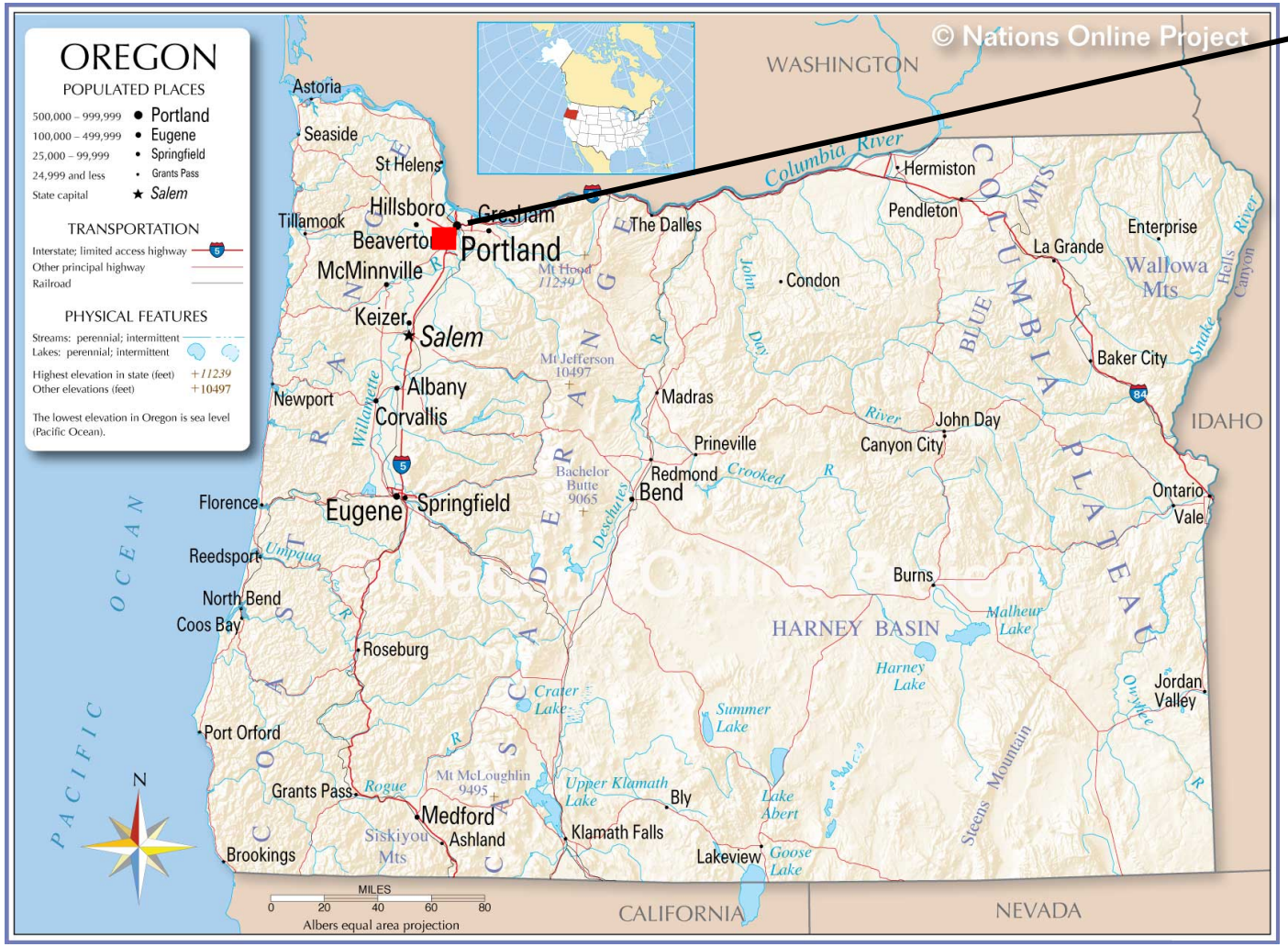
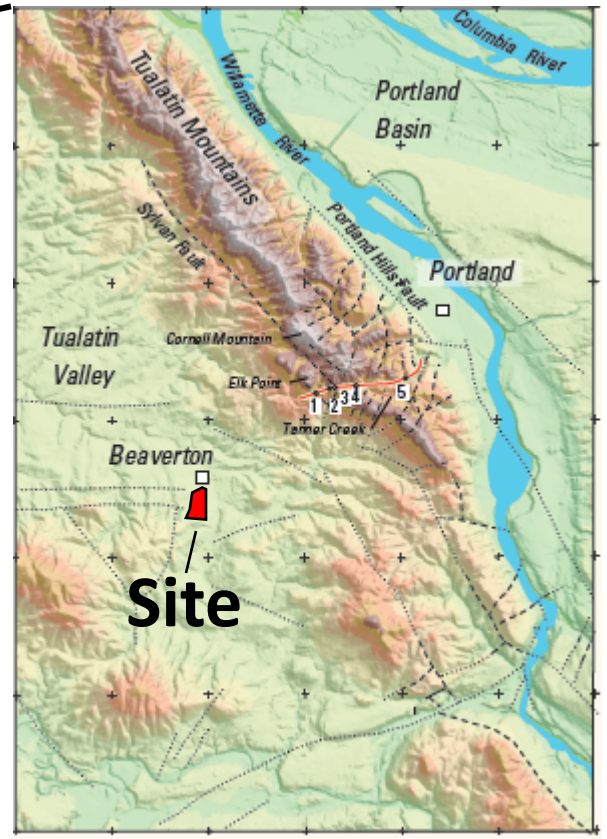
Case Study: View-Master Site, Beaverton, Oregon

