

Observers: CL

Center for Snow and Avalanche Studies

Profile # 1

Time: 1120

Snowpack Profile

Date: 11/27/09

Location: SASP

Elev. 11,050'

Aspect: NE

Boot Pen: 25 cm

$\angle$ : 4 °

Air T: +5 °C

Sky: 0

Precip: Nil

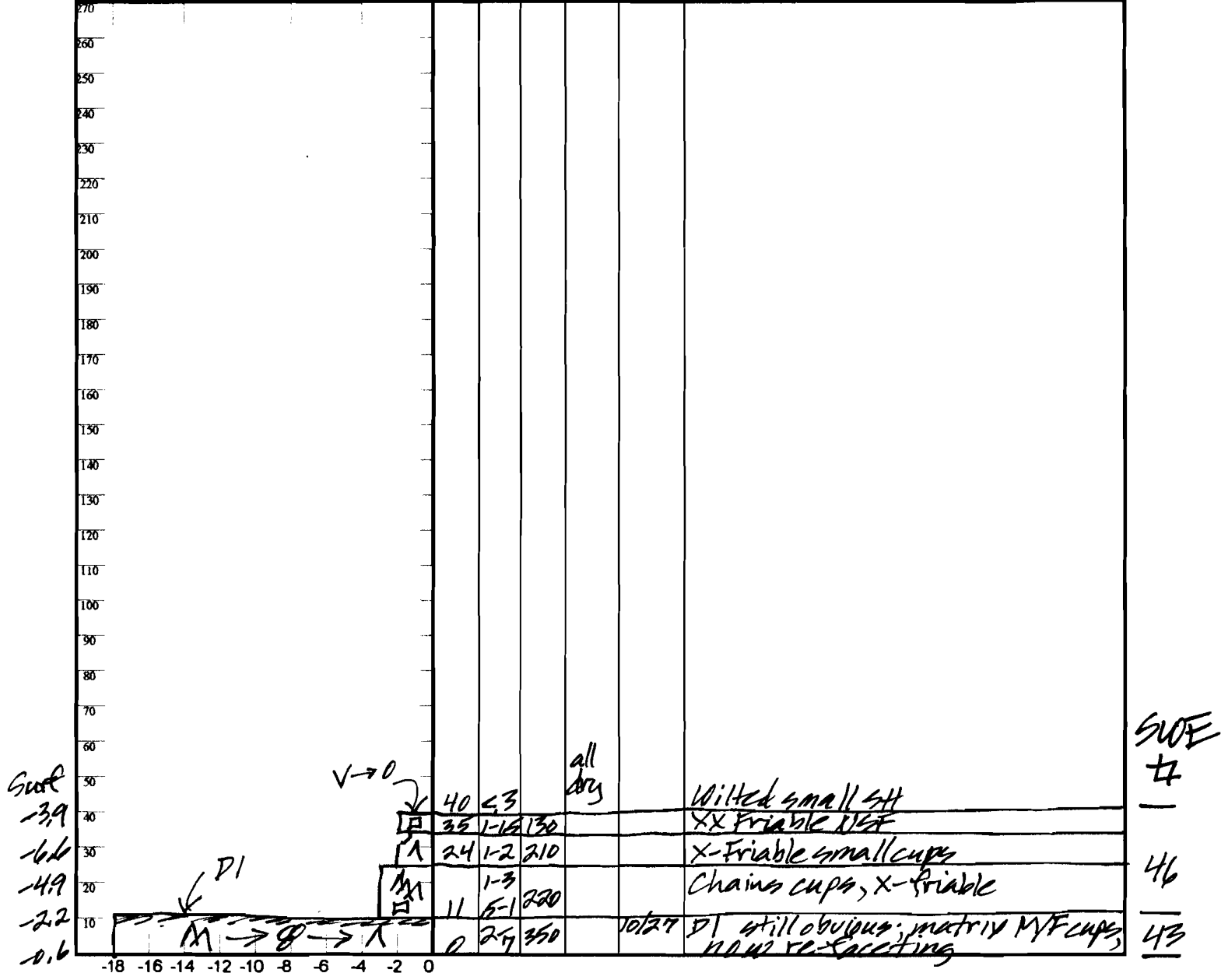
Wind: Nil

Prior Pit: # —; — — —

Total Snowpack SWE: 89 mm H<sub>2</sub>O

Notes: H<sub>s</sub>t = 0.38m;  $\bar{\rho}$  = 234 kg/m<sup>3</sup>

T° K P 1F 4F F H E  $\rho$   $\theta$  DOD Notes



Potential Slab			Weak Layer & Bed Surface						
Ref	$H_{2ONor} \div H_{Nor} = \rho_{kg}$	$\sin \angle \times H_{Nor} \times \rho \times 9.8 = \tau_{Slab}$	F	E	T <sub>WL</sub>	S	C	RB	Shear Quality
A	mm ÷ m =	X X X 9.8 =							
B	mm ÷ m =	X X X 9.8 =							

Notes:

Observers: CL+AT

Center for Snow and Avalanche Studies

Profile # 2

Time: 1115

Snowpack Profile

Date: 12/31/09

Location: GASP

Elev. 11,060' Aspect: NE

Boot Pen: 49 cm  $\angle$ : 3°

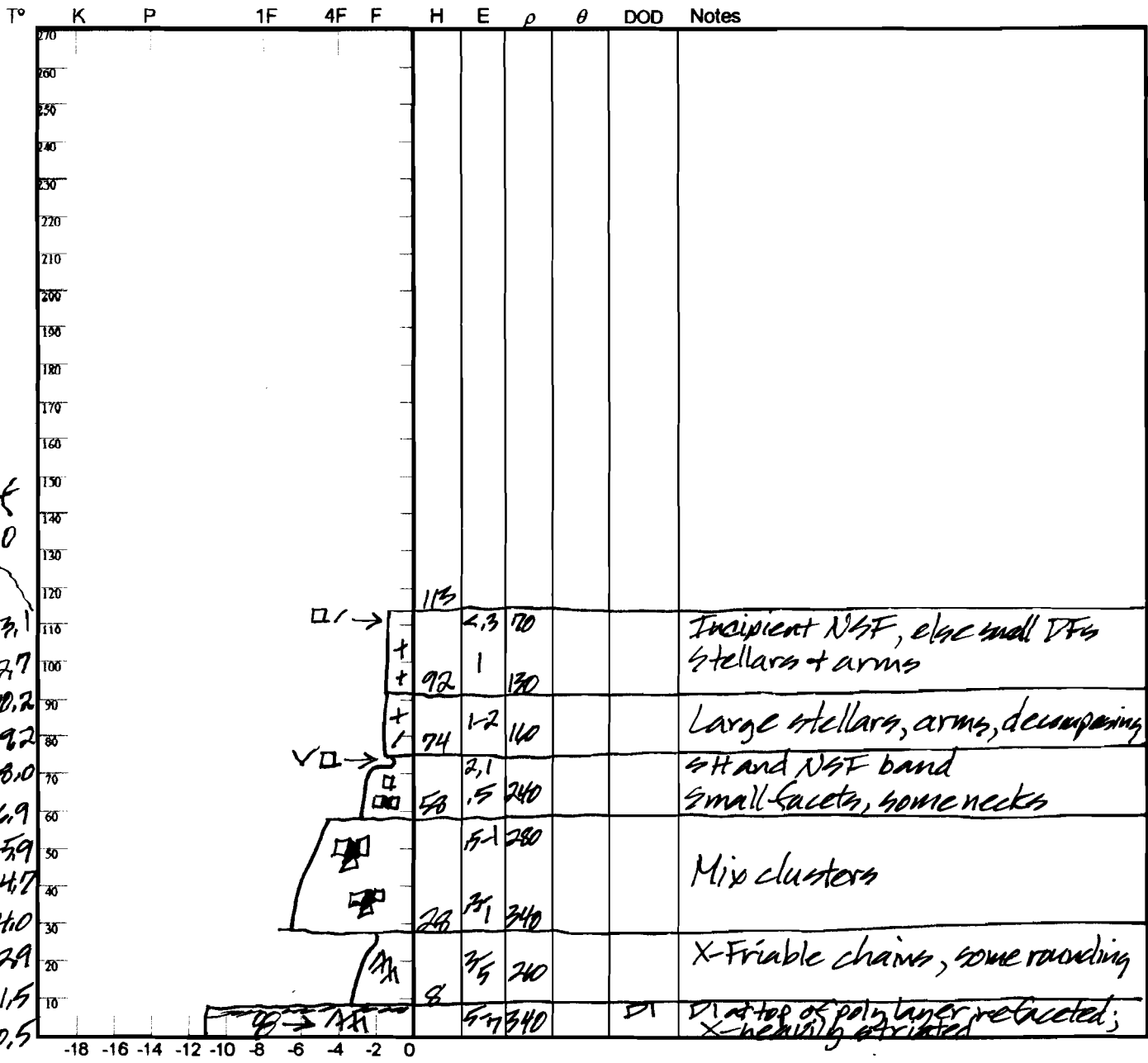
Air T: -11 °C Sky: 0

Precip: Nil Wind: Nil

Prior Pit: # 1; 11/27/09

Total Snowpack SWE: 255 mm H<sub>2</sub>O

Notes: H<sub>2</sub>O = 1.15 m;  $\bar{\rho}$  = 222 kg/m<sup>3</sup>



SWR  
-13.1  
-12.7  
-10.2  
-8.2  
-8.0  
-6.9  
-5.9  
-4.7  
-4.0  
-2.9  
-1.5  
-0.5

4  
50E  
45  
58  
51  
101

Potential Slab			Weak Layer & Bed Surface						
Ref	$H_2O_{Nor} \div H_{Nor} = \rho_{kg}$	$\sin \angle \times H_{Nor} \times \rho \times 9.8 = T_{Slab}$	F	E	T <sub>wl</sub>	S	C	RB	Shear Quality
A	mm ÷ m =	X X X 9.8 =							
B	mm ÷ m =	X X X 9.8 =							

Notes:

V. 11/20/03

Observers: CLTAT

Center for Snow and Avalanche Studies

Profile # 3

Time: 1100

Snowpack Profile

Date: 11/1/2010

Location: SBSP

Elev. 12,185'

