Appendix A
Step1 SPI Camera Field Documentation

Appendix A. Step1 SPI Camera Field Documentation

This appendix provides the field information from the sediment sampling events and includes the following:

- Appendix A-1 – Field Notebook Scans
- Appendix A-2 – SPI Camera Field Activities Photo Log

Appendix A-1
Field Notebook Scans

Location: WISHRAM Date 4-10-22

Project / Client BNSF

Field Prep - Kris Iverson

SPI CAMERA STATIONS:

SG 11 6 TOTAL

~~SG 18~~ KI det. BAZ -

SG 19 primary goal

SG 29

SG 21

SG 04

SG 31

lines of evidence to be used:

- Redox zone
- sed. texture: grain type & size
    - sed color
- Biological activity evidence
- presence of methane
  or other reducing environment

Location Wishran Date 4-12-22

Project / Client

Ivarson
left for site @ 0730
@Boat 800

Gravity Crew - Ed Sloan
- Mike Duffield

Safety Brief - Cayuse -

Ed

Kris Ivar

Sloan on Deck w/ Exposure Suit
One suit on board for all staff
Line on equipment - Spectra line

Location Date 4-12-22

Project / Client

On station SG04 @ 0900
Water Depth ~ 35 Ft
SPI in water

Penetration minimal
~ 2" depth in view finder

note: ~4" below view for penetration

Add weight to max
Try again

SG04 - SPI
3 recordings.

Switch to Ekman grab
min penetration
gravel 1-4" ϕ with shell
fragments
smaller gravel 1-2" ϕ in Att 1
gravel 1-4" ϕ AH 2
gravel 1-4 ϕ Attempt 3
Move to next station
No O2 reading @ SG04

Location ______ Date 4-12-22

Project / Client ______

STATION SG11 @ 950 AM
EDGE of BANK, ROCKY
WD ≈ 8 FT

[WD = WATER DEPTH]

SG11 - SPI

Attempt @ 955 photo of bank
Attempt 1 - penetration = zero
\# 2 - 0 penetration, biomass visible. Maybe a rope piece
AH 3 ~~4~~ vegetation
AH 4 - ~~good~~ camera sitting on
KB bottom

SG11 - O_2 W/EKMAN
Small amount of sediment
No change with depth
~2" sediment in grab sampler
not enough for good reading
need more (~15 cm)

Location ______ Date 4-12-22

Project / Client ______

STATION SG19 @ 1030

SG19 - SPI
WD = 9.4 FT
ROCKY SHORE / RIP RAP
getting ~ 4-6" penetration
3 videos

switch to Grab

Attempt #1 - mostly rock
minimal sediment
\#2 - rocks & shell fragments
\#3 - rock
\#4 - shell & rock
decanted, vegetation
not enough recovery
for profile w/ O_2 meter

Location Date 4-12-22

Project / Client

STATION SG21 @ 1120

WD ~ 30 ft

SG21-SPI Only part of blade wet in
shallow penetration @ 2-4"
seems typical of this area
bottom is hard
looks like just the leading edge
3 videos at station

Switch to Grab
Attempt 1 - one rock
Attempt 2 - ~~rock only~~ one shell
#3 - no recovery

Location Date 4-12-22

Project / Client

STATION SG29

WD 25.1 @1155

SG29-SPI
3 videos
minimum penetration
One had a little better
Could see some white
material in sed.

Switch to Grab

Attempt 1 - couple small
rocks & shells. Min sed.
photo
#2 - shell, rock. Min sed.

#3 - rock. No recovery

Location

Date 4·12·22

Project / Client

Station SG31 @ 1230
WD = 28 FT

SG31- SPI
3 videos
minimal penetration
typical for this area

Switch to Grabs
Att #1 - empty - did not close
Att #2 - a few fines
could see bottom
of grab sampler

Attempt #3 - empty
Attempt # 4 - no recovery

Adding BG locations for
Re-con of bottom conditions
Unplanned location

Date 4-12-22

Location

Project / Client

STATION BG01 @1315

Check sediment w/SPI
WD = 30 ft

BG01 - SPI

3 videos, Min Penetration
hard bottom

Station BG04 @1335

BG04 - SPI
too rough to hold station
Done for the Day

Winds picked up
Return to Dock

Leave site @ 215 pm
Demob @ hotel & travel
End @ 545pm 4/12/22

Appendix A-2

SPI Camera Field Activities Photo Log

Project Title: Wishram Sediment Remedial Investigation Report

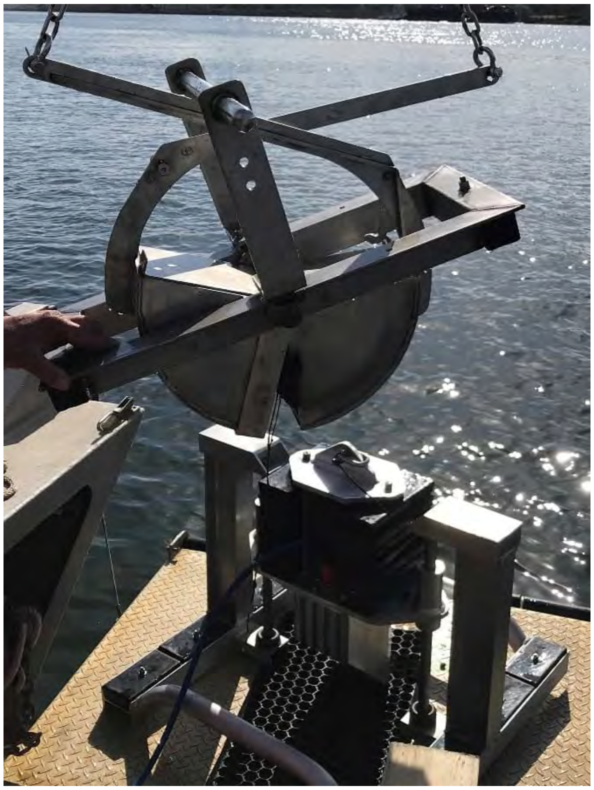
Location: Wishram, Washington

Date: April 10, 2022, and April 12, 2022

SPI Camera Field Activities

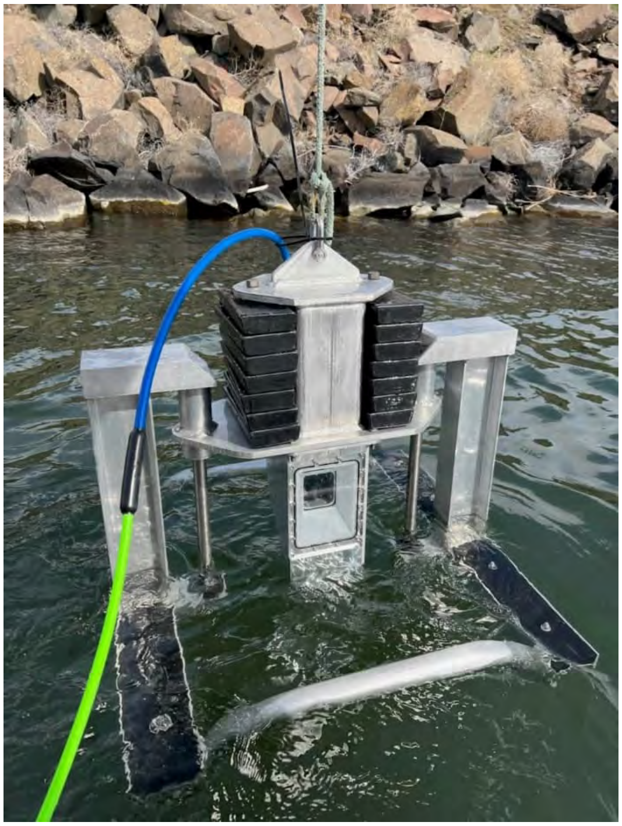
Photograph 1: SPI Camera on Boat Deck

Date taken: 04/10/2022



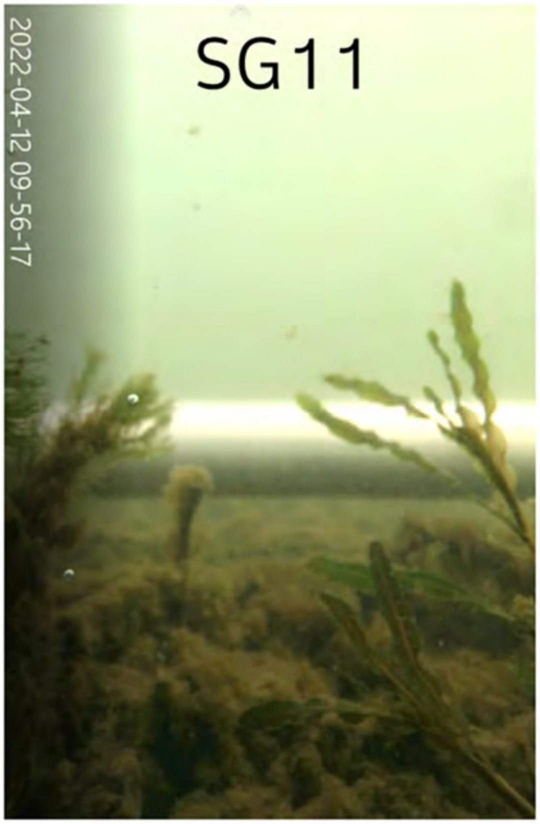
Photograph 2: Grab Sampler and SPI Camera on Boat Deck

Date taken: 04/10/2022



Photograph 3: SPI Camera Drive

Date taken: *04/12/2022*



Photograph 4: SPI Camera Sediment Photograph at SG11

Date taken: *04/12/2022*

Photograph 5: Grab Recovery at SG11

Date taken: *04/12/2022*

Appendix B
Step 1 Grab Sampling Documentation

Appendix B. Step 1 Grab Sampling Documentation

This appendix provides the field information from the sediment sampling events and includes the following:

- Table B-1 – Attempted and Retained Surface Sediment Sample Locations and Details
- Appendix B-1 – Sediment Grab Sampling Logs
- Appendix B-2 – Field Notebook Scans
- Appendix B-3 – Retained and Sampled Grab Photolog
- Appendix B-4 – Representative Field Activities Photolog
- Appendix B-5 – In-situ Sediment Conditions Photolog

Table B-1
Attempted and Retained Surface Sediment Sample Locations and Details

Table B-1. Attempted and Retained Surface Sediment Sample Locations and Details
BNSF Wishram Sediment Remedial Investigation Report

Station ID	Grab ID	Sample Type	Bathymetric Elevation[a] (ft NAVD88)	Sample Date	X Coordinate[b]	Y Coordinate[b]	Distance from Target Location (ft)	Recovery (cm)	Sample Interval (cm)	Sampled
SG01	SG01-G1	Site	153.836	4/19/2022	1520336.62	117922.02	6.8	10	0-10	Yes
SG02	SG02-G1	Site	145.964	4/19/2022	1520270.95	117854.68	8.5	7	--	No
SG02	SG02-G2	Site	145.964	4/19/2022	1520287.59	117838.27	17.5	5	--	No
SG02	SG02-G3	Site	145.964	4/19/2022	1520263.19	117840.85	13.2	14	0-10	Yes
SG03	SG03-G1	Site	135.685	4/27/2022	1520380.06	117758.17	6.8	5.5	0-5.5	Yes
SG03	SG03-G2	Site	135.685	4/27/2022	1520375.78	117759.00	1.8	2	0-2	Yes
SG03	SG03-G3	Site	135.685	4/27/2022	1520381.47	117761.26	6.7	2	0-2	Yes
SG04	SG04-G1	Site	--	4/25/2022	1520425.51	117642.92	2.5	<1	--	No
SG04	SG04-G2	Site	--	4/25/2022	1520411.40	117638.94	17.0	<1	--	No
SG04	SG04-G3	Site	--	4/25/2022	1520441.77	117654.31	17.0	0	--	No
SG05	SG05-G1	Site	--	4/22/2022	1520439.72	117525.60	2.8	1	--	No
SG05	SG05-G2	Site	--	4/22/2022	1520421.98	117515.32	22.0	0	--	No
SG05	SG05-G3	Site	--	4/22/2022	1520457.63	117531.12	19.5	2	--	No
SG06	SG06-G1	Site	--	4/25/2022	1520602.46	117757.12	4.0	<1	--	No
SG06	SG06-G2	Site	--	4/25/2022	1520584.37	117770.55	22.0	1	--	No
SG06	SG06-G3	Site	--	4/25/2022	1520612.86	117743.19	19.0	1	--	No
SG07	SG07-G1	Site	--	4/22/2022	1520563.45	117673.59	18.0	3	--	No
SG07	SG07-G2	Site	--	4/22/2022	1520575.20	117676.59	5.0	1	--	No
SG07	SG07-G3	Site	--	4/22/2022	1520598.76	117678.23	23.0	0	--	No
SG08	SG08-G1	Site	--	4/22/2022	1520657.05	117538.58	9.0	0	--	No
SG08	SG08-G2	Site	--	4/22/2022	1520662.39	117563.77	20.0	0	--	No
SG08	SG08-G3	Site	--	4/22/2022	1520647.83	117525.64	24.0	<1	--	No
SG09	SG09-G1	Site	--	4/22/2022	1520734.35	117670.94	0.9	0	--	No
SG09	SG09-G2	Site	--	4/22/2022	1520717.12	117676.89	18.0	0	--	No
SG09	SG09-G3	Site	--	4/22/2022	1520734.21	117660.18	11.7	2	--	No
SG10	SG10-G1	Site	--	4/22/2022	1520828.82	117599.67	16.5	0	--	No
SG10	SG10-G2	Site	--	4/22/2022	1520843.74	117626.51	20.5	0	--	No
SG10	SG10-G3	Site	--	4/22/2022	1520846.45	117611.60	4.0	0	--	No
SG11	SG11-G1	Site	154.975	4/28/2022	1520807.22	117999.36	5.0	0	--	No
SG11	SG11-G2	Site	154.975	4/28/2022	1520822.58	118008.23	13.0	5	--	No
SG11	SG11-G3	Site	154.975	4/28/2022	1520798.95	117986.87	20.0	0	--	No
SG12	SG12-G1	Site	--	4/27/2022	1520830.54	117887.32	12.0	0	--	No
SG12	SG12-G2	Site	--	4/27/2022	1520822.96	117901.88	10.2	0	--	No
SG12	SG12-G3	Site	--	4/27/2022	1520804.12	117882.43	17.0	0	--	No
SG13	SG13-G1	Site	132.736	4/25/2022	1521012.94	117998.89	5.5	<1	--	No
SG13	SG13-G2	Site	132.736	4/25/2022	1521012.31	118008.12	5.0	0	--	No
SG13	SG13-G3	Site	132.736	4/25/2022	1521015.13	117984.22	19.1	1.5	0-1.5	Yes
SG14	SG14-G1	Site	--	4/25/2022	1520989.44	117875.80	1.0	0	--	No
SG14	SG14-G2	Site	--	4/25/2022	1520998.47	117889.73	17.5	1	--	No
SG14	SG14-G3	Site	--	4/25/2022	1520969.27	117865.07	23.0	0	--	No
SG15	SG15-G1	Site	--	4/25/2022	1520891.74	117807.18	0.4	0	--	No
SG15	SG15-G2	Site	--	4/25/2022	1520899.25	117794.30	15.0	<1	--	No
SG15	SG15-G3	Site	--	4/25/2022	1520880.85	117820.62	17.0	1	--	No
SG16	SG16-G1	Site	--	4/22/2022	1520921.07	117711.80	15.0	2	--	No
SG16	SG16-G2	Site	--	4/22/2022	1520930.91	117738.28	19.8	<1	--	No
SG16	SG16-G3	Site	--	4/22/2022	1520949.94	117715.16	16.5	3	--	No
SG17	SG17-G1	Site	--	4/22/2022	1521042.22	117670.74	6.0	0	--	No
SG17	SG17-G2	Site	--	4/22/2022	1521030.57	117657.19	23.0	0	--	No
SG17	SG17-G3	Site	--	4/22/2022	1521037.06	117690.20	16.0	0	--	No
SG18	SG18-G1	Site	--	4/25/2022	1521152.79	118102.54	0.2	2	--	No
SG18	SG18-G2	Site	--	4/25/2022	1521140.04	118099.72	13.0	0	--	No
SG18	SG18-G3	Site	--	4/25/2022	1521156.59	118087.03	15.0	1	--	No
SG19	SG19-G1	Site	--	4/25/2022	1521183.61	118107.61	7.0	1	--	No
SG19	SG19-G2	Site	--	4/25/2022	1521180.52	118122.81	10.5	0	--	No
SG19	SG19-G3	Site	--	4/25/2022	1521199.23	118113.79	15.3	0	--	No
SG20	SG20-G1	Site	--	4/25/2022	1521201.51	117985.90	1.6	<1	--	No
SG20	SG20-G2	Site	--	4/25/2022	1521192.95	117973.81	15.3	0	--	No
SG20	SG20-G3	Site	--	4/25/2022	1521214.75	117999.01	20.0	0	--	No
SG21	SG21-G1	Site	--	4/25/2022	1521170.70	117867.89	2.2	0	--	No
SG21	SG21-G2	Site	--	4/25/2022	1521158.69	117856.08	19.0	0	--	No
SG21	SG21-G3	Site	--	4/25/2022	1521174.19	117886.39	17.0	0	--	No
SG22	SG22-G1	Site	--	4/21/2022	1521285.44	117864.17	5.8	0	--	No
SG22	SG22-G2	Site	--	4/21/2022	1521297.49	117847.63	20.5	0	--	No
SG22	SG22-G3	Site	--	4/21/2022	1521284.56	117876.93	12.5	0	--	No

Table B-1. Attempted and Retained Surface Sediment Sample Locations and Details

BNSF Wishram Sediment Remedial Investigation Report

Station ID	Grab ID	Sample Type	Bathymetric Elevation[a] (ft NAVD88)	Sample Date	X Coordinate[b]	Y Coordinate[b]	Distance from Target Location (ft)	Recovery (cm)	Sample Interval (cm)	Sampled
SG23	SG23-G1	Site	140.902	4/21/2022	1521345.82	118118.77	1.3	3	--	No
SG23	SG23-G2	Site	140.902	4/21/2022	1521346.87	118099.26	21.5	7	0-6	Yes
SG23	SG23-G3	Site	140.902	4/21/2022	1521350.72	118098.92	21.5	<1	--	No
SG24	SG24-G1	Site	--	4/21/2022	1521408.22	118131.31	1.6	<1	--	No
SG24	SG24-G2	Site	--	4/21/2022	1521394.21	118149.07	22.0	0	--	No
SG24	SG24-G3	Site	--	4/21/2022	1521417.14	118113.86	20.5	<1	--	No
SG25	SG25-G1	Site	--	4/21/2022	1521487.39	117940.50	1.3	0	--	No
SG25	SG25-G2	Site	--	4/21/2022	1521491.87	117928.17	13.0	<1	--	No
SG25	SG25-G3	Site	--	4/21/2022	1521469.41	117950.36	20.5	0	--	No
SG26	SG26-G1	Site	--	4/21/2022	1521557.05	118175.75	7.0	<1	--	No
SG26	SG26-G2	Site	--	4/21/2022	1521581.71	118181.77	19.5	<1	--	No
SG26	SG26-G3	Site	--	4/21/2022	1521542.07	118193.28	24.5	<1	--	No
SG27	SG27-G1	Site	--	4/21/2022	1521681.38	117987.01	0.2	0	--	No
SG27	SG27-G2	Site	--	4/21/2022	1521661.18	117992.90	21.0	0	--	No
SG27	SG27-G3	Site	--	4/21/2022	1521692.41	117968.95	21.5	0	--	No
SG28	SG28-G1	Site	--	4/21/2022	1521847.67	117950.29	10.0	0	--	No
SG28	SG28-G2	Site	--	4/21/2022	1521852.33	117970.96	14.0	<1	--	No
SG28	SG28-G3	Site	--	4/21/2022	1521822.65	117963.39	23.0	0	--	No
SG29	SG29-G1	Site	--	4/19/2022	1521729.42	118242.54	7.0	2	--	No
SG29	SG29-G2	Site	--	4/19/2022	1521731.61	118224.10	17.0	7.5	--	No
SG29	SG29-G3	Site	--	4/19/2022	1521731.23	118254.89	16.1	0	--	No
SG30	SG30-G1	Site	--	4/19/2022	1521844.79	118159.72	0.8	<1	--	No
SG30	SG30-G2	Site	--	4/19/2022	1521850.60	118140.40	21.0	<1	--	No
SG30	SG30-G3	Site	--	4/19/2022	1521827.63	118162.07	17.0	<1	--	No
SG31	SG31-G1	Site	--	4/19/2022	1521936.94	118001.57	20.1	<1	--	No
SG31	SG31-G2	Site	--	4/19/2022	1521958.24	117996.25	4.7	0	--	No
SG31	SG31-G3	Site	--	4/19/2022	1521915.19	117998.88	23.0	0	--	No
SG32	SG32-G1	Site	--	4/19/2022	1521738.38	118380.09	16.5	<1	--	No
SG32	SG32-G2	Site	--	4/19/2022	1521739.82	118347.77	21.0	4	--	No
SG32	SG32-G3	Site	--	4/19/2022	1521770.93	118366.02	21.2	0	--	No
SG33	SG33-G1	Site	--	4/19/2022	1521897.52	118243.03	24.7	0	--	No
SG33	SG33-G2	Site	--	4/19/2022	1521863.55	118266.35	16.4	0	--	No
SG33	SG33-G3	Site	--	4/19/2022	1521871.86	118234.11	19.6	<1	--	No
SG34	SG34-G1	Site	--	4/19/2022	1521946.70	118164.08	22.0	0	--	No
SG34	SG34-G2	Site	--	4/19/2022	1521963.79	118151.72	0.4	<1	--	No
SG34	SG34-G3	Site	--	4/19/2022	1521974.57	118135.39	18.5	<1	--	No
D100	D100-G1	Site	--	4/29/2022	1520453.33	117994.56	7.0	0	--	No
D100	D100-G2	Site	--	4/29/2022	1520441.61	117994.81	11.0	0	--	No
D100	D100-G3	Site	--	4/29/2022	1520452.17	117980.92	20.0	0	--	No
D160	D160-G1	Site	153.394	4/28/2022	1520506.84	117996.04	9.0	0	--	No
D160	D160-G2	Site	153.394	4/28/2022	1520492.76	118002.00	17.0	0	--	No
D160	D160-G3	Site	153.394	4/28/2022	1520514.70	117984.03	21.0	5	0-5	Yes
D240	D240-G1	Site	--	4/28/2022	1520581.08	118005.88	10.5	0	--	No
D240	D240-G2	Site	--	4/28/2022	1520592.26	117989.93	10.0	0	--	No
D240	D240-G3	Site	--	4/28/2022	1520573.55	117998.69	20.0	0	--	No
E320	E320-G1	Site	153.354	4/28/2022	1520671.71	117993.00	0.5	0	--	No
E320	E320-G2	Site	153.354	4/28/2022	1520667.30	117973.94	19.5	0	--	No
E320	E320-G3	Site	153.354	4/28/2022	1520659.82	117990.58	13.0	4	0-4	Yes
E380	E380-G1	Site	155.561	4/28/2022	1520729.99	117994.21	3.0	0	--	No
E380	E380-G2	Site	155.561	4/28/2022	1520714.49	117992.40	17.0	3	0-3	Yes
E380	E380-G3	Site	155.561	4/28/2022	1520737.77	117997.08	6.8	4	0-4	Yes
E460	E460-G1	Site	149.078	4/29/2022	1520475.89	117902.19	1.5	4	0-4	Yes
E460	E460-G2	Site	149.078	4/29/2022	1520468.89	117898.49	10.0	0	--	No
E460	E460-G3	Site	149.078	4/29/2022	1520487.85	117888.20	19.0	3	0-3	Yes
H260	H260-G1	Site	--	4/29/2022	1520713.84	117935.92	1.0	0	--	No
H260	H260-G2	Site	--	4/29/2022	1520697.89	117932.39	18.0	0	--	No
H260	H260-G3	Site	--	4/29/2022	1520728.15	117943.69	20.0	0	--	No
H360	H360-G1	Site	139.999	4/29/2022	1520547.89	117850.59	2.0	1	0-1	Yes
H360	H360-G2	Site	139.999	4/29/2022	1520540.34	117831.99	22.0	4	0-4	Yes
H360	H360-G3	Site	139.999	4/29/2022	1520537.40	117856.78	14.0	8	0-8	Yes
I120	I120-G1	Site	149.896	4/29/2022	1520615.95	117930.01	1.0	3	0-3	Yes
I120	I120-G2	Site	149.896	4/29/2022	1520598.95	117922.23	19.5	6	0-6	Yes
I120	I120-G3	Site	149.896[a]	4/29/2022	1520622.76	117918.42	15.0	4	0-4	Yes
L320	L320-G1	Site	133.851	4/29/2022	1520676.71	117853.93	3.0	2	0-2	Yes