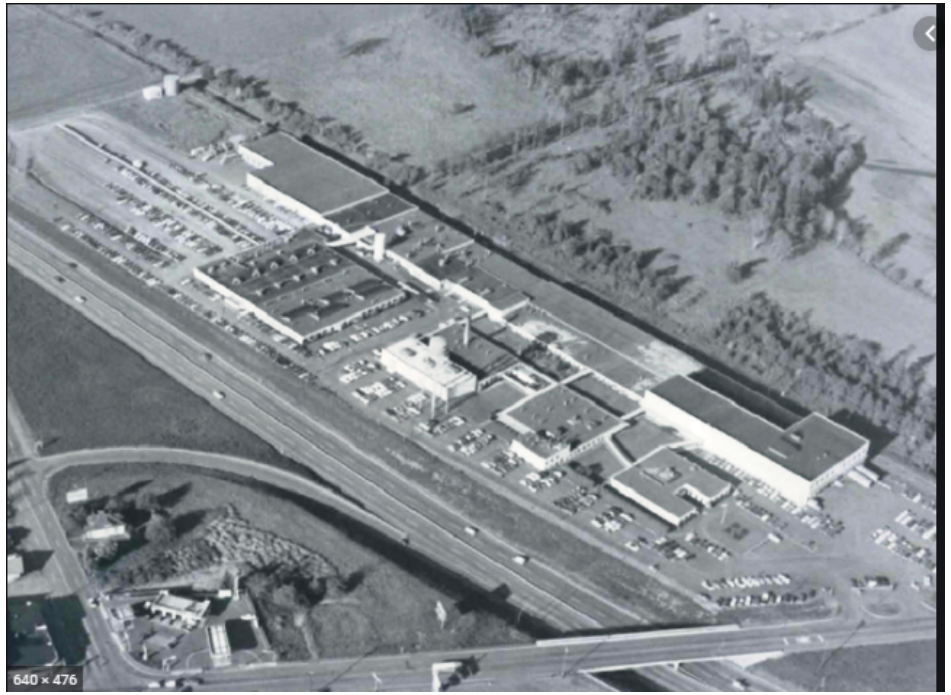
Henning Larsen, RG

View-Master Site, Beaverton Oregon



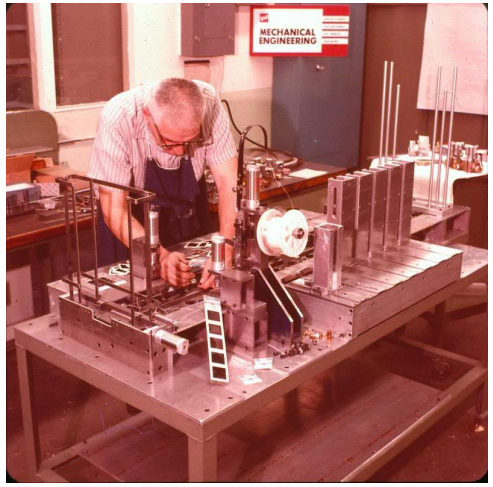


TCE Releases at the View-Master Site



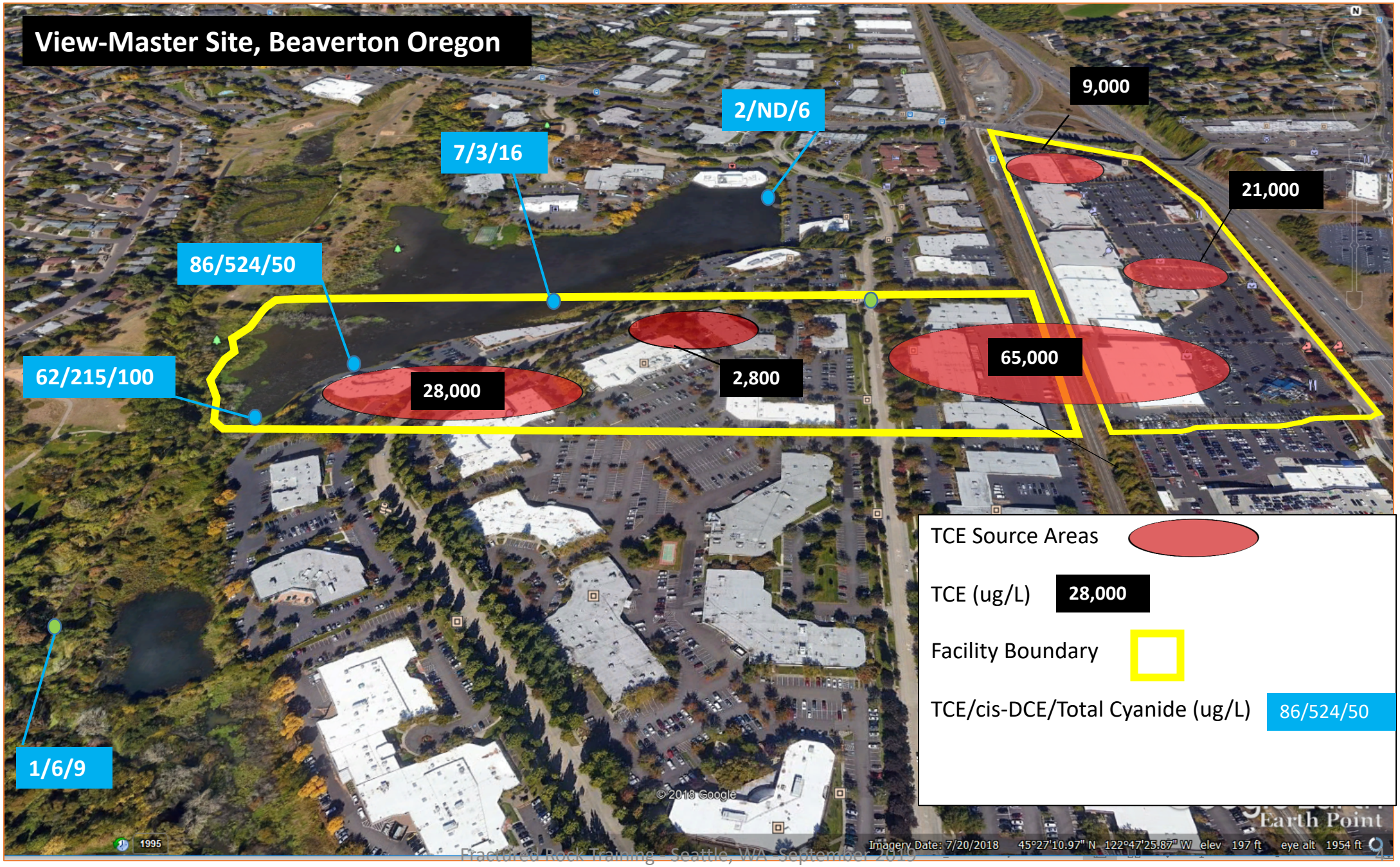
View-Master Campus Circa 1960s

- TCE released via waste disposal, drain fields, vapor degreaser
- 1,200-1,500 ug/L TCE - Industrial Supply Well
- Up to 25,000 Workers Exposed; 1,000 for >5yrs
- Epi Study identified increased incidence of cancer



Factory Work