Aspect: NE

Boot Pen: 75 cm

$\angle$ : 2 °

Air T: -6 °C

Sky: 0

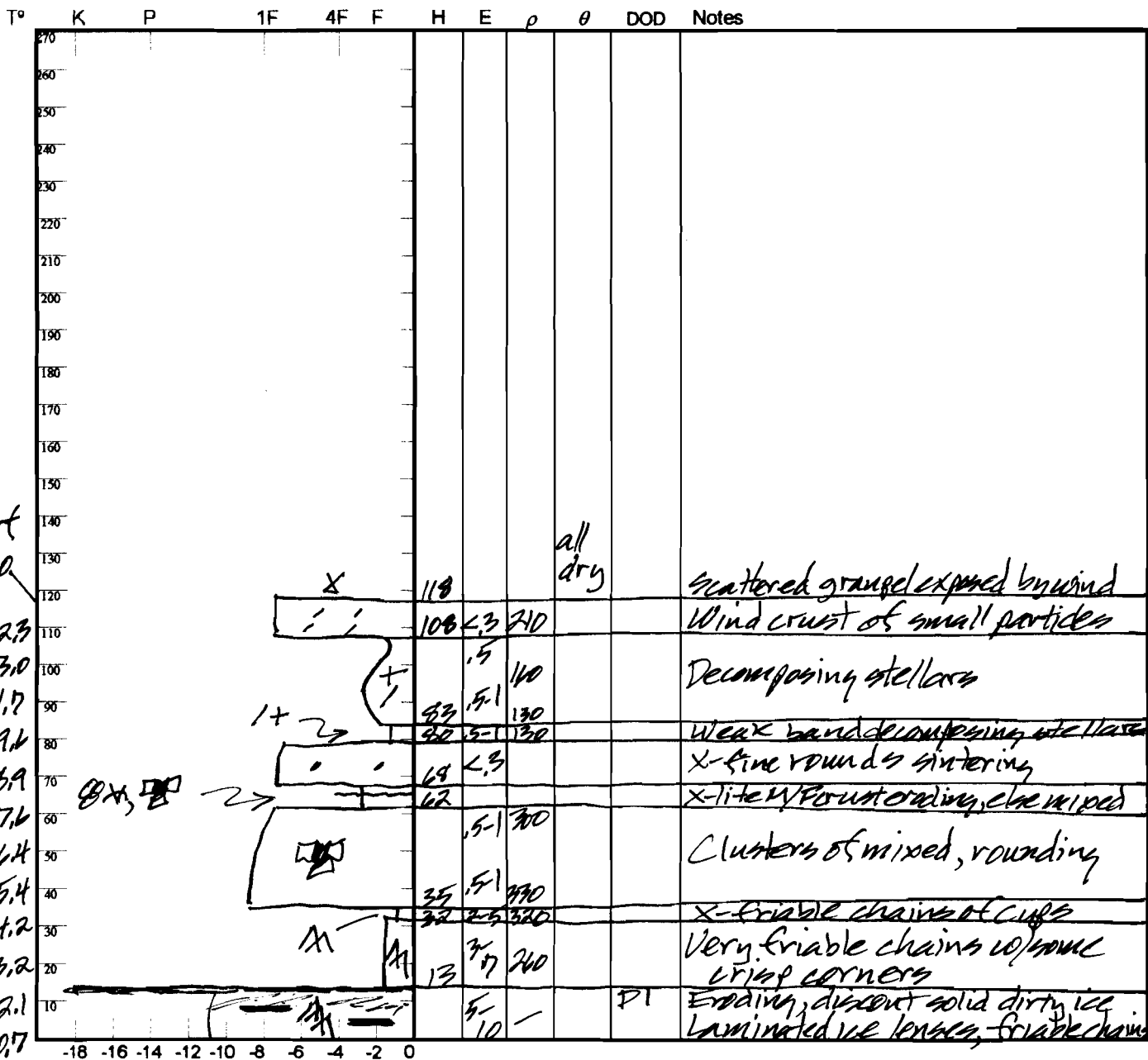
Precip: Nil

Wind: LT

Prior Pit: # 1; 1

Total Snowpack SWE: 297 mm H<sub>2</sub>O

Notes: H<sub>s</sub> = 1.17m;  $\bar{\rho}$  = 254 kg/m<sup>3</sup>



SWE  
7  
55  
76  
76  
89  
52  
49

Sust  
-9.2  
-12.3  
-13.0  
-11.7  
-9.6  
-6.9  
-7.6  
-6.4  
-5.4  
-4.2  
-3.2  
-2.1  
-0.7

Potential Slab			Weak Layer & Bed Surface						
Ref	$H_2O_{Nor} \div H_{Nor} = \rho_{kg}$	$\sin \angle \times H_{Nor} \times \rho \times 9.8 = \tau_{Slab}$	F	E	T <sub>WL</sub>	S	C	RB	Shear Quality
A	mm ÷ m =	x x x 9.8 =							
B	mm ÷ m =	x x x 9.8 =							

Notes: Triangular column in pit face collapsed ~10cm below D1 ice layer, in large cups. Observed R4/R3 deep slab natural avalanche on basin headwall, not on trip PK, that was very late in storm #17. 11/20/03

Observers: CL+AT

Center for Snow and Avalanche Studies

Profile # 4

Time: 0950

Snowpack Profile

Date: 1/31/10

Location: SASP

Elev. 11,060' Aspect: NE

Boot Pen: 89 cm  $\angle$ : 3°

Air T: -7°C Sky: 0

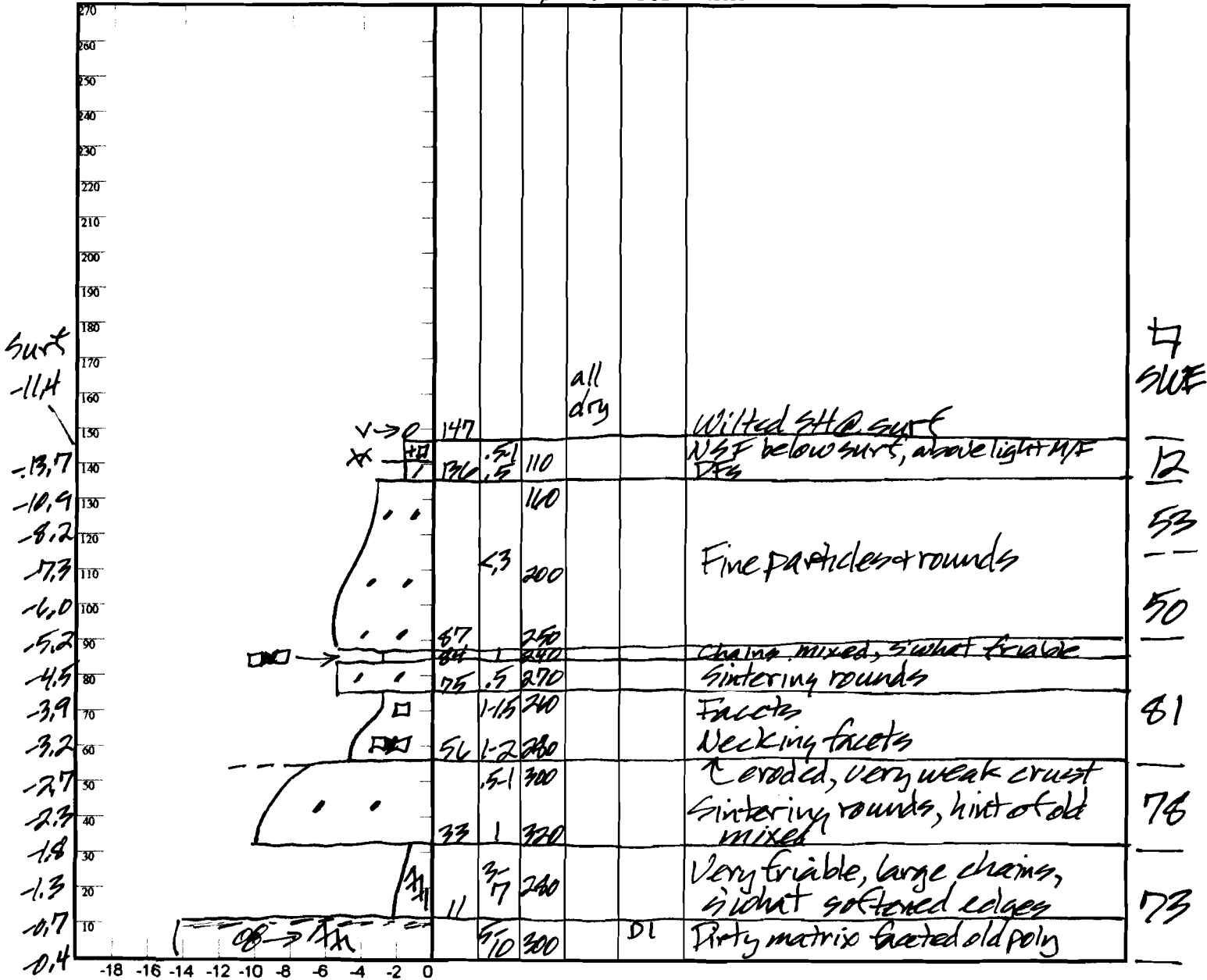
Precip: Nil Wind: Nil

Prior Pit: # 2; 12/31/09

Total Snowpack SWE: 347 mm H<sub>2</sub>O

Notes: H<sub>SH</sub> = 1.47m;  $\bar{\rho}$  = 236 kg/m<sup>3</sup>

T° K P 1F 4F F H E  $\rho$   $\theta$  DOD Notes



Potential Slab				Weak Layer & Bed Surface						
Ref	$H_{2O_{Nor}} \div H_{Nor} = \rho_{kg}$	$\sin \angle \times H_{Nor} \times \rho \times 9.8 = \tau_{slab}$		F	E	T <sub>WL</sub>	S	C	RB	Shear Quality
A	mm ÷ m =	X X X 9.8 =								
B	mm ÷ m =	X X X 9.8 =								

Notes: Cut wedge collapsed with minimal disturbance, fracturing @ ~20 cm in cups.

Observers: CL+AT

Center for Snow and Avalanche Studies

Profile # 5

Time: 1125

Snowpack Profile

Date: 2/1/10

Location: SBSF

Elev. 12,200

Aspect: NE

Boot Pen: 24 cm

$\angle$ : 4 °

Air T: -10 °C

Sky: 0

Precip: Nil

Wind: Lt

Prior Pit: # 3; 1/1/10

Total Snowpack SWE: 393 mm H<sub>2</sub>O

Notes: H<sub>50</sub> = 1.44 m;  $\rho$  = 273 kg/m<sup>3</sup>

T°	K	P	1F	4F	F	H	E	$\rho$	$\theta$	DOD	Notes
270											
260											
250											
240											
230											
220											
210											
200											
190											
180											
170											
160											
150											
140											
130											
120											
110											
100											
90											
80											
70											
60											
50											
40											
30											
20											
10											
-18											

SWE  
-13.5

-12.4

-11.5

-9.9

-8.1

-7.2

-6.1

-5.4

-4.6

-4.2

-3.8

-3.2

-2.6

-2.0

-1.4

-1.1

all dry

7  
SWE

18

13

36

18

86

83

39

Potential Slab			Weak Layer & Bed Surface						
Ref	H <sub>2</sub> O <sub>Nor</sub> ÷ H <sub>Nor</sub> = $\rho_{kg}$	Sin $\angle$ x H <sub>Nor</sub> x $\rho$ x 9.8 = $\tau_{Slab}$	F	E	T <sub>WL</sub>	S	C	RB	Shear Quality
A	mm ÷ m =	X X X 9.8 =							
B	mm ÷ m =	X X X 9.8 =							

Notes:

Observers: CL

Center for Snow and Avalanche Studies

Profile # 6

Time: 1330

Snowpack Profile

Date: 2/28/10

Location: 4858

Elev. 12,200'

