24/00 — 261

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No
Permit No **48**

(1) OWNER: Name DAVID R.B. SWENSON Address 14416 S.E. 18TH Bellevue, WN 98007

(2) LOCATION OF WELL: County KING W 1/2 - NW 1/4 1/4 Sec 28 T 24 N. R 8 E W

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic [X] Industrial [ ] Municipal [ ]
Irrigation [ ] Test Well [ ] Other [ ]

(4) TYPE OF WORK: Owner's number of well (if more than one)
New well [ ] Method: Dug [ ] Bored [ ]
Deepened [X] Cable [X] Driven [ ]
Reconditioned [ ] Rotary [ ] Jetted [ ]

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 260 ft. Depth of completed well 260 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6 " Diam. from 230 ft. to 260 ft.
Threaded [ ] " Diam. from ft. to ft.
Welded [X] " Diam. from ft. to ft.

Perforations: Yes [ ] No [X]
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes [ ] No [X]
Manufacturer's Name
Type Model No
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes [ ] No [X] Size of gravel:
Gravel placed from ft. to ft.

Surface seal: Yes [ ] No [ ] To what depth? N/A ft.
Material used in seal
Did any strata contain unusable water? Yes [ ] No [ ]
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level 245 ft. below top of well Date 3-4-83
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes [ ] No [X] If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test 7-8 gal./min. with 2-3 ft. drawdown after 3 hrs.
Artesian flow N/A g.p.m. Date
Temperature of water Was a chemical analysis made? Yes [ ] No [X]

(10) WELL LOG: (60)

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
BROWN CONGLOMERATED SAND & GRAVEL	230	249
BROWN LAYERED, WASHED SAND & GRAVEL	249	260

Work started 3-2 19 83 Completed 3-5 19 83

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME BURRAS DRILLING COMPANY
(Person, firm, or corporation) (Type or print)

Address 1519 DAYTON CT N.E RENTON 98

[Signed] Jan Burras
(Well Driller)

License No. 0690 Date 3-15 19 83

(USE ADDITIONAL SHEETS IF NECESSARY)

Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

SS&G #2

Water Right Permit No. G1-24839P

49

(1) OWNER: Name Snoqualmie Sand & Gravel Address P.O. Box 492 Snoqualmie, 98065

(2) LOCATION OF WELL: County King NW ¼ NW ¼ Sec 20 T. 24 N. R 8 W.M.

(2a) STREET ADDDRESS OF WELL (or nearest address) SS&G 2

(3) PROPOSED USE: ☐ Domestic ☐ Irrigation ☐ DeWater Industrial ☒ Test Well ☐ Municipal ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)
Abandoned ☐ New well ☒ Deepened ☐ Reconditioned ☐ Method: Dug ☐ Cable ☐ Rotary ☒ Bored ☐ Driven ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 8 inches.
Drilled 354 feet. Depth of completed well 354 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 8 " Diam. from 0 ft. to 334 ft.
Welded ☒ Liner installed ☐ Threaded ☐ _____ " Diam. from _____ ft. to _____ ft.
_____ " Diam. from _____ ft. to _____ ft.

Perforations: Yes ☐ No ☒
Type of perforator used _____
SIZE of perforations _____ in. by _____ in.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.

Screens: Yes ☒ No ☐
Manufacturer's Name Johnson
Type Stainless Model No. _____
Diam. 8" Slot size .100 from 334 ft. to 344 ft.
Diam. 8" Slot size .080 from 344 ft. to 354 ft.

Gravel packed: Yes ☐ No ☒ Size of gravel _____
Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes ☒ No ☐ To what depth? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? _____ Depth of strata _____
Method of sealing strata off _____

(7) PUMP: Manufacturer's Name _____
Type: _____ H.P. _____

(8) WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
Static level 157 ft. below top of well Date 4-7-88
Artesian pressure _____ lbs. per square inch Date _____
Artesian water is controlled by _____ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☒ If yes, by whom? _____
Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test _____
Bailer test _____ gal./min. with _____ ft. drawdown after _____ hrs.
Airtest 300+ gal./min. with stem set at 330 ft. for 6 hrs.
Artesian flow _____ g.p.m. Date _____
Temperature of water _____ Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Brown Sand & Gravel	0	167
Brown Silty Sand & Occ. Gravel	167	221
Blue Silty Sand & Occ. Gravel	221	307
Water Bearing Sand & Gravel	307	354

RECEIVED
MAY 5 1988
DEPARTMENT OF ECOLOGY
NORTHWEST REGION

Work started 3-30-88 19. Completed 4-7-88 19

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Northwest Pump and Drilling Co.
(PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address 3245 Auburn Way South

(Signed) _____ License No. 0097
(WELL DRILLER)

Contractor's Registration No. North P D 137 P 9 Date 4-8-88 19

(USE ADDITIONAL SHEETS IF NECESSARY)

LEGEND

- SANDY GRAVEL WITH COBBLES
- SANDY GRAVEL
- POORLY SORTED SAND
- WELL SORTED SAND
- DIAMICTON
- SILT - CLAY
- PEAT
- BEDROCK
- SILTY

DRILLING METHOD: Air-Rotary

SAMPLING METHOD: Grab Samples
5' intervals

WATER LEVEL	139'	167'	139'	181'
DATE	9/27	9/30	10/3	11/6
TIME	3:00	8:30	9:00	8:30

STRATA	DEPTH	DESCRIPTION	WATER TABLE(S)
	0	Brown/grey, silty, sandy gravel. Fast, smooth drilling.	
	50	Brown, silty sand with some gravel (dirty sand). Fast, smooth drilling.	
	100	Slight increase in gravel.	
	150	Grey, coarse, sandy gravel with some silt and scattered cobbles. Medium, rough drilling.	▽ WD
	200		100gpm ▽ WD
	250	Grey, coarse, sandy gravel with trace silt. Slow, rough drilling. Heaving sands and gravels.	

NOTES:

WD = While Drilling.

PROJECT NO. 8607-14
BORING NO. TW-5
ELEVATION 450'
PAGE 1 **OF** __

DRILLING LOG

ASSOCIATED EARTH SCIENCES, INC.
ECONOMIC GEOLOGISTS / ENGINEERING GEOLOGISTS
13714 PARK LANE • KIRKLAND, WASHINGTON 98033 • 206-827-7701

LEGEND

- SANDY GRAVEL WITH COBBLES
- SANDY GRAVEL
- POORLY SORTED SAND
- WELL SORTED SAND
- DIAMICTON
- SILT - CLAY
- PEAT
- BEDROCK
- SILTY

DRILLING METHOD: Air-Rotary to 445'

SAMPLING METHOD: Grab Samples 5' intervals

WATER LEVEL				
DATE				
TIME				

STRATA	DEPTH	DESCRIPTION	WATER TABLE(S)
	250	Grey, silty sand with some gravel. Slow to medium, rough drilling. Some clasts of blue silt/clay. Heaving conditions.	
	300	No gravel. Fast, smooth drilling.	▽ WD
	350		
	400	Organics with trace clay clasts.	▽ WD
	450	Grey, gravelly, silty, fine to coarse sand with some silt/clay clasts. No hammer needed to drive casing.	75gpm ▽ WD
	500		

NOTES:

WD = While Drilling.

PROJECT NO. 8607-14
BORING NO. TW-5
ELEVATION 450'
PAGE 2 **OF** __

DRILLING LOG

ASSOCIATED EARTH SCIENCES, INC.
ECONOMIC GEOLOGISTS / ENGINEERING GEOLOGISTS
13714 PARK LANE • KIRKLAND, WASHINGTON 98033 • 206-827-7701

LEGEND

- SANDY GRAVEL WITH COBBLES
- SANDY GRAVEL
- POORLY SORTED SAND
- WELL SORTED SAND
- DIAMICTON
- SILT - CLAY
- PEAT
- BEDROCK
- SILTY

DRILLING METHOD: Cable Tool
445' to 538.5'
Mud Rotary
538.5' to 583'

SAMPLING METHOD: Grab Samples
5' intervals

WATER LEVEL				
DATE				
TIME				

STRATA	DEPTH	DESCRIPTION	WATER TABLE(S)
	500	Grey, silty, fine sand with trace gravel.	
		Grey, gravelly sand with some silt. Alternating hard and easy drilling.	
	550	Grey, gravel with some silt.	
		Bedrock, black basalt and purple andesite.	
		BOH	
	600		

NOTES:

PROJECT NO. 8607-14
BORING NO. TW-5
ELEVATION 450'
PAGE ___ **OF** ___

DRILLING LOG

ASSOCIATED EARTH SCIENCES, INC.
ECONOMIC GEOLOGISTS / ENGINEERING GEOLOGISTS
13717 PARK LANE • KIRKLAND, WASHINGTON 98033 • 206-827-7701

LEGEND

- Sandy gravel with cobbles
- Sandy gravel
- Poorly sorted sand
- Well sorted sand
- Bedrock
- Diamicton
- Peat
- Silt-clay
- Silt

Project Name: Snoqualmie North Well Field
Project Number: W93199K
Drilling Method: Cable Tool
Sampling Method: Baller Grab and Split
Elevation: 436.55'
Boring Diameter: 20" 0'-415'; 16" 415'-564'
Drilling Contractor: Armstrong Drilling, Inc.
Page 1 of 12 Boring No. TW-7

Water Level	150.11	149.60	149.63		
Date	5/13/94	5/26/94	6/7/94		
Time	7:10 AM	11:30 AM	1:13 PM		

Strata	Depth	Description	Well Compl..
		Yellow-brown, gravelly SAND with trace silt and some cobbles.	
		Yellow-brown, gravelly SAND with cobbles and some silt.	
	10	Yellow-brown, gravelly SAND with some cobbles and some silt.	Surface Seal
	20	Yellow-brown, gravelly SAND with some silt and trace cobbles.	20" Steel Casing
	30	Yellow-brown, fine to coarse SAND with gravel and some silt.	
	40		
		Yellow-brown, gravelly SAND with trace of silt.	
	50		

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Drilling Log

LEGEND

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- Well sorted sand
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Water Level	150.11	149.60	149.63		
Date	5/13/94	5/26/94	6/7/94		
Time	7:10 AM	11:30 AM	1:13 PM		

Strata	Depth	Description	Well Compl..
		Yellow-brown, fine to coarse SAND with gravel and silt.	20" Steel Casing
	60	Yellow-brown, gravelly SAND with some silt.	
		Yellow-brown, gravelly SAND with some silt and some cobbles.	
	70	Yellow-brown, gravelly SAND with some cobbles and some silt.	
	80	Yellow-brown, sandy GRAVEL with cobbles and some silt.	
	90		
		Yellow-brown, sandy GRAVEL with some cobbles and trace silt.	
	100		

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Drilling Log

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Water Level	150.11	149.60	149.63		
Date	5/13/94	5/26/94	6/7/94		
Time	7:10 AM	11:30 AM	1:13 PM		

Strata	Depth	Description	Well Compl..
		Yellow-brown, sandy GRAVEL with some cobbles and trace silt.	20" Steel Casing
		Yellow-brown, sandy GRAVEL with some silt and some cobbles.	
	110		
	120	Gray-brown, gravelly SAND.	
		Gray, gravelly SAND with trace silt and some cobbles.	
		Yellow-brown and gray, gravelly SAND with some cobbles and some silt.	
	130		
		Gray-brown, gravelly SAND with some silt and a few cobbles.	
	140		
	150		

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Drilling Log

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Water Level	150.11	149.60	149.63		
Date	5/13/94	5/26/94	6/7/94		
Time	7:10 AM	11:30 AM	1:13 PM		

Strata	Depth	Description	Well Compl..
	160	Gray-brown, gravelly SAND with some silt.	20" Steel Casing
	170	Gravelly SAND with some cobbles grading into sandy GRAVEL with cobbles.	
	180	Dark gray, sandy GRAVEL with cobbles.	
	190	Gray-brown, gravelly SAND with some silt and trace cobbles.	
	200	Dark gray, gravelly SAND with some silt and trace cobbles.	
		Dark gray, gravelly SAND with some cobbles.	

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Drilling Log

LEGEND

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Project Name: Snoqualmie North Well Field
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Drilling Method: Cable Tool
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Boring No. TW-7

Water Level	150.11	149.60	149.63		
Date	5/13/94	5/26/94	6/7/94		
Time	7:10 AM	11:30 AM	1:13 PM		

Strata	Depth	Description	Well Compl..
		Gray-brown, gravelly SAND with some silt.	
		Siltier lenses present.	
	210		
	220		
	230		
	240	Gray-brown, gravelly, silty SAND.	
		Brown, sandy GRAVEL to silty SAND with gravel.	
	250		

20" Steel Casing

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Page 6 of 12 . Boring No. TW-7

Water Level	150.11	149.60	149.63		
Date	5/13/94	5/26/94	6/7/94		
Time	7:10 AM	11:30 AM	1:13 PM		

Strata	Depth	Description	Well Compl..
		Brown, sandy GRAVEL with cobbles and trace silt..	20" Steel Casing
	260	Some heaving 260'-270'.	
	270	Gray, cobbly, gravelly, very silty SAND (till-like); hard drilling.	
	280	Gray, gravelly SAND with silt. Able to drive and bail without drilling.	
	290		
	300		

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Page 7 of 12 · Boring No. TW-7

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Date	5/13/94	5/26/94	6/7/94		
Time	7:10 AM	11:30 AM	1:13 PM		

Strata	Depth	Description	Well Compl..
	310	Gray, gravelly SAND with silt. Able to drive and ball without drilling.	20" Steel Casing
	320		
	330	Gray, cobbly, sandy, silty GRAVEL. Very dense, hard drilling. "Till-like."	Top 16" Casing 328'-4"
	340		Top Cement Grout 16" to 20" @ 340'
	350		16" Steel Casing

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Date	5/13/94	5/26/94	6/7/94		
Time	7:10 AM	11:30 AM	1:13 PM		

Strata	Depth	Description	Well Compl..
	360	Gray, cobbly, sandy, silty GRAVEL. Very dense, hard drilling. "Till-like."	16" Steel Casing
	370		
		Gray, very silty SAND.	
	380	Gray, cobbly, sandy, silty GRAVEL. Very dense, hard drilling.	
	390		
		@ 394' large cobbles/boulders	
	400		

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Water Level	150.11	149.60	149.63		
Date	5/13/94	5/26/94	6/7/94		
Time	7:10 AM	11:30 AM	1:13 PM		

Strata	Depth	Description	Well Compl.
	410	Gray, silty, fine SAND. @ 405'-409' large cobbles.	
	420	Gray, sandy SILT.	Bottom 20" Casing @ 415'
	430	Gray, clay-rich, sandy SILT with lenses of fine sand.	16" Steel Casing
	440		
	450		

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Date	5/13/94	5/26/94	6/7/94		
Time	7:10 AM	11:30 AM	1:13 PM		

Strata	Depth	Description	Well Compl..
	460	Gray, clay-rich, sandy SILT with lenses of fine sand.	16" Steel Casing
	470		
	480	Gray, clayey SILT with scattered lenses of fine sand, trace peat, local gravelly zones.	
	490		
	500		

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Water Level	150.11	149.60	149.63		
Date	5/13/94	5/26/94	6/7/94		
Time	7:10 AM	11:30 AM	1:13 PM		

Strata	Depth	Description	Well Compl..
	510	Gray, clayey SILT with scattered lenses of fine sand, trace peat, local gravelly zones.	Top 10" Riser Flanged to 12"
	520	Gray, cobbly GRAVEL with silt/clay matrix.	Top Screen 516'-7"
	530	Gray, gravelly, fine SAND with silt; coarsens with depth.	Bottom 16" Casing @ 527'-7"
	540	Gray, cobbly, sandy GRAVEL with thin lenses of silty, fine sand.	10" Riser; 10" Pipe Size, 50 Slot, Stainless Steel Screen; 8-12 Colorado Sand
	550		

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Page 12 of 12
Boring No. TW-7

Water Level	150.11	149.60	149.63		
Date	5/13/94	5/26/94	6/7/94		
Time	7:10 AM	11:30 AM	1:13 PM		

Strata	Depth	Description	Well Compl..
		Gray, cobbly, sandy GRAVEL with thin lenses of silty, fine sand.	
		"Till-like", gravelly, silty SAND (hard silt matrix).	
	560	Very hard, gravelly SAND with large cobbles.	Top Tailpipe 556'-5"
			Cement Plug 558'-564'
		Maroon, gray-green, and black, basaltic flows/flow breccia BEDROCK.	
		BOH @ 564'	
	570		
	580		
	590		
	600		

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Drilling Log

EXPLORATION BORING LOG

Number OBW-1

52

SEDIMENT DESCRIPTION ELEVATION 423.6'	DEPTH	SAMPLE	GROUND WATER	STANDARD PENETRATION RESISTANCE Blows/Foot 10 20 30 40
Moist, brown, silty, fine SAND. (Fill?) Rocks in tip affected blow counts.	5			50/ 5-1/2"
No recovery. Rocks in tip. Driller reported change at approximately 7-1/2' to 8' to silty material.				
No recovery. Rocks in tip.	10		▽ WD	
Damp, gray SILT with sand, gravel. (Lodgement Till) Approximate 3" recovery.				50/ 3" ①
Damp, gray, sandy SILT to silty SAND with gravel. (Lodgement Till) Approximate 6" recovery.	15			50/ 6" ①
Damp, gray, silty SAND with gravel. (Lodgement Till) Approximate 6" recovery.				50/ 5" ①
Qvt				
Saturated, brown SAND AND GRAVEL with silt. (Qva)	20			50/ 4" ①
BOH @ 23' Note: Probable bedrock at approximately 23'. Twisted off auger in hole. Hole abandoned.	25			
WD = while drilling				
Split spoon sampler	30			
① Dames & Moore California Modified Ring Sampler (140 lb. hammer)				

Subsurface conditions depicted represent our observations at the time and location of this exploratory hole, modified by geologic interpretations, engineering analysis, and judgment. They are not necessarily representative of other times and locations. We will not accept responsibility for the use or interpretation by others of information presented on this log.

Reviewed By GJK

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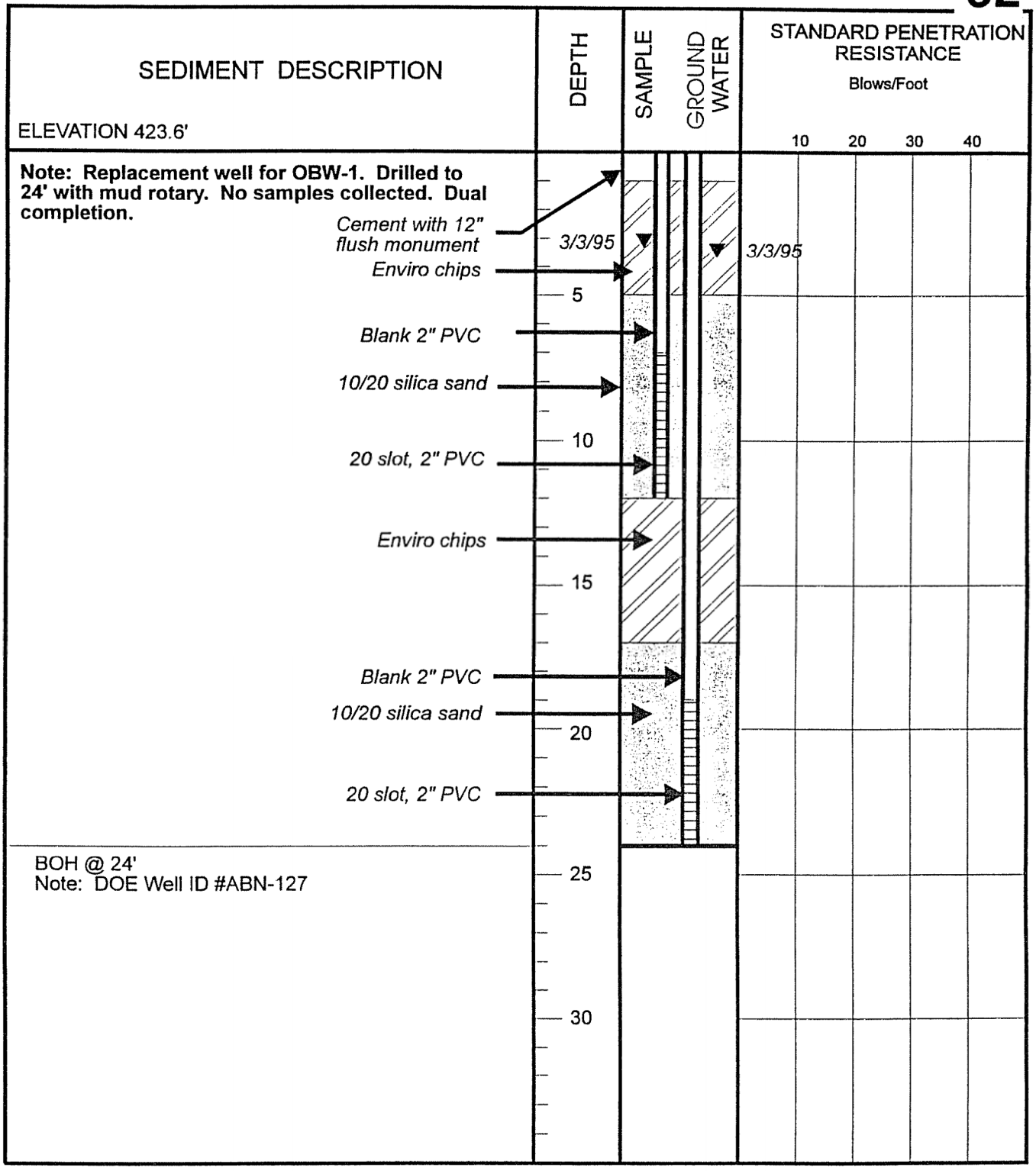
Snoqualmie Waste Water Treatment Plant
Snoqualmie, Washington
Project No. W94236A
February 1995

EXPLORATION BORING LOG

Number OBW-1B

52



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Reviewed By CJK

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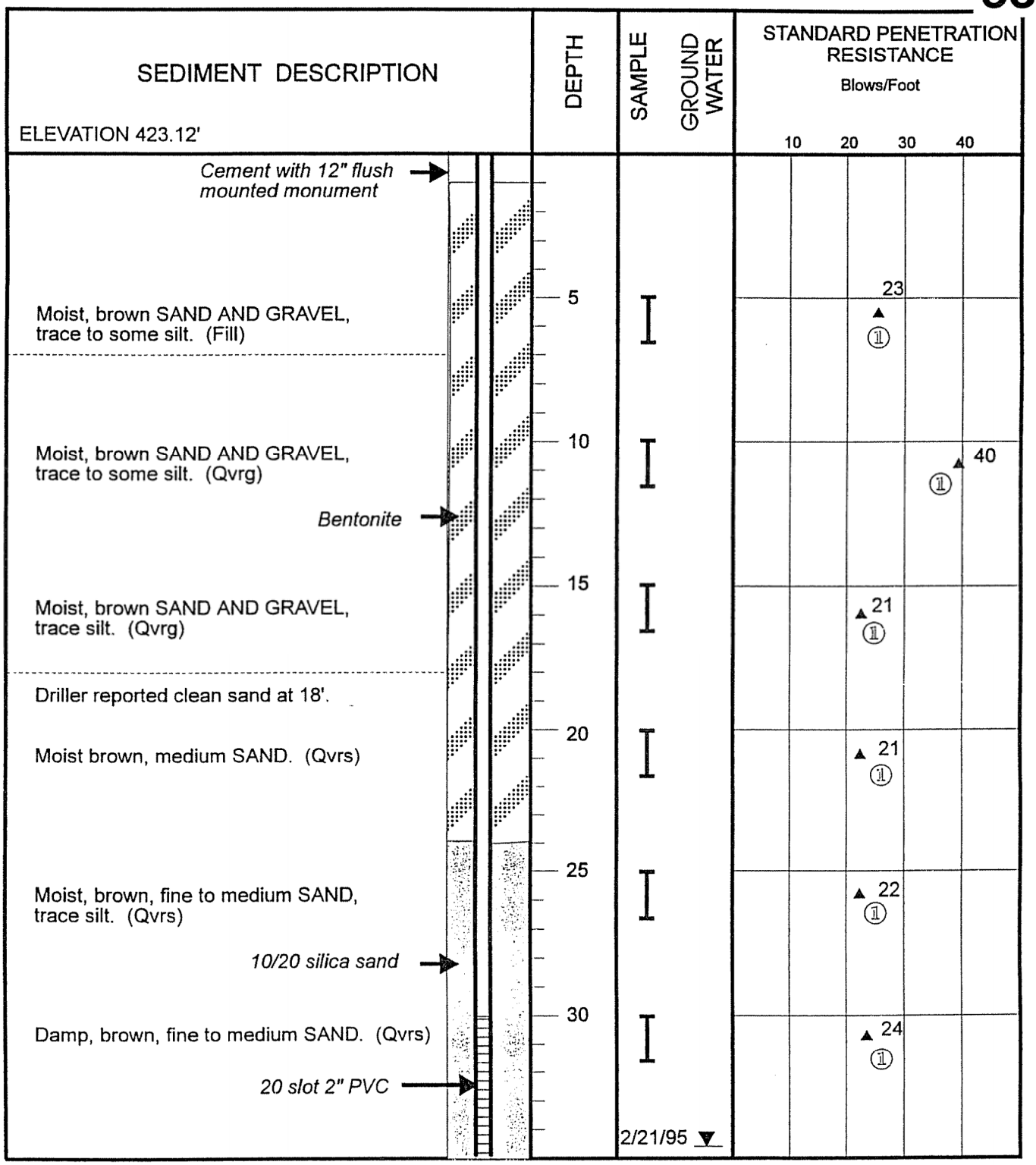
Snoqualmie Waste Water Treatment Plant
Snoqualmie, Washington
Project No. W94236A
February 1995

EXPLORATION BORING LOG

Number OBW-2 Page 1 of 2

53



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Reviewed By CSK

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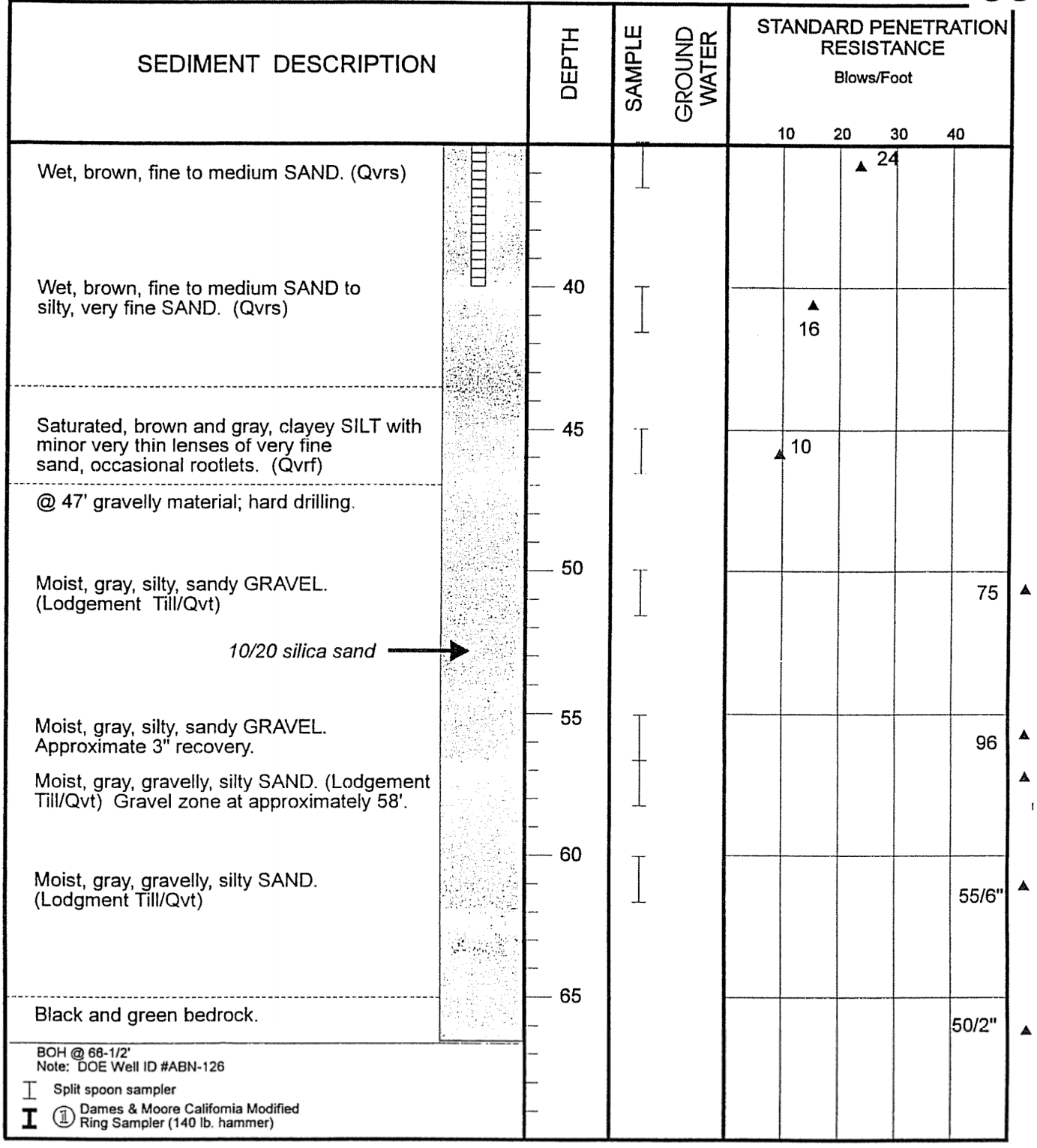
Snoqualmie Waste Water Treatment Plant
Snoqualmie, Washington
Project No. W94236A
February 1995

EXPLORATION BORING LOG

Number OBW-2 Page 2 of 2

53



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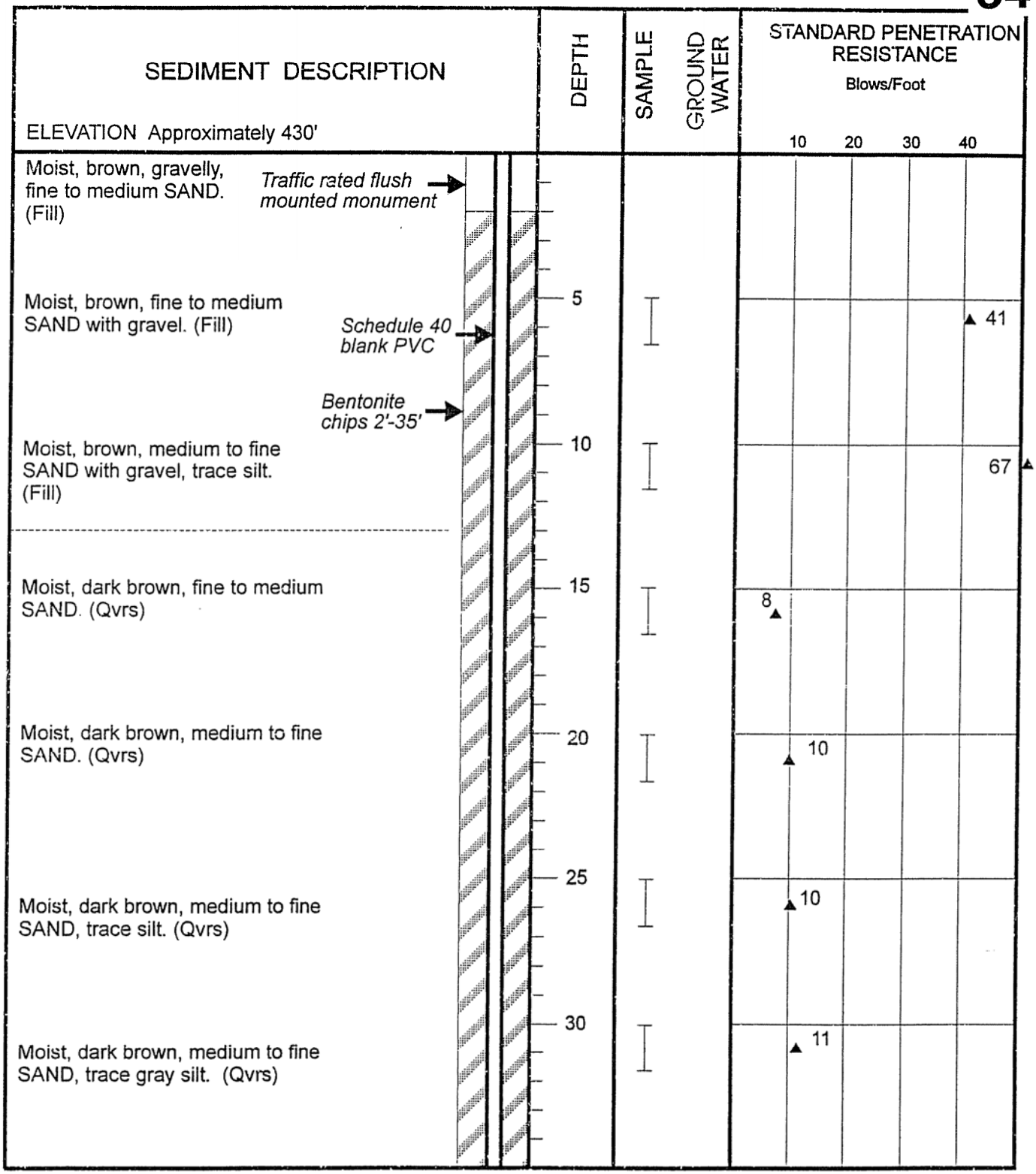
Snoqualmie Waste Water Treatment Plant
Snoqualmie, Washington
Project No. W94236A
February 1995

EXPLORATION BORING LOG

Number OBW-2A Page 1 of 2

54



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Snoqualmie Waste Water Treatment Plant
Snoqualmie, Washington
Project No. W94263C
July 1996

EXPLORATION BORING LOG

Number OBW-2A Page 2 of 2

54

SEDIMENT DESCRIPTION	DEPTH	SAMPLE	GROUND WATER	STANDARD PENETRATION RESISTANCE Blows/Foot (10 20 30 40)
Moist, dark brown, medium to fine SAND, trace gray silt. (Qvrs)				▲12
Colorado silica sand 35' to 51-1/2' →				
Moist, dark brown, medium to fine SAND, trace silt. (Qvrs)	40			▲12
0.020 Slot Schedule 40 screen 40'-50' →				
Moist, dark brown, medium to fine SAND, trace gray silt. (Qvrs)	45		▼ 07/27/96	▲12
Saturated, brown, medium to fine SAND with gray silt. (Qvrs)	50			▲14
BOH @ 51-1/2' Note: DOE Well ID #ACJ290 replacement for OBW-2 DOE Well ID #ABN-126 which was abandoned.	55			
	60			
	65			

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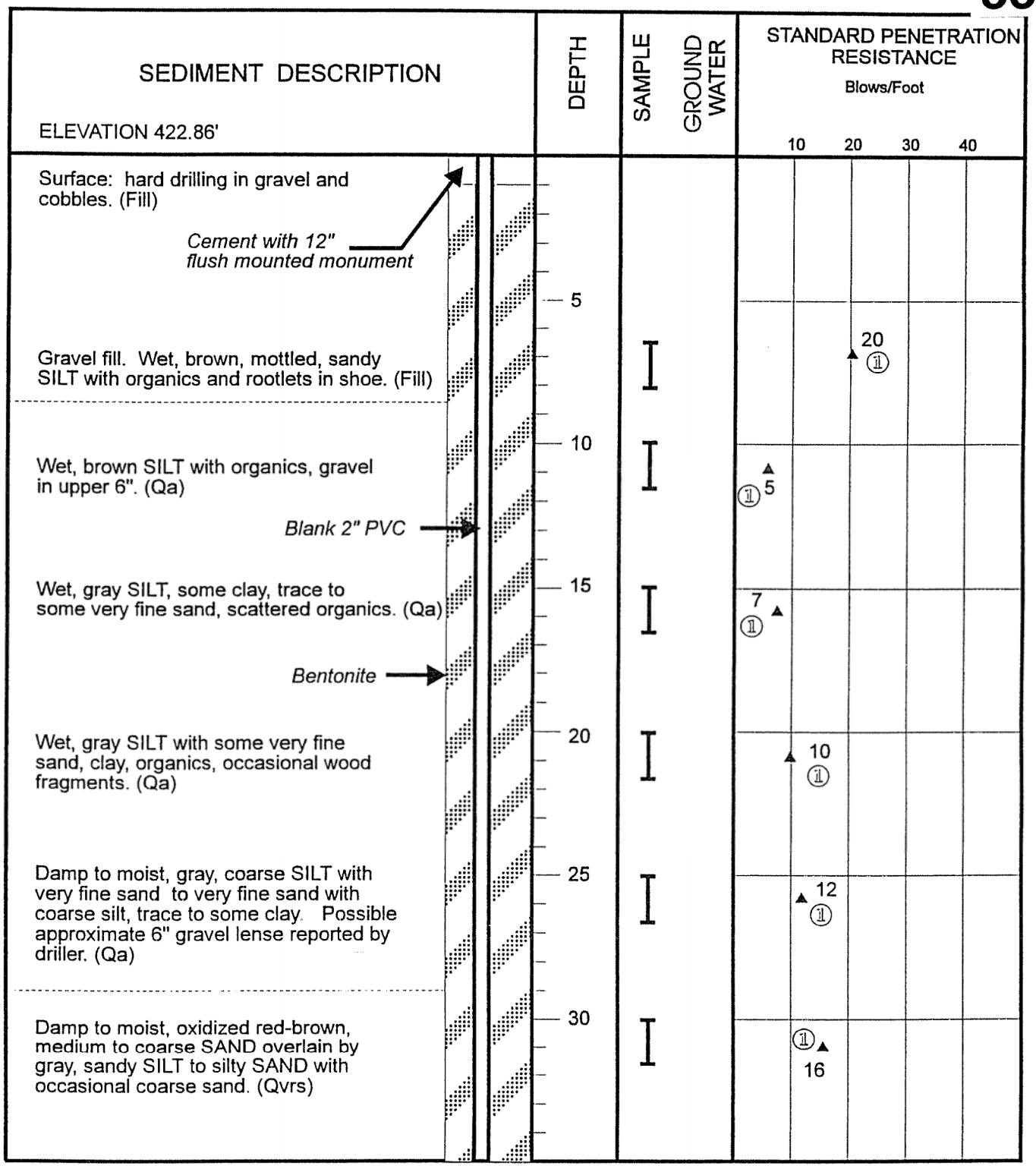
Snoqualmie Waste Water Treatment Plant
Snoqualmie, Washington
Project No. W94263C
July 1996