Water Tower Demolition


View-Master Site, Beaverton Oregon
9,000
2/ND/6
7/3/16
21,000
86/524/50
65,000
2,800
62/215/100
28,000
1/6/9
TCE Source Areas
TCE (ug/L)
28,000
Facility Boundary
TCE/cis-DCE/Total Cyanide (ug/L)
86/524/50
© 2018 Google
Earth Point
1995
Imagery Date: 7/20/2018 45°27'10.97" N 122°47'25.87" W elev 197 ft eye alt 1954 ft

Regional Structural Geology

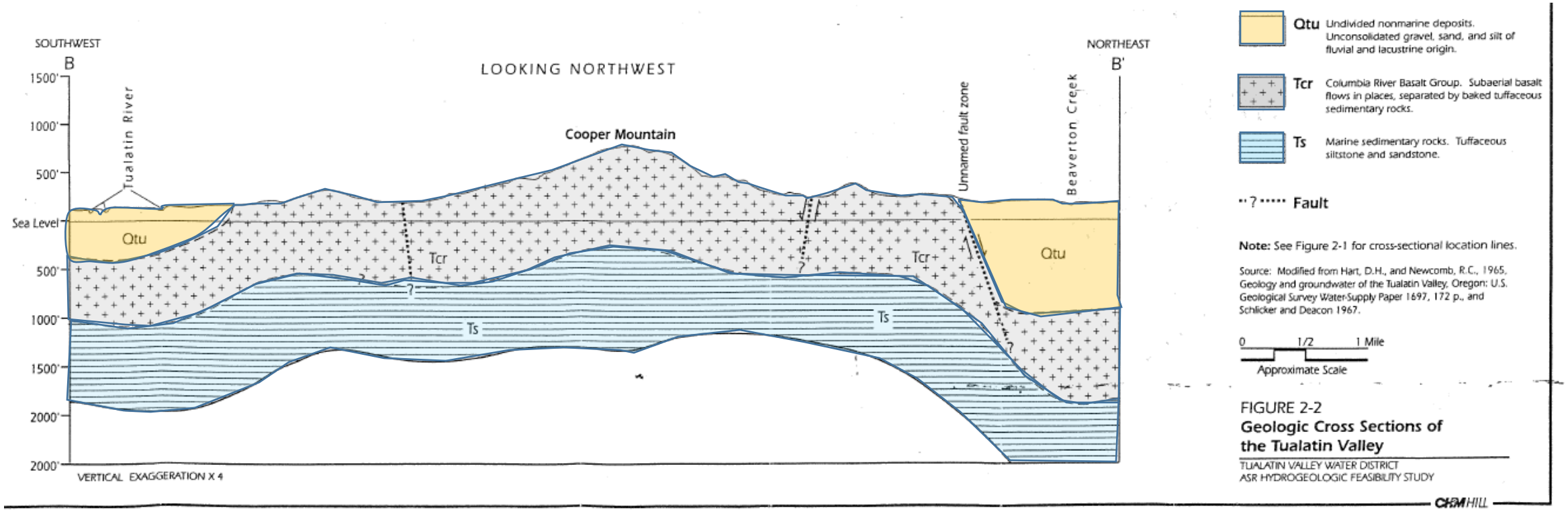
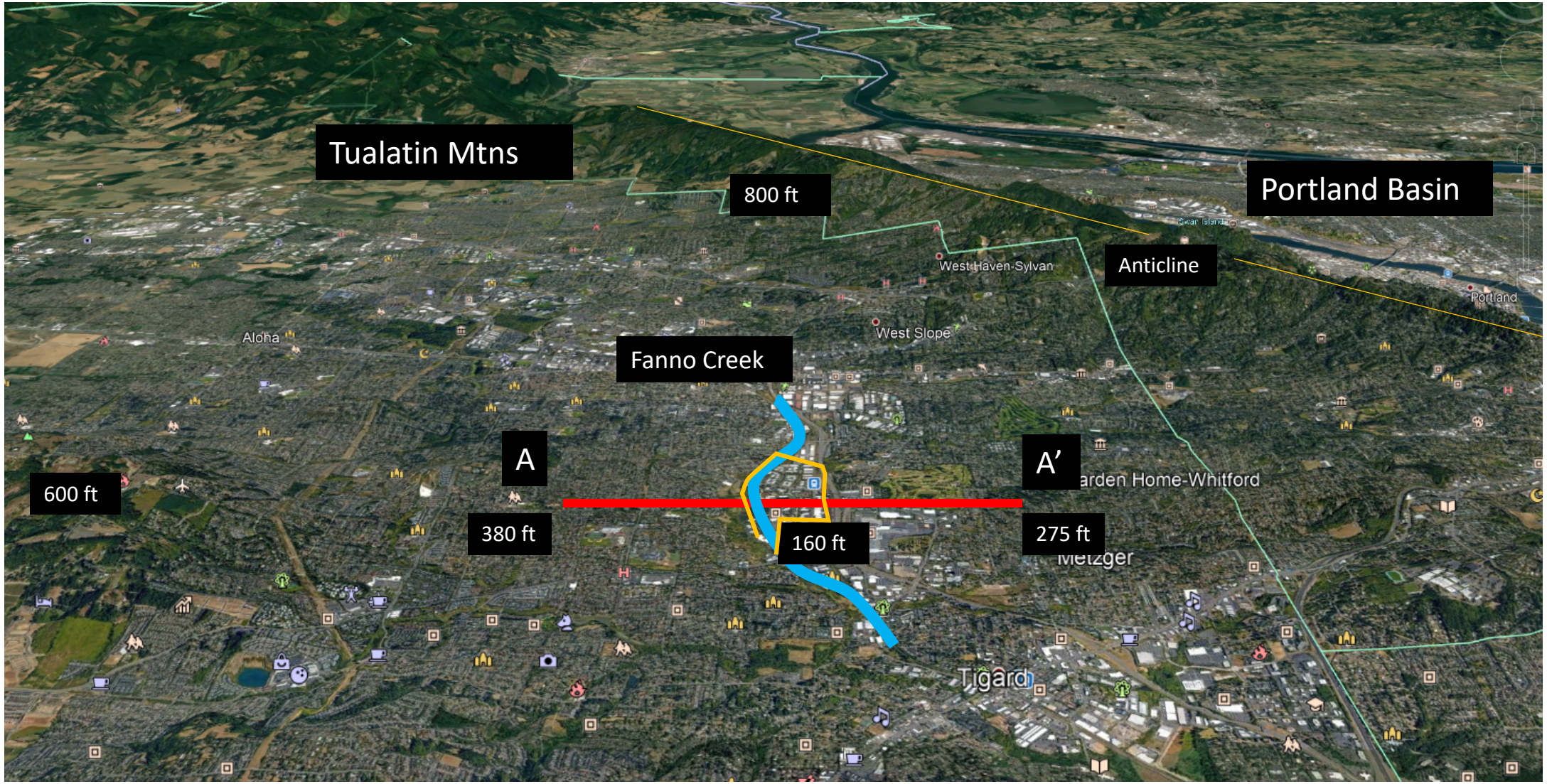
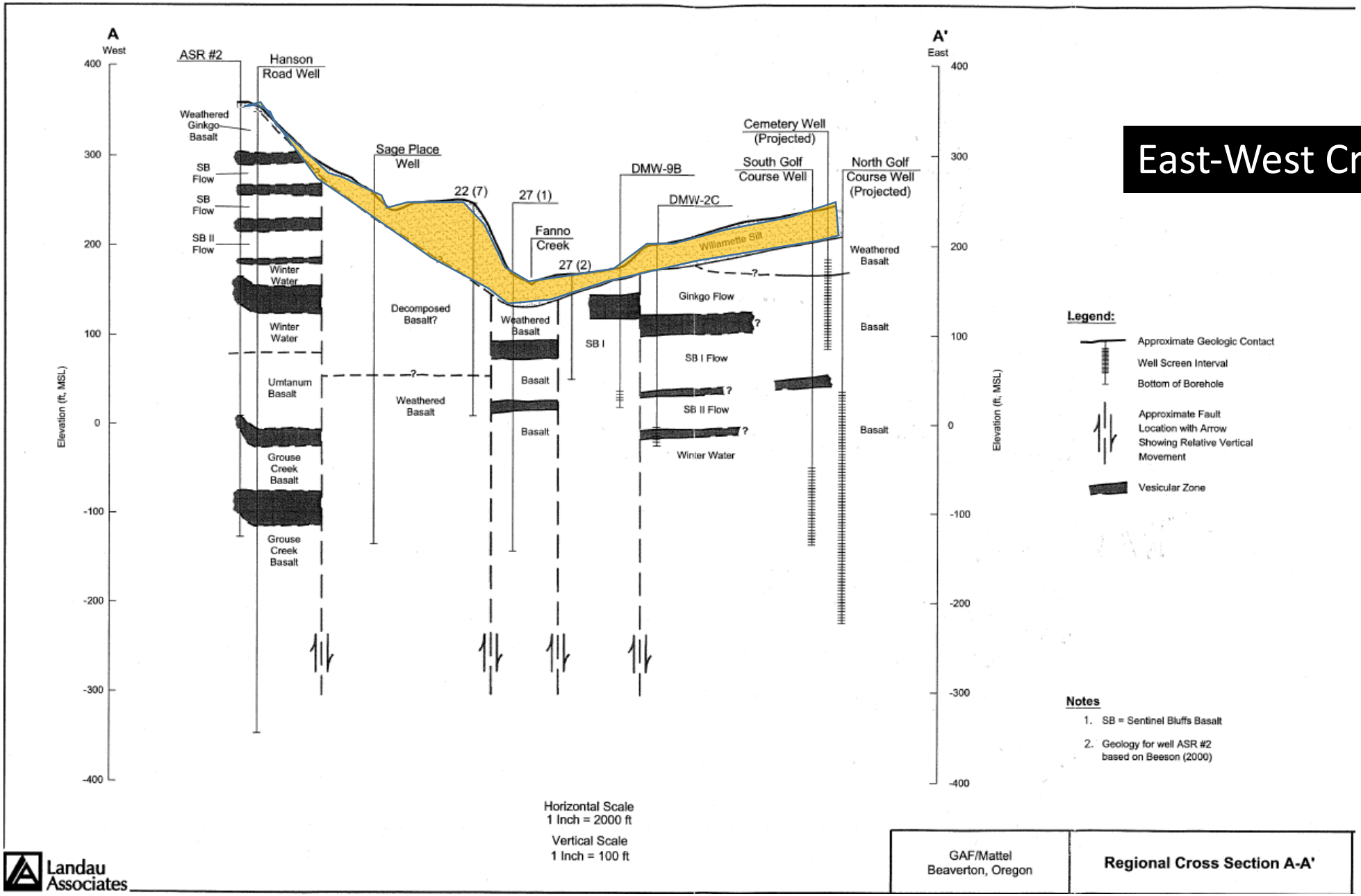