Aspect: NE

Boot Pen: 2/2 cm

$\angle$ : 3 °

Air T: -6 °C

Sky: ⊕

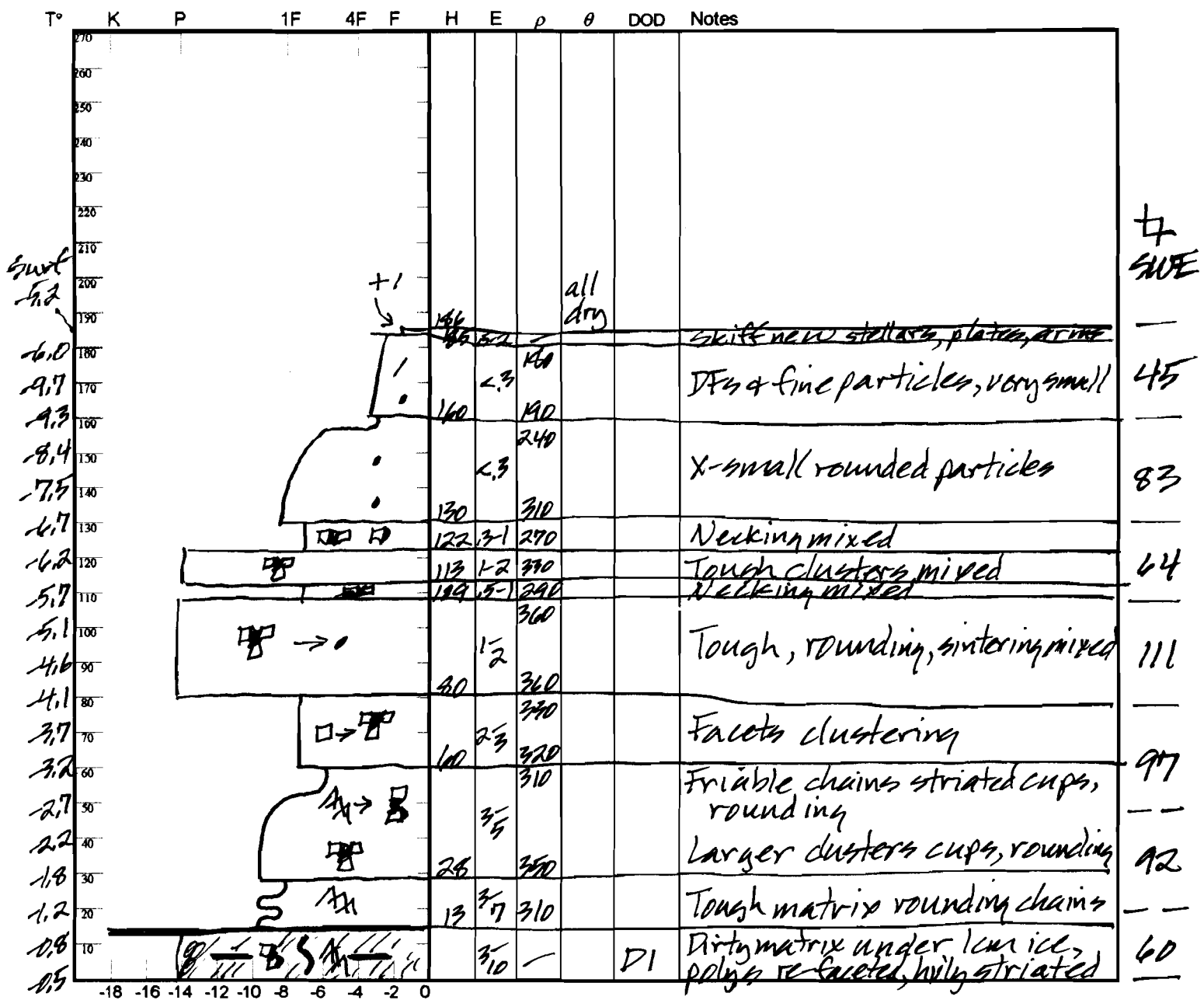
Precip: 51

Wind: Lt

Prior Pit: # 5; 2/1/10

Total Snowpack SWE: 552 mm H<sub>2</sub>O

Notes: H<sub>s</sub> = 1.83m;  $\bar{\rho}$  = 302 kg/m<sup>3</sup>



Potential Slab			Weak Layer & Bed Surface						
Ref	H <sub>2</sub> O <sub>Nor</sub> ÷ H <sub>Nor</sub> = ρ <sub>ig</sub>	Sin $\angle$ x H <sub>Nor</sub> x ρ x 9.8 = τ <sub>Slab</sub>	F	E	T <sub>WL</sub>	S	C	RB	Shear Quality
A	mm ÷ m =	x x x 9.8 =							
B	mm ÷ m =	x x x 9.8 =							

Notes:

Observers: CL+AT

Center for Snow and Avalanche Studies

Profile # 7

Time: 1225

Snowpack Profile

Date: 3/2/10

Location: SASP

Elev. 11,060'

Aspect: NE

Boot Pen: 22 cm

∠: 3°

Air T: +5 °C

Sky: 0

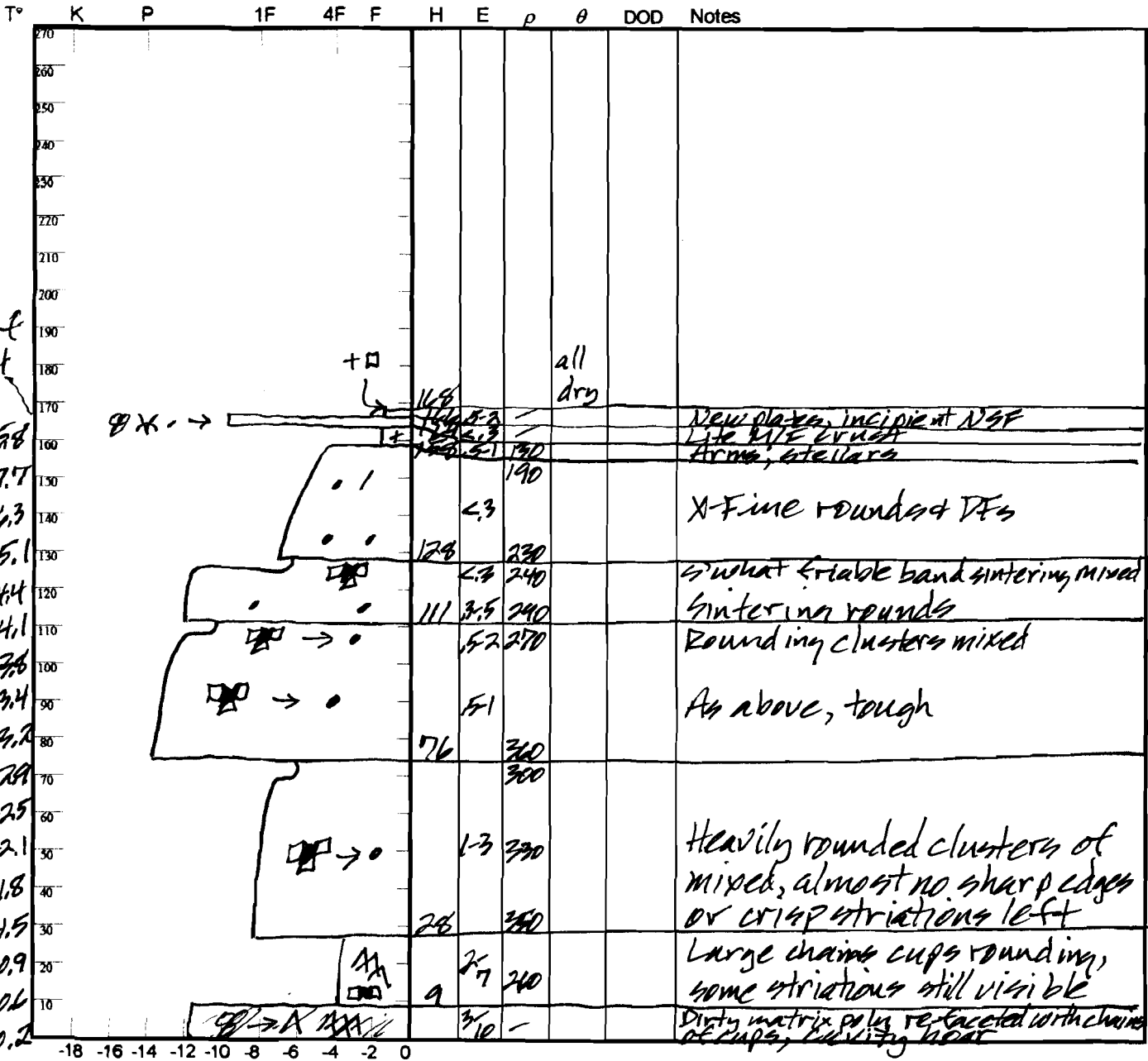
Precip: Nil

Wind: Nil

Prior Pit: # 4; 1/31/10

Total Snowpack SWE: 461 mm H<sub>2</sub>O

Notes: H<sub>2</sub>O = 1.65 m; ρ = 292 kg/m<sup>3</sup>



Handwritten notes on the right side of the graph, including 'SWE', '11', '67', '46', '113', '85', '71', and '86', which likely correspond to specific layers or measurements in the snowpack profile.

Potential Slab				Weak Layer & Bed Surface						
Ref	H <sub>2</sub> O <sub>Nor</sub> ÷ H <sub>Nor</sub> = ρ <sub>kg</sub>	Sin ∠ x H <sub>Nor</sub> x ρ x 9.8 = T <sub>Slab</sub>		F	E	T <sub>WL</sub>	S	C	RB	Shear Quality
A	mm ÷ m =	X X X 9.8 =								
B	mm ÷ m =	X X X 9.8 =								

Notes:

V. 11/20/03

Observers: CL+AT

Center for Snow and Avalanche Studies

Profile # 8

Time: 0840 MST

Snowpack Profile

Date: 3/21/10

Location: SASP

Elev. 11,000'

