BLAST REPORT **BLAST REPORT #** SN 3 + 4

☐ Sanders Construction, Inc. ☒ Western States Drilling & Blasting, Inc.

DATE: 10-7-10 EXACT TIME OF SHOT: 6:07 PM

CUSTOMER: KLB JOB NO.: WS21005

SHOT LOCATION WITH GPS COORDINATES: Presplit 1344+25 - 1345+00 TICKET NO.:

1345+12 - 1345+35 / 1344+15 - 1344+90 CHECK LIST COMPLETED: YES NO

TYPE OF ROCK: Lapilli Tuff FACE HEIGHT: 24' / 12' FT. POUNDS PER DELAY: 15.9

TOTAL HOLES:

NUMBER OF HOLES: 40 Production HOLE DIA: 3" BxS 4' x 4' STEMMING: 7' DEPTH: 8'
80 presplit 3" — 1' 2' 17-26'

NUMBER OF HOLES: 91 Production HOLE DIA: 3" BxS 6' x 6' STEMMING: 6.5' DEPTH: 12'

POWDER FACTOR: .93 LBS. OF EXPLOSIVES: 1538 YARDS OF ROCK: 189/1456 1,645 x 3

WEATHER: Cloudy 47° WIND: Calm

EXACT MONITOR LOCATION(GPS): See Report DIRECTION OF BLAST: — MONITOR TYPE: —

MONITOR: L/R — T — V — PVS — Db — MONITOR SERIAL NO.: —

DISTANCE TO BLAST: — AVERAGE POUNDS PER HOLE: — OPERATOR: —

EXACT MONITOR LOCATION(GPS): See Report DIRECTION OF BLAST: — MONITOR TYPE: —

MONITOR: L/R — T — V — PVS — Db — MONITOR SERIAL NO.: —

DISTANCE TO BLAST: — AVERAGE POUNDS PER HOLE: — OPERATOR: —

EXPLOSIVES

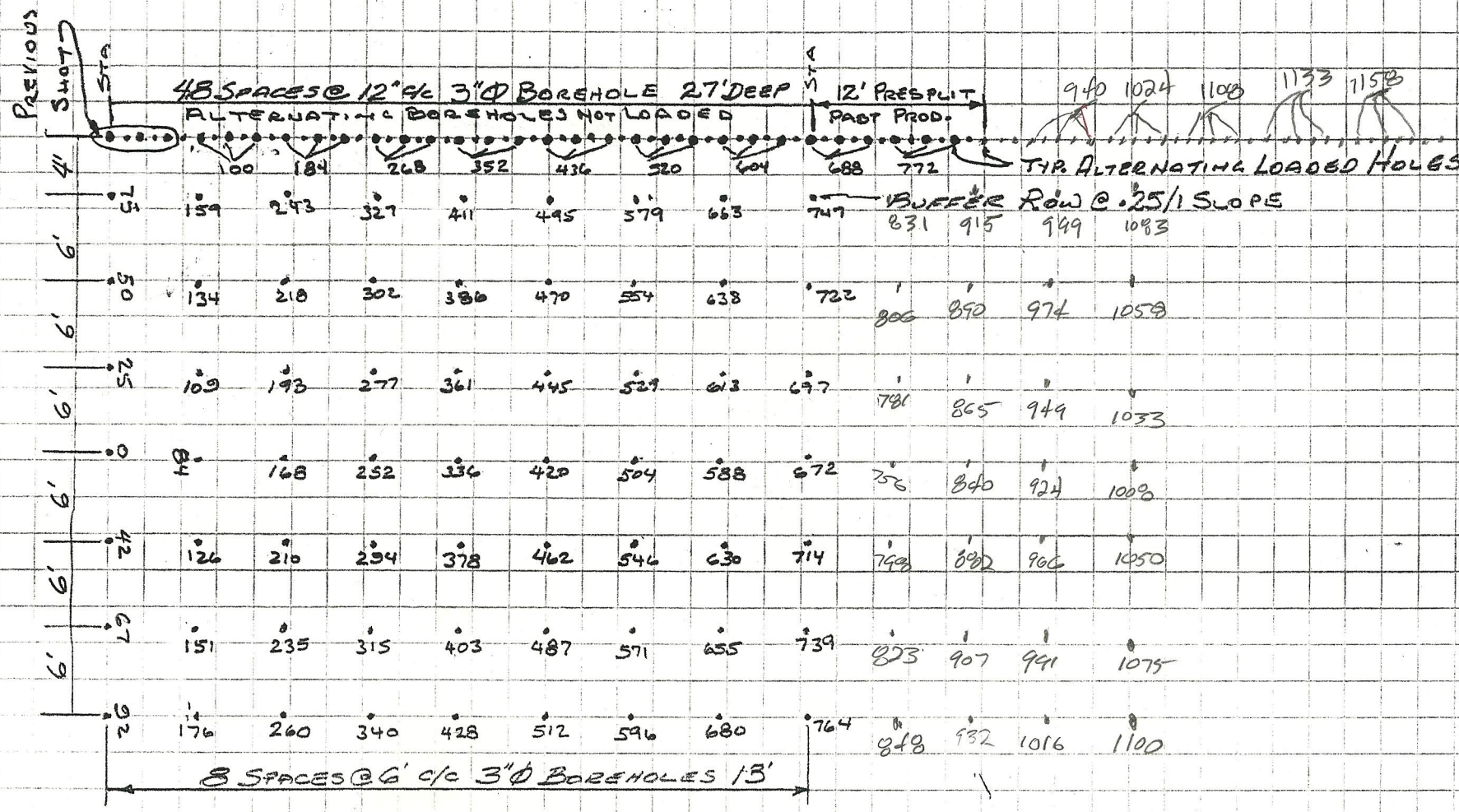
DESCRIPTION	QUANTITY USED		DATE CODE	MAGAZINE	REMOVED	RETURNED
LOCATION:						
BULK A/N	[redacted]	Lbs				
BAG ANFO 50 lbs	25	Bags	85E10		33	8
POWDER 2x16 Forbel	46	ea.	22M+10J1		5.5cs	3cs 10eg
POWDER 1½x8 PO1000	79	ea.	07J+10J1		88	9
3/4 lb. BOOSTER	42	ea.	01M+10AY		42	Ø
1½x8 A. BOOSTER	136	ea.	061128		152	16
40 ft. MS20	39	ea.	07SE09B4		71	32
16 ft. Hawket	43	ea.	190C09B4		65	22
24 ft. Hawkets	89	ea.	29MA10B4		140	51
12 ft GTO MS42	40	ea.	25JA10B4		76	36
ft.		ea.				
ft.		ea.				
ft. ms		ea.				
		ft.				
400 GRAIN CORD	784	ft.	12MY08T4		984	200
200 GRAIN CORD	872	ft.	26OC09T4		872	Ø
MISCELLANEOUS						