FIGURE 2-2
Geologic Cross Sections of the Tualatin Valley
TUALATIN VALLEY WATER DISTRICT
ASR HYDROGEOLOGIC FEASIBILITY STUDY

CH2MHILL

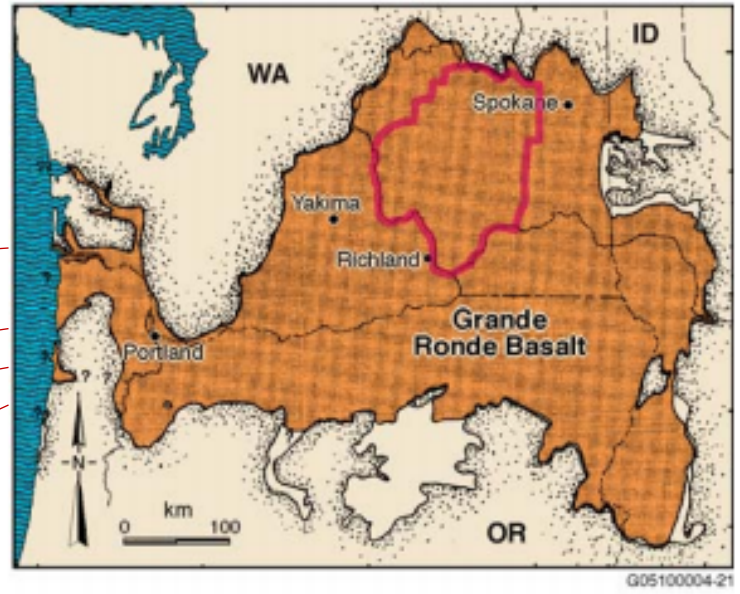

Tualatin Mtns
800 ft
Portland Basin
Anticline
West Haven-Sylvan
Portland
Aloha
West Slope
Fanno Creek
A
A’
600 ft
380 ft
160 ft
275 ft
Metzger
Tigard

East-West Cross-Section



Columbia River Basalt Flows Identified at the Site

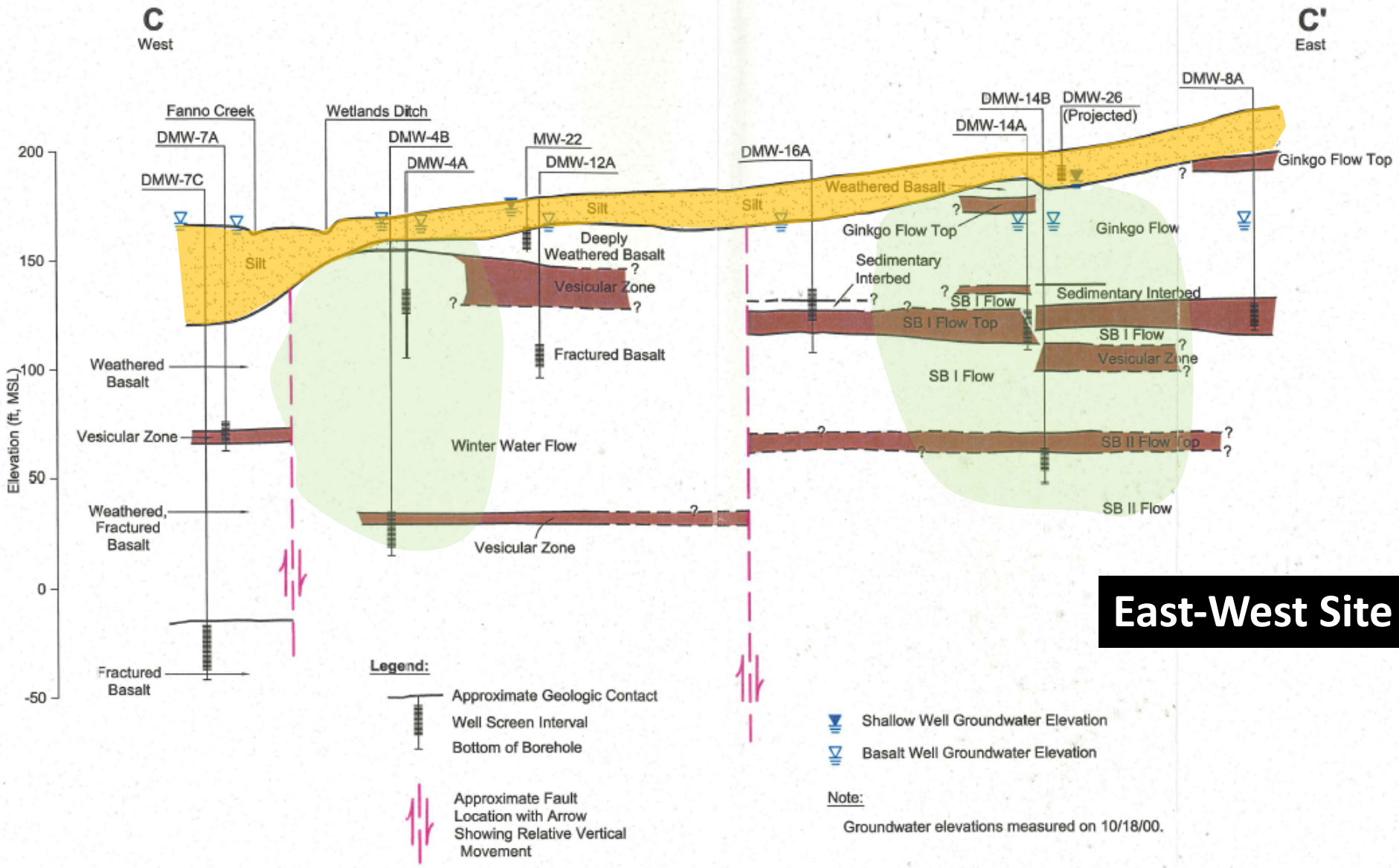
Series	Group	Formation	Member	Isotopic Age (m. y.)	Magnetic Polarity
Miocene / Middle	Columbia River Basalt Group		Basalt of Sillusi		N
			Basalt of Umatilla Member		N
		Wanapum Basalt	Priest Rapids Member	14.5	
			Basalt of Lolo		R
			Basalt of Rosalia		R
			Roza Member		T,R
			Shumaker Creek Member		N
			Frenchman Springs Member		
			Basalt of Lyons Ferry		N
			Basalt of Sentinel Gap		N
			Basalt of Sand Hollow	15.3	N
			Basalt of Silver Falls		N,E
			Basalt of Ginkgo		
			Basalt of Palouse Falls		E
			Eckler Mountain Member		
			Basalt of Dodge		N
			Basalt of Robinette Mountain		N
			Vantage Horizon		
		Grande Ronde Basalt	Member of Sentinel Bluffs	15.6	
			Member of Slack Canyon		
			Member of Field Springs		N_2
			Member of Winter Water		
			Member of Umtanum		
			Member of Ortley		
			Member of Armstrong Canyon		
			Member of Meyer Ridge		
			Member of Grouse Creek		
			Member of Wapshilla Ridge		
			Member of Mt. Horrible		