Table B-1. Attempted and Retained Surface Sediment Sample Locations and Details

BNSF Wishram Sediment Remedial Investigation Report

Station ID	Grab ID	Sample Type	Bathymetric Elevation[a] (ft NAVD88)	Sample Date	X Coordinate[b]	Y Coordinate[b]	Distance from Target Location (ft)	Recovery (cm)	Sample Interval (cm)	Sampled
L320	L320-G2	Site	133.851	4/29/2022	1520663.20	117846.13	17.5	0	--	No
L320	L320-G3	Site	133.851	4/29/2022	1520688.73	117840.68	17.0	2	0-2	Yes
BG01	BG01-G1	Background	--	4/20/2022	1542519.95	115839.58	6.0	<1	--	No
BG01	BG01-G2	Background	--	4/20/2022	1542541.97	115839.69	21.5	<1	--	No
BG01	BG01-G3	Background	--	4/20/2022	1542497.68	115836.13	24.2	<1	--	No
BG02	BG02-G1	Background	--	4/20/2022	1539726.62	113144.45	1.8	3	--	No
BG02	BG02-G2	Background	--	4/20/2022	1539706.27	113134.37	22.0	<1	--	No
BG02	BG02-G3	Background	--	4/20/2022	1539732.83	113151.83	9.5	2	--	No
BG03	BG03-G1	Background	--	4/20/2022	1536453.91	111940.71	6.5	0	--	No
BG03	BG03-G2	Background	--	4/20/2022	1536482.86	111929.96	25.0	0	--	No
BG03	BG03-G3	Background	--	4/20/2022	1536446.83	111955.62	18.8	0	--	No
BG04	BG04-G1	Background	--	4/20/2022	1533370.71	112577.14	3.8	0	--	No
BG04	BG04-G2	Background	--	4/20/2022	1533374.16	112557.07	20.0	0	--	No
BG04	BG04-G3	Background	--	4/20/2022	1533376.98	112593.19	17.1	0	--	No
BG05	BG05-G1	Background	--	4/20/2022	1531444.54	114404.06	6.0	0	--	No
BG05	BG05-G2	Background	--	4/20/2022	1531430.81	114422.01	23.0	0	--	No
BG05	BG05-G3	Background	--	4/20/2022	1531451.26	114390.65	18.5	0	--	No
BG06	BG06-G1	Background	--	4/20/2022	1528929.34	116888.77	5.9	0	--	No
BG06	BG06-G2	Background	--	4/20/2022	1528930.11	116862.92	21.0	0	--	No
BG06	BG06-G3	Background	--	4/20/2022	1528929.34	116906.01	21.6	4	--	No
BG07	BG07-G1	Background	--	4/21/2022	1526554.16	118948.51	1.6	0	--	No
BG07	BG07-G2	Background	--	4/21/2022	1526545.60	118931.43	20.0	0	--	No
BG07	BG07-G3	Background	--	4/21/2022	1526558.99	118967.83	19.1	<1	--	No
BG08	BG08-G1	Background	--	4/21/2022	1528828.17	118381.86	0.3	0	--	No
BG08	BG08-G2	Background	--	4/21/2022	1528808.34	118388.63	22.0	0	--	No
BG08	BG08-G3	Background	--	4/21/2022	1528838.80	118371.22	14.0	0	--	No
BG09	BG09-G1	Background	--	4/21/2022	1530186.05	117528.97	14.5	0	--	No
BG09	BG09-G2	Background	--	4/21/2022	1530191.88	117517.56	1.5	0	--	No
BG09	BG09-G3	Background	--	4/21/2022	1530193.11	117500.32	17.8	0	--	No
BG10A[c]	BG10Ac-G1	Background	--	4/20/2022	1532483.66	117377.29	570	2	--	No
BG10A[c]	BG10Ac-G2	Background	--	4/20/2022	1532466.37	117388.73	552	0	--	No
BG10A[c]	BG10Ac-G3	Background	--	4/20/2022	1532490.46	117356.30	588	0	--	No
BG11	BG11-G1	Background	--	4/20/2022	1536582.49	118256.48	15.0	0	--	No
BG11	BG11-G2	Background	--	4/20/2022	1536587.30	118262.12	9.2	0	--	No
BG11	BG11-G3	Background	--	4/20/2022	1536618.09	118266.63	22.5	0	--	No
BG12	BG12-G1	Background	--	4/20/2022	1538899.44	119725.92	8.8	<1	--	No
BG12	BG12-G2	Background	--	4/20/2022	1538903.02	119712.45	7.6	0	--	No
BG12	BG12-G3	Background	--	4/20/2022	1538891.86	119736.31	5.0	<1	--	No
BG13	BG13-G1	Background[d]	--	4/21/2022	1542636.86	118224.60	NT	11	0-10	Yes
BG14	BG14-G1	Background[d]	--	4/27/2022	1541923.51	119101.89	NT	4	0-3	Yes
BG14	BG14-G2	Background[d]	--	4/27/2022	1541924.63	119102.05	1.2	6.5	0-5.5	Yes
BG14	BG14-G3	Background[d]	--	4/27/2022	1541930.28	119100.35	6.8	4	0-3	Yes
BG15	BG15-G1	Background[d]	--	4/27/2022	1534632.59	111156.99	NT	11	0-10	Yes
BG16	BG16-G1	Background[d]	--	4/27/2022	1533741.83	111539.23	NT	17	0-10	Yes
BG17	BG17-G1	Background[d]	--	4/27/2022	1533741.83	111539.23	NT	20	0-10	Yes
BG18	BG18-G1	Background[d]	--	4/27/2022	1531750.74	112057.48	NT	13	0-10	Yes
BG19	BG19-G1	Background[d]	--	4/27/2022	1531163.01	116612.51	NT	12	0-10	Yes
BG20	BG20-G1	Background[d]	--	4/29/2022	1542294.04	119025.98	NT	10	0-10	Yes

[a] Bathymetric Survey data, February 2022 presented in North American Vertical Datum of 1988 (NAVD88) (feet)

[b] X-Y Coordinates in U.S. survey feet, North American Datum 1983 Oregon State Plane North.

[c] Planned Station BG10 was too difficult to access/attempt sample and was replaced with Alternate Station BG10A

[d] Sample station added in field due to no recovery at planned background stations. Team observed an area on the northeast side of Miller Island where sediment appeared to be prevalent.

Notes:

< = less than

-- = no recovery or not applicable/not recorded

cm = centimeter(s)

ft = foot/feet

ID = identification

NT = No Target Location; Station was added based on the presence of sediment

NAVD88 = North American Vertical Datum 1988

U.S. = United States

Appendix B-1
Sediment Grab Sampling Logs

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: SG01
Primary/Secondary/Background: PRIMARY
Sample Date: 4/19/2022
Vessel: ~~Tieton~~ OUT MAZAMA
Sampling Crew: J. WRIGHT
L. TOCHKO
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 1130
Station Depart: 1230
Logged by: J WRIGHT
River Mile: /
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	6.76	1138	1520336.62	117922.02	8.8	10	0-10	Y
2								
3								
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 = PROBE FOR SED DEPTH - FEELS SOFT, ~ 1 INCH

FD01 COLLECTED HERE

Sample ID: BNSF-SG01-041922-0-10
FD01-041922-0-10

Sample Time: 1200
1215

Analytical Suite:
- ☑ Ammonia (SM4500 NH3)
- ☑ T. Sulfides (SW9030)
- ☑ Metals (SW6020B/SW7470B) &TOC (SW9060A)
- ☑ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
- ☑ TPH DRO/RRO (NWTPH-Dx)
- ☑ SVOCs and PAHs (SW8270E/SW8270E-SIM)
- ☑ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by:

Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: SG02
Primary/Secondary/Background: PRIMARY
Sample Date: 4/19/2022
Vessel: ~~Tieton~~ MAZAMA
Sampling Crew: J. ULRICH
L. TOCHKO
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 1231
Station Depart: 1345
Logged by: J. ULRICH
River Mile: —
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	8.49	1231	1520270.95	117854.68	18.4	7	—	N
2	17.50	1255	1520287.59	117838.27	20.7	5	—	N
3	13.20	1317	1520263.19	117840.85	18.1	14	0-10	Y
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1. PROBE BOTTOM w/ lead line - SOFT; LOW RECOVERY - HOLD

2. " - SOFT; LOW RECOVERY - HOLD

3. " - SOFT; ACCEPTABLE GRAB CRITERIA - USE AS SAMPLE

SP 75%, GW 10%, ML 15%, GLEY 2.5/10Y
↓
Med GRAIN, NO ODOR

Sample ID: BNSF-SG02-041922-0-10
Sample Time: 1335

Analytical Suite:
☑ Ammonia (SM4500 NH3)
☑ T. Sulfides (SW9030)
☑ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☑ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☑ TPH DRO/RRO (NWTPH-Dx)
☑ SVOCs and PAHs (SW8270E/SW8270E-SIM)
☑ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by:

Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3S93500
Project Location: Wishram, WA

Station ID:	SG03	**Tide Datum:**	NAVD 88
Primary/Secondary/Background:	PRIMARY	**Water Elevation:**	TBD
Sample Date:	4/27/22	**Station Arrival:**	1129
Vessel:	MAZAMA ~~[illegible]~~ JUP	**Station Depart:**	1213
Sampling Crew:	J. ULLRICH	**Logged by:**	J. ULLRICH
	C. TORGERSON	**River Mile:**	—
	M. DUFFIELD	**Collection method:**	Power Grab Sampler
	E. SANTANA		

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet) Easting	Northing	Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
1	6.8	1133	1520380.06	117758.17	25.4	5.5	0-5.5	Y
2	1.83	1142	1520375.76	117759.00	24.5	2	0-2	Y
3	6.66	1150	1520381.47	~~[illegible]~~ JUP 117761.26	24.9	2	0-2	Y
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - PROBE W/ LEADLINE - HARD. SP - MED. GRAINED, BIOLOGICAL ODOR - HOLD SOME SHELLS 2.5Y 3/2 (VERY DARK GREYISH BROWN)

2 - " . VIDEO DID NOT RECORD. ~~SP~~ JUP LITH: SAME AS ABOVE

3 - " . LITH: SAME AS ABOVE

Sample ID: BNSF-SG03-042722-0-5.5 **Sample Time:** 1200

Analytical Suite:
☑ Ammonia (SM4500 NH3)
☑ T. Sulfides (SW9030)
☑ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☑ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☑ TPH DRO/RRO (NWTPH-Dx)
☑ SVOCs and PAHs (SW8270E/SW8270E-SIM)
☑ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: ______ **Date:** ______

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID:	SB04	**Tide Datum:**	NAVD 88
Primary/Secondary/Background:	JUF ~~SECONDARY~~ PRIMARY	**Water Elevation:**	TBD
Sample Date:	4/25/22	**Station Arrival:**	1118
Vessel:	MAZAMA ~~Tieton~~ JUF	**Station Depart:**	1130
Sampling Crew:	J. ULRICH	**Logged by:**	J. ULRICH
	C. TORGERSON	**River Mile:**	
	M. DUFFIELD	**Collection method:**	Power Grab Sampler
	E		

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	2.5	1120	1520425.51	117642.92	35.5	<1	0	N
2	17	1125	152 0411.40	117638.94	35.6	<1	0	N
3	17	1128	152 0441.77	117 654.31	35.1	0	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - PROBE W/ LEADLINE. HARD. COBBLES/SHELLS

2 - " - COBBLES/SHELLS. TRACE SAND

3 - " . COBBLES IN JAWS

NO SAMPLE

Sample ID: **Sample Time:**

Analytical Suite:
☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID:	SG05	Tide Datum:	NAVD 88
Primary/Secondary/Background:	PRIMARY	Water Elevation:	TBD
Sample Date:	4/22/22	Station Arrival:	1035
Vessel:	MAZAMA ~~Tieton~~ JUF	Station Depart:	1052
Sampling Crew:	J. ULRICH	Logged by:	J. ULRICH
	L. TOCHKO	River Mile:	
	M. DUFFIELD	Collection method:	Power Grab Sampler
	E. SANTANA		

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
JUF ~~1~~		~~1039~~	~~15250439.72~~	~~JUF~~	~~57.8~~			
JUF ~~2~~ 1	2.8	1039	1520439.72	117525.60	57.8	1	0	N
JUF ~~3~~ 2	22	1044	1520421.98	117515.32	60.3	0	0	N
JUF ~~4~~ 3	19.5	1050	1520457.63	117531.12	59.9	2	0	N
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - CURRENT TOO STRONG/WATER TOO DEEP TO PROBE.
COBBLES

2 - " . COBBLES IN JAWS

3 - " . SHELLS

NO SAMPLE

Sample ID: Sample Time:

Analytical Suite: ☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: SG06
Primary/Secondary/Background: SECONDARY
Sample Date: 4/25/22
Vessel: MAZAMA ~~Teton~~ JUP
Sampling Crew: J. ULRICH
C. TORGERSON
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 1100
Station Depart: 1113
Logged by: J. ULRICH
River Mile:
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	4	1103	1520602.46	117757.12	28.7	<1	0	N
2	22	1107	1520584.37	117770.55	29.1	1	0	N
3	19	1112	1520612.86	117743.19	29.4	1	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - PROBE W/ LEADLINE - HARD. COBBLES

2 - " . VIDEO DID NOT RECORD. COBBLES/SHELLS, TRACE SAND

3 - " . VIDEO DID NOT RECORD. COBBLES/SHELLS, TRACE SAND.

NO SAMPLE

Sample ID:
Sample Time:

Analytical Suite: ☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: SG07
Primary/Secondary/Background: SECONDARY
Sample Date: 4/22/22
Vessel: MAZAMA ~~Tieton~~ JUP
Sampling Crew: J. ULRICH
L. TOCHKO
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 1013
Station Depart: 1033
Logged by: J. ULRICH
River Mile: —
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	18	1015	1520563.45	117673.59	35.4	3	0	N
2	5	1024	1520575.20	117676.59	34.2	1	0	N
3	23	1031	1520598.76	117678.23	34.4	0	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - CURRENT TOO STRONG TO PROBE. 3/4 SHELLS, 1/4 COBBLES ~~w/~~ JUP W/ TRACE ALGAE.

2 - " . 1/2 SHELLS, 1/2 COBBLES W/ TRACE ALGAE

3 - " . VIDEO DID NOT RECORD. CAMERA ON BOAT LOOKS LIKE ROCKY BOTTOM W/ SHELLS. FEW ~~SHE~~ JUP COBBLES

NO SAMPLE

Sample ID:
Sample Time:

Analytical Suite: ☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by:
Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: SG08

Primary/Secondary/Background: PRIMARY

Sample Date: 4/22/22

Vessel: MAZAMA ~~Tieton~~ JUF

Sampling Crew: J. ULRICH
L. TOCHKO
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88

Water Elevation: TBD

Station Arrival: 0953

Station Depart: 1010

Logged by: J. ULRICH

River Mile:

Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	9	0955	1520657.05	117538.58	58.2	0	0	N
2	20	1001	1520662.39	117563.77	61.1	0	0	N
3	24	1008	1520647.83	117525.64	58.4	<1	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - CURRENT TOO STRONG / ~~WATEER~~ JUF WATER TOO DEEP TO PROBE.
BOULDER IN JAWS

2 - " . COBBLES IN JAWS

3 - " . VIDEO DID NOT RECORD. CAMERA ON BOAT LOOKED LIKE SOLID ROCK/SHELLS. FEW COBBLES
NO SAMPLE

Sample ID:

Sample Time:

Analytical Suite: ☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by:

Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: SG09
Primary/Secondary/Background: PRIMARY
Sample Date: 4/22/22
Vessel: MAZAMA ~~Tieton~~ JUF
Sampling Crew: J. ULRICH
L. TOCHKO
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 0927
Station Depart: 0946
Logged by: J. ULRICH
River Mile:
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
~~1~~		~~0927~~			~~47.7~~			JUF
1 ~~2~~ JUF	0.9	0928	1520734.35	117670.94	36.4	0	0	N
2 ~~3~~ JUF	18	0938	1520717.12	117676.89	36.5	0	0	N
3 ~~4~~ JUF	11.7	0944	1520734.21	117660.18	38.9	2	0	N
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - CURRENT TOO STRONG TO PROBE. LRG. COBBLES IN JAWS

2 - '' VIDEO DID NOT RECORD. CAMERA ON BOAT LOOKED TO BE SOLID ROCK W/ FEW SHELLS. COBBLES IN JAWS & SHELLS

3 - '' . COBBLES, SHELLS, TRACE GRAVEL

NO SAMPLE

Sample ID:
Sample Time:

Analytical Suite:
☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: JEM
Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: SG10
Primary/Secondary/Background: SECONDARY
Sample Date: 4/22/22
Vessel: MAZAMA ~~Tieton~~ JUF
Sampling Crew: J. ULRICH
L. TOCHKO
M. DUFFIELD

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 0909
Station Depart: 0925
Logged by: J. ULRICH
River Mile: —
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	16.5	0910	1520828.82	117599.67	47.1	0	0	N
2	20.5	0915	1520843.74	117626.51	46.9	0	0	N
3	4	0920	1520846.45	117611.60	47.4	0	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - CURRENT TOO STRONG | WATER TOO DEEP TO PROBE.
NO RECOVERY.

2. - " . VIDEO DID NOT RECORD. COULD SEE LRG COBBLES
ON BOAT CAMERA. NO RECOVERY

3 - " . NO RECOVERY

Sample ID:
Sample Time:

Analytical Suite: ☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by:
Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID:	SG11	Tide Datum:	NAVD 88
Primary/Secondary/Background:	PRIMARY	Water Elevation:	TBD
Sample Date:	4/28/22	Station Arrival:	0740
Vessel:	MAZAMA ~~Tieton~~ JLU	Station Depart:	0810
Sampling Crew:	J. ULRICH	Logged by:	J. ULRICH
	C. TORGERSON	River Mile:	—
	M. DUFFIELD	Collection method:	Power Grab Sampler
	E. SANTANA		

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	5	0743	1520807.22	117999.36	8.2	0	0	N
2	13	0747	1520822.58	118008.23	7.3	5	~~0~~ 0-5	~~N~~ Y
3	20	0756	1520798.95	117986.87	7.9	0	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - PROBE W/ LEADLINE — SOFT. ALGAE & GRASS

2 - " - SOFT. SP - medgrained, no odor. 2.5Y 3/2 (VERY DARK GREYISH BROWN). SOME GRASS & ALGAE.