COMMENTS: SHOT WELL NO ROCK ON I90

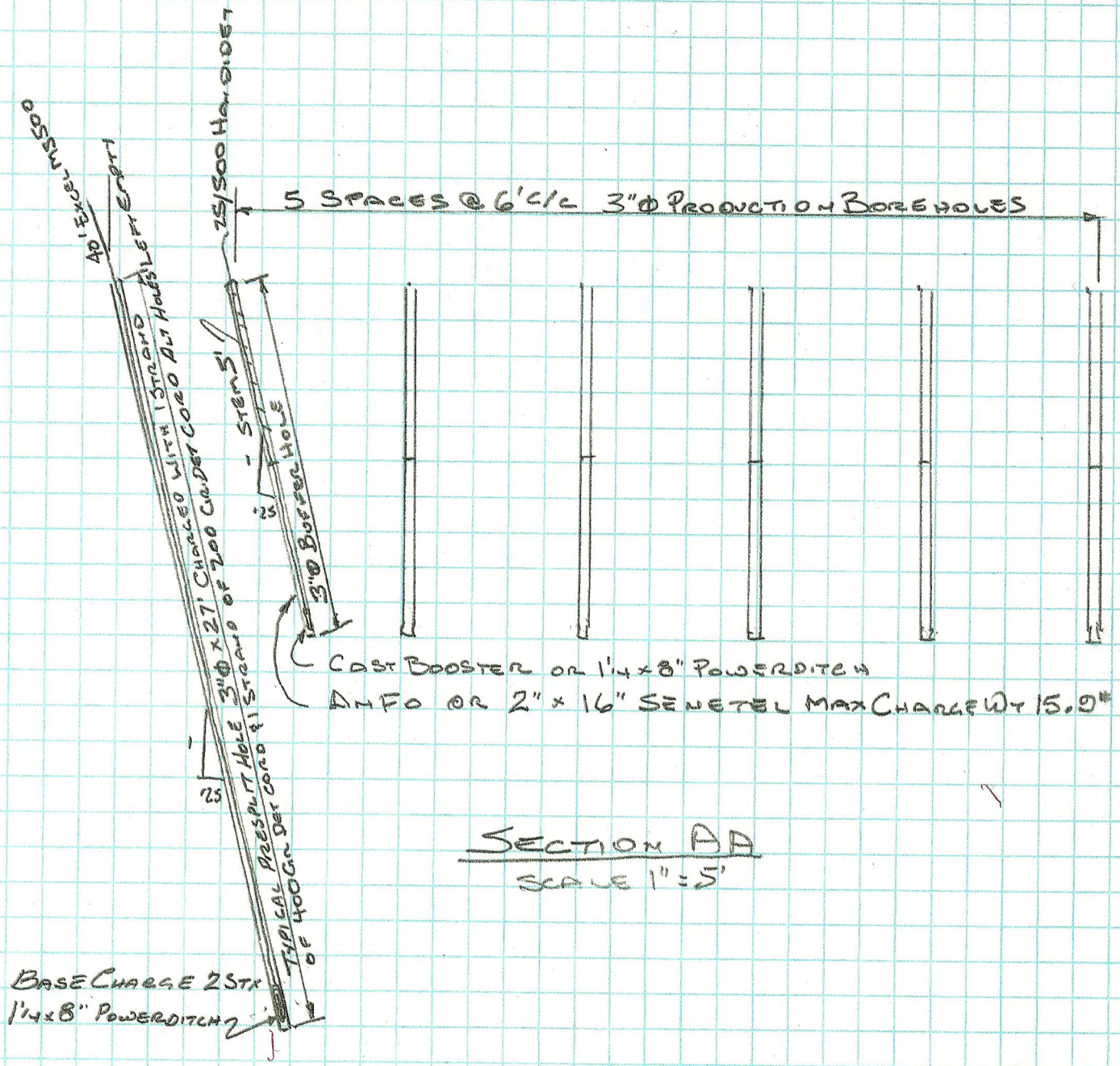
BLASTER'S SIGNATURE: [signature] LICENSE NO.: U21291