Columbia River Basalts in their Native Habitat

Palouse Canyon, the Sentinel Bluffs flows of the Grand Ronde Formation are seen on the bottom, covered by the Ginkgo Flow of the Wanapum Basalt.

Hydrogeologic Blocks of Columbia River Basalt Group: View-Master Site

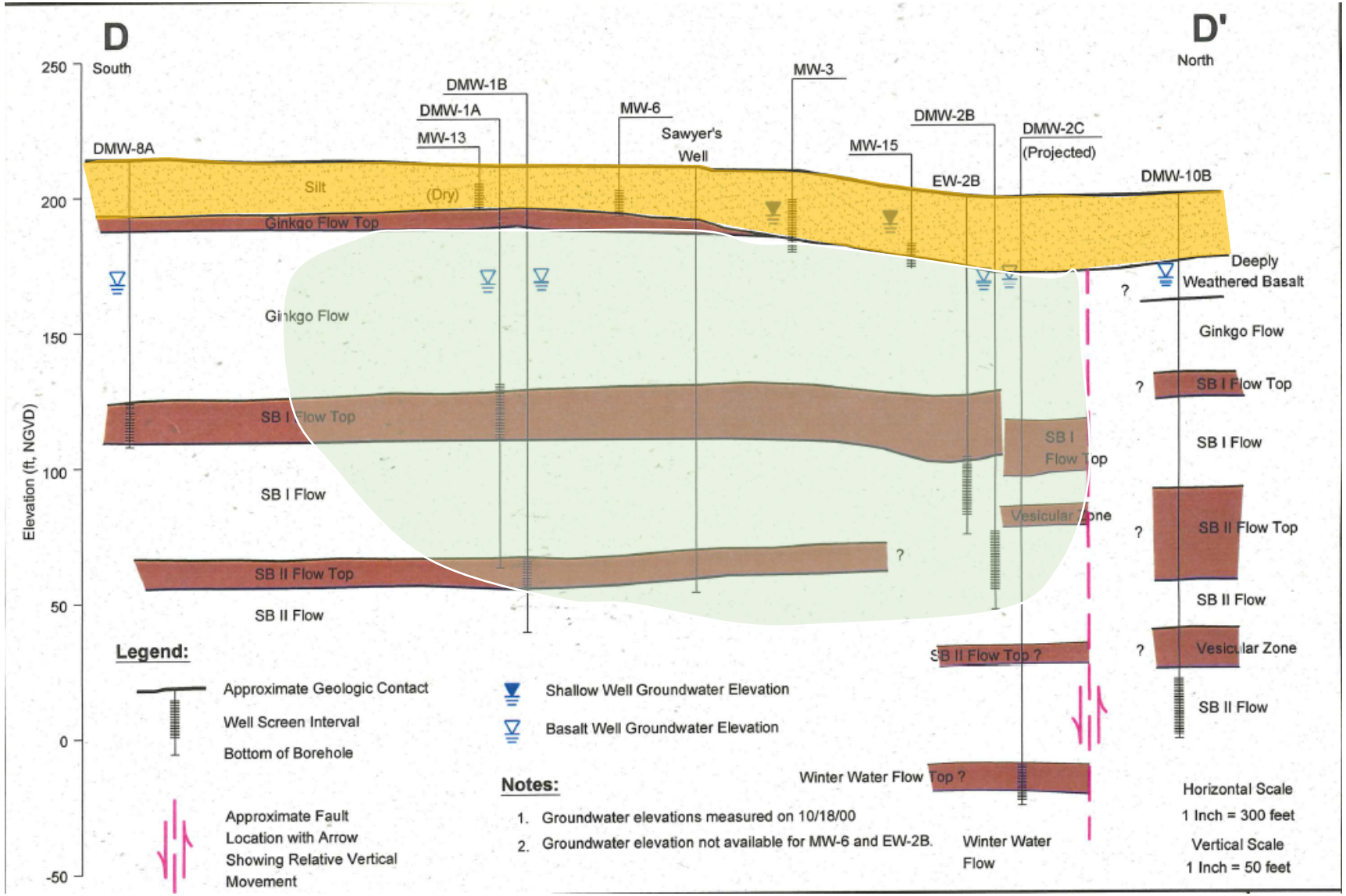


TCE Plume

Willamette Silt

CRB Flow Top

East-West Site Cross-Section

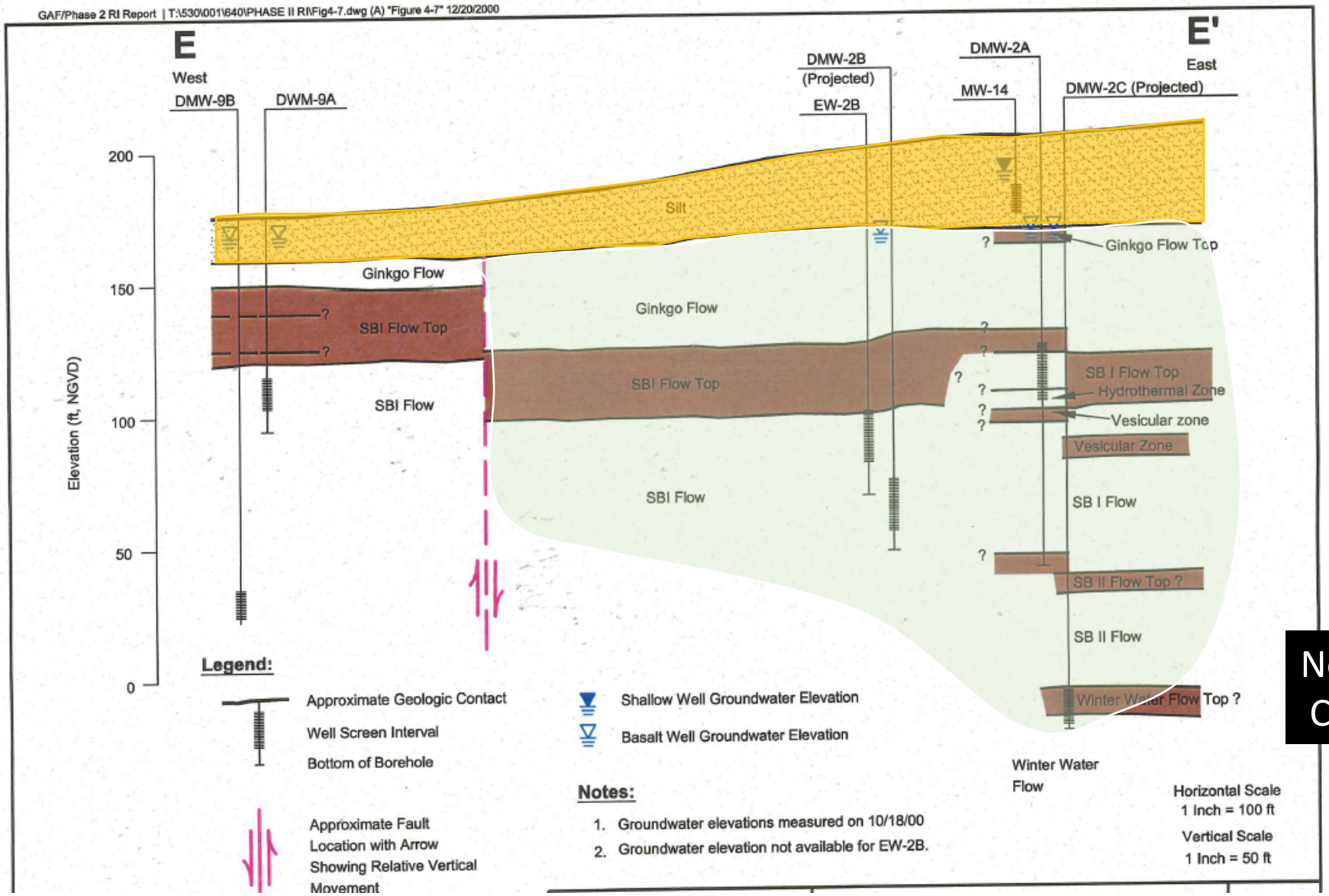


TCE Plume

Willamette Silt

CRB Flow Top

North-South Cross-Section



TCE Plume

Willamette Silt

CRB Flow Top

Northwest-Southeast Cross-Section

