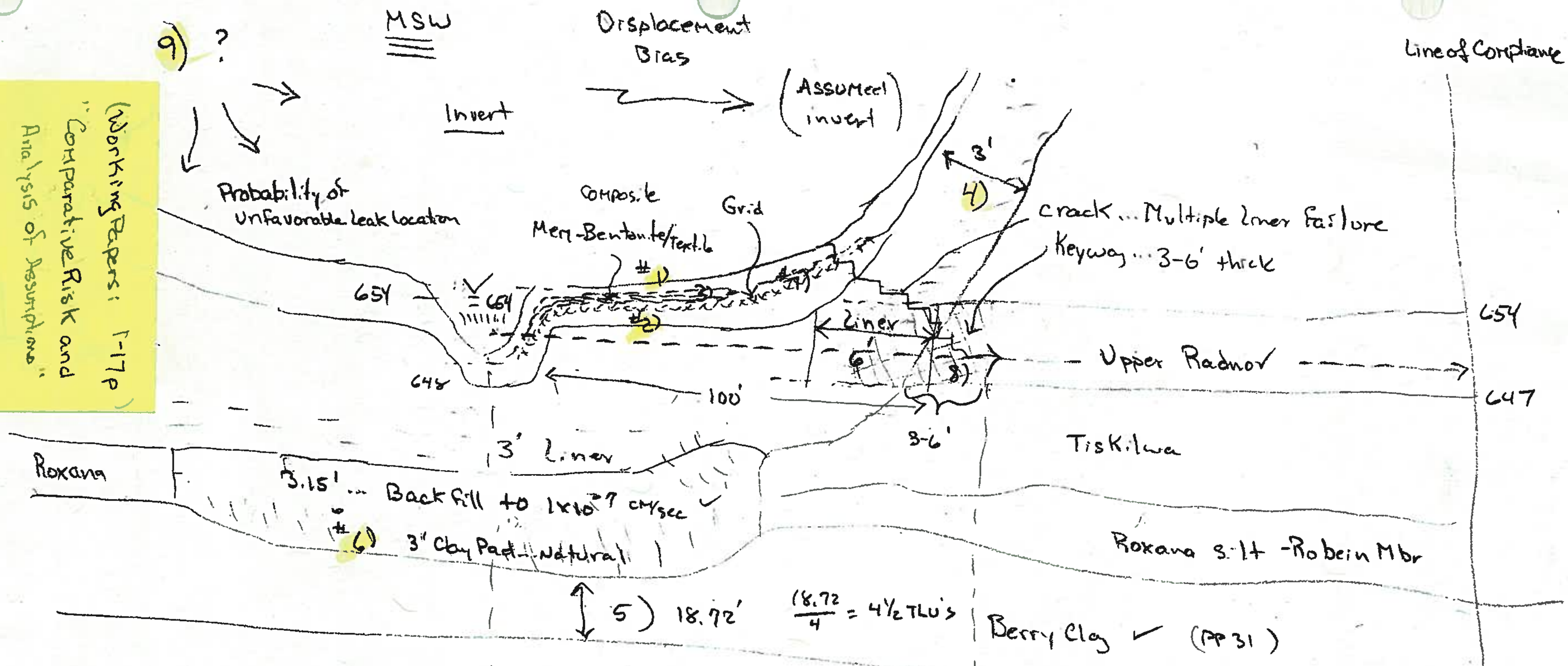
(Working Papers: 1-17p
"Comparative Risk and
Analysis of Assumptions"
Used in Comparing Models
IEPA - CLI - TSCA
Contam. Pathway Assmt's
Part of 42pp discussion doc.



Listed Barrier Items:

MSW Barriers ←→ | Attenuation Zone →

Factors of Safety

1 Unit = 60 mil liner #1,2)

w/ F.S. 2 under TSCA ... 30 mil Minimum

4 TLU's	- 2 Liner @ 60 mils each = 120 mil / 30 mil = 4	# 1, 2
" "		# 3
2 "	- 6' Clay @ spec ...	# 4, 6
1 "	- 1 Leak detector transmissivity	# 7
1 "	- hole location Bias ... +100 ft,	# 9
1 "	- Keyway	# 8
4½	- 18½' Natural Clay (18½ / 4 = 4.5) 4' = 1 TLU	
13½ TLU's		

Note ... Corrected?

Keyway on sides of cell not below ... sf

Table of Equivalencies

2 TSCA 30 mil = 1 Normal Liner Unit @ 60 mil

1 liner @ 60 mil (NLU) = 1 bentomat (#3)

= 3' Clay at spec #4)

= 4 Clay Natural 5)

= 3' Natural clay 6)

= Leak detector 7)

= 1 Keyway 8)

CWU Barrier →

2	- 1 liner @ 60 mil
1	- 1 bentomat

16½ TLU's Existing to L. Radnor

or .. to U. Radnor via CWU = 11 TLU's

{ 6 3 liners @ 60; 1 bentomat; 1 3' clay @ spec; 1 1 lk. det.; 1 1 hole loc.; 1 1 Key way }

Σ 11 TLU's

U.S. EPA Region 5

Barrier Units ...

Factor of safety Calc.

10/16

S.M. Johnson 9/24/08

1/17

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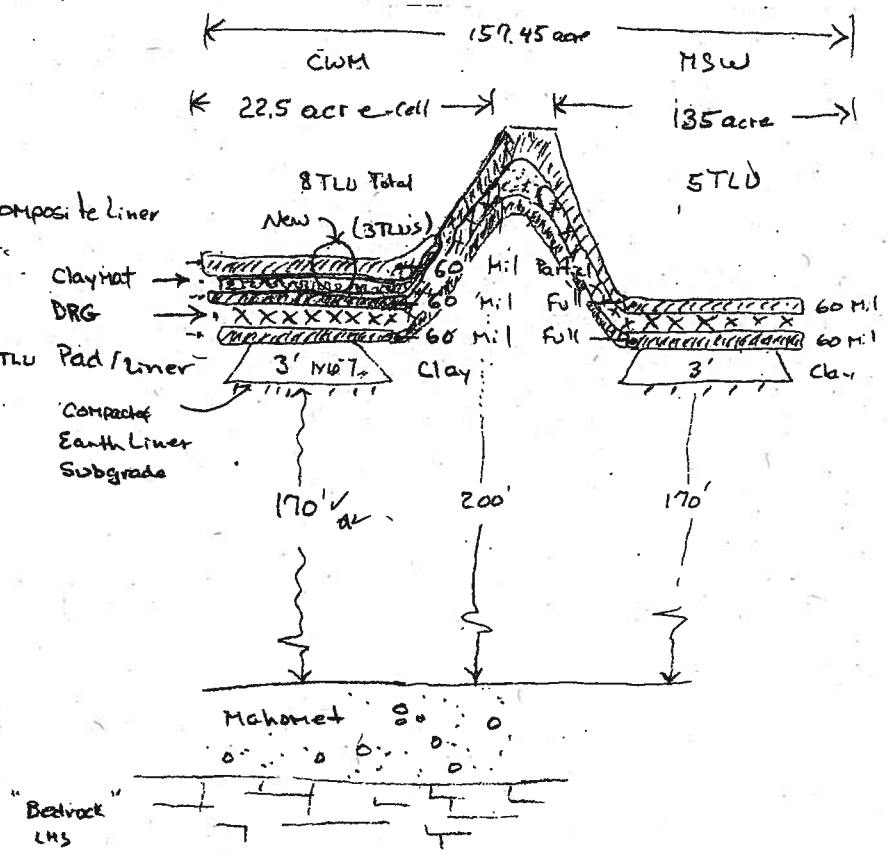
re Executive Summary
Oct 2007