ATTACH SKETCH OF SHOT

Revised 03/04 THIS FORM MUST BE FILLED OUT COMPLETELY

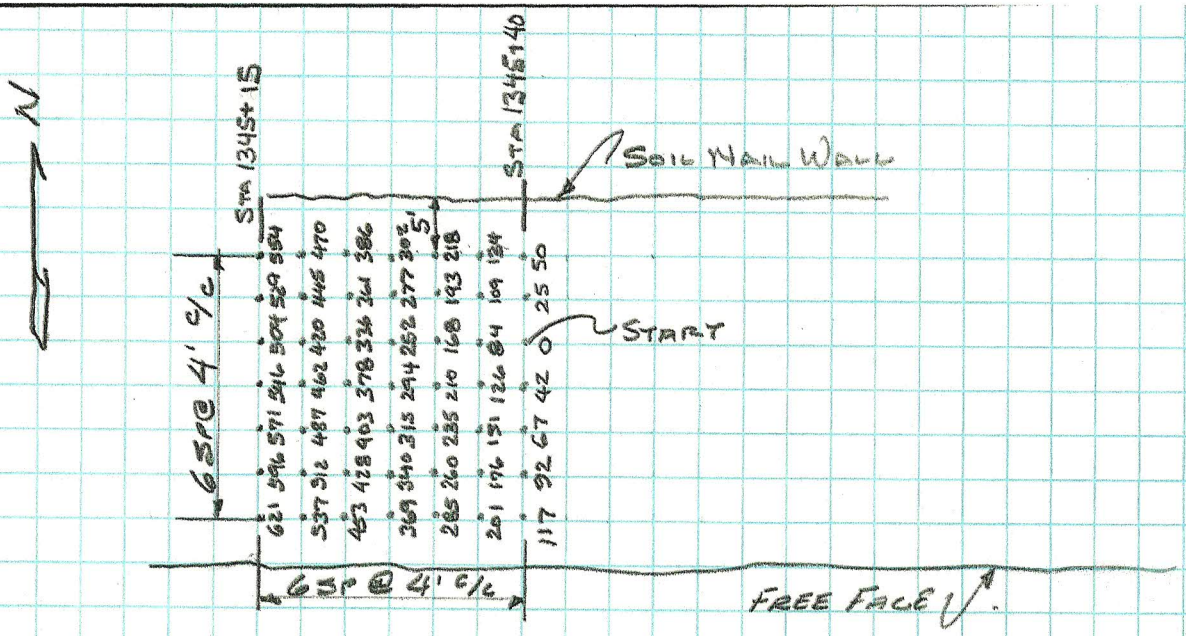


PLAN VIEW TYPICAL BLAST NEAR
SOIL NAIL WALL
SCALE 1" = 10'



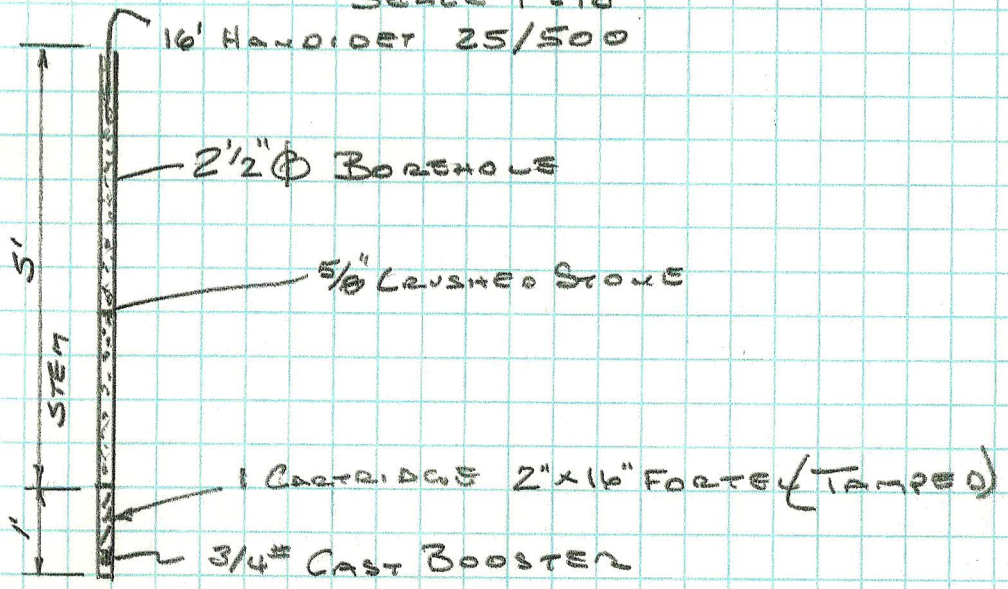
SECTION AA

SCALE 1" = 5'



PLAN VIEW BLAST SN 4

SCALE 1" = 16'



TYPICAL PRODUCTION BOREHOLE

SCALE 1" = 2'

SubTerra, Inc.

Civil & Mining Engineering
Engineering Geology
Tunnel Engineering & Construction Management
Rapid Excavation/Support Systems
Active/Abandoned Mine Subsidence
Quality Assurance / Quality Control
Safety Monitoring of Structures
Blast Optimization / Vibration Monitoring
Mine & Quarry Permitting
Material Science / Laboratory Testing

Friday, October 8, 2010

Mr. Charley Murphy
Western States Drilling & Blasting
Sent via email to charley@blastwest.com
Sent via email to blastervic@gmail.com

Re: I-90 Hyak to Snowshed Blast Monitoring

Dear Charley and Vic:

This letter summarizes the monitoring results for the blast in the vicinity of the soil nail wall at the I-90 widening project for Blast No. SN3 on October 7, 2010. Three seismographs were installed at the locations shown in the attached figure.

The blast was detonated on October 7, 2010 at 6:07 p.m. All seismographs triggered. Monitoring results are summarized below and Event Reports are attached.