Aspect: NE

Boot Pen: 45 cm

∠: 3°

Air T: +1 °C

Sky: 0

Precip: Nil

Wind: Nil

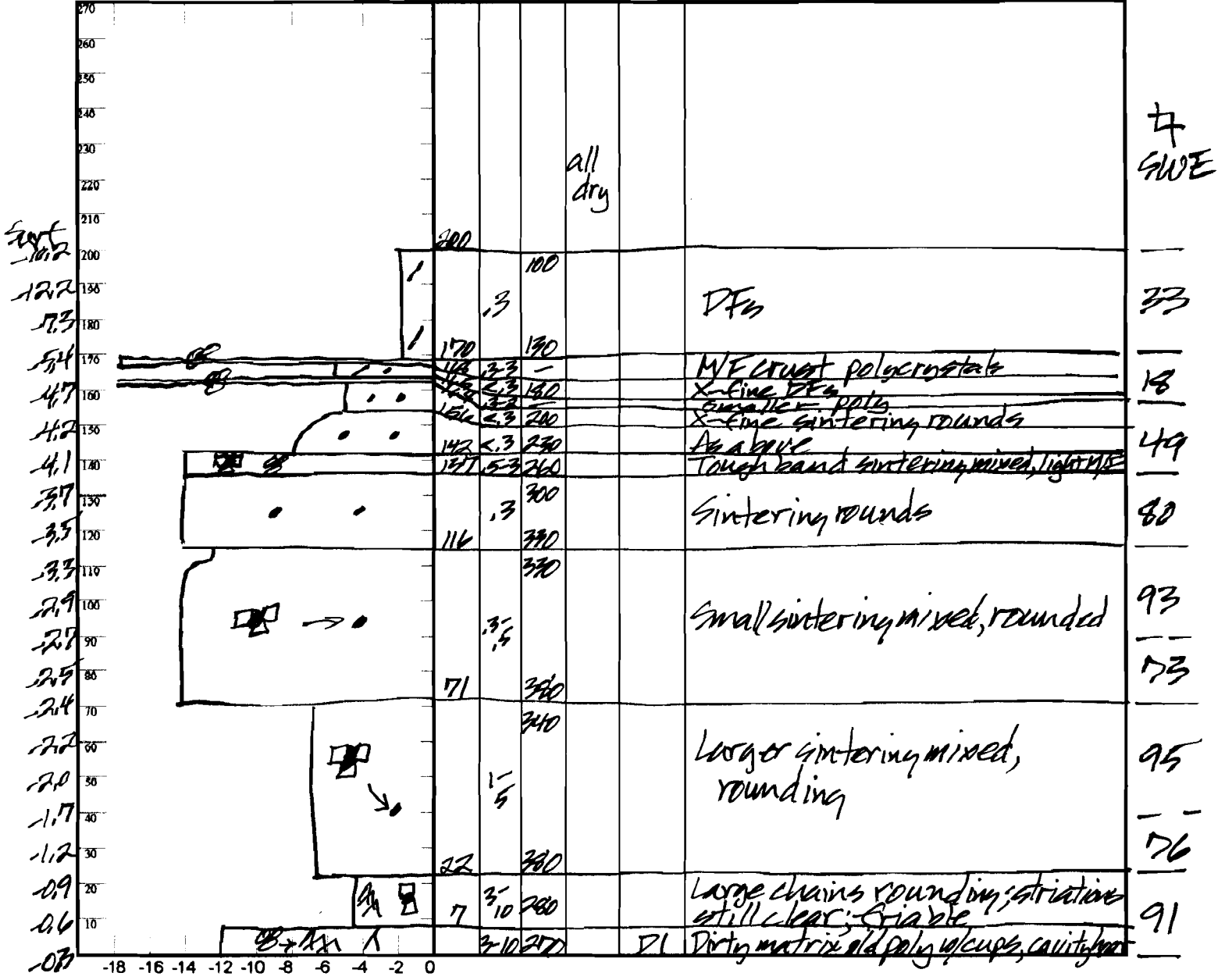
Prior Pit: # 7; 3/2/10

Total Snowpack SWE: 608 mm H<sub>2</sub>O

Notes:  $H_s = 2.00$ ;  $\rho = 304 \text{ kg/m}^3$

No new dust (since D1 - 10/27/09)

T° K P 1F 4F F H E ρ θ DOD Notes



Potential Slab			Weak Layer & Bed Surface						
Ref	$H_{2ONor} \div H_{Nor} = \rho_{kg}$	$\sin \angle \times H_{Nor} \times \rho \times 9.8 = \tau_{Slab}$	F	E	T <sub>WL</sub>	S	C	RB	Shear Quality
A	mm ÷ m =	X X X 9.8 =							
B	mm ÷ m =	X X X 9.8 =							

Notes:

V. 11/20/03



Observers: CL+AT

Center for Snow and Avalanche Studies

Profile # 9

Time: 1005 MST

Snowpack Profile

Date: 4/5/10

Location: SASP

Elev. 11,060'

Aspect: NE

Boot Pen: 25 cm

$\angle$ : 3 °

Air T: +1 °C

Sky: ☉

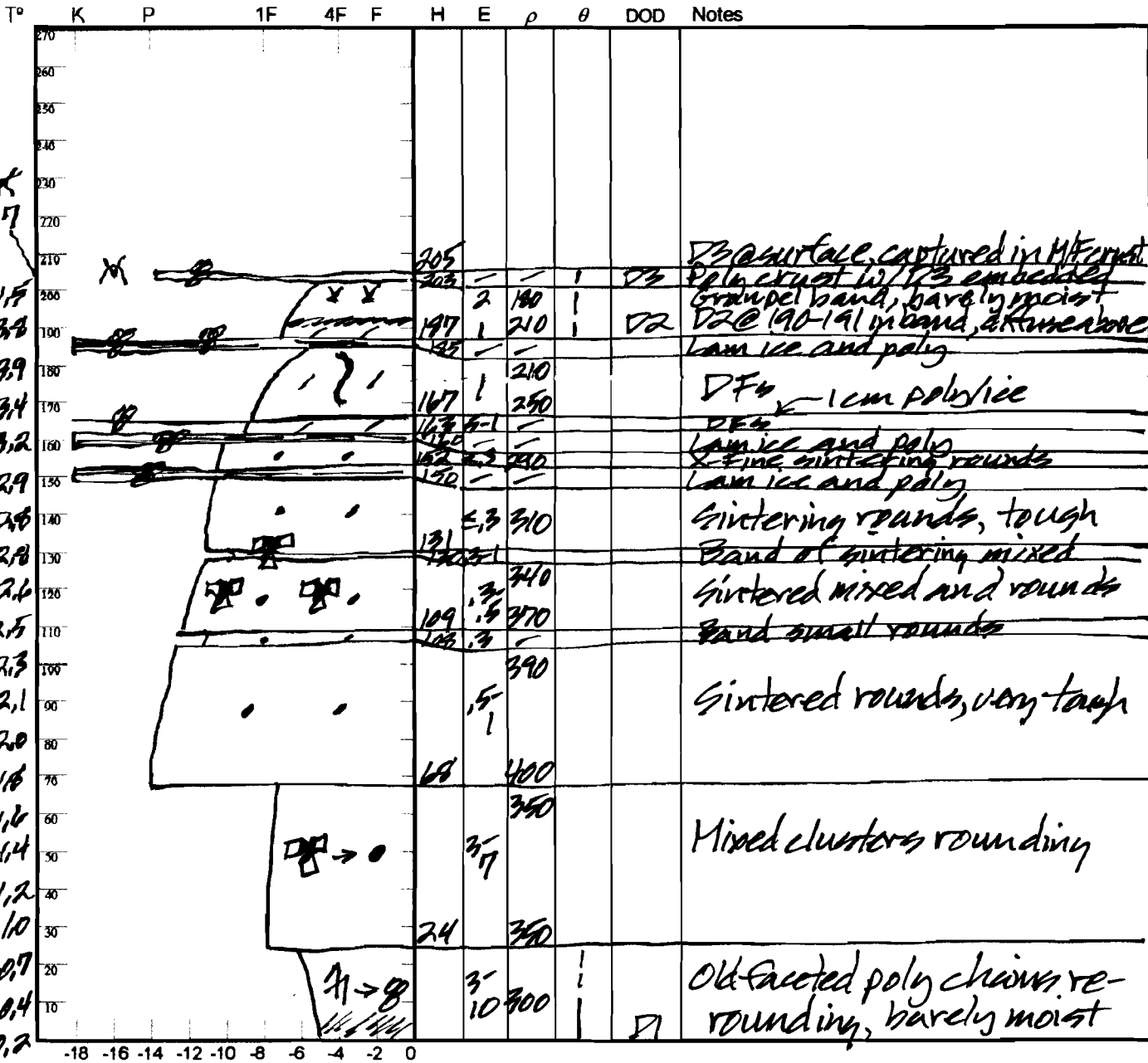
Precip: Nil

Wind: Mod

Prior Pit: # 8; 321/10

Total Snowpack SWE: 446 mm H<sub>2</sub>O

Notes: HS  $\eta = 2.03$  m ;  $\bar{\rho} = 318$  Kg/m<sup>3</sup>



Handwritten notes on the right side of the graph, including SWE values: 4, 9, 29, 64, 33, 65, 109, 122, 101, 114.

Potential Slab			Weak Layer & Bed Surface						
Ref	$H_2O_{Nor} \div H_{Nor} = \rho_{rg}$	$\sin \angle \times H_{Nor} \times \rho \times 9.8 = \tau_{Slab}$	F	E	T <sub>WL</sub>	S	C	RB	Shear Quality
A	mm ÷ m =	X X X 9.8 =							
B	mm ÷ m =	X X X 9.8 =							

Notes:

Observers: CL, AT, MB

Center for Snow and Avalanche Studies

Profile # 10

Time: 1050

Snowpack Profile

Date: 4/5/10

Location: 489P

Elev. 12,200'

Aspect: NE

Boot Pen: 7 cm

∠: 7°

Air T: -7°C

Sky: 0

Precip: Nil

Wind: Nil

Prior Pit: # 6; 2/28/10

Total Snowpack SWE: 789 mm H<sub>2</sub>O

Notes:  $H_{eq} = 2.20m$ ;  $\rho = 359 kg/m^3$

T <sub>o</sub>	K	P	1F	4F	F	H	E	$\rho$	$\theta$	DOD	Notes
270											
250											
240											
230											
220						205					
210						219	<.3	370		D4	Diffuse D4
200						207	.5	400		D3, D4	Concentrated D4 & D3
190						200	.3	250		D2	Thin band D2 @ bottom
180								240			
170								240			
160								<.3			X Fine particles & rounds
150						174		310			
140								240			
130								<.3			X-Fine sintering rounds
120						150		340			
110								360			
100								.3			As above
90						124		370			
80								340			
70								3.5			X tough sintered rounds
60						102		410			
50								430			
40								5.1			As above
30						72		410			
20								12	13		Clusters mixed rounding, tough
10								370			
0								13			As above
								26			
								15	3/10	380	Chains cups rounding
								3/10	310		Polys in D1 bands faceted
											Friable chains, crisp corners

SWE  
41.4

7  
SWE

66

76

75

92

96

72

54

88

101

69

Potential Slab					Weak Layer & Bed Surface					
Ref	H <sub>2</sub> O <sub>Nor</sub> ÷ H <sub>Nor</sub> = $\rho_{kg}$	Sin $\angle$ x H <sub>Nor</sub> x $\rho$ x 9.8 = $\tau_{slab}$	F	E	T <sub>WL</sub>	S	C	RB	Shear Quality	
A	mm ÷ m =	X X X 9.8 =								
B	mm ÷ m =	X X X 9.8 =								

Notes:

Observers: CLAT

Center for Snow and Avalanche Studies

Profile # 11

Time: 0830

Snowpack Profile

Date: 4/12/10

Location: SASP

Elev. 11,080'