3 - " - SOFT. ALGAE & GRASS

Sample ID: BNSF-SG11-042822-0-5

Sample Time: 0805

Analytical Suite:
☑ Ammonia (SM4500 NH3) ☑ T. Sulfides (SW9030) ☑ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☑ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☑ TPH DRO/RRO (NWTPH-Dx) ☑ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☑ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: Jllu

Date: 4/29/22

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID:	SG12	**Tide Datum:**	NAVD 88
Primary/Secondary/Background:	PRIMARY	**Water Elevation:**	TBD
Sample Date:	4/27/22	**Station Arrival:**	1254
Vessel:	MAZAMA ~~Tieton~~ JUP	**Station Depart:**	1309
Sampling Crew:	J. ULRICH	**Logged by:**	J. ULRICH
	C. TORGERSON	**River Mile:**	
	M. DUFFIELD	**Collection method:**	Power Grab Sampler
	E. SANTANA		

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	12	1256	1520830.54	117887.32	28.8	0	0	N
2	10.2	1300	1520822.96	117901.88	25.4	0	0	N
3	17	1305	1520804.12	117882.43	25.2	0	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

~~A~~ JUP 1 - CURRENT TOO STRONG TO PROBE BOTTOM. COBBLES IN JAWS

2 - " . VIDEO DID NOT RECORD. COBBLES IN JAWS

3 - " . COBBLES IN JAWS

NO SAMPLE

Sample ID: **Sample Time:**

Analytical Suite:
☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: **Date:**

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID:	SG 13	Tide Datum:	NAVD 88
Primary/Secondary/Background:	SECONDARY	Water Elevation:	TBD
Sample Date:	4/25/22	Station Arrival:	0932
Vessel:	MAZAMA ~~Tieton~~ (JUP)	Station Depart:	1003
Sampling Crew:	J. ULRICH	Logged by:	J. ULRICH
	C. TORGERSON	River Mile:	
	M. DUFFIELD	Collection method:	Power Grab Sampler
	E. SANTANA		

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet) Easting	Northing	Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
1	5.5	0936	1521012.94	117998.89	26.5	<1	0	N
2	5	0941	152 1012.31	118008.12	23.9	0	0	N
3		0943	1521015.13	117984.22	30.6	~~4.5~~		Y
4	JUP					1.5	0 -1.5	
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - PROBE W/ LEADVINE. HARD. COBBLES IN JAWS. <1 CM OF SAND/SED W/ SHELLS IN CORNER OF BUCKET

2 - " . ~~LRE~~ (JUP) BOULDER IN JAWS. ~~NO REC~~ (JUP)

3 - " . VIDEO DID NOT RECORD. ~~09~~ (JUP)
SP - med. grained. strong biological odor. 2.5Y 4/2 (DARK GREYISH BROWN). 5% SHELLS

Sample ID: BNSF-SG13-042522-0-1.5 Sample Time: 0955

Analytical Suite:
☑ Ammonia (SM4500 NH3) ☑ T. Sulfides (SW9030) ☑ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☑ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☑ TPH DRO/RRO (NWTPH-Dx) ☑ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☑ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: 8G14
Primary/Secondary/Background: PRIMARY
Sample Date: 4/25/22
Vessel: MAZAMA ~~Tieton~~ JUP
Sampling Crew: J. ULRICH
C. TORGERSON
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: ~~09~~ JUP 1015
Station Depart: 1033
Logged by: J. ULRICH
River Mile:
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	\	1022	1520989.44	117875.80	35.8	0	0	N
2	17.5	1027	1520998.47	117889.73	35.4	1	0	N
3	23	1031	1520969.27	117865.07	35.2	0	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - PROBE W/ LEADLINE - MIXED HARD, POTENTIALLY SOFT POCKETS.
NO RECOVERY.

2 - " - SHELLS / COBBLES, TRACE SAND.

3 - " . BOULDER / SHELLS.
NO SAMPLE

Sample ID:
Sample Time:

Analytical Suite:
☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B) ☐ Grainsize (D7928/D6913)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by:
Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: S615
Primary/Secondary/Background: PRIMARY
Sample Date: 4/25/22
Vessel: MAZAMA ~~Teton~~ JUF
Sampling Crew: J. ULRICH
C. TORGERSON
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 1037
Station Depart: 1052
Logged by: J. ULRICH
River Mile:
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet) Easting	Northing	Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
1	0.35	1042	1520891.74	117807.18	33.0	0	0	N
2	15.	1046	152 0899.25	117794.30	34.1	<1	0	N
3	17	1051	1520880.85	117820.62	33.1	1	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - PROBE W/ LEADLINE. HARD W/ SOME POTENTIAL POCKETS OF SOFT.
COBBLE IN JAWS.

2 - " . ~~FEW COBBLES~~ JUF FEW ~~PF~~ JUF COBBLES

3 - " . SHELLS / COBBLES, TRACE SAND

NO SAMPLE

Sample ID:
Sample Time:

Analytical Suite: ☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: Date:

JACOBS®

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: SG16
Primary/Secondary/Background: SECONDARY
Sample Date: 4/22/22
Vessel: MAZAMA ~~Tieton~~ JUE
Sampling Crew: J. ULRICH
L. TOCHKO
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 0841
Station Depart: 0900
Logged by: J. ULRICH
River Mile:
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	15	0843	1520921.07	117711.80	46.6	2	0	N
2	19.8	0850	1520930.91	117738.28	47.2	<1	0	N
3	16.5	0856	1520949.94	117715.16	47.5	3	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 – CURRENT TOO STRONG/WATER TOO DEEP TO PROBE.
COBBLES/SHELLS

2 – " . FEW SHELLS & TRACE SAND

3 – " , SHELLS & COBBLES, TRACE SAND

NO SAMPLE

Sample ID:
Sample Time:

Analytical Suite:
☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: JLM
Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: SG17
Primary/Secondary/Background: PRIMARY
Sample Date: 4/22/22
Vessel: MAZAMA ~~Tieton~~ JUE
Sampling Crew: J. ULRICH
L. TOLHKO
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 0818
Station Depart: 0840
Logged by: J. ULRICH
River Mile:
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	6	0821	1521042.22	117670.74	45.6	0	0	N
2	23	0828	1521030.57	117657.19	45.5	0	0	N
3	16	0835	1521037.06	117690.20	45.9	0	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - ~~FD~~ JUE CURRENT TOO STRONG | WATER TOO DEEP TO PROBE.
LOSE VIDEO VISIBILITY PRIOR TO REACHING BOTTOM.
COBBLES & BOULDERS

2 - " . ~~ROD~~ JUE NO RECOVERY

3 - " . LOSE VISIBILITY PRIOR TO REACHING BOTTOM.
LRG COBBLES IN JAWS

NO SAMPLE

Sample ID:
Sample Time:

Analytical Suite: ☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by:
Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: SG18
Primary/Secondary/Background: PRIMARY
Sample Date: 4/25/22
Vessel: MAZAMA ~~Tieton~~ JUF
Sampling Crew: J. ULRICH
C. TORGERSON
M. DUFFIELD
E. SA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 0915
Station Depart: 0927
Logged by: J. ULRICH
River Mile:
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet) Easting	Northing	Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
1	0.21	0917	1521152.79	118102.54	9.8	2	0	N
2	13	0923	1521140.04	118099.72	8.4	0	0	N
3	15	0927	1521156.59	118087.03	10.8	1	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - PROBE W/ LEADLINE. HARD W/ SOME POCKETS OF POTENTIAL SOFT. GRASS, ALGAE, COBBLES/SHELLS, ~~TR~~ JUF

2 - " . VIDEO DID NOT RECORD. SM. COBBLES IN JAWS.

3 - " . ~~V+~~ JUF VIDEO DID NOT RECORD. GRASS, COBBLES, SHELLS & TRACE SAND.

NO SAMPLE

Sample ID:

Sample Time:

Analytical Suite: ☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by:

Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: SG 19
Primary/Secondary/Background: PRIMARY
Sample Date: 4/25/22
Vessel: MAZAMA ~~Tieton~~ JWB
Sampling Crew: J. ULRICH
C. TORGERSON
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: ~~08~~ JWB 0900
Station Depart: 0913
Logged by: J. ULRICH
River Mile: —
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet) Easting	Northing	Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
1	7	0903	1521183.61	118107.61	9.5	1	0	N
2	10.5	0908	1521180.52	118122.81	6.7	0	0	N
3	15.3	0912	1521199.23	118113.79	8.7	0	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - PROBE W/ LEADLINE. HARD W/ SOME POTENTIAL SOFT SPOTS IN BETWEEN. SHELLS/ROCKS

2 - " . MED. COBBLES IN JAWS

3 - " . BOULDER IN JAWS.

NO SAMPLE

Sample ID: —
Sample Time: —

Analytical Suite: ☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by:
Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: SG20
Primary/Secondary/Background: PRIMARY
Sample Date: 4/25/22
Vessel: MAZAMA ~~Fieton~~ JWP
Sampling Crew: J. ULRICH
C. TORGERSON
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 0848
Station Depart: 0859
Logged by: J. ULRICH
River Mile:
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet) Easting	Northing	Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
1	1.6	0848	1521201.51	117985.90	20.7	<1	0	N
2	15.3	0853	152 1192.95	117973.81	21.8	0	0	N
3	20	0857	1521214.75	117999.01	21.4	0	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 – PROBE W/ LEADLINE – HARD. TRACE ALGAE.

2 – " . NO RECOVERY

3 – " . LRG COBBLE IN JAWS. NO RECOVERY

NO SAMPLE

Sample ID:

Sample Time:

Analytical Suite:
☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: **Date:**

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID:	SG21	Tide Datum:	NAVD 88
Primary/Secondary/Background:	PRIMARY	Water Elevation:	TBD
Sample Date:	4/25/22	Station Arrival:	0827
Vessel:	MAZAMA ~~Tieton~~ JUF	Station Depart:	0845
Sampling Crew:	J. ULRICH	Logged by:	J. ULRICH
	C. TORGERSON	River Mile:	
	M. DUFFIE	Collection method:	Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	2.2	0830	1521170.70	117867.89	29.1	0	0	N
2	19	0837	1521158.69	117856.08	28.8	0	0	N
3	17	0843	1521174.19	117886.39	27.1	0	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - ~~CURRENT~~ JUF PROBE W/ LEADLINE - HARD. NO RECOVERY

2 - " " VIDEO DID NOT RECORD. NO RECOVERY

3 " " NO RECOVERY

NO SAMPLE

Sample ID: ——— Sample Time: ———

Analytical Suite:
☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID:	SG22	Tide Datum:	NAVD 88
Primary/Secondary/Background:	PRIMARY	Water Elevation:	TBD
Sample Date:	4/21/22	Station Arrival:	1457
Vessel:	MAZAMA ~~Tieton~~ JUF	Station Depart:	1515
Sampling Crew:	J. ULRICH	Logged by:	J. ULRICH
	L. TOCHKO	River Mile:	
	M. DUFFIELD	Collection method:	Power Grab Sampler
	E. SANTANA		

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	5.75	1458	1521285.44	117864.17	31.3	0	0	N
2	20.5	1503	1521297.49	117847.63	32.8	0	0	N
3	12.5	1510	1521284.56	117876.93	31.7	0	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - PROBED W/ LEADLINE - HARD. NO RECOVERY

2 - " . HARD. NO RECOVERY

3 - " . HARD. 2 X SM. COBBLES IN JAWS

NO SAMPLE

Sample ID:

Sample Time:

Analytical Suite:
☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by:

Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID:	SG23	Tide Datum:	NAVD 88
Primary/Secondary/Background:	SECONDARY	Water Elevation:	TBD
Sample Date:	4/21/22	Station Arrival:	1357
Vessel:	MAZAMA ~~Tieton~~ (JUF)	Station Depart:	1445
Sampling Crew:	J. ULRICH	Logged by:	J. ULRICH
	L. TOCHKO	River Mile:	—
	M. DUFFIELD	Collection method:	Power Grab Sampler
	E. SANTANA		

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	1.3	1359	1521345.82	118118.77	21.7	3	~~0~~	N
2	21.5	1411	1521346.87	118099.26	20.6	7	0 - 6	Y
3	21.5	1428	1521350.72	118098.92	20.8	21	~~0~~	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - PROBE BOTTOM W/ LEADLINE - HARD. 95% SHELLS, ~5% PEBBLES (ROUND-SUB-round) TRACE SAND

2 - ~~S01~~ (JUF) " . SOFTER. 50% SHELLS, VERY STRONG BIOLOGICAL ODOR. 50% SP - coarse grained, 2.5Y 3/2 (VERY DARK GREYISH BROWN)

3 - " . VIDEO DID NOT RECORD ON THIS ATTEMPT. TRACE SAND.

Sample ID: BNSF-SG23-042122-0-6

Sample Time: 1440

Analytical Suite:
☑ Ammonia (SM4500 NH3)
☑ T. Sulfides (SW9030)
☑ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☑ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☑ TPH DRO/RRO (NWTPH-Dx)
☑ SVOCs and PAHs (SW8270E/SW8270E-SIM)
☑ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by:

Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: B624
Primary/Secondary/Background: SECONDARY
Sample Date: 4/21/22
Vessel: MAZAMA ~~Tieton~~ JUE
Sampling Crew: J. ULRICH
L. TOCHKO
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 1335
Station Depart: 1357
Logged by: J. ULRICH
River Mile:
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	1.6	1336	1521408.22	118131.31	20.1	<1	0	N
2	22	1340	1521394.21	118149.07	21.7	0	0	N
3	20.5	1348	1521417.14	118113.86	23.5	<1	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - CURRENT/WIND DYING DOWN. WILL ~~A~~ JUE TRY PROBING BOTTOM ON NEXT ATTEMPT. SHELLS & TRACE SAND

2 - PROBE BOTTOM W/ LEADLINE. - HARD. NO RECOVERY

3 - " . HARD. ~~ALGAE~~ JUE ~~ALGEA~~ JUE ALGAE.

NO SAMPLE

Sample ID:
Sample Time:

Analytical Suite: ☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by:
Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: SG25
Primary/Secondary/Background: PRIMARY
Sample Date: 4/21/22
Vessel: MAZAMA ~~Tieton~~ JUF
Sampling Crew: J. ULRICH
L. TOCHKO
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 1206
Station Depart: ~~1211~~ JUF 1224
Logged by: J. ULRICH
River Mile:
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	1.25	1206	1521487.39	117940.50	31.9	0	0	N
2	13	1214	1521491.87	117928.17	32.7	<1	0	N
3	20.5	1220	1521469.41	117950.36	30.2	0	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 – CURRENT TOO STRONG TO PROBE BOTTOM. NO RECOVERY

2 – " . TRACE SAND

3 – " . NO RECOVERY

NO SAMPLE

Sample ID:
Sample Time:

Analytical Suite: ☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by:
Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: SG26
Primary/Secondary/Background: SECONDARY
Sample Date: 4/21/22
Vessel: MAZAMA ~~Tieton~~ JUE
Sampling Crew: J. ULRICH
L. TOCHKO
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 1150
Station Depart: 1205
Logged by: J. ULRICH
River Mile:
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	7	1151	1521557.05	118175.75	17.4	<1	0	N
2	19.5	1156	1521581.71	118181.77	18.3	<1	0	N
3	24.5	1200	1521542.07	118193.28	19.2	<1	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - CURRENT TOO STRONG TO PROBE BOTTOM. TRACE SAND

2 - " . TRACE SAND

3 - " . TRACE SAND

NO SAMPLE

Sample ID:
Sample Time:

Analytical Suite: ☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by:
Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: SG27
Primary/Secondary/Background: SECONDARY
Sample Date: 4\21\22
Vessel: MAZAMA Tieton JUE
Sampling Crew: J.ULRICH
L. TOCHKO
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 1132
Station Depart: 1148
Logged by: J. ULRICH
River Mile:
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet) Easting	Northing	Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
1	0.21	1133	1521681.38	117987.01	31.3	0	0	N
2	21	1139	1521661.18	117992.90	31.8	0	0	N
3	21.5	1143	1521692.41	117968.95	32.1	0	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - CURRENT TOO STRONG TO PROBE BOTTOM. NO RECOVERY

2 - " . NO RECOVERY

3 - " . CAMERA VIDEO DID NOT RECORD FOR THIS ATTEMPT.
1 X COBBLE (MED) ;

NO SAMPLE

Sample ID:
Sample Time:

Analytical Suite: ☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID:	SG28	Tide Datum:	NAVD 88
Primary/Secondary/Background:	SECONDARY	Water Elevation:	TBD
Sample Date:	4/21/22	Station Arrival:	1116
Vessel:	MAZAMA ~~Teton~~ JWE	Station Depart:	1132
Sampling Crew:	J. ULRICH	Logged by:	J. ULRICH
	L. TOCHKO	River Mile:	
	M. DUFFIELD	Collection method:	Power Grab Sampler
	E. SANTANA		

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	9.95	1117	1521847.67	117950.29	31.9	0	0	N
2	14	1123	1521852.33	117970.96	30.9	<1	0	N
3	23	1128	1521822.65	117963.39	31.5	0	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 – CURRENT TOO STRONG TO PROBE BOTTOM. NO RECOVERY

2 – " . TRACE SAND

3 – " . NO RECOVERY

NO SAMPLE

Sample ID: Sample Time:

Analytical Suite: ☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: Date:

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: SG29
Primary/Secondary/Background: PRIMARY
Sample Date: 4/19/22
Vessel: JW ~~Tieton~~ MAZAMA
Sampling Crew: J. ULRICH
L. TOCHKO
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 1352
Station Depart: 1422
Logged by: J. ULRICH
River Mile: —
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	7	1355	1521729.42	118242.54	26.1	2	—	N
2	17	1408	1521731.61	118224.10	25.8	7.5	—	N
3	16.1	1416	1521731.23	118254.89	27.4	0	—	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1: PROBE W/ LEADLINE - HARD BOTTOM. VERY LOW RECOVERY IN SAMPLER - 95% SHELLS, 5% COBBLES (2-3 INCH, SUB-ANG)

2: " - HARD BOTTOM. ~3 ~~CM~~ JWF ~~3~~ IN OF SHELLS (~~90~~ JWF >95%), TRACE GRAVEL

3: " - HARD BOTTOM. 3X LARGE COBBLES

NO SAMPLE

Sample ID: —
Sample Time: —

Analytical Suite: ☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by:
Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: SG30
Primary/Secondary/Background: SECONDARY
Sample Date: 4/19/22
Vessel: MAZAMA ~~Tieton~~ JUE
Sampling Crew: J. ULRICH
K. TOCHKO
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 1426
Station Depart: 1456
Logged by: J. ULRICH
River Mile: /
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	0.8	1425	1521844.79	118159.72	26.8	<1	—	N
2	21	1435	1521850.60	118140.40	25.8	<1	—	N
3	17	1446	1521827.63	118162.07	27.3	<1	—	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

- 1 – PROBE BOTTOM w/ LEADLINE – HARD. VERY FEW SMALL ~~ROCKS~~ COBBLES JUE (1-2-IN, SUB-ANG)
- 2 – " – HARD. SAME AS ABOVE. SUB-ROUND – SUB-ANG
- 3 – " – HARD. SAME AS ABOVE

NO SAMPLE

Sample ID:

Sample Time:

Analytical Suite:
☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: SG31
Primary/Secondary/Background: PRIMARY
Sample Date: 4/19/22
Vessel: MAZAMA ~~Tieton~~ WE
Sampling Crew: J. ULRICH
L. ~~FOCK~~ WE TOCHKO
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 1620
Station Depart: 1645
Logged by: J. ULRICH
River Mile: —
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	20.1	1621	1521936.94	118001.57	31.8	<1	0	N
2	4.7	1627	1521958.24	117996.25 ~~HARD~~	26.9	0	0	N
3	23	1637	1521915.19	117998.88	26.9	0	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - PROBE W/ LEADLINE - HARD. TRACE SAND/SED/GRAVEL

2 - " - HARD. NO RECOV.

3 - " - HARD. TRACE SAND/SED/GRAVEL

NO SAMPLE

Sample ID: Sample Time:

Analytical Suite: ☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: SG32
Primary/Secondary/Background: PRIMARY
Sample Date: 4/19/2022
Vessel: MAZAMA ~~Tieton~~ [✓ WF]
Sampling Crew: J. ULRICH
L. TOCHKO
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 1457
Station Depart: 1518
Logged by: J. ULRICH
River Mile: —
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	16.5	1458.	1521738.38	118380.09	16.9	<1	—	N
2	21	1507	1521739.82	118347.77	22.6	4	—	N
3	21.19	1514	1521770.93	118366.02	22.7	—	—	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

- 1ST ATTEMPT – PROBE W/ LEADLINE – HARD – LRG ~~ROCK~~ COBBLE & SHELLS
- 2nd ATTEMPT – " HARD – SHELLS
- 3RD ATTEMPT – " HARD – LARGE COBBLE

NO SAMPLE

Sample ID: —
Sample Time: —

Analytical Suite: ☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: J.U
Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: SG33
Primary/Secondary/Background: SECONDARY
Sample Date: 4/19/22
Vessel: MAZAMA ~~Tieton~~ JUE
Sampling Crew: J. ULRICH
L. TOCHKO
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 1528
Station Depart: 1555
Logged by: J. ULRICH
River Mile: —
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	24.7	1538	1521863.55	118266.35	23.1	0	—	N
2	16.4	1548	1521897.52	118243.03	25.9	0	—	N
3	19.6	1558	1521871.86	118234.11	23.4	<1	—	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - NO RECOVERY. TRACE GRAVEL|SAND|SED - PROBED W/ LEADLINE - HARD

2 - PROBED W/ LEADLINE - HARD. NO RECOVERY

3 - " - HARD. TRACE GRAVEL|SAND|SED - NO RECOVERY

NO SAMPLE

Sample ID: —
Sample Time: —

Analytical Suite:
☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: SG34
Primary/Secondary/Background: PRIMARY
Sample Date: 4/19/22
Vessel: MAZAMA ~~Tieton~~ JUF
Sampling Crew: J. WRICH
L. TOCHKO
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 1558
Station Depart: 1618
Logged by: J. WRICH
River Mile: —
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	22	1600	1521946.70	118164.08	28.4	—	—	N
2	0.37	1606	1521963.79	118151.72	27.6	<1	—	N
3	18.5	1613	1521974.57	118135.39	28.4	<1	—	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 – PROBE W/ LEADLINE – HARD. NO RECOVERY

2 – " – HARD. TRACE SAND/GRAVEL

3 – " – HARD. SAME AS ATTEMPT 2

NO SAMPLE

Sample ID: —
Sample Time: —

Analytical Suite: ☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: QLM
Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: D100
Tide Datum: NAVD 88
Primary/Secondary/Background: PRIMARY
Water Elevation: TBD
Sample Date: 4/29/22
Station Arrival: 0748
Vessel: MAZAMA ~~Tieton~~ JWE
Station Depart: 0805
Sampling Crew: J. ULRICH
Logged by: J. ULRICH
C. TORGERSON
River Mile: /
M. DUFFIELD
Collection method: Power Grab Sampler
E. SANTANA

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet) Easting	Northing	Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
1	7	0751	1520453.33	117994.56	8.4	0	0	N
2	11	0756	1520441.61	117994.81	6.8	0	0	N
3	20	0800	1520452.17	117980.92	9.4	0	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - PROBE W/ LEAD LINE - HARD. COBBLES IN JAWS. FEW SHELLS. ~~NO~~ JWE VIDEO DID NOT RECORD

2 - " . ALGAE & GRASS.

