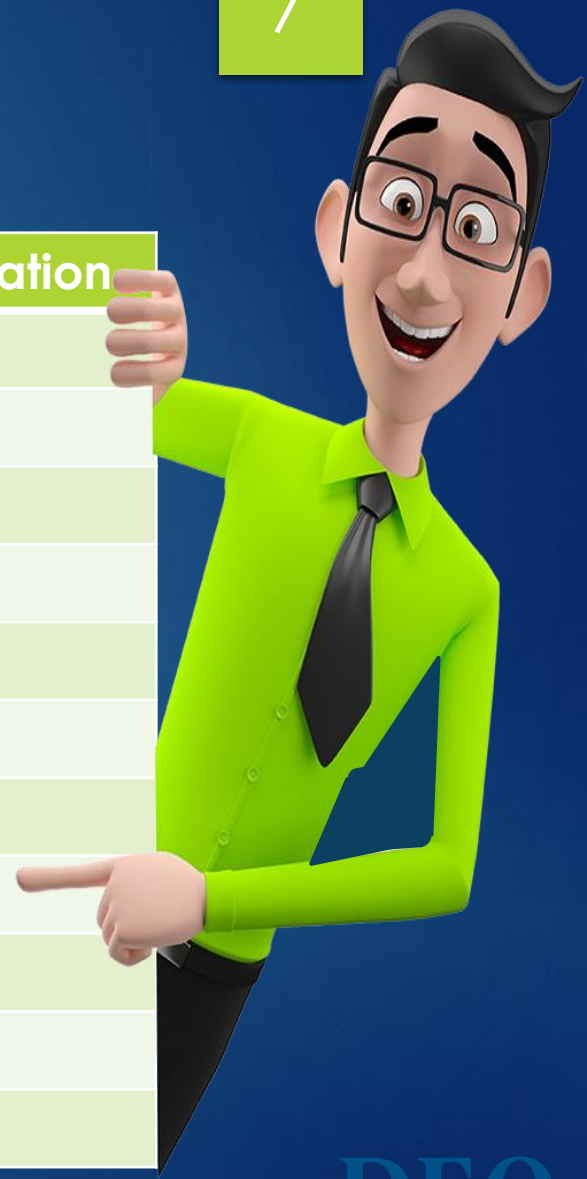
Table 1: Surface Soils

Distance to Groundwater		<10 feet to Groundwater	
Chemical (mg/kg)	E	Residential RBSL	B
C5-C8 Aliphatics	N	52	dc
C9-C12 Aliphatics	N	77	dc
C9-C10 Aromatics	N	130	I/dc
MTBE	C	0.078	L
Benzene	C	0.07	L
Toluene	N	21	L
Ethylbenzene	C	6.4	dc
Xylenes	N	72	dc
Naphthalene	C	4.3	dc
Etc…	X	#.#	X

Table 1, Tier 1, Column 1
Is it a release?

Distance to Groundwater		<10 feet to Groundwater		Concentration
Chemical (mg/kg)	E	Residential RBSL	B	
C5-C8 Aliphatics	N	52	dc	550
C9-C12 Aliphatics	N	77	dc	630
C9-C10 Aromatics	N	130	I/dc	472
MTBE	C	0.078	L	1.7
Benzene	C	0.07	L	1.3
Toluene	N	21	L	65
Ethylbenzene	C	6.4	dc	80
Xylenes	N	72	dc	600
Naphthalene	C	4.3	dc	499
Etc…	X	#.#	X	X



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What Do You Know?

- Where was the sample collected?
  Sample Collected at 8 feet BGS
- How deep is groundwater?
  Depth to Groundwater is 23 feet BGS
- What is the property type?
  Property type is a commercial gas station
- Which RBCA Table should we use based on the information?
  - Table 1 = Surface Soil?
  - Table 2 = Subsurface Soil?