EXPLORATION BORING LOG

Number OBW-3 Page 1 of 3

55



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Reviewed By CJK

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Snoqualmie Waste Water Treatment Plant
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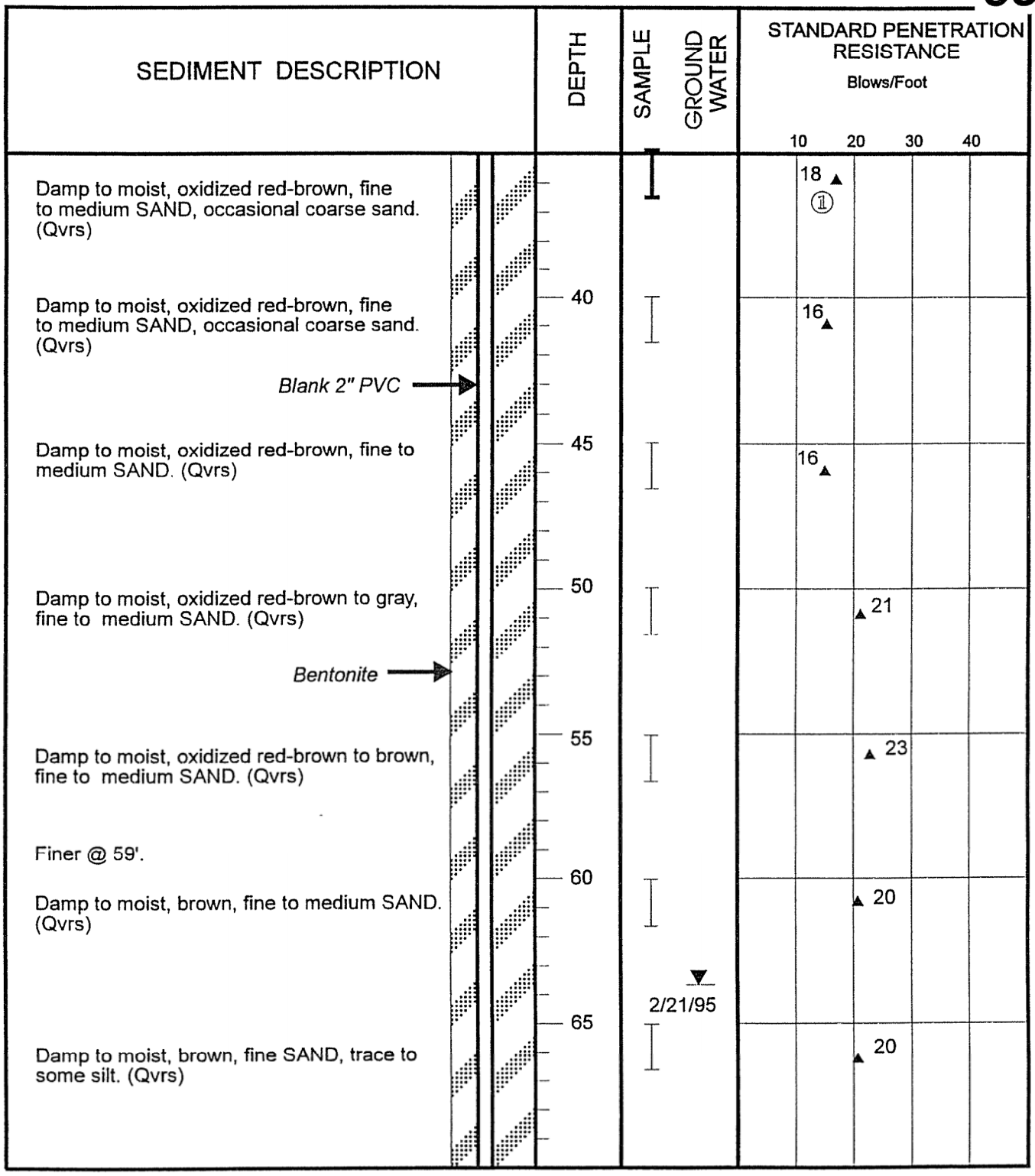
Project No. W94236A
February 1995

EXPLORATION BORING LOG

Number OBW-3 Page 2 of 3

55



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Snoqualmie Waste Water Treatment Plant
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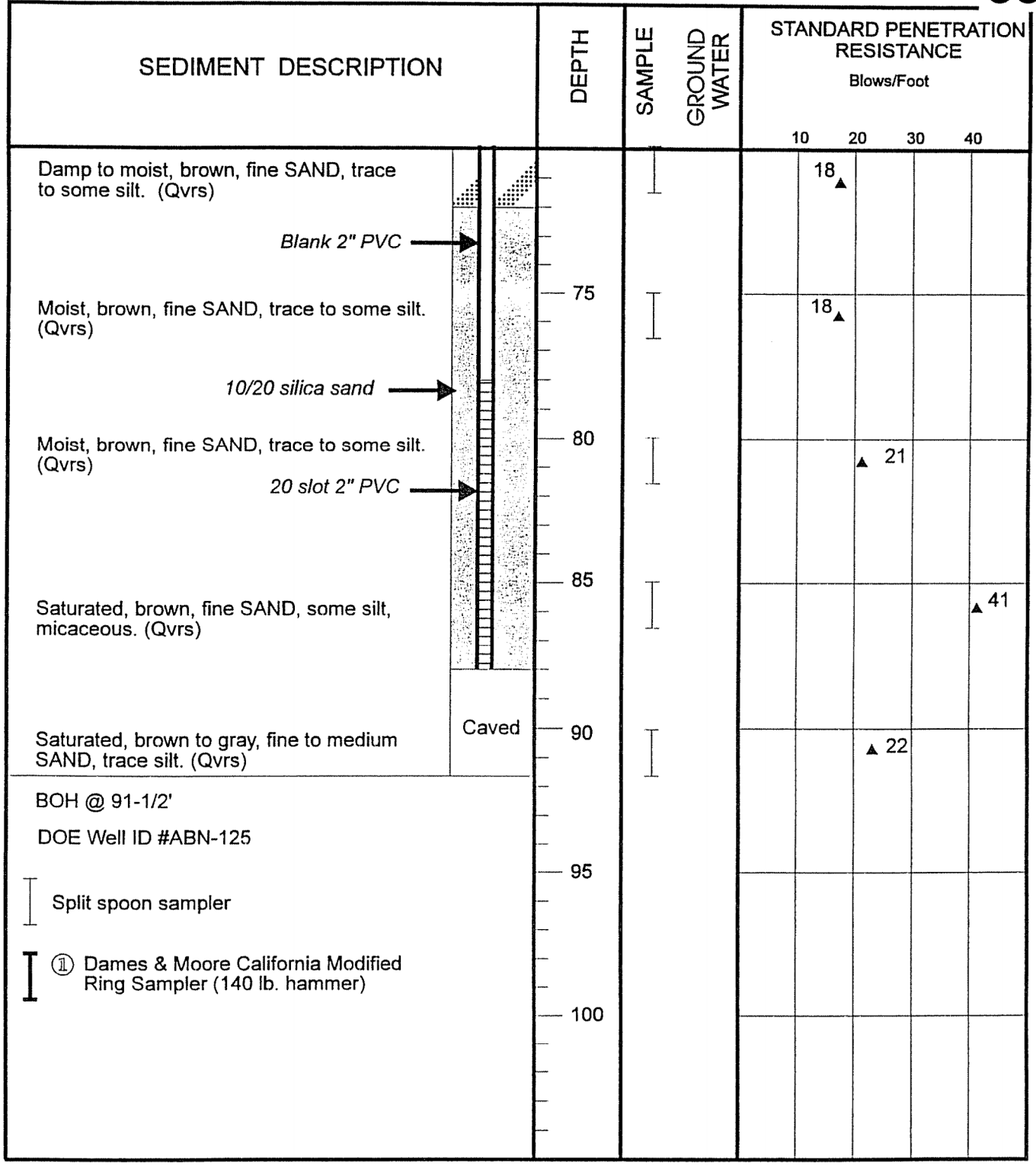
Project No. W94236A
February 1995

EXPLORATION BORING LOG

Number OBW-3 Page 3 of 3

55



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Snoqualmie Waste Water Treatment Plant
Snoqualmie, Washington
Project No. W94236A
February 1995

EXPLORATION BORING LOG

Number OBW-4 (BH-6) Page 1 of 2

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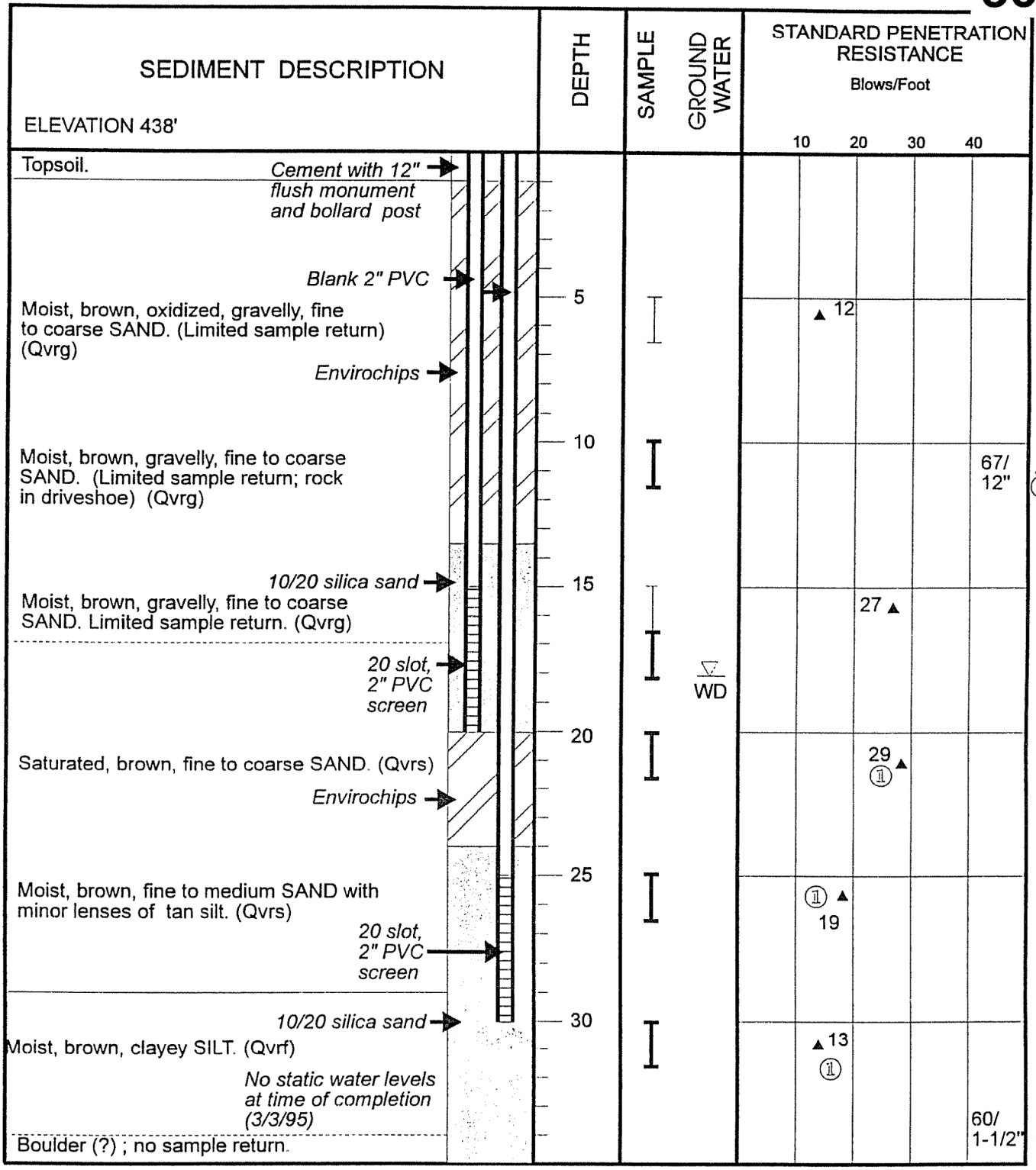

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Snoqualmie Waste Water Treatment Plant
Snoqualmie, Washington
Project No. G94236A
March 1995

EXPLORATION BORING LOG

Number OBW-4 (BH-6) Page 2 of 2

56

SEDIMENT DESCRIPTION	DEPTH	SAMPLE	GROUND WATER	STANDARD PENETRATION RESISTANCE Blows/Foot 10 20 30 40
BOH @ 35' Refusal				
I Split spoon sampler				
I ① Dames & Moore California Modified Ring Sampler (140 lb. hammer)	40			
WD Ground water encountered while drilling				
DOE Well ID #ABN-114	45			

Subsurface conditions depicted represent our observations at the time and location of this exploratory hole, modified by geologic interpretations, engineering analysis, and judgment. They are not necessarily representative of other times and locations. We will not accept responsibility for the use or interpretation by others of information presented on this log.

Reviewed By CJK

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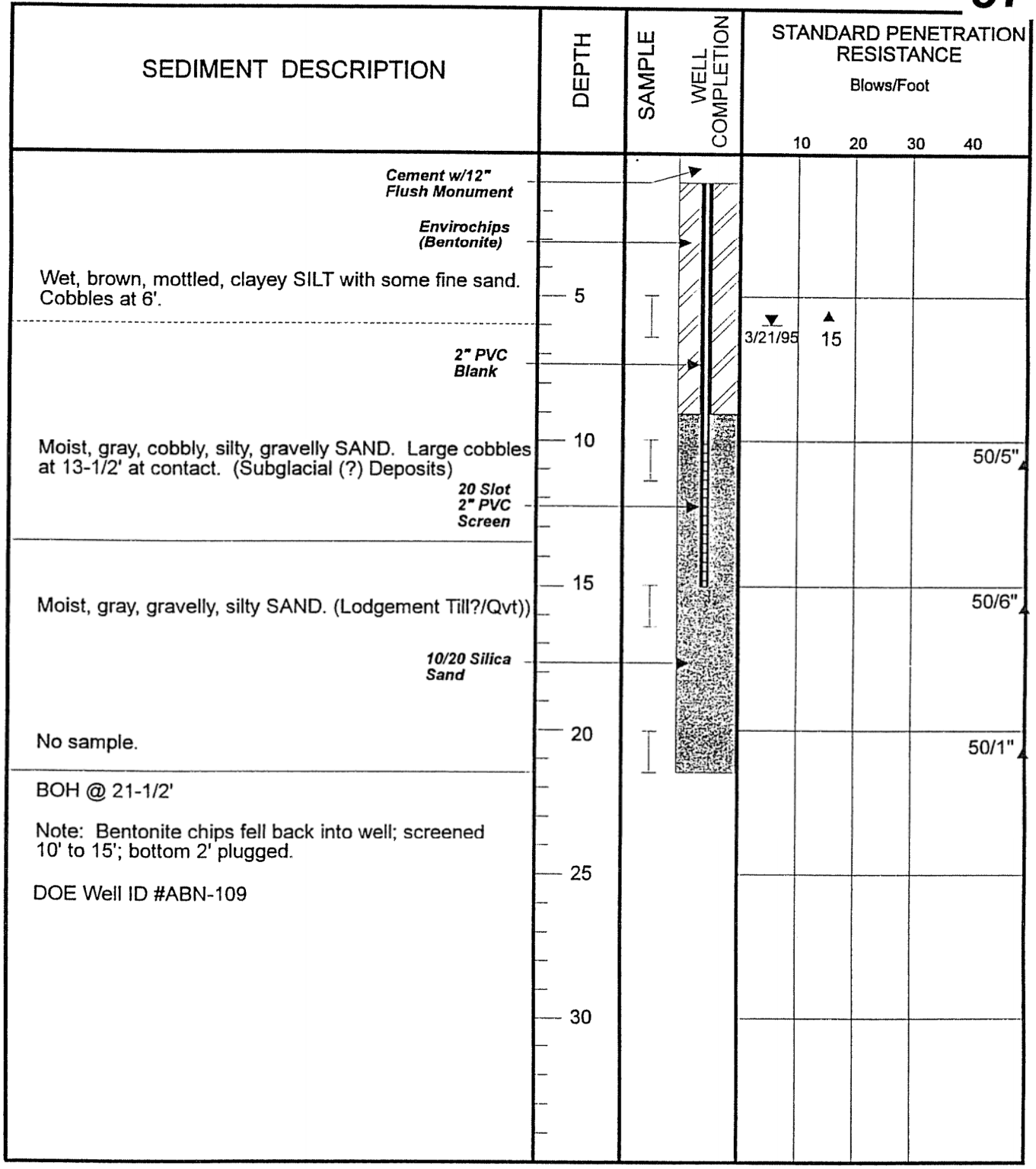
Snoqualmie Waste Water Treatment Plant
Snoqualmie, Washington
Project No. G94236A
March 1995

EXPLORATION BORING LOG

Number OBW-5

57



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Snoqualmie Waste Water Treatment Plant
Snoqualmie, Washington
Project No. W94263A
March 1995

LEGEND


SANDY GRAVEL WITH COBBLES


SANDY GRAVEL


POORLY SORTED SAND


WELL SORTED SAND


DIAMICTON


SILT - CLAY


PEAT


BEDROCK


SILTY

DRILLING METHOD: Reverse air circulation

SAMPLING METHOD: Continuous

WATER LEVEL				
DATE				
TIME				

STRATA	DEPTH	Initiated 4/8/91 DESCRIPTION	WATER TABLE(S)
	10	Brown, wet, sandy gravelly cobbles.	
	20	Becoming dry with some silt content below 10'.	
	30		
	40	Brown, wet, gravelly, fine to coarse sand with scattered cobbles. Cobble zone at 38-40'	
		Brown, moist, sandy, well sorted sand with scattered cobbles.	
	50	Brown, moist, gravelly, fine to coarse sand with cobbles. Containing less cobbles below 48'.	

NOTES:

PROJECT NO. E93013A
BORING NO. EB-B4W
ELEVATION 545
PAGE 1 **OF** 6

DRILLING LOG

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LEGEND


SANDY GRAVEL WITH COBBLES


SANDY GRAVEL


POORLY SORTED SAND


WELL SORTED SAND


DIAMICTON


SILT - CLAY


PEAT


BEDROCK


SILTY

DRILLING METHOD: Reverse air circulation

SAMPLING METHOD: Continuous

WATER LEVEL				
DATE				
TIME				

STRATA	DEPTH	DESCRIPTION	WATER TABLE(S)
		As above. Well sorted ½"-1" gravels at 50'-56½'.	
	60	Grading interbeds of brown, moist, sandy gravel and gravelly, fine to coarse sand. Well sorted 1" gravels 60'-63'.	
	70		
	80		
	90		
	100		

NOTES:

PROJECT NO. E93013A
BORING NO. EB-B4W
ELEVATION 545
PAGE 2 OF 6

DRILLING LOG

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LEGEND


SANDY GRAVEL WITH COBBLES


SANDY GRAVEL


POORLY SORTED SAND


WELL SORTED SAND


DIAMICTON


SILT - CLAY


PEAT


BEDROCK


SILTY

DRILLING METHOD: Reverse air circulation

SAMPLING METHOD: Continuous

WATER LEVEL				
DATE				
TIME				

STRATA	DEPTH	DESCRIPTION	WATER TABLE(S)
	110 120	As above.	
	130 140 150	Interbedded zones of brown, cemented, dry, silty, fine to coarse sand (hard drilling) and brown, moist, fine to coarse sand with varying gravel content.	

NOTES:

PROJECT NO. E93013A
BORING NO. EB-B4W
ELEVATION 545
PAGE 3 **OF** 6

DRILLING LOG

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LEGEND

- SANDY GRAVEL WITH COBBLES
- SANDY GRAVEL
- POORLY SORTED SAND
- WELL SORTED SAND
- DIAMICTON
- SILT - CLAY
- PEAT
- BEDROCK
- SILTY

DRILLING METHOD : Reverse air circulation

SAMPLING METHOD : Continuous

WATER LEVEL				
DATE				
TIME				

STRATA	DEPTH	DESCRIPTION	WATER TABLE(S)
	160	As above.	Water added 152'-180'
	170	Becoming brown-grey 156'-177'. Losing fines content between 152'-180' due to adding water.	
	180	Cobble zone 166'-170'.	
	190		
	200		

NOTES:

PROJECT NO. E93013A
BORING NO. EB-B4W
ELEVATION 545
PAGE 4 **OF** 6

DRILLING LOG

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LEGEND

- SANDY GRAVEL WITH COBBLES
- SANDY GRAVEL
- POORLY SORTED SAND
- WELL SORTED SAND
- DIAMICTON
- SILT - CLAY
- PEAT
- BEDROCK
- SILTY

DRILLING METHOD: Reverse air circulation

SAMPLING METHOD: Continuous

WATER LEVEL				
DATE				
TIME				

STRATA	DEPTH	DESCRIPTION	WATER TABLE(S)
		As above	Water added 205'-208'
	210		
	220	Brown, dry, sandy, well sorted 1" gravels at 222'-224'. Limited sample return 224'-232'.	
	230		
		Brown, wet, sandy, well sorted 3/4"-1" gravels with minor cobbles.	▽ Trace while drilling
		Brown, wet to saturated, unsorted, clayey, sandy silt.	
	240	Brown, dry, silty, fine to coarse sand with minor cobbles and gravels. Becoming wet below 246' where water added. (Hard drilling)	Water added 246'-248'
	250		

NOTES:

PROJECT NO. E93013A
BORING NO. EB-B4W
ELEVATION 545
PAGE 5 **OF** 6

DRILLING LOG

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LEGEND

- SANDY GRAVEL WITH COBBLES
- SANDY GRAVEL
- POORLY SORTED SAND
- WELL SORTED SAND
- DIAMICTON
- SILT - CLAY
- PEAT
- BEDROCK
- SILTY

DRILLING METHOD: Reverse air circulation

SAMPLING METHOD: Continuous

WATER LEVEL				
DATE				
TIME				

STRATA	DEPTH	DESCRIPTION	WATER TABLE(S)
		Brown, dry becoming wet where water added, subangular medium to coarse sand	Water added 251'-260'
	260	Brown, wet to saturated, unsorted, sandy silt. (Hard drilling) Losing some fines content due to adding water.	
	270	TD 260' 4/13/91 Refusal	
	280		
	290		
	300		

NOTES:

PROJECT NO. E93013A
BORING NO. EB-B4W
ELEVATION 545
PAGE 6 **OF** 6

DRILLING LOG

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LEGEND

- SANDY GRAVEL WITH COBBLES
- SANDY GRAVEL
- POORLY SORTED SAND
- WELL SORTED SAND
- DIAMICTON
- SILT - CLAY
- PEAT
- BEDROCK
- SILTY

DRILLING METHOD : Air Rotary

SAMPLING METHOD : Grab

WATER LEVEL				
DATE				
TIME				

STRATA	DEPTH	DESCRIPTION	WATER TABLE(S)
	10		
	20	Brown gravel and coarse sand.	
	30	Brown gravel with sand, high % of fractured rock chips.	
	40	Brown gravel with coarse sand.	
	50	Brown gravel/cobbles with coarse sand, rock fragments.	

NOTES: 8" surface casing to 20'; 6" casing surface to TD; 8" casing later pulled. Surface seal from 0-20'.

PROJECT NO. 9206-15W
BORING NO. SS&G #3
ELEVATION ~476
PAGE 1 **OF** 4

DRILLING LOG

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LEGEND

- SANDY GRAVEL WITH COBBLES
- SANDY GRAVEL
- POORLY SORTED SAND
- WELL SORTED SAND
- DIAMICTON
- SILT - CLAY
- PEAT
- BEDROCK
- SILTY

DRILLING METHOD: Air Rotary

SAMPLING METHOD: Grab

WATER LEVEL				
DATE				
TIME				

STRATA	DEPTH	DESCRIPTION	WATER TABLE(S)
	60	Brown sandy gravel with cobbles, rock fragments	
	70	Brown gravel with cobbles with interbedded coarse sand, rock fragments.	
	80	Gray-brown gravel with coarse sand, rock fragments.	
	90	Gray gravel with rock fragments with trace sand.	
	100	Gray gravel with rock fragments with trace sand.	

NOTES:

PROJECT NO. 9206-15W
BORING NO. SS&G #3
ELEVATION ~476
PAGE 2 **OF** 4

DRILLING LOG

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LEGEND

- SANDY GRAVEL WITH COBBLES
- SANDY GRAVEL
- POORLY SORTED SAND
- WELL SORTED SAND
- DIAMICTON
- SILT - CLAY
- PEAT
- BEDROCK
- SILTY

DRILLING METHOD: Air Rotary

SAMPLING METHOD: Grab

WATER LEVEL				
DATE				
TIME				

STRATA	DEPTH	DESCRIPTION	WATER TABLE(S)
	100	Gray gravel with rock fragments with trace sand.	
	110	Brown coarse sand and gravel with some rock fragments.	
	120	Brown coarse sand with some gravel and rock fragments.	
	130	Brown coarse sand with rock fragments and some gravel.	
	140	Grayish-brown gravel with rock fragments and trace sand.	
	150	Gray gravel with sand and rock fragments and some silt	

NOTES:

PROJECT NO. 9206-15W
BORING NO. SS&G #3
ELEVATION ~476
PAGE 3 **OF** 4

DRILLING LOG

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LEGEND

- SANDY GRAVEL WITH COBBLES
- SANDY GRAVEL
- POORLY SORTED SAND
- WELL SORTED SAND
- DIAMICTON
- SILT - CLAY
- PEAT
- BEDROCK
- SILTY

DRILLING METHOD: Air Rotary

SAMPLING METHOD: Grab

		while drilling	
WATER LEVEL	~70		163.2
DATE	6/25/92		6/26/92
TIME	12:10		1:30pm

STRATA	DEPTH	DESCRIPTION	WATER TABLE(S)
		@155 dark brown fine to medium sand with some scattered gravel.	
	160	Dark brown medium sand and thin layers of silt inter-bedded in gray gravel with coarse sand.	
		@165 dark brown medium sand.	▼
	170	Dark brown medium sand, wet.	▽ WD
		@175 brown fine to medium sand and silt, saturated.	
	180	Brown fine to medium sand, silt, and clay, woody fragments, saturated.	
		@185 brown fine sand and silt, saturated.	
	190	Gray-brown fine to coarse sand with some silt.	
		@195 brown fine to coarse sand and silt.	
	200	Brown fine to medium sand.	

NOTES: 10' of No 12 screen installed from 188'-198'.

PROJECT NO. 9206-15W
BORING NO. SS&G #3
ELEVATION ~476
PAGE 4 **OF** 4

DRILLING LOG

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Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

24/8E/32/F

60

Application No. ——

Permit No G-120316 P

(1) OWNER: Name TOWN of SNOQUALMIE Address TOWN Hall SNOQUALMIE WA 98065

(2) LOCATION OF WELL: County KING SE ¼ NW ¼ Sec. 32 T. 24 N., R. 8 E W.M.

Bearing and distance from section or subdivision corner 840' W & 1260'N of ¢ Sec. 32

PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☒
Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)....

New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 16 inches.
Drilled 544 ft. Depth of completed well 544 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 16" Diam. from 0 ft. to 98.8 ft.
Threaded ☐ 12" Diam. from 98.8 ft. to 434.7 ft.
Welded ☐ 8" Diam. from 434.7 ft. to 544 ft.

Perforations: Yes ☐ No ☒
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☒ No ☐
Manufacturer's Name
Type Model No
Diam. 8 Slot size 60 from 516 ft. to 527 ft.
Diam. 8 Slot size 50 from 527 ft. to 539 ft.

Gravel packed: Yes ☐ No ☒ Size of gravel:
Gravel placed from ft. to ft.

Surface seal: Yes ☒ ? No ☐ To what depth? ft.
Material used in seal
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name Line Shaft turbine
Type: GMC DIESEL H.P.

8) WATER LEVELS: Land-surface elevation above mean sea level.... 410 ft.
Static level 46 ft. below top of well Date 5-11-73
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom? Story Armstrong
Yield: 600 gal./min. with 179 ft. drawdown after 11.5 hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO	
Brn clay	0	20	20
Blue Sand - Silt	20	50	30
Blue Silty Sand	50	100	50
Blue Silt	100	140	40
Blue Silty clay	140	190	50
Blue Silty clay	190	240	50
Blue Silty clay	240	245	5
fine Silty Sand / Little H2O	245	255	10
Stiff Blue clay	255	265	10
Sandy Blue clay	265	340	75
Silty Sandy Blue clay	340	375	35
Fine Silty Sand Little H2O	375	430	10
Silty Sand Some water	430	445	15
Sand & Some Gravel	445	470	25
Sand & Gravel W Clay Binder	470	490	10
COARSE Gravel & Sand	490	500	20
GLACIAL Till	500	515	15
Sand & Gravel	515	530	15
Sand & Gravel	530	544	14

Specific Capasity = 3.35 gal/ft.

Potential = 1500 gal

106' below Sea Level

Work started 4-4, 1973 Completed 4-26, 1973

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Story Armstrong
(Person, firm, or corporation) (Type or print)

Address

[Signed]
(Well Driller)

License No. Date, 19

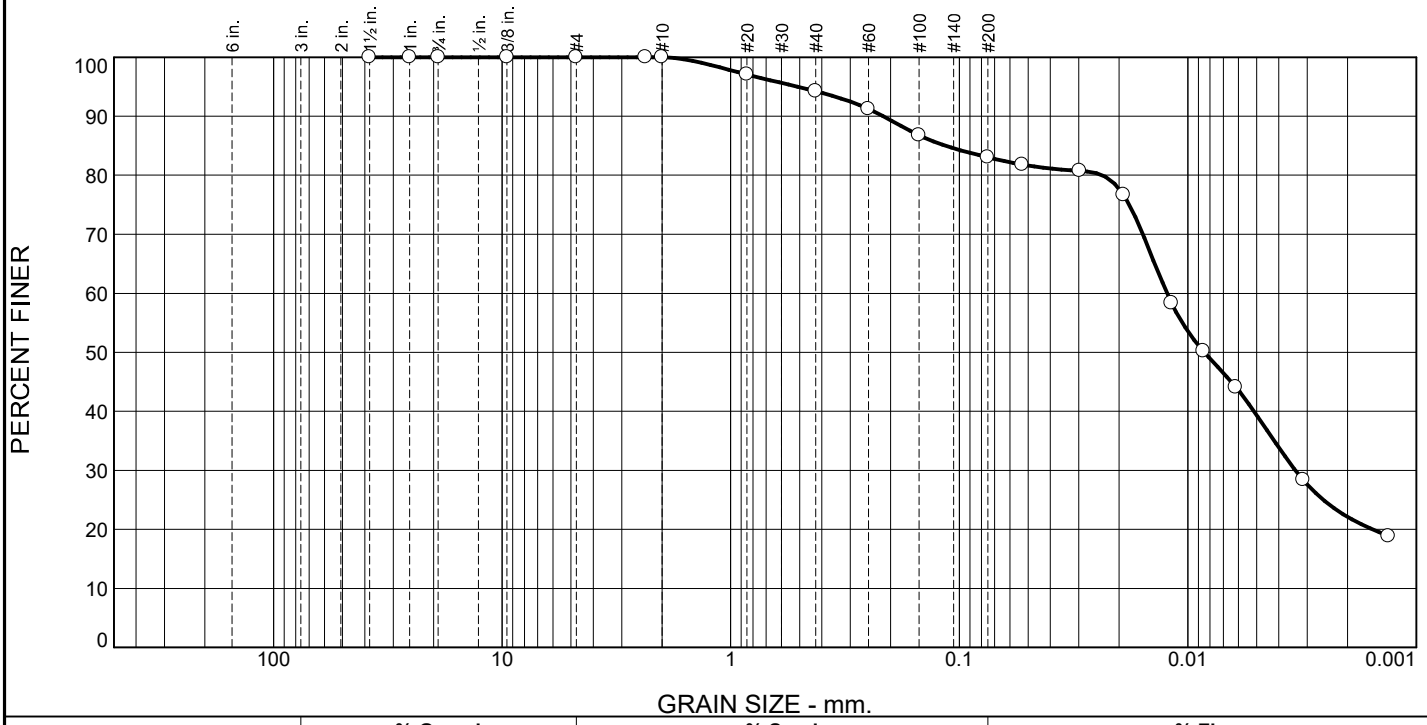
(USE ADDITIONAL SHEETS IF NECESSARY)

F. No. 7356—OS—(Rev. 4-71).

APPENDIX C

Laboratory Testing

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	5.8	11.2	43.6	39.4

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100.0		
1	100.0		
.75	100.0		
.375	100.0		
#4	100.0		
#8	100.0		
#10	100.0		
#20	97.1		
#40	94.2		
#60	91.2		
#100	86.8		
#200	83.0		
#270	81.8		
0.0297 mm.	80.7		
0.0191 mm.	76.7		
0.0118 mm.	58.3		
0.0086 mm.	50.2		
0.0062 mm.	44.1		
0.0031 mm.	28.4		
0.0013 mm.	18.9		

* (no specification provided)

Material Description

sandy SILT

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 0.2156 D_{85}= 0.1149 D_{60}= 0.0123
D_{50}= 0.0085 D_{30}= 0.0034 D_{15}=
D_{10}= C_u= C_c=

Remarks

Collected by: LDM

Date Received: 02/15/2018 **Date Tested:** 02/20/2018

Tested By: BN

Checked By: CJK

Title:

Location: Onsite
Sample Number: EB-1 **Depth:** 10'

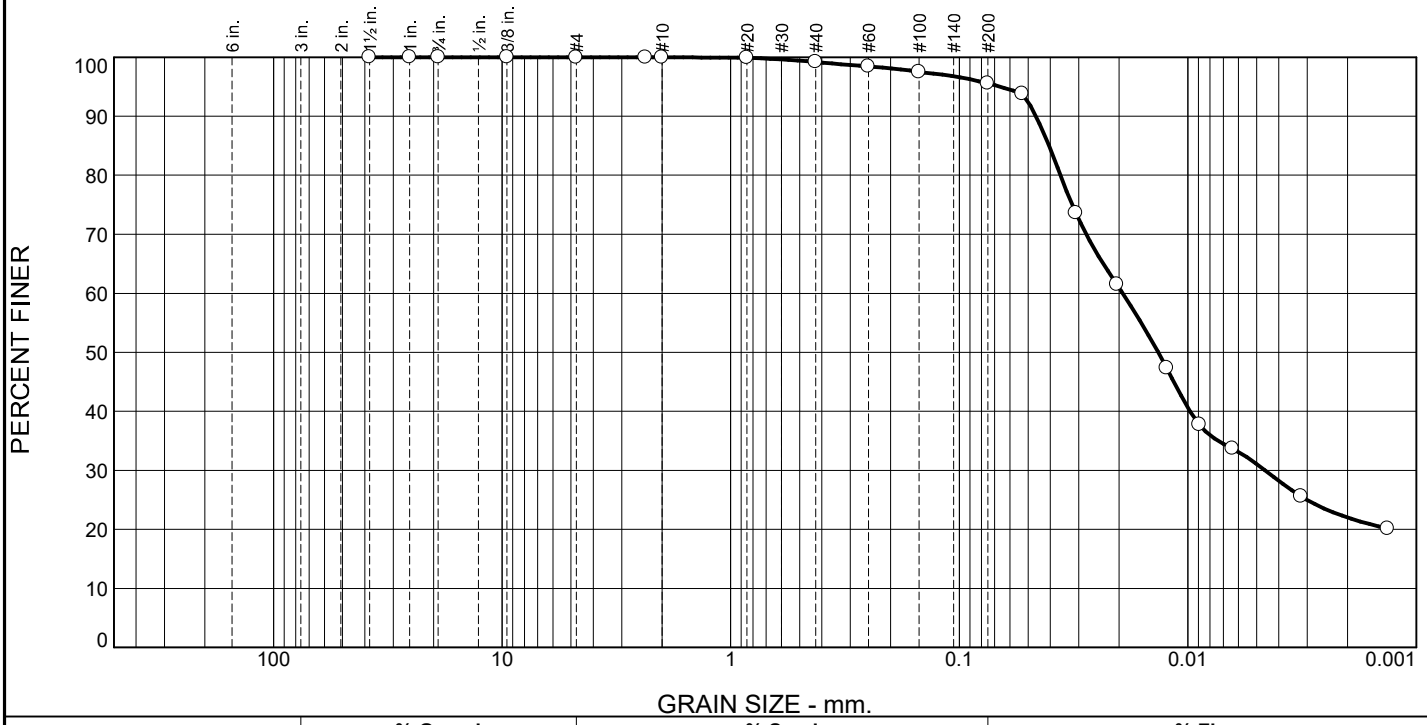
Date Sampled: 12/19/2017

associated earth sciences incorporated

Client: Snoqualmie Mill Ventures
Project: Snoqualmie Mill Site

Project No: 120126 H012 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.8	3.6	64.6	31.0

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100.0		
1	100.0		
.75	100.0		
.375	100.0		
#4	100.0		
#8	100.0		
#10	100.0		
#20	99.9		
#40	99.2		
#60	98.4		
#100	97.5		
#200	95.6		
#270	93.8		
0.0309 mm.	73.6		
0.0204 mm.	61.5		
0.0124 mm.	47.3		
0.0089 mm.	37.7		
0.0064 mm.	33.7		
0.0032 mm.	25.6		
0.0013 mm.	20.1		