Missing item

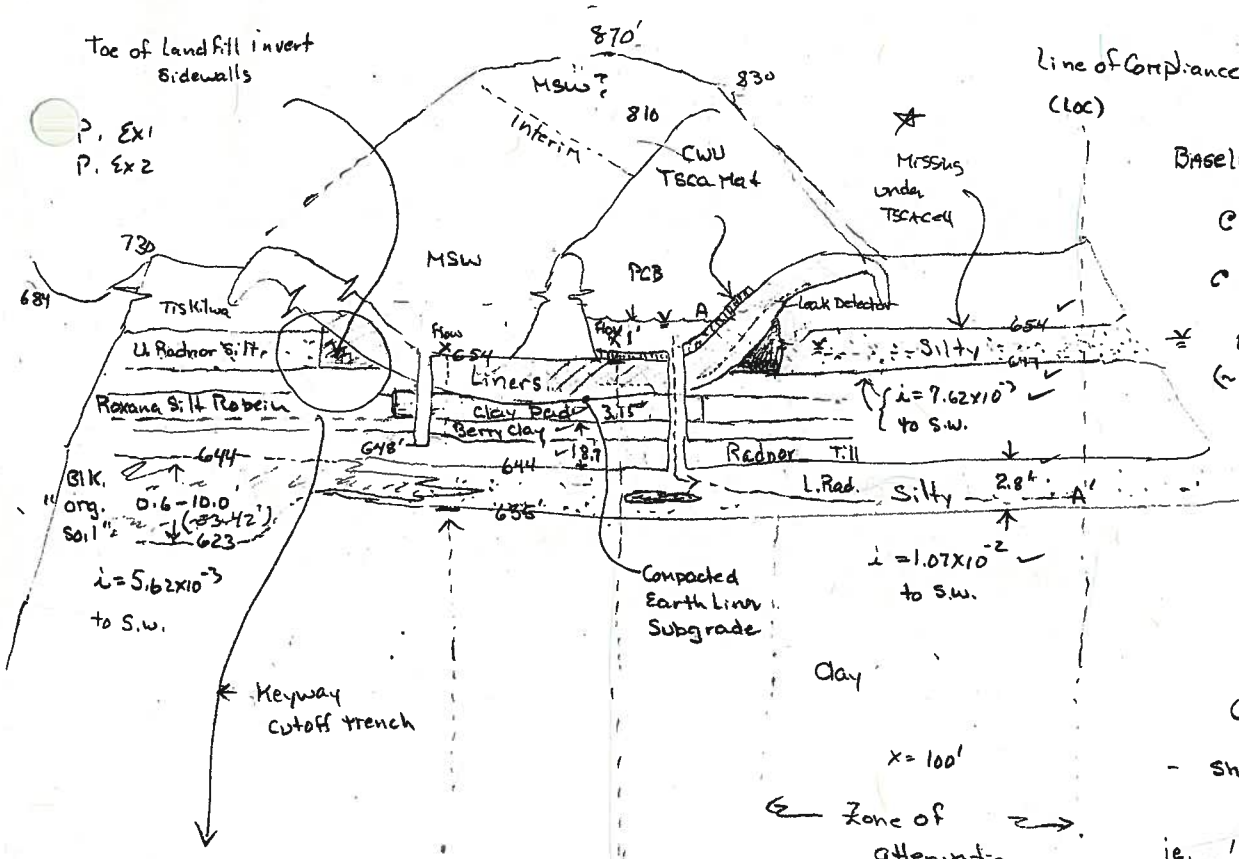
See P-Ex-1 Dwg ?
P-Ex2 Dwg ?
in Log 2005-020 ...



Stability: static F.S. ≥ 1.5 Short & Long term "Global Mass Stab."
Seismic F.S. ≥ 1.3

U.S. EPA R-5
Barrier Analysis
Clinton L.F. Ill.
S.M.J 10/16/08

Exaggerated Scale Looking South



1) Feb, 2008
App. for S.S/Max
GIA 812, 316

Baseline MSW Model Results at A'

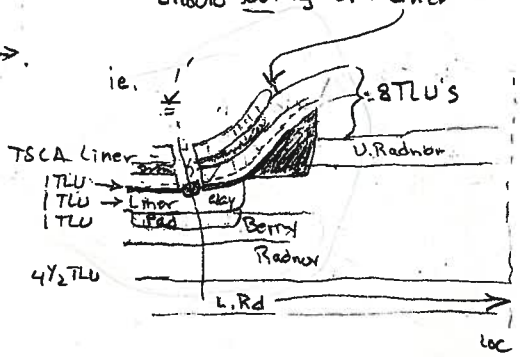
@ 145 yrs C^{MSW}_{Surr} = 2.9x10^-4

@ 135 C^{MSW}_{Surr} = 1.6x10^-4

Upper Radnor - NO TSCA GIA
(~1.5' thick)
1) PDC pp28
if η = 0.05 (5%)

Lower Radnor Sd
.2 - 5.3' (2.8' avg)

CWU Model: PCB Path
- Should Not ignore Liner
ie.



TLU = TSCA Liner Unit equivalency

120 mil HDPE = 4 TLU's
1 Bento Mat = 1 TLU
6' Clay = 2 TLU's
leak det = 1 TLU
8 TLU's

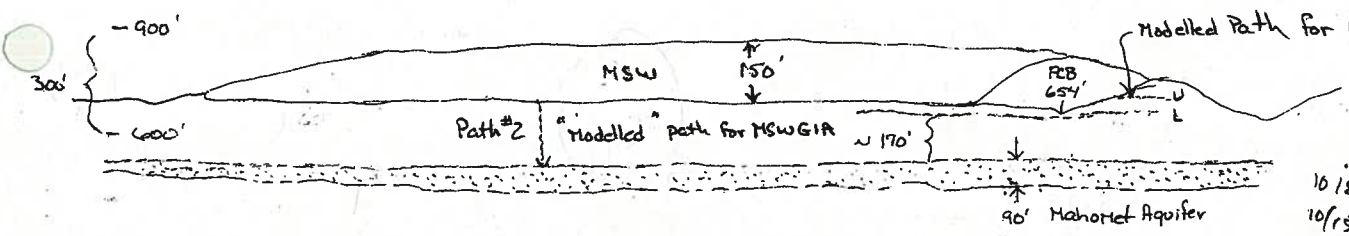
Legend:
C = Concentration
V = Velocity
η = porosity

C^{Surr}_{Mah} = 2.014x10^-14 @ 145yr Final GIA @ POC A'

C^{Surr}_{Mah} = 5.691x10^-15 @ 135yr Final GIA @ POC A'

U.S. Env. Prot. Agency R-5
Corrected
Pathway Review...Analysis
Clinton L.F. A-A'
S.N. Johnson 10/16/08