CHEMICAL	Concentration
C5-C8 Aliphatics	550
C9-C12 Aliphatics	630
C9-C10 Aromatics	472
MTBE	1.7
Benzene	1.3
Toluene	65
Ethylbenzene	80
Xylenes	600
Naphthalene	499

Table 2: Subsurface Soils

Distance to Groundwater		10 – 20 feet to Groundwater	
Chemical (mg/kg)	E	>2 ft Construction RBSL	B
C5-C8 Aliphatics	N	410	dc
C9-C12 Aliphatics	N	640	dc
C9-C10 Aromatics	N	470	L
MTBE	C	0.16	L
Benzene	C	0.21	L
Toluene	N	65	L
Ethylbenzene	C	84	L
Xylenes	N	610	dc
Naphthalene	N	40	L
Etc…	X	#.#	X

- Sample Collected at 8 feet BGS
- Depth to Groundwater is 23 feet BGS

Table 2: Subsurface Soils

Distance to Groundwater		10 – 20 feet to Groundwater		Concentration
Chemical (mg/kg)	E	>2 ft Construction RBSL	B	
C5-C8 Aliphatics	N	410	dc	550
C9-C12 Aliphatics	N	640	dc	630
C9-C10 Aromatics	N	470	L	472
MTBE	C	0.16	L	1.7
Benzene	C	0.21	L	1.3
Toluene	N	65	L	65
Ethylbenzene	C	84	L	80
Xylenes	N	610	dc	600
Naphthalene	N	40	L	499
Etc…	X	#.#	X	

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Table 3: Groundwater

Chemical	Effect	Basis	GW Standard or RBSL
C5-C8 Aliphatics	N	RB	650
C9-C12 Aliphatics	N	RB	1,400
C9-C10 Aromatics	N	RB	1,100
MTBE	N	HHS	30
Benzene	C	HHS	5
Toluene	N	HHS	1,000
Ethylbenzene	N	HHS	700
Xylenes	N	HHS	10,000
Naphthalene	C	HHS	100
Etc…	X	X	#

Table 3: Groundwater

Chemical	Effect	Basis	GW Standard or RBSL	Concentration
C5-C8 Aliphatics	N	RB	650	559
C9-C12 Aliphatics	N	RB	1,400	1,121
C9-C10 Aromatics	N	RB	1,100	900
MTBE	N	HHS	30	<1.0
Benzene	C	HHS	5	<0.5
Toluene	N	HHS	1,000	500
Ethylbenzene	N	HHS	700	270
Xylenes	N	HHS	10,000	690
Naphthalene	C	HHS	100	70
Etc…	X	X	#	<#

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What we know…

Distance to Groundwater		10 – 20 feet to Groundwater		Concentration
Chemical (mg/kg)	E	>2 ft Construction RBSL	B	
C5-C8 Aliphatics	N	410	dc	550
C9-C12 Aliphatics	N	640	dc	630
C9-C10 Aromatics	N	470	L	472
MTBE	C	0.16	L	1.7
Benzene	C	0.21	L	1.3
Toluene	N	65	L	65
Ethylbenzene	C	84	L	80
Xylenes	N	610	dc	600
Naphthalene	N	40	L	499
Etc…	X	#.#	X	

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What is Table 4?
It is the Master Table!