1. Monitoring Point M1 – Seismograph BE9247 with high frequency geophone located 5-ft from nearest presplit blast hole. M1 registered a Peak Particle Velocity of 13.3 in/sec in the vertical direction.
2. Monitoring Point M2 – Seismograph BE9248 with standard geophone was located on the ground at the base of the soil nail wall directly below unit M3. The geophone was located 13-ft from the nearest production blast hole. M2 registered a Peak Particle Velocity greater than 10 in/sec, which is out of range for the sensor. The monitoring technician noted that the shot buried the geophone in more than a foot of material: the last full second of the vibration trace accounts for this action.
3. Monitoring Point M3 – Seismograph BE10408 with wall-mount geophone anchored to soil nail wall 18-ft from the nearest production blast hole. M3 registered a Peak Particle Velocity of 7.82 in/sec in the vertical direction. We note that the vibration trace indicates airborne material impacting the wall and sensor after the 3-second mark and continues throughout the sensor check after the fixed 4-second record time.

If you have any questions please do not hesitate to call us at 425-888-5425.

Sincerely,

Post Office Box 520, 218 East North Bend Way, North Bend, WA 98045-0520
Phone (425) 888-5425 Web Site: www.subterra.us Email: info@subterra.us Fax (425) 888-2725

Larry Leone
Project Engineer, SubTerra, Inc.

Enc: Blast Vibration Summary Report
Blast Event Reports (3 ea)
Figure 1: Seismograph Layout

SubTerra, Inc.

Blast Vibration Report

SubTerra, Inc.
North Bend, WA
425.888.5425

Date: 10/7/2010 Time of Blast: 6:07 am (pm) Blast Number: SN#3
Client: KLB / Sanders Project Number: 2010-24
Project: I90 Hyak City, State, Zip: Hyak Wa.
Shot Location: Snoqualmie Pass (Near Snow shed)

Pro E - Pattern 1 - No. Holes: 40 Burden-Ft: 4 Spacing-Ft: 4 No. Decks: 0 Max.W-Lbs: 2.55 per delay
Pro W - Pattern 2 - No. Holes: 91 Burden-Ft: 6 Spacing-Ft: 6 No. Decks: 1 Max.W-Lbs: 15.28 per delay
Pre - Pattern 3 - No. Holes: 40 Burden-Ft: 1 Spacing-Ft: 1 No. Decks: 0 Max.W-Lbs: 18.4 per delay

Distance to Nearest Structure-Ft: 13' Identify Structure: Soil Nail Wall
Weather Conditions - Temperature-°F: Wind: Clouds: Overcast

Instrument Setup Summary

Unit Location	Seismograph Serial Number	Calibration Date	Sampling Rate	Geo Trigger Level (in/s)	Maximum Range (in/s)	Record Time (sec)	Geophone Orientation
M1	BE 9247	7/27/11	~~1024~~ 11	1 in/sec	100	4	West
M2	BE 9248	~~7/30~~/11	4096	.06 in/sec	10	4	West
M3	Be 10408	9/13/11	4096	.06 in/sec	10	4	Wall mount
M4							
M5							
M6							

Vibration Record Summary

Unit Location	Recording Date	Recording Time	Time Rel. to Trigger	PPV (in/s)	Peak Chan	Freq. (Hz)	Distance to Shot (ft)	Max. Lbs. per Delay	SD
M1	10/7/10	6:06:56	1.272 sec	13.3	Vert	—	5		
M2	10/7/10	6:08:08	1.285 sec	+10.0	Tran/Vert	146	13		
M3	10/7/10	6:07:01	1.642	7.82	Vert	46	18		
M4									
M5									
M6									

Layout Sketch

Pre STA 1344+25 — 1345+00
Pro E STA 1345+12 — 1345+35
Pro W STA 1344+15 — 1344+90 75' high '11'

22' Ft. Wide No holes between E n W

Robert Biggs
Seismograph Operator, Print.

Seismograph Operator, Sign.

10/7/2010
Date Signed.

Event Report

Date/Time Vert at 18:08:04 October 7, 2010
Trigger Source Geo: 0.0600 in/s
Range Geo : 10.00 in/s
Record Time 4.0 sec at 4096 sps
Notes
Location: Snoqualmie Pass
Client: KLB Construction
Monitored By: SubTerra Inc.
Unit Location: M2 - Toe of Soil Wall Below M3