3 - " . GRASS

NO SAMPLE

Sample ID: /
Sample Time: /

Analytical Suite: ☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: Date: 4/29/22

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: D160
Primary/Secondary/Background: PRIMARY
Sample Date: 4/28/22
Vessel: MAZAMA ~~Tieton~~ JWP
Sampling Crew: J. WURICH
C. TORGERSON
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 0934
Station Depart: 1000
Logged by: J. WURICH
River Mile:
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	9	0935	1520506.84	117996.04	6.8	0	0	N
2	17	0939	1520492.76	118002.00	6.6	0	0	N
3	21	0943	1520514.70	117984.03	7.8	5	0-5	Y
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - PROBE W/ LEADLINE - HARD W/ SOME SOFT PATCHES. COBBLE IN JAWS

2 - " . COBBLES IN JAWS.

3 - . ~~TRACE SAND~~ JWP 50 % GRASS. SP - MED. GRAINED, NO ODOR. 2.5Y 3/2.

Sample ID: BNSF-D160-042822-0-5
Sample Time: 0950

Analytical Suite:
☒ Ammonia (SM4500 NH3) ☒ T. Sulfides (SW9030) ☒ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☒ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☒ TPH DRO/RRO (NWTPH-Dx) ☒ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☒ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: Jeu
Date: 4/29/22

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: D240
Primary/Secondary/Background: SECONDARY
Sample Date: 4/28/22
Vessel: MAZAMA ~~Tieton~~ (14ft)
Sampling Crew: J. ULRICH
C. TORGERSON
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 0913
Station Depart: 0930
Logged by: J. ULRICH
River Mile: —
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet) Easting	Northing	Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
1	10.5	0916	1520581.08	118005.88	7.3	0	0	N
2	10	0922	1520592.26	117989.93	8.4	0	0	N
3	20	0927	1520573.55	117998.69	8.1	0	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - PROBE W/ LEADLINE - HARD. LRG COBBLES

2 - " . SOFT. GRASS & ALGAE

3 - " . HARD. GRASS, LRG. CHUNK OF METAL

NO SAMPLE

Sample ID: —
Sample Time: —

Analytical Suite: ☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: **Date:** 4/28/22

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID:	E320	Tide Datum:	NAVD 88
Primary/Secondary/Background:	SECONDARY	Water Elevation:	TBD
Sample Date:	4/28/22	Station Arrival:	0844
Vessel:	MAZAMA ~~Tieton~~ JWF	Station Depart:	0910
Sampling Crew:	J. ULRICH	Logged by:	J. ULRICH
	C. TORGERSON	River Mile:	—
	M. DUFFIELD	Collection method:	Power Grab Sampler
	E. SANTANA		

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	0.5	0847	1520671.71	117993.00	7.1	0	0	N
2	19.5	0851	1520667.30	117973.94	6.9	0	0	N
3	13	0856	1520659.82	117990.58	7.2	4	0-4	Y
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - PROBE W/ LEADLINE - SOFT. GRASS

2 - " . GRASS. VIDEO DID NOT RECORD

3 - " . SP - MED ~~[illegible]~~ GRAINED. NO ODOR MOTTLED 2.5Y 3/2 & 2.5Y 2.5/1 (BLACK)

VIDEO DID NOT RECORD

Sample ID: BNSF-E320-042822 Sample Time: 0905

Analytical Suite: ☑ Ammonia (SM4500 NH3) ☑ T. Sulfides (SW9030) ☑ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☑ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☑ TPH DRO/RRO (NWTPH-Dx) ☑ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☑ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: JLu Date: 4/29/22

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: E380
Primary/Secondary/Background: SECONDARY
Sample Date: 4/28/22
Vessel: MAZAMA ~~Tieton~~ JUP
Sampling Crew: J. WLRICH
C. TORGERSON
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 0814
Station Depart: 0840
Logged by: J. WLRICH
River Mile:
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	3	0816	1520729.99	117994.21	5.9	0	0	N
2	17	0820	1520714.49	117992.40	7.3	3	0-3	Y
3	6.8	0829	1520737.77	117997.08	6.9	4	0-4	Y
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1- PROBE W/ LEADLINE - SOFT. TRACE ALGAE

2- " . SOFT. SP-MED GRAINED. NO ODOR. 2.5Y 3/2.
SOME GRASS

3 - " , SP - MED GRAINED. NO ODOR. 2.5Y 3/2
FEW SHELLS.

Sample ID: BNSF-E380-042822-0-4
Sample Time: 0835

Analytical Suite: ☑ Ammonia (SM4500 NH3) ☑ T. Sulfides (SW9030) ☑ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☑ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☑ TPH DRO/RRO (NWTPH-Dx) ☑ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☑ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: Jlu **Date:** 4/29/22

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID:	E460	Tide Datum:	NAVD 88
Primary/Secondary/Background:	PRIMARY	Water Elevation:	TBD
Sample Date:	4/29/22	Station Arrival:	0811
Vessel:	MAZAMA ~~Tieton~~ (JUF)	Station Depart:	0850
Sampling Crew:	J. ULRICH	Logged by:	J. ULRICH
	C. TORGERSON	River Mile:	—
	M. DUFFIELD	Collection method:	Power Grab Sampler
	E. SANTANA		

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet) Easting	Northing	Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
1	1.5	0813	1520475.89	117902.19	12.2	4	0-4	Y
2	10	0829	1520468.89	117898.49	12.4	0	0	N
3	(JUF) ~~20~~ 19	0834	1520487.85	117888.20	14.2	3	0-3	Y
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 – PROBE W/ LEADLINE – SOFT. SP – MED GRAINED. NO ODOR. MICACEOUS. TRACE SHELLS/ROOTS 2.5Y 3/2.

2. " SOFT. ~ ~~50%~~ (JUF) GRASS

3. " . SOFT . SP – MED-GRAINED. NO ODOR. MICACEOUS. TRACE SHELLS/ROOTS. 2.5Y 3/2.

Sample ID: BNSF-E460-042922-0-4

Sample Time: 0845

Analytical Suite: ☑ Ammonia (SM4500 NH3) ☑ T. Sulfides (SW9030) ☑ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☑ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☑ TPH DRO/RRO (NWTPH-Dx) ☑ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☑ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: Date: 4/29/22

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID:	H260	**Tide Datum:**	NAVD 88
Primary/Secondary/Background:	SECONDARY	**Water Elevation:**	TBD
Sample Date:	4/29/22	**Station Arrival:**	1001
Vessel:	MAZAMA ~~Tieton~~ (JUF)	**Station Depart:**	1013
Sampling Crew:	J. URICH	**Logged by:**	J. URICH
	G. TORGERSON	**River Mile:**	
	M. DUFFIELD	**Collection method:**	Power Grab Sampler
	E. SANTANA		

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet) Easting	Northing	Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
1	1	1003	1520713.84	117935.92	14.1	0	0	N
2	18	1006	1520697.89	117932.39	14.4	0	0	N
3	20	1010	~~15207~~ (JUF) ↑	↑	13.8	0	0	N
4			1520728.15	117943.69				
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 – PROBE W/ LEADLINE – SOFT. GRASS.

2 – " . GRASS

3 – " . GRASS

NO SAMPLE

Sample ID:

Sample Time:

Analytical Suite:
☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: **Date:** 4/29/22

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: H360
Primary/Secondary/Background: SECONDARY
Sample Date: 4/29/22
Vessel: MAZAMA ~~Tieton~~ (JUF)
Sampling Crew: J. ULRICH
C. TORGERSON
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 0854
Station Depart: 0925
Logged by: J. ULRICH
River Mile: —
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	2	0856	1520547.89	117850.59	22.5	1	0-1	Y
2	22	0902	1520540.34	117831.99	27.4	4	0-4	Y
3	14	0911	1520337.40	117856.78	21.3	8	0-8	Y
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - PROBE W/ LEADLINE - HARD. SP- MED GRAINED. NO ODOR. 2.5Y 3/2. TRACE SHELLS. - HOLD

2 - " . SOFT. ~~SP~~ (JUF) LITH: SAME ~~A A~~ (JUF) AS ATTEMPT 1. HOLD.

3. " . " . LITH: SAME AS ATTEMPT 1

Sample ID: BNSF-H360-042922-0-8
Sample Time: 0920

Analytical Suite: ☑ Ammonia (SM4500 NH3) ☑ T. Sulfides (SW9030) ☑ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☑ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☑ TPH DRO/RRO (NWTPH-Dx) ☑ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☑ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: Date: 4/29/22

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: I120
Primary/Secondary/Background: PRIMARY
Sample Date: 4/29/22
Vessel: MAZAMA ~~Tieton~~ JUF
Sampling Crew: J. WULICH
C. TORGERSON
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 1015
Station Depart: 1100
Logged by: J. WULICH
River Mile: —
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	1	1016	1520615.95	117930.01	12.5	3	0-3	Y
2	19.5	1023	1520598.95	117922.23	13.1	6	0-6	Y
3	15	1034	1520622.76	117918.42	14.3	4	0-4	Y
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1- PROBE W/ LEADLINE - SOFT. 45% GRASS. ~3 CM SED.
SP-MED-GRAINED. 2.5Y 3/2 - HOLD

2 - ″ . 25% GRASS. LITH: SAME AS ATTEMPT 1

3 - ″ . 20% GRASS. LITH: SAME AS ATTEMPT 1

Sample ID: BNSF-I120-042922-0-6
Sample Time: 1040

Analytical Suite: ☑ Ammonia (SM4500 NH3) ☑ T. Sulfides (SW9030) ☑ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☑ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☑ TPH DRO/RRO (NWTPH-Dx) ☑ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☑ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by:
Date: 4/29/22

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: L320
Primary/Secondary/Background: SECONDARY
Sample Date: 4|29|22
Vessel: MAZAMA ~~Tieton~~ UP
Sampling Crew: J. ULRICH
C. TORGERSON
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 0929
Station Depart: 1000
Logged by: J. ULRICH
River Mile:
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	3	0931	1520676.71	117853.93	28.7	2	0-2	Y
2	17.5	0941	1520663.20	117846.13	28.7	0	0	N
3	17	0945	1520688.73	117840.68	29.7	2	0-2	Y
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - PROBE W| LEADLINE - HARD W| SOME POTENTIAL SOFT AREAS.
SP - MED - GRAINED, BIOLOGICAL ODOR,
~10% CLAM SHELLS, 2.5Y 3/2. -HOLD

2 - " - HARD. COBBLES, TRACE ALGAE

3 - " - HARD. LITH: SAME AS ATTEMPT 1.

Sample ID: BNSF-L320-042922-0-2
Sample Time: 0955

Analytical Suite:
☑ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☑ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☑ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☑ TPH DRO/RRO (NWTPH-Dx) ☑ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☑ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by:
Date: 4/29/22

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: BG01
Primary/Secondary/Background: BACKGROUND
Sample Date: 4/20/22
Vessel: MAZAMA ~~Tieton~~ JMP
Sampling Crew: J. ULRICH
L. TICHKO
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 1124
Station Depart: 1150
Logged by: J. ULRICH
River Mile: —
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	6	1126	1542519.95	115839.58	30.2	<1	0	N
2	21.5	1137	1542541.97	115839.69	29.5	<1	0	N
3		1146	1542497.68	115836.13	29.9	<1	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - CURRENT TOO STRONG TO PROBE BOTTOM. SM COBBLES W/ SHELLS & TRACE FINES

2 - " . FEW COBBLES/SHELLS

3 - " . FEW COBBLES.

NO SAMPLE

Sample ID: —
Sample Time: —

Analytical Suite:
☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: JLM Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID:	BG02	Tide Datum:	NAVD 88
Primary/Secondary/Background:	BACKGROUND	Water Elevation:	TBD
Sample Date:	4/20/22	Station Arrival:	1055
Vessel:	MAZAMA ~~Tieton~~ (JUF)	Station Depart:	1115
Sampling Crew:	J. ULRICH	Logged by:	J. ULRICH
	L. TOCHKO	River Mile:	—
	M. DUFFIELD	Collection method:	Power Grab Sampler
	E. SANTANA		

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	1.8	1056	1539726.62	113144.45	29.1	3	0	N
2	22	1104	1539706.27	113134.37	29.9	<1	0	N
3	9.5	1111	1539732.83	113151.83	30.3	2	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - CURRENT TOO STRONG TO PROBE BOTTOM. COBBLES & SHELLS

2 - " . FEW SM. COBBLES.

3 - " . SM. COBBLES - SUB-ROUND & SHELLS

NO SAMPLE

Sample ID: — Sample Time: —

Analytical Suite: ☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID:	BG03	Tide Datum:	NAVD 88
Primary/Secondary/Background:	BACKGROUND	Water Elevation:	TBD
Sample Date:	4/20/22	Station Arrival:	1031
Vessel:	MAZAMA ~~Tieton~~ JUF	Station Depart:	1047
Sampling Crew:	J. ULRICH	Logged by:	J. ULRICH
	L. TOCHKO	River Mile:	—
	M. DUFFIELD	Collection method:	Power Grab Sampler
	E. SANTANA		

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	6.5	1032	1536453.91	111940.71 ~~119~~ JUF	34.4	0	0	N
2	25	1037	1536482.86	111929.96	33.8	0	0	N
3	18.75	1042	1536446.83	111955.62	30.1	0	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - CURRENT TOO STRONG TO PROBE. NO RECOVERY

2 - " . NO RECOVERY ← * MISSED CAMERA FOR THIS ATTEMPT (2)

3 - " . ~~NO~~ JUF 1 COBBLE, FEW SHELLS

NO SAMPLE

Sample ID: Sample Time:

Analytical Suite: ☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: BG04
Tide Datum: NAVD 88
Primary/Secondary/Background: BACKGROUND
Water Elevation: TBD
Sample Date: 4/20/22
Station Arrival: 1001
Vessel: MAZAMA ~~Tieton~~ JUE
Station Depart: 1024
Sampling Crew: J. ULRICH
Logged by: J. ULRICH
L. TOCHKO
River Mile: —
M. DUFFIELD
Collection method: Power Grab Sampler
E. SANTANA

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	3.75	1005	1533370.71	112577.14	25.7	0	0	N
2	20	1010	1533374.16	112557.07	26.7	0	0	N
3	17.1	1018	1533376.98	112593.19	28.2	0	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 – CURRENT TOO STRONG ~~WATER TOO~~ TO PROBE. LRG COBBLE IN JAW – NO RECOVERY

2 – " – LRG BOULDER IN SAMPLER

3 – " – MED BOULDER IN SAMPLER

NO SAMPLE

Sample ID: —
Sample Time: —

Analytical Suite: ☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by:
Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: BG05
Primary/Secondary/Background: BACKGROUND
Sample Date: 4/20/22
Vessel: MAZAMA ~~Tieton~~ JLE
Sampling Crew: J. ULRICH
L. TOCHKO
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 0849
Station Depart: 0920
Logged by: J. ULRICH
River Mile: —
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	6	0849	1531444.54	114404.06	33.8	0	0	N
2	23	0902	1531430.81	114422.01	30.9	0	0	N
3	18.5	0913	1531451.26	114390.65	32.5	0	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 – CURRENT TOO STRONG / WATER TOO DEEP TO PROBE NAV CHART SAYS ROCK BOTTOM. NO RECOVERY

2 – " – LARGE COBBLE – NO RECOVERY

3 – " – SM. BOULDER – NO RECOVERY

NO SAMPLE

Sample ID: —
Sample Time: —

Analytical Suite:
☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: glu
Date:

JACOBS®

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: BG06
Primary/Secondary/Background: BACKGROUND
Sample Date: 4/20/22
Vessel: MAZAMA ~~Tieton~~ JUF
Sampling Crew: J. ULRICH
L. TOCHKO
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 0815
Station Depart: 0838
Logged by: J. ULRICH
River Mile: /
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	5.90	0818	1528929.34	116888.77	33.2	—	—	N
2	21.0	0828	1528930.11	116862.92	31.3	—	—	N
3	~~22.0~~ JUF	0834	1528929.34	116906.01	32.9	4	—	N
4	21.6							
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1- PROBE W/ LEADLINE - HARD. - LRG COBBLE IN JAWS JUF

2- " - HARD. LRG COBBLES IN JAW.

3 - " - HARD. COBBLES 3/4-IN - 3IN, SUB-ANG-SUB-ROUND
MANY SHELLS, TRACE SAND

NO SAMPLE

Sample ID: ________ Sample Time: ________

Analytical Suite: ☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: Jlu Date: ________

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: BG07
Primary/Secondary/Background: BACKGROUND
Sample Date: 4/21/22
Vessel: MAZAMA ~~Tieton~~ (UP)
Sampling Crew: J. ULRICH
L. TOCHKO
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 0911
Station Depart: 0929
Logged by: J. ULRICH
River Mile:
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	1.6	0913	1526554.16	118948.51	48.7	0	0	N
2	20	0918	1526545.60	118931.43	48.1	0	0	N
3	19.1	0924	1526558.99	118967.83	48.0	<1	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 — CURRENT TOO STRONG & WATER TOO DEEP TO PROBE BOTTOM.
LRG. BOULDER & FEW COBBLES IN JAWS.

2 — " . LRG BOULDER IN JAWS

3 — " . FEW COBBLES & SHELLS. TRACE SAND

NO SAMPLE

Sample ID:
Sample Time:

Analytical Suite:
☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by:
Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: BG08
Primary/Secondary/Background: BACKGROUND
Sample Date: 4/21/22
Vessel: MAZAMA ~~Tieton~~ JWP
Sampling Crew: J. WURICH
L. TOCHKO
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 0848
Station Depart: 0905
Logged by: J. WURICH
River Mile:
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	0.29	0849	1528828.17	118381.86	49.6	0	0	N
2	22	0855	1528808.34	118388.63	48.3	0	0	N
3	14	0901	1528838.80	118371.22	49.1	0	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - CURRENT TOO STRONG, WATER TOO DEEP TO PROBE BOTTOM.
4X MED COBBLES

2 - " . ~~4X MED COBBLES.~~ JWP NO RECOVERY

3 - " . NO RECOVERY

NO SAMPLE

Sample ID:
Sample Time:

Analytical Suite: ☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: B609

Primary/Secondary/Background: BACKGROUND

Sample Date: ~~4/20~~ JUF 4/21/22

Vessel: MAZAMA ~~Tieton~~ JUF

Sampling Crew: J. ULRICH
L. TOCHKO
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88

Water Elevation: TBD

Station Arrival: 0820

Station Depart: 0843

Logged by: J. ULRICH

River Mile: —

Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	14.5	0824	1530186.05	117528.97	43.7	0	0	N
2	1.5	0833	1530191.88	117517.56	48.1	0	0	N
3	17.8	0840	1530193.11	117500.32	42.2	0	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 – CURRENT TOO STRONG, WATER TOO DEEP TO PROBE BOTTOM. ~~RO~~ JUF NO RECOVERY → VIDEO DID NOT RECORD @ THIS ATTEMPT

2 – " . NO RECOVERY

3 – " . NO RECOVERY

NO SAMPLE

Sample ID: —

Sample Time: —

Analytical Suite: ☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID:	BG10 A * SEE NOTES	Tide Datum:	NAVD 88
Primary/Secondary/Background:	BACKGROUNG	Water Elevation:	TBD
Sample Date:	4/20	Station Arrival:	1450
Vessel:	MAZAMA ~~Tieton~~ JUF	Station Depart:	1516
Sampling Crew:	J. ULRICH	Logged by:	J. ULRICH
	L. TOCHKO	River Mile:	/
	M. DUFFIELD	Collection method:	Power Grab Sampler

Attempt #	*Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	~~583~~ 570 JUF	1456	1532483.66	117377.29	14.4	2	~~0~~	N
~~2~~ JUF	570							
JUF ~~3~~ 2	552	1502	1532466.37	117388.73	12.8	0	0	N
JUF ~~4~~ 3	588	1508	1532490.46	117356.30	16.0	0	0	N
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - PROBE BOTTOM W/ LEADLINE. HARD. COBBLES, SHELLS, TRACE SAND

2 - " . NO RECOVERY. ~ 21 FT FROM ATTEMPT 1

3 - " . ONE SM COBBLE. ~22.3 FROM ATTEMPT 1

NO SAMPLE

*ASSESSED PLANNED STATION BG10. BOTTOM SURFACE PER DEPTH FINDER & BATHYMETRY INDICATE HIGHLY IRREGULAR SURFACE. THIS, COMBINED W/ VERY STRONG CURRENT HAVE LEAD TEAM TO CHOOSE ALTERNATE STATION (BG10A). REFS TO DISTANCE FROM TARGET ARE (BG10A ACTUAL to PLANNED BG10)

Sample ID: Sample Time:

Analytical Suite:
☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: BG 11
Primary/Secondary/Background: BACKGROUND
Sample Date: 4/20/22
Vessel: MAZAMA ~~Tieton~~ JUF
Sampling Crew: J. ULRICH
L. TOCHKO
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 1357
Station Depart: 1422
Logged by: J. ULRICH
River Mile:
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	15	1358	1536582.49	118256.48	54.7	0	0	N
2	9.2	1405	1536587.30	118262.12	52.1	0	0	N
3	22.5	1415	1536618.09	118266.63	61.2	0	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - TOO DEEP TO PROBE BOTTOM. LOSE VISIBILITY ON CAMERA DUE TO DEPTH. 1 LRG BOULDER IN JAWS.