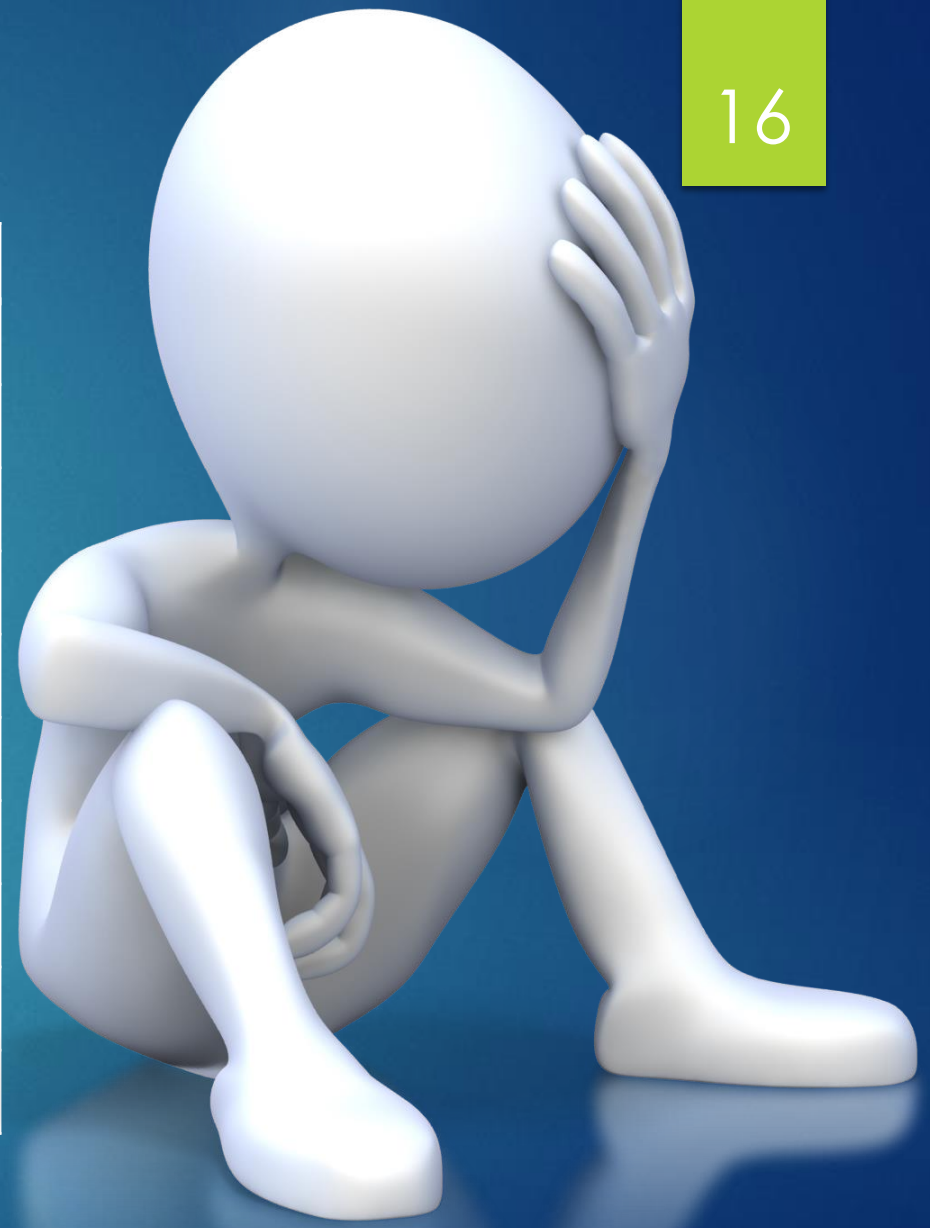
Chemical	Leaching 0-10'	Leaching 10-20'	Leaching >20'	D.C. Residential	D.C. Commercial	D.C. Construction
C5-C8 Aliphatics	22	770	1,200	52	290	410
C9-C12 Aliphatics		40,00	00	77	360	640
C9-C10 Aromatics			720	130	1,000	1,000
MTBE	0.0		0.25	52	230	8,900
Benzene	0.07		0.33	1.3	5.7	240
Toluene	21		100	610	5,500	5,500
Ethylbenzene	2		130	6.4	28	1,300
Xylenes		,	,600	72	310	610
Naphthalene		4	62	4.3	19	140
Etc…		#	#	#	#	#

Table 4: Direct Contact

Chemical	D.C. Residential	D.C. Commercial	D.C. Construction
C5-C8 Aliphatics	52	290	410
C9-C12 Aliphatics		0	640
C9-C10 Aromatics		000	1,000
MTBE		230	8,900
Benzene		5.7	240
Toluene		5,500	5,500
Ethylbenzene		28	1,300
Xylenes		310	610
Naphthalene		2	140
Etc…	#	#	#