* (no specification provided)

Material Description

SILT, trace sand

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** 29 **PI=** NP

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-4(1)

Coefficients

D_{90}= 0.0461 D_{85}= 0.0405 D_{60}= 0.0193
D_{50}= 0.0135 D_{30}= 0.0046 D_{15}=
D_{10}= C_u= C_c=

Remarks

Collected By: LDM

Date Received: 02/15/2018 **Date Tested:** 02/20/2018

Tested By: BN

Checked By: CJK

Title:

Location: Onsite
Sample Number: EB-1 **Depth:** 25'

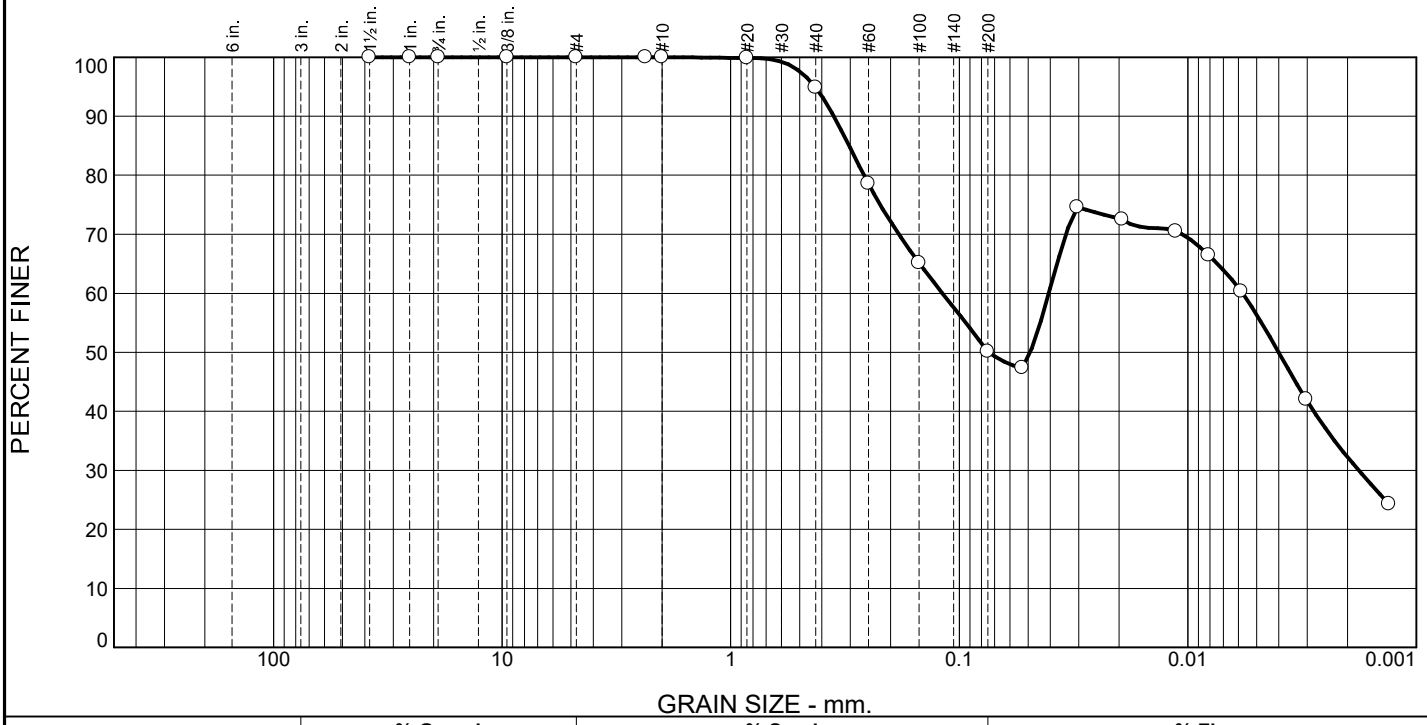
Date Sampled: 12/19/2017

associated earth sciences incorporated

Client: Snoqualmie Mill Ventures
Project: Snoqualmie Mill Site

Project No: 120126 H012 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	5.1	44.8	50.1	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100.0		
1	100.0		
.75	100.0		
.375	100.0		
#4	100.0		
#8	100.0		
#10	100.0		
#20	99.9		
#40	94.9		
#60	78.6		
#100	65.2		
#200	50.1		
#270	47.4		
0.0305 mm.	74.6		
0.0194 mm.	72.5		
0.0113 mm.	70.5		
0.0081 mm.	66.4		
0.0058 mm.	60.3		
0.0030 mm.	42.0		
0.0013 mm.	24.3		

* (no specification provided)

Material Description

Atterberg Limits (ASTM D 4318)

PL= 32 **LL=** 42 **PI=** 10

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-5(3)

Coefficients

D_{90}= 0.3542 D_{85}= 0.3034 D_{60}= 0.0058
D_{50}= 0.0040 D_{30}= 0.0018 D_{15}=
D_{10}= C_u= C_c=

Remarks

Collected by: LDM

Date Received: 02/16/2018 **Date Tested:** 02/20/2018

Tested By: BN

Checked By: CJK

Title:

Location: Onsite
Sample Number: EB-1 **Depth:** 30'

Date Sampled: 12/19/2017

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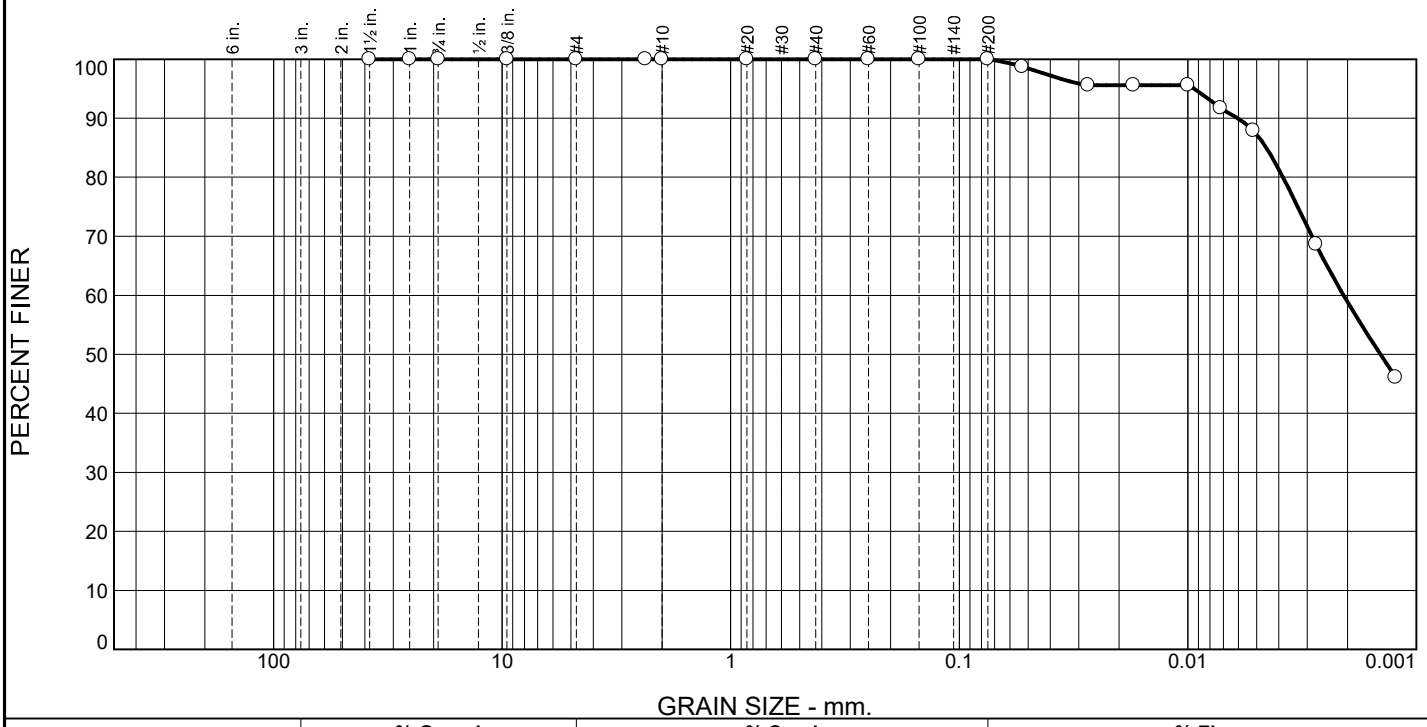
Client: Snoqualmie Mill Ventures
Project: Snoqualmie Mill Site

Project No: 120126 H012 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.0	0.0	12.8	87.2

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100.0		
1	100.0		
.75	100.0		
.375	100.0		
#4	100.0		
#8	100.0		
#10	100.0		
#20	100.0		
#40	100.0		
#60	100.0		
#100	100.0		
#200	100.0		
#270	98.7		
0.0273 mm.	95.6		
0.0173 mm.	95.6		
0.0100 mm.	95.6		
0.0072 mm.	91.7		
0.0052 mm.	87.9		
0.0028 mm.	68.6		
0.0012 mm.	46.1		

* (no specification provided)

Material Description

fat clay

Atterberg Limits (ASTM D 4318)

PL= 29 **LL=** 57 **PI=** 28

Classification

USCS (D 2487)= CH **AASHTO (M 145)=** A-7-6(34)

Coefficients

D_{90}= 0.0061 D_{85}= 0.0045 D_{60}= 0.0021
D_{50}= 0.0014 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Collected by: LDM

Date Received: 02/15/2018 **Date Tested:** 02/20/2018
Tested By: BN
Checked By: CJK
Title:

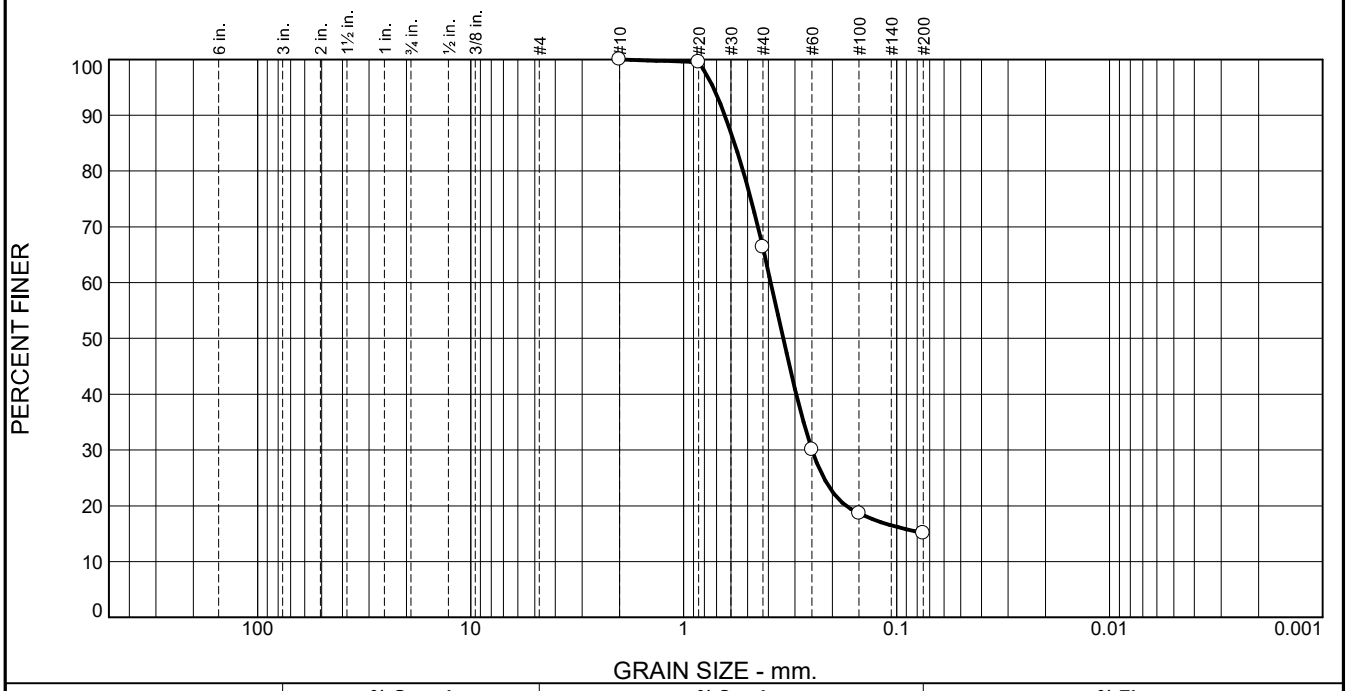
Location: Onsite
Sample Number: EB-1 **Depth:** 45'
Date Sampled: 12/19/2017

associated earth sciences incorporated

Client: Snoqualmie Mill Ventures
Project: Snoqualmie Mill Site

Project No: 120126 H012 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	33.6	51.3	15.1	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#10	100.0		
#20	99.5		
#40	66.4		
#60	30.1		
#100	18.6		
#200	15.1		

* (no specification provided)

Material Description

Silty SAND

Atterberg Limits (ASTM D 4318)

PL= np **LL=** nv **PI=**

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-2-4(0)

Coefficients

D_{90}= 0.6401 D_{85}= 0.5764 D_{60}= 0.3895
D_{50}= 0.3408 D_{30}= 0.2497 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 2-8-18 **Date Tested:** 2-8-18

Tested By: BN

Checked By: CJK

Title:

Location: Onsite
Sample Number: EB-1 **Depth:** 65'

Date Sampled: 2-8-18

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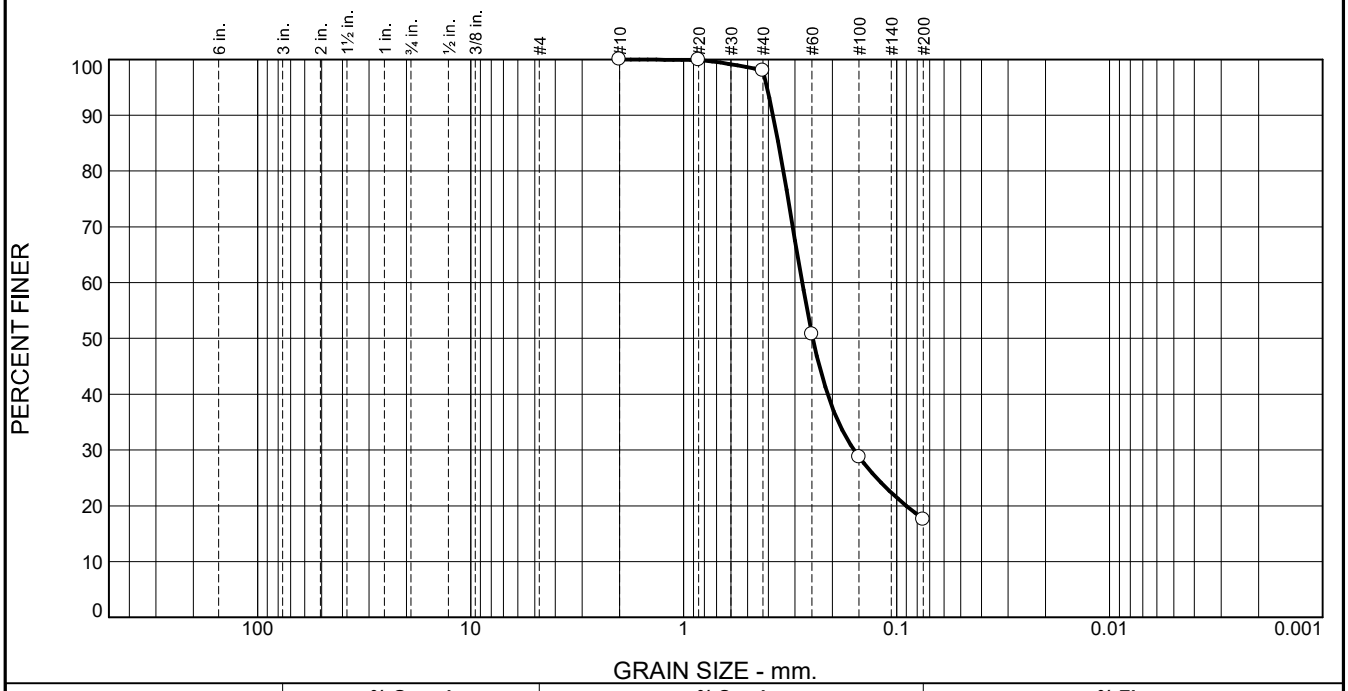
Client: Snoqualmie Mill Ventures
Project: Snoqualmie Mill Site

Project No: 120126 H012 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	2.0	80.5	17.5	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#10	100.0		
#20	99.9		
#40	98.0		
#60	50.8		
#100	28.7		
#200	17.5		

* (no specification provided)

Material Description

Silty SAND

Atterberg Limits (ASTM D 4318)

PL= np **LL=** nv **PI=**

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-2-4(0)

Coefficients

D_{90}= 0.3801 D_{85}= 0.3590 D_{60}= 0.2779
D_{50}= 0.2475 D_{30}= 0.1584 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 2-8-18 **Date Tested:** 2-8-18

Tested By: BN

Checked By: CJK

Title:

Location: Onsite
Sample Number: EB-1 **Depth:** 95'

Date Sampled: 2-8-18

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Client: Snoqualmie Mill Ventures
Project: Snoqualmie Mill Site

Project No: 120126 H012 **Figure**

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Percent Passing #200
ASTM - D1140

Date Samp	Project	Project No.		Soil Description
12/19/17	Snoqualmie Mill Site	120126 H012		
Tested By	**Location**	**EB/EP No.**	**Depth**	Various
BN	Onsite			

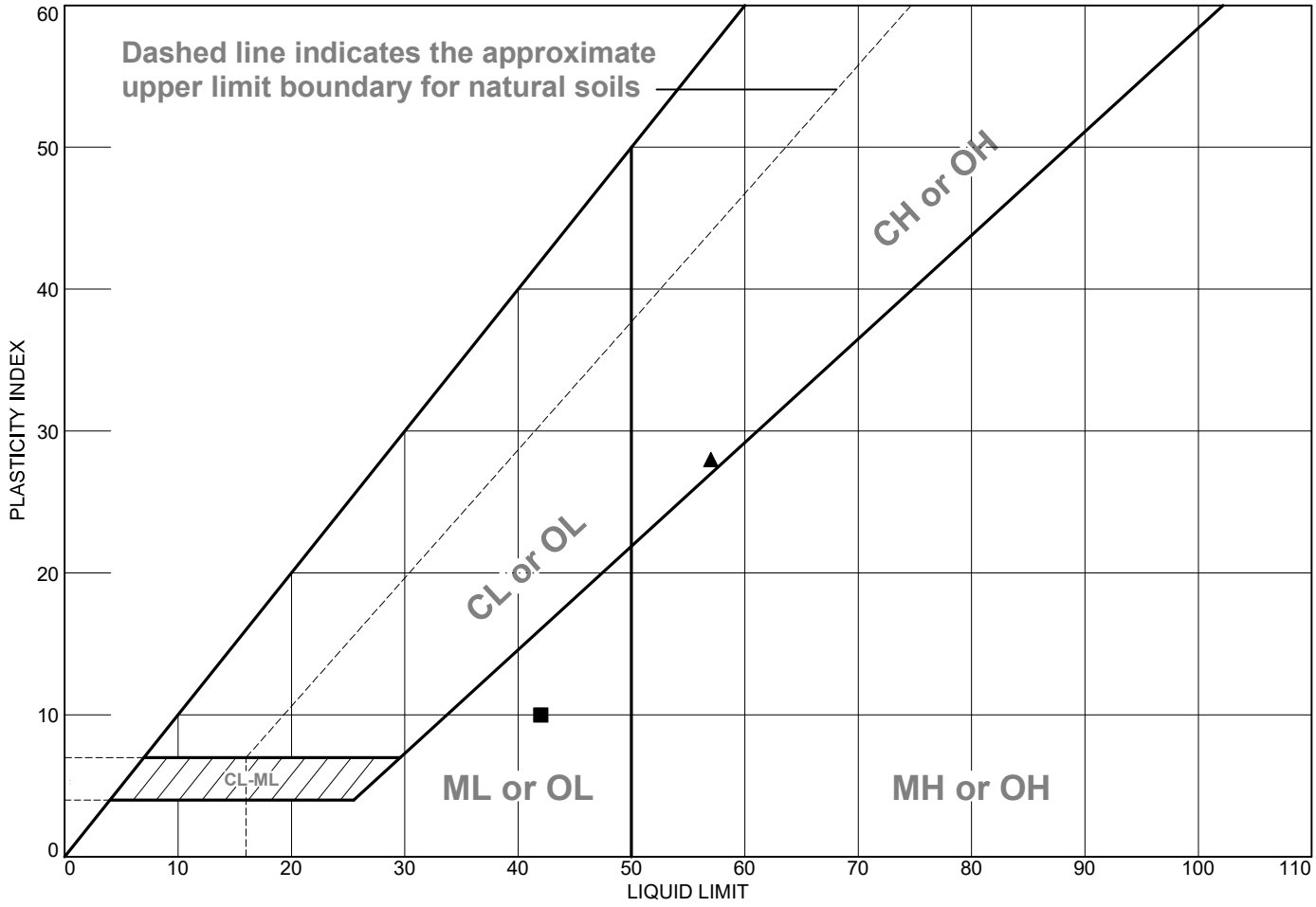
Sample I.D.	EB1-55'	EB1-65'	EB1-75'
Wet Weight	1059.4	1057.5	1104.1
Dry Weight	931.2	931.2	954.2
Water Weight	128.3	126.3	149.9
Pan	425.1	453.0	424.5
Actual Dry Weight	506.0	478.2	529.7
Percent of Water Weight	**25.3**	**26.4**	**28.3**
After Wash Weight	851.5	854.9	842.6
Percent Passing #200	**15.7**	**16.0**	**21.1**

Sample I.D.	EB1-85'	EB1-95'
Wet Weight	1323.4	1181.5
Dry Weight	1158.5	1045.9
Water Weight	164.9	135.6
Pan	507.0	530.6
Actual Dry Weight	651.6	515.3
Percent of Water Weight	**25.3**	**26.3**
After Wash Weight	1064.6	958.8
Percent Passing #200	**14.4**	**16.9**

ASSOCIATED EARTH SCIENCES, INC.

911 5th Ave., Suite 100 Kirkland, WA 98033 425-827-7701 FAX 425-827-5424

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	SILT, trace sand	29	NP	NP	99.2	95.6	ML
■	SILT, trace sand	42	32	10	94.9	50.1	ML
▲	fat clay	57	29	28	100.0	100.0	CH

Project No. 120126 H012 **Client:** Snoqualmie Mill Ventures

Project: Snoqualmie Mill Site

●**Location:** Onsite **Depth:** 25' **Sample Number:** EB-1

■**Location:** Onsite **Depth:** 30' **Sample Number:** EB-1

▲**Location:** Onsite **Depth:** 45' **Sample Number:** EB-1

associated earth sciences incorporated

Remarks:

●Collected by: LDM

■Collected by: LDM

▲Collected by: LDM

Figure

Tested By: BN **Checked By:** CJK

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

GEOTECHNICAL LABORATORY TESTING REPORT

Project:
Snoqualmie Mill

Performed at the Request of:
Associated Earth Sciences, Inc.

Reviewed By:
Joe Laprade, C.E.T.
Shannon & Wilson, Inc. Lab Manager

February 23, 2018

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Plasticity Chart, Boring EB-1
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CU Triaxial Compression, Boring EB-1, 37 ft

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

GEOTECHNICAL LABORATORY TESTING

We performed geotechnical laboratory testing on selected soil samples retrieved from one boring completed for Associated Earth Sciences, Inc.'s Snoqualmie Mill Project. The laboratory testing program included tests to classify the soil and provide data for engineering studies. We visually described all tested samples. Our laboratory testing program included water content determinations, grain size distribution analyses, Atterberg limits determinations, one-dimensional consolidation, and consolidated-undrained triaxial testing.

The following sections describe the laboratory test procedures.

VISUAL CLASSIFICATION

We classified or described soil samples using ASTM International (ASTM) D2487-17, Standard Test Method for Classification of Soil for Engineering Purposes, or ASTM D2488-17, Standard Recommended Practice for Description of Soils (Visual-Manual Procedure). For samples which we did not perform index testing, we assigned a Unified Soil Classification System (USCS) group name and symbol, based on visual-manual description. We revised visual classifications using results of the index tests discussed below.

WATER CONTENT DETERMINATION

We tested the water content of selected samples in accordance with ASTM D2216-10, Standard Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures. Comparison of the water content of a soil with its index properties can be useful in characterizing soil unit weight, consistency, compressibility, and strength. We present water content test results in the Laboratory Test Summary table in this lab report.

GRAIN SIZE DISTRIBUTION ANALYSIS

Grain size distribution analyses separate soil particles through mechanical or sedimentation processes. We present grain size distribution analysis results in the Lab Summary Table and on plots in this lab report. Grain size distribution plots provide tabular information about each specimen, including: USCS group symbol and group name; water content; constituent (i.e., cobble, gravel, sand, and fines) percentages; coefficients of uniformity and curvature, if applicable; personnel initials; ASTM standard designation; and testing remarks. Constituent percentages are also presented in the Lab Summary Table in this lab report.

We performed combined analyses (mechanical and sedimentation) on selected soil specimens to determine the grain size distribution of coarse- and fine-grained soil particles, in accordance with ASTM D422-63 (2007)e2, Standard Test Method for Particle-Size Analysis of Soils. We typically assume a specific gravity of 2.7 for hydrometer calculations, unless otherwise indicated on grain size distribution plots. We assumed a different specific gravity for one tested specimen, as noted on the associated plot.

ATTERBERG LIMITS DETERMINATION

We determined soil plasticity by performing Atterberg Limits tests on selected samples in accordance with ASTM D4318-17, Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils, Method A (Multi-Point Liquid Limit). The Atterberg Limits include liquid limit (LL), plastic limit (PL), and plasticity index (PI=LL-PL).

We present soil plasticity test results in the Lab Summary Table and on plasticity charts in this lab report. Plasticity charts provide the liquid limit, plastic limit, plasticity index, USCS group symbol, the sample description, water content, and percent passing the No. 200 sieve (if a grain size distribution analysis was performed).

ONE-DIMENSIONAL CONSOLIDATION TESTING

We performed one-dimensional consolidation tests in a fixed-ring consolidometer on relatively undisturbed samples in accordance with ASTM D2435/D2435M-11, Standard Test Methods for One Dimensional Consolidation Properties of Soils Using Incremental Loading, Test Method B (loaded to 100% primary consolidation with time-deformation readings on all load increments). We used the Casagrande construction method (log of time) to determine the end of primary consolidation. One-dimensional consolidation results presented in this lab report include a test summary, settlement plots, summarized incremental plots, and incremental plots at requested load increments.

CONSOLIDATED UNDRAINED (CU) TRIAXIAL COMPRESSION TESTING

We performed consolidated, undrained, triaxial compression tests (CU) with pore pressure measurements on requested, relatively undisturbed tube samples in accordance with ASTM D4767-11, Standard Test Method for Consolidated Undrained Triaxial Compression Test for Cohesive Soils. We saturated each sample using back pressure, then determined the degree of specimen saturation by measuring pore pressure coefficient B. Sample side drains consisting of thin strips of filter paper were used to facilitate consolidation. We sheared the specimens with a

displacement-controlled testing machine. CU test results presented in this lab report include test summary tables, and plots of principal stress difference versus axial strain, pore pressure versus axial strain, principal effective stress ratio versus axial strain, and Mohr diagrams for failure conditions.

CONSIDERATIONS

Drilling, sampling, and handling methodologies may affect the outcome of prescribed geotechnical laboratory tests. We cannot quantify or qualify sample disturbance imparted during the sampling process, or from handling procedures prior to our receipt of the samples. Sample disturbance may impact one-dimensional consolidation and triaxial testing results. As-received moisture content may affect test results; we cannot account for the effects of moisture change between sampling and testing. Instances of limited recovery may have resulted in test samples not meeting specified minimum mass requirements, per ASTM standards. Test plots show which samples do not meet ASTM specified minimum mass requirements.

REFERENCES

ASTM International, 2007, Standard test method for particle-size analysis of soils, D422-63(2007)e2: West Conshohocken, Pa., ASTM International, Annual book of standards, v. 04.08, soil and rock (I): D420 - D5876, 8 p., available: www.astm.org.

ASTM International, 2010, Standard test methods for laboratory determination of water (moisture) content of soil and rock by mass, D2216-10: West Conshohocken, Pa., ASTM International, Annual book of standards, v. 04.08, soil and rock (I): D420 - D5876, 7 p., available: www.astm.org.

ASTM International, 2011, Standard test method for consolidated undrained triaxial compression test for cohesive soils, D4767-11: West Conshohocken, Pa., ASTM International, Annual book of standards, v. 04.08, soil and rock (I): D420 - D5876, 14 p., available: www.astm.org.

ASTM International, 2011, Standard test methods for one-dimensional consolidation properties of soils using incremental loading, D2435-11: West Conshohocken, Pa., ASTM International, Annual book of standards, v. 04.08, soil and rock (I): D420 - D5876, 15 p., available: www.astm.org.

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ASTM International, 2017, Standard practice for description and identification of soils (visual-manual procedures), D2488-17: West Conshohocken, Pa., ASTM International, Annual book of standards, v. 04.08, soil and rock (I): D420 - D5876, 13 p., available: www.astm.org.

ASTM International, 2017, Standard test methods for liquid limit, plastic limit, and plasticity index of soils, D4318-17: West Conshohocken, Pa., ASTM International, Annual book of standards, v. 04.08, soil and rock (I): D420 - D5876, 16 p., available: www.astm.org.

LABORATORY TERMS

Abbreviations, Symbols, and Terms	Descriptions
%	Percent
*	Sample specimen weight did not meet required minimum mass for the test method
"	Inch
#	Test not performed by Shannon & Wilson, Inc. laboratory
ASTM Std.	ASTM International Standard
C_c	Coefficient of curvature
Clay-size	Soil particles finer than 0.002 mm
cm	Centimeter
cm^2	Square centimeter
Coarse-grained	Soil particles coarser than 0.075 mm (cobble-, gravel- and sand-sized particles)
Cobbles	Soil particles finer than 305 mm and coarser than 76.2 mm
C_u	Coefficient of uniformity
CU	Consolidated-Undrained
ε	Axial strain
Fine-grained	Soil particles finer than 0.075 mm (silt- and clay-sized particles)
ft	Feet
γm	Wet unit weight
Gravel	Soil particles finer than 76.2 mm and coarser than 4.75 mm
G_s	Specific gravity of soil solids
H_o	Initial height
ΔH	Change in height
ΔH_{load}	End of load increment deformation
in	Inch
in^3	Cubic inch
LL	Liquid Limit
min	Minute
mm	Millimeter
μ_m	Micrometer
MC	Moisture content
MPa	Mega-Pascal
NP	Non-plastic
OC	Organic content
p	Total stress
p'	Effective stress
Pa	Pascal
pcf	Pounds per cubic foot
PI	Plasticity Index
PL	Plastic Limit
psf	Pounds per square foot
psi	Pounds per square inch
q	Deviatoric stress
Sand	Soil particles finer than 4.75 mm and coarser than 0.075 mm
sec	Second
Silt	Soil particles finer than 0.075 mm and coarser than 0.002 mm
t_n	Time to n% primary consolidation
t_{load}	Duration of load increment
tsf	Short tons per square foot
USCS	Unified Soil Classification System
UU	Unconsolidated-Undrained
WC	Water content

LABORATORY INDEX TEST SUMMARY

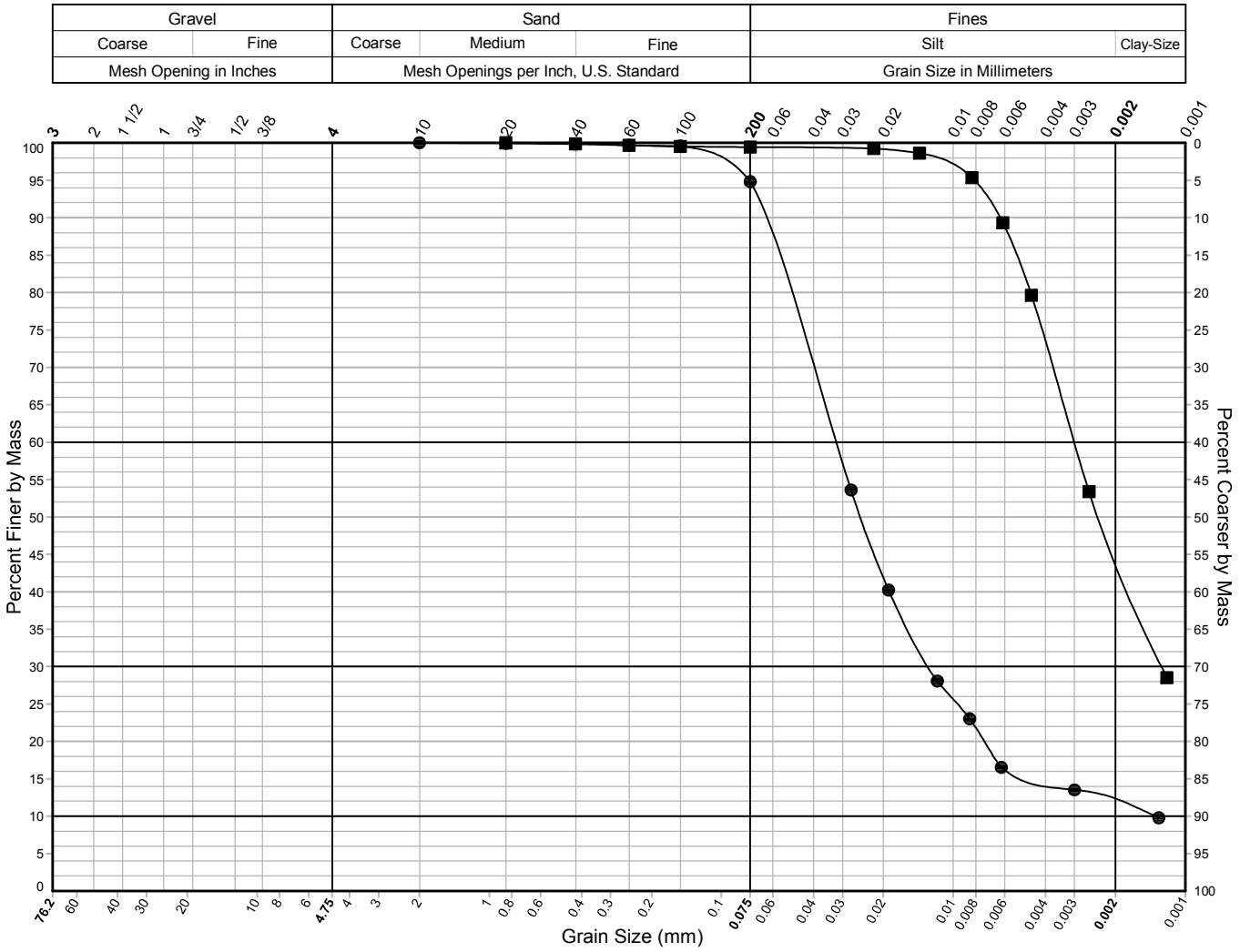
Boring	Top Depth (ft)	USCS	WC (%)	% Sand	% Fines	% Clay-size	LL	PL	Soil Description
EB-1	22	ML	34.9	5	95	12	28	27	Silt
EB-1	37	ML	46.3	1	99	45	42	27	Silt

SHANNON & WILSON, INC.