True Scale - Looking South

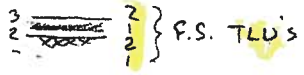


10/8 2hr
10/15 45Min
10/16

28

3/17

Factor of Safety to Mahomet Aquifer — Worksheet for Pathways



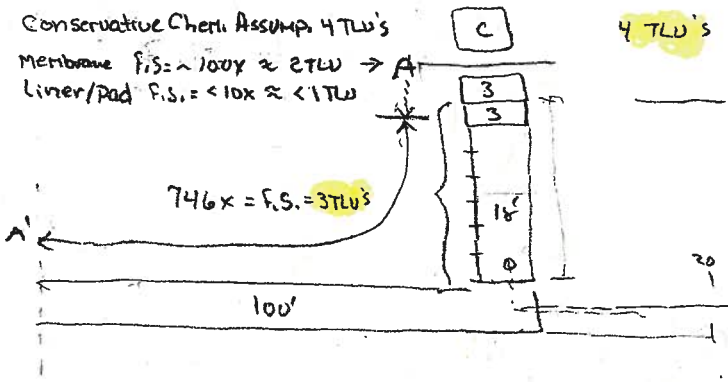
Conservative Chem. Assump. 4 TLU's

Membrane F.S. = ~100x ≈ 2 TLU → A

Liner/Pad F.S. = <10x ≈ <1 TLU

C

4 TLU's

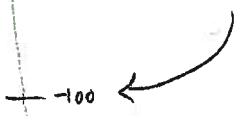


well 15-3 3000' awg WSW of Expansion
re App VII App E 812, 314-13
i =

weldon Spgs

weldon Spgs

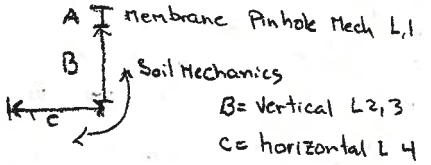
Want this Pathway B-B'

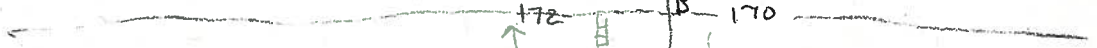


but have No Data

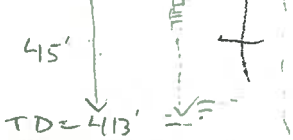
Solution... Use A-A' layers

break up Pathway into 3 Segments / A, B, C





nf PDC



Mahomet

10/21 10/28

29

4/17

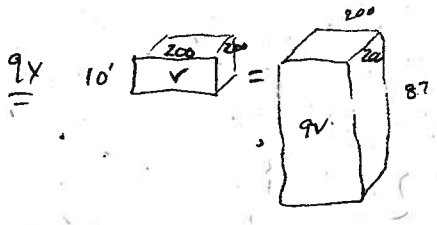
?

Clinton L.F. Modelling of Mahomet Aquifer

Thickness of Compound Clay Pans

186' from base of Liner
+ 160' from Lowest sump
= 346
173 Avg thickness
double clay pan Composite

quoted by PDC 170' ok to use
3' difference... not signif.



Magnification by 9X

170' thick stacked Clay Pan thickness ok to use

SMJ 10/16/08

assumption reduce volume of aquifer by neglecting to increase impact of chemical constituents

10'

~~664~~ ~~540~~ est by SMJ 6/14/07
487 CSM-1 (DWG-G5)

Mahomet aq.

90' PDC ...87' subtracted

Thickness of Mahomet Aquif.

~~485~~ 812+314-7

Draft worksheet ... ok

664' from base of Liner PDC G-6
488' Top of Mahomet
→ 186' to top of Mahomet

648' el. lowest sump G3
- 488' Top of Mahomet
→ 160' To top of Mahomet

U.S. Env. Prot. Agy Reg 5
Mahomet Aquifer Depth Calculations
S.M. Johnson 10/16/08

Table: Chemical Assumptions
with regard to Flow Modelling for PCB's

Draft

Assumption number	TSCA Liner Equivalent	Conservative	Assumption	Liberal	Explanation
			Chemical of Concern (surrogate)		
			Surrogate: Water	Chemical: PCB	
1)	2 U	← V. Conservative			
			Frequency of Detection (Leachate FOIA's WDI + Grassy Mtn)		
2)	2 TLU	← V. Conservative 100X	Frequent	V. infrequent	See Step 5) and F.S. Calc. for L. Rad. Tail (sd. A)
3)	~~5~~		Chemical of Concern: Surrogate "water" substance "W" @ 1 ppm; Chemical: Benzene	100X →	Migration: −1 ? Organic solvents Penetrate Clay easily. ΔNAPL: −1 ? Benzene May Move contrary to hydraulic gradient.. if SpGr < 1 and would sink in Esist Artesian conditions
4)	0.5 µg/L	NA	Selection of Standard for Residual F.S. "Applicable GW. Qual Std." (AGQS) = Lowest MDL Per ?? ... State PDC ??		Use 40CFR 761.79(b)(1)(i) 0.5 ppb PCB ie 0.5 µg/L
			Used: Lowest Standard observed MDL/AGQS required (2.0 µg/L)		
			2.69 x 10⁻² µg/L 1. Acenaphth 2.0 mg/L		
			3/4 Xylene 3.0 µg/L F.S. PCB = 0.5 µg/L TSCA / 2.69 x 10⁻² µg/L = 18.6		
			PCB 0.5 µg/L		
			0.5 ppb µg/L n PCB → 10 µg/L Un conservative 20X =		
5)	See Factor of Safety Calc. for PCB's in G.W.		Available Numbers · Model Input		
			Test observed ... Most		
		← Modelled #'s	Model # C Acenaphth <	Lowest Acenaphth	
		< Modelled #'s	Model # C Xylene	Lowest Xylene	
5 TLU's			1000 ppb (1 TLU) — 100 ppb ← 5.6 ppb (>1 TLU, >2 TLU) ← 1 ppb PCB (Most Likely Conc. @ 1% of time)		
			INPUT { ic 10 ppm or 1.0 mg/L } 10X 20X 5.6X 100X		
			F.S. = (10 X 20 X 5.6 X 100) = 1.12 x 10⁵ ≈ 5 TLU's to get input PCB value for GIA USING FOIA DATA Attachment 17 GIA		

Note:

(C = Concentration)

Model = PDC's Calc's GIA of Feb '08

10/24/08 10/23/08 10/20/08 10/21

Draft

Flow Model Notes ... L. Radnor

$V = \frac{Ki}{\eta}$ if η = large .. < 1 V = Larger ... if η = small << 1 V = V. Large Then

#	Conservative		Assumption	Liberal (Unconservative)	
1)	① TLV 100/150' Zone	<1/3X ←	Distance to Point of Compliance 150'		[See Calc's on protectiveness of Silt layer
2)	-1 TLV ? see pp 41 GIA		Mathmatical Stability obs. positive / obs. negative	→ X	[ignoring Negatives suggests something wrong
3)	1 TLV	No adsorption in soils ←	Adsorption		Most constituents Sorb.... PCB strongly; Diff. Coef.; Coef Diff water independent of Sorp. advective diff. can probably compensate proper... in #8 ... 1 TLV
9)	?	X ← 10X	Dispersion Vertical horizontal	?X → ?	Need Sensitivity anal]
#10)	1 TLU	X ← conservative; X ← very V. cons.	"Effective porosity" η = 0.288 for Clay ... Seems? for Silt @ .05		[probably increases V by 20X ... allow 10X ... 1 TLU; where η = effective porosity]
11)	? TLU's	?	Density ... ? No bearing PDC GIA P35 Feb '08	?	
12)	... flow		Advection: Horiz.		(Radnor K = 2.21x10^{-4} cm/sec (69.69 m/a); K = 1x10^{-7} in Liner, Berry Clay used PDC GIA; K = 1x10^{-8} - 1x10^{-9} cm/sec observed PP37
	0 TLU'S	← conservative	0 Layer A, B, C		[rationale for 0 TLU's vertical and hz advection linked ... as vector components ...]
		← cons.	0 B		organic soil 2.65x10^{-5} cm/s w(8.19 m/A) P37 required to exist
		← cons.	0 C		i = field gradient 1x10^{-2}
			[X] D		
#13)	flow		Advection: Vertical		[rationale ... Units act as 1]
	1 TLU vert. flow	1.42x10^{-6} ← cons; 1.42x10^{-6} ← cons; 1.42x10^{-6} ← cons	↓ Layer A Ø Should be 1.4x10^{-7} m/A (?); B Ø "; then hz C Ø " ↑		(PDC GIA 38) Depends on Piez... Most Numbers show "artesian" conditions in L. Radnor
	1 TLU upwelling	← cons	D O upwelling Piezometry K = 2.21x10^{-4} cm/s (69.69 m/A) i = 1.07x10^{-2}		
#14)	TLU'S		Model Input Concentration: (ramp-up from leachate max. values)		Steps b-c-d 10/20/08 10/21/08
	1	← Cons 10x	Used 1 ppm; observed max 43 ppb		1 order of Mag. = 1 TLU
	1	← Cons 10x	.3 ppm; Chemical: Toluene @ 28 ppb (.028 ppm)		2 orders of Mag = 2 TLU's
	1	← Cons 10x	.5 ppm; Naphthalene @ 43 ppb (.043 ppm)		Use Lowest ?
	2	← V. cons 100x See Worksheet for Calc. of #5 for PCB	.1 ppm; Pcb @ 5.6 .0056 ppm		Depends on 32 ...