Aspect: NE

Boot Pen: 5 cm

$\angle$ : 3°

Air T: +4 °C

Sky: ☉

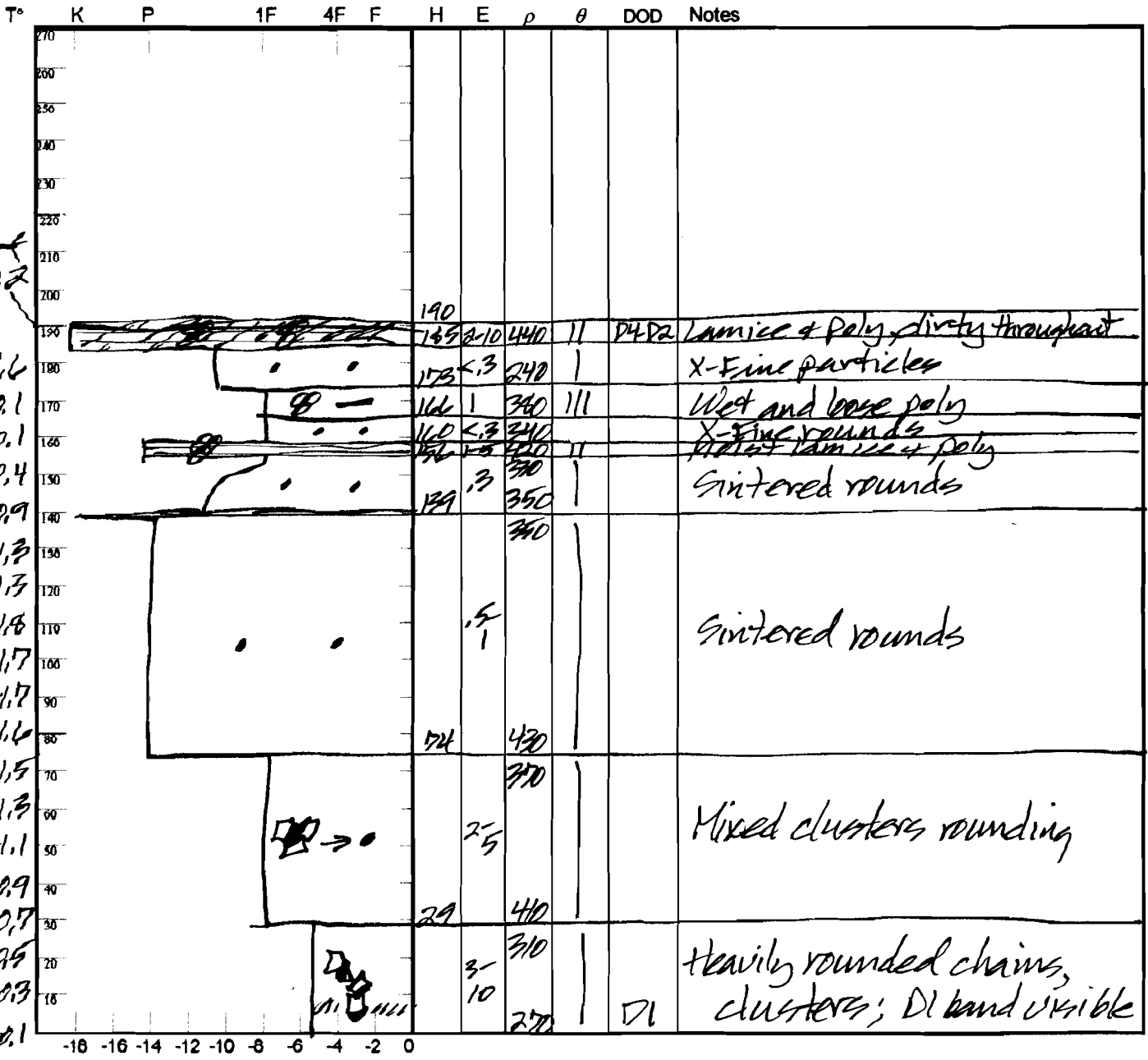
Precip: Nil

Wind: Lt-

Prior Pit: # 9; 4/5/10

Total Snowpack SWE: 442 mm H<sub>2</sub>O

Notes: H<sub>50</sub> = 1.89;  $\bar{\rho}$  = 361 kg/m<sup>3</sup>



7  
SWE  
28  
55  
90  
65  
107  
61  
98  
72  
86

Potential Slab			Weak Layer & Bed Surface						
Ref	$H_2O_{Nor} \div H_{Nor} = \rho_{kg}$	$\sin \angle \times H_{nor} \times \rho \times 9.8 = T_{slab}$	F	E	T <sub>WL</sub>	S	C	RB	Shear Quality
A	mm ÷ m =	X X X 9.8 =							
B	mm ÷ m =	X X X 9.8 =							

Notes:

V. 11/20/03

Observers: CL+AT

Center for Snow and Avalanche Studies

Profile # 12

Time: 0910

Snowpack Profile

Date: 4/19/20

Location: SBSP

Elev. 12,200'

Aspect: NE

Boot Pen: 5 cm

$\angle$ : 4 °

Air T: 12 °C

Sky: 0 → 0

Precip: Nil

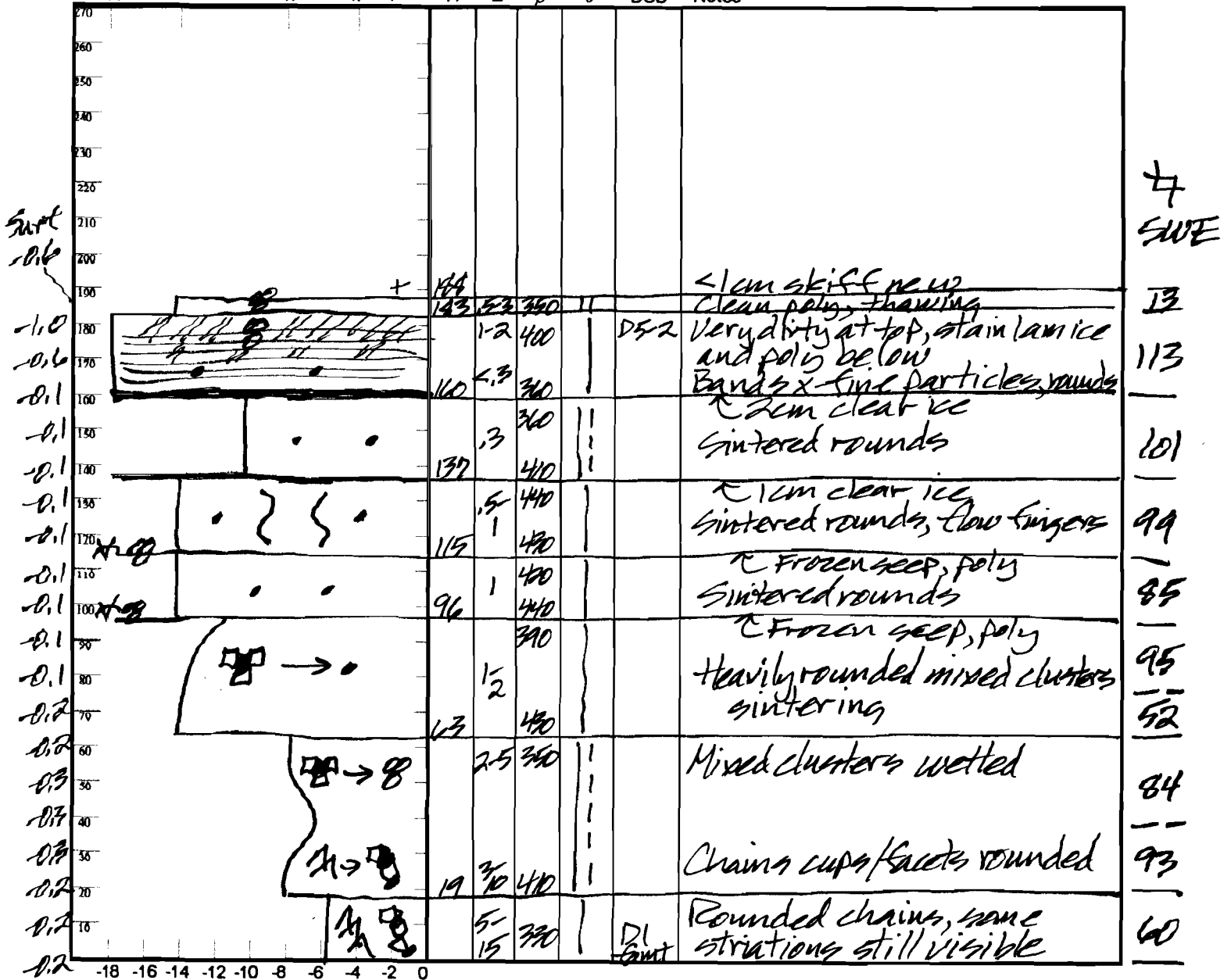
Wind: Nil

Prior Pit: # 10; 4/7/10

Total Snowpack SWE: 795 mm H<sub>2</sub>O

Notes: H<sub>2</sub>O = 1.97 m;  $\rho$  = 404 kg/m<sup>3</sup>

T° K P 1F 4F F H E  $\rho$   $\theta$  DOD Notes



Potential Slab			Weak Layer & Bed Surface						
Ref	$H_2O_{Nor} \div H_{Nor} = \rho_{kg}$	$\sin \angle \times H_{Nor} \times \rho \times 9.8 = T_{Slab}$	F	E	T <sub>wl</sub>	S	C	RB	Shear Quality
A	mm ÷ m =	X X X 9.8 =							
B	mm ÷ m =	X X X 9.8 =							

Notes:

V. 11/20/03

Observers: CLAT

Center for Snow and Avalanche Studies

Profile # 13

Time: 1030

Snowpack Profile

Date: 4/20/10

Location: SASP

Elev. 11,080'