GRAIN SIZE DISTRIBUTION PLOT

Snoqualmie Mill
King County, Washington

BORING EB-1



Sample Identification	Depth (ft)	USCS Group Symbol	USCS Group Name	Gravel %	Sand %	Fines %	< 20µm %	< 2µm %	WC %	Tested By	Review By	ASTM Std.
● EB-1	22.0	ML	Silt		5	95	42	12	34.9	AKV	JFL	D422
■ EB-1	37.0	ML	Silt		1	99	99	45	46.3	AKV	JFL	D422

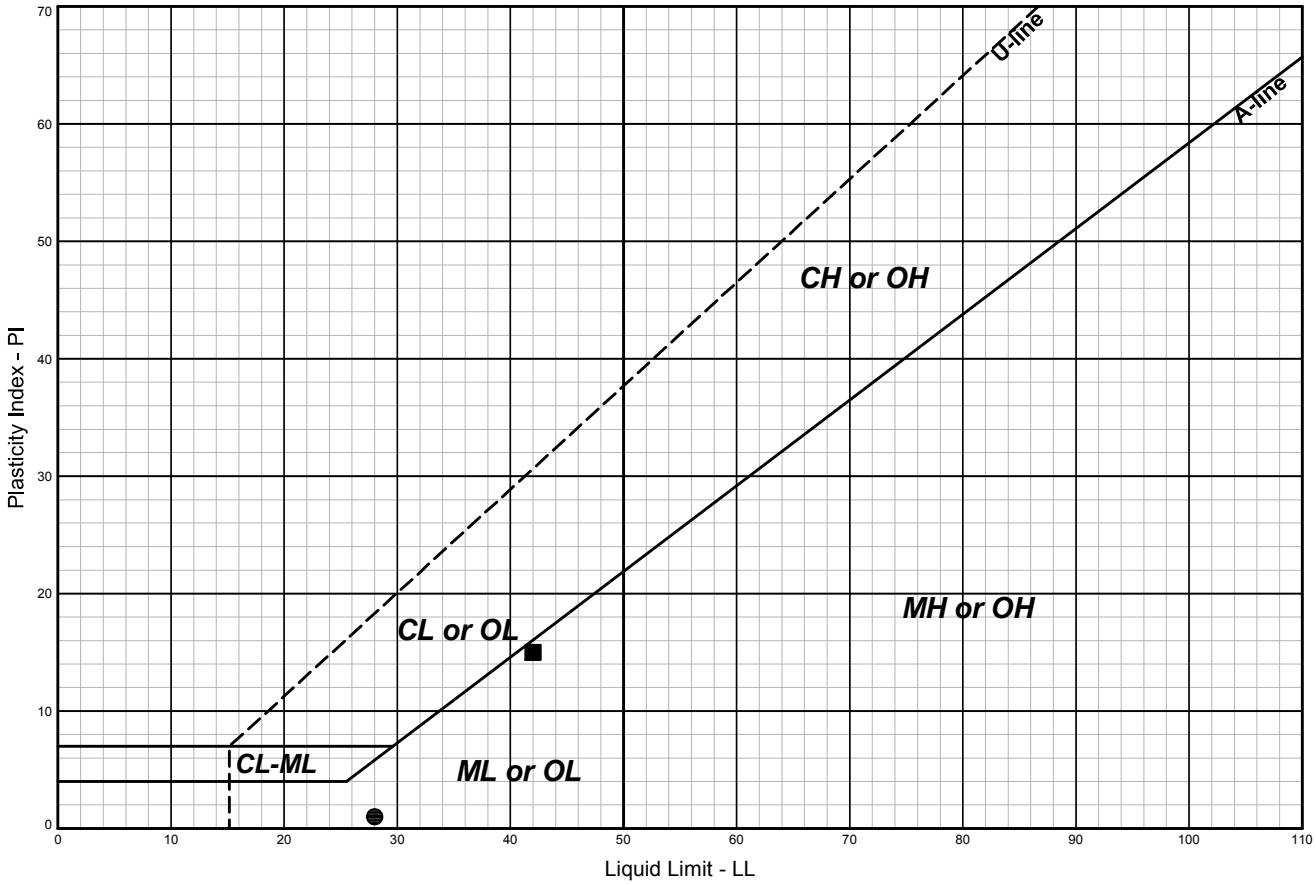
Testing Remarks: Hydrometer tests require specific gravity data for calculation of the percent finer. In the absence of specific-gravity testing, we typically assume a specific gravity of 2.7, unless the mechanical and settling curves do not match. The hydrometer curve at 37 ft required a specific-gravity-approximation adjustment to 2.78 to align with the mechanical curve. The actual specific gravity of this specimen may vary.

SHANNON & WILSON, INC.

PLASTICITY CHART

Snoqualmie Mill
King County, Washington

BORING EB-1



Sample Identification	Depth (ft)	USCS Group Symbol	USCS Group Name	LL	PL	PI	WC %	Gravel %	Sand %	Fines %	< 2µm %	Tested By	Review By	ASTM Std.
● EB-1	22.0	ML	Silt	28	27	1	34.9		5	95	12	AKV	JFL	D4318
■ EB-1	37.0	ML	Silt	42	27	15	46.3		1	99	45	AKV	JFL	D4318

ONE-DIMENSIONAL CONSOLIDATION

Snoqualmie Mill
King County, Washington

TEST SUMMARY
Boring EB-1, Sample , 22.6 ft

SPECIMEN DATA AND TEST RESULTS

Sample Classification:
Silt (ML)

Specific Gravity, G_s (Assumed)	2.7
Liquid Limit, LL	---
Plastic Limit, PL	---
Plasticity Index, PI (LL - PL)	---
Fines Content	---
Organic Content	---
Initial Seating Load, g	50
Final Seating Load, g	50
ASTM Test Method	Method B
Coefficient of Consolidation Interpretation	Procedure 1

	Pre-Inundation	Final Load
Height, in	0.787	0.609
Diameter, in	1.972	1.972
Specimen Volume, in^3	2.404	1.861
Wet Unit Weight, pcf	116.7	134.2
Dry Unit Weight, pcf	84.4	109.1
Water Content	38%	23%
Void Ratio	1.00	0.55
Degree of Saturation	100%	100%

Load Increment Number	Applied Stress, tsf	t_{load}, min	t_{50}, min	ΔH_{load}, in	ΔH at t_{100}, in	$\Delta H/H_o$	Void Ratio	a_v, Mpa^{-1}	c_v, cm^2/s	k, cm/s
Seating										
1	0.05	1410	0.7	0.002	0.002	0.2%	0.992	8.85E-01	4.43E-03	1.92E-07
2	0.10	510	0.4	0.008	0.005	0.6%	0.983	1.71E+00	7.26E-03	6.12E-07
3	0.26	525	0.3	0.025	0.019	2.4%	0.947	2.41E+00	1.11E-02	1.32E-06
4	0.52	885	0.3	0.038	0.029	3.6%	0.924	9.53E-01	8.93E-03	4.29E-07
5	1.04	315	0.1	0.052	0.041	5.2%	0.893	6.11E-01	2.10E-02	6.55E-07
6	2.07	1080	0.1	0.072	0.055	7%	0.857	3.70E-01	2.48E-02	4.75E-07
7	4.15	300	0.1	0.091	0.072	9.2%	0.813	2.18E-01	2.69E-02	3.09E-07
8	8.30	230	0.1	0.115	0.093	11.8%	0.761	1.32E-01	3.13E-02	2.24E-07
9	16.60	900	0.1	0.144	0.116	14.8%	0.701	7.55E-02	3.47E-02	1.46E-07
10	33.19	285	0.1	0.173	0.143	18.1%	0.635	4.17E-02	3.52E-02	8.45E-08
11	66.38	1110	0.1	0.208	0.171	21.7%	0.562	2.28E-02	3.66E-02	5.00E-08
12	95.42	185	0.1	0.225	0.189	24%	0.516	1.64E-02	2.57E-02	2.66E-08
13	23.86	1455	0.7	0.216	0.194	24.6%	0.504	-1.73E-03	2.57E-03	2.88E-10
14	6.22	2715	0.2	0.207	0.190	24.1%	0.514	5.91E-03	9.37E-03	3.61E-09
15	1.56	465	0.2	0.199	0.186	23.6%	0.524	2.23E-02	9.20E-03	1.33E-08
16	0.39	975	0.2	0.188	0.180	22.9%	0.539	1.32E-01	1.29E-02	1.10E-07
17	0.10	8851	167.0	0.178	0.167	21.2%	0.573	1.25E+00	1.20E-05	9.58E-10

Specimen trimmed using a trimming turntable and indundated with distilled water.
Tested by AKV in accordance with ASTM D2435-11. Finalized by JFL.

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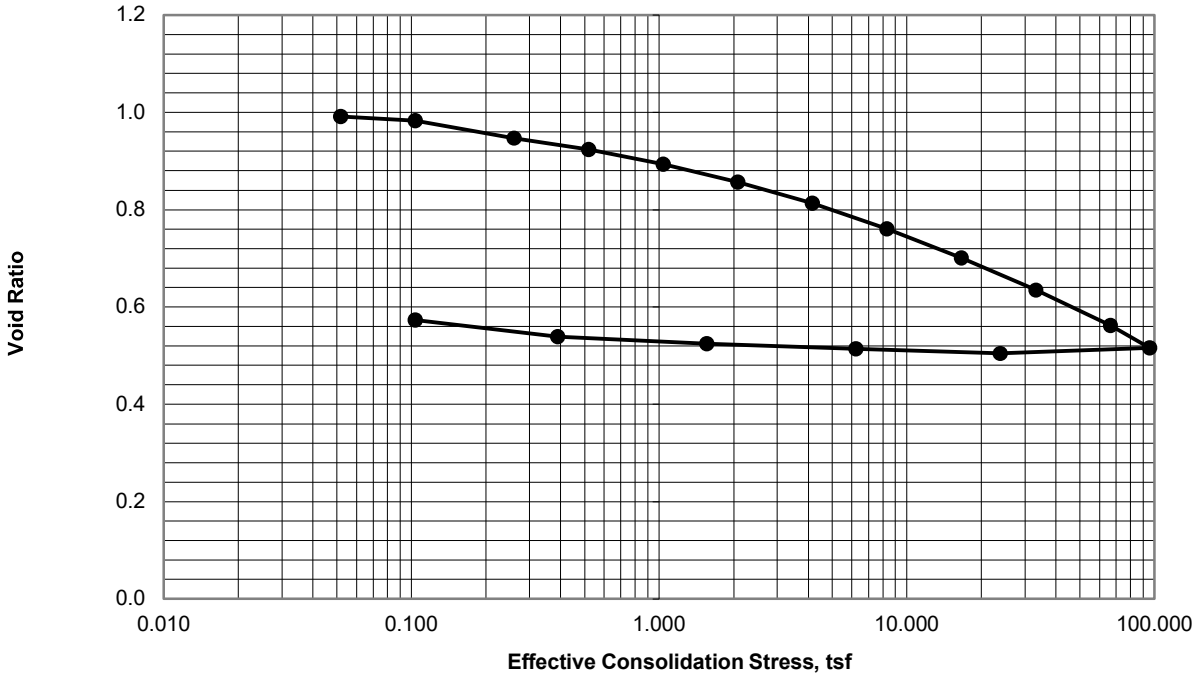
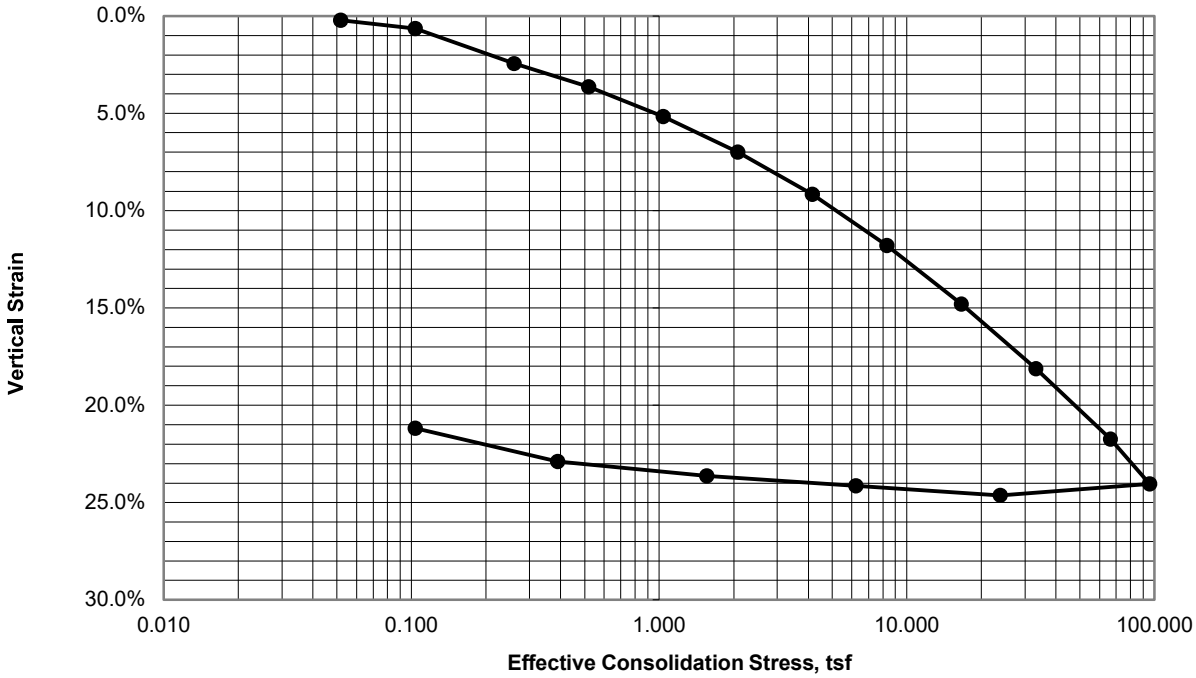
ONE-DIMENSIONAL CONSOLIDATION

Snoqualmie Mill
King County, Washington

CONSOLIDATION CURVES
Boring EB-1, Sample , 22.6 ft





Maximum Applied Effective Consolidation Stress, tsf = 95.42

Specimen trimmed using a trimming turntable and indundated with distilled water.
Tested by AKV in accordance with ASTM D2435-11. Finalized by JFL.

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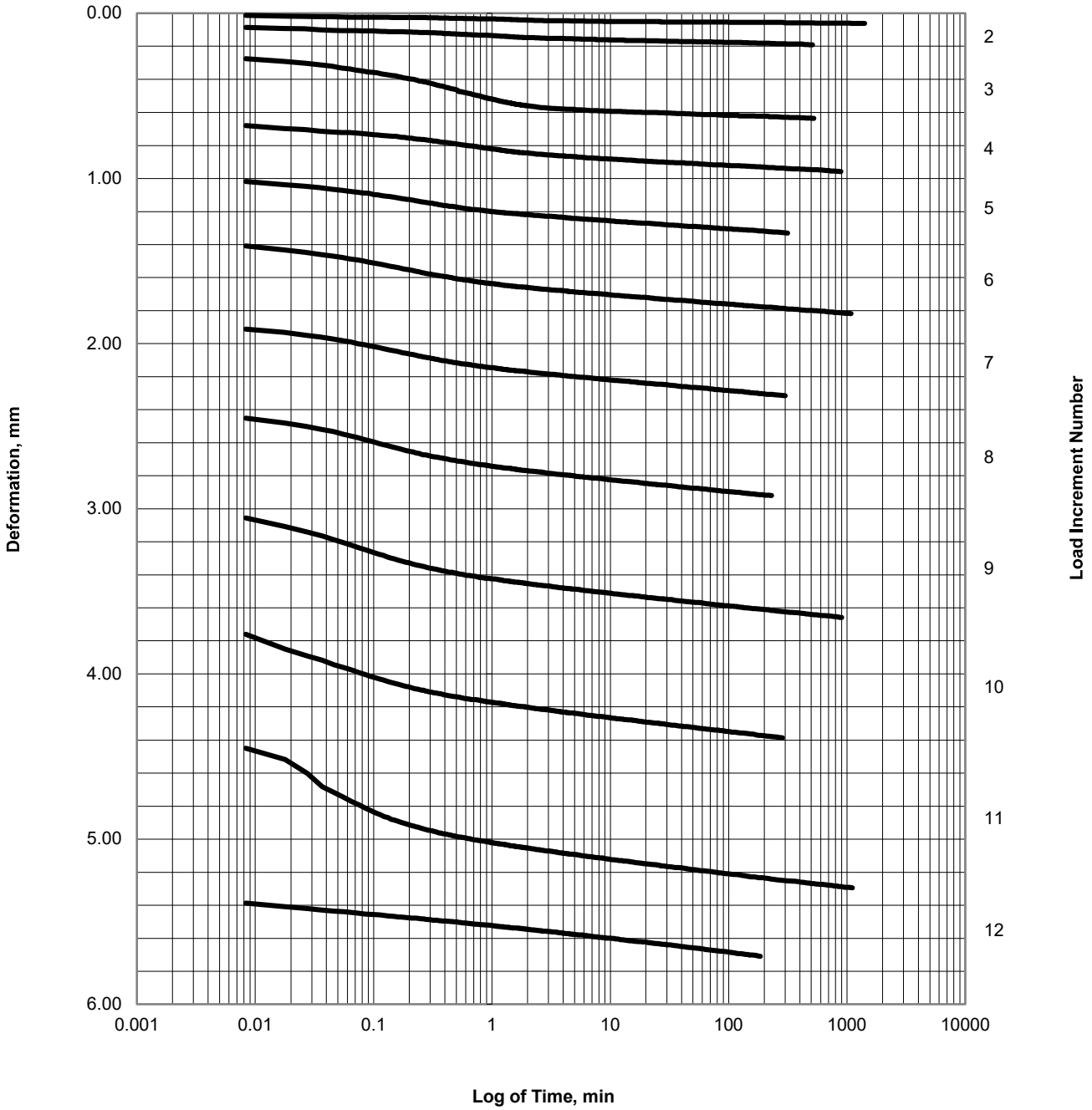
ONE-DIMENSIONAL CONSOLIDATION

Snoqualmie Mill
King County, Washington

LOAD INCREMENT TIME-DEFORMATION CURVES
Boring EB-1, Sample , 22.6 ft



Load Sequence, tsf = 0.1, 0.26, 0.52, 1.04, 2.07, 4.15, 8.3, 16.6, 33.19, 66.38, 95.42

Specimen trimmed using a trimming turntable and indundated with distilled water.
Tested by AKV in accordance with ASTM D2435-11. Finalized by JFL.

CONSOL_v3.0_NOTB_snoqualmie mill_EB-1_22.6.xlsm 02/22/18

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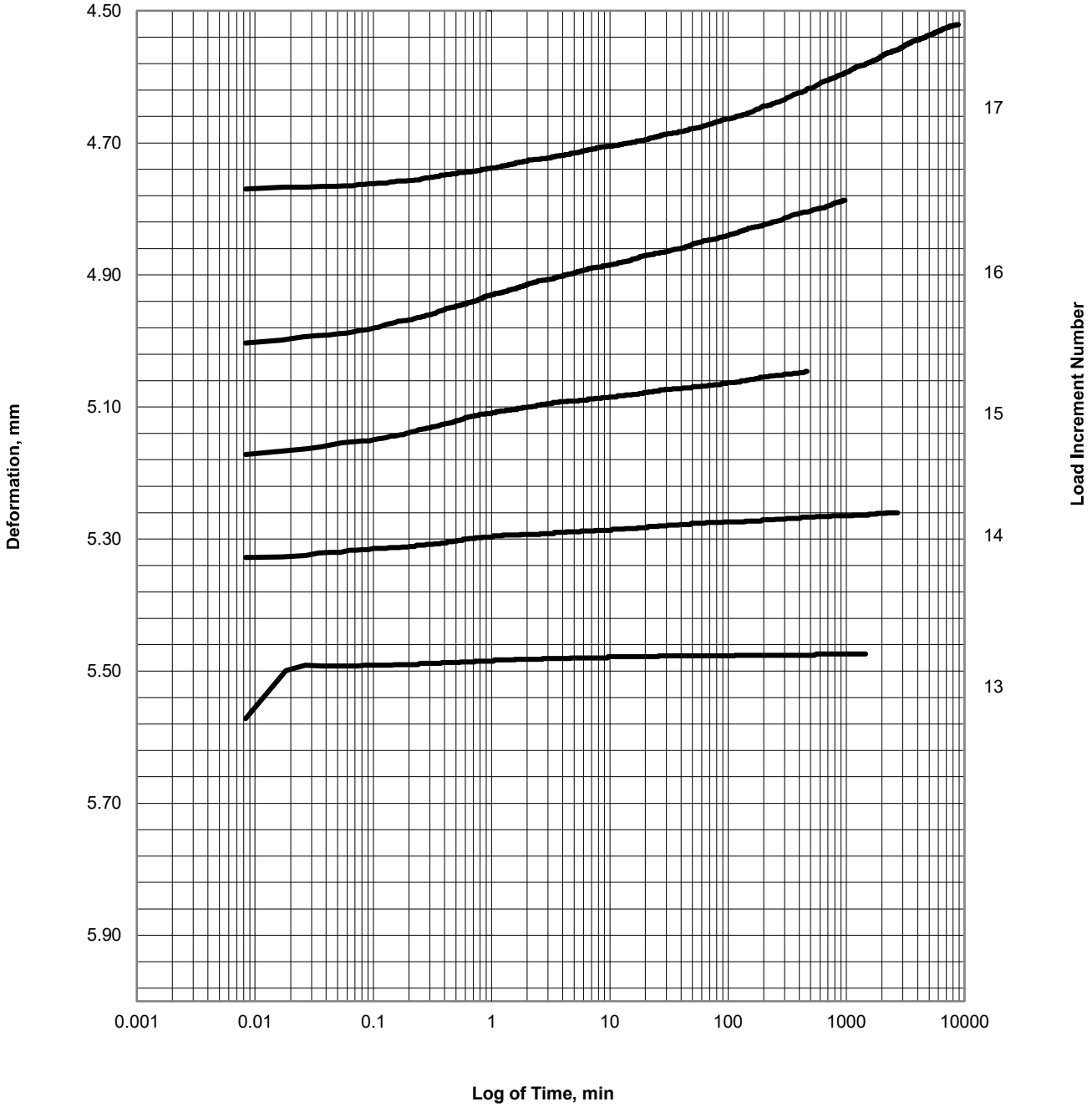
ONE-DIMENSIONAL CONSOLIDATION

Snoqualmie Mill
King County, Washington

UNLOAD INCREMENT TIME-DEFORMATION CURVES
Boring EB-1, Sample , 22.6 ft



Load Sequence, tsf = 23.86, 6.22, 1.56, 0.39, 0.1

Specimen trimmed using a trimming turntable and indundated with distilled water.
Tested by AKV in accordance with ASTM D2435-11. Finalized by JFL.

CONSOL_v3.0_NOTB_snoqualmie mill_EB-1_22.6.xlsm 02/22/18

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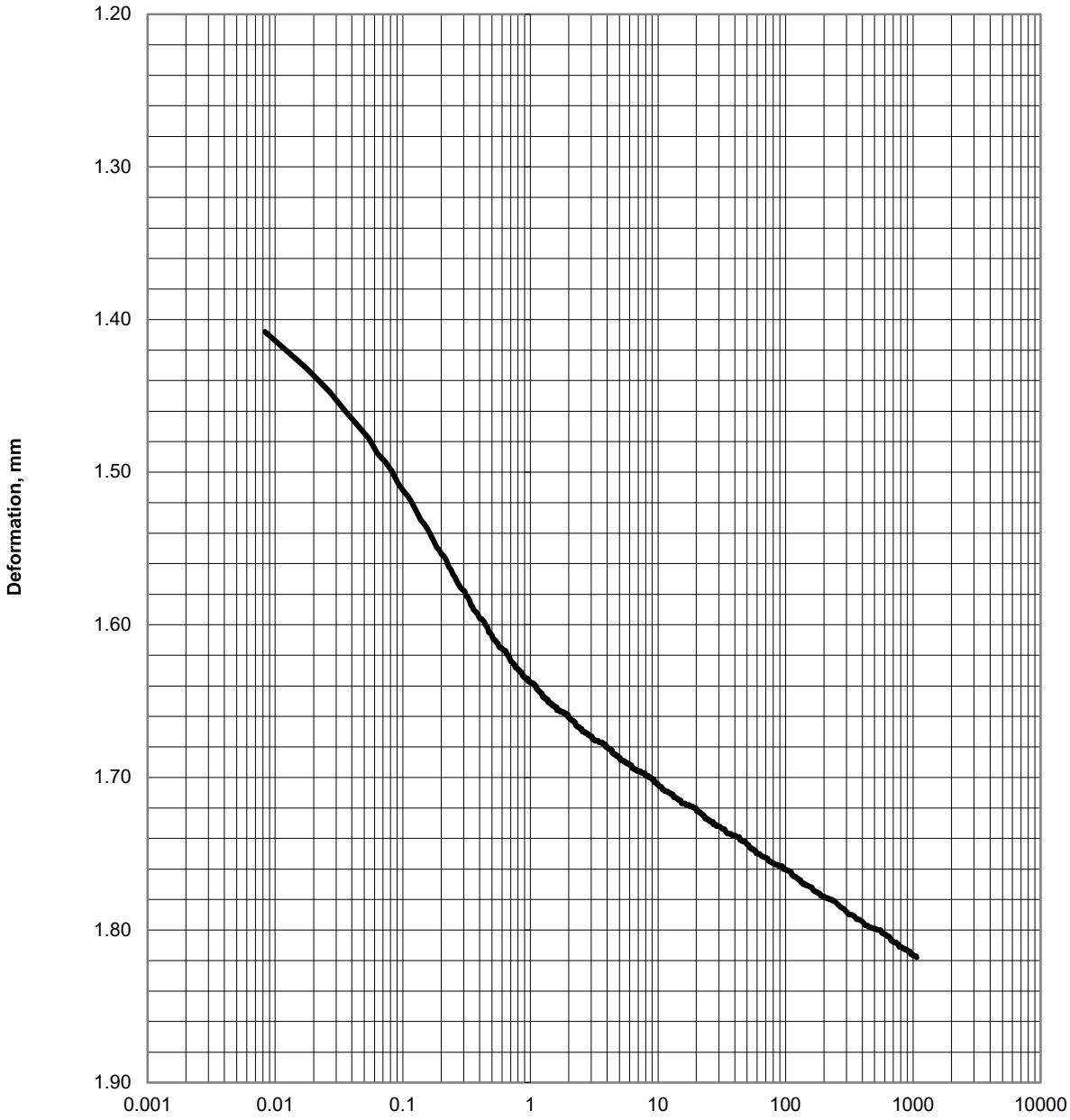
ONE-DIMENSIONAL CONSOLIDATION

Snoqualmie Mill
King County, Washington

PLOT OF LOAD INCREMENT 6 (LOG TIME)
BORING EB-1, SAMPLE , 22.6 ft



Applied Stress, tsf = 2.07

Specimen trimmed using a trimming turntable and indundated with distilled water.
Tested by AKV in accordance with ASTM D2435-11. Finalized by JFL.

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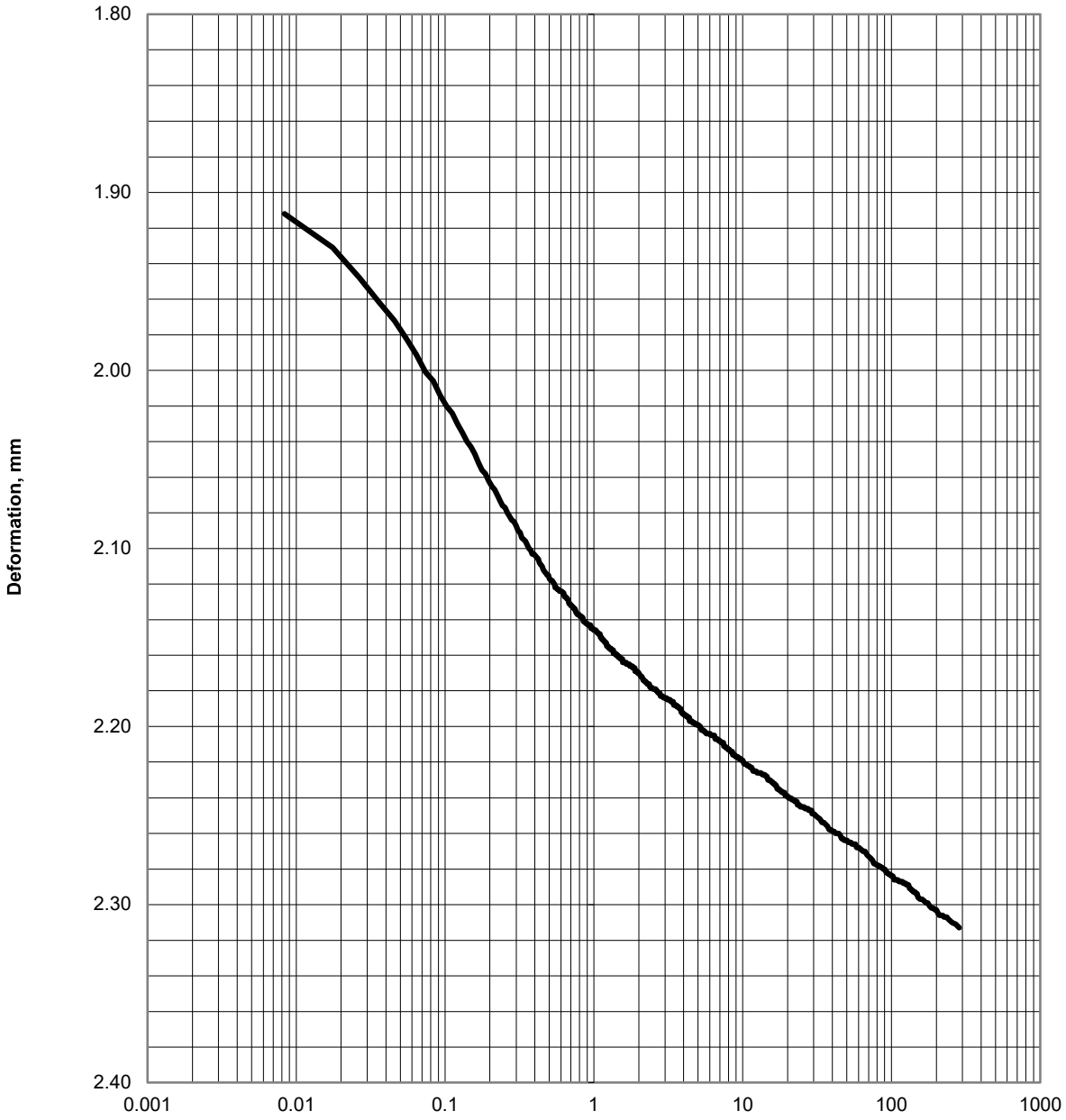
ONE-DIMENSIONAL CONSOLIDATION

Snoqualmie Mill
King County, Washington

PLOT OF LOAD INCREMENT 7 (LOG TIME)
BORING EB-1, SAMPLE , 22.6 ft



Applied Stress, tsf = 4.15

Specimen trimmed using a trimming turntable and indundated with distilled water.
Tested by AKV in accordance with ASTM D2435-11. Finalized by JFL.

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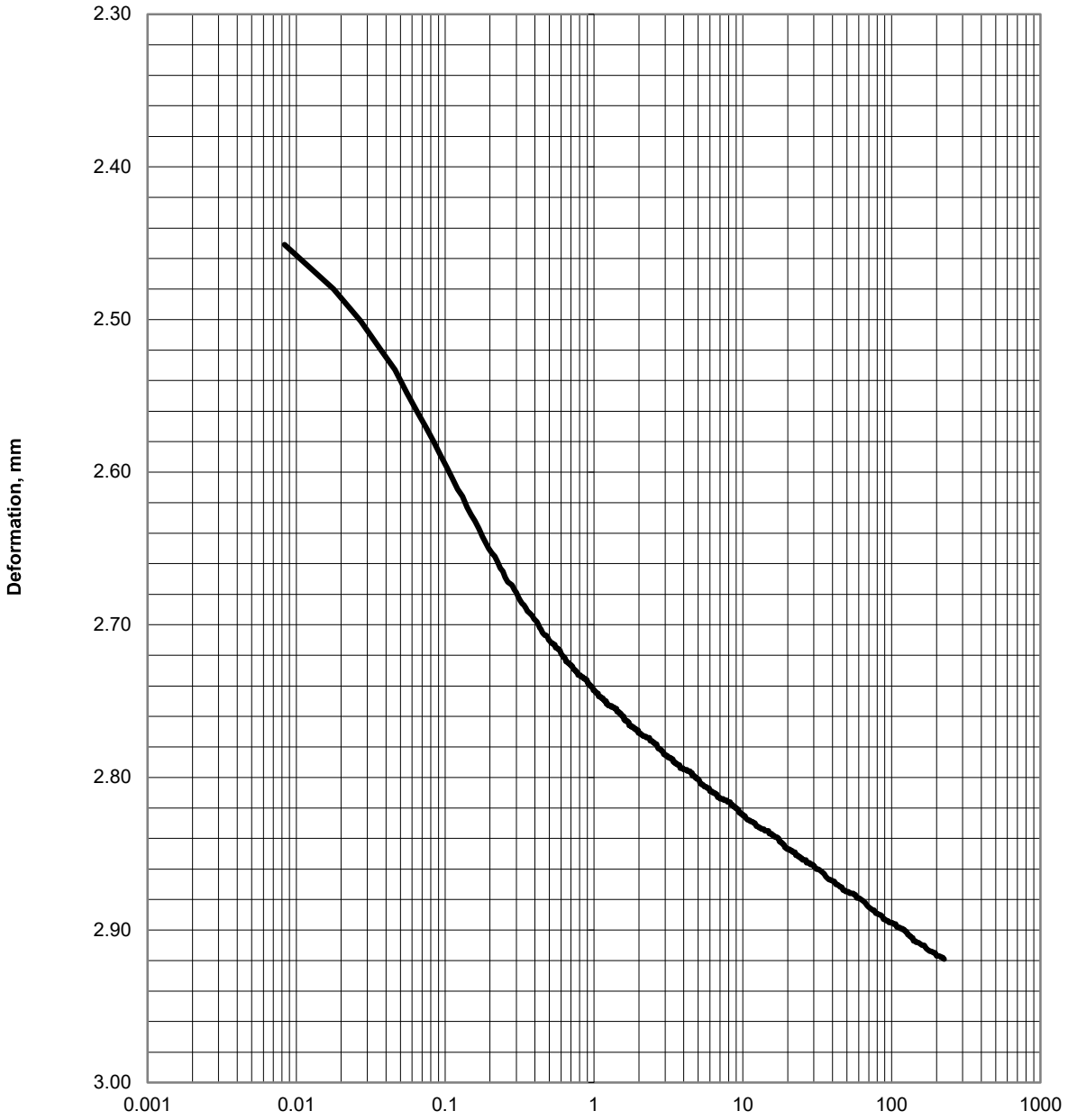
ONE-DIMENSIONAL CONSOLIDATION

Snoqualmie Mill
King County, Washington

PLOT OF LOAD INCREMENT 8 (LOG TIME)
BORING EB-1, SAMPLE , 22.6 ft



Applied Stress, tsf = 8.3

Specimen trimmed using a trimming turntable and indundated with distilled water.
Tested by AKV in accordance with ASTM D2435-11. Finalized by JFL.

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ONE-DIMENSIONAL CONSOLIDATION

Snoqualmie Mill
King County, Washington

TEST SUMMARY
Boring EB-1, Sample , 22.8 ft

SPECIMEN DATA AND TEST RESULTS

Sample Classification:
Silt (ML)

Specific Gravity, G_s (Assumed)	2.7
Liquid Limit, LL	---
Plastic Limit, PL	---
Plasticity Index, PI (LL - PL)	---
Fines Content	---
Organic Content	---
Initial Seating Load, g	50
Final Seating Load, g	50
ASTM Test Method	Method B
Coefficient of Consolidation Interpretation	Procedure 1

	Pre-Inundation	Final Load
Height, in	0.786	0.631
Diameter, in	1.992	1.992
Specimen Volume, in^3	2.450	1.969
Wet Unit Weight, pcf	115.1	129.7
Dry Unit Weight, pcf	85.7	106.7
Water Content	34%	22%
Void Ratio	0.97	0.58
Degree of Saturation	96%	100%

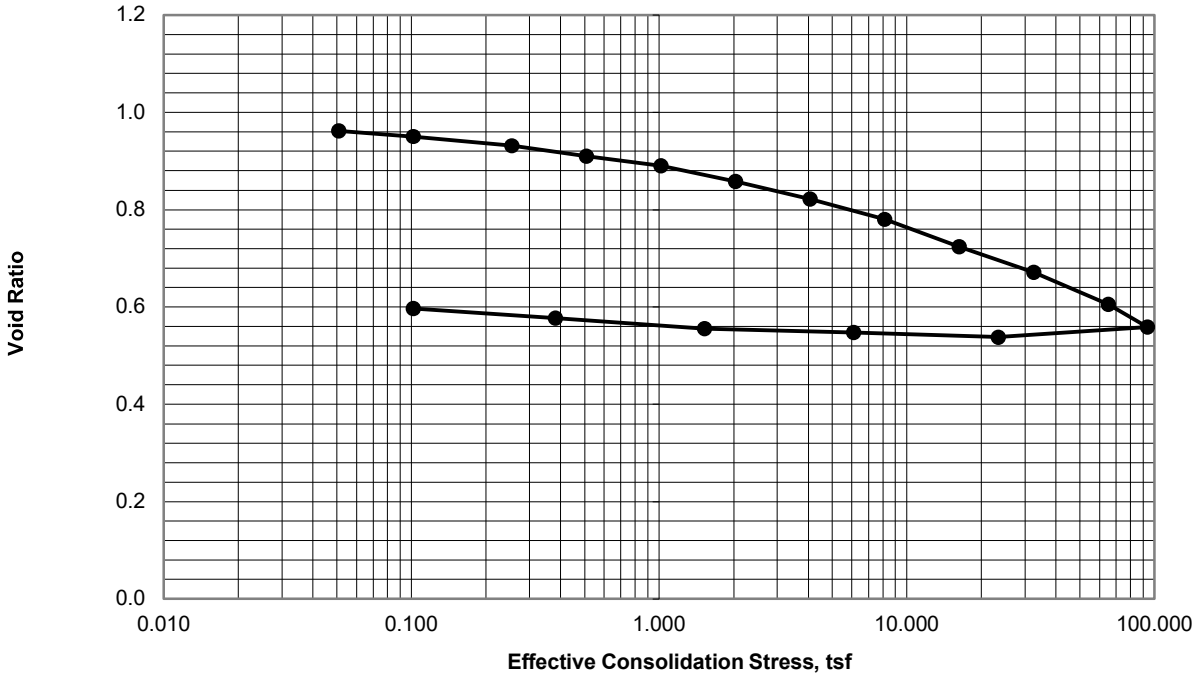
Load Increment Number	Applied Stress, tsf	t_{load}, min	t_{50}, min	ΔH_{load}, in	ΔH at t_{100}, in	$\Delta H/H_o$	Void Ratio	a_v, Mpa^{-1}	c_v, cm^2/s	k, cm/s
Seating										
1	0.05	1410	0.1	0.003	0.002	0.2%	0.962	8.30E-01	4.73E-02	1.96E-06
2	0.10	510	0.1	0.009	0.006	0.8%	0.950	2.41E+00	2.99E-02	3.60E-06
3	0.25	525	0.1	0.019	0.014	1.8%	0.931	1.31E+00	4.35E-02	2.86E-06
4	0.51	885	0.1	0.028	0.023	2.9%	0.910	8.91E-01	3.69E-02	1.67E-06
5	1.02	315	0.1	0.039	0.031	3.9%	0.890	4.09E-01	5.95E-02	1.25E-06
6	2.03	1080	0.1	0.055	0.043	5.5%	0.858	3.25E-01	5.88E-02	9.93E-07
7	4.06	300	0.1	0.071	0.058	7.3%	0.822	1.84E-01	5.54E-02	5.38E-07
8	8.13	230	0.0	0.091	0.074	9.5%	0.780	1.09E-01	5.50E-02	3.23E-07
9	16.26	900	0.1	0.116	0.097	12.3%	0.724	7.17E-02	4.99E-02	1.97E-07
10	32.52	285	0.0	0.142	0.118	15%	0.672	3.37E-02	1.08E-01	2.07E-07
11	65.03	1110	0.0	0.175	0.144	18.4%	0.605	2.13E-02	5.29E-02	6.62E-08
12	93.48	1455	0.1	0.193	0.163	20.7%	0.558	1.71E-02	2.75E-02	2.88E-08
13	23.37	2715	0.5	0.185	0.171	21.8%	0.538	-3.04E-03	4.19E-03	8.00E-10
14	6.10	465	0.1	0.178	0.167	21.3%	0.547	5.60E-03	3.82E-02	1.36E-08
15	1.52	975	0.1	0.171	0.164	20.9%	0.556	1.91E-02	3.35E-02	4.06E-08
16	0.38	1395	10.1	0.163	0.156	19.8%	0.577	1.94E-01	2.06E-04	2.53E-09
17	0.10	7441	254.8	0.155	0.148	18.8%	0.597	7.32E-01	8.36E-06	3.81E-10

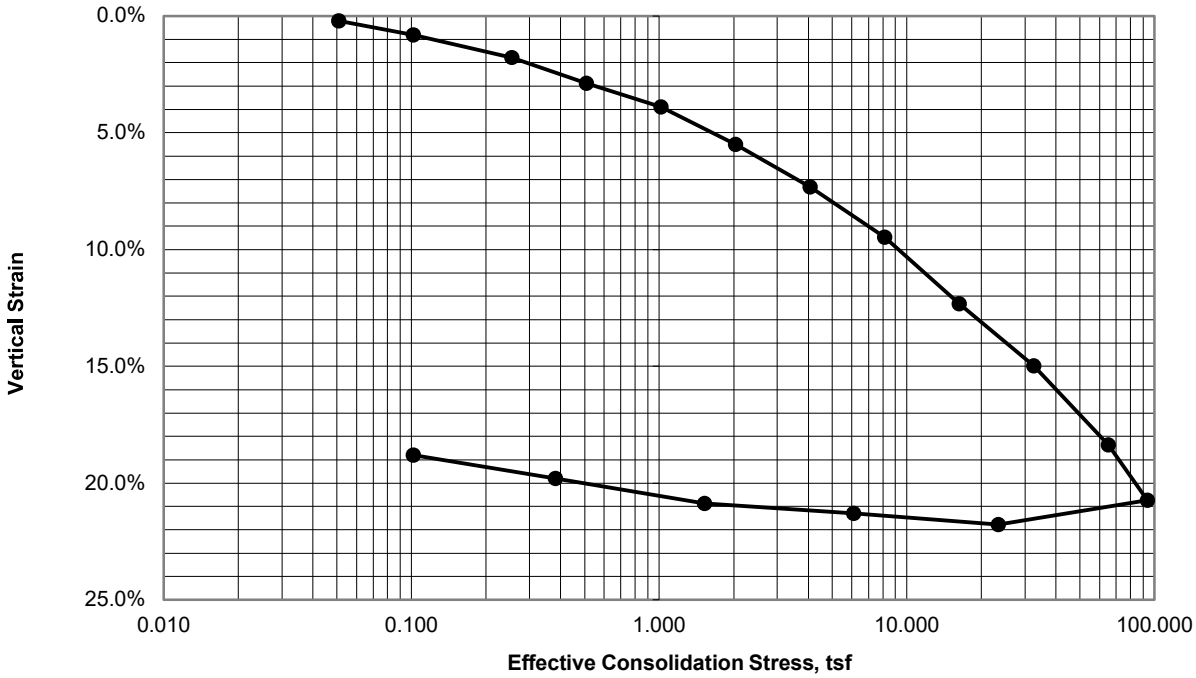
Specimen trimmed using a trimming turntable and indundated with distilled water.
Tested by AKV in accordance with ASTM D2435-11. Finalized by JFL.