2 - " . MIN. VISIBILITY ON CAMERA @ DEPTH. 1 LRG COBBLE IN JAWS

3 - " " NO RECOVERY

NO SAMPLE

Sample ID:
Sample Time:

Analytical Suite: ☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: Alu
Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: BG12
Primary/Secondary/Background: BACKGROUND
Sample Date: 4/20/22
Vessel: MAZAMA ~~Tieton~~ JWF
Sampling Crew: J. ULRICH
L. TOCHKO
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 1240
Station Depart: 1347
Logged by: J. ULRICH
River Mile: —
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	8.79	1326	1538899.44	119725.92	72.9	<1	0	N
2	7.60	1335	1538903.02	119712.45	69.5	0	0	N
3	5.00	1341	1538891.86	119736.31	75.2	<1	0	N
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 – TOO DEEP TO PROBE BOTTOM. ~~LOOSE~~ LOSE VISIBILITY W/ GRAB SAMPLER CAMERA DUE TO DEPTH JWF ~~@~~ JWF. UNABLE TO RECORD BOTTOM CONDITIONS. FEW SM - MED COBBLES

2 – " . SAME ISSUE W/ CAMERA. COBBLES IN JAW.

3 – " . " . FEW LRG COBBLES

NO SAMPLE

*1240 - HAD TO ADJUST CABLE LENGTH DUE TO DEPTH

Sample ID: —
Sample Time: —

Analytical Suite:
☐ Ammonia (SM4500 NH3) ☐ T. Sulfides (SW9030) ☐ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☐ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☐ TPH DRO/RRO (NWTPH-Dx) ☐ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☐ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: BG13*
Primary/Secondary/Background: BACK GROUND
Sample Date: 4/21/22
Vessel: MAZAMA ~~Tieton~~ JUP
Sampling Crew: J. ULRICH
L. TOCHKO
M. DUFFIELD

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 0945
Station Depart: 1035
Logged by: J. ULRICH
River Mile: —
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	N/A	0945	1542836.86	118224.60	3.7	11	0-10	Y
2								
3								
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1- PROBE BOTTOM W/ LEADLINE-SOFT. ~~GREY~~ JUE 2.5Y 3/2 (VERY DARK GREYISH BROWN)
SP - med grain, no odor, ~~FOO~~ JUF PLANT MATERIAL,
Few shells

COLLECT MS/MSD : BNSF-BG13-042122-0-10-MS
BNSF-BG13-042122-0-10-MSD
@0950

* ADDED BACKGROUND ~~LO~~ JUF STATION - SEE LOG BOOK

Sample ID: BNSF-BG13-042122-0-10
Sample Time: 0950

Analytical Suite:
☑ Ammonia (SM4500 NH3)
☑ T. Sulfides (SW9030)
☑ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☑ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☑ TPH DRO/RRO (NWTPH-Dx)
☑ SVOCs and PAHs (SW8270E/SW8270E-SIM)
☑ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: JEU
Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: BG14 *
Primary/Secondary/Background: BACKGROUND
Sample Date: 4/27/22
Vessel: MAZAMA ~~Tieton~~ JUP
Sampling Crew: J. ULRICH
C. TORGERSON
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 0815
Station Depart: 0900
Logged by: J ULRICH
River Mile:
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	NA	0821	1541923.51	119101.89	13.4	4	0-3	Y
2	1.2	0831	1541924.63	119102.05	13.5	6.5	0-5.5	Y
3	6.8	0841	1541930.28	119100.35	13.4	4	0-3	Y
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 – PROBE W/ LEADLINE – SOFT. SAMPLER HAS ~50% GRASS.
95% SP – med. grained, no ODOR. 2.5Y 3/1. 5% ML.
(VERY DARK GREY)

2 – " , SAMPLER HAS ~5% GRASS.
LITH: SAME AS ATTEMPT 1.

3 – " , SAMPLER HAS ~20% GRASS.
LITH: SAME AS ABOVE

* ADDED LOCATION TO ENSURE MULTIPLE BACKGROUND LOCS COLLECTED

Sample ID: BNSF-BG14-042722-0-~~5.5~~ JUP 5.5
Sample Time: 0850

Analytical Suite:
☑ Ammonia (SM4500 NH3)
☑ T. Sulfides (SW9030)
☑ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☑ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☑ TPH DRO/RRO (NWTPH-Dx)
☑ SVOCs and PAHs (SW8270E/SW8270E-SIM)
☑ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be ~~average~~ JUP MAX depth of the grabs included in composite.

Reviewed by: Jlu
Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3S93500
Project Location: Wishram, WA

Station ID:	BG15 *	Tide Datum:	NAVD 88
Primary/Secondary/Background:	BACKGROUND	Water Elevation:	TBD
Sample Date:	4/27/22	Station Arrival:	0918
Vessel:	MAZAMA ~~Tieton~~ JUP)	Station Depart:	0935
Sampling Crew:	J. URICH	Logged by:	J. URICH
	C. TORGERSON	River Mile:	—
	M. DUFFIELD	Collection method:	Power Grab Sampler
	E. SANTANA		

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	NA	0919	1534632.59	111156.99	6.1	11	0-10	Y
2								
3								
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 – PROBE W/ LEAD LINE – SOFT. SP – MED GRAINED, BIOLOGICAL ODOR (SAND BAR @ MOUTH OF DESCHUTES COMMONLY FREQUENTED BY SEAGULLS). 2.5Y 3/1 (VERY DARK GREY)

* ADDED STATION TO ENSURE SUFFICIENT # OF BACKGROUND SAMPLES

Sample ID: BNSF-BG15-042722-0-1[illegible] **Sample Time:** 0925

Analytical Suite:
☑ Ammonia (SM4500 NH3) ☑ T. Sulfides (SW9030) ☑ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☑ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☑ TPH DRO/RRO (NWTPH-Dx) ☑ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☑ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: BG16*
Primary/Secondary/Background: BACKGROUND
Sample Date: 4/27/22
Vessel: MAZAMA ~~Tieton~~ JUP
Sampling Crew: J. ULRICH
C. TORGERSON
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 0937
Station Depart: 0950
Logged by: J. ULRICH
River Mile:
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet) Easting	Northing	Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
1	NA	0938	1533741.83	111539.23	7.7	17	0-10	Y
2								
3								
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - PROBE W/ LEADLINE - SOFT. SP - med grain. JUP BIOLOGICAL ODOR. 2.5Y 3/1, (VERY DARK GREY)

* ADDED STATION TO ENSURE SUFFICIENT #OF BACKGROUND SAMPLES

Sample ID: BNSF-BG16-042722-0-10
Sample Time: 0945

Analytical Suite: ☑ Ammonia (SM4500 NH3) ☑ T. Sulfides (SW9030) ☑ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☑ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☑ TPH DRO/RRO (NWTPH-Dx) ☑ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☑ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by:
Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: BG17*
Primary/Secondary/Background: BACKGROUND
Sample Date: 4/27/22
Vessel: MAZAMA ~~Tieton~~ JMC
Sampling Crew: J. ULRICH
C. TORGERSON
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 0957
Station Depart: 1028
Logged by: J. ULRICH
River Mile:
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	NA	0958	1532768.17	111932.96	7.6	20	0 - 10	Y
2								
3								
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - PROBE W/ LEADLINE - SOFT. VIDEO DID NOT RECORD.

SP - MED GRAINED, SLIGHT BIOLOGICAL ODOR. 2.5Y 3/1 (VERY DARK GREY)

> FD02-042722-0-10 @ 1010

* ADDED STATION TO ENSURE SUFFICENT # OF BACKGROUND SAMPLES

Sample ID: BNSF-BG17-042722-0-10
Sample Time: 1005

Analytical Suite:
☑ Ammonia (SM4500 NH3) ☑ T. Sulfides (SW9030) ☑ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☑ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☑ TPH DRO/RRO (NWTPH-Dx) ☑ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☑ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3S93500
Project Location: Wishram, WA

Station ID: BG18 *
Primary/Secondary/Background: BACKGROUND
Sample Date: 4/27/22
Vessel: MAZAMA ~~Tieton~~ JUE
Sampling Crew: J. ULRICH
C. TORGERSON
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 1025
Station Depart: 1042
Logged by: J. ULRICH
River Mile: —
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	NA	1026	1531750.74	112057.48	4.8	13	0-10	Y
2								
3								
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - PROBE W/ LEADLINE - SOFT. SP - MED GRAINED. NO ODOR. 2.5Y 3/1 (VERY DARK GREY)

* ADDED STATION TO ENSURE SUFFICIENT OF BACKGROUND SAMPLES

Sample ID: BNSF-BG18-042722-0-10
Sample Time: 1035

Analytical Suite:
☑ Ammonia (SM4500 NH3)
☑ T. Sulfides (SW9030)
☑ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☑ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☑ TPH DRO/RRO (NWTPH-Dx)
☑ SVOCs and PAHs (SW8270E/SW8270E-SIM)
☑ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by:

Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID:	~~SOWUP~~ BG19*	Tide Datum:	NAVD 88
Primary/Secondary/Background:	BACKGROUND	Water Elevation:	TBD
Sample Date:	4/27/22	Station Arrival:	1055
Vessel:	MAZAMA ~~Tieton~~ (WUP)	Station Depart:	1115
Sampling Crew:	J. ULRICH	Logged by:	J. ULRICH
	C. TURGERSON	River Mile:	—
	M. DUFFIELD	Collection method:	Power Grab Sampler
	E. SANTANA		

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	NA	1055	1531163.01	116612.51	2.5	12	0-10	Y
2								
3								
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - PROBE W/ LEADLINE - SOFT. SP - COARSE GRAINED, SLIGHT BIOLOGICAL ODOR. 2.5Y 3/2

* ADDED STATION TO ENSURE SUFFICIENT # OF BACKGROUND SAMPLES

Sample ID: BNSF-BG19-042722-0-10 **Sample Time:** 1105

Analytical Suite:
☑ Ammonia (SM4500 NH3) ☑ T. Sulfides (SW9030) ☑ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☑ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☑ TPH DRO/RRO (NWTPH-Dx) ☑ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☑ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by: Date:

JACOBS

Site Name: BNSF Wishram
Project Number: D3593500
Project Location: Wishram, WA

Station ID: BG20*
Primary/Secondary/Background: BACKGROUND
Sample Date: 4/29/22
Vessel: MAZAMA ~~Tieton~~ [illegible]
Sampling Crew: J. ULRICH
C. TORGERSON
M. DUFFIELD
E. SANTANA

Tide Datum: NAVD 88
Water Elevation: TBD
Station Arrival: 1120
Station Depart: 1150
Logged by: J. ULRICH
River Mile:
Collection method: Power Grab Sampler

Attempt #	Distance from Target Center (ft)	Time	As-Sampled Coordinates (International Feet)		Water Depth (ft)	Recovery (cm)	Sample Interval (cm)	In composite?
			Easting	Northing				
1	NA	1119	1542294.04	119025.98	8.4	10	0-10	Y
2								
3								
4								
5								
6								
7								
8								
9								
10								

Sediment description (grain size, odor, color) for each grab:

1 - PROBE W/ LEADLINE - SOFT. SP - MED GRAINED, NO ODOR,
[illegible] 2.5Y 2.5/1

+ MS/MSD (NO GRAIN SIZE)
BNSF-BG20-042922-0-10-MS
BNSF-BG20-042922-0-10-MSD

Sample ID: BNSF-BG20-042922-0-10
Sample Time: 1125

Analytical Suite:
☑ Ammonia (SM4500 NH3) ☑ T. Sulfides (SW9030) ☑ Metals (SW6020B/SW7470B) &TOC (SW9060A)
☑ PCB congeners (EPA 1669C) & Dioxins/Furans (EPA 1613B)
☑ TPH DRO/RRO (NWTPH-Dx) ☑ SVOCs and PAHs (SW8270E/SW8270E-SIM) ☑ Grainsize (D7928/D6913)

Notes: Sample depth reported in field summary table will be average depth of the grabs included in composite.

Reviewed by:
Date: 4/29/22

Appendix B-2

Field Notebook Scans

CONTENTS

PAGE	REFERENCE	DATE

Location BNSF - WISHRAM, WA Date 4/19/22

Project / Client BNSF RI Phase 1

TASK: BEGIN GRAB SAMPLING
FOR PHASE 1 RI (56
PROPOSED ~~L~~ JUF STATIONS)

PERSONNEL:

JACOBS { J. ULRICH - TM/SL/FTL (JUF)
L. TOCHKO - SL ALT (LLT)

GRAVITY { E. SANTANA - DECKHAND (ES)
M. DUFFIELD - CAPTAIN (MD)

WEATHER: (AM) PARTLY CLOUDY, ~~5~~ JUF 47°F
(PM) OVERCAST/PARTLY CLOUDY, 50°F LITE RAIN

0700 - GRAVITY & JACOBS ONSITE.
PREP FOR FIRST DAY OF GRAB SAMPLING. TEAM WILL USE CAMERA MOUNTED ~1.5 FT ABOVE GRAB SAMPLER TO HELP ASSESS BOTTOM CONDITIONS. WILL ALSO USE MEASURED PROBING ROD TO DETERMINE SED DEPTH, WHERE POSSIBLE (E.G., WATER COLUMN NOT TOO DEEP)

0815 - CONDUCT H&S BRIEFING/ ORIENTATION. TOPICS INCLUDE:

- JACOBS STAFF & DECKHAND TO WEAR

Location BNSF WISHRAM, WA Date 4/19/22
Project / Client BNSF WISHRAM RI PHASE 1

IMMERSION SUITS WHILE ONBOARD
- SLIPS/TRIPS/FALLS
- OVER-WATER WORK HAZARDS
- SECURITY OF VEHICLES WHILE UNATTENDED

0845 - HEAD TOWARDS SG STATIONS.
- GRAVITY LOADS STATION COORDS

0900 ~~0910~~ - ENGINE OVERHEATS. ALLOW TO COOL BEFORE RESTART
- * CLEARED SANDTRAP & TURNED ON COOLING PUMP ENGINE FUNCTIONING

0935 - EXPERIENCING GPS SOFTWARE ISSUES. TROUBLESHOOT W/ GRAVITY IT.

1100 - TROUBLESHOOTING SUCCESSFUL RUNNING HYPACK SYSTEM ON V 2018 VS. V 2020.

1130 - BEGIN GRAB SAMPLING @ STATION SG01 FULL RECOVERY @ ATTEMPT 1.
COLLECT SAMPLES: (SEE GRAB SAMPLE LOG)
1200 - BNSF-SG01-041922-0-10
1215 - FD01-041922-0-10

Location BNSF WISHRAM, WA Date 4/19/22
Project / Client BNSF WISHRAM RI Phase 1

1231 - ONSITE SG02 STATION
- 1ST ATTEMPT - LOW RECOV; 2-3 VERY SM. BLEBS VISIBLE (BIOLOGICAL?) AT ONSET OF ~~[illegible]~~ PLACING POTENTIAL SAMPLE INTO PAN.
  ~~DISS[illegible]~~ BLEB NO LONGER VISIBLE AFTER 1 MIN.
- 2ND ATTEMPT - LOW RECOV. ~~[illegible]~~
- 3RD ATTEMPT - FULL RECOVERY.

1335 - COLLECT SAMPLE: BNSF-SG02-041922-0-10 (SEE GRAB SAMPLE LOG)

1355 - ONSITE STATION SG29
- 1ST ATTEMPT: SHELLS/ROCKS - REJECT
- 2ND ATTEMPT: SHELLS/ROCKS - REJECT
- 3RD ATTEMPT: ROCKS - REJECT

* NO SAMPLE (SEE GRAB LOG)

1426 - ONSITE STATION SG30
- 1ST ATTEMPT: REJECT - FEW ROCKS
- 2ND ATTEMPT: REJECT - FEW ROCKS
- 3RD ATTEMPT: REJECT - ONE LRG ROCK

* NO SAMPLE (SEE GRAB LOG)

1457 - ONSITE SG32 STATION
- 1ST ATTEMPT: REJECT - LRG ROCK/SHELLS
- 2ND ATTEMPT: REJECT - SHELLS
- 3rd ATTEMPT: REJECT - ROCK

Location BNSF WISHRAM, WA Date 4/19/22

Project / Client BNSF WISHRAM RI PHASE 1

* NO SAMPLE (SEE GRAB LOG)

1528 - ONSITE SG33 STATION

- ATTEMPT 1 : REJECT, NO RECOV
- ATTEMPT 2 : REJECT, NO RECOV
- ATTEMPT 3 : REJECT, NO RECOV

* NO SAMPLE (SEE GRAB LOG)

1558 - ONSITE SG34 STATION

- ATTEMPT 1 : REJECT - NO RECOV
- ATTEMPT 2 : REJECT - NO RECOV
- ATTEMPT 3 : REJECT - NO RECOV

* NO SAMPLE (SEE GRAB LOG)

1620 - ONSITE STATION SG31

- ATTEMPT 1 : REJECT - NO RECOV
- ATTEMPT 2 : REJECT - NO RECOV
- ATTEMPT 3 : REJECT - NO RECOV

* NO SAMPLE (SEE GRAB LOG)

1650 - RETURN TO DOCK. DEMOB FOR THE DAY.

1715 - OFFSITE

4/19/22

Location BNSF WISHRAM, WA Date 4/20/22

Project / Client BNSF WISHRAM RI PHASE 1

TASK: CONTINUE GRAB SAMPLING

PERSONNEL:

JACOBS { J. ULRICH - SL/FTL/TM (JUF)
L. TOCHKO - ALTSL (LT)

GRAVITY { M. DUFFIELD - CAPTAIN (MD)
E. SANTANA - DECKHAND (ES)

WEATHER: (AM) PARTLY CLOUDY, 48°F, CALM
(PM) RAIN, LITE WINDS, 50°F

0700 - TEAM ONSITE CELILO PARK DOCK. JUF @ BNSF RAILYARD ORGANIZING SAMPLE FRIDGE/SUPPLIES. COORDINATE W/ B. JONES-STANLEY ON TODAYS PICKUP/SHIPMENT. SAMPLES WILL GO OVERNIGHT TO LAB.

0730 - ALL STAFF @ BOAT, CONDUCT H&S BRIEFING. TOPICS INCLUDE:

- CHANGING WEATHER CONDITIONS
- PAYING ATTENTION TO WAKE FROM PASSING VESSELS
- SLIPS/TRIPS/FALLS
- SUN PROTECTION

Location BNSF WISHRAM, WA Date 4/20/22

Project / Client BNSF WISHRAM RI PHASE 1

0818 - ONSITE STATION BG06

*~~N~~ JWF · ATTEMPT 1: REJECT - ROCKS

· ATTEMPT 2: REJECT - ROCKS

· ATTEMPT 3: REJECT - ROCKS

JWF ~~- ONSITE STA~~ * **NO SAMPLE**

(SEE GRAB LOG)

0849 - ONSITE STATION BG05

· ATTEMPT 1: REJECT - NO RECOV

· ATTEMPT 2: REJECT - NO RECOV

· ATTEMPT 3: REJECT - NO RECOV

* **NO SAMPLE** (SEE GRAB LOG)

0930 - RETURN TO DOCK TO GRAB ADDT'L SUPPLIES

1001 - ONSITE STATION BG04

· ATTEMPT 1: REJECT - NO RECOV

· ATTEMPT 2: REJECT - NO RECOV

· ATTEMPT 3: REJECT - NO RECOV

* **NO SAMPLE** (SEE GRAB LOG)

1031 - ONSITE STATION BG03

* MISSED CAMERA ON 2ND ATTEMPT

· ATTEMPT 1: REJECT - NO RECOV

· ATTEMPT 2: REJECT - NO RECOV

· ATTEMPT 3: REJECT - NO RECOV

* **NO SAMPLE** (SEE GRAB LOG)

Location BNSF WISHRAM, WA Date 4/20/22

Project / Client BNSF WISHRAM RI PHASE 1

1055 - ONSITE STATION BG02

· ATTEMPT 1: REJECT - ~~NO RECOV~~ ROCKS JWF

· ATTEMPT 2: REJECT - ~~NO RECOV~~ ROCKS JWF

· ATTEMPT 3: REJECT - ROCKS

* **NO SAMPLE** (SEE GRAB LOG)

1124 - ONSITE STATION BG01

· ATTEMPT 1: REJECT. ROCKS

· ATTEMPT 2: REJECT. ROCKS

· ATTEMPT 3: REJECT. ROCKS

* **NO SAMPLE** (SEE GRAB LOG)

1245 ~~1320~~ JWF - ONSITE BG12 STATION

(HAD TO ADJUST CABLE DEPTH, ETC AS STATION WATER DEPTH IS ~~IS~~ JWF SIGNIFICANTLY DEEPER THAN PREVIOUS STATIONS)

1328 - ~~DROP~~ JWF DEPLOY GRAB SAMPLER

· ATTEMPT 1: REJECT. ROCKS

· ATTEMPT 2: REJECT. ROCKS

· ATTEMPT 3: REJECT. ROCKS

* **NO SAMPLE** (SEE GRAB LOG)

1357 - ONSITE BG11 STATION

· ATTEMPT 1: REJECT. ROCK

· ATTEMPT 2: REJECT. ROCK

· ATTEMPT 3: REJECT. NO RECOV

Location WISHRAM BNSF, WA Date 4/20/22

Project / Client BNSF WISHRAM RI PHASE 1

* NO SAMPLE (SEE GRAB LOG)

1430 - ONSITE STATION BG10.
ASSESSED PLANNED STATION BG10.
BOTTOM TOPOGRAPHY PER
DEPTH FINDER & BATHYMETRY
~~ST~~ JUF INDICATE HIGHLY IRREGULAR
SURFACE. CURRENT IS ALSO VERY
STRONG HERE. TEAM HAS CONCERNS
OF LOSING/DAMAGING EQUIPMENT.
SCOUT AREA ~550 FT EAST OF
PLANNED BG10. FIND AREA
THAT MAY SERVE AS ALTERNATE
STATION. DISCUSS W/ PM. PM
OKS. WILL NAME ALT. STATION
"BG10A"

1450 - ONSITE ~~ATT~~ JUF BG10A STATION
- ATTEMPT1 : REJECT. ROCKS
- ATTEMPT2 : REJECT. NO RECOV
- ATTEMPT3 : REJECT. NO RECOV

* NO SAMPLE (SEE GRAB LOG)

1545 - RETURN TO DOCK & DEMOB
1600 - OFFSITE

JUL 4/20/22

Location WISHRAM BNSF, WA Date 4/~~30~~ 21/22 JUF

Project / Client BNSF WISHRAM RI Phase I

TASK: FINISH COLLECTING BACKGROUND
GRAB SAMPLES & PICK BACK UP
W/ SED GRAB STATIONS

PERSONNEL:

JACOBS { J. ULRICH - TM/FTL/SL (JUF)
L. TOCHKO - ALT SL (LT)

GRAVITY { M. DUFFIELD - CAPTAIN (MD)
E. SANTANA - DECKHAND (ES)

WEATHER: (AM) PARTLY CLOUDY, 48°F, CALM
(PM) CLEAR, WINDS PICKUP 6-11 MPH

0700 - ONSITE. PREP FOR DAY

0745 - CONDUCT H&S BRIEFING. TOPICS
INCLUDE:
- CHANGING CONDITIONS
- PROPER ERGONOMICS/STRETCHING
- SLIPS/TRIPS/FALLS
- STAYING HYDRATED

0822 - ONSITE STATION BG09
- ATTEMPT 1: REJECT. NO RECOV
- ATTEMPT2 : "
- ATTEMPT 3 : "

* NO SAMPLE (SEE GRAB LOG)

JUF

Rite in the Rain

Location BNSF WISHRAM, WA Date 4/21/22

Project / Client BNSF WISHRAM, RI PHASE 1

0848 - ONSITE STATION BG08
- ATTEMPT 1 REJECT. ROCKS
- ATTEMPT 2 : REJECT. NO RECOV
- ATTEMPT 3 : "

* NO SAMPLE (SEE GRAB LOG)

0911 - ONSITE ~~B~~ JLF STATION BG07
- ATTEMPT 1 : REJECT. ROCKS
- ATTEMPT 2. REJECT. ROCKS
- ATTEMPT 3 : REJECT. ROCKS

* NO SAMPLE (SEE GRAB LOG)

0933 - HEAD TO ADDED STATION BG13.
WHILE IN TRANSIT 4/20/22, THE FIELD TEAM OBSERVED AN AREA W/ SEDIMENT ON SE CORNER OF MILLER ISLAND. DISCUSSED W/ PM THAT WE WOULD SAMPLE FROM BG13 IF PLANNED STATION (BG01 - BG12) DID NOT PRODUCE SAMPLES. (SEE GRAB LOG)
- ATTEMPT 1 - SUCCESSFUL.