Aspect: NE

Boot Pen: 1 cm

$\angle$ : 2°

Air T: +6 °C

Sky: ⊙

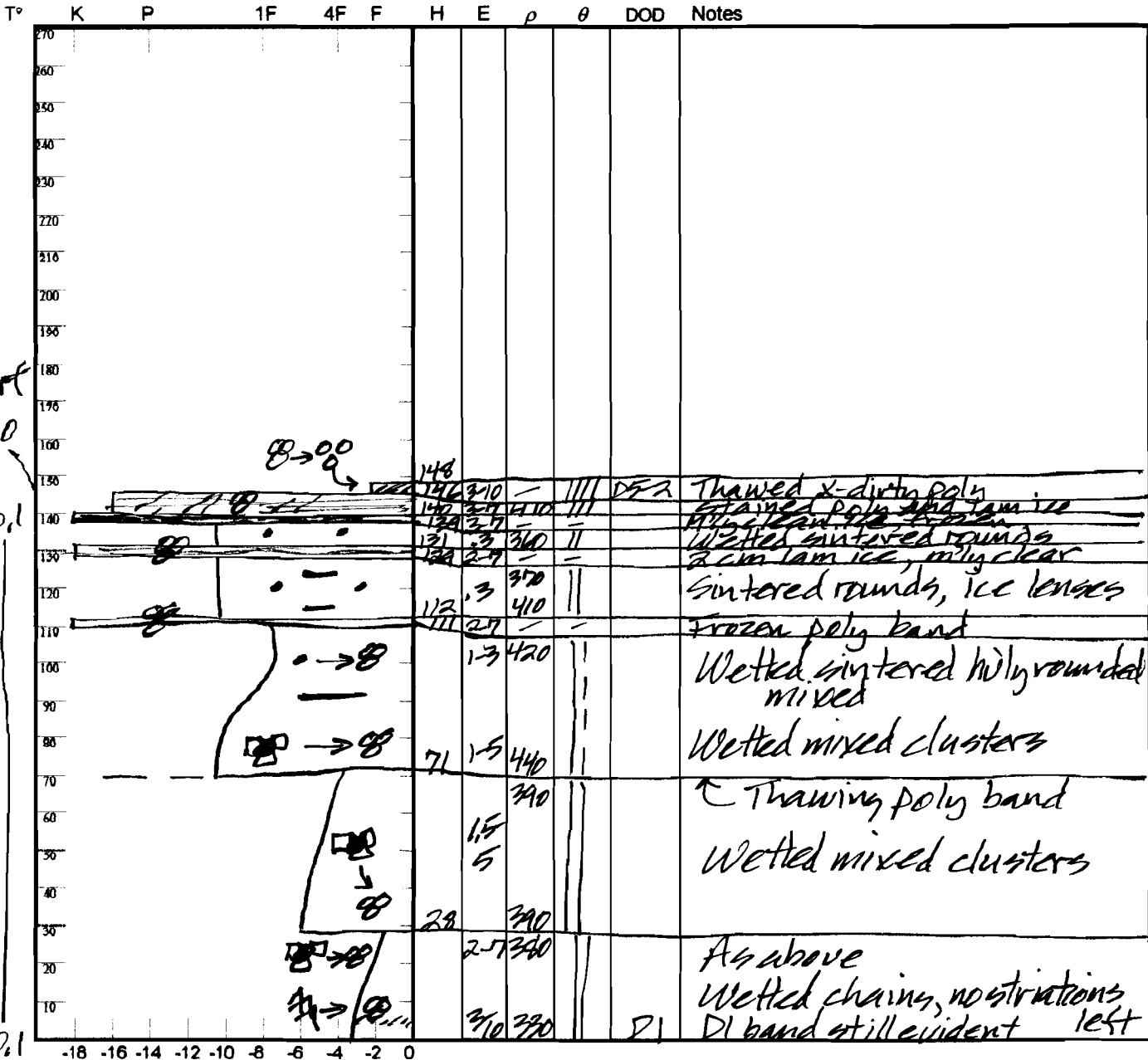
Precip: Nil

Wind: Nil

Prior Pit: # 11; 4/12/10

Total Snowpack SWE: 585 mm H<sub>2</sub>O

Notes: HS  $\bar{\rho}$  = 1.45 m<sup>3</sup>;  $\bar{\rho}$  = 403 kg/m<sup>3</sup>



Potential Slab			Weak Layer & Bed Surface						
Ref	$H_{2O_{Nor}} \div H_{Nor} = \rho_{kg}$	$\sin \angle \times H_{Nor} \times \rho \times 9.8 = \tau_{Slab}$	F	E	T <sub>WL</sub>	S	C	RB	Shear Quality
A	mm ÷ m =	X X X 9.8 =							
B	mm ÷ m =	X X X 9.8 =							

Notes:

V. 11/20/03

Observers: CL, AT, DN

Center for Snow and Avalanche Studies

Profile # 14

Time: 0815 MST

Snowpack Profile

Date: 4/26/10

Location: GASP

Elev. 11,040' Aspect: NE Boot Pen: 11 cm  $\angle$ : 2°

Air T: -2°C Sky: 0

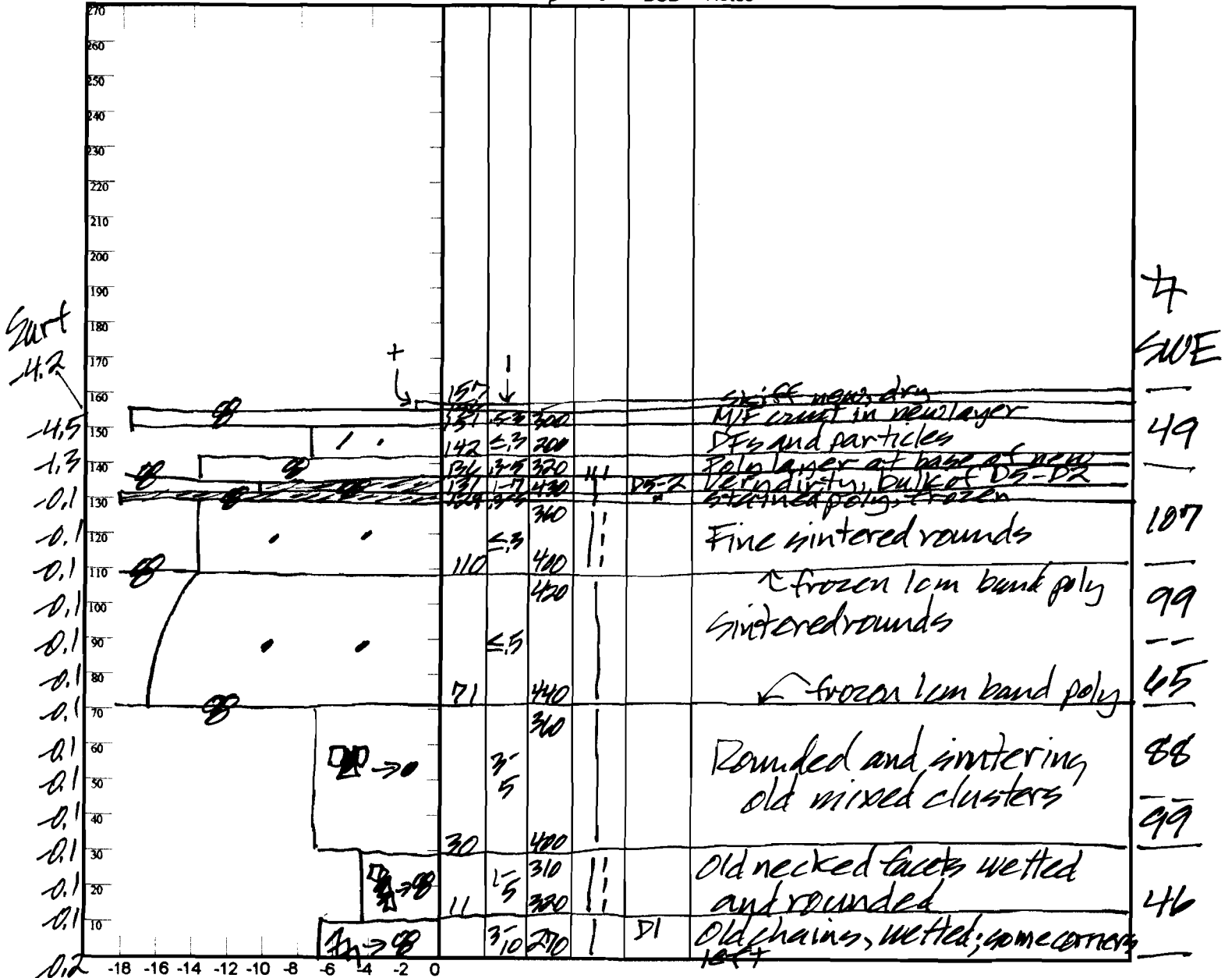
Precip: Nil Wind: Nil

Prior Pit: # 13; 4/20/10

Total Snowpack SWE: 553 mm H<sub>2</sub>O

Notes: HS  $\eta = 1.57$  m;  $\bar{\rho} = 352$  kg/m<sup>3</sup>

T° K P 1F 4F F H E  $\rho$   $\theta$  DOD Notes



Potential Slab				Weak Layer & Bed Surface						
Ref	H <sub>2</sub> O <sub>Nor</sub> ÷ H <sub>Nor</sub> = $\rho_{kg}$	Sin $\angle$ x H <sub>Nor</sub> x $\rho$ x 9.8 = T <sub>Slab</sub>		F	E	T <sub>WL</sub>	S	C	RB	Shear Quality
A	mm ÷ m =	x x x 9.8 =								
B	mm ÷ m =	x x x 9.8 =								

Notes:

V. 11/20/03

Observers: CLAT, KB, AB, H, AP  
Center for Snow and Avalanche Studies

Profile # 15

Time: 0900 MST

Snowpack Profile

Date: 5/3/10

Location: SASP

Elev. 11,080'