ONE-DIMENSIONAL CONSOLIDATION

Snoqualmie Mill
King County, Washington

CONSOLIDATION CURVES
Boring EB-1, Sample , 22.8 ft





Maximum Applied Effective Consolidation Stress, tsf = 93.48

Specimen trimmed using a trimming turntable and indundated with distilled water.
Tested by AKV in accordance with ASTM D2435-11. Finalized by JFL.

CONSOL_v3.0_NOTB_snoqualmie mill_EB-1_22.8.xlsm 02/22/18

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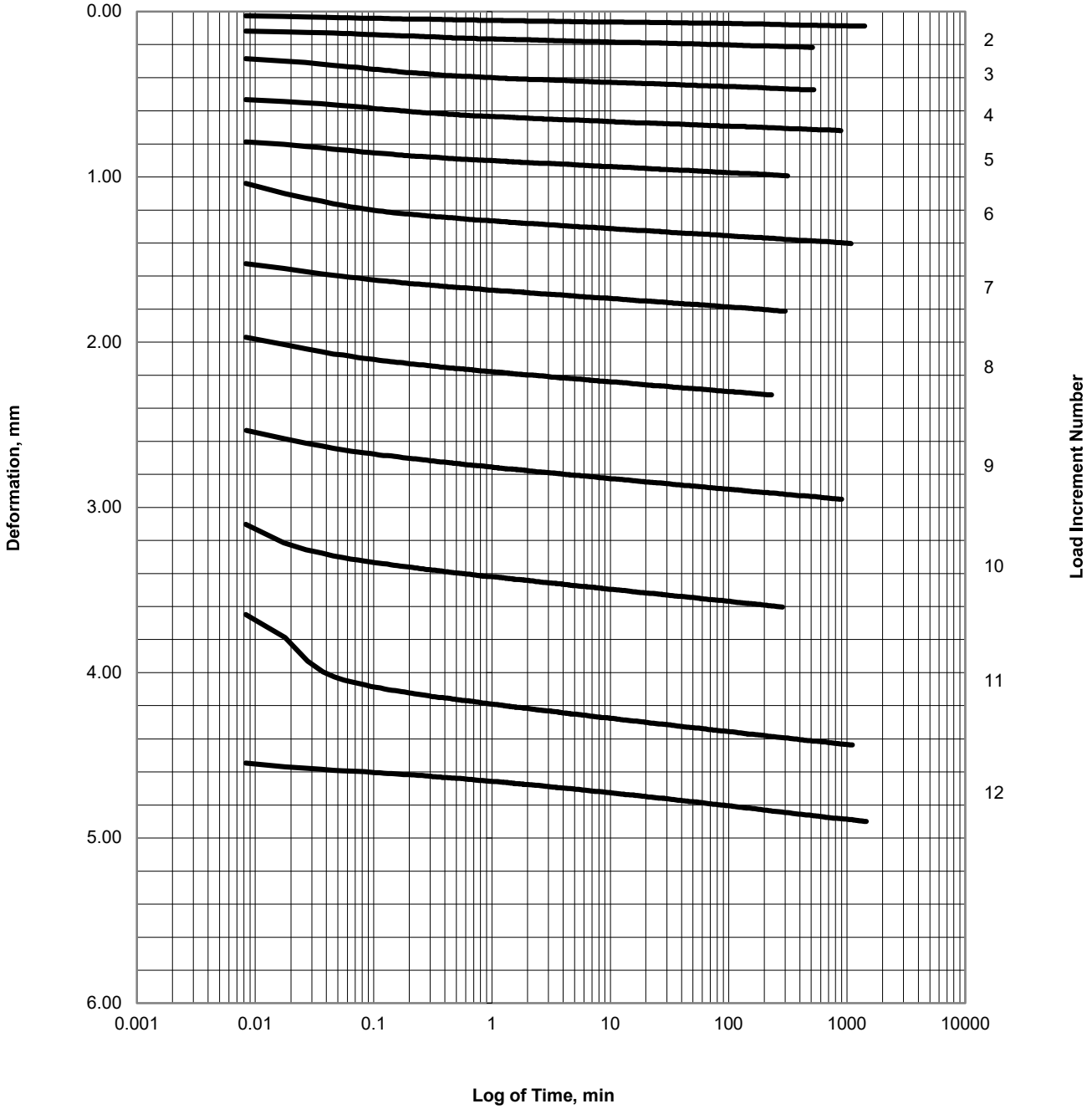
ONE-DIMENSIONAL CONSOLIDATION

Snoqualmie Mill
King County, Washington

LOAD INCREMENT TIME-DEFORMATION CURVES
Boring EB-1, Sample , 22.8 ft



Load Sequence, tsf = 0.1, 0.25, 0.51, 1.02, 2.03, 4.06, 8.13, 16.26, 32.52, 65.03, 93.48

Specimen trimmed using a trimming turntable and indundated with distilled water.
Tested by AKV in accordance with ASTM D2435-11. Finalized by JFL.

CONSOL_v3.0_NOTB_snoqualmie mill_EB-1_22.8.xlsm 02/22/18

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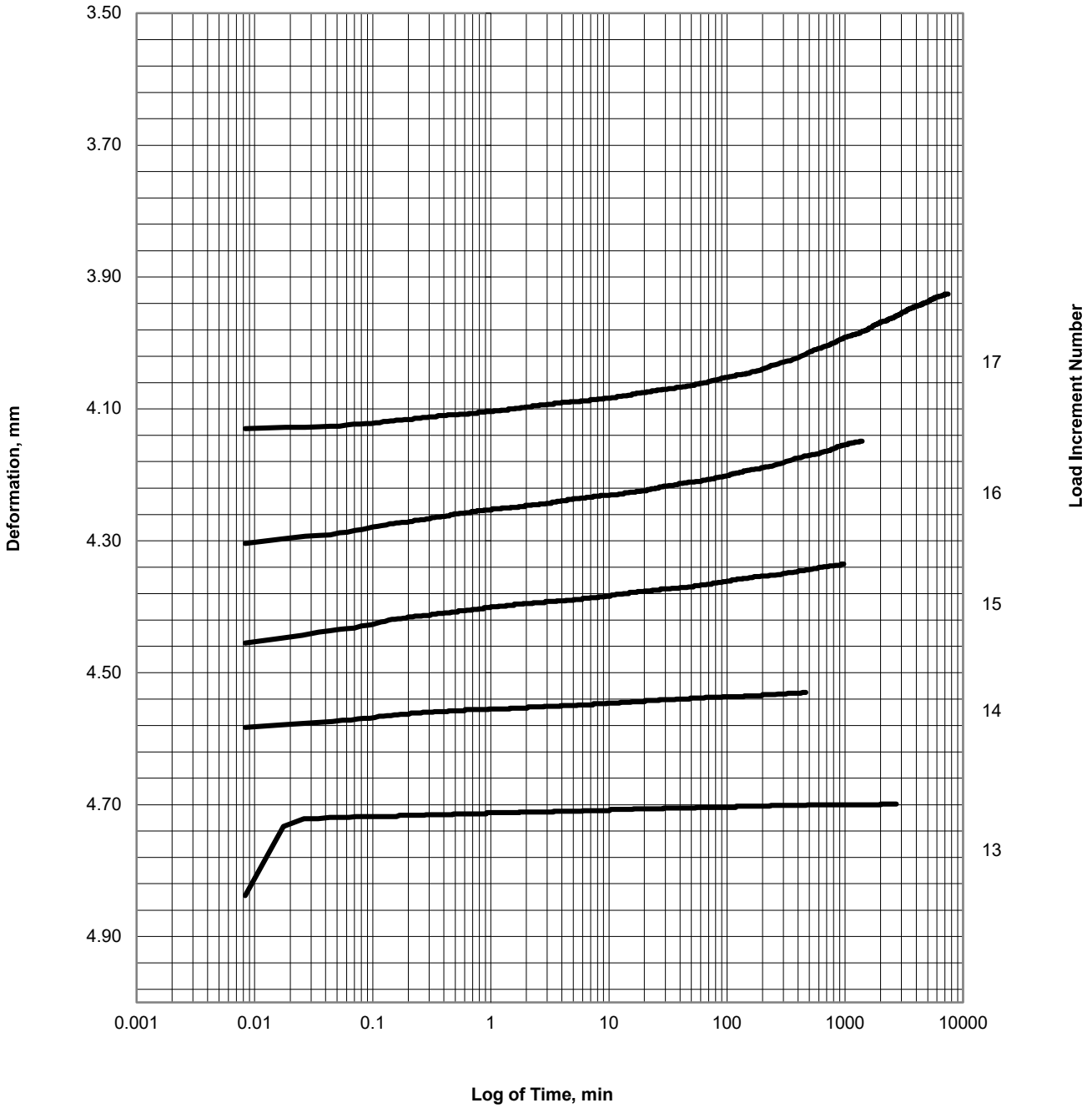
ONE-DIMENSIONAL CONSOLIDATION

Snoqualmie Mill
King County, Washington

UNLOAD INCREMENT TIME-DEFORMATION CURVES
Boring EB-1, Sample , 22.8 ft



Load Sequence, tsf = 23.37, 6.1, 1.52, 0.38, 0.1

Specimen trimmed using a trimming turntable and indundated with distilled water.
Tested by AKV in accordance with ASTM D2435-11. Finalized by JFL.

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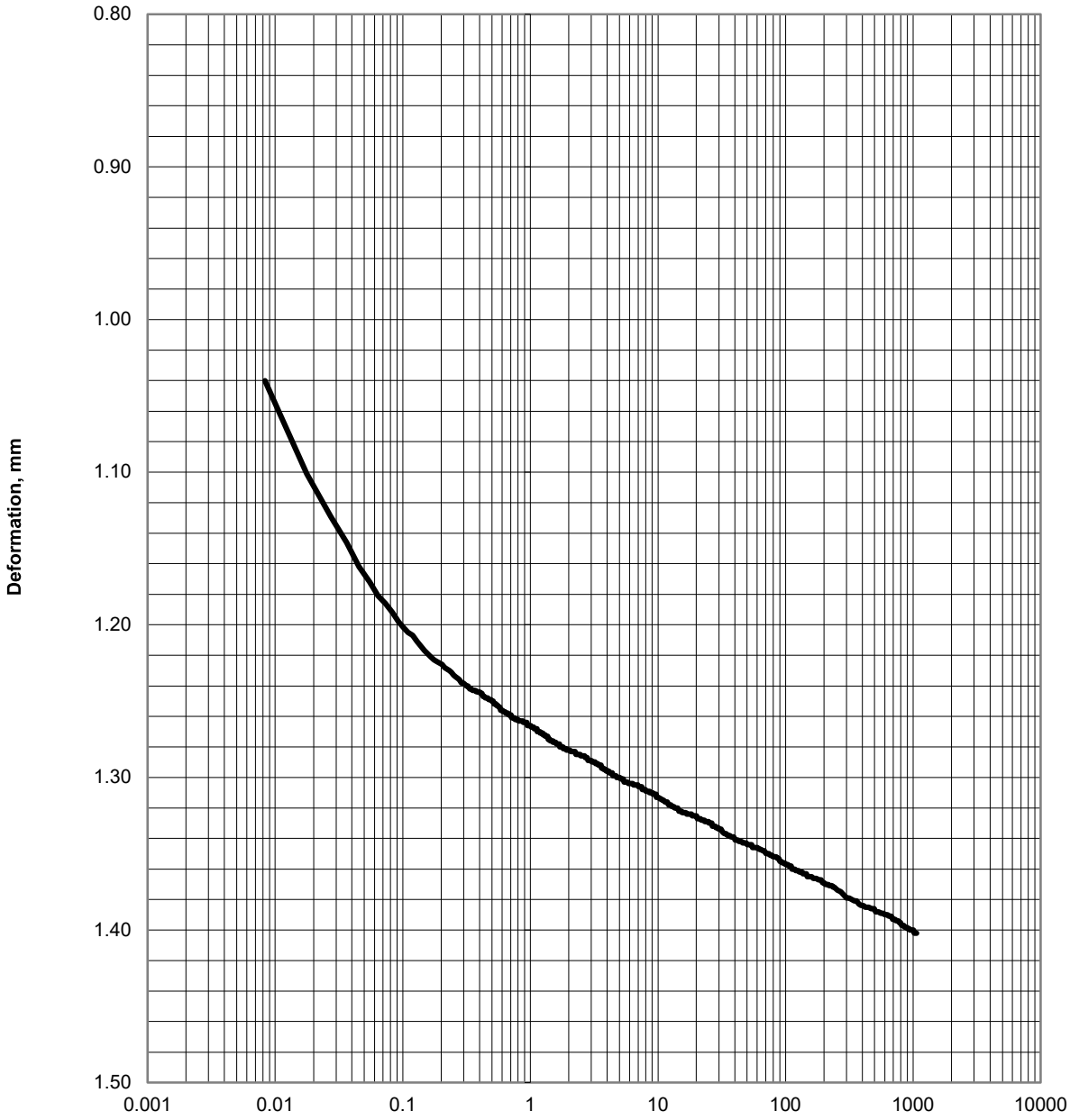
ONE-DIMENSIONAL CONSOLIDATION

Snoqualmie Mill
King County, Washington

PLOT OF LOAD INCREMENT 6 (LOG TIME)
BORING EB-1, SAMPLE , 22.8 ft



Applied Stress, tsf = 2.03

Specimen trimmed using a trimming turntable and indundated with distilled water.
Tested by AKV in accordance with ASTM D2435-11. Finalized by JFL.

CONSOL_v3.0_NOTB_snoqualmie mill_EB-1_22.8.xlsm 02/22/18

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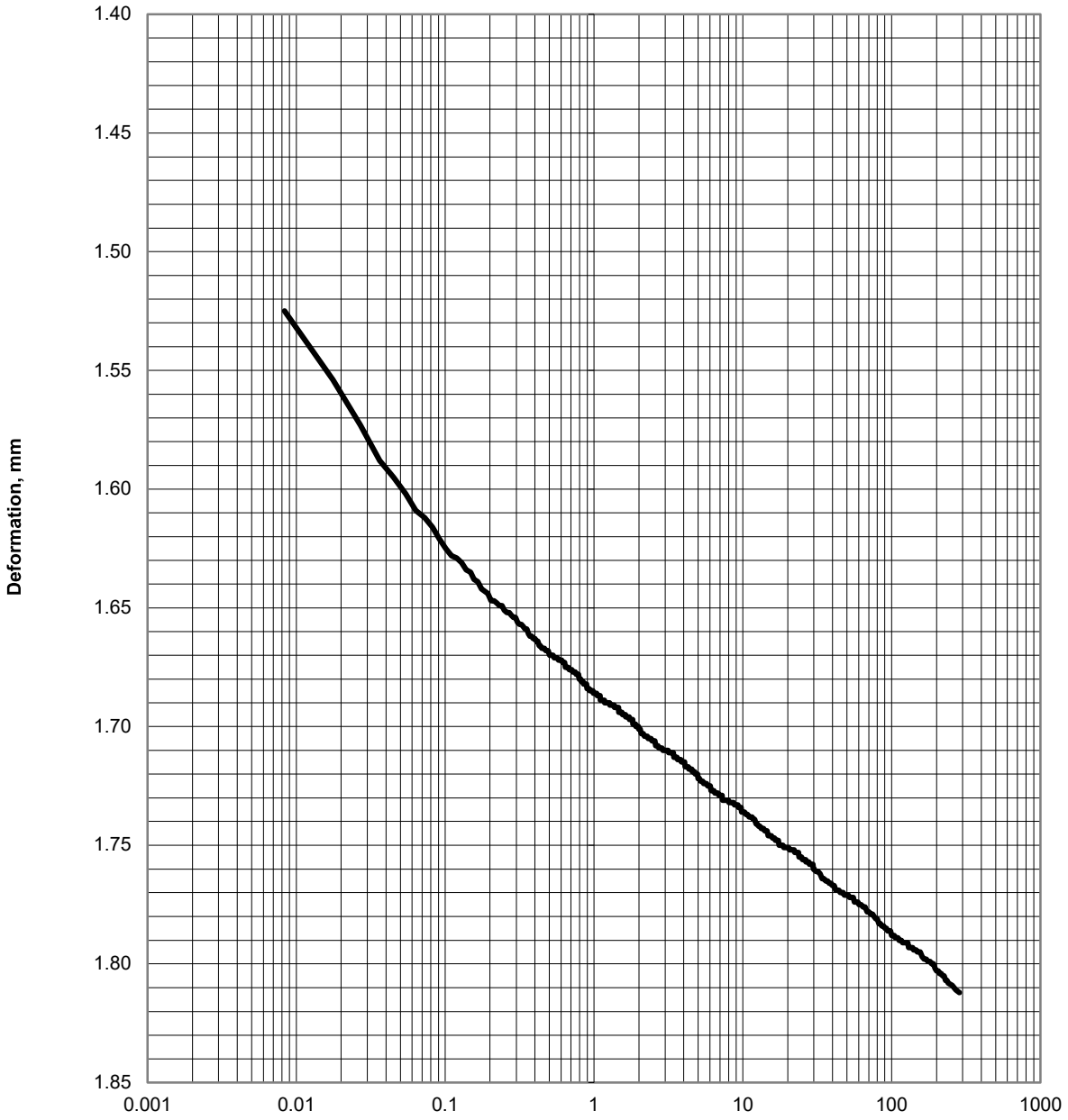
ONE-DIMENSIONAL CONSOLIDATION

Snoqualmie Mill
King County, Washington

PLOT OF LOAD INCREMENT 7 (LOG TIME)
BORING EB-1, SAMPLE , 22.8 ft



Applied Stress, tsf = 4.06

Specimen trimmed using a trimming turntable and indundated with distilled water.
Tested by AKV in accordance with ASTM D2435-11. Finalized by JFL.

CONSOL_v3.0_NOTB_snoqualmie mill_EB-1_22.8.xlsm 02/22/18

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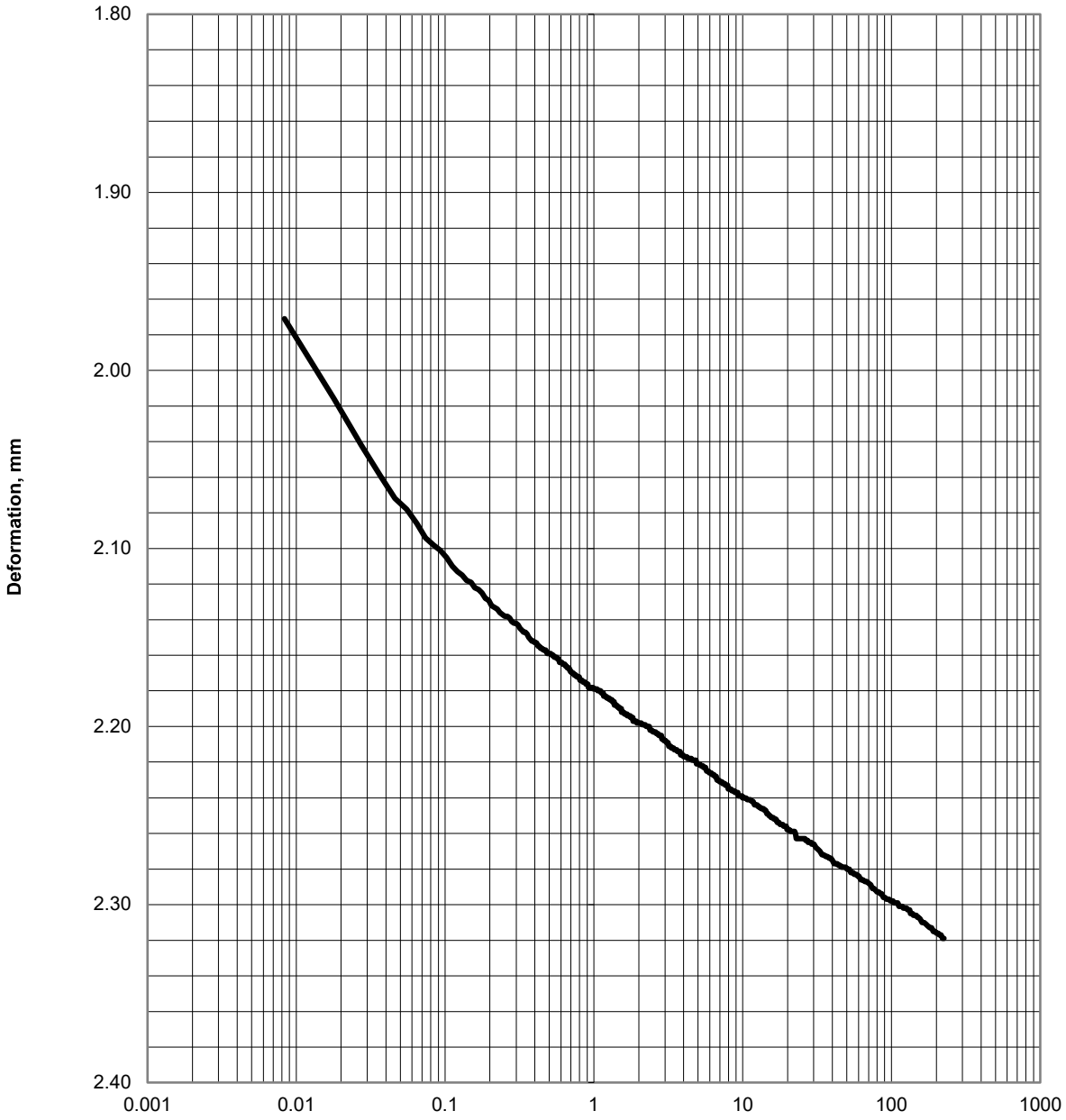
ONE-DIMENSIONAL CONSOLIDATION

Snoqualmie Mill
King County, Washington

PLOT OF LOAD INCREMENT 8 (LOG TIME)
BORING EB-1, SAMPLE , 22.8 ft



Applied Stress, tsf = 8.13

Specimen trimmed using a trimming turntable and indundated with distilled water.
Tested by AKV in accordance with ASTM D2435-11. Finalized by JFL.

CONSOL_v3.0_NOTB_snoqualmie mill_EB-1_22.8.xlsm 02/22/18

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GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

CU TRIAXIAL COMPRESSION

Snoqualmie Mill
King County, Washington

BORING EB-1, SAMPLE , 22 ft
EFFECTIVE CONFINING PRESSURE = 14 psi

SPECIMEN DATA AND TEST RESULTS

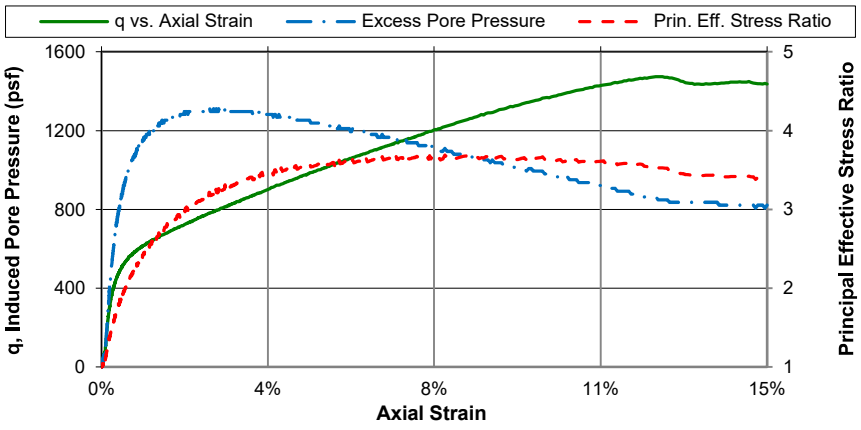
Sample Classification:
Silt; ML; LL =28; PL =27

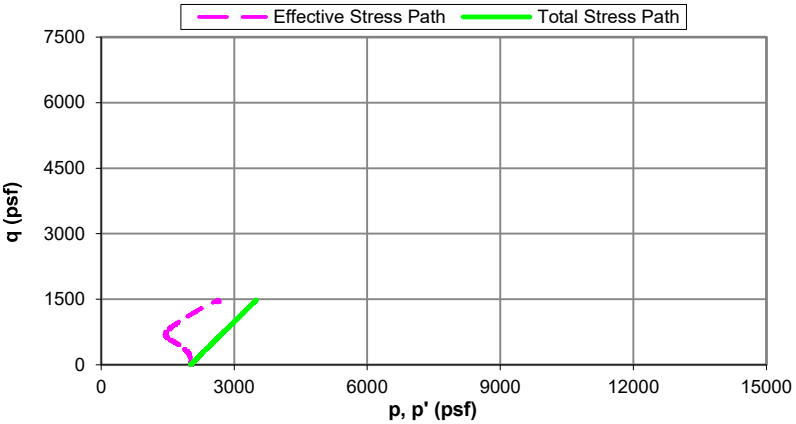
			Initial	Post-Consolidation	Post-Shear
Specific Gravity, G_s (Assumed)	2.7	Height, in	5.197	5.165	4.488
Initial Specimen State	Intact	Diameter, in	2.575	2.546	---
Specimen Saturation Method	Wet	Aspect Ratio	2.02	2.03	---
B-value at End of Saturation	0.99	Wet Mass, grams	696.4	669.9	669.9
Specimen Height Post-Saturation, in	5.196	Water Content	34.9%	29.8%	29.8%
Effective Confining Pressure, psf	2016	Wet Unit Weight, pcf	98.0	97.0	97.0
Time to 50% Primary Consolidation, min	6	Dry Unit Weight, pcf	72.7	74.8	74.8
Post Consolidation Area Calculation	Method A	Void Ratio	1.32	1.25	---
Shear Rate, in/min	0.0004	Percent Saturation	71.7%	64.4%	---
Shear Rate, %/min	0.0085	Area, in^2	5.207	5.091	---

CONSOLIDATED UNDRAINED COMPRESSIVE STRENGTH FAILURE CRITERION SUMMARY

Peak Principal Effective Stress Difference Criterion	
Principal Effective Stress Difference	2950 psf
Effective Major Principal Stress	4110 psf
Effective Minor Principal Stress	1160 psf
Axial Strain at Peak	12.54%
Axial Strain at 50% Peak	1.99%

Peak Principal Effective Stress Ratio Criterion	
Principal Effective Stress Ratio	3.69
Effective Major Principal Stress	3350 psf
Effective Minor Principal Stress	910 psf
Axial Strain at Peak	7.74%
Axial Strain at 50% Peak	0.43%





Pre-Shear Specimen Photo

Post-Shear Specimen Photo

Principal Stress Difference adjusted for filter-paper and membrane effects.
Water content derived from entire specimen.
Test procedures and calculations were performed in accordance with ASTM D4767-11. Original document produced in color.
Tested by AKV. Finalized by JFL.

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CU TRIAXIAL COMPRESSION

Snoqualmie Mill
King County, Washington

BORING EB-1, SAMPLE , 37 ft
EFFECTIVE CONFINING PRESSURE = 28 psi

SPECIMEN DATA AND TEST RESULTS

Sample Classification:
Silt; ML; LL =42; PL =27

Specific Gravity, G_s (Assumed)	2.78
Initial Specimen State	Intact
Specimen Saturation Method	Wet
B-value at End of Saturation	0.96
Specimen Height Post-Saturation, in	4.432
Effective Confining Pressure, psf	4032
Time to 50% Primary Consolidation, min	23
Post Consolidation Area Calculation	Method A
Shear Rate, in/min	0.0004
Shear Rate, %/min	0.0102

	Initial	Post-Consolidation	Post-Shear
Height, in	4.479	4.323	3.675
Diameter, in	2.390	2.274	---
Aspect Ratio	1.87	1.90	---
Wet Mass, grams	680.1	639.6	639.6
Water Content	46.3%	37.6%	37.6%
Wet Unit Weight, pcf	129.0	138.7	138.7
Dry Unit Weight, pcf	88.1	100.8	100.8
Void Ratio	0.97	0.72	---
Percent Saturation	100.0%	100.0%	---
Area, in^2	4.485	4.061	---

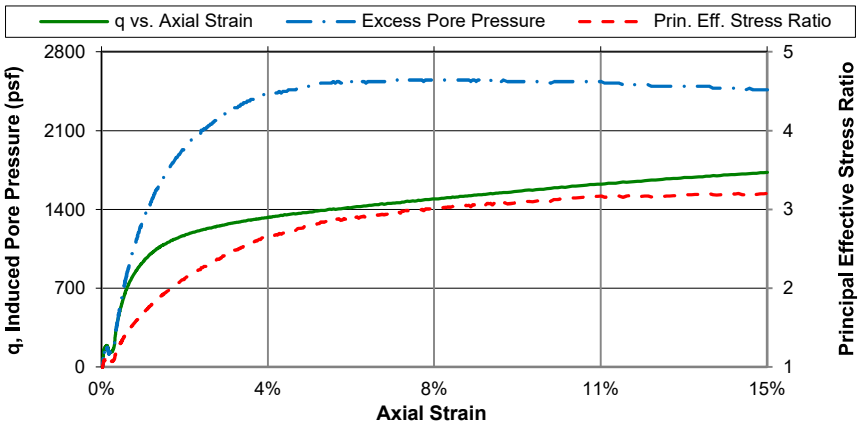
CONSOLIDATED UNDRAINED COMPRESSIVE STRENGTH FAILURE CRITERION SUMMARY

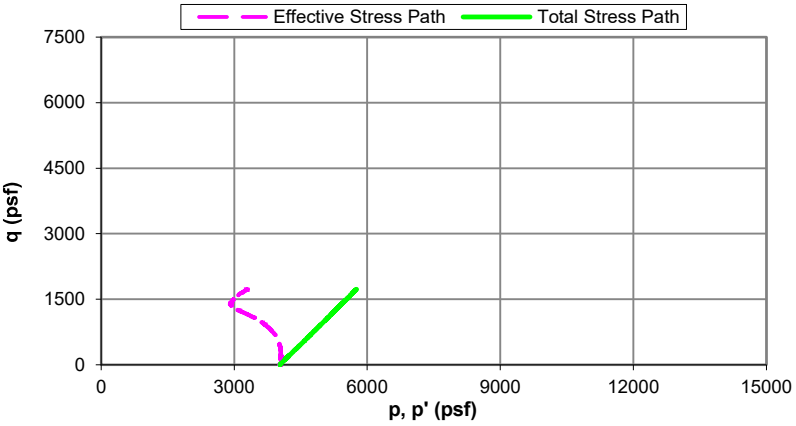
Peak Principal Effective Stress Difference Criterion

Principal Effective Stress Difference	3460 psf
Effective Major Principal Stress	5030 psf
Effective Minor Principal Stress	1570 psf
Axial Strain at Peak	15.01%
Axial Strain at 50% Peak	0.80%

Peak Principal Effective Stress Ratio Criterion

Principal Effective Stress Ratio	3.21
Effective Major Principal Stress	4990 psf
Effective Minor Principal Stress	1560 psf
Axial Strain at Peak	14.60%
Axial Strain at 50% Peak	0.81%





Pre-Shear Specimen Photo

Post-Shear Specimen Photo

Principal Stress Difference adjusted for filter-paper and membrane effects.
Water content derived from entire specimen. Specific Gravity estimated by hydrometer data; actual specific gravity may vary.
Test procedures and calculations were performed in accordance with ASTM D4767-11. Original document produced in color.
Tested by AKV. Finalized by JFL.

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

CU TRIAXIAL COMPRESSION

Snoqualmie Mill
King County, Washington

BORING EB-1, SAMPLE , 37.5 ft
EFFECTIVE CONFINING PRESSURE = 42 psi

SPECIMEN DATA AND TEST RESULTS

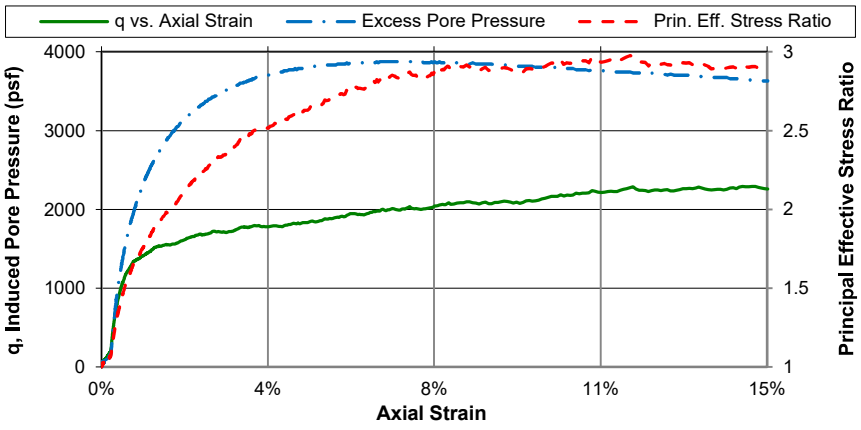
Sample Classification:
Silt; ML

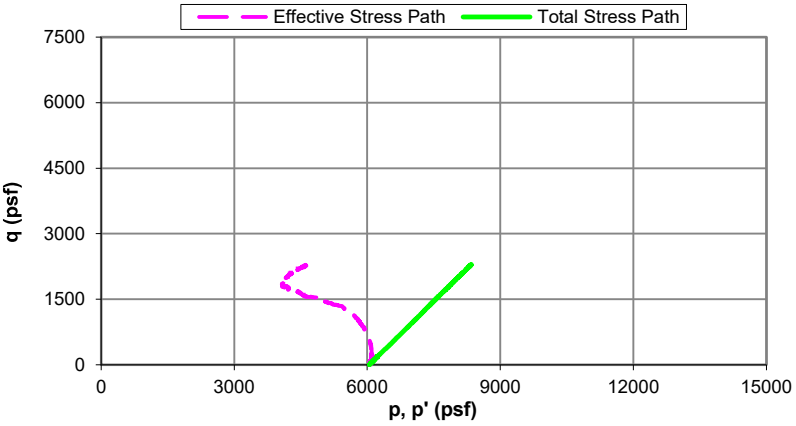
			Initial	Post-Consolidation	Post-Shear
Specific Gravity, G_s (Assumed)	2.78	Height, in	5.175	4.978	4.231
Initial Specimen State	Intact	Diameter, in	2.442	2.327	---
Specimen Saturation Method	Wet	Aspect Ratio	2.12	2.14	---
B-value at End of Saturation	0.96	Wet Mass, grams	665.7	612.0	612.0
Specimen Height Post-Saturation, in	5.135	Water Content	47.4%	35.5%	35.5%
Effective Confining Pressure, psf	6048	Wet Unit Weight, pcf	104.6	110.1	110.1
Time to 50% Primary Consolidation, min	27	Dry Unit Weight, pcf	71.0	81.2	81.2
Post Consolidation Area Calculation	Method A	Void Ratio	1.44	1.13	---
Shear Rate, in/min	0.0004	Percent Saturation	91.5%	87.2%	---
Shear Rate, %/min	0.0088	Area, in^2	4.685	4.253	---

CONSOLIDATED UNDRAINED COMPRESSIVE STRENGTH FAILURE CRITERION SUMMARY

Peak Principal Effective Stress Difference Criterion	
Principal Effective Stress Difference	4580 psf
Effective Major Principal Stress	6990 psf
Effective Minor Principal Stress	2410 psf
Axial Strain at Peak	14.73%
Axial Strain at 50% Peak	0.52%

Peak Principal Effective Stress Ratio Criterion	
Principal Effective Stress Ratio	2.97
Effective Major Principal Stress	6900 psf
Effective Minor Principal Stress	2320 psf
Axial Strain at Peak	11.97%
Axial Strain at 50% Peak	0.50%





Pre-Shear Specimen Photo

Post-Shear Specimen Photo

Principal Stress Difference adjusted for filter-paper and membrane effects.
Water content derived from entire specimen. Specific Gravity estimated by hydrometer data; actual specific gravity may vary.
Test procedures and calculations were performed in accordance with ASTM D4767-11. Original document produced in color.
Tested by AKV. Finalized by JFL.