7/17 - 2/3

Draft

flow model Notes "Organic Soil" Draft worksheet

Realistic

i_{hz} = 5.62×10^{-3} field gradient

K = 2.6×10^{-5} cm/s (8.2 m/A)

V = 0.046 m/y

Adsorption in organic unit Not used... Not sure if TLU's should be increased

Draft

Worksheet: Factor of Safety Calc for PCB in Groundwater

A) Lower Radnor Till Sand

Conservative — Typical Detection level — Liberal

WDI : 3yrs data

7/234 detection or ~ 3% @ 1 ppb

Grassy Mtn : 7yrs data

2/1575 detections ~ 0.1% @ 1ppb

Best Fit... Expected PCB's @ .5ppb Threshold

~ 1% hits....

99% of time leachate is clean

1% of time leachate has PCB @

For Continuous Flow Modelling of PCB use?

a : 1% of time PCB is @ 1 ppb

b : Reported 5.6ppb Continuous ....(Table 812-316-17)

What is difference? F.S. between A and B

if 1% of hits are 1ppb and reported value is

5.6ppb 100% of time

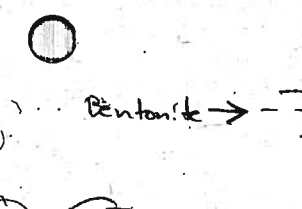
Then F.S. frequency is 100 x

F.S. Concentration is 5.6 x

Σ_{FS} 560 x ?

10/21

9/17 Y2

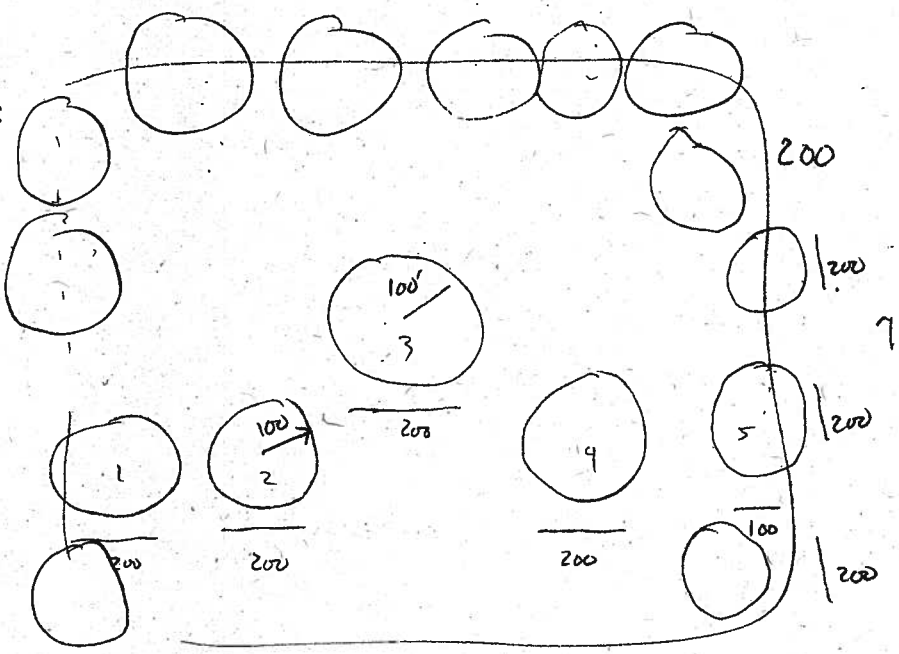


1000 yrs for holes to Match ignoring bentonite

1

N

Favorability of hole location:



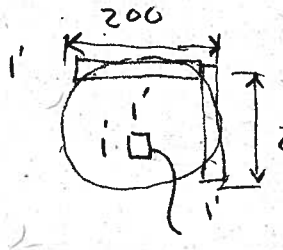
Conclusion ...

base areal probability

9/400 of a hole being "critical"

over Time .... No good way to guess.... Suppose it is based on liner degradation and 500 yr life* under oxidizing cond.

2 liners = 1000 yrs to make 1 ft² hole in each



1 hole @ 1 ft²

1000'

$A = \pi R^2$

3.14 (100)(100)

3.4 × 10,000

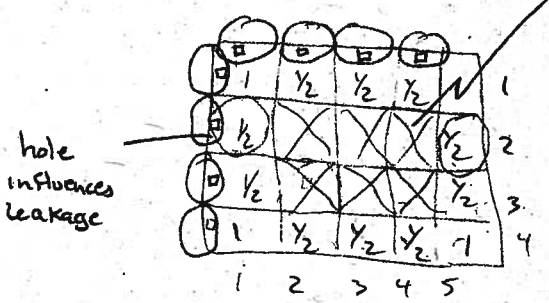
34,000 ft²

34,000 ≈ 40,000

$$\frac{1\ ft^2}{200 \times 200} = \frac{1}{40{,}000}$$

randomly located

Probabilities if any hole creates a leak



Hole does not influence leakage

$\sum_{x=1}^{x=20} 1 + \frac{1}{2} + \frac{1}{2} + \ldots$ zones of risk = 9

9/20 th's of L.f. is at risk

4 × 5 = 20 "areas of equivalence"

at risk .... 9 areas × 1/400 = 9/400

$\frac{400 \text{ at risk}}{40{,}000 \text{ Total}} = \frac{1}{400}$ chance of a hole per "area"

Ok to use Sy

1) Time Frame: Calc. Assume rate of failure... is per year

$\frac{9}{400} = 0.0225 = 2.25\%$ "risk"/yr

2) or say 1/100 yrs ... time to fail

$\frac{2.25\%}{100} = \frac{.0225}{100} = .000225/100\text{yr}$

.0225 /100 yrs = .0225%/1

3) or 1000 yrs ... .0225%/1000 yrs

* ref.: available ... on request

if 1 ft² in any 200 x 1 rectangle causes a leak and there are 2 x 200 ft² rectangles we get 400 ft²

U.S. EPA R-5

Probability Illustrations

- Liner failure creating a release ..... #9

Sid Johnson 9/24/08

Draft

L Radnor only

Worksheet 8 Factor of Safety for PCB in G.W. ...(cont.)