0950 - COLLECT PRIMARY & MS/MSD SAMPLES:
BNSF-BG13-042122-0-10-~~1~~ JLF
BNSF-BG13-042122-0-10-MS
BNSF-BG13-042122-0-10-MSD

Location BNSF WISHRAM, WA Date 4/21/22

Project / Client BNSF WISHRAM RI PHASE 1

1116 - ONSITE STATION SG28
- ATTEMPT 1 - REJECT. NO RECOV
- ATTEMPT 2 - REJECT. NO RECOV
- ATTEMPT 3 - REJECT. NO RECOV

* NO SAMPLE (SEE GRAB LOG)

1132 - ONSITE STATION SG27
- ATTEMPT 1 : REJECT. NO RECOV
- ATTEMPT 2 : REJECT. NO RECOV
- ATTEMPT 3 : "

* NO SAMPLE (SEE GRAB LOG)

1150 - ONSITE STATION SG26
- ATTEMPT 1 : REJECT. NO RECOV.
- ATTEMPT 2 : "
- ATTEMPT 3 : "

* NO SAMPLE (SEE GRAB LOG)

1206 - ONSITE STATION SG25
- ATTEMPT 1 : REJECT. NO RECOV.
- ATTEMPT 2 : "
- ATTEMPT 3 : "

* NO SAMPLE (SEE GRAB LOG)

1230 - RETURN TO DOCK TO PICK UP ADDT'L SUPPLIES.

1335 - ONSITE STATION BG24
- ATTEMPT 1 : REJECT. SHELLS

Location BNSF WISHRAM, WA Date 4/21/22

Project / Client BNSF WISHRAM RI PHASE 1

- ATTEMPT 2 : REJECT. NO RECOV
- ATTEMPT 3 : REJECT. "

* NO SAMPLE (SEE GRAB LOG)

1357 - ONSITE STATION SG23
- ATTEMPT 1 : REJECT - SHELLS
- ATTEMPT 2 - RECOV ~~6~~ 7 JUF CM
- ATTEMPT 3 - REJECT. NO RECOV

1440 - COLLECT SAMPLE ~~BNSF-SG3~~ JUF

BNSF-SG23-042122-0-6

(SEE GRAB LOG)

1458 - ONSITE STATION SG22
- ATTEMPT 1 : REJECT. NO RECOV
- ATTEMPT 2 : "
- ATTEMPT 3 : "

* NO SAMPLE (SEE GRAB LOG)

1517 - RETURN TO DOCK TO DEMOB

1600 - OFFSITE. SAMPLES TO SAMPLE FRIDGE

4/21/22

Location BNSF WISHRAM, WA Date 4/22/22

Project / Client BNSF WISHRAM RI PHASE 1

TASK : CONTINUE GRAB SAMPLING

PERSONNEL:

JACOBS { J. ULRICH - SL/FTL/TM (JUF)
L. TOCHKO - Alt. SL (LT)

GRAVITY { M. DUFFIELD (MD)
E. SANTANA (ES)

WEATHER: (AM) CLEAR, 47°F, WINDY

0700 - ONSITE CELILO PARK DOCK. PREP FOR DAY.

~~0730~~ JUF

0745 - CONDUCT H&S BRIEFING. TOPICS INCLUDE:
- CHANGING CONDITIONS. WINDS ARE EXPECTED TO BUILD THROUGHOUT THE MORNING.
- COMMUNICATIONS
- BOAT SAFETY

0818 - ONSITE STATION ~~JUF~~ SG17
- ATTEMPT 1 : REJECT. ROCKS
- ATTEMPT 2 : REJECT. NO RECOV
- ATTEMPT 3 : "

* NO SAMPLE (SEE GRAB LOG)

0841 - ONSITE STATION SG16

Location BNSF WISHRAM Date 4/22/22

Project / Client BNSF WISHRAM RI PHASE 1

- ATTEMPT 1: REJECT. ROCKS
- ATTEMPT 2: REJECT. SHELLS
- ATTEMPT 3, REJECT. SHELLS/ROCKS

* NO SAMPLE (SEE GRAB LOG)

0909 - ONSITE STATION SG10

- ATTEMPT 1: REJECT. NO RECOV
- ATTEMPT 2: REJECT. NO RECOV
- ATTEMPT 3: REJECT. NO RECOV

* NO SAMPLE (SEE GRAB LOG)

0926 - ONSITE STATION SG09

- ATTEMPT 1: REJECT - ROCKS
- ATTEMPT 2: "
- ATTEMPT 3: "

* NO SAMPLE (SEE GRAB LOG)

0953 - ONSITE STATION SG08

- ATTEMPT 1: REJECT. NO RECOV
- ATTEMPT 2: "
- ATTEMPT 3: "

* NO SAMPLE (SEE GRAB LOG)

1013 - ONSITE STATION SG07

- ATTEMPT 1: REJECT. SHELLS/ROCKS
- ATTEMPT 2: "
- ATTEMPT 3: "

* NO SAMPLE (SEE GRAB LOG)

Location BNSF WISHRAM Date 4/22/22

Project / Client BNSF WISHRAM RI PHASE 1

1035 - ONSITE STATION SG05

- ATTEMPT 1: REJECT. ROCKS
- ATTEMPT 2: "
- ATTEMPT 3: "

* NO SAMPLE (SEE GRAB LOG)

1100 - WINDS PICKING UP. HEAD BACK TO DOCK & DEMOB / PREP SAMPLES FOR DELIVERY TODAY (LT WILL RUN OUT TO CORNFOOT FEDEX LOCATION IN PDX.

1200 - OFFSITE

4/22/22

Location BNSF WISHRAM, WA Date 4/25/22

Project / Client BNSF WISHRAM RI PHASE 1

TASK: CONTINUE GRAB SAMPLING

PERSONNEL:

J. ULRICH - SL/FTL/TM (JUF)
C. TORGERSON - AHSL (CT)
M. DUFFIELD - CAPTAIN (MD)
E. SATANA - DECKHAND (ES)

WEATHER: (AM) OVERCAST, 50°F, CALM
(PM)

0700 - ONSITE CELILO PARK. PREP FOR DAYS EVENT. CT WILL BE 2ND JACOBS STAFF FOR REMAINDER OF EFFORT. ORIENT TO THE SITE, PLANNED EFFORT, ETC.

0800 - CONDUCT H&S BRIEFING W/ TEAM. TOPICS INCLUDE:
- SLIPS/TRIPS/FALLS
- COMMUNICATION
- BOAT SAFETY
- OVERWATER WORK
- CHANGING CONDITIONS

0827 - ONSITE STATION SG21
- ATTEMPT 1: REJECT. NO RECOV
- ATTEMPT 2: "
- ATTEMPT 3: "

* NO SAMPLE (SEE GRAB LOG)

Location BNSF WISHRAM, WA Date 4/25/22

Project / Client BNSF WISHRAM RI PHASE 1

0848 - ONSITE STATION SG20
- ATTEMPT 1: REJECT - TRACE ALGAE
- ATTEMPT 2: REJECT - NO RECOV
- ATTEMPT 3: "

* NO SAMPLE (SEE GRAB LOG)

0900 - ONSITE STATION SG19
- ATTEMPT 1: REJECT: SHELLS/ROCKS
- ATTEMPT 2: REJECT. NO RECOV.
- ATTEMPT 3: "

* NO SAMPLE (SEE GRAB LOG)

0915 - ONSITE STATION SG18
- ATTEMPT 1: REJECT. SHELLS/ROCKS
- ATTEMPT 2: REJECT. NO RECOV.
- ATTEMPT 3: REJECT. SHELLS/ROCKS.

* NO SAMPLE (SEE GRAB LOG)

0932 - ONSITE STATION SG13
- ATTEMPT 1: REJECT. ROCKS.
- ATTEMPT 2: REJCT. NO RECOV.
- ATTEMPT 3: 1.5 CM RECOV

0955 - COLLECT SAMPLE (SEE GRAB LOG)
BNSF-SG13-042522-0-1.5

1015 - ONSITE STATION SG14
- ATTEMPT 1: REJECT. NO RECOV.
- ATTEMPT 2: SHELLS/ROCKS

Location BNSF WISHRAM, WA Date 4/25/22

Project / Client BNSF WISHRAM, RI PHASE 1

- ATTEMPT 3: REJECT. NO RECOV.

* NO SAMPLE (SEE GRAB LOG)

1037 - ONSITE STATION SG15
- ATTEMPT 1: REJECT. ROCKS
- ATTEMPT 2: "
- ATTEMPT 3: "

* NO SAMPLE (SEE GRAB LOG)

1100 - ONSITE STATION SG06
- ATTEMPT 1: REJECT. ROCKS
- ATTEMPT 2: "
- ATTEMPT 3: "

* NO SAMPLE (SEE GRAB LOG)

1118 - ONSITE STATION SG04
- ATTEMPT 1: REJECT. ROCKS
- ATTEMPT 2: "
- ATTEMPT 3: "

* NO SAMPLE (SEE GRAB LOG)

1133 - RETURN TO DOCK TO RE-UP SUPPLIES.

1220 - HEADED OUT TOWARD SG11, WINDS HAVE PICKED UP & WAVES BUILT. WILL CALL OFF SAMPLING FOR REMAINDER OF THE DAY.

1225 - BACK TO DOCK. DEMOB. JUF

1315 - OFFSITE - RUN SAMPLES TO BNSF.

JUU 4/25/22

Location BNSF WISHRAM, WA Date 4/26/22

Project / Client BNSF WISHRAM, RI PHASE 1

TASK: CONTINUE GRAB SAMPLING

PERSONNEL:

J. ULRICH - FTL/STL/TM (JUF)

WEATHER: (AM) WINDY, PARTLY CLOUDY, 49°F.

0645 - JUF ONSITE CELILO PARK TO ASSESS WIND CONDITIONS. WINDS ARE ALREADY STRONG & WHITE CAPS VISIBLE FROM SHORE. REACH OUT TO TEAM TO DISCUSS STANDBY DAY DUE TO WEATHER.

* TEAM WILL RECONVENE TOMORROW WHEN WINDS ARE FORECAST TO BE MORE FAVORABLE.

0700 - ~~JUF~~ JUF OFFSITE. HEAD TO BNSF WISHRAM SAMPLE STORAGE TO DROP ADD'TL SHIPPING SUPPLIES.

JUU 4/26/22

Location BNSF WISHRAM, WA Date 4/27/22

Project / Client BNSF WISHRAM RI PHASE I

TASK: CONTINUE GRAB SAMPLING

PERSONNEL:

J. ULRICH - SL/FTL/TM (JUF)
C. TORGERSON - Alt. SL (CT)
M. DUFFIELD - CAPTAIN (MD)
E. SANTANA - DECKHAND (ES)

WEATHER: (AM) PARTLY CLOUDY, CALM, 50°F

0700 - TEAM ONSITE CELILO PARK DOCK. PREP FOR DAY. CONDUCT H&S BRIEFING. TOPICS INCLUDE:
- CHANGING CONDITIONS
- OVERWATER WORK
- COMMUNICATIONS
- HYDRATION

* ~~ONSI~~ JUF PM INFORMED THAT ~6 ADDITIONAL BACKGROUND LOCATIONS ARE NEEDED. TEAM DISCUSSED POTENTIAL STATIONS AS:
- 1) @ NE END OF MILLER ISLAND
- 2-5 @ CONFLUENCE OF DESCHUTES/COLUMBIA RIVERS
- 6 @ W END OF MILLER ISLAND

* HEAD TO BACKGROUND POTENTIAL

Location BNSF WISHRAM, WA Date 4/27/22

Project / Client BNSF WISHRAM RI PHASE I

LOCS.

0815 - ONCITE NEW STATION BG14
- ATTEMPT 1: 4 CM SAND
- ATTEMPT 2: 5.5 CM SAND
- ATTEMPT 3: 4 CM SAND

0850 - COLLECT COMPOSITE SAMPLE (ALL 3 ATTEMPTS) (SEE GRAB LOG)
BNSF-BG14-042722-0-5.5

0918 - ONSITE ~~B1~~ JUF NEW STATION BG15
- ATTEMPT 1: 11 CM - FULL RECOV
- ~~ATTEMPT 2:~~ JUF
- ~~ATTEMPT 3:~~ JUF

0925 - COLLECT GRAB SAMPLE (SEE GRAB LOG)
BNSF-BG15-042722-0-10

0937 - ONSITE NEW STATION BG16
- ATTEMPT 1: 17 CM - FULL RECOV

0945 - COLLECT SAMPLE (SEE GRAB LOG)
BNSF-BG16-042722-0-10

0957 - ONSITE NEW STATION BG17
- ATTEMPT 1: 20 CM - FULL RECOV

1005 - COLLECT SAMPLES (SEE GRAB LOG)
BNSF-BG17-042722-0-10

Location BNSF WISHRAM, WA Date 4/27/22

Project / Client BNSF WISHRAM RI PHASE I

1010 - COLLECT FD
- FD02-042722-0-10

1025 - ONSITE NEW STATION BG18
- ATTEMPT 1: 13 cm - FULL RECOV

1035 - COLLECT SAMPLE (SEE GRAB LOG)
BNSF-BG18-042722-0-10

1055 - ONSITE NEW STATION BG19
- ATTEMPT 1: 12 cm - FULL RECOV

1105 - COLLECT SAMPLE (SEE GRAB LOG)
BNSF-BG19-042722-0-10

1129 - ONSITE STATION SG03
- ATTEMPT 1: 6.5 cm
- ATTEMPT 2: 2 cm
- ATTEMPT 3: 2 cm

1200 - COLLECT COMPOSITE SAMPLE
(ALL 3 ATTEMPTS) SEE GRAB LOG
BNSF-SG03-042722-0-5.5

1215 - BACK TO DOCK TO PICKUP MORE SUPPLIES

1254 - ONSITE STATION SG12
- ATTEMPT 1: REJECT. NO RECOV
- ATTEMPT 2: "
- ATTEMPT 3: "

*NO SAMPLE (SEE GRAB LOG)

Location BNSF WISHRAM, WA Date 4/27/22

Project / Client BNSF WISHRAM RI PHASE I

1300 - WINDS HAVE PICKED UP. RETURN TO DOCK FOR THE DAY. WILL RUN SAMPLES TO BNSF WISHRAM SAMPLE FRIDGE.

~~133~~ JUP 1345 - OFFSITE

4/27/22

Location BNSF WISHRAM, WA Date 4/28/22

Project / Client BNSF WISHRAM RI PHASE I

TASK: CONTINUE GRAB SAMPLING

PERSONNEL:

J. ULRICH - SL/FTL/TM (JUF)
C. TORGERSON - AH. SL (CT)
M. DUFFIELD - CAPTAIN (MD)
E. SANTANA - DECKHAND (ES)

WEATHER: (AM) OVERCAST, 49°F, LITE WIND

0700 - ONSITE CELILO PARK DOCK. PREP FOR DAY. CONDUCT H & S BRIEFING. TOPICS INCLUDE:

- COMMUNICATIONS
- SPATIAL AWARENESS
- CHANGING CONDITIONS
- SLIPS/TRIPS/FALLS
- PROPER PPE

0740 - ONSITE STATION S611

- ATTEMPT 1: REJECT. GRASS
- ATTEMPT 2: 5 cm
- ATTEMPT 3. REJECT. GRASS

0805 - COLLECT SAMPLE (SEE GRAB LOG)

BNSF-~~B6~~ JUF S611-042822-0-5

0814 - ONSITE STATION E380

- ATTEMPT 1: REJECT. NO RECOV
- ATTEMPT 2: 3 cm
- ATTEMPT 3: 4 cm

Location BNSF WISHRAM, WA Date 4/28/22

Project / Client BNSF WISHRAM RI PHASE I

0835 - COLLECT COMPOSITE SAMPLE (ATTEMPTS 2 & 3 - SEE GRAB LOG)

BNSF-E380-042822-0-4

0844 - ONSITE STATION E320

- ATTEMPT 1: REJECT. ~~NO~~ JUF GRASS
- ATTEMPT 2: "
- ATTEMPT 3: 4 cm

0905 - COLLECT SAMPLE (SEE GRAB LOG)

BNSF-E320-042822-0-4

0913 - ONSITE STATION D240

- ATTEMPT 1: REJECT. ROCKS
- ATTEMPT 2: REJECT. GRASS
- ATTEMPT 3: REJECT. METAL/GRASS

* NO SAMPLE (SEE GRAB LOG)

0934 - ONSITE STATION D160

- ATTEMPT 1: REJECT. ROCKS
- ATTEMPT 2: "
- ATTEMPT 3: 5 cm

0950 - COLLECT SAMPLE (SEE GRAB LOG)

BNSF-D160-042822-0-5

1000 - WINDS HAVE PICKED. RETURN TO SHORE FOR THE DAY

1015 - SETUP TO COLLECT EBS

Location BNSF WISHRAM, WA Date 4/28/22

Project / Client BNSF WISHRAM, RI PHASE 1

1050 - COLLECT EB01

EB01-042822-01

1200 - COLLECT EB02

EB02-042822-02

1335 - ~~DEMOB~~ OFFSITE FOR THE DAY

4/28/22

Location BNSF WISHRAM, WA Date 4/29/22

Project / Client BNSF WISHRAM RI PHASE 1

TASK: CONTINUE GRAB SAMPLING

PERSONNEL

JACOBS { J. ULRICH - FTL/SL/TM (JUF)
C. TORGERSON - ALT. SL (CT)

GRAVITY { M. DUFFIELD - CAPTAIN (MD)
E. SANTANA - DECKHAND (ES)

WEATHER: (AM) CLEAR, CALM, 49°F (PM)

0700 - ONSITE CELILO PARK DOCK. PREP FOR DAY. CONDUCT H&S BRIEFING. TOPICS INCLUDE:

- SUNSCREEN
- HYDRATION
- CHANGING CONDITIONS
- COMPLACENCY

0748 - ONSITE STATION D100

- ATTEMPT 1: REJECT. GRASS/COBBLES
- ATTEMPT 2: REJECT. "
- ATTEMPT 3: "

*NO SAMPLE (SEE GRAB)

0811 - ONSITE E460

- ATTEMPT 1: 4 CM
- ATTEMPT 2: REJECT. GRASS
- ATTEMPT 3: 3 cm

Location BNSF WISHRAM, WA Date 4/29/22

Project / Client BNSF WISHRAM RI PHASE I

0845 - COLLECT COMPOSITE SAMPLE (FROM
ATTEMPTS 1 & 3 - SEE GRAB LOG)
BNSF-E460-042922-0-4

0854 - ONSITE STATION H360
- ATTEMPT 1: 1 CM
- ATTEMPT 2: 4 CM
- ATTEMPT 3: 8 CM

0920 - COLLECT COMPOSITE SAMPLE
(ALL 3 ATTEMPTS - SEE GRAB LOG)
BNSF-H360-042922-0-8

0929 - ONSITE STATION L320
- ATTEMPT 1: 2 CM
- ATTEMPT 2: COBBLES
- ATTEMPT 3: 2 CM

0955 - COLLECT COMPOSITE SAMPLE
(ATTEMPTS 1 & 3 - SEE GRAB LOG)
BNSF-L320-042922-0-2

1001 - ONSITE STATION H260
- ATTEMPT 1: REJECT, GRASS
- ATTEMPT 2: "
- ATTEMPT 3: "

* NO SAMPLE (SEE GRAB LOG)

1015 - ONSITE STATION I120
- ATTEMPT 1: 3 CM

Location BNSF WISHRAM, WA Date 4/29/22

Project / Client BNSF WISHRAM RI PHASE I

- ATTEMPT 2: 6 CM
- ATTEMPT 3: 4 CM

1040 - COLLECT COMPOSITE SAMPLE
(ALL 3 ATTEMPTS - SEE GRAB LOG)
BNSF-I120-042922-0-6

1120 - ONSITE NEW STATION
BG20
- ATTEMPT 1 = 10 CM - FULL RECO

1125 - COLLECT SAMPLES:
BNSF-BG20-042922-0-10
BNSF-BG20-042922-0-10-MS
BNSF-BG20-042922-0-10-MSD

1225 - RETURN TO DOCK & DEMOB
FROM PHASE. WILL SHIP
ALL SAMPLES W/ OVERNIGHT
SAT DELIVERY TODAY.