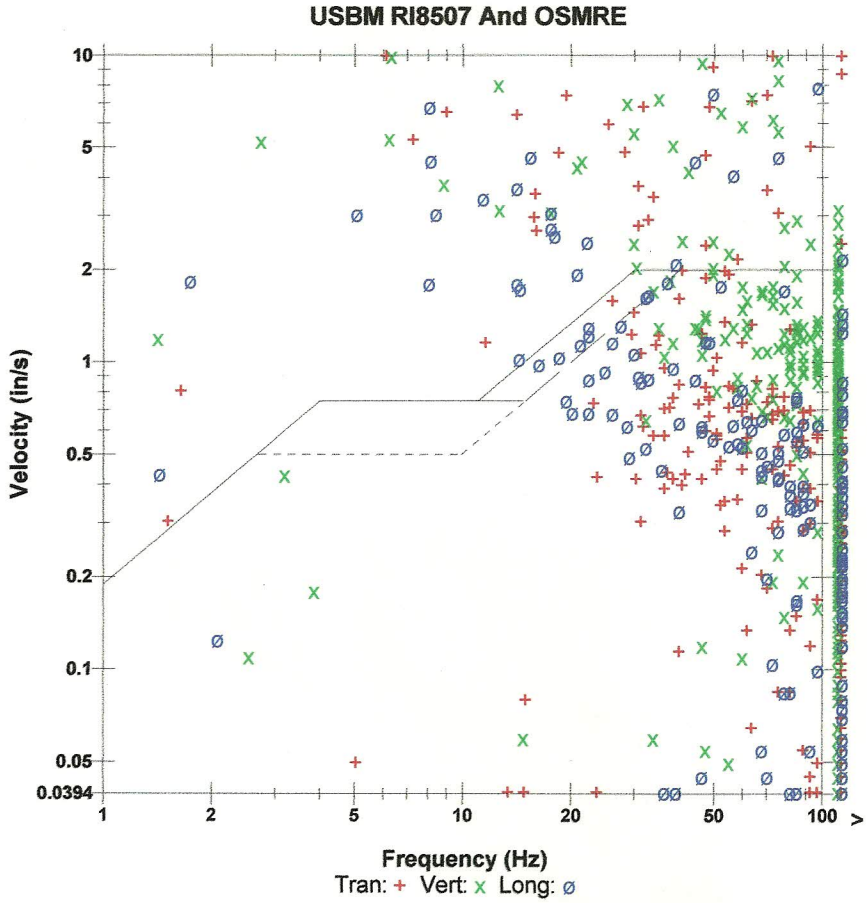
Serial Number BE9248 V 8.12-8.0 MiniMate Plus
Battery Level 6.2 Volts
Unit Calibration July 30, 2010 by Instantel Inc.
File Name K248DG3B.PG0
Post Event Notes
Geophone was place 20 ft. East of last Pre-Split Hole at the toe of the Soil Nail Wall.

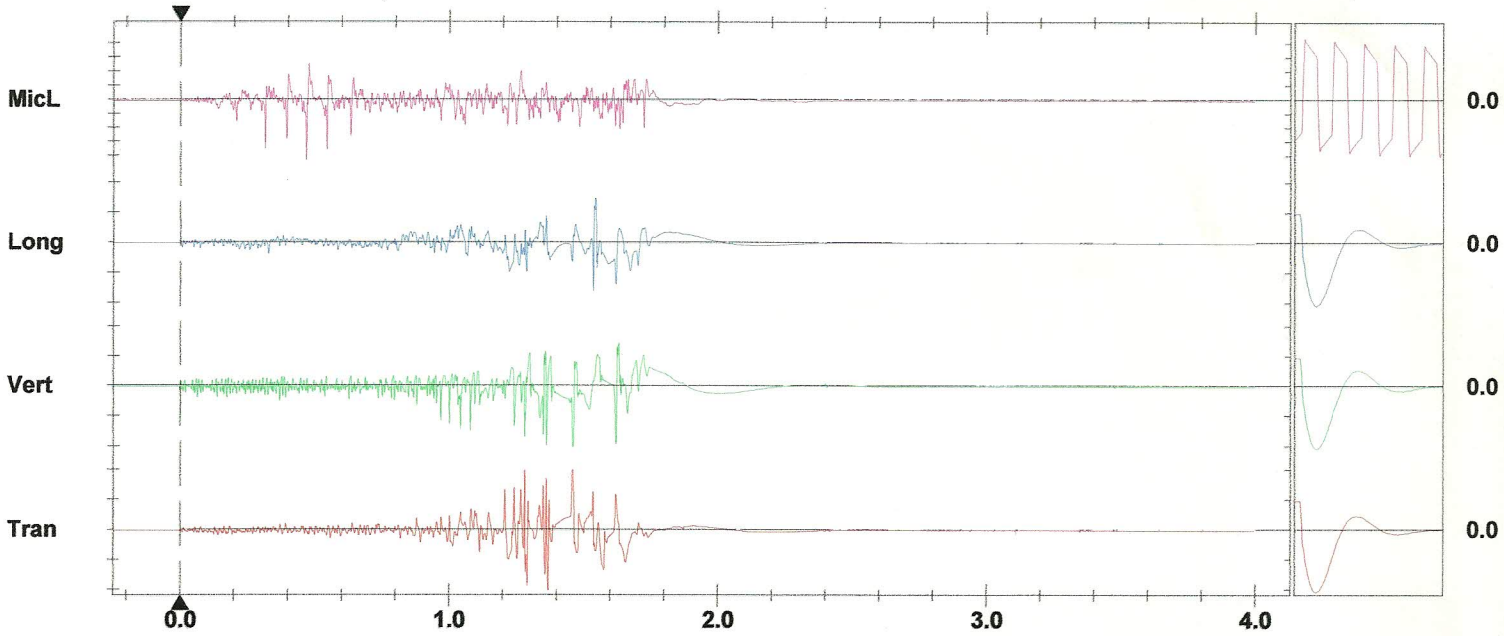
Extended Notes::
I-90 Widening Hyak to Snowshed.