Distribution of Flow in CRB Sheet Flow Basalts

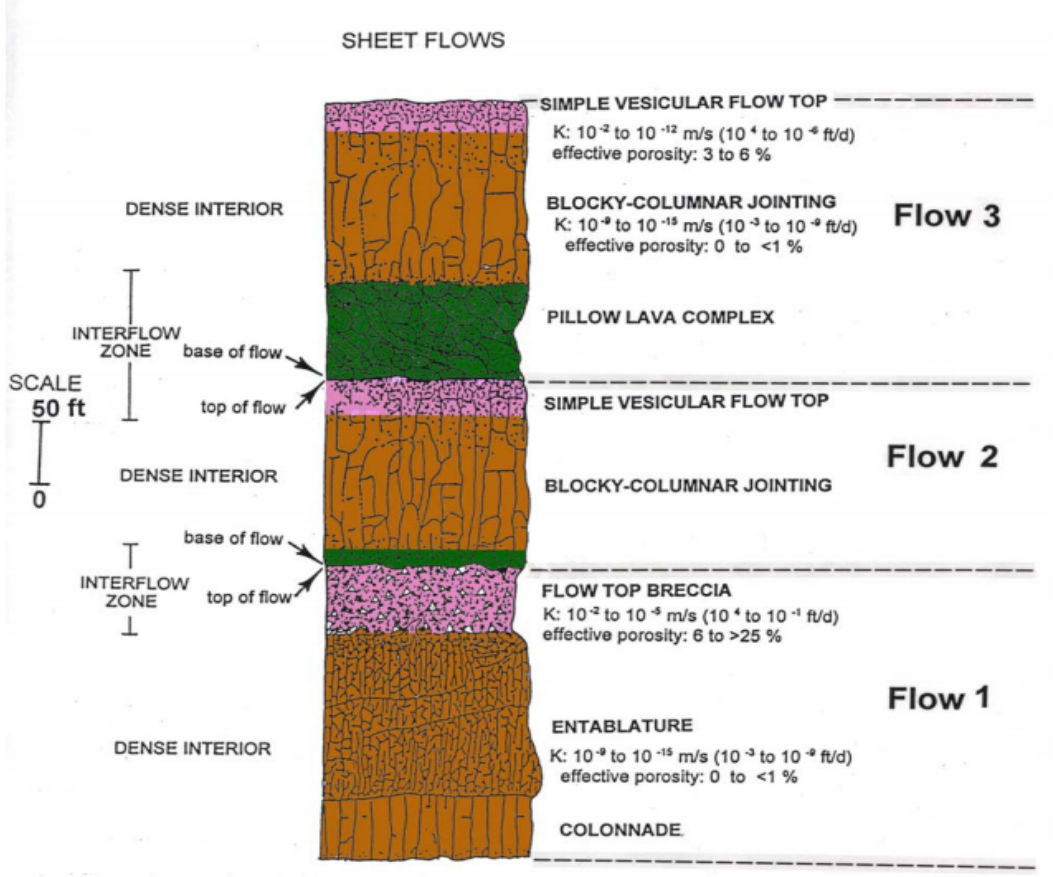
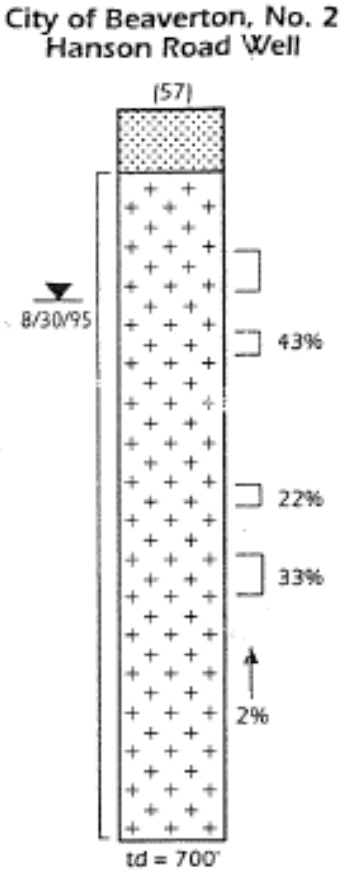
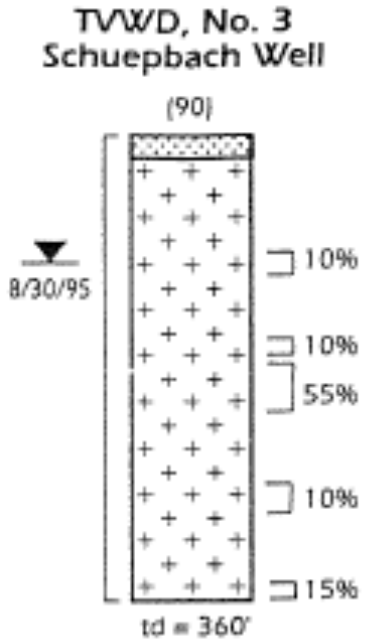


Figure 8. Diagram showing the basic intraflow structures found in typical CRBG sheet flows.

Basalt Well Spinner Logs





A SUMMARY OF COLUMBIA RIVER BASALT GROUP GEOLOGY AND ITS INFLUENCE ON THE HYDROGEOLOGY OF THE COLUMBIA RIVER BASALT AQUIFER SYSTEM: COLUMBIA BASIN GROUND WATER MANAGEMENT AREA OF ADAMS, FRANKLIN, GRANT, AND LINCOLN COUNTIES

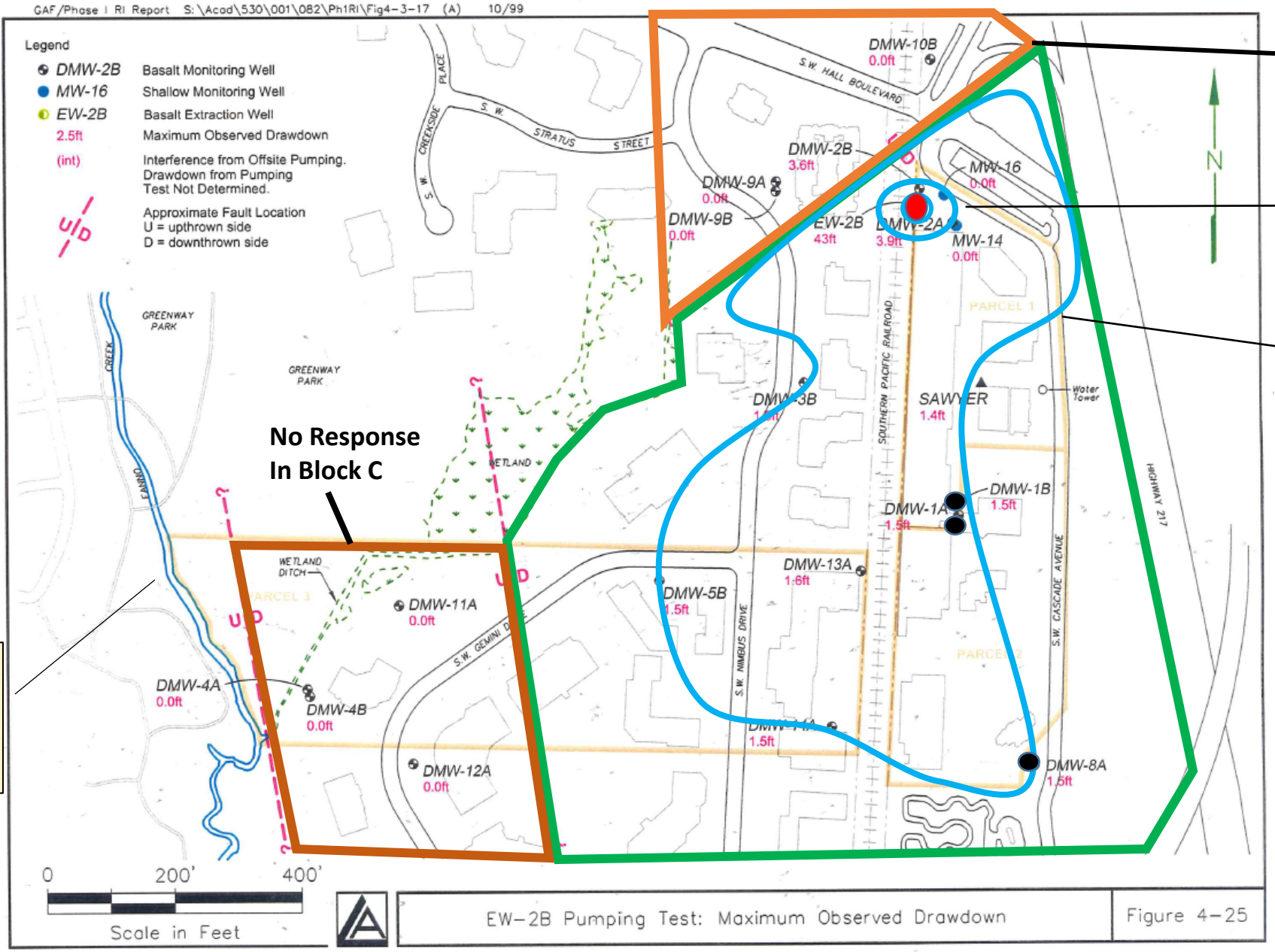
JUNE 2009

PREPARED BY:

THE COLUMBIA BASIN GROUND WATER MANAGEMENT AREA
OF ADAMS, FRANKLIN, GRANT, AND LINCOLN COUNTIES
449 E. CEDAR BLVD.
OTHELLO, WASHINGTON 99344
509-488-3409
www.cbgwma.org

AUTHORS:

TERRY TOLAN, LHG, KEVIN LINDSEY, LHG, AND JOHN PORCELLO, LHG
GSI WATER SOLUTIONS, INC.
1020 NORTH CENTER PARKWAY, SUITE F
KENNEWICK, WASHINGTON 99336



No Response in Block D

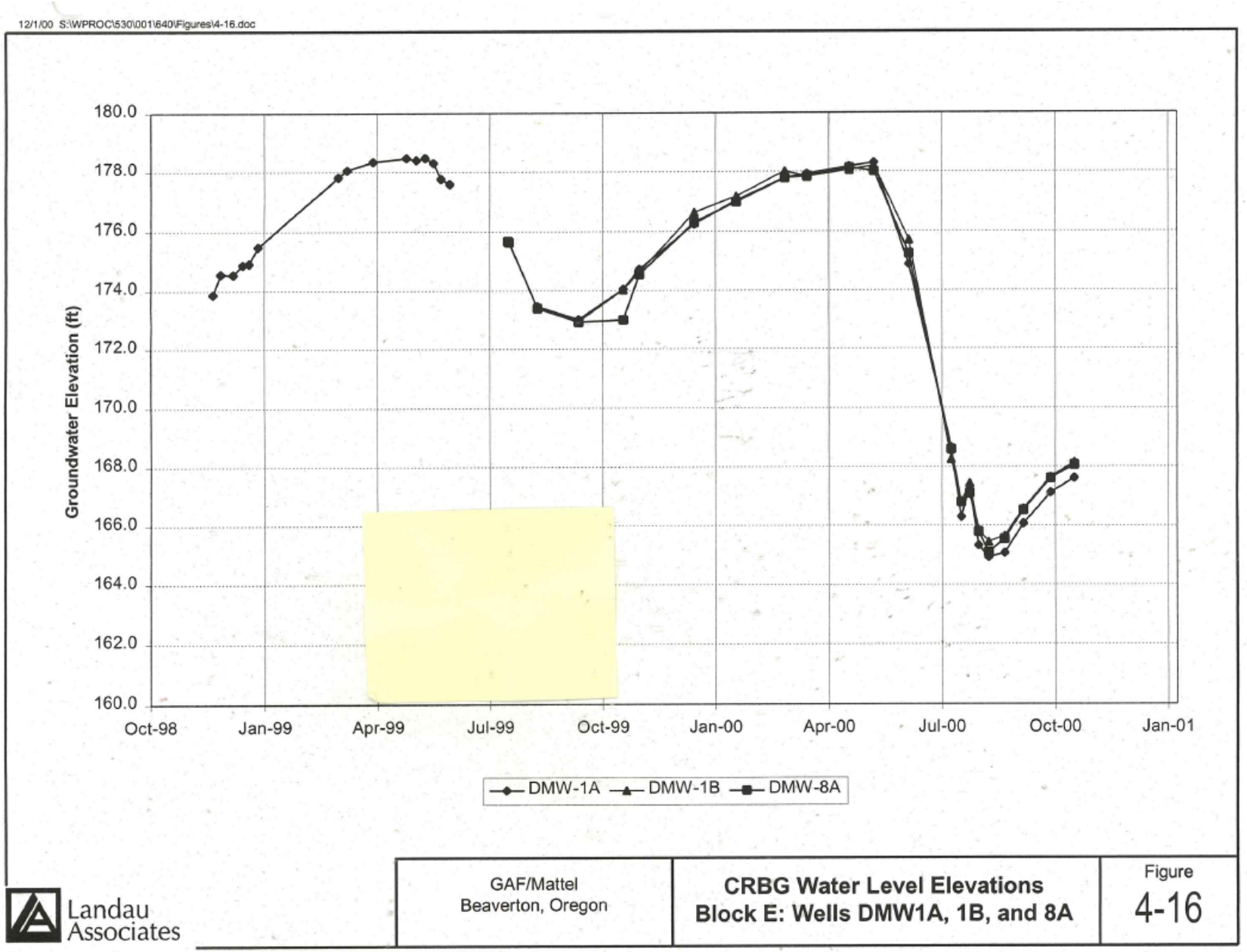
4 ft drawdown

1.5 ft drawdown contour within Block E

No Response In Block C

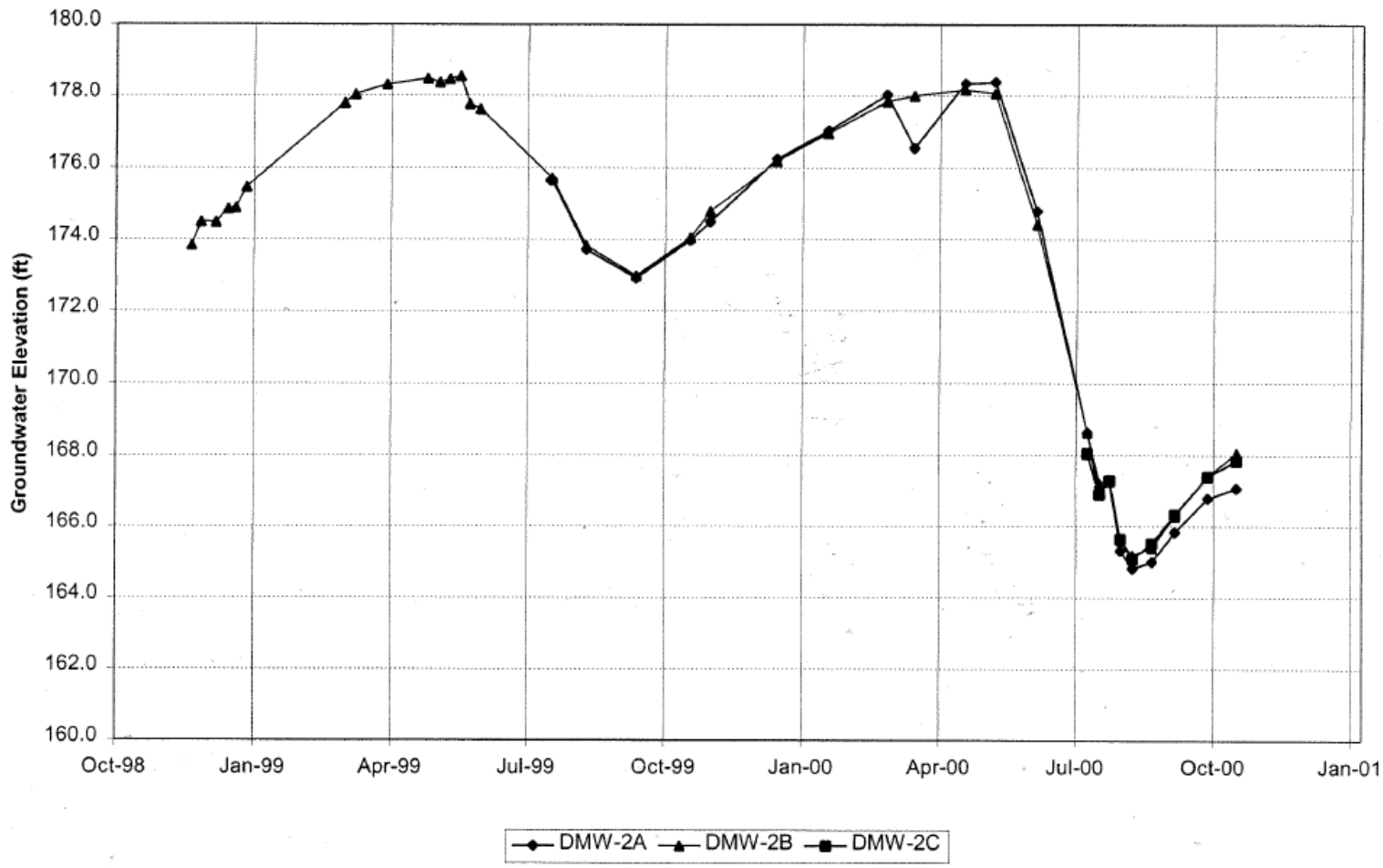
Extraction Well

Estimated 120 gpm groundwater inflow based on average gain of Fanno Creek



High lateral and Vertical conductivity and hydraulic connection within Blocks

12/1/00 S:\WPROC\530\001\640\Figures\4-15.doc



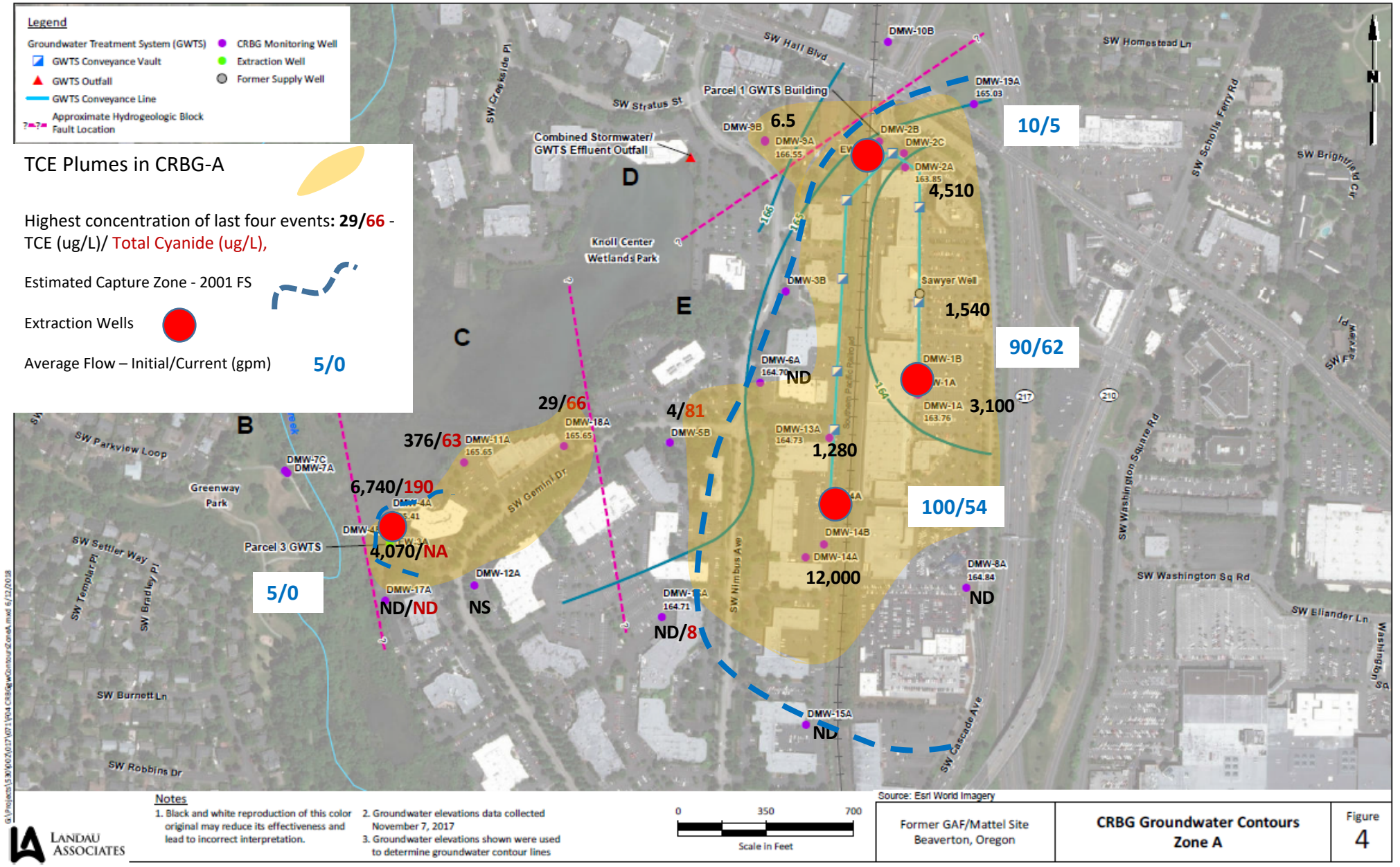
Landau Associates

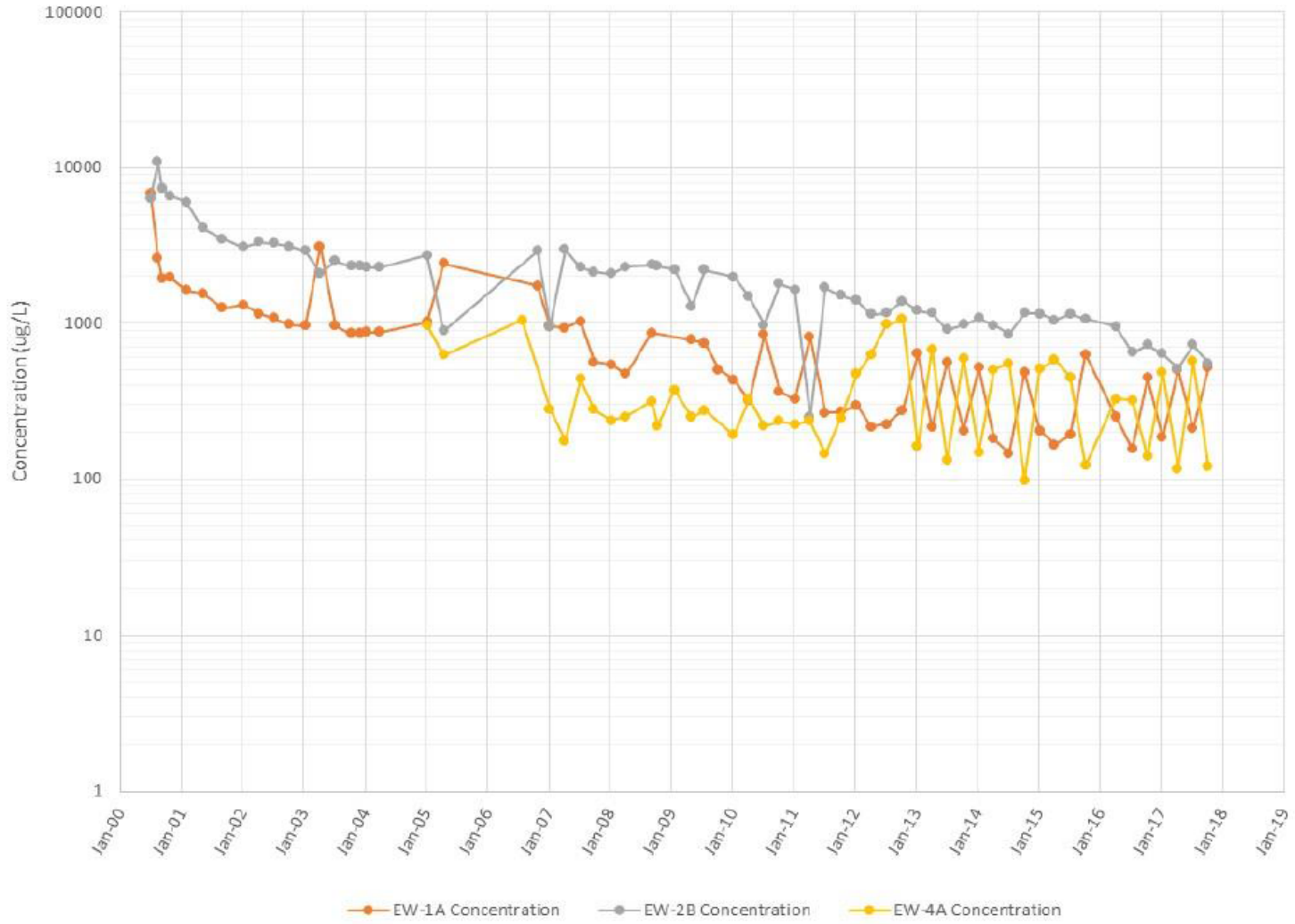
GAF/Mattel Beaverton, Oregon	**CRBG Water Level Elevations Block E: Wells DMW-2A, 2B, and 2C**	Figure 4-15