Table 812-316-17

A) Lower Radnor till ...cont. regarding item 5) ... expanding

Chemical Assumptions: Summary table a) → d)

Given #5) 1% @ 1ppb (a) Obs —560x (3TLU's)→ 100% @ 5.6ppb (b) reported —20x (1TLU)→ 100 ppb (c) assumed —10x 1TLU→ 1000ppb PCB 1.0 mg/L (d)

ΣTLU's = 5

#		
1)	2	2
2)	X	X
3)	—	
4)	—	—
#5)	5	5
6)	70	70
7)	-1	-1
8)	1	1
9)	3	
10)	1	1
11)	—	
12)	0	
13)	2	1
14)	—	—

GIA Input Assumptions } = Σ=9 TLU

$\Psi = \frac{0.5\,\mu g/L \text{ Req}}{1.345\times10^{-2}\,\mu g/L \text{ Predicted}}$

F.S. = 37x

e) Surrogate mg/L = 1.345E^-4 — Calculated/Predicted for L. Radnor till $\frac{1\times10^{3}\,\mu g/L}{1\times10^{-2}\,\mu g/L}$

GIA Chemical Assumptions Combined w/ TSCA Physical Barriers

~ 1 ppb PCB hits 1% of time in leachate to 100ppb Assumed continuous

Chem – Chemistry 9 TLU's (assumed for GIA input) [C]

Physical – Membrane 5 TLU (impaired) Liner 60M —.5 — 1.0 mg/L → .01 mg/L

Layer 1 1 TLU Clay [3'] = 1

Layer 2 1 TLU Clayfill [3'] = 1

Layer 3 4½ TLU's (TSCA) Geological Unit (Trsk/Lwr Radnor) [18'] 18½/4 ≈

Start with ~ ! TLU's

Layer 4 Aquifer [C] [K = 2.21 x10^-4 cm/s 100' λ = 1.07x10^-2]

9 Summary table of Assumptions

2 Pinhole Model 100x reduction 5TLU $\frac{1\times10^{3}\,\mu g}{1\times10^{-2}\,\mu g} = 10^5$x

37x GIA reduction ≈ 1 TLU

it is equivalent to

e) .01 mg/L / .000134 mg/L ≈ 74 < 100 < 2TLU

.000134 mg/L = ?

TLU's Assumed Conservatively ... upon outset of GIA

Chemical Protection : Σ

others i.e.
2x Selection of water
1x vertical velocity
rest cancel
i.e. State gw std cancels adsorption
i.e. ignoring "negative" in model runs cancels
GW acceleration "Effective Velocity" due to use of η

Remaining TLU's ignored Completely

Then : reserve TLU capacity exists ...

1) Chemical

2) Physical Modelling ... ignored by GIA analysts

? < ok

Draft

0 all accounted for?

2 MSW (Geomembrane) ...
2 CWU'S (Geomembrane)
1 LK Det
1 Location of hole
1 bentomat ?
Σ TLU's ignored ...

?

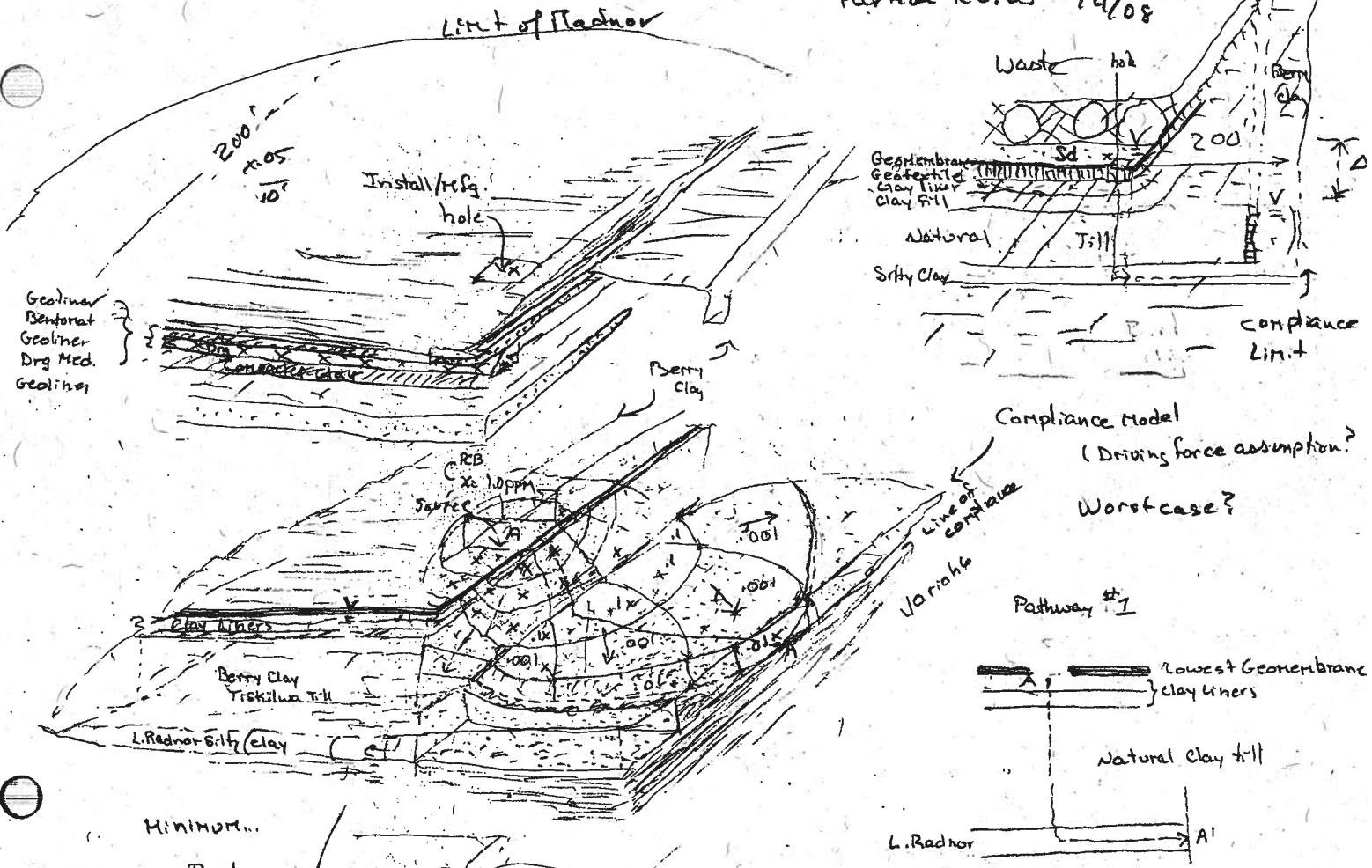
2/2 11/17

Lin... 36 10/21/08

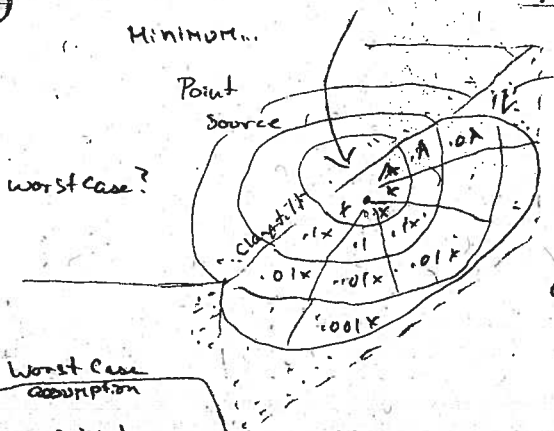
Modelling Notes — Clinton Lf

Existing Hydrochemical Dilution Model

Partial review 9/4/08



Minimum...