Microphone Linear Weighting
PSPL 0.0211 psi(L) at 0.472 sec
ZC Freq 23.3 Hz
Channel Test Passed (Freq = 20.1 Hz Amp = 634 mv)

	Tran	Vert	Long	
PPV	***	***	7.93	in/s
ZC Freq	146	6.4	98	Hz
Time (Rel. to Trig)	1.285	1.465	1.541	sec
Peak Acceleration	35.1	22.0	21.2	g
Peak Displacement	0.0946	0.177	0.155	in
Sensorcheck	Passed	Passed	Passed	
Frequency	7.5	7.4	7.3	Hz
Overswing Ratio	4.3	3.8	4.4	

Peak Vector Sum *** in/s at 1.466 sec
*** **: Out of Range**





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 5.00 in/s/div Mic: 0.00500 psi(L)/div Sensorcheck
Trigger = ▶——◀

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Event Report

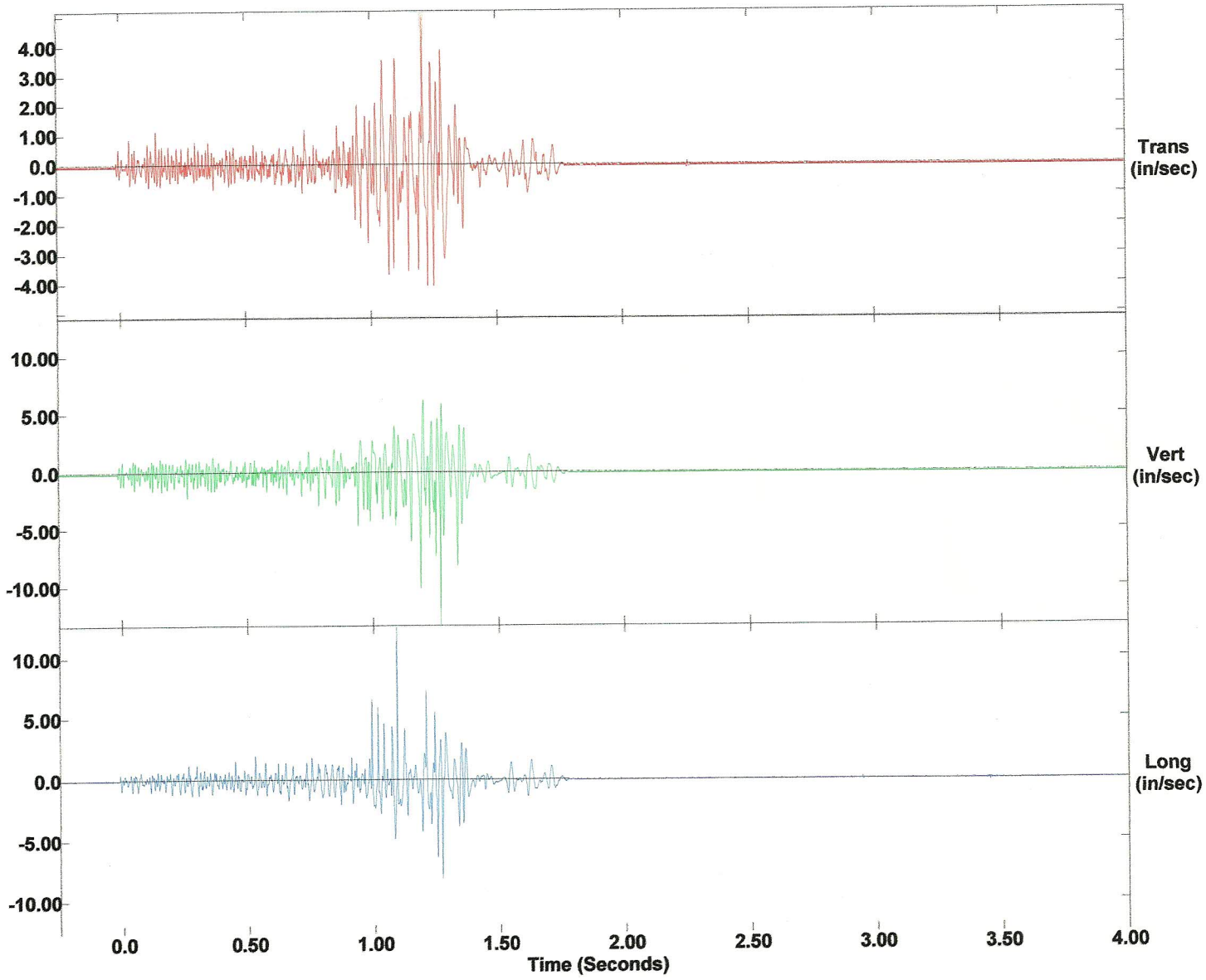
Date/Time Vert at 18:06:56 October 7, 2010
Record Time 4.0 sec at 4096 sps

Serial Number BE9247 V 10.10-8.17 MiniMate Plus
Battery Level 6.3 Volts
Unit Calibration July 27, 2010 by Instantel Inc.
File Name K247DG3B.NK0

Notes
Location: Snoqualmie Pass
Client: KLB Construction
Monitored By: SubTerra, Inc.
Unit Location: M1 - Near Field

Instal Details:
I-90 Widening Hyak to Snowshed.
Post Event Notes
Geophone was located 5ft. East of last Pre-Split hole.

Channel	Name	Peak	Time (sec)	Trigger Level	Gain	Range	Units
1	Trans	5.15	1.209	1.000	1x	100	in/sec
2	Vert	13.3	1.272	1.000	1x	100	in/sec
3	Long	12.6	1.094	1.000	1x	100	in/sec



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Event Report

Date/Time Tran at 18:07:01 October 7, 2010
Trigger Source Geo: 0.0600 in/s
Range Geo : 10.00 in/s
Record Time 4.0 sec at 4096 sps
Notes
Location: Snoqualmie Pass
Client: KLB Construction
Monitored By: SubTerra, Inc.
Unit Location: M3 - Soil Nail Wall