Aspect: NE

Boot Pen: 6 cm

∠: 3°

Air T: 13 °C

Sky: 0

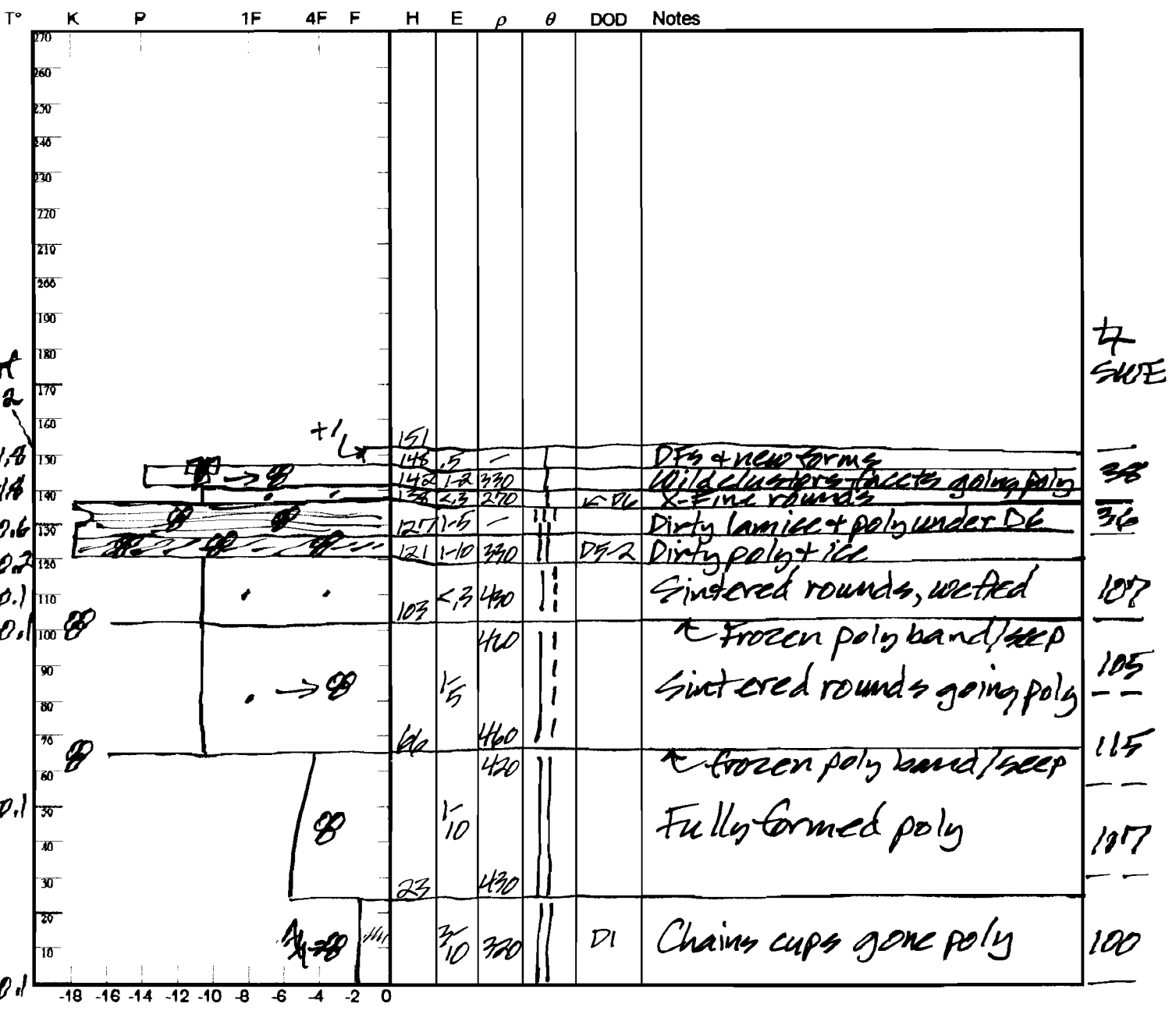
Precip: Nil

Wind: Nil

Prior Pit: # 14; 4/26/10

Total Snowpack SWE: 608 mm H<sub>2</sub>O

Notes: HS  $\eta = 1.51$ ;  $\bar{\rho} = 403 \text{ kg/m}^3$



Potential Slab			Weak Layer & Bed Surface						
Ref	$H_2O_{Nor} \div H_{Nor} = \rho_{kg}$	$\sin \angle \times H_{Nor} \times \rho \times 9.8 = \tau_{Slab}$	F	E	T <sub>WL</sub>	S	C	RB	Shear Quality
A	mm ÷ m =	X X X 9.8 =							
B	mm ÷ m =	X X X 9.8 =							

Notes:

Observers: CL, AT

Center for Snow and Avalanche Studies

Profile # 16

Time: 1000 MST

Snowpack Profile

Date: 5/17/10

Location: SBSF

Elev. 17,800

Aspect: NE

Boot Pen: 2 cm

$\angle$ : 4 °

Air T: +1 °C

Sky: 0

Precip: Nil

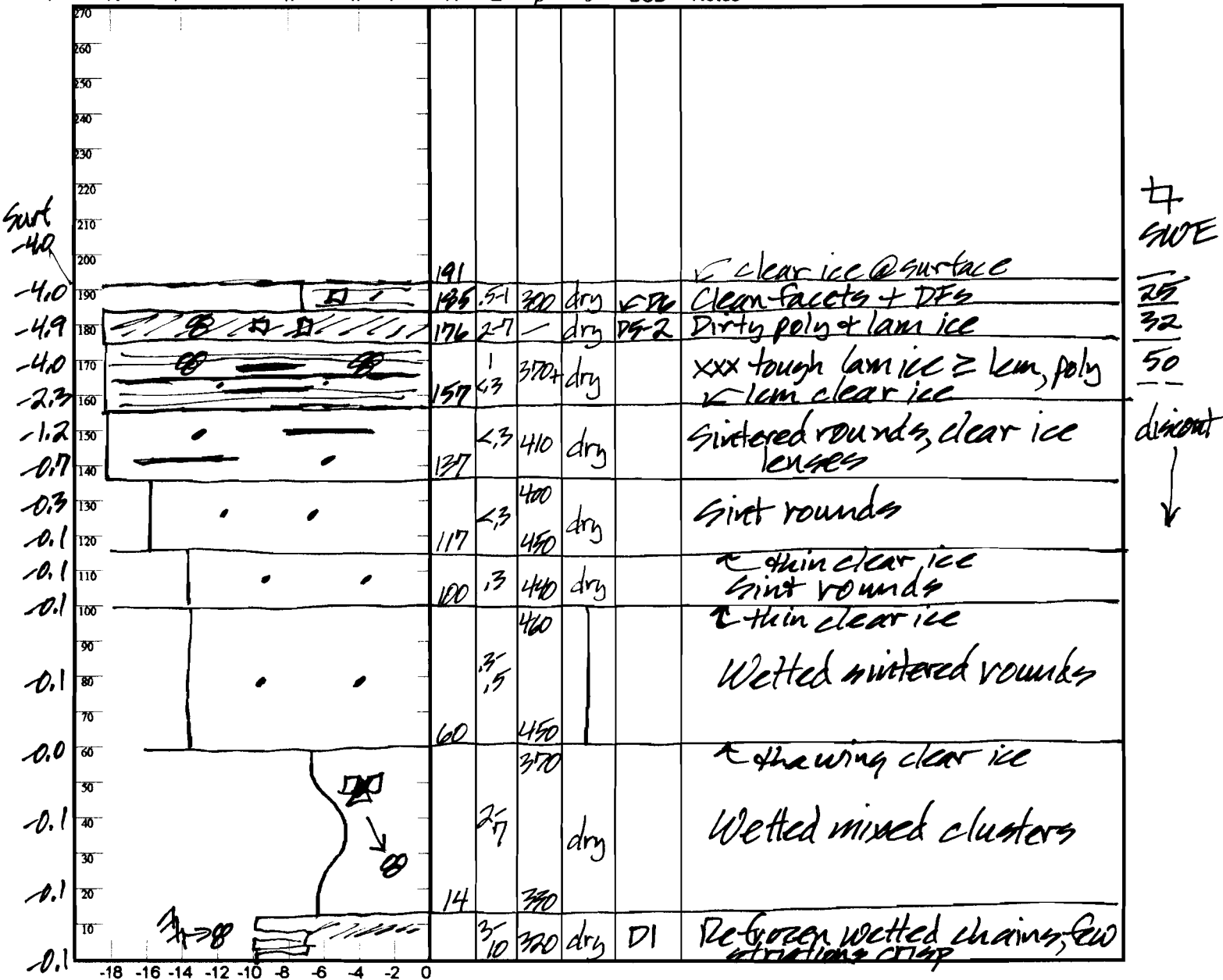
Wind: Nil/Lt

Prior Pit: # 12; 4/19/10

Total Snowpack SWE: — mm H<sub>2</sub>O

Notes: H<sub>2</sub>O = 1.90 m;  $\rho$  = —; could not collect SWE measurement — ice layers and snow too tough.

T° K P 1F 4F F H E  $\rho$   $\theta$  DOD Notes



Potential Slab			Weak Layer & Bed Surface						
Ref	$H_2O_{Nor} \div H_{Nor} = \rho_{kg}$	$\sin \angle \times H_{Nor} \times \rho \times 9.8 = \tau_{slab}$	F	E	T <sub>WL</sub>	S	C	RB	Shear Quality
A	mm $\div$ m =	X X X 9.8 =							
B	mm $\div$ m =	X X X 9.8 =							

Notes:

V. 11/20/03



Observers: CL, AT, Fred Fisher Center for Snow and Avalanche Studies

Profile # 117

Time: 0835

Snowpack Profile

Date: 5/11/10

Location: SNAP

Elev. 11,060'

Aspect: NE

Boot Pen: 5 cm

∠: 3°

Air T: +2 °C

Sky: 0

Precip: Nil

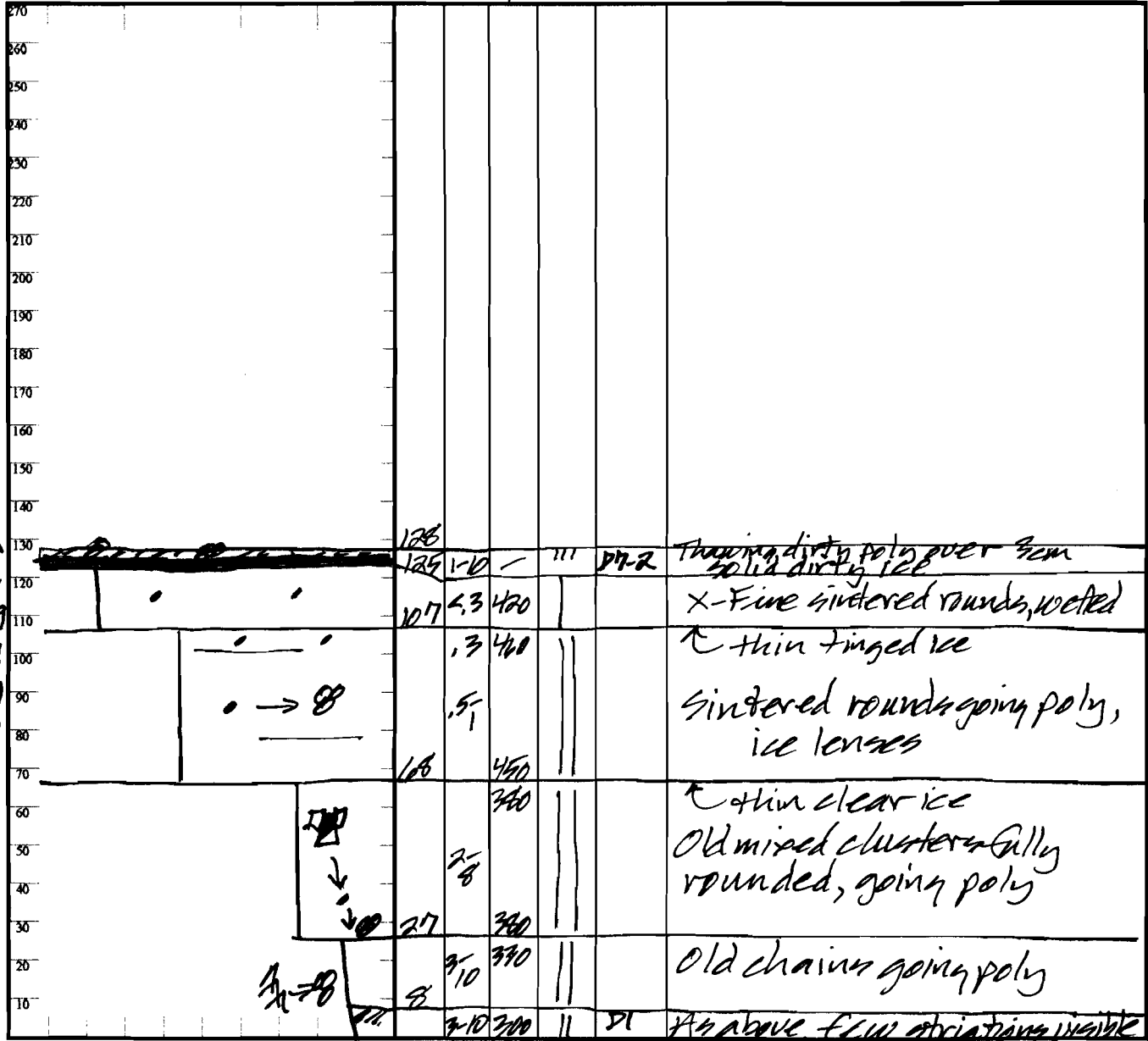
Wind: Mod

Prior Pit: # 15; 5/3/10

Total Snowpack SWE: 580 mm H<sub>2</sub>O

Notes: H<sub>st</sub> = 1.28m; ρ = 406 kg/m<sup>3</sup>

T° K P 1F 4F F H E ρ θ DOD Notes



SWE  
-0.2

7  
SWE

-0.6

18

-0.9

82

-0.1

87

-0.1

85

-0.1

95

-0.1

96

-0.1

97

-0.1

-0.1

-0.1

-0.1

-0.1

-0.1

Potential Slab

Weak Layer & Bed Surface

Ref	H <sub>2</sub> O <sub>Nor</sub> ÷ H <sub>Nor</sub> = ρ <sub>kg</sub>	Sin ∠ x H <sub>Nor</sub> x ρ x 9.8 = τ <sub>Slab</sub>	F	E	T <sub>WL</sub>	S	C	RB	Shear Quality
A	mm ÷ m =	x x x 9.8 =							
B	mm ÷ m =	x x x 9.8 =							