1345 - OFFSITE

4/29/22

Appendix B-3
Retained and Sampled Grab Photolog

Project Title **Wishram Sediment Remedial Investigation Report**

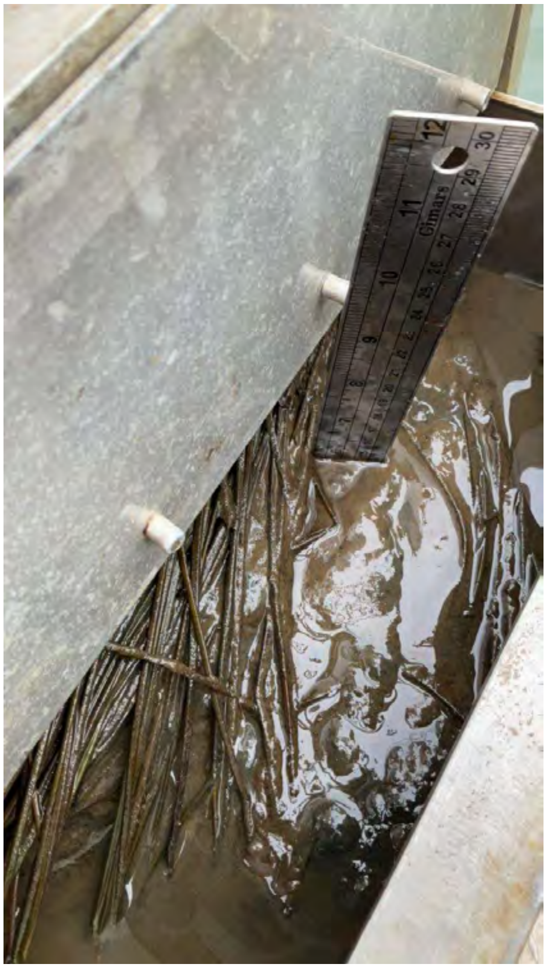
Location Wishram, Washington

Date April 19, 2022, to April 29, 2022

Sediment Grab Sampling

Photograph 1: SG01 Grab Attempt 1 - Recovery

Date taken:* *04/19/22



Photograph 2: SG02 Grab Attempt 3 - Recovery

Date taken:* *04/19/22

Photograph 3: SG03 Grab Attempt 1 - Recovery

Date taken: ***04/27/22***

Photograph 4: SG11 Grab Attempt 2 - Recovery

Date taken: ***04/28/22***

Photograph 5: SG13 Grab Attempt 3 - Recovery

Date taken: ***04/25/22***

Photograph 6: SG23 Grab Attempt 2 - Recovery

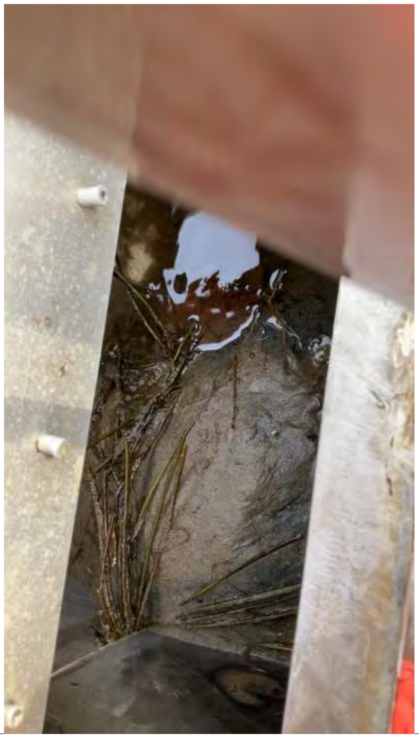
Date taken: ***04/21/22***

Photograph 7: D160 Grab Attempt 3 - Recovery

Date taken: ***04/28/22***

Photograph 8: E320 Grab Attempt 3 - Recovery

Date taken: ***04/28/22***



Photograph 9: E380 Grab Attempt 2 - Recovery

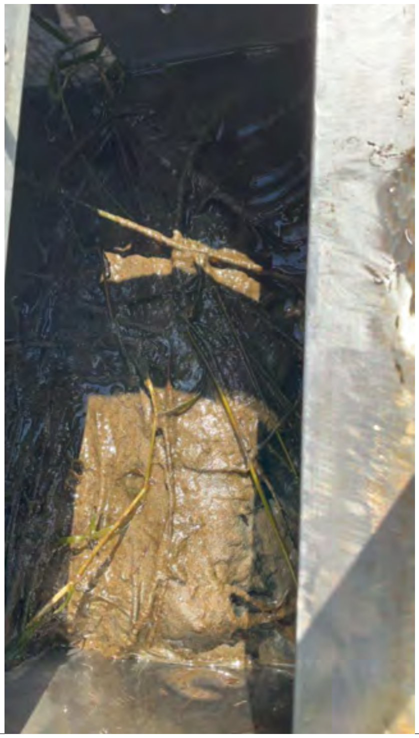
Date taken: ***04/28/22***

Photograph 10: E460 Grab Attempt 1 - Recovery

Date taken: ***04/29/22***

Photograph 11: H360 Grab Attempt 3 - Recovery

Date taken: ***04/29/22***



Photograph 12: I120 Grab Attempt 2 - Recovery

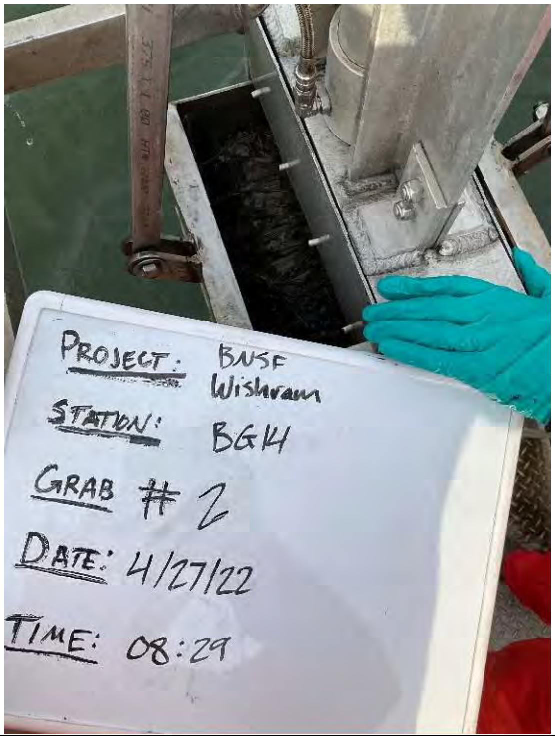
Date taken: ***04/29/22***

Photograph 13: L320 Grab Attempt 1 - Recovery

Date taken: ***04/29/22***

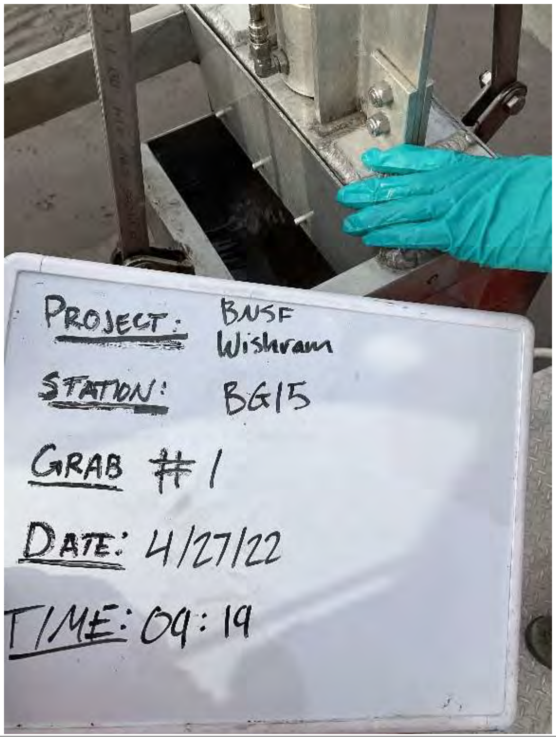
Photograph 14: BG13 Grab Attempt 1 - Recovery

Date taken: ***04/21/22***



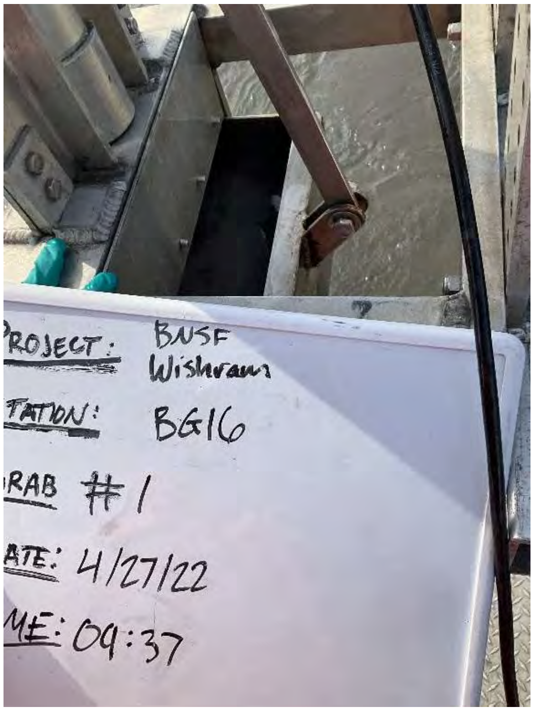
Photograph 15: BG14 Grab Attempt 2 - Recovery

Date taken: 04/27/22



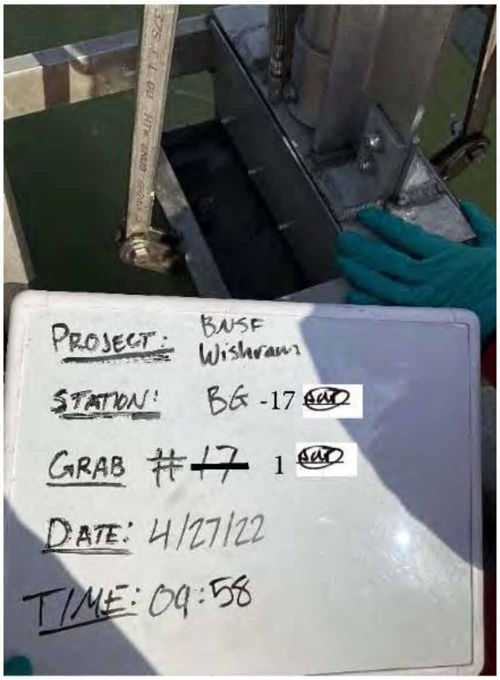
Photograph 16: BG15 Grab Attempt 1 - Recovery

Date taken: 04/27/22



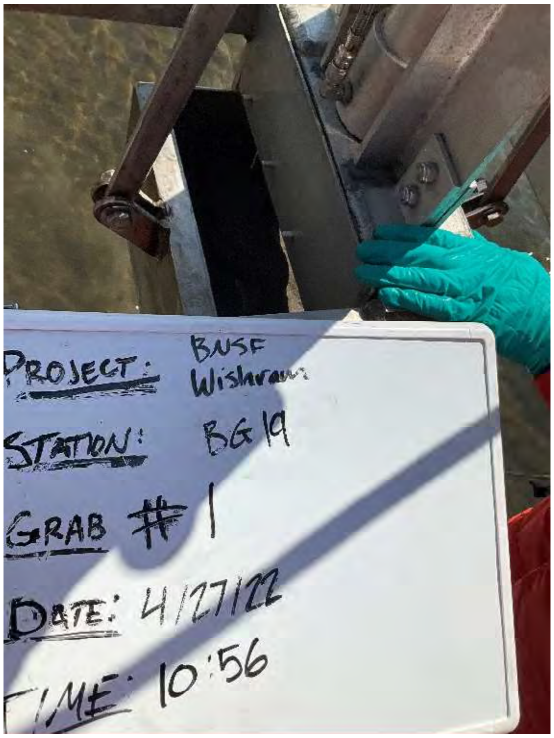
Photograph 17: BG16 Grab Attempt 1 - Recovery

Date taken: 04/27/22



Photograph 18: BG17 Grab Attempt 1 - Recovery

Date taken: 04/27/22



Photograph 19: BG19 Grab Attempt 1 - Recovery

Date taken: *04/27/22*

Appendix B-4
Representative Field Activities Photolog

Project Title: Wishram Sediment Remedial Investigation Report

Location: Wishram, Washington

Date: April 19, 2022 to April 29, 2022

Representative Field Activities

Photograph 1: SG01 Grab Attempt 1 – Grab Sampler over Water

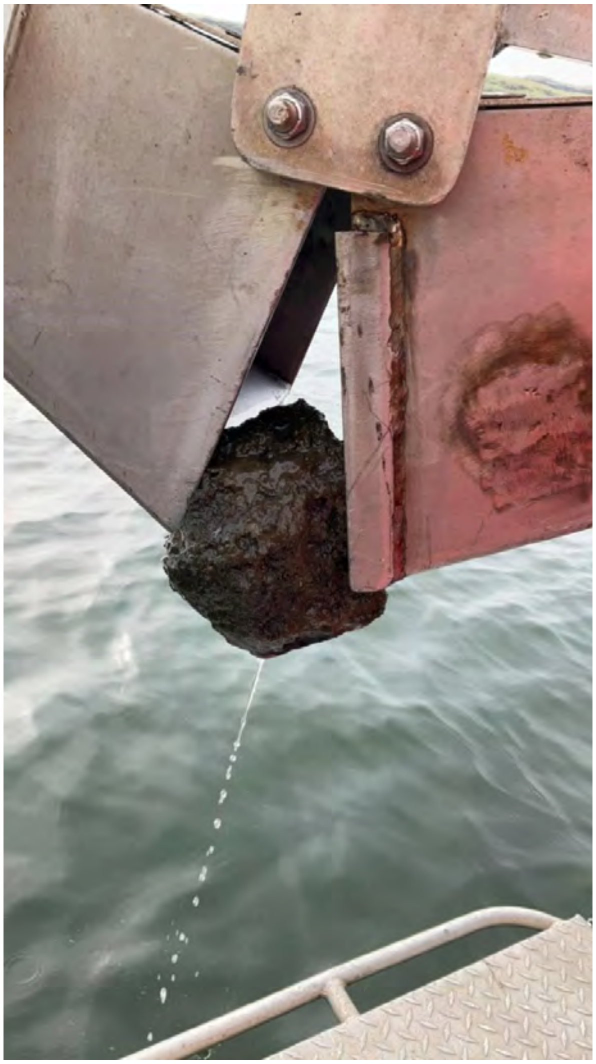
Date taken: *4/19/22*

Photograph 2: SG01 Grab Attempt 1 - Drive

Date taken: *4/19/22*

Photograph 3: BG08 Grab Attempt 3 –
No Recovery

Date taken: *4/21/2022*



Photograph 4: SG19 Grab Attempt 3 –
Rock in Jaw

Date taken: *4/25/22*

Photograph 5: SG29 Grab Attempt 2 – Shells Recovered

Date taken: *4/19/22*

Photograph 6: SG01 Grab Attempt 1 – Overlying Water

Date taken: *4/19/22*

Photograph 7: BG13 Grab Attempt 1 - Measuring Recovery

Date taken: *4/21/22*

Photograph 8: SG01 Attempt 1 – Homogenizing and Sampling

Date taken: *4/19/22*

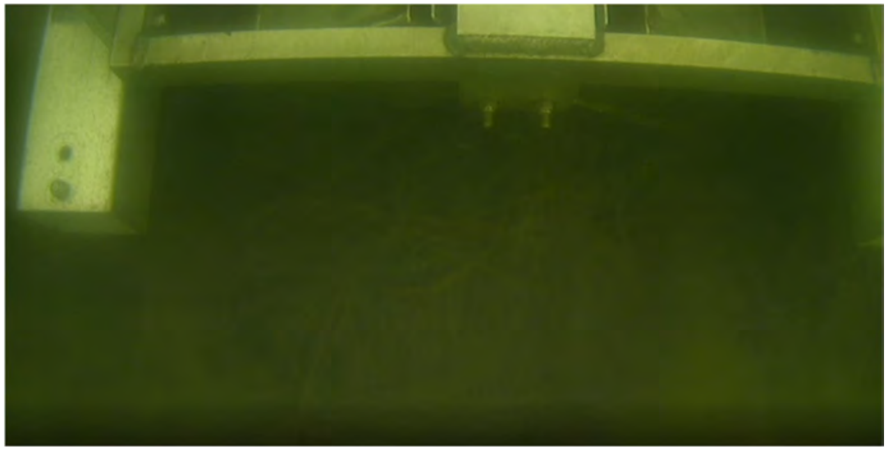
Appendix B-5
In-situ Sediment Conditions Photolog

Project Title: Wishram Sediment Remedial Investigation Report

Location: Wishram, Washington

Date: April 19, 2022 to April 29, 2022

Sediment Grab In-situ Conditions

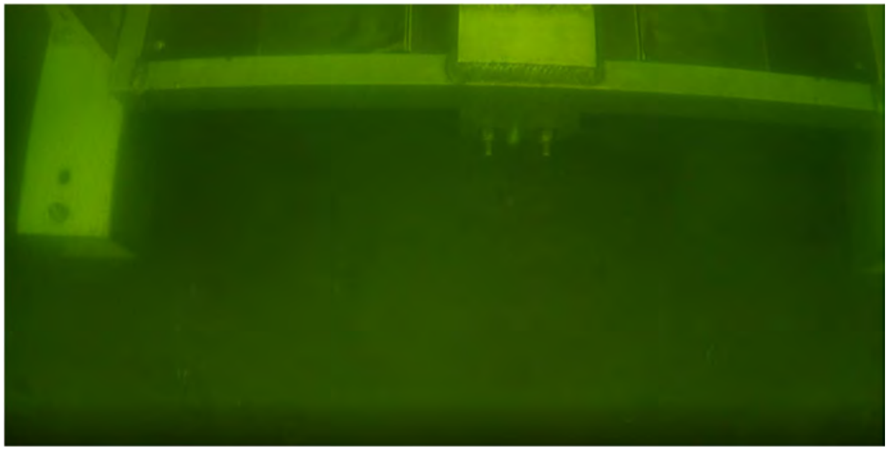


Photograph 1: SG01 Grab Attempt 1 - In-situ Sediment Surface

Date taken: 4/19/22

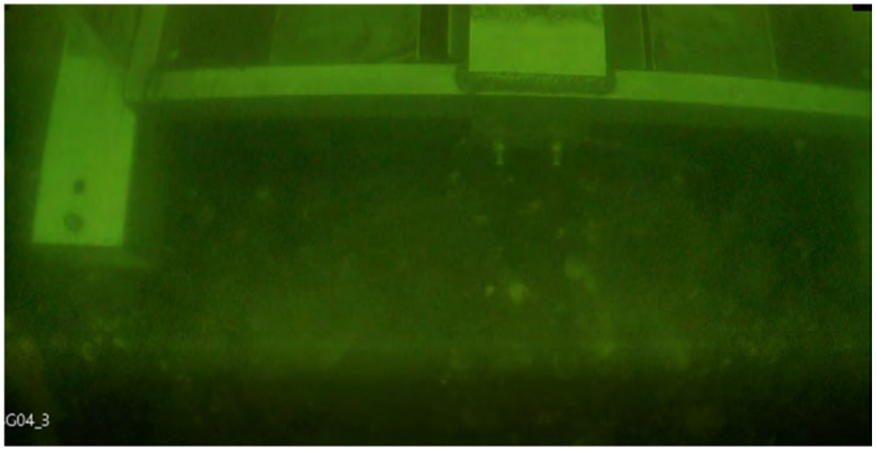
Photograph 2: SG02 Grab Attempt 3 - In-situ Sediment Surface

Date taken: 4/19/22



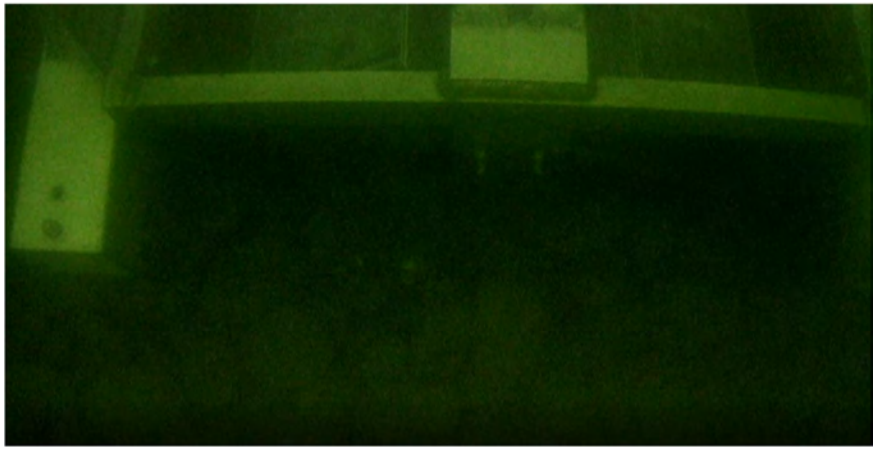
Photograph 3: SG03 Grab Attempt 1 - In-situ Sediment Surface

Date taken: *4/27/22*



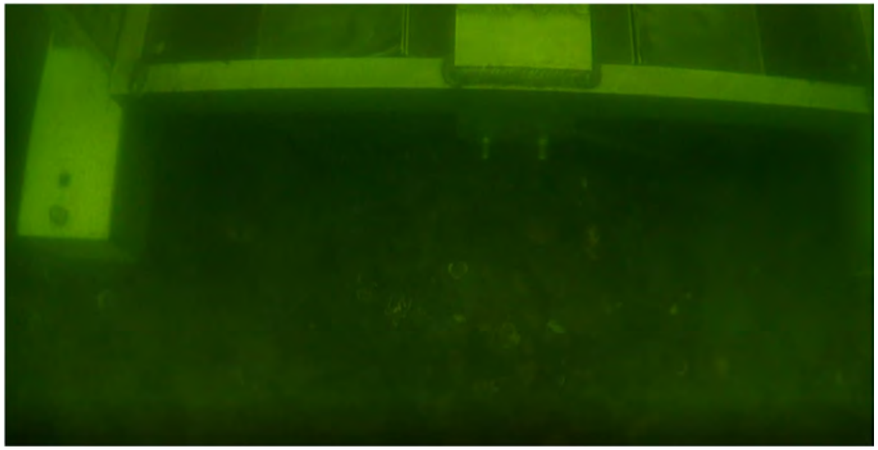
Photograph 4: SG04 Grab Attempt 3 - In-situ Sediment Surface