Table 4: Results

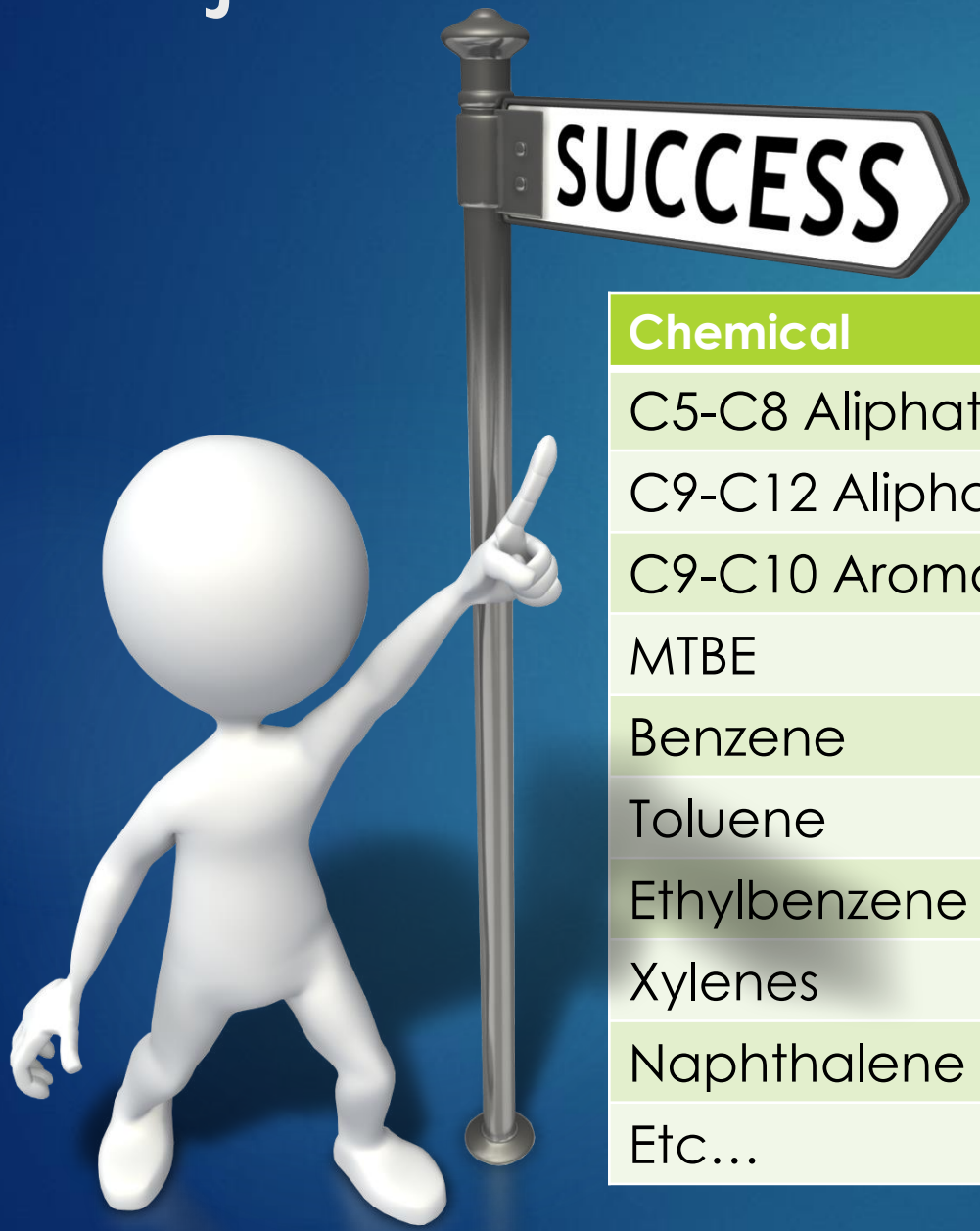
Chemical	D.C. Construction	Concentration
C5-C8 Aliphatics	410	550
C9-C12 Aliphatics	640	
C9-C10 Aromatics	1,000	472
MTBE	8,900	1.7
Benzene	240	1.3
Toluene	5,500	
Ethylbenzene	1,300	
Xylenes	610	
Naphthalene	140	499
Etc…	#	



Surprise
A Quick Tier II Calculation

Chemical	Effect	Table 4 RBSL	Multiply	Total # of non-carcinogens/# of non-carcinogens >Table 4 RBSLs	Equals	Adjusted RBSL
C5-C8 Aliphatics	Non-Carcinogen	410	X	8/2	=	1,640
Naphthalene	Non-Carcinogen	140	X	8/2	=	560

Adjusted RBSLs



Chemical	D.C. Construction	Concentration	Adjusted RBSL
C5-C8 Aliphatics	410	550	1,640
C9-C12 Aliphatics	640		
C9-C10 Aromatics	1,000	472	
MTBE	8,900	1.7	
Benzene	240	1.3	
Toluene	5,500		
Ethylbenzene	1,300		
Xylenes	610		
Naphthalene	140	499	560
Etc…	#		

Put it in a Table

Location	Date	Depth to GW	MTBE	Benzene	Toluene	Ethyl-benzene	Xylenes	Naphthalene	X
Tier I RBSL			0.16	0.21	65	84	610	40	#
DC Construction			8,900	240	5,500	1,300	610	140	#
Tier II RBSL								560	#
Sample 1	02/05/20	23'	1.7	1.3	65	80	600	499	#

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