Isodilution contours ... Ficks law Flow ... No advection

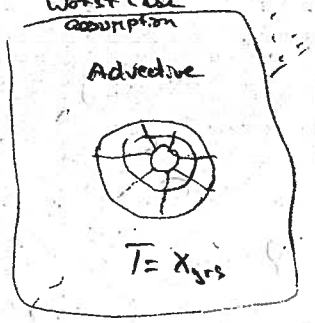
Darcy Law Flow ... advection

Mixed Flow advective/d. ffusive

Concentrations ∝ Area of Square

Measure square to get Concentration Constituents C_1, C_2,

C_1 Concentration drop ∝ Volume, retardation



Advective - retard

diffusive - retard

Laplace block

$r = R_i$ hydraulic area

retarded hydraulic

very retarded

Extremely retarded constituent

Draft

~~Obsolete~~

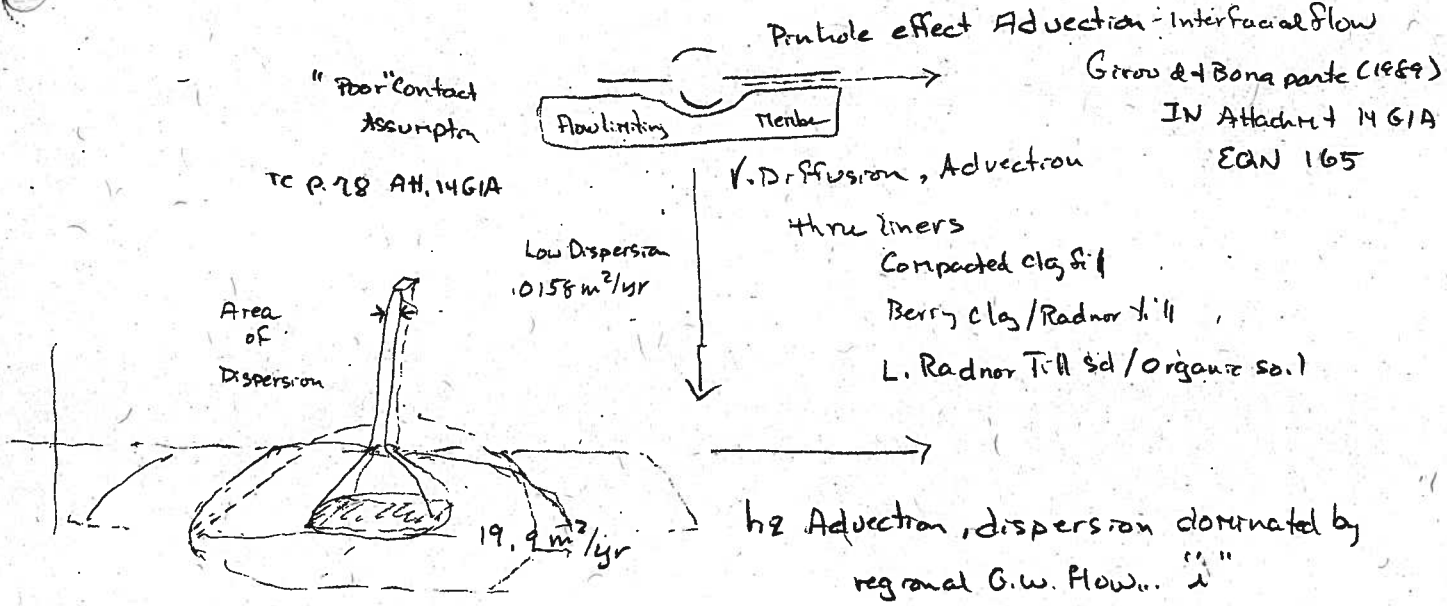
10/24/08

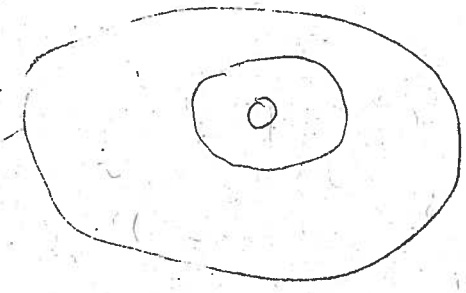
9/4/08

12/11

37

SFG USEPA





Dispersion in Lower Radnor Till Sd.

U.S. EPA Reg 5

Draft

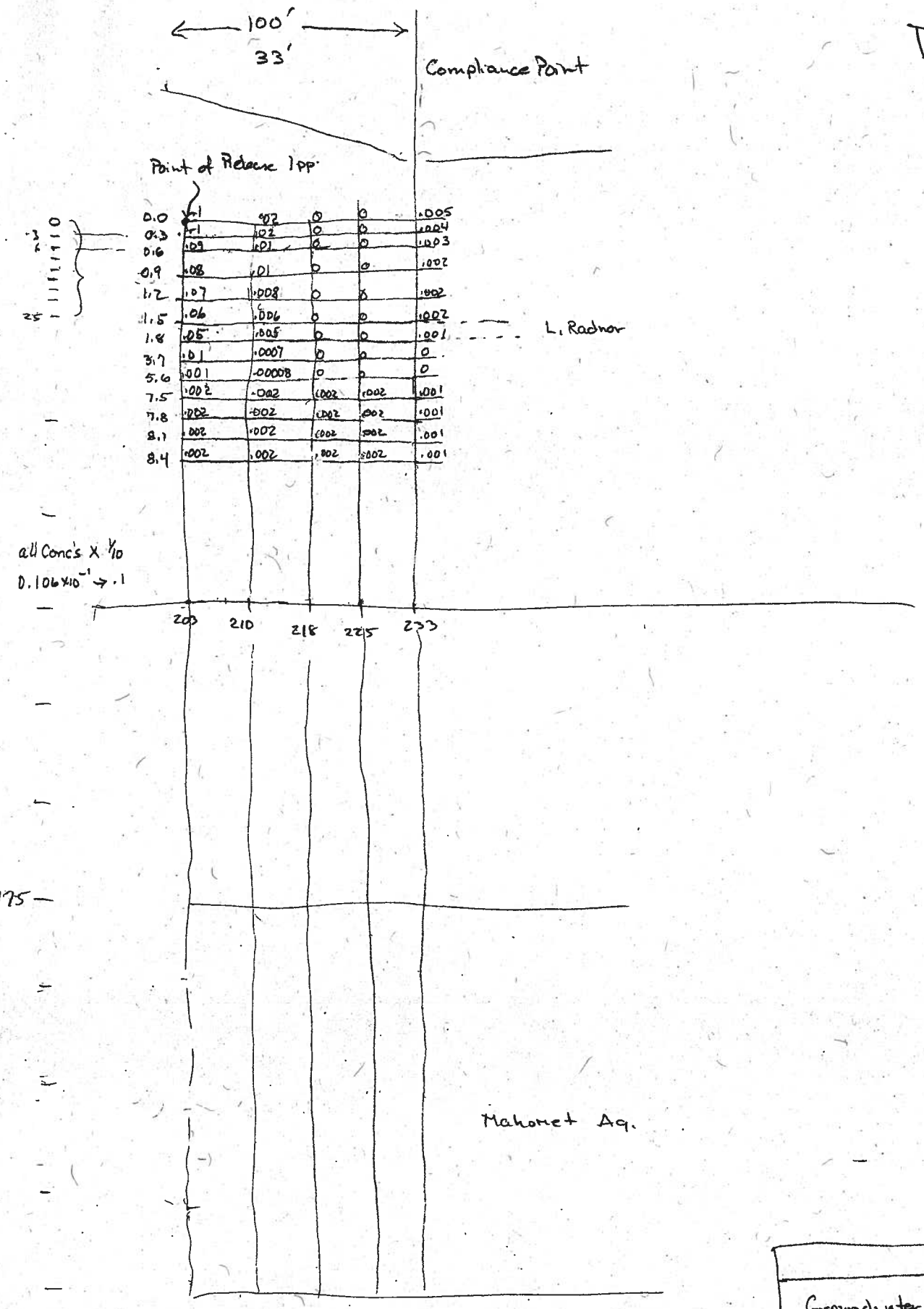
"Illustration of Pinhole"