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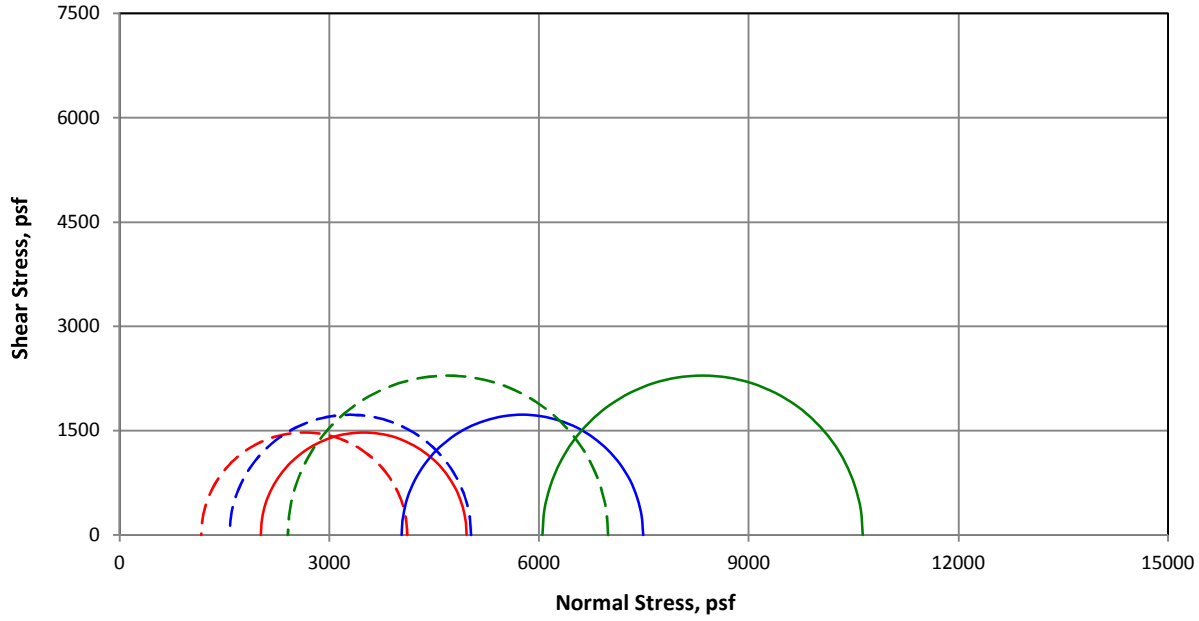
Snoqualmie Mill
King County, Washington

MOHR'S CIRCLE PLOTS
BORING EB-1, SAMPLE

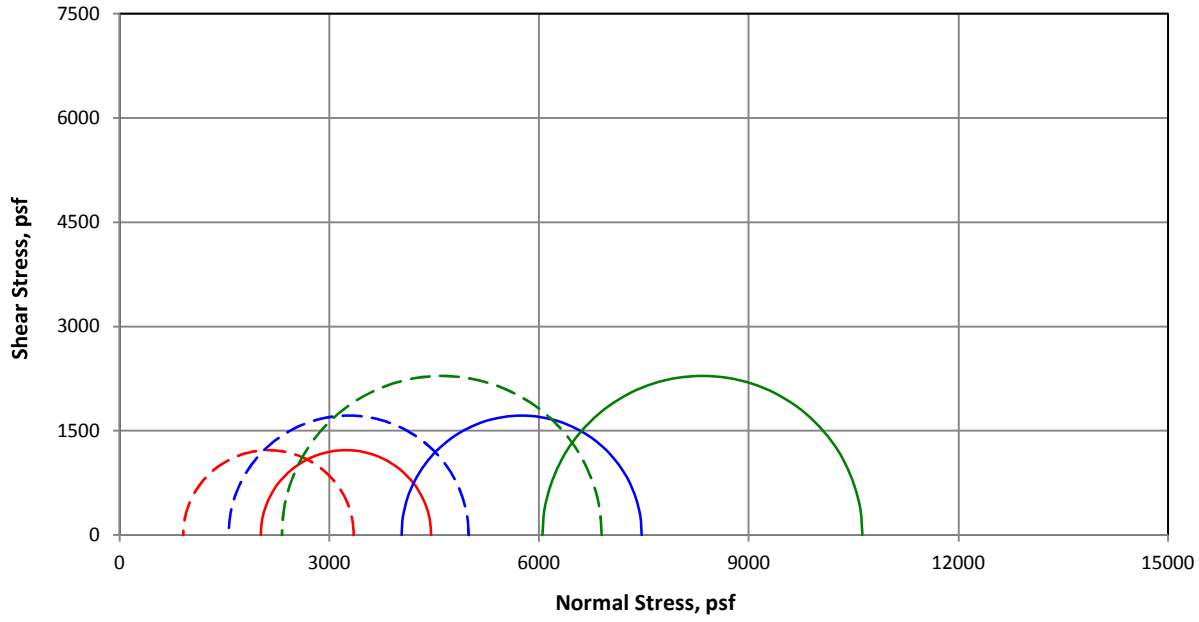
SPECIMEN SUMMARY

TS EB-1, , 22ft
TS EB-1, , 37ft
TS EB-1, , 37.5ft
EFF EB-1, , 22ft
EFF EB-1, , 37ft
EFF EB-1, , 37.5ft

MOHR'S CIRCLE PLOT BASED ON MAXIMUM PRINCIPAL EFFECTIVE STRESS DIFFERENCE



MOHR'S CIRCLE PLOT BASED ON MAXIMUM PRINCIPAL EFFECTIVE STRESS RATIO



Test procedures and calculations were performed in accordance with ASTM D4767-11.
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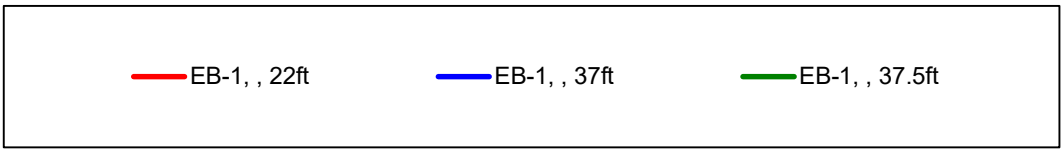
CU TRIAXIAL COMPRESSION

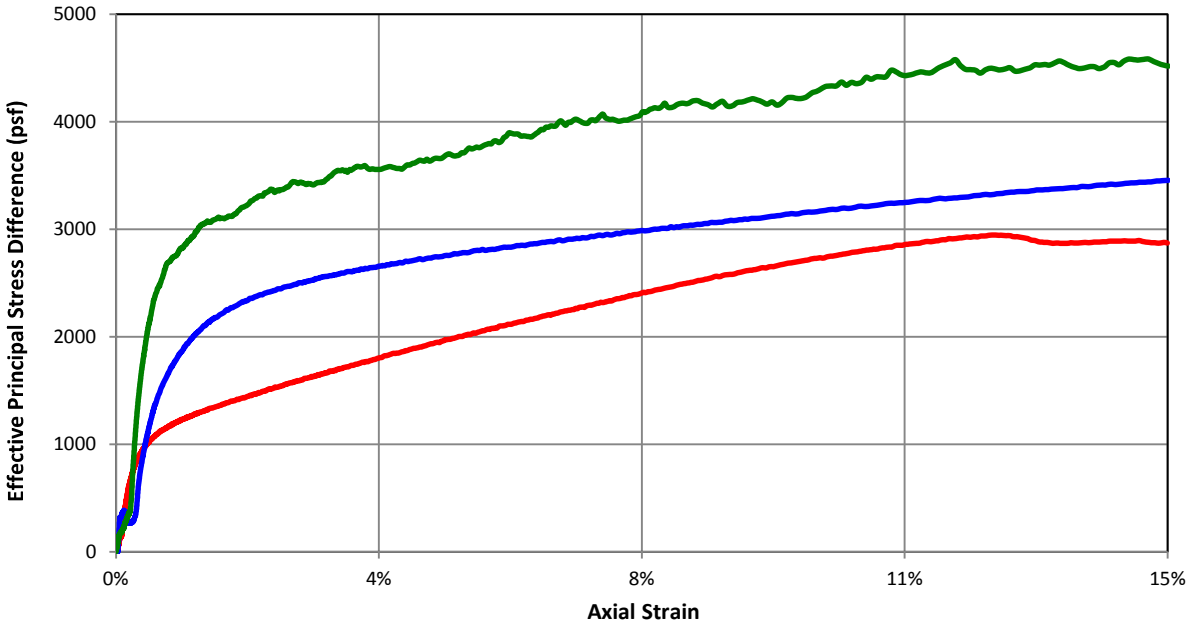
Snoqualmie Mill
King County, Washington

STRESS BEHAVIOR PLOTS
BORING EB-1, SAMPLE

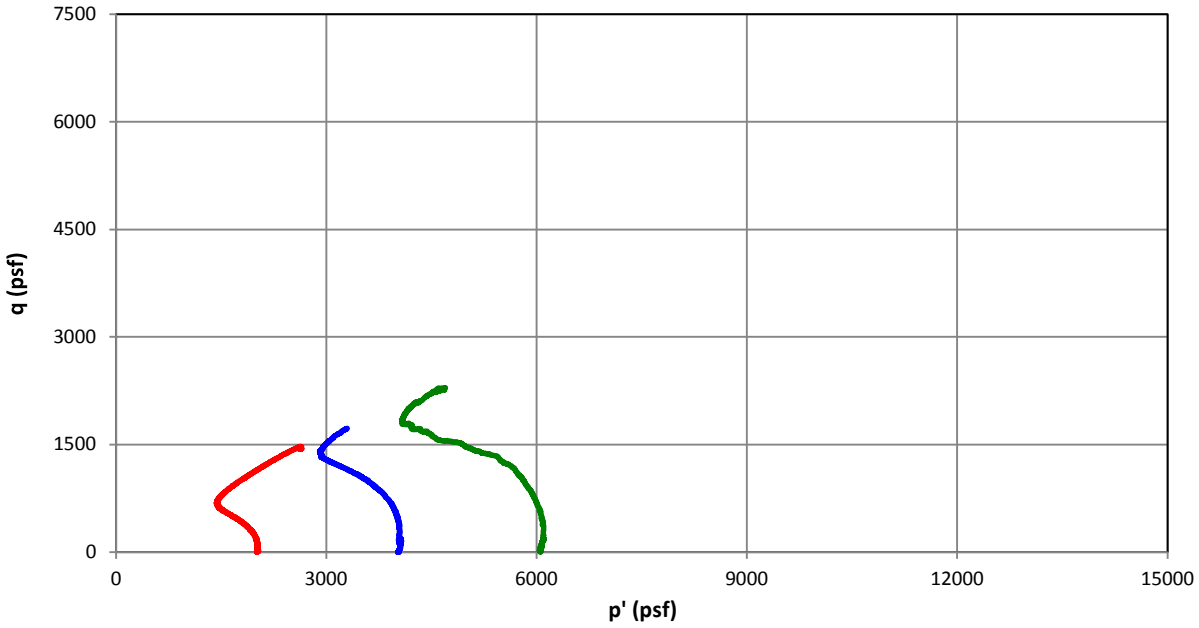
SPECIMEN SUMMARY



STRESS-STRAIN PLOT



STRESS PATH PLOT



Test procedures and calculations were performed in accordance with ASTM D4767-11.
Original document produced in color.
Tested by AKV. Finalized by JFL.

BETA ANALYTIC INC.
DR. M.A. TAMERS and MR. D.G. HOOD
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MIAMI, FLORIDA, USA 33155
PH: 305-667-5167 FAX:305-663-0964
beta@radiocarbon.com

REPORT OF RADIOCARBON DATING ANALYSES

Mr. Curtis J. Koger

Report Date: 5/21/2012

Associated Earth Sciences, Incorporated

Material Received: 5/14/2012

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 322015	5510 +/- 30 BP	-25.8 o/oo	5500 +/- 30 BP
SAMPLE : KH120126MW1@37.5			
ANALYSIS : AMS-Standard delivery			
MATERIAL/PRETREATMENT : (wood): acid/alkali/acid			
2 SIGMA CALIBRATION : Cal BC 4360 to 4330 (Cal BP 6310 to 6280)			
Beta - 322016	7960 +/- 40 BP	-25.0 o/oo	7960 +/- 40 BP
SAMPLE : KH120126MW1@194			
ANALYSIS : AMS-Standard delivery			
MATERIAL/PRETREATMENT : (wood): acid/alkali/acid			
2 SIGMA CALIBRATION : Cal BC 7050 to 6690 (Cal BP 9000 to 8640)			

Dates are reported as RCYBP (radiocarbon years before present, "present" = AD 1950). By international convention, the modern reference standard was 95% the 14C activity of the National Institute of Standards and Technology (NIST) Oxalic Acid (SRM 4990C) and calculated using the Libby 14C half-life (5568 years). Quoted errors represent 1 relative standard deviation statistics (68% probability) counting errors based on the combined measurements of the sample, background, and modern reference standards. Measured 13C/12C ratios (delta 13C) were calculated relative to the PDB-1 standard.

The Conventional Radiocarbon Age represents the Measured Radiocarbon Age corrected for isotopic fractionation, calculated using the delta 13C. On rare occasion where the Conventional Radiocarbon Age was calculated using an assumed delta 13C, the ratio and the Conventional Radiocarbon Age will be followed by "*". The Conventional Radiocarbon Age is not calendar calibrated. When available, the Calendar Calibrated result is calculated from the Conventional Radiocarbon Age and is listed as the "Two Sigma Calibrated Result" for each sample.

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www.radiocarbon.com

Darden Hood
President

Ronald Hatfield
Christopher Patrick
Deputy Directors

May 21, 2012

Mr. Curtis J. Koger
Associated Earth Sciences, Incorporated
911 Fifth Avenue
Suite 100
Kirkland, WA 98033
USA

RE: Radiocarbon Dating Results For Samples KH120126MW1@37.5, KH120126MW1@194

Dear Mr. Koger:

Enclosed are the radiocarbon dating results for two samples recently sent to us. They each provided plenty of carbon for accurate measurements and all the analyses proceeded normally. As usual, the method of analysis is listed on the report with the results and calibration data is provided where applicable.

As always, no students or intern researchers who would necessarily be distracted with other obligations and priorities were used in the analyses. We analyzed them with the combined attention of our entire professional staff.

If you have specific questions about the analyses, please contact us. We are always available to answer your questions.

The cost of the analysis was charged to the MASTERCARD card provided. A receipt is enclosed. with the mailed report copy Thank you. As always, if you have any questions or would like to discuss the results, don't hesitate to contact me.

Sincerely,

Digital signature on file

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-25:lab. mult=1)

Laboratory number: **Beta-322016**

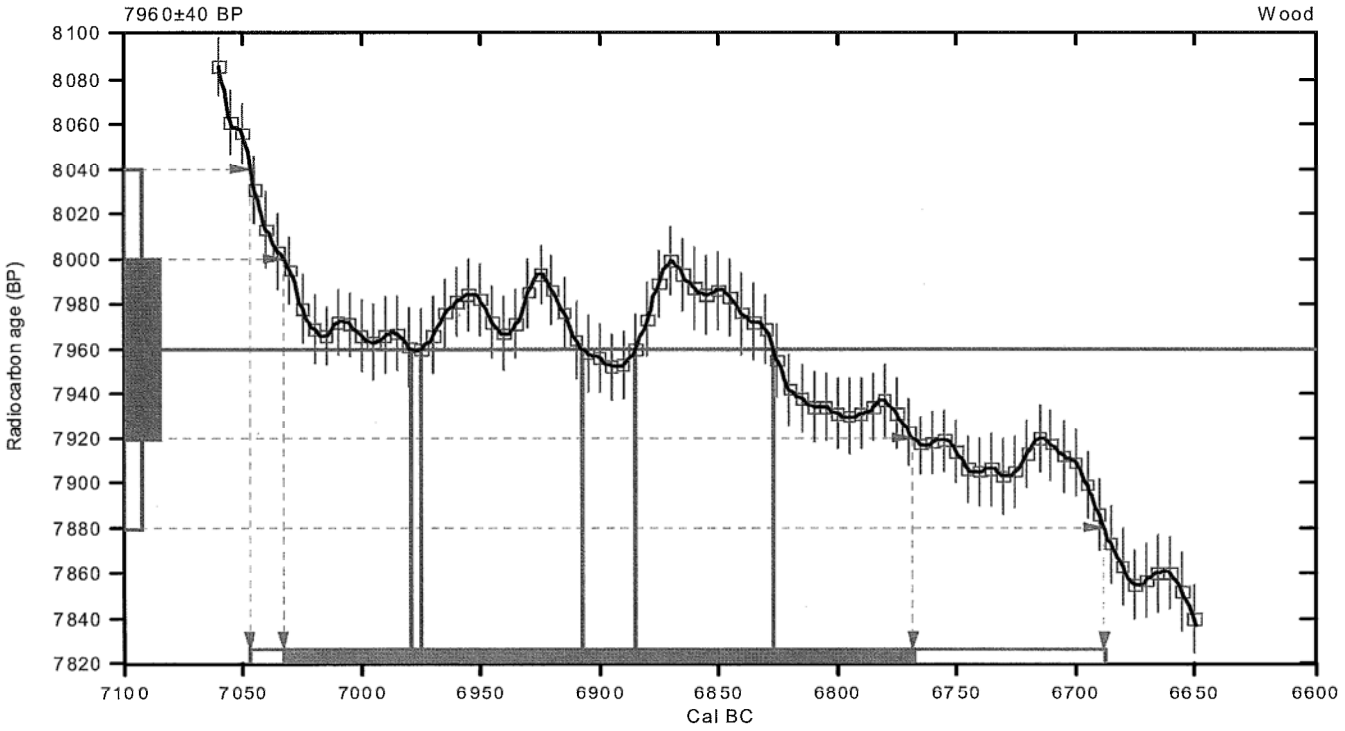
Conventional radiocarbon age: **7960±40 BP**

2 Sigma calibrated result: (95% probability) **Cal BC 7050 to 6690 (Cal BP 9000 to 8640)**

Intercept data

Intercepts of radiocarbon age with calibration curve: Cal BC 6980 (Cal BP 8930) and
Cal BC 6980 (Cal BP 8920) and
Cal BC 6910 (Cal BP 8860) and
Cal BC 6880 (Cal BP 8840) and
Cal BC 6830 (Cal BP 8780)

1 Sigma calibrated result: (68% probability) Cal BC 7030 to 6770 (Cal BP 8980 to 8720)



References:

Database used

INTCAL09

References to INTCAL09 database

Heaton,et.al.,2009, Radiocarbon 51(4):1151-1164, Reimer,et.al, 2009, Radiocarbon 51(4):1111-1150, Stuiver,et.al,1993, Radiocarbon 35(1):137-189, Oeschger,et.al.,1975,Tellus 27:168-192

Mathematics used for calibration scenario

A Simplified Approach to Calibrating C14 Dates
Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2):317-322

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-25.8:lab. mult=1)

Laboratory number: **Beta-322015**

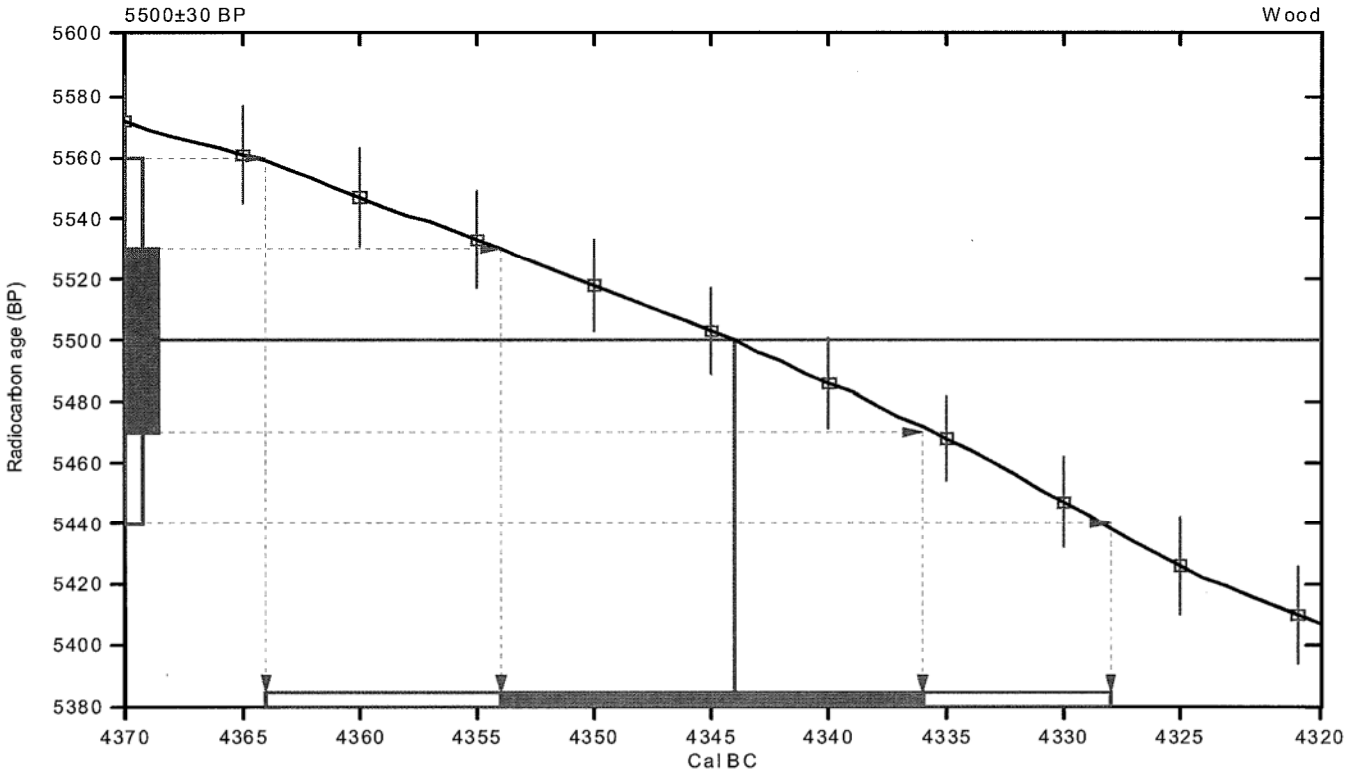
Conventional radiocarbon age: **5500±30 BP**

2 Sigma calibrated result: (95% probability) **Cal BC 4360 to 4330 (Cal BP 6310 to 6280)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal BC 4340 (Cal BP 6290)

1 Sigma calibrated result: (68% probability) Cal BC 4350 to 4340 (Cal BP 6300 to 6290)



References:

Database used

INTCAL09

References to INTCAL09 database

Heaton,et.al.,2009, Radiocarbon 51(4):1151-1164, Reimer,et.al, 2009, Radiocarbon 51(4):1111-1150, Stuiver,et.al,1993, Radiocarbon 35(1):137-189, Oeschger,et.al.,1975,Tellus 27:168-192

Mathematics used for calibration scenario

A Simplified Approach to Calibrating C14 Dates

Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2):317-322

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BETA ANALYTIC INC.

RADIOCARBON DATING SERVICES

Dr. JERRY J. STIPP
Dr. MURRY A. TAMERS
CO-DIRECTORS

DARDEN G. HOOD, P.G.
Laboratory Head

RONALD E. HATFIELD
Laboratory Manager

CHRISTOPHER PATRICK
TERESA A. ZILKO-MILLER
Associate Managers

July 21, 1995

Mr. Curtis J. Koger
Associated Earth Sciences, Inc.
911 5th Avenue
Suite 100
Kirkland, Washington 98033

Dear Mr. Koger:

Please find enclosed the radiocarbon dating results on one wood sample recently submitted for analysis. It provided plenty of carbon for a precise measurement after full pretreatments. In addition to the results, please review the enclosed discussions on applied methodology, pretreatments and calendar calibration. The reported "Conventional C14 Age" is the radiocarbon date of interest and was the value used to calculate the calendar equivalent age.

Our invoice is enclosed. Thank you in advance, for your prompt attention to its payment. As always, if you have any specific questions, please do not hesitate to fax, e-mail, or call us.

Sincerely,

Darden Hood

P.S. Please note the two new services for 1996; SEM analysis of carbon dated materials and the ADVANCE AMS analysis service with 14 day delivery (literature enclosed).

4985 S.W. 74 COURT, MIAMI, FL 33155 U.S.A.
TELEPHONE: 305-667-5167 / FAX: 305-663-0964 / INTERNET: beta@analytic.win.net
WWW HOME PAGE: http://www.win.net/~analytic

BETA ANALYTIC INC.

DR. J.J. STIPP and DR. M.A. TAMERS

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PH: 305/667-5167 FAX: 305/663-0964
E-mail: beta@analytic.win.net

REPORT OF RADIOCARBON DATING ANALYSES

FOR: Mr. Curtis J. Koger
Associated Earth Sciences, Inc.

DATE RECEIVED: June 29, 1995
DATE REPORTED: July 20, 1995

Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-83433	3050 +/- 80 BP	-25.0* o/oo	3050 +/- 80* BP

SAMPLE #: EB-1 23½ - 25
ANALYSIS: radiometric-standard
MATERIAL/PRETREATMENT:(wood): acid/alkali/acid

NOTE: It is important to read the calendar calibration information and to use the calendar calibrated results (reported separately) when interpreting these results in AD/BC terms.

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-83433	3050 +/- 80 BP	-25.0* o/oo	3050 +/- 80* BP

SAMPLE #: B-1 23½ - 25
ANALYSIS: radiometric-standard
MATERIAL/PRETREATMENT: (wood): acid/alkali/acid

NOTE: It is important to read the calendar calibration information and to use the calendar calibrated results (reported separately) when interpreting these results in AD/BC terms.

Dates are reported as RCYBP (radiocarbon years before present, "present"= 1950A.D.). By international convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards. Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the atio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 Age.

BETA ANALYTIC, INC
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E-mail beta@analytic.win.net

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

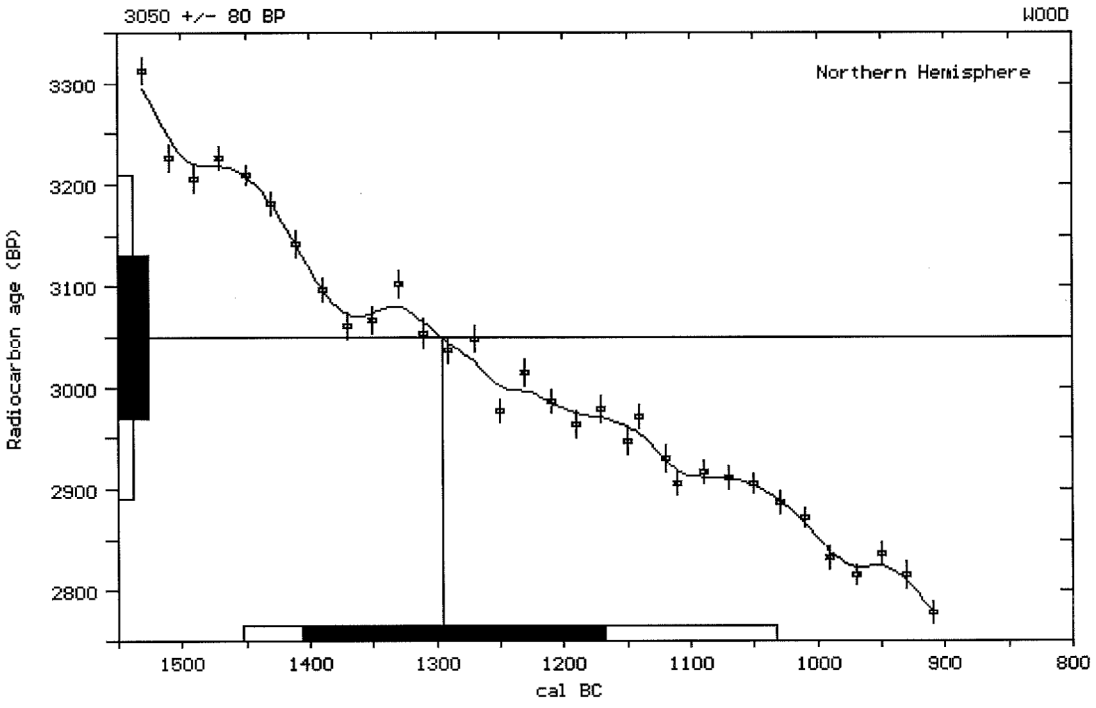
(Variables:estimated C13/C12=-25:lab mult.=1)

Laboratory Number:	Beta-83433
Conventional radiocarbon age*:	**3050 +/- 80 BP**
Calibrated results: (2 sigma, 95% probability)	**cal BC 1450 to 1030**

* C13/C12 ratio estimated

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal BC 1295
1 sigma calibrated results: (68% probability)	cal BC 1405 to 1170



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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E-MAIL: beta@radiocarbon.com

REPORT OF RADIOCARBON DATING ANALYSES

Mr. Curtis J. Koger/Jenny Hilden — Report Date: 2/23/01

Associated Earth Sciences, Inc. — Material Received: 1/15/01

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 151591	> 41240 BP	-25.0* o/oo	> 41240 BP

SAMPLE : KH00005C-TW8-248FEET
ANALYSIS : Radiometric-Standard delivery
MATERIAL/PRETREATMENT : (wood): acid/alkali/acid
2 SIGMA CALIBRATION : (result is outside of the calibration range)

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

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E-MAIL: beta@radiocarbon.com

REPORT OF RADIOCARBON DATING ANALYSES

Mr. Curtis J. Koger/Jenny Hilden

Report Date: 2/23/01

Sample Data	Measured Radiocarbon Age	13C/12C Ratio	Conventional Radiocarbon Age(*)
Beta - 151592	> 40380 BP	-25.0* o/oo	> 40380 BP

SAMPLE : KH00005C-TW8-395FEET
ANALYSIS : Radiometric-Standard delivery
MATERIAL/PRETREATMENT : (wood): acid/alkali/acid
2 SIGMA CALIBRATION : (result is outside of the calibration range)

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

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July 31, 2015

Mr. Curtis J. Koger
Associated Earth Sciences, Incorporated
911 Fifth Avenue, Suite 100
Kirkland, WA 98033
USA

RE: Radiocarbon Dating Results For Samples KE150249EB2@45- Organic Sediment, KE150249EB2@65, KE150249EB2@45- Plant

Dear Mr. Koger:

Enclosed are the radiocarbon dating results for three samples recently sent to us. As usual, the method of analysis is listed on the report with the results and calibration data is provided where applicable. The Conventional Radiocarbon Ages have all been corrected for total fractionation effects and where applicable, calibration was performed using 2013 calibration databases (cited on the graph pages).

The web directory containing the table of results and PDF download also contains pictures, a cvs spreadsheet download option and a quality assurance report containing expected vs. measured values for 3-5 working standards analyzed simultaneously with your samples.

Reported results are accredited to ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 standards and all chemistry was performed here in our laboratories and counted in our own accelerators here in Miami. Since Beta is not a teaching laboratory, only graduates trained to strict protocols of the ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 program participated in the analyses.

As always Conventional Radiocarbon Ages and sigmas are rounded to the nearest 10 years per the conventions of the 1977 International Radiocarbon Conference. When counting statistics produce sigmas lower than +/- 30 years, a conservative +/- 30 BP is cited for the result.

When interpreting the results, please consider any communications you may have had with us regarding the samples. As always, your inquiries are most welcome. If you have any questions or would like further details of the analyses, please do not hesitate to contact us.

The cost of the analysis was charged to the VISA card provided. Thank you. As always, if you have any questions or would like to discuss the results, don't hesitate to contact me.

Sincerely,

Darden Hood
Digital signature on file

BETA ANALYTIC INC.
DR. M.A. TAMERS and MR. D.G. HOOD
4985 S.W. 74 COURT
MIAMI, FLORIDA, USA 33155
PH: 305-667-5167 FAX:305-663-0964
beta@radiocarbon.com

REPORT OF RADIOCARBON DATING ANALYSES

Mr. Curtis J. Koger

Report Date: 7/31/2015

Associated Earth Sciences, Incorporated

Material Received: 7/23/2015

Sample Data	Measured Radiocarbon Age	d13C	Conventional Radiocarbon Age(*)
Beta - 415738	6040 +/- 30 BP	-28.5 o/oo	5980 +/- 30 BP
SAMPLE : KE150249EB2@45- Organic Sediment			
ANALYSIS : AMS-Standard delivery			
MATERIAL/PRETREATMENT : (organic sediment): acid washes			
2 SIGMA CALIBRATION : Cal BC 4940 to 4790 (Cal BP 6890 to 6740)			
Beta - 415739	5920 +/- 30 BP	-26.8 o/oo	5890 +/- 30 BP
SAMPLE : KE150249EB2@65			
ANALYSIS : AMS-Standard delivery			
MATERIAL/PRETREATMENT : (plant material): acid/alkali/acid			
2 SIGMA CALIBRATION : Cal BC 4830 to 4815 (Cal BP 6780 to 6765) and Cal BC 4805 to 4705 (Cal BP 6755 to 6655)			
Beta - 415972	5890 +/- 30 BP	-25.1 o/oo	5890 +/- 30 BP
SAMPLE : KE150249EB2@45- Plant			
ANALYSIS : AMS-Standard delivery			
MATERIAL/PRETREATMENT : (plant material): acid/alkali/acid			
2 SIGMA CALIBRATION : Cal BC 4830 to 4815 (Cal BP 6780 to 6765) and Cal BC 4805 to 4705 (Cal BP 6755 to 6655)			

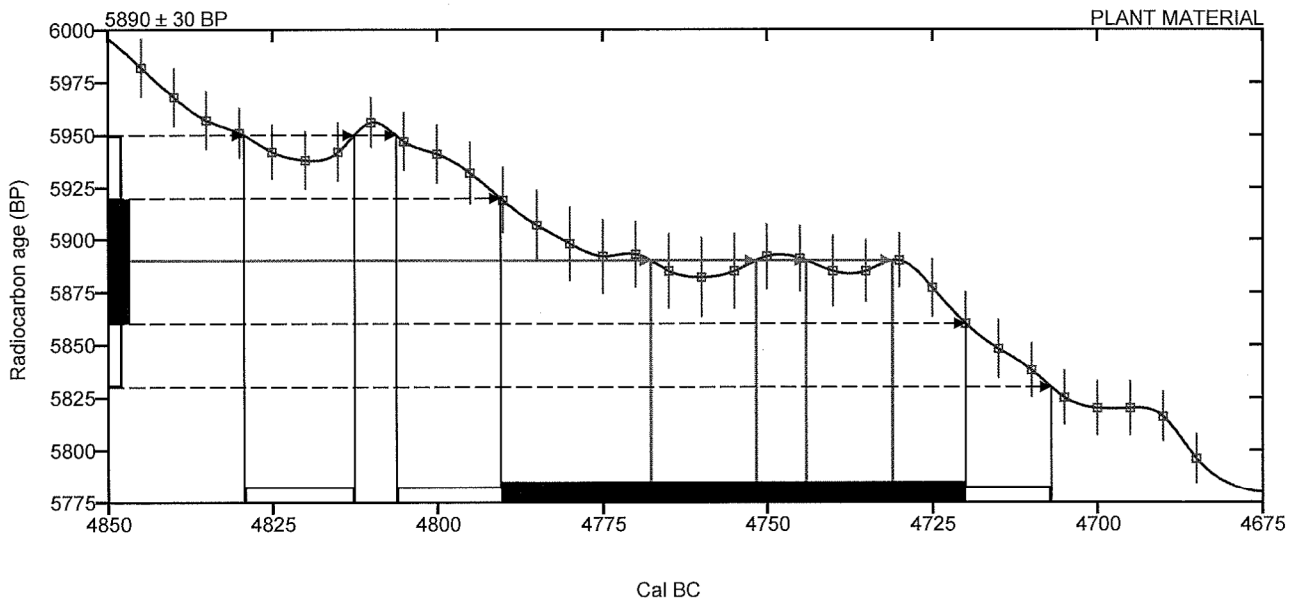
Dates are reported as RCYBP (radiocarbon years before present, "present" = AD 1950). By international convention, the modern reference standard was 95% the 14C activity of the National Institute of Standards and Technology (NIST) Oxalic Acid (SRM 4990C) and calculated using the Libby 14C half-life (5568 years). Quoted errors represent 1 relative standard deviation statistics (68% probability) counting errors based on the combined measurements of the sample, background, and modern reference standards. Measured 13C/12C ratios (delta 13C) were calculated relative to the PDB-1 standard.