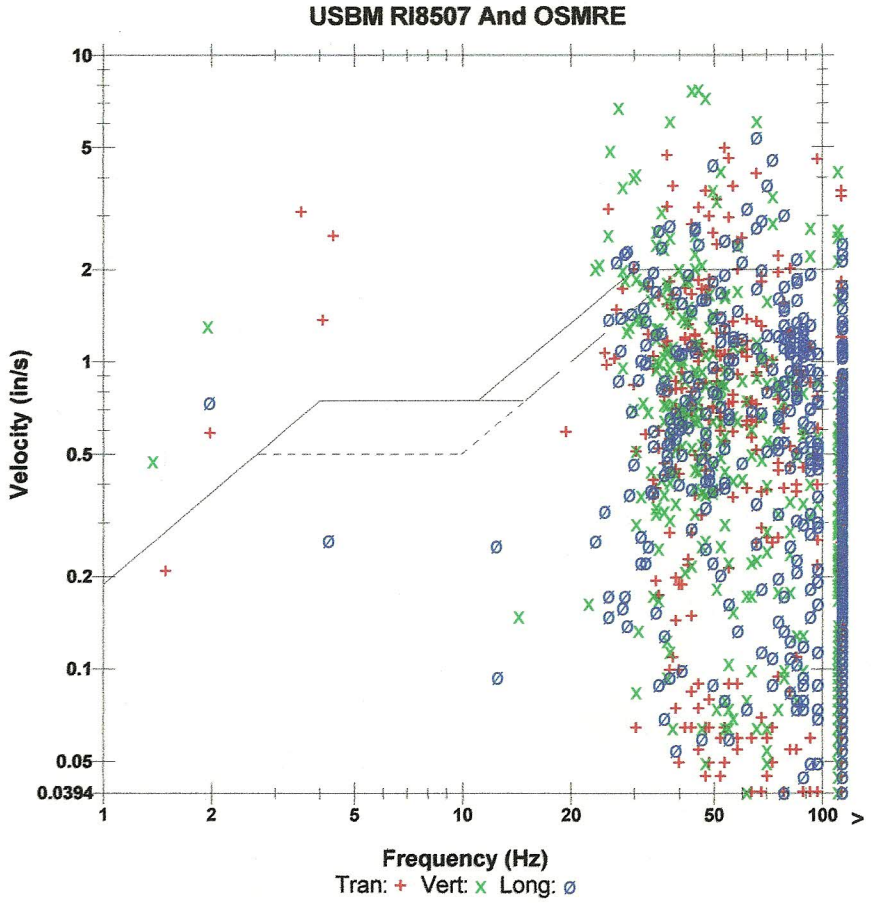
Serial Number BE10408 V 10.10-8.17 MiniMate Plus
Battery Level 6.3 Volts
Unit Calibration September 13, 2010 by Instantel Inc.
File Name L408DG3B.NP0
Post Event Notes
Geophone was located 18' East and 8' North of the last Pre-Split hole.

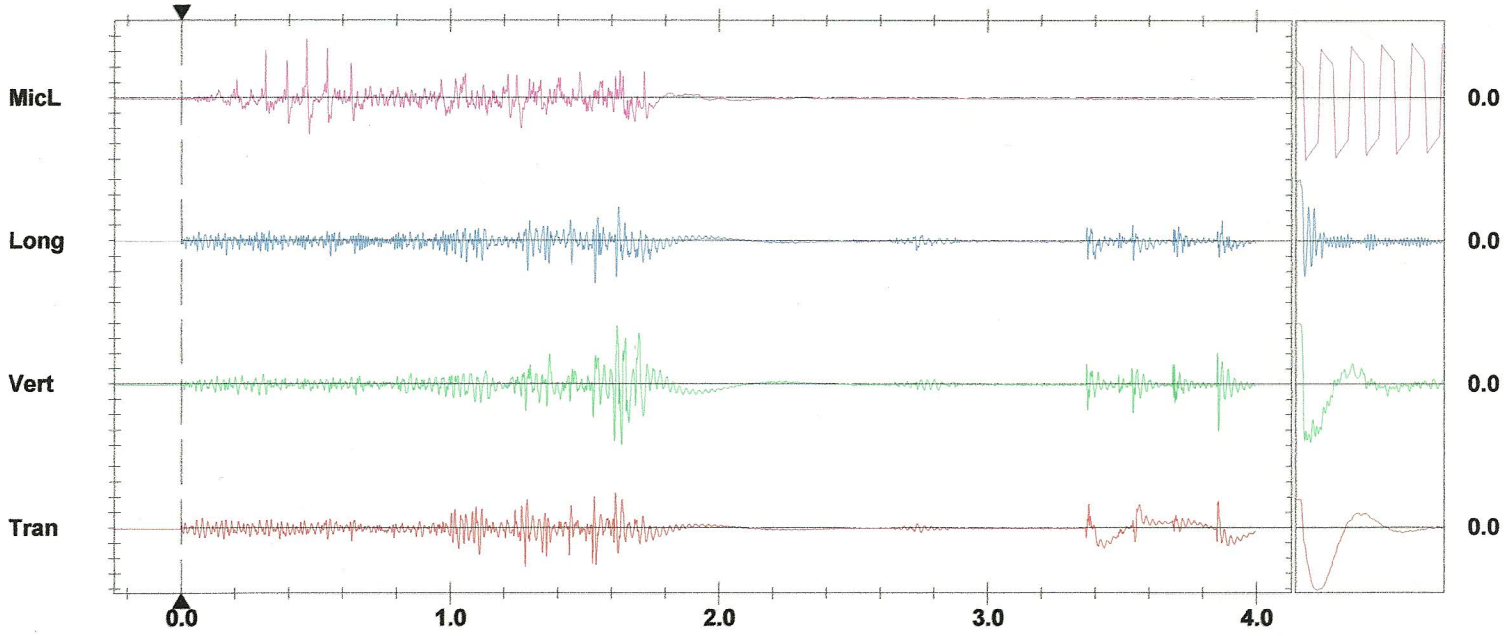
Extended Notes
I-90 Widening Hyak to Snowshed. Geophone attached to bracket on soil nail wall near snowshed.