in Geomembrane

Clinton L.F #3 Clinton IL

S.M. John undated

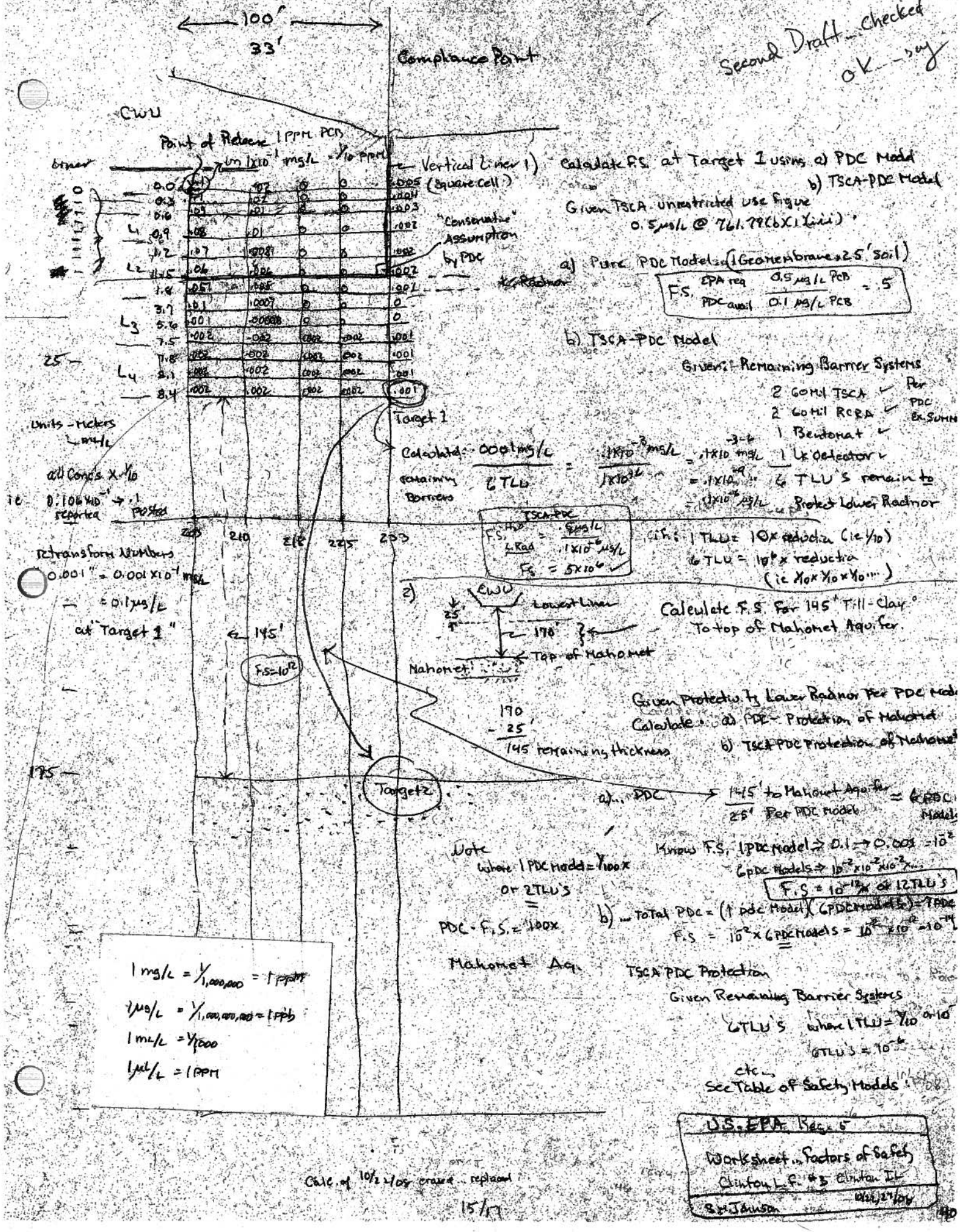
13/17



Draft

Groundwater Impact assessment PDC @ 135yrs... @ 7TLU's

14/17



Second Draft ... Checked OK --> by

1) Calculate F.S. at Target 1 using a) PDC Model
b) TSCA-PDC Model

Given TSCA unrestricted use figure
0.5 µg/L @ 761.79(b)(1)(iii).

a) Pure PDC Model: (1 Geomembrane + 2.5' soil)

$$F.S. = \frac{\text{EPA req}}{\text{PDC avail}} \quad \frac{0.5\ \mu g/L\ PCB}{0.1\ \mu g/L\ PCB} = 5$$

b) TSCA-PDC Model

Given: Remaining Barrier Systems
2 GCMU TSCA ← Per PDC Ex. Summ
2 GCMU RCRA ←
1 Bentonat ←
1 Lk Detector ←
6 TLU's remain to Protect Lower Radnor

$$\text{Calculated} = \frac{.001\ mg/L}{6\ TLU} = \frac{.1\times10^{-3}\ mg/L}{1\times10^{6}} = .1\times10^{-9}\ mg/L = .1\times10^{-3}\ \mu g/L$$

remaining Barriers

$$F.S._{TSCA\text{-}PDC} = \frac{.5\ \mu g/L}{.1\times10^{-3}\ \mu g/L} = 5\times10^{3}$$

$$F.S._{Rad} = 5\times10^{6}$$

if: 1 TLU = 10x reduction (ie 1/10)
6 TLU = 10^6 x reduction
(ie 1/10 x 1/10 x 1/10 ...)

2) Calculate F.S. For 145' Till-Clay to top of Mahomet Aquifer.

Given Protection by Lower Radnor Per PDC Model
Calculate: a) PDC - Protection of Mahomet
b) TSCA-PDC Protection of Mahomet

a) ... PDC → 145' to Mahomet Aquifer / 25' Per PDC Model = 6 PDC Models

Known F.S. 1 PDC Model ⇒ 0.1 → 0.001 = 10^{-3}
6 PDC Models ⇒ $10^{-3} \times 10^{-3} \times 10^{-3} \times \ldots$

F.S. = 10^{-12} or 12 TLU's

b) ... Total PDC = (1 PDC Model)(6 PDC Models) = 7 PDC

F.S. = $10^{-3} \times 6$ PDC Models = $10^{-3} \times 10^{-3} = 10^{-19}$

TSCA PDC Protection
Given Remaining Barrier Systems
6 TLU's where 1 TLU = 1/10 or 10^{-1}
6 TLU's = 10^{-6}
etc.
See Table of Safety Models

U.S. EPA Reg. 5
Worksheet ... Factors of Safety
Clinton L.F. #3 Clinton IL
S.M. Johnson 10/22/27/04