The Conventional Radiocarbon Age represents the Measured Radiocarbon Age corrected for isotopic fractionation, calculated using the delta 13C. On rare occasion where the Conventional Radiocarbon Age was calculated using an assumed delta 13C, the ratio and the Conventional Radiocarbon Age will be followed by "*". The Conventional Radiocarbon Age is not calendar calibrated. When available, the Calendar Calibrated result is calculated from the Conventional Radiocarbon Age and is listed as the "Two Sigma Calibrated Result" for each sample.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12 = -25.1 o/oo : lab. mult = 1)

Laboratory number	**Beta-415972**
Conventional radiocarbon age	**5890 ± 30 BP**
Calibrated Result (95% Probability)	**Cal BC 4830 to 4815 (Cal BP 6780 to 6765)** **Cal BC 4805 to 4705 (Cal BP 6755 to 6655)**
Intercept of radiocarbon age with calibration curve	Cal BC 4770 (Cal BP 6720) Cal BC 4750 (Cal BP 6700) Cal BC 4745 (Cal BP 6695) Cal BC 4730 (Cal BP 6680)
Calibrated Result (68% Probability)	Cal BC 4790 to 4720 (Cal BP 6740 to 6670)



Database used

INTCAL13

References

Mathematics used for calibration scenario

A Simplified Approach to Calibrating C14 Dates, Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2):317-322

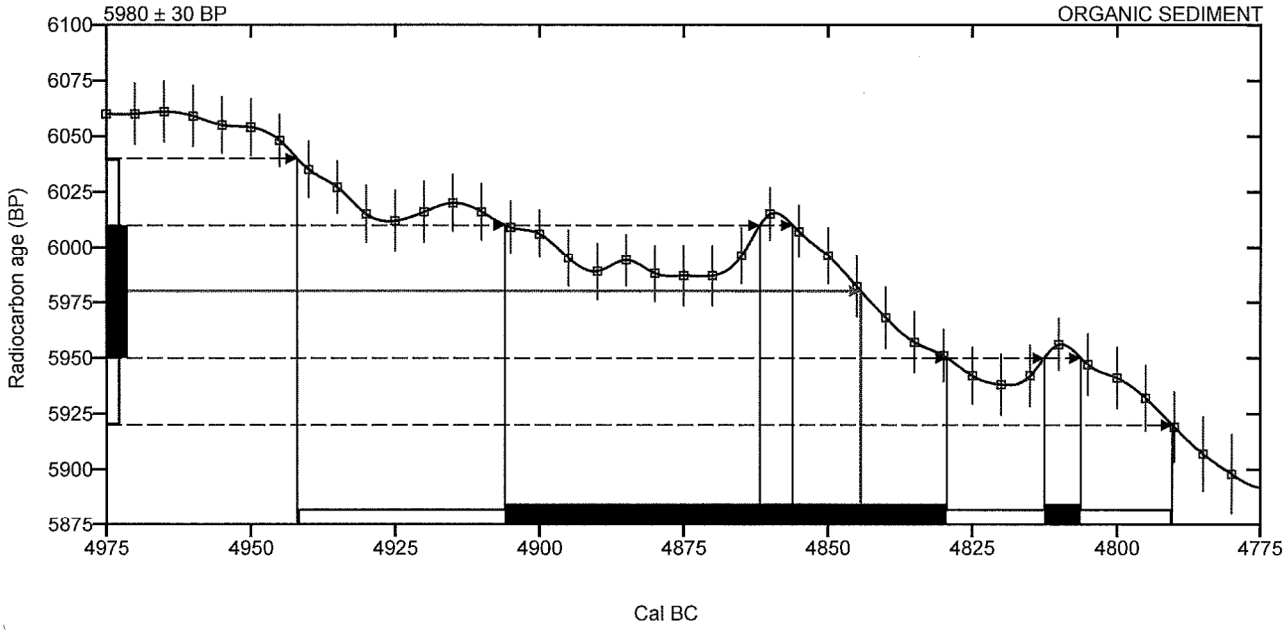
References to INTCAL13 database

Reimer PJ et al. IntCal13 and Marine13 radiocarbon age calibration curves 0–50,000 years cal BP. Radiocarbon 55(4):1869–1887., 2013.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12 = -28.5 o/oo : lab. mult = 1)

Laboratory number	**Beta-415738**
Conventional radiocarbon age	**5980 ± 30 BP**
Calibrated Result (95% Probability)	**Cal BC 4940 to 4790 (Cal BP 6890 to 6740)**
Intercept of radiocarbon age with calibration curve	Cal BC 4845 (Cal BP 6795)
Calibrated Result (68% Probability)	Cal BC 4905 to 4830 (Cal BP 6855 to 6780) Cal BC 4815 to 4805 (Cal BP 6765 to 6755)



Database used

INTCAL13

References

Mathematics used for calibration scenario

A Simplified Approach to Calibrating C14 Dates, Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2):317-322

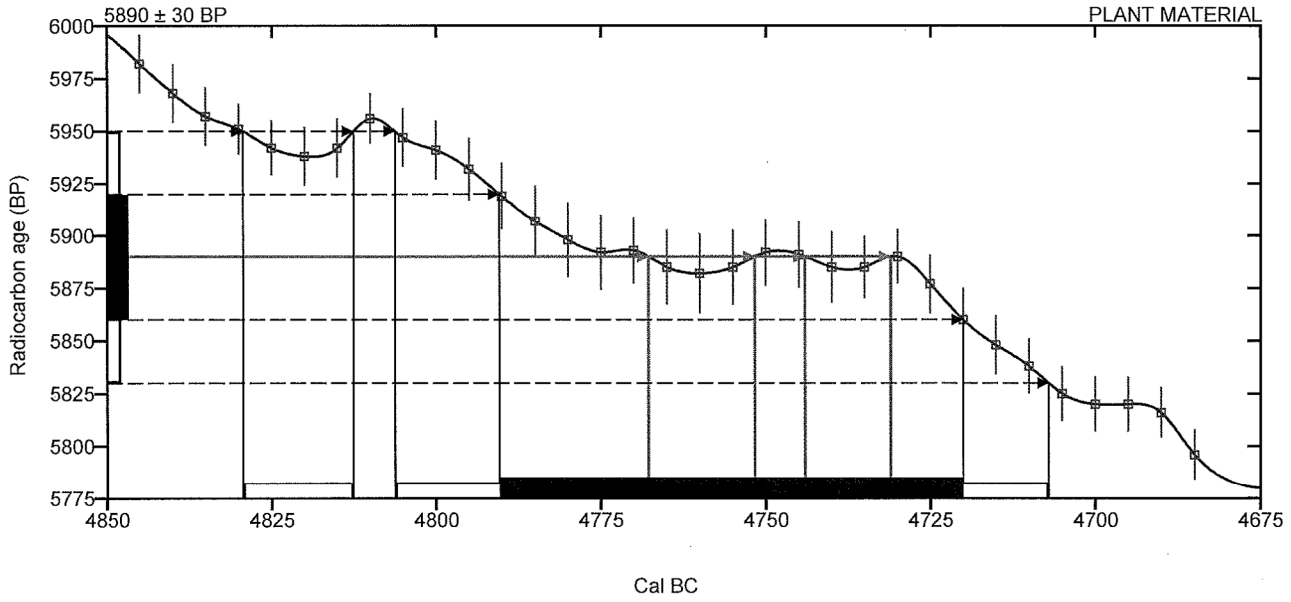
References to INTCAL13 database

Reimer PJ et al. IntCal13 and Marine13 radiocarbon age calibration curves 0–50,000 years cal BP. Radiocarbon 55(4):1869–1887., 2013.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12 = -26.8 o/oo : lab. mult = 1)

Laboratory number	**Beta-415739**
Conventional radiocarbon age	**5890 ± 30 BP**
Calibrated Result (95% Probability)	**Cal BC 4830 to 4815 (Cal BP 6780 to 6765)** **Cal BC 4805 to 4705 (Cal BP 6755 to 6655)**
Intercept of radiocarbon age with calibration curve	Cal BC 4770 (Cal BP 6720) Cal BC 4750 (Cal BP 6700) Cal BC 4745 (Cal BP 6695) Cal BC 4730 (Cal BP 6680)
Calibrated Result (68% Probability)	Cal BC 4790 to 4720 (Cal BP 6740 to 6670)



Database used

INTCAL13

References

Mathematics used for calibration scenario

A Simplified Approach to Calibrating C14 Dates, Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2):317-322

References to INTCAL13 database

Reimer PJ et al. IntCal13 and Marine13 radiocarbon age calibration curves 0–50,000 years cal BP. Radiocarbon 55(4):1869–1887., 2013.

BETA ANALYTIC INC.

RADIOCARBON DATING SERVICES

Dr. JERRY J. STIPP
Dr. MURRY A. TAMERS
CO-DIRECTORS

DARDEN G. HOOD, P.G.
Laboratory Head

RONALD E. HATFIELD
Laboratory Manager

CHRISTOPHER PATRICK
TERESA A. ZILKO-MILLER
Associate Managers

August 16, 1995

Mr. Curtis J. Koger
Associated Earth Sciences, Inc.
911 5th Avenue
Suite 100
Kirkland, Washington 98033

South Well Field
Well # 2
474'

Dear Mr. Koger:

Please find enclosed the radiocarbon dating results on one wood sample (W94036A-474) recently submitted for analysis. Reliable measurements were made on the suitable carbon remaining after pretreatments. The applied pretreatment is listed next to the sample on the report sheet and described in the "PRETREATMENT GLOSSARY". In addition to the results, please review the enclosed discussions on applied methodology, pretreatments and calendar calibration. The reported "Conventional C14 Age" is the radiocarbon date of interest and would have been the value used to calculate the calendar equivalent age if the material was less than 10,000 BP.

Our invoice is enclosed. Thank you in advance, for your prompt attention to its payment. As always, if you have any specific questions, please do not hesitate to fax, e-mail, or call us.

Sincerely,

Darden Hood

P.S. Please note the two new services for 1996; SEM analysis of carbon dated materials and the ADVANCE AMS analysis service with 14 day delivery (literature enclosed).

4985 S.W. 74 COURT, MIAMI, FL 33155 U.S.A.
TELEPHONE: 305-667-5167 / FAX: 305-663-0964 / INTERNET: beta@analytic.win.net
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BETA ANALYTIC INC.

DR. J.J. STIPP and DR. M.A. TAMERS

UNIVERSITY BRANCH
4985 S.W. 74 COURT
MIAMI, FLORIDA, USA 33155
PH: 305/667-5167 FAX: 305/663-0964
E-mail: beta@analytic.win.net

REPORT OF RADIOCARBON DATING ANALYSES

FOR: Mr. Curtis J. Koger
Associated Earth Sciences, Inc.

DATE RECEIVED: July 18, 1995
DATE REPORTED: August 15, 1995

Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-83811	> 41940 years BP	-25.0* o/oo	> 41940 years* BP

SAMPLE #: W94036A-474 ⇒ City of Snoq. Well #2 @ 474'
ANALYSIS: radiometric-standard
MATERIAL/PRETREATMENT:(wood): acid/alkali/acid

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

BETA ANALYTIC INC.

RADIOCARBON DATING SERVICES

Dr. JERRY J. STIPP
Dr. MURRY A. TAMERS
CO-DIRECTORS

DARDEN G. HOOD, P.G.
Laboratory Head

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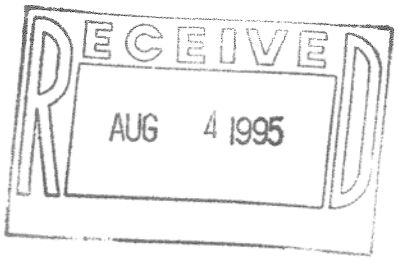
Laboratory Manager

CHRISTOPHER PATRICK
TERESA A. ZILKO-MILLER
Associate Managers

July 31, 1995



Mr. Curtis J. Koger
Associated Earth Sciences, Inc.
911 5th Avenue
Suite 100
Kirkland, Washington 98033

Dear Mr. Koger:

Please find enclosed the radiocarbon dating results on a wood sample recently submitted for analysis. Reliable measurements were made on the suitable carbon remaining after pretreatments. In addition to the results, please review the enclosed discussions on applied methodology, pretreatments and calendar calibration. The reported "Conventional C14 Age" is the radiocarbon date of interest and was the value used to calculate the calendar equivalent age.

As always, if you have any specific questions, please do not hesitate to fax, e-mail, or call us.

Sincerely,

Chris Patrick

P.S. Please note the two new services for 1996; SEM analysis of carbon dated materials and the ADVANCE AMS analysis service with 14 day delivery (literature enclosed).

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BETA ANALYTIC INC.

DR. J.J. STIPP and DR. M.A. TAMERS

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MIAMI, FLORIDA, USA 33155
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E-mail: beta@analytic.win.net

REPORT OF RADIOCARBON DATING ANALYSES

FOR: Mr. Curtis J. Koger
Associated Earth Sciences, Inc.

DATE RECEIVED: June 30, 1995
DATE REPORTED: July 31, 1995

Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-83465	5720 +/- 70 BP	-25.0* o/oo	5720 +/- 70* BP

SAMPLE #: W94036B
ANALYSIS: radiometric-standard
MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid

NOTE: It is important to read the calendar calibration information and to use the calendar calibrated results (reported separately) when interpreting these results in AD/BC terms.

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

THIS IS A COPY OF THE REPORT MAILED TO YOU TODAY. CALENDAR CALIBRATIONS ARE NOT INCLUDED.

BETA ANALYTIC INC.

DR. MURRY TAMERS
DR. JERRY STIPP

4985 SW 74 COURT
MIAMI, FL 33155, U.S.A

July 31, 1995

Mr. Curtis J. Koger
Associated Earth Sciences, Inc.
911 5th Avenue
Suite 100
Kirkland, Washington 98033

Dear Mr. Koger:

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Sincerely,

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DATING RESULTS

Mr. Curtis J. Koger — June 30, 1995

Associated Earth Sciences, Inc. — July 31, 1995

Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)

South Well Field TW-2
Drld by Holt - GeoEngineers onsite to supervise drlg.

Beta-83465 / 5720 +/- 70 BP -25.0* o/oo 5720 +/- 70* BP

SAMPLE #: W94036B -95'
ANALYSIS: radiometric-standard
MATERIAL/PRETREATMENT: (charred material): acid/alkali/acid

NOTE: It is important to read the calendar calibration information and to use the calendar calibrated results (reported separately) when interpreting these results in AD/BC terms.

Dates are reported as RCYBP (radiocarbon years before present, "present"= 1950A.D.). By international convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards. Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 Age.

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! MIAMI, FL 33155
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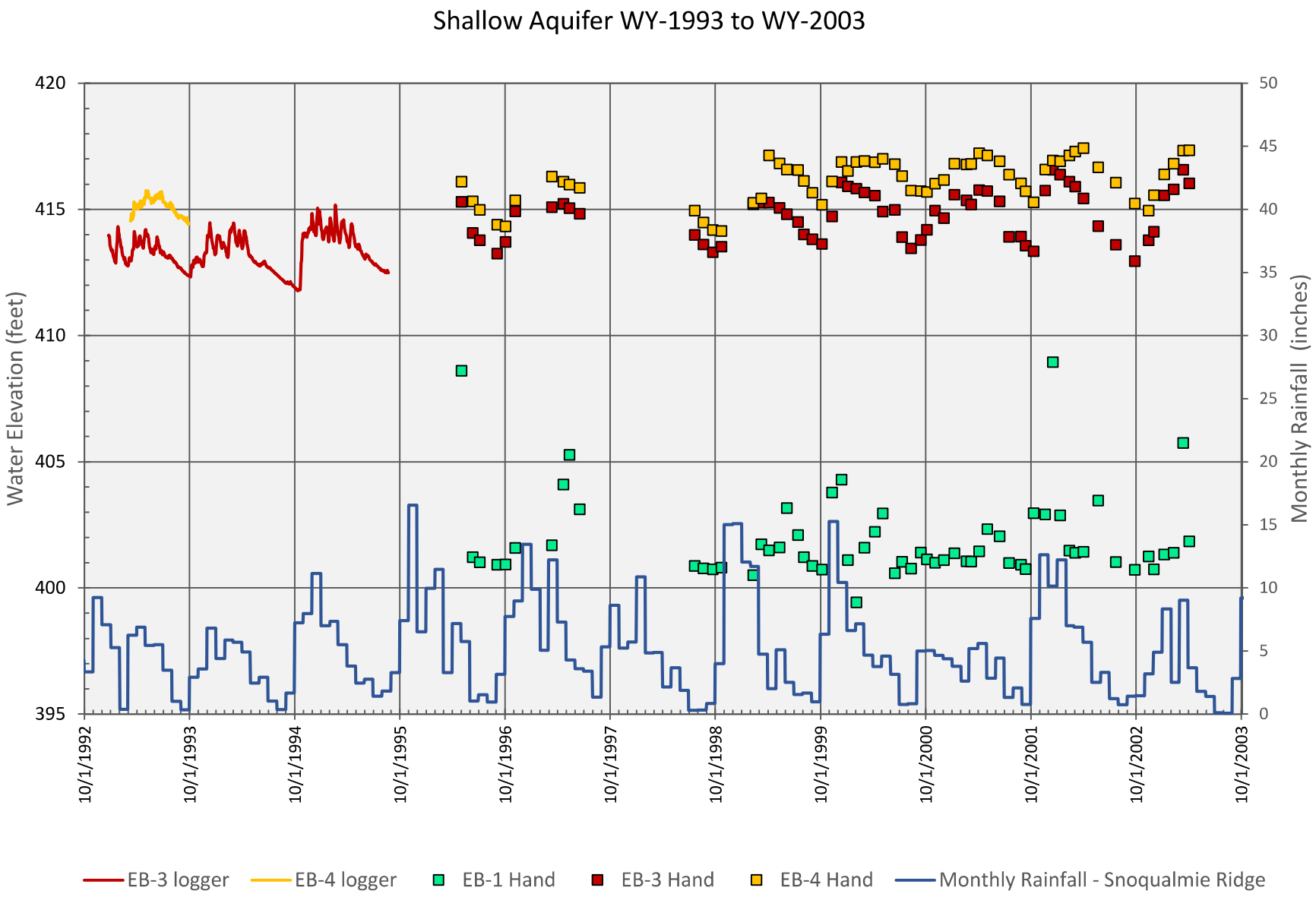
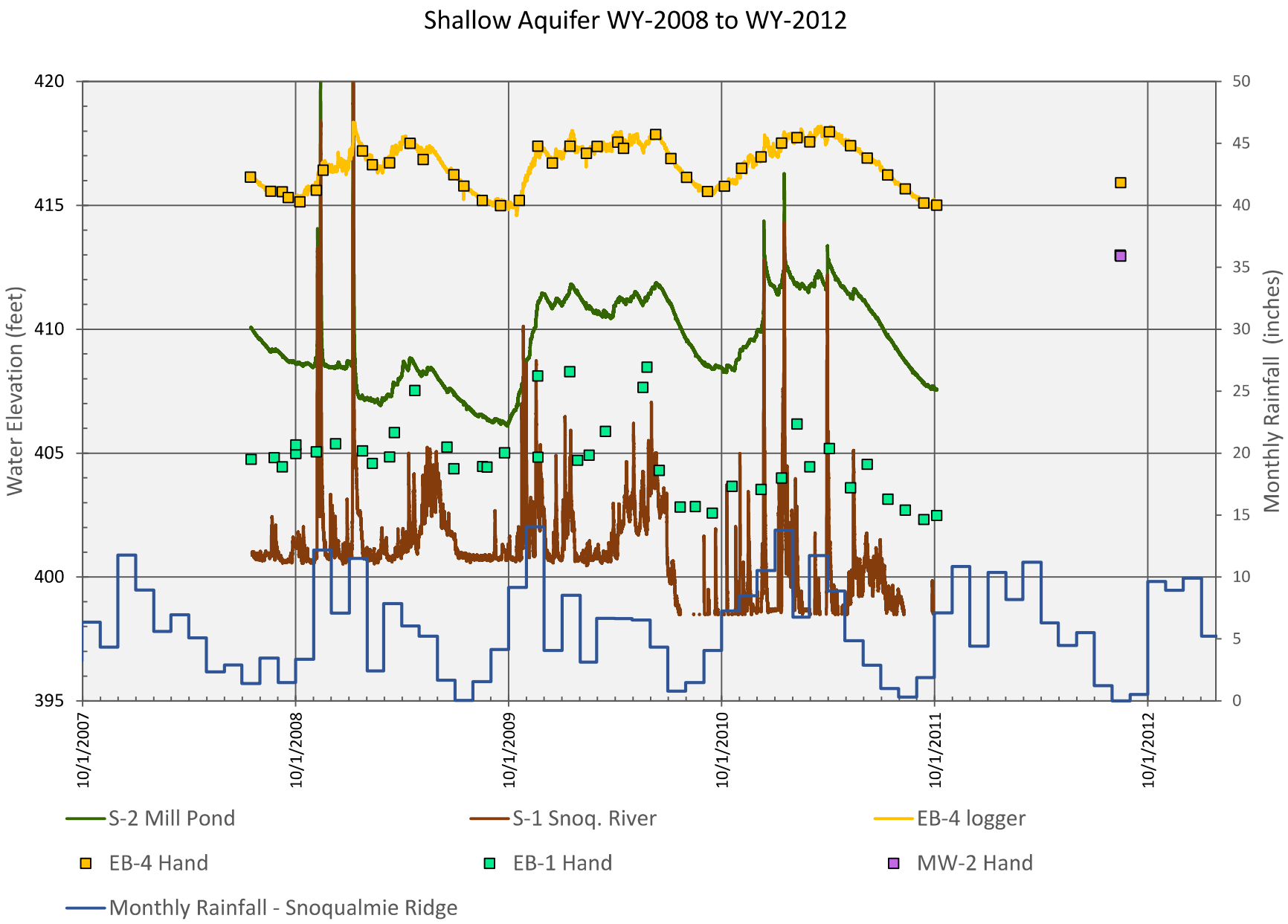
!E-mail beta@analytic.win.net

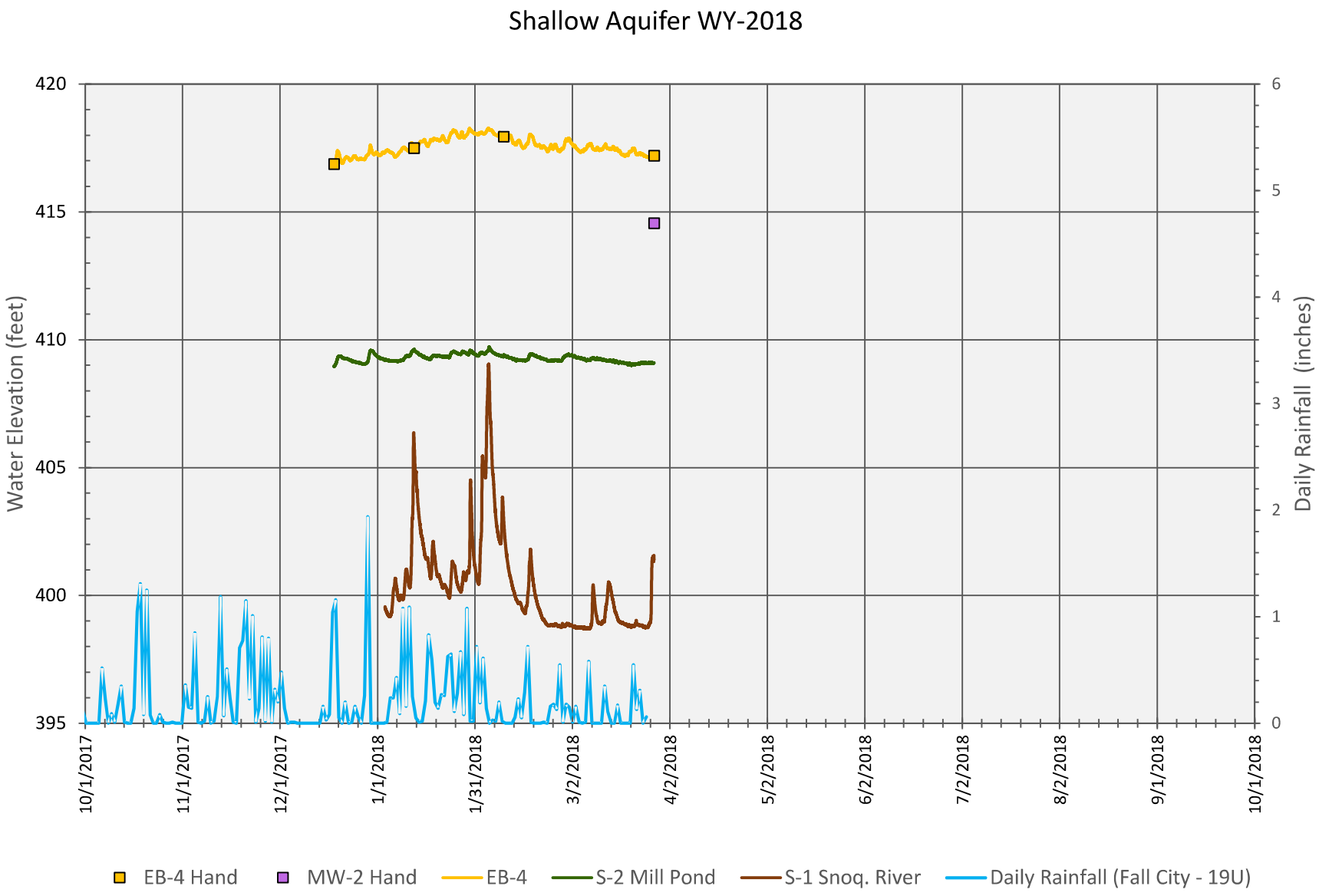
APPENDIX D

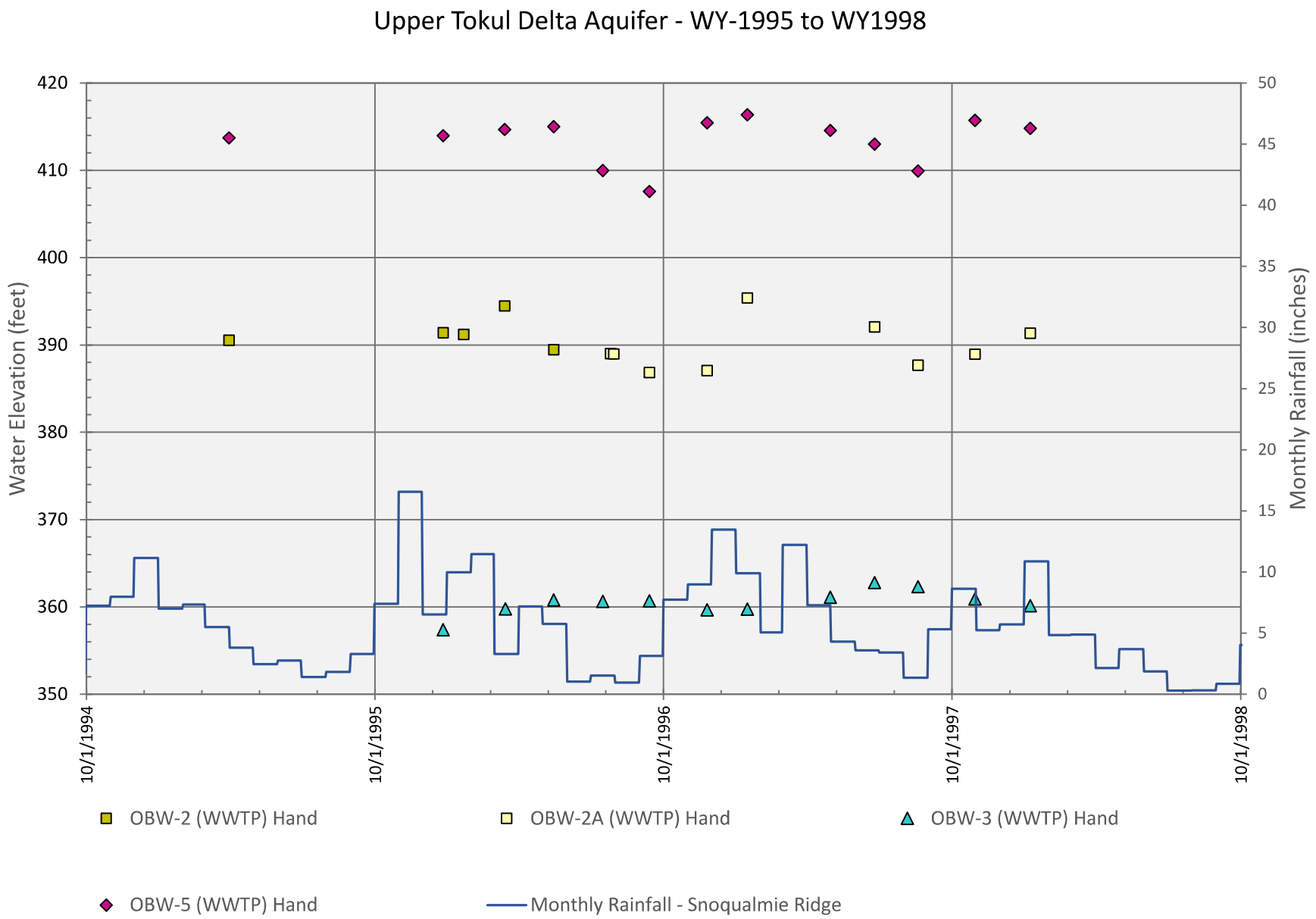
Water Level Monitoring Data

Well ID	Aquifer or Surface Water Body	Monitoring Start	Monitoring End	High Groundwater Elevation (ft)	High Groundwater Elevation Date
EB-1	Snoqualmie Shallow Aquifer	May-96 July-08	Apr-04 Oct-11	409.0	May-96
EB-2	Snoqualmie Shallow Aquifer	Mar-93	Apr-04	408.4	Jan-97
EB-3	Snoqualmie Shallow Aquifer	Mar-93	Apr-04	416.4	Jan-02
EB-4	Snoqualmie Shallow Aquifer	Mar-93 July-08 Dec-17	Apr-04 Oct-11 Current	418.0	Apr-11
MW-2	Snoqualmie Shallow Aquifer	Limited	Limited	414.6	Mar-18
EB-C1W	Tokul Creek Delta Aquifer	Feb-94	Current	268.0	Jul-97
OBW-1	Tokul Creek Delta Aquifer	July-91 Jan-94 June-02	Oct-92 Jan-95 Nov-11	305.0	May-11
OBW-2	Tokul Creek Delta Aquifer	Jul-91	Current	311.3	Mar-97
OBW-2 (WWTP)	Tokul Creek Delta Aquifer	Feb-95	May-96	394.5	Mar-96
OBW-2A (WWTP)	Tokul Creek Delta Aquifer	Jul-96	Jan-98	395.4	Jan-97
OBW-3 (WWTP)	Tokul Creek Delta Aquifer	Feb-95	Jan-98	362.8	Jun-97
OBW-5 (WWTP)	Tokul Creek Delta Aquifer	Feb-95	Jan-98	416.4	Jan-97
MW-3	Tokul Creek Delta Aquifer	Jul-02	Current	278.6	Jun-11
SS&G #3	Tokul Creek Delta Aquifer	Jan-94	Current	330.0	Feb-97
CITY	Deep Aquifer	Aug-91	Jun-05	385.6	Apr-96
CITY #2	Deep Aquifer	Apr-08	Mar-09	379.0	Feb-09
OBW-4	Deep Aquifer	Jan-10	Current	259.5	Mar-17
TW-5	Deep Aquifer	July-91 Jan-94 June-02	Oct-92 Jan-95 Nov-11	294.7	May-97
TW-6	Deep Aquifer	July-91 Jan-94 Jan-05	Jan-93 Aug-95 Feb-09	290.9	Feb-97
TW-7	Deep Aquifer	Sept-94 Jan-05	Aug-95 Feb-09	298.7	Mar-96
TW-8	Deep Aquifer	Oct-01 Jan-05	May-02 Feb-09	290.0	Mar-07
SG-1	Snoqualmie River	Jul-91	Oct-11	405.7	Jan-09
SG-2	Mill Pond	Jul-91	Oct-11	412.6	Apr-11

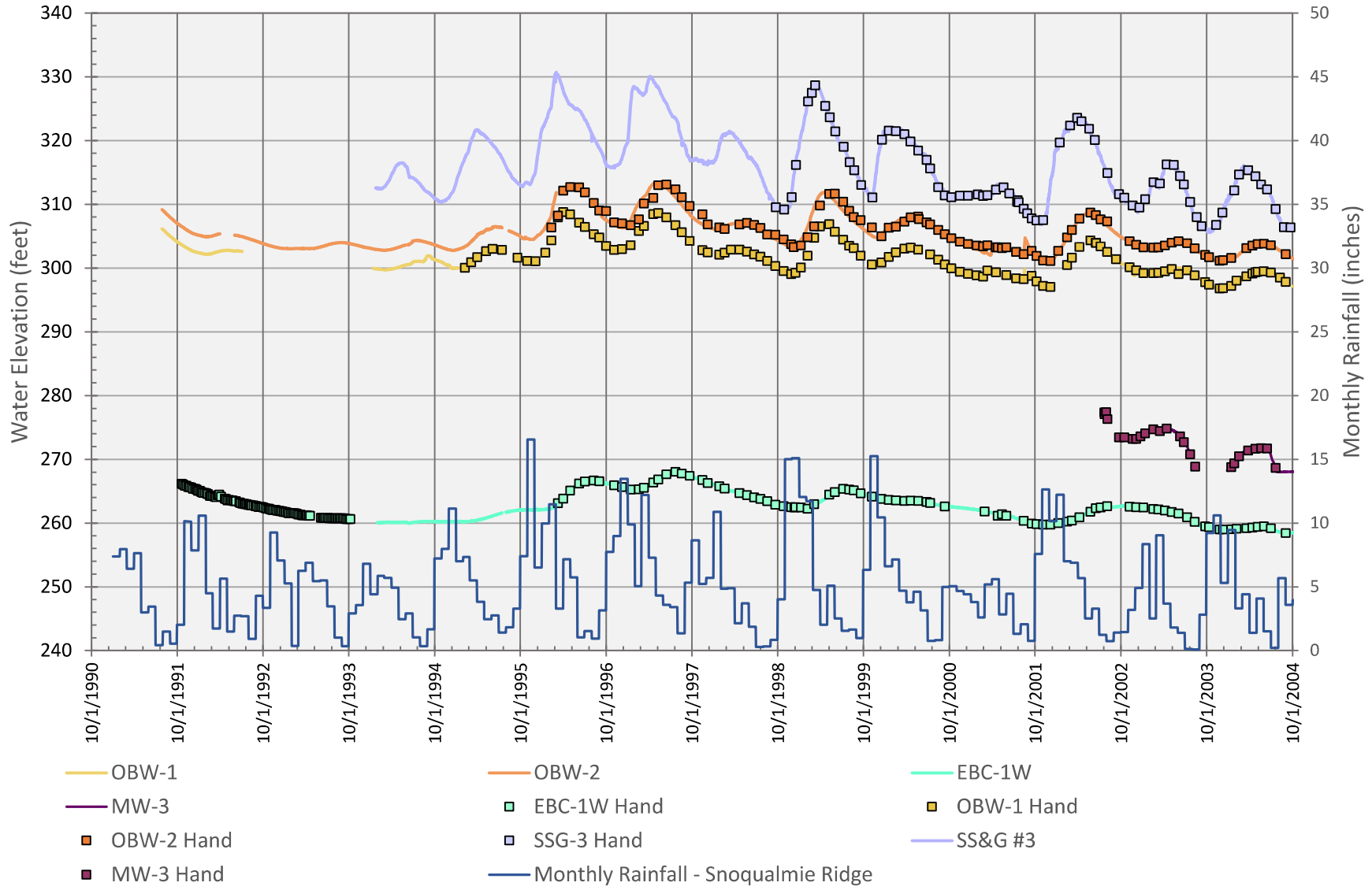

Shallow Aquifer WY-1993 to WY-2003
Water Elevation (feet)
Monthly Rainfall (inches)
420
415
410
405
400
395
50
45
40
35
30
25
20
15
10
5
0
10/1/1992
10/1/1993
10/1/1994
10/1/1995
10/1/1996
10/1/1997
10/1/1998
10/1/1999
10/1/2000
10/1/2001
10/1/2002
10/1/2003
EB-3 logger
EB-4 logger
EB-1 Hand
EB-3 Hand
EB-4 Hand
Monthly Rainfall - Snoqualmie Ridge


Shallow Aquifer WY-2008 to WY-2012
Water Elevation (feet)
Monthly Rainfall (inches)
420
415
410
405
400
395
50
45
40
35
30
25
20
15
10
5
0
10/1/2007
10/1/2008
10/1/2009
10/1/2010
10/1/2011
10/1/2012
S-2 Mill Pond
S-1 Snoq. River
EB-4 logger
EB-4 Hand
EB-1 Hand
MW-2 Hand
Monthly Rainfall - Snoqualmie Ridge