Microphone Linear Weighting
PSPL 0.0194 psi(L) at 0.469 sec
ZC Freq 20.9 Hz
Channel Test Passed (Freq = 20.1 Hz Amp = 662 mv)

	Tran	Vert	Long	
PPV	4.99	7.82	5.44	in/s
ZC Freq	54	46	66	Hz
Time (Rel. to Trig)	1.283	1.642	1.543	sec
Peak Acceleration	10.3	15.5	5.57	g
Peak Displacement	0.0780	0.0849	0.0445	in
Sensorcheck	Passed	Check	Check	
Frequency	7.2	9.9	68.3	Hz
Overswing Ratio	4.0	2.7	25.9	

Peak Vector Sum 8.81 in/s at 1.642 sec





Time Scale: 0.20 sec/div **Amplitude Scale:** Geo: 2.00 in/s/div Mic: 0.00500 psi(L)/div Sensorcheck
Trigger = ▶—— ——◀

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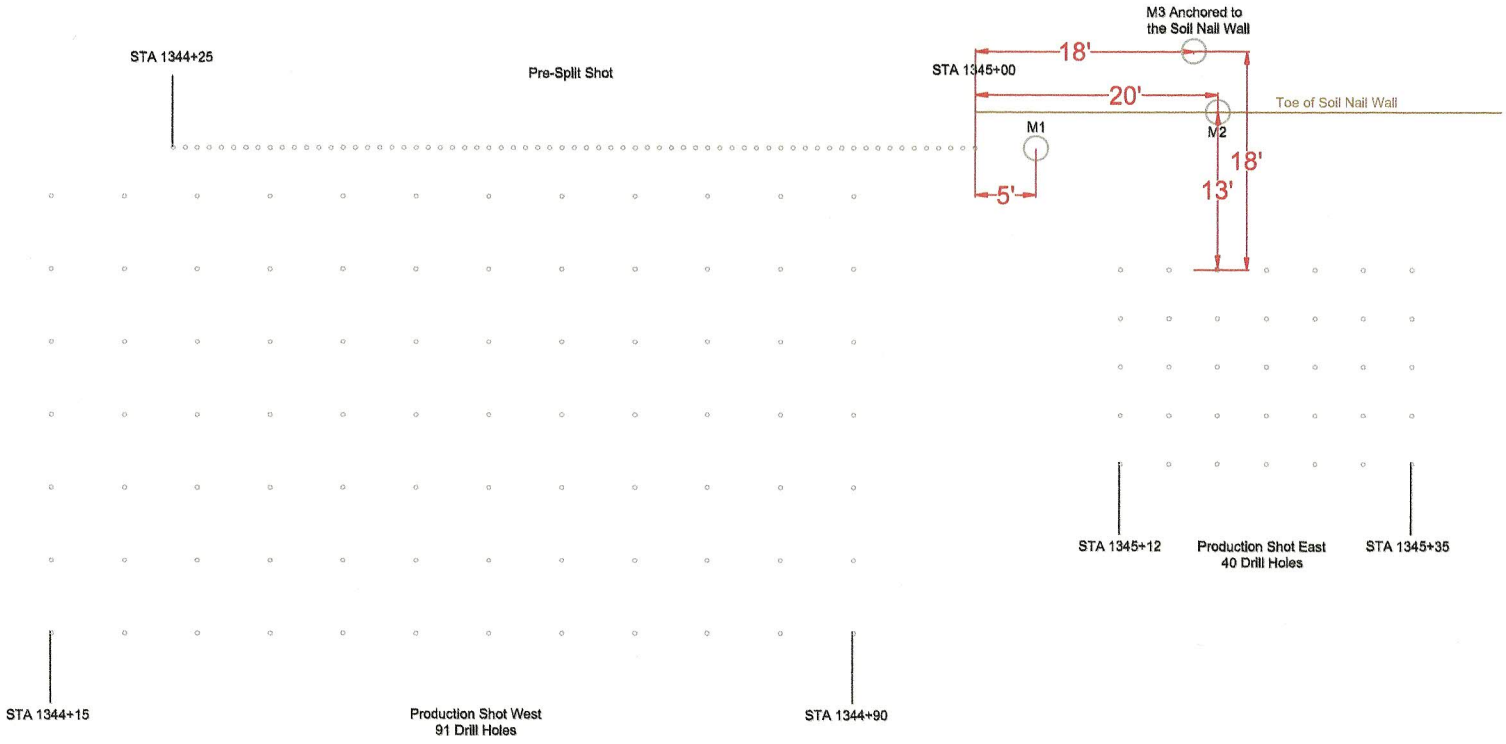

M1 - Near Field, Hi Frequency Unit
M2 - 50' Ft. away from Nearest Drill Hole
M3 - Anchored to Soil Nail Wall

HORIZONTAL SCALE	1"=10'
VERTICAL SCALE	Same
DESIGNED	
DATE	BY
00-00-00	LL
DRAWN	
DATE	BY
00-00-00	RJR

SubTerra, Inc.®
P.O. Box 520, 218 East North Bend Way, North Bend WA 98045
Telephone: (425) 888-5425 E-mail: SubTerra@subterra.us Fax: (425) 888-2725

Seismograph Layout
Blast Monitoring I-90 Hyak
October 7th, 2010
Production and Pre-Split Shot
Blast # SN3

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