Calc. of 10/24/05 erased ... replaced
15/17
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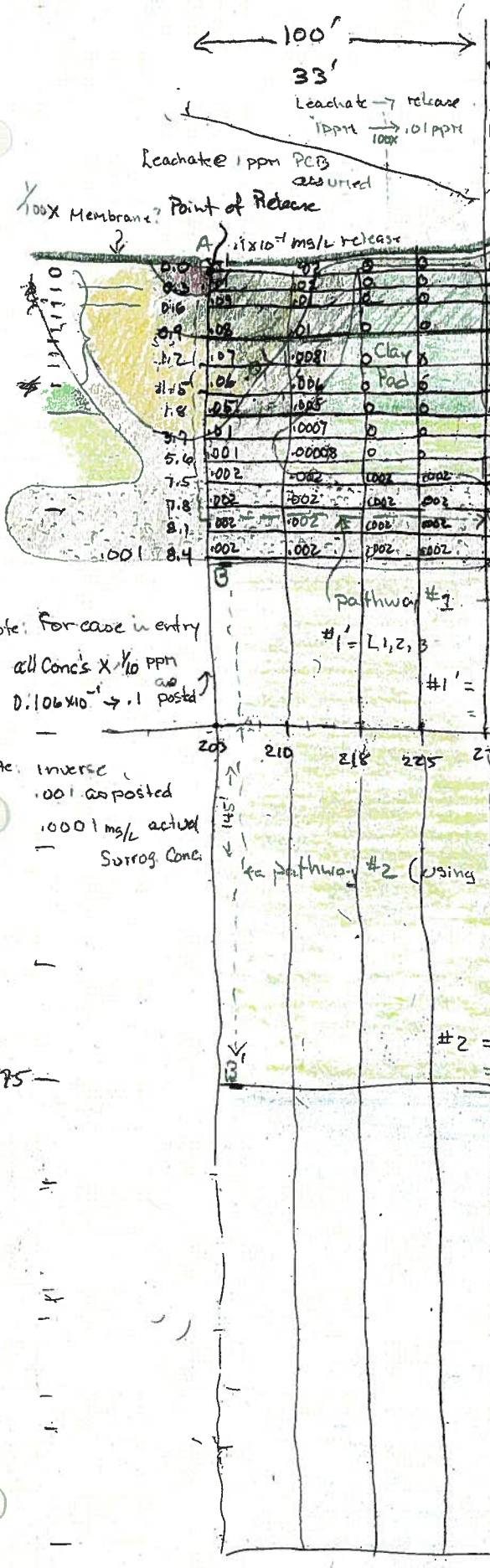
Rough Draft

Factor of Safety Worksheet & GIA Reanalysis of Protectiveness



Want: protectiveness of Pathway B-B' given A-A'

Compliance Point

1) Protectiveness of Geomembrane & Given Puncture Model by PDC

a) If release is 10 µL/L thru Model for pinholes per HELP of "Qian et al"

In PDC GIA Attachment 14:

Conc. Surrog. Release 10 µL/L → (Semi-Perm.) Membrane $\frac{10}{.1\times10^{-4}} = \frac{10}{1\times10^{-5}} = 100$

b) Protectiveness ... → 2 order Mag. Red = 2 TLU's ✓

2) Next. re-evaluation of Tiskilwa Protectiveness... Using GIA Analysis by PDC

a) GIA Concentrations:

1.8m - .05 Top of Tiskilwa/Rad.
↓ 1X reduction ✓ ~1 TLU @ Layer 3 → Layer 3 1 TLU
7.5m - .002 → .001 → Layer 4 0 TLU

No reduction seen in Concentration...

3) Next... re-evaluate F.S. of Layer 1, 2 Using GIA ... 0.0u - 0.1

Layer 1 & 2 = <1 TLU

1.8m - 0.05

$\frac{0.1}{0.05} = \frac{1}{2}$

So $\frac{1}{2} \neq \frac{1}{10}$

4) next extrapolate what is known from Pathway A-A' to Pathway B-B'

Given:

MFG Barrier & membrane w/o defect 2 TLU* in place ✓

Then:

Soil Barriers:		
~~TCEQ modelled~~	Layer 1	<< 1 TLU in place
	Layer 2	< 1 TLU in place
	~~Layer 3~~ REVISED	~~4 TLU's~~ revised
GIA Modelled (per PDC As Interp. by SM&A)	Layer 3 ↙	1 TLU's in place
	Layer 4	0 TLU's in place
		< 4 TLU's Total

Observed per GIA in place...

Soil Mechanics:

Given { 50' 6' clay + 18' Till } = <2 TLU's Geo
~ 25' "base" = <2 TLU's

if 25' base/ran = <2 TLU's (Not including Membrane)

Δ to Mahomet = 145/25 = 6-12 TLU's

Mahomet Aq.

Pathway 1	< 4 TLU's
Pathway 2	11.6 TLU's
Total Soil	15.6 TLU's
Bentomat + HDPE = 8 TLU's (SM&A Barrier Alert 10/16/08)	
Leak. detector	

U.S. EPA Region 5 Rough Draft... Buggy

Mahomet Aquifer Protection Model

Plume Model... @ 135 yrs

Per PDC GIA Feb. 2008

Data From pp 35/71 Attachment 16

Migrate V9 Simulation L. Radnor

SM Johnson 10/22-23/08

where 1 TLU = 1 order of Magnitude change

* where 100x reduction based on PDC calc. for defects (Attachment #14 GIA)

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See pp40!

Draft

This is where I would like to consult w/ Risk folks

Models available

Factor of Safety Table for CWU (PCB-Cell)

Model	Power (TLU's)	Background	F.S.	F.S.	F.S.	F.S.
Chemical / Statistical Model ASSUMED To get from leachate Data to 1.0 mg/L and ignored in PDC (SMJ Model) "Migrate"	9	Remaining = ASSUMPTIONS (applied to PDC by SMJ)				Statistical Chemical PDC-TSCA -Mahomet Model-
TSCA Model... 761.75 2 Liners @ 60 mil = 4 1 Bento Mat = 1 1 Drg Layer = 1	6	Remaining Barrier Systems (assuming 30 mil = 1/10 reduction in Conc.)		PDC-TSCA Model 5×10^{6}	PDC-TSCA Mahomet Model 5×10^{18}	18 + 9 = 27 5×10^{27}
PDC-IEPA Model 1 Liner 25' so. 1 (Migrate V. 9.0)	2	Used barriers (100x reduction) PDC/IEPA Model as observed from Data)	PDC Model 5			
Mahomet Model (Wandalian Layer)	12	Extrapolated from PDC-IEPA Model Model by SMJ				

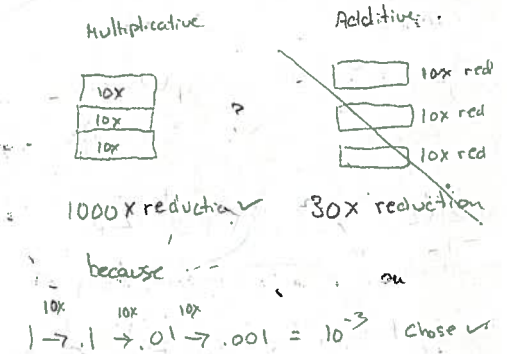
F.S. = Factor of Safety, w/ regard to EPA-TSCA 761.79 PCB rule "Unrestricted discharg" $\leq 0.5 \mu g/L$

1 TLU = TSCA Liner Unit... 30 mil Membrane = 1

Corresponds to 10x reduction of leachate...

(Checks out with PDC's Groundwater Model Calc's...

based on work by Giroud IN HELP Model 3 USEPA/600/R-94/168b)



Conclusion... Pathway from Expectable PCB Concentrations in leachate to "Top of Mahomet Aquifer" (Not modelled to point of Compliance)

- Expected reduction $1/5 \times 10^{27}$ times release... 10^{-12} 10^{-12}

it ½ of a trillionth of a trillionth of one thousandth of "Non-detect" PCB in leachate

U.S. EPA Region 5

Table of Safety Models

Clinton L.F. #3 CWU-PCBCell

DeWitt Co. Ill.

ok's

S.M. Johnson 10/21/08

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