Notes:



Observers: CL, AT, JD

Center for Snow and Avalanche Studies

Profile # 19

Time: 1345 MST

Snowpack Profile

Date: 5/17/10

Location: SASP

Elev. 11,060'

Aspect: NE

Boot Pen: 1 cm

∠: 3 °

Air T: +11 °C

Sky: ☉

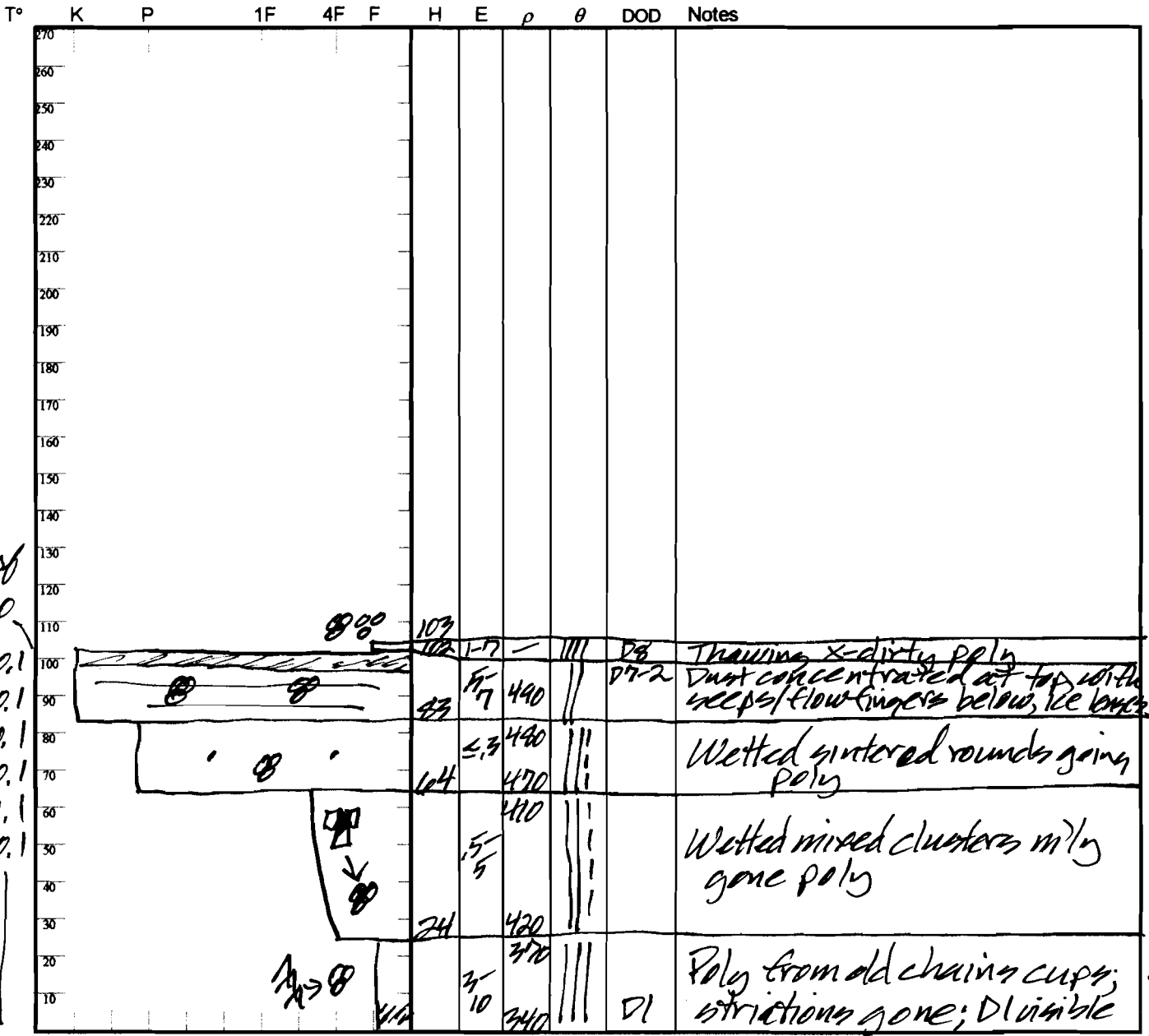
Precip: Nil

Wind: Lt

Prior Pit: # 17; 5/11/10

Total Snowpack SWE: 440 mm H<sub>2</sub>O

Notes: HS = 1.01 m;  $\bar{\rho} = 436$  kg/m<sup>3</sup>



7  
SWE  
97  
95  
127  
170  
51

Potential Slab			Weak Layer & Bed Surface						
Ref	$H_2O_{Nor} \div H_{Nor} = \rho_{kg}$	$\sin \angle \times H_{Nor} \times \rho \times 9.8 = \tau_{Slab}$	F	E	T <sub>WL</sub>	S	C	RB	Shear Quality
A	mm ÷ m =	X X X 9.8 =							
B	mm ÷ m =	X X X 9.8 =							
Notes:									

Observers: CLIKB

Center for Snow and Avalanche Studies

Profile # 20

Time: 0850

Snowpack Profile

Date: 5/24/10

Location: GASP

Elev. 11,080'

Aspect: NE

Boot Pen: 6 cm

$\angle$ : 3 °

Air T: -7 °C

Sky: ⊙

Precip: SL

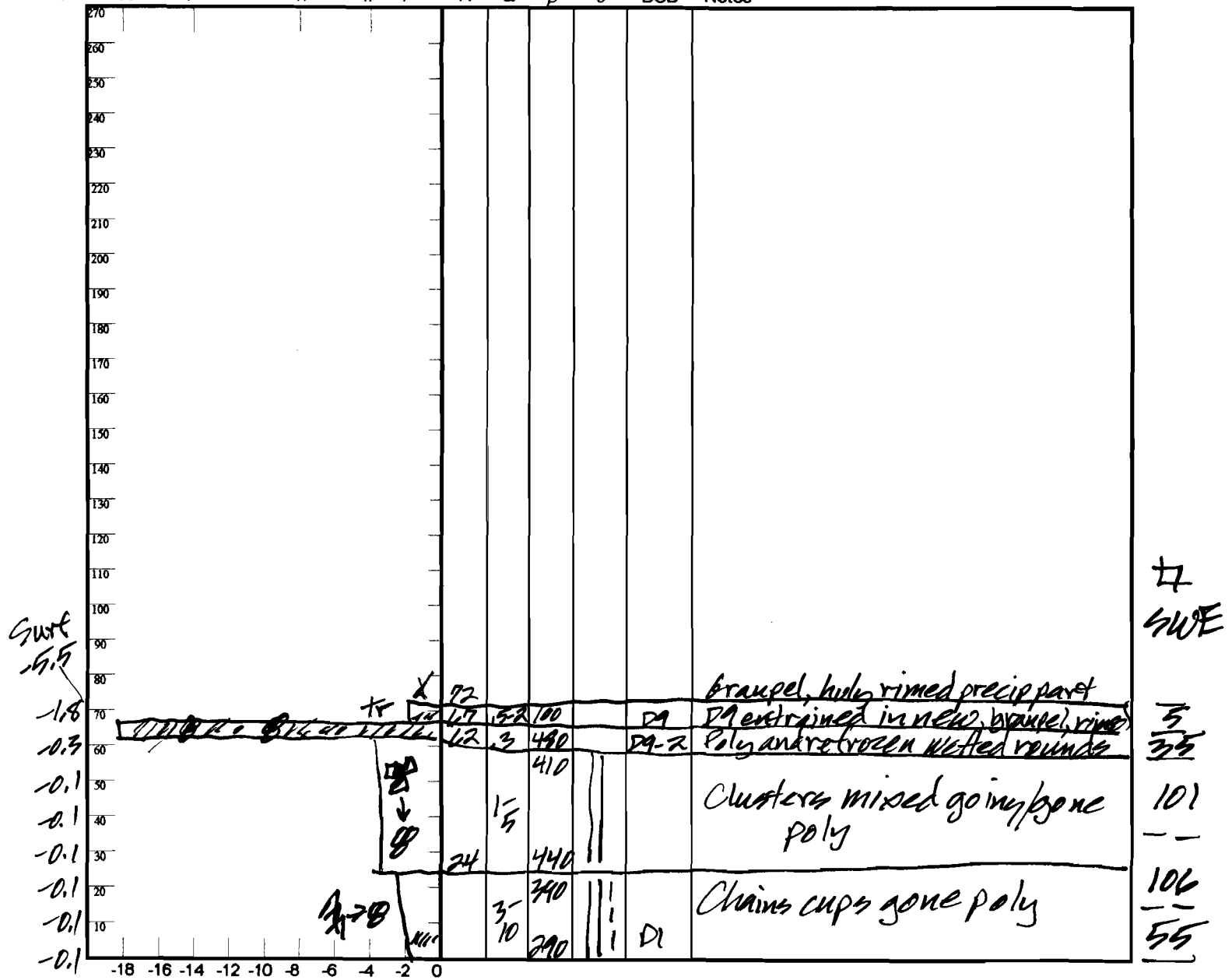
Wind: LT

Prior Pit: # 19; 5/17/10

Total Snowpack SWE: 302 mm H<sub>2</sub>O

Notes: H<sub>2</sub>O = 0.75m;  $\bar{\rho}$  = 403 kg/m<sup>3</sup>

T° K P 1F 4F F H E  $\rho$   $\theta$  DOD Notes



Potential Slab					Weak Layer & Bed Surface					
Ref	$H_2O_{Nor} \div H_{Nor} = \rho_{kg}$	$\sin \angle \times H_{Nor} \times \rho \times 9.8 = \tau_{Slab}$	F	E	T <sub>WL</sub>	S	C	RB	Shear Quality	
A	mm ÷ m =	X X X 9.8 =								
B	mm ÷ m =	X X X 9.8 =								

Notes:

V. 11/20/03