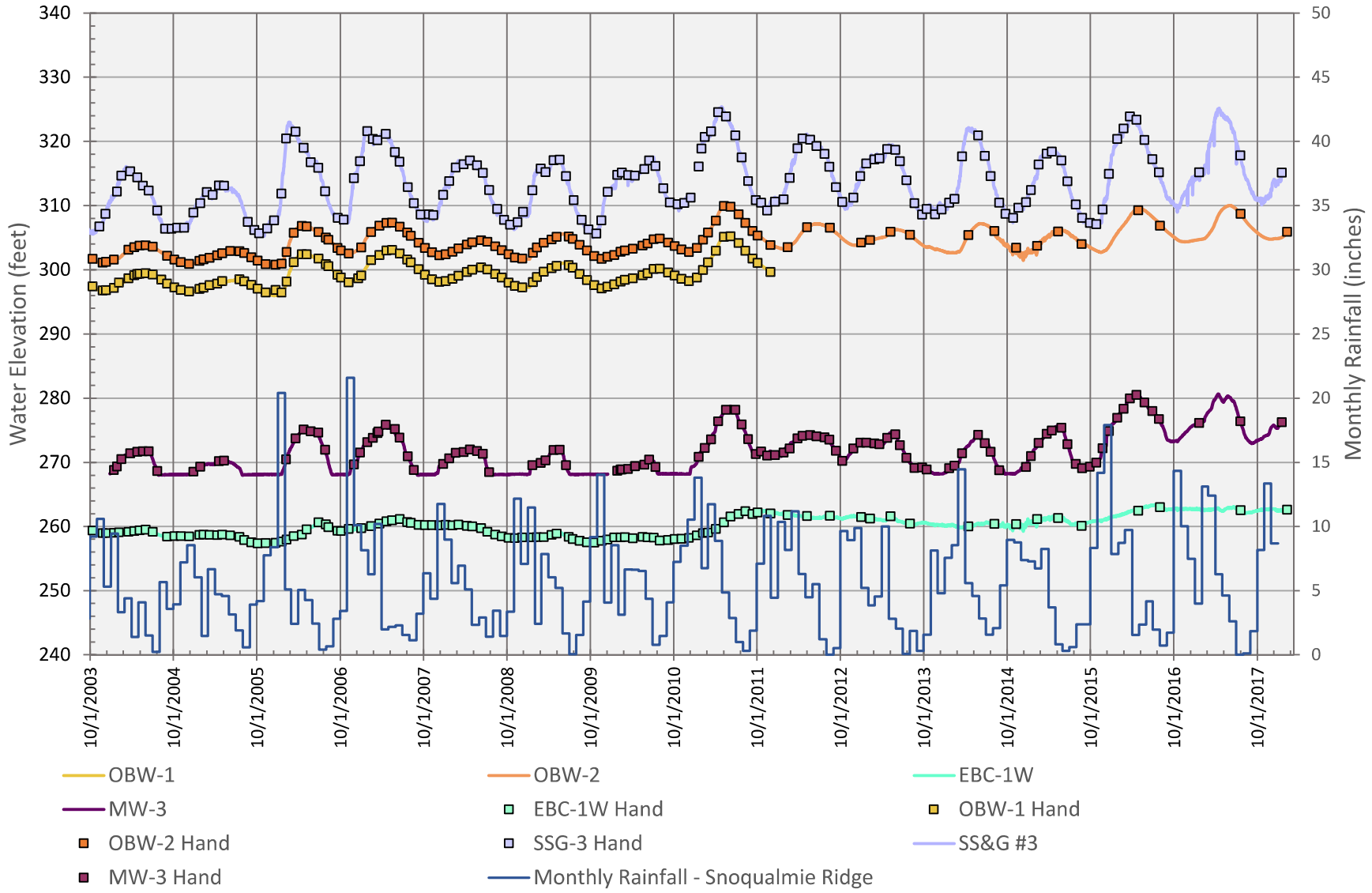

Shallow Aquifer WY-2018
Water Elevation (feet)
Daily Rainfall (inches)
420
415
410
405
400
395
6
5
4
3
2
1
0
10/1/2017
11/1/2017
12/1/2017
1/1/2018
1/31/2018
3/2/2018
4/2/2018
5/2/2018
6/2/2018
7/2/2018
8/2/2018
9/1/2018
10/1/2018
EB-4 Hand
MW-2 Hand
EB-4
S-2 Mill Pond
S-1 Snoq. River
Daily Rainfall (Fall City - 19U)


Upper Tokul Delta Aquifer - WY-1995 to WY1998
Water Elevation (feet)
Monthly Rainfall (inches)
420
410
400
390
380
370
360
350
50
45
40
35
30
25
20
15
10
5
0
10/1/1994
10/1/1995
10/1/1996
10/1/1997
10/1/1998
OBW-2 (WWTP) Hand
OBW-2A (WWTP) Hand
OBW-3 (WWTP) Hand
OBW-5 (WWTP) Hand
Monthly Rainfall - Snoqualmie Ridge

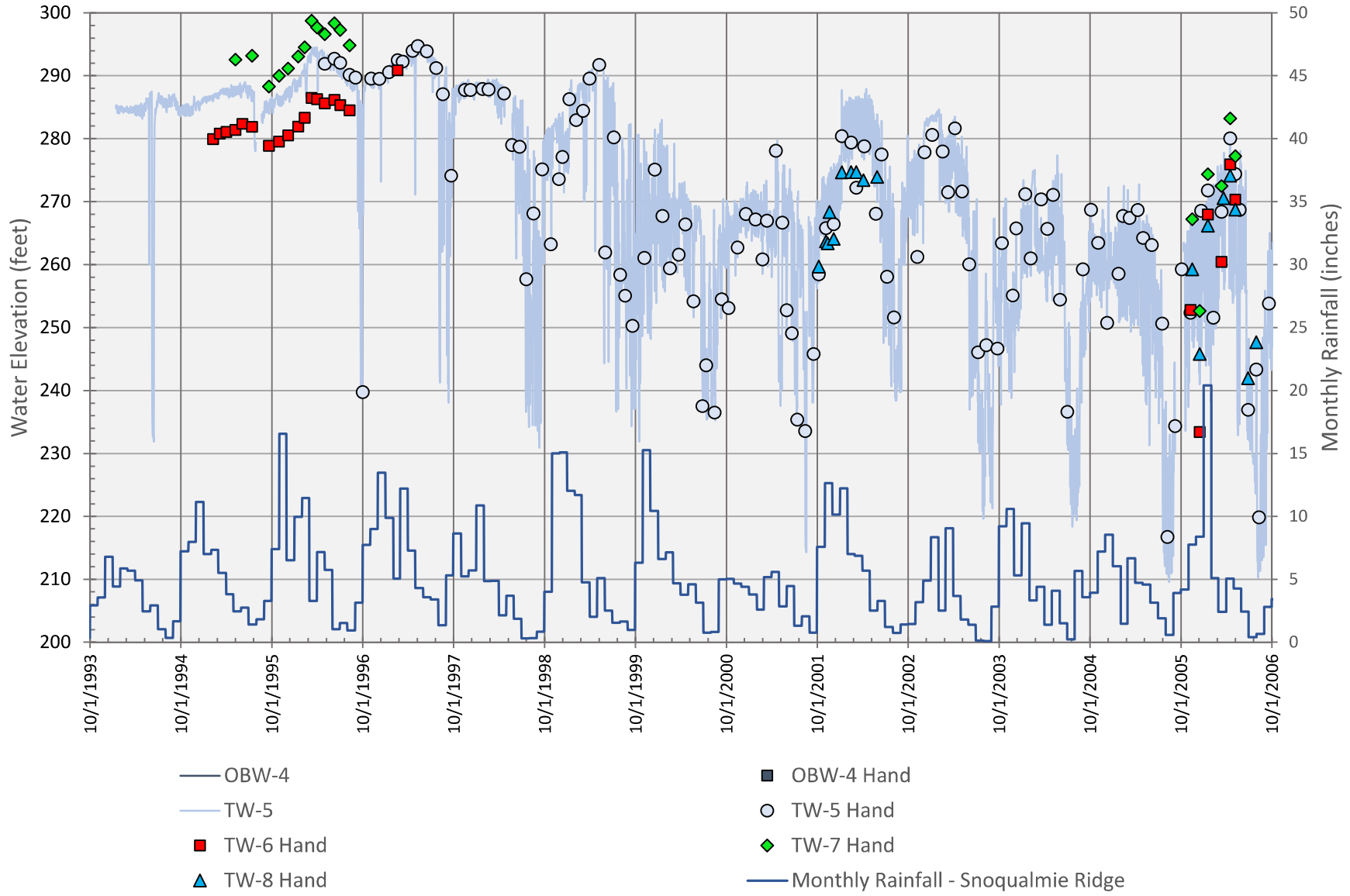
Lower Tokul Delta Aquifer - WY-1991 to WY-2004

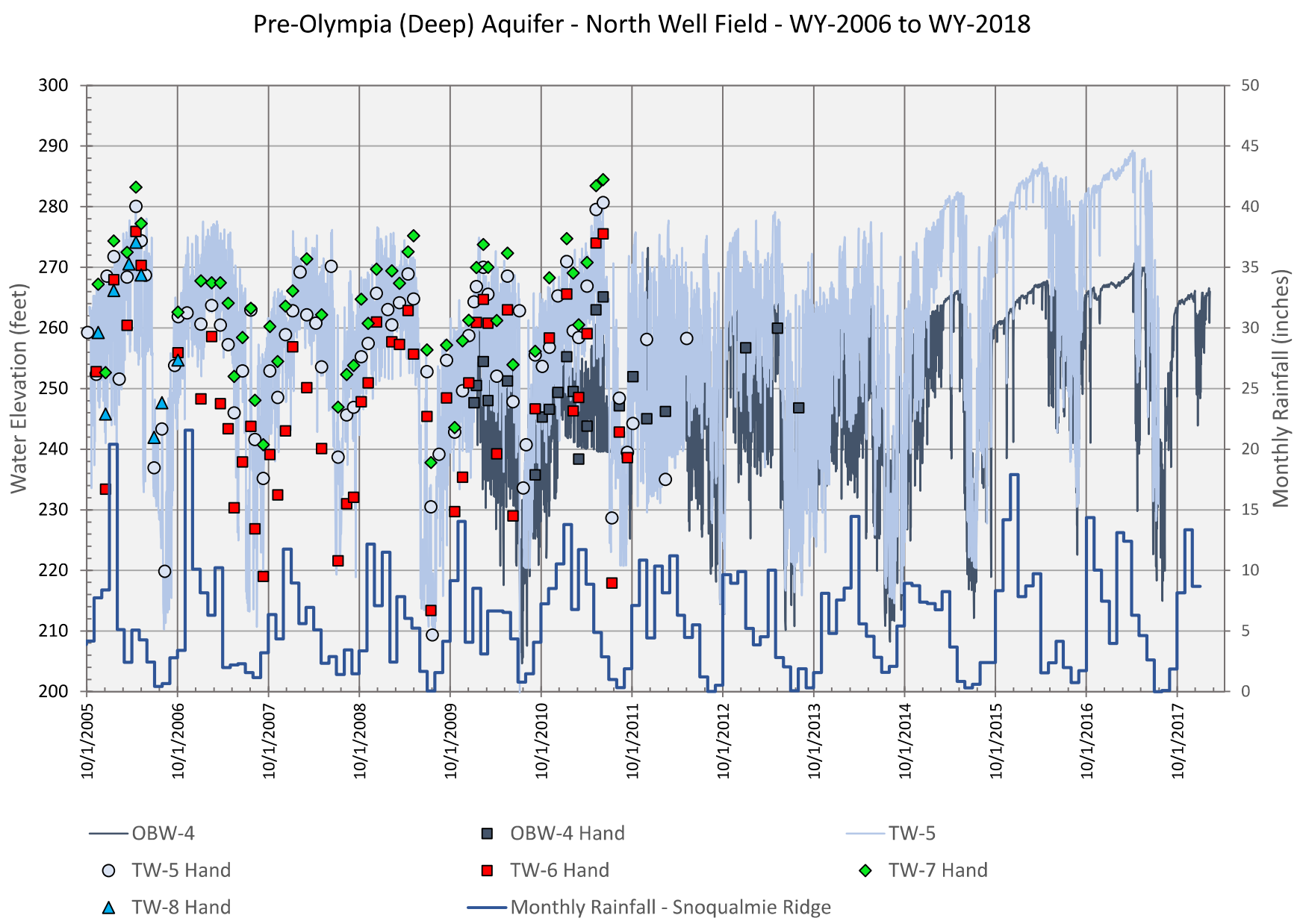


Lower Tokul Delta Aquifer - WY-2004 to WY-2018

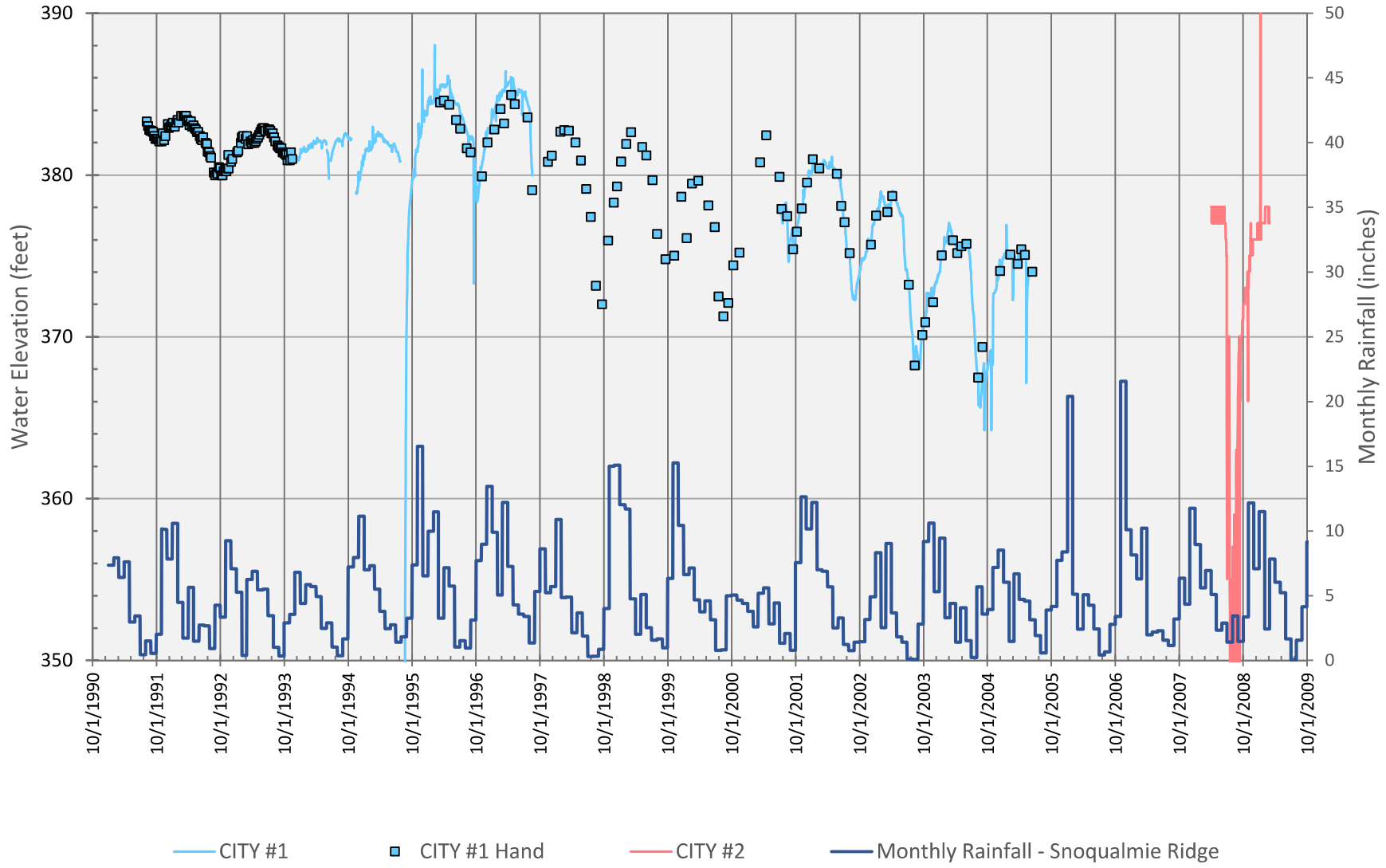


Pre-Olympia (Deep) Aquifer - North Well Field - WY-1994 to WY-2006




Pre-Olympia (Deep) Aquifer - North Well Field - WY-2006 to WY-2018
Water Elevation (feet)
Monthly Rainfall (inches)
300
290
280
270
260
250
240
230
220
210
200
50
45
40
35
30
25
20
15
10
5
0
10/1/2005
10/1/2006
10/1/2007
10/1/2008
10/1/2009
10/1/2010
10/1/2011
10/1/2012
10/1/2013
10/1/2014
10/1/2015
10/1/2016
10/1/2017
OBW-4
OBW-4 Hand
TW-5
TW-5 Hand
TW-6 Hand
TW-7 Hand
TW-8 Hand
Monthly Rainfall - Snoqualmie Ridge

Pre-Olympia (Deep) Aquifer - South Well Field - WY-1991 to WY-2009

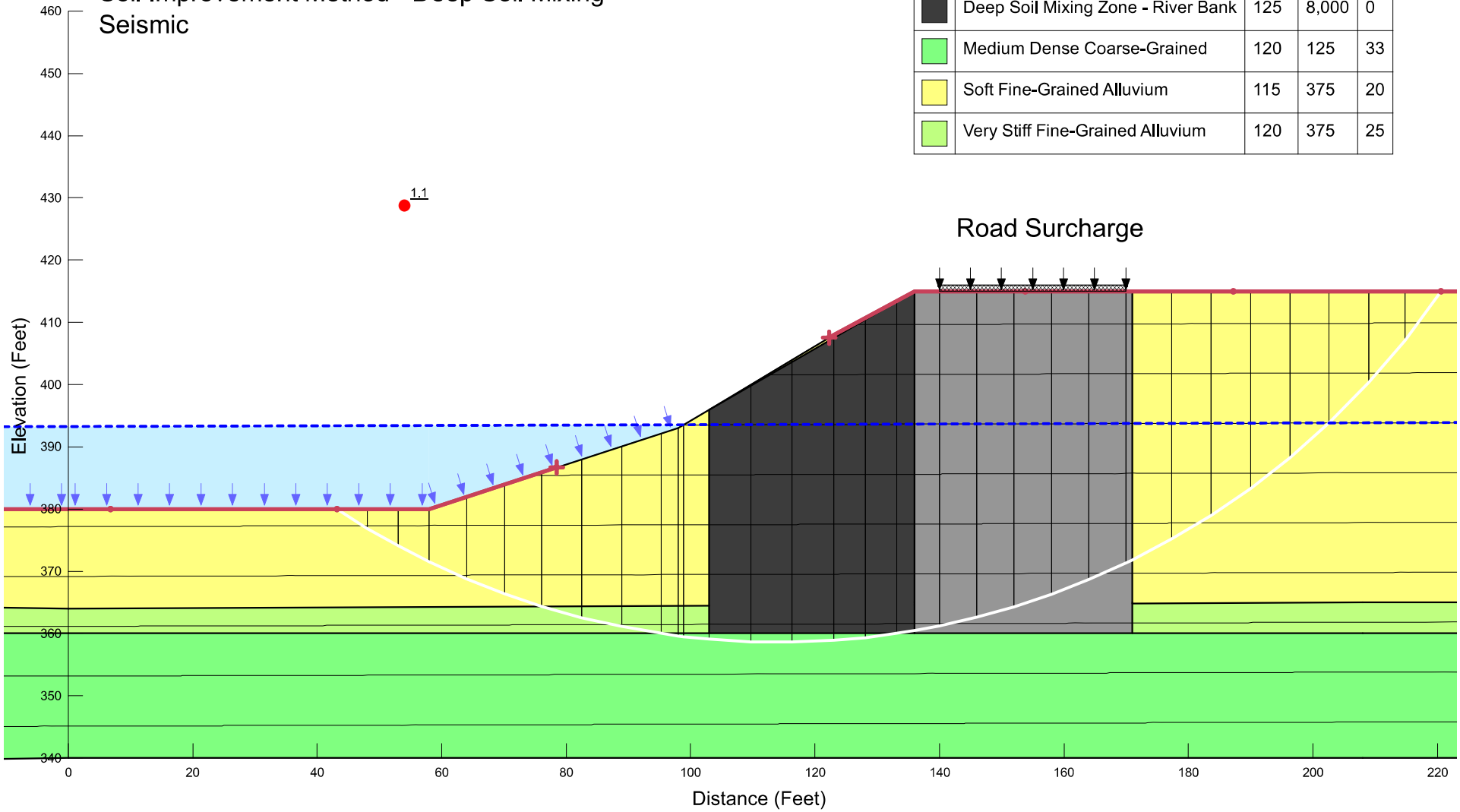


APPENDIX E

Slope Stability Analysis

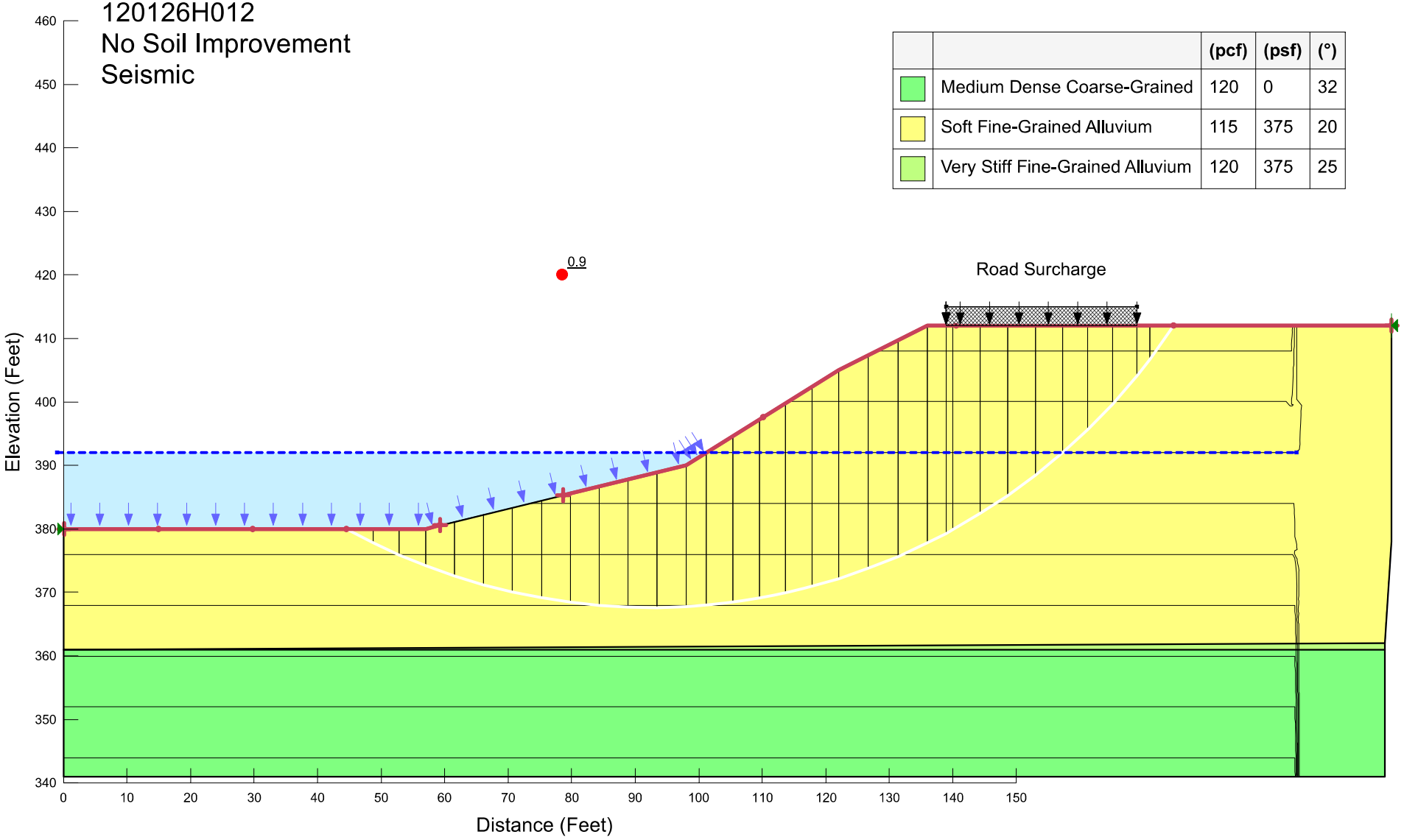
Snoqualmie Mill Site
120126H012
Soil Improvement Method - Deep Soil Mixing
Seismic

		(pcf)	(psf)	(°)
	Deep Soil Mixing Zone	125	800	0
	Deep Soil Mixing Zone - River Bank	125	8,000	0
	Medium Dense Coarse-Grained	120	125	33
	Soft Fine-Grained Alluvium	115	375	20
	Very Stiff Fine-Grained Alluvium	120	375	25



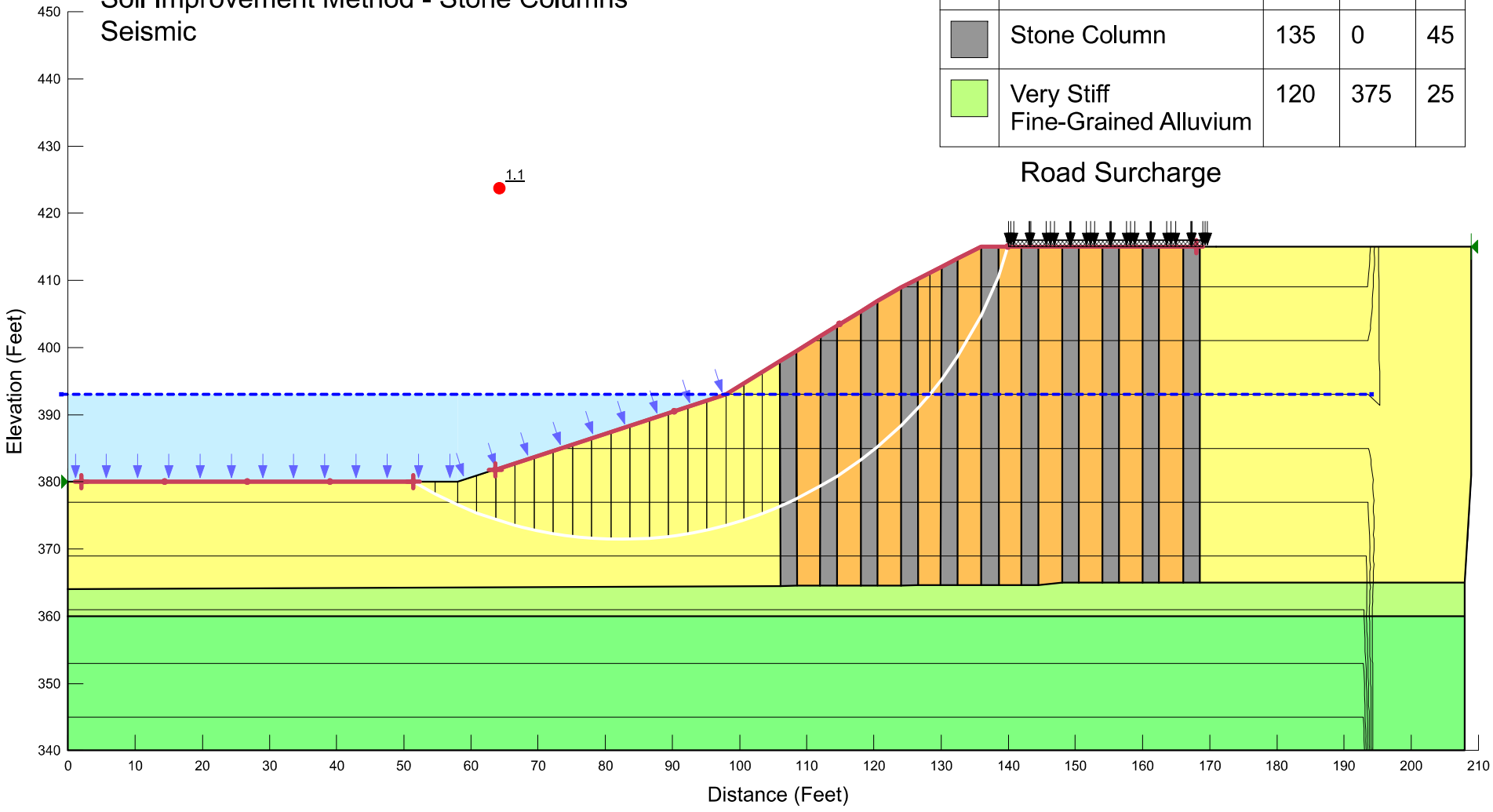
Snoqualmie Mill Site
120126H012
No Soil Improvement
Seismic

		(pcf)	(psf)	(°)
	Medium Dense Coarse-Grained	120	0	32
	Soft Fine-Grained Alluvium	115	375	20
	Very Stiff Fine-Grained Alluvium	120	375	25



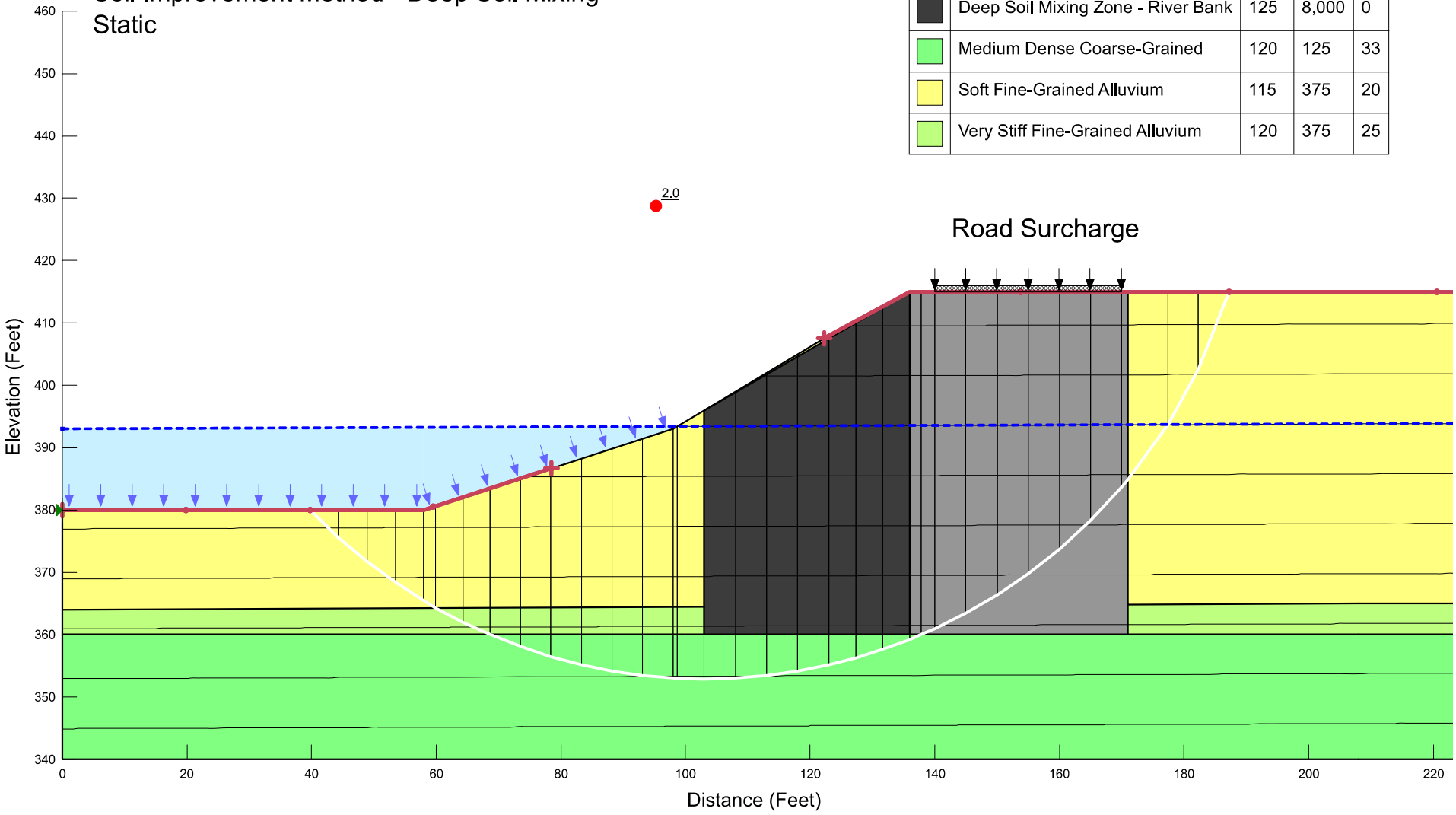
Snoqualmie Mill Site
120126H012
Soil Improvement Method - Stone Columns
Seismic

		(pcf)	(psf)	(°)
	Improved Alluvium	120	150	32
	Medium Dense Coarse-Grained	120	0	32
	Soft Fine-Grained Alluvium	115	375	20
	Stone Column	135	0	45
	Very Stiff Fine-Grained Alluvium	120	375	25



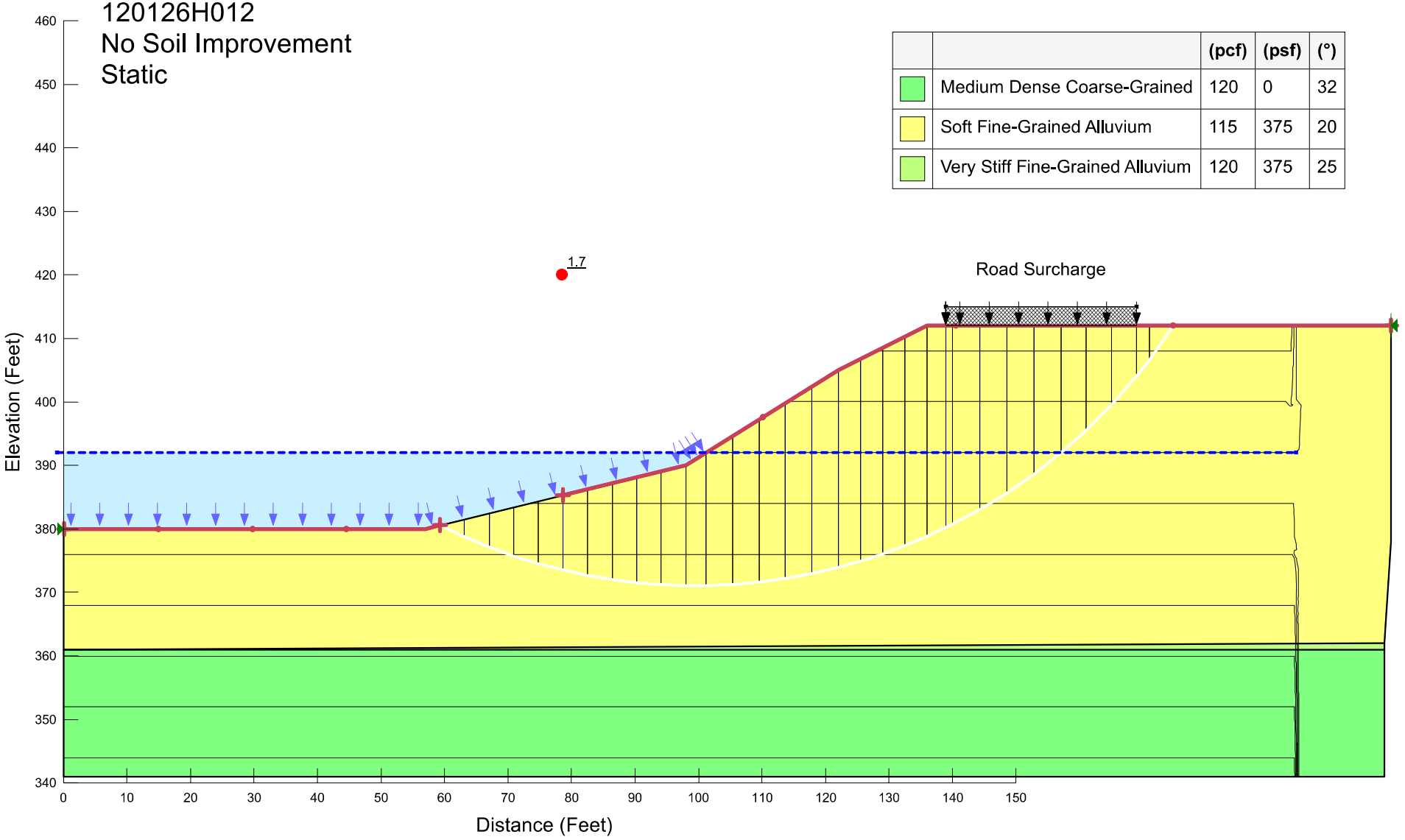
Snoqualmie Mill Site
120126H012
Soil Improvement Method - Deep Soil Mixing
Static

		(pcf)	(psf)	(°)
	Deep Soil Mixing Zone	125	800	0
	Deep Soil Mixing Zone - River Bank	125	8,000	0
	Medium Dense Coarse-Grained	120	125	33
	Soft Fine-Grained Alluvium	115	375	20
	Very Stiff Fine-Grained Alluvium	120	375	25



Snoqualmie Mill Site
120126H012
No Soil Improvement
Static

		(pcf)	(psf)	(°)
	Medium Dense Coarse-Grained	120	0	32
	Soft Fine-Grained Alluvium	115	375	20
	Very Stiff Fine-Grained Alluvium	120	375	25



Snoqualmie Mill Site
120126H012
Soil Improvement Method - Stone Columns
Static

		(pcf)	(psf)	(°)
	Improved Alluvium	120	150	32
	Medium Dense Coarse-Grained	120	0	32
	Soft Fine-Grained Alluvium	115	375	20
	Stone Column	135	0	45
	Very Stiff Fine-Grained Alluvium	120	375	25