Strong Vertical Hydraulic Connection

- Head similarities
- Deep contaminant migration

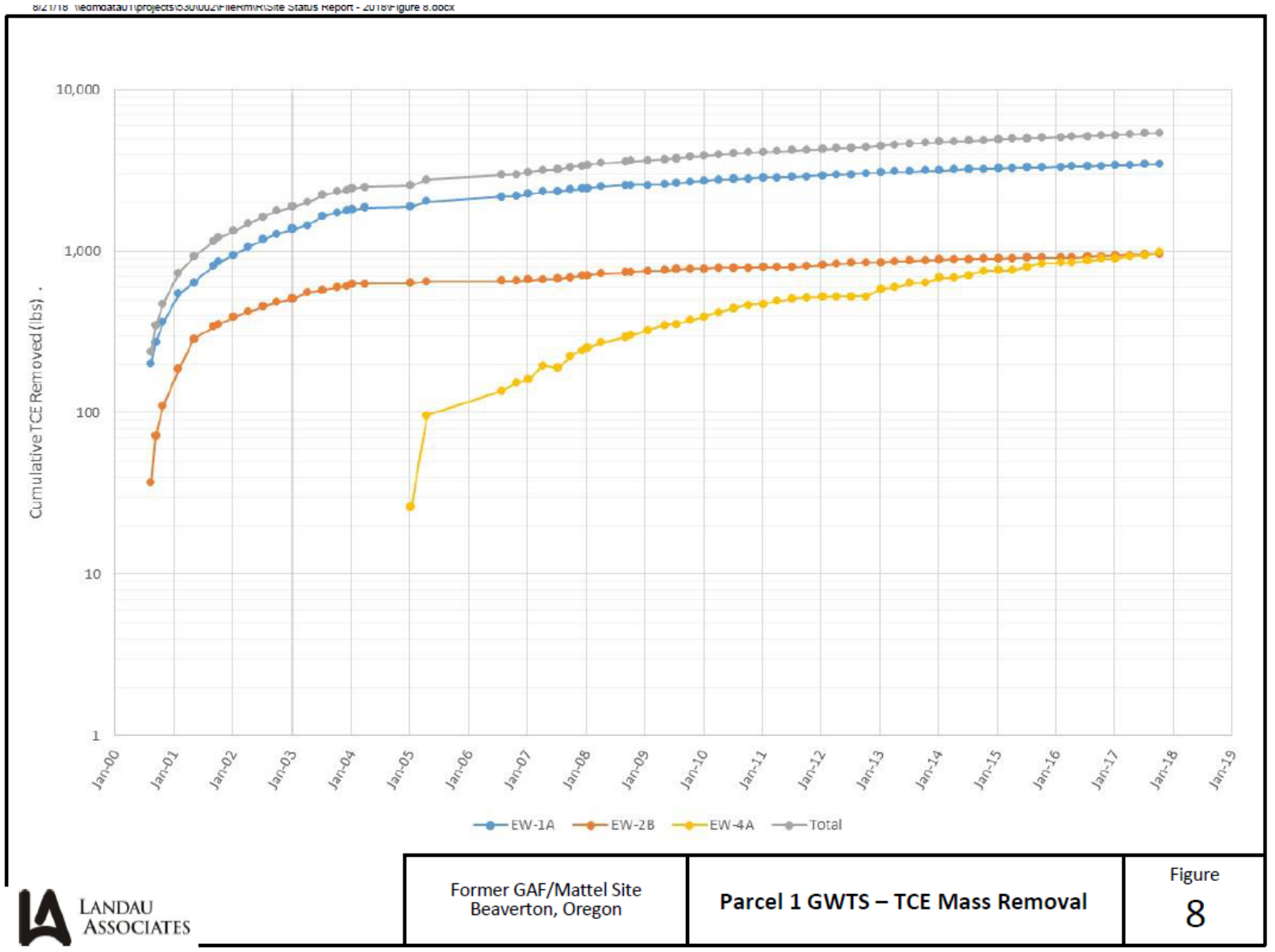
130 ft vertical separation between DMW-2A and DMW-2C


Legend
Groundwater Treatment System (GWTS)
GWTS Conveyance Vault
GWTS Outfall
GWTS Conveyance Line
Approximate Hydrogeologic Block Fault Location
CRBG Monitoring Well
Extraction Well
Former Supply Well
TCE Plumes in CRBG-A
Highest concentration of last four events: 29/66 - TCE (ug/L)/ Total Cyanide (ug/L),
Estimated Capture Zone - 2001 FS
Extraction Wells
Average Flow – Initial/Current (gpm) 5/0
Parcel 1 GWTS Building
Combined Stormwater/ GWTS Effluent Outfall
Parcel 3 GWTS
Knoll Center Wetlands Park
Greenway Park
Sawyer Well
DMW-10B
DMW-19A
DMW-9B
DMW-9A
DMW-2B
DMW-2C
DMW-2A
DMW-3B
DMW-6A
DMW-1B
DMW-1A
DMW-13A
DMW-5B
DMW-11A
DMW-18A
DMW-7C
DMW-7A
DMW-4A
DMW-12A
DMW-17A
DMW-14B
DMW-14A
DMW-8A
DMW-15A
6.5
4,510
1,540
3,100
1,280
12,000
ND
ND
ND/8
NS
ND/ND
4,070/NA
6,740/190
376/63
29/66
4/81
10/5
90/62
100/54
5/0
A
B
C
D
E
SW Hall Blvd
SW Stratus St
SW Crestside Pl
SW Homestead Ln
SW Scholls Ferry Rd
SW Brightfield Cir
SW Parkview Loop
SW Gemini Dr
SW Settler Way
SW Templar Pl
SW Bradley Pl
SW Burnett Ln
SW Robbins Dr
SW Nimbus Ave
SW Washington Square Rd
SW Washington Sq Rd
SW Eliander Ln
SW Cascade Ave
Source: Esri World Imagery
Notes
1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.
2. Groundwater elevations data collected November 7, 2017
3. Groundwater elevations shown were used to determine groundwater contour lines
0 350 700
Scale in Feet
Landau Associates
Former GAF/Mattel Site
Beaverton, Oregon
CRBG Groundwater Contours
Zone A
Figure
4

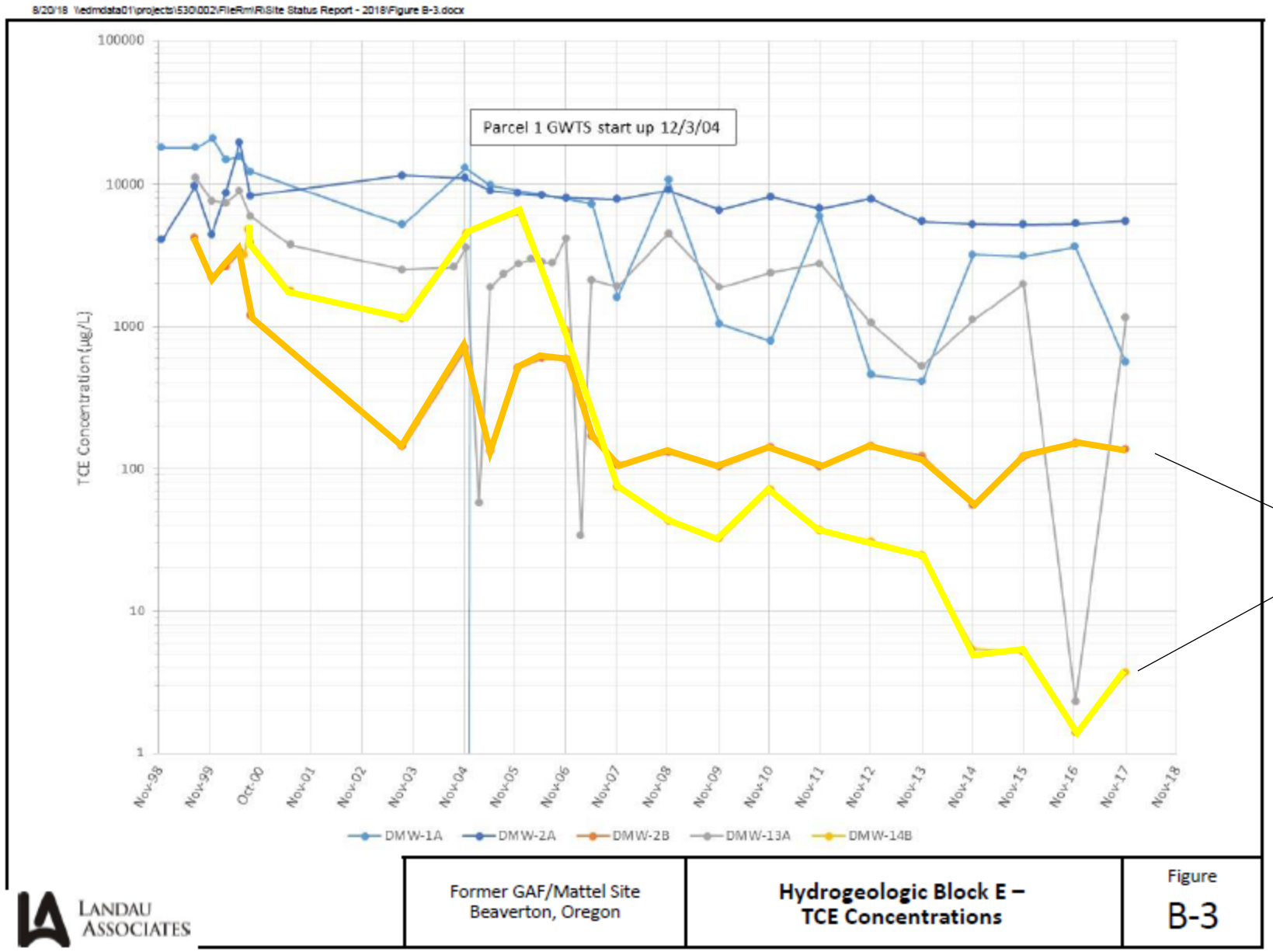


LANDAU ASSOCIATES

Former GAF/Mattel Site Beaverton, Oregon	**Parcel 1 GWTS – Extraction Well TCE Concentrations**	Figure 9


8/21/18 \\edmdata01\projects\830\002\FileRM\R\Site Status Report - 2018\Figure 8.docx
10,000
1,000
100
10
1
Cumulative TCE Removed (lbs)
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
Jan-13
Jan-14
Jan-15
Jan-16
Jan-17
Jan-18
Jan-19
EW-1A
EW-2B
EW-4A
Total
LANDAU ASSOCIATES
Former GAF/Mattel Site
Beaverton, Oregon
Parcel 1 GWTS – TCE Mass Removal
Figure
8

TCE Concentrations Block E



Deeper Aquifer

Conclusions

Interflow zones have high lateral conductivity and transmissivity, but offset by faults can disconnect zones in adjacent blocks

Faults Act as Flow Barriers
- No hydraulic response across inferred faults
- Steep seasonal gradients

Faults Convey Water
- Deep groundwater discharge to wetland and Fanno Creek
- Discharge of contaminated groundwater to Koll Center Wetlands

Flow Within Blocks – Interflow zones are highly conductive within fault blocks and are inter-connected vertically (water tank)

Pump and Treat Alone has limited success in remediating groundwater in this geologic setting