Date taken: *4/25/22*



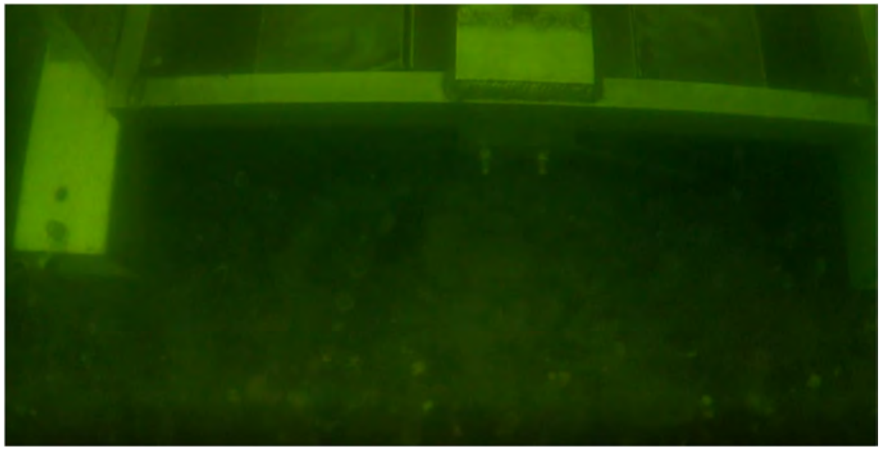
Photograph 5: SG05 Grab Attempt 1 - In-situ Sediment Surface

Date taken: *4/22/22*



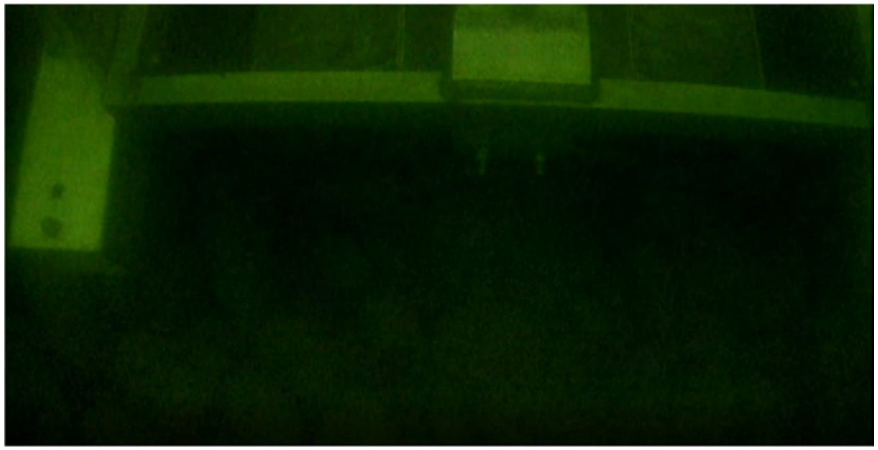
Photograph 6: SG06 Grab Attempt 1 - In-situ Sediment Surface

Date taken: *4/25/22*



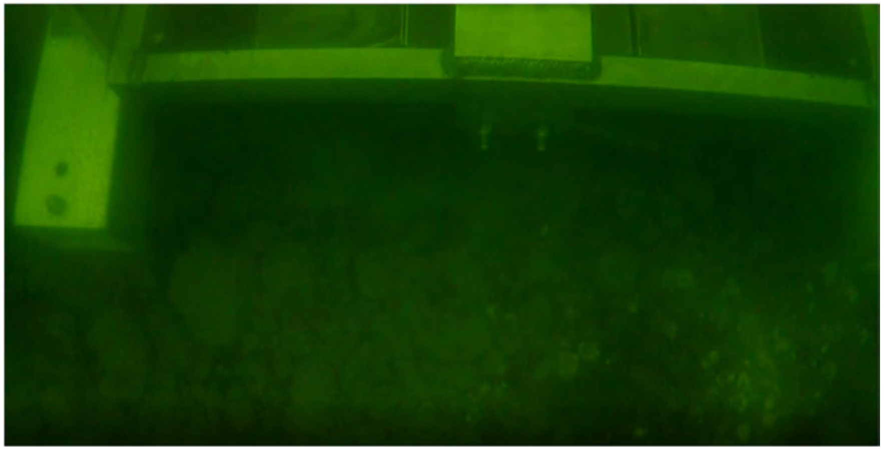
Photograph 7: SG07 Grab Attempt 1 - In-situ Sediment Surface

Date taken: *4/22/22*



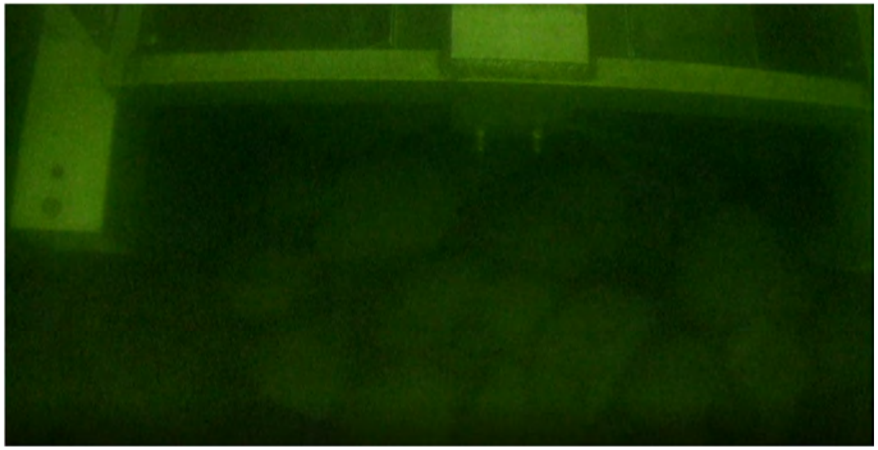
Photograph 8: SG08 Grab Attempt 1 - In-situ Sediment Surface

Date taken: *4/22/22*



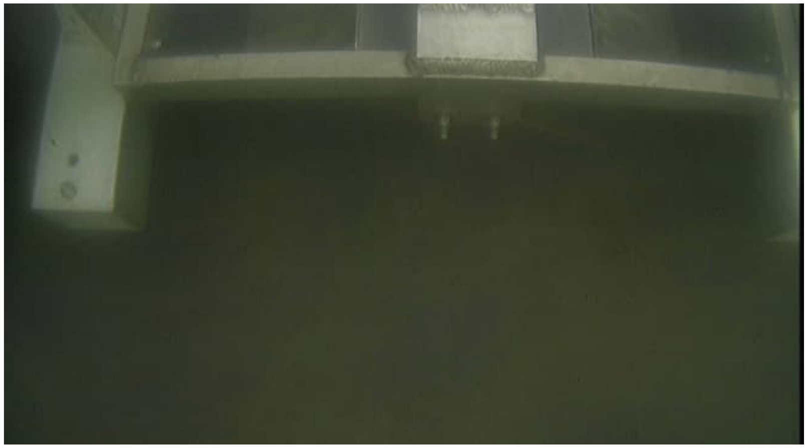
Photograph 9: SG09 Grab Attempt 1 - In-situ Sediment Surface

Date taken: *4/22/22*



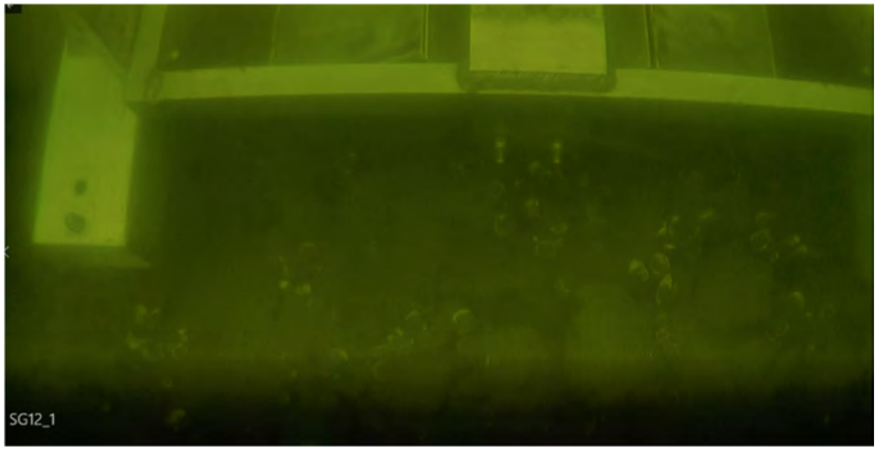
Photograph 10: SG10 Grab Attempt 1 – In-situ Sediment Surface

Date taken: *4/22/22*



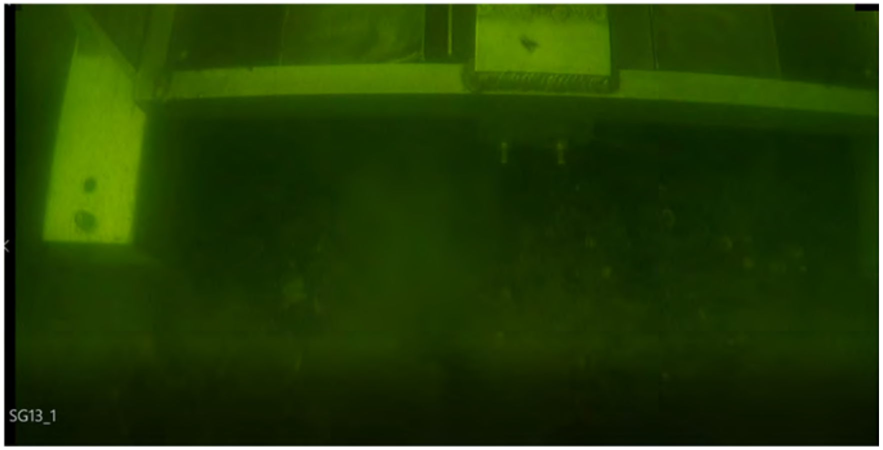
Photograph 11: SG11 Grab Attempt 3 – In-situ Sediment Surface

Date taken: *4/28/22*



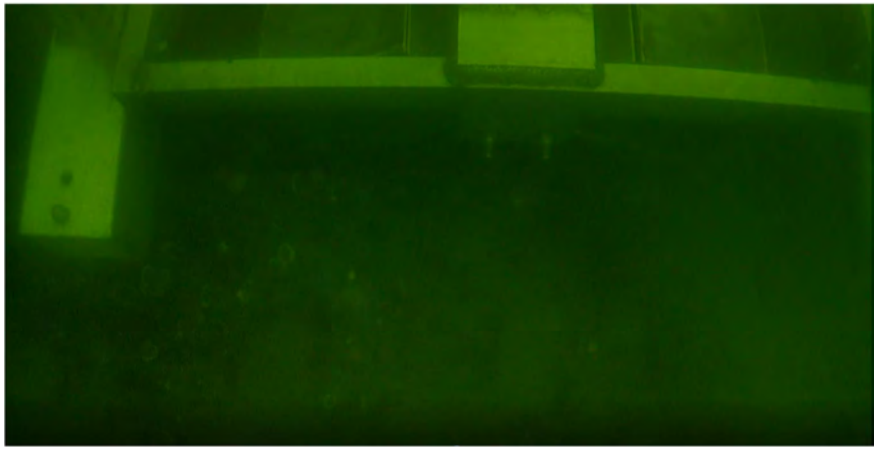
Photograph 12: SG12 Grab Attempt 1 – In-situ Sediment Surface

Date taken: *4/27/22*



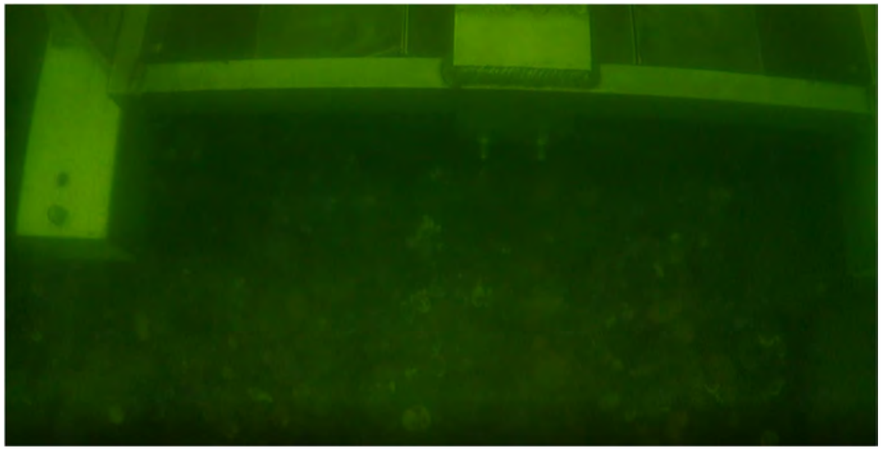
Photograph 13: SG13 Grab Attempt 1 – In-situ Sediment Surface

Date taken: *4/25/22*



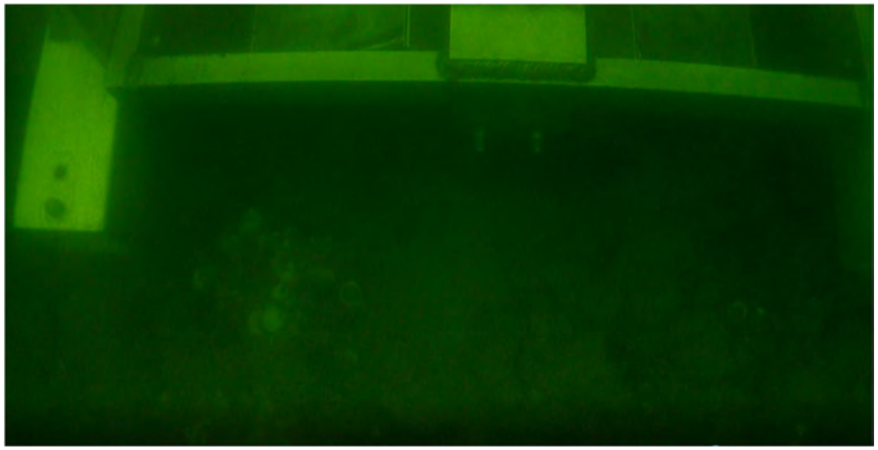
Photograph 14: SG14 Grab Attempt 1 – In-situ Sediment Surface

Date taken: *4/25/22*



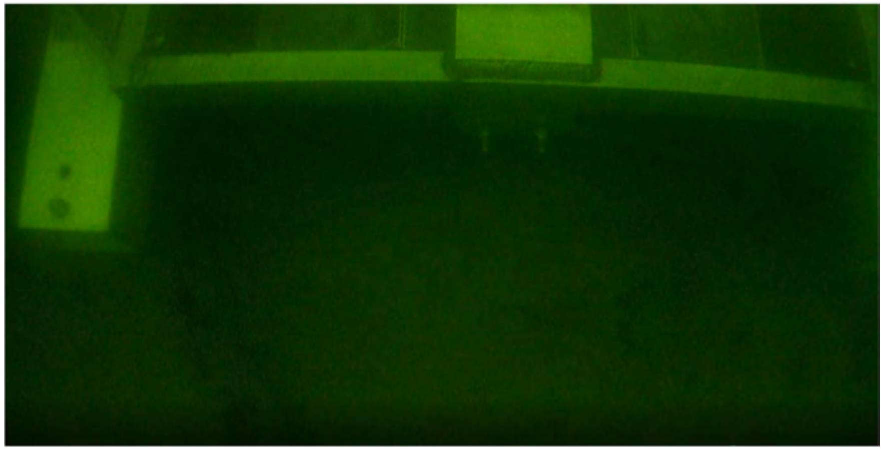
Photograph 15: SG15 Grab Attempt 1 – In-situ Sediment Surface

Date taken: *4/25/22*



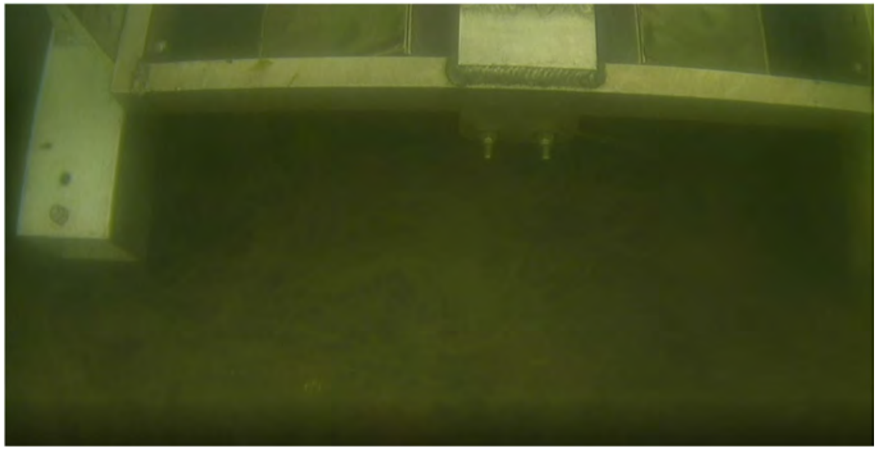
Photograph 16: SG16 Grab Attempt 1 – In-situ Sediment Surface

Date taken: *4/22/22*



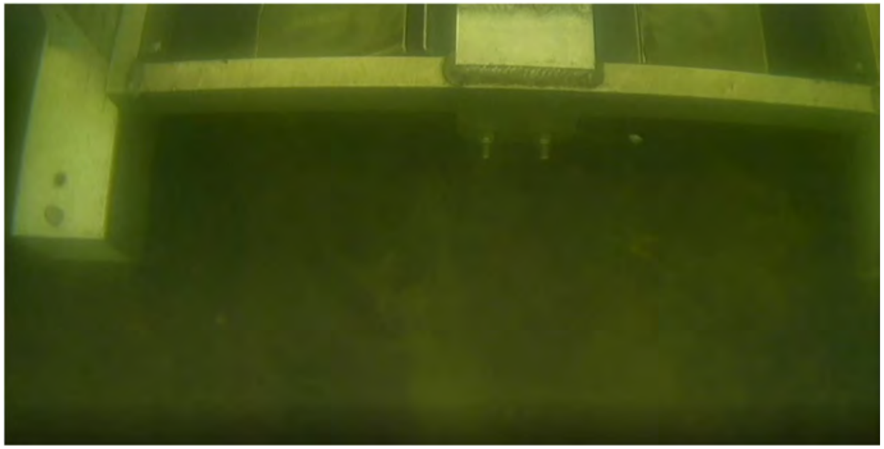
Photograph 17: SG17 Grab Attempt 2 – In-situ Sediment Surface

Date taken: *4/22/22*



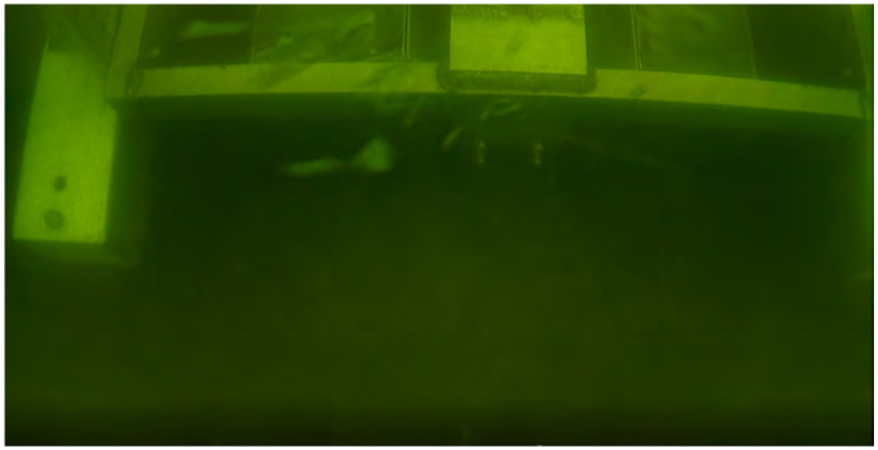
Photograph 18: SG18 Grab Attempt 1 – In-situ Sediment Surface

Date taken: *4/25/22*



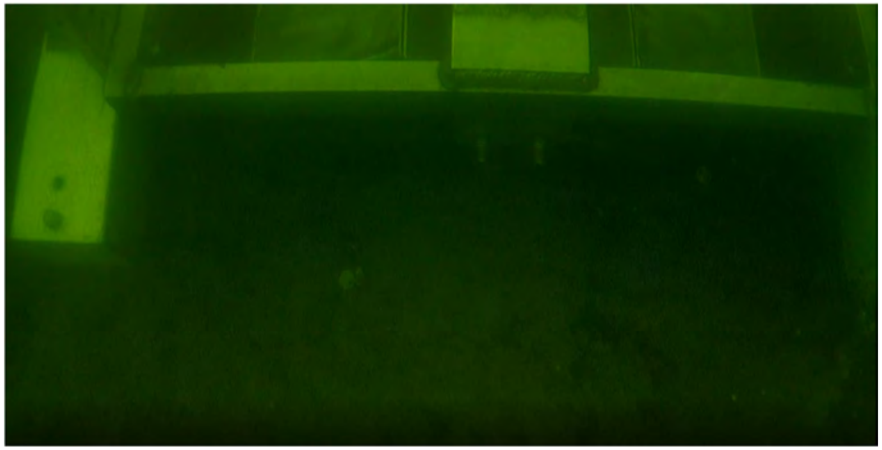
Photograph 19: SG19 Grab Attempt 1 – In-situ Sediment Surface

Date taken: *4/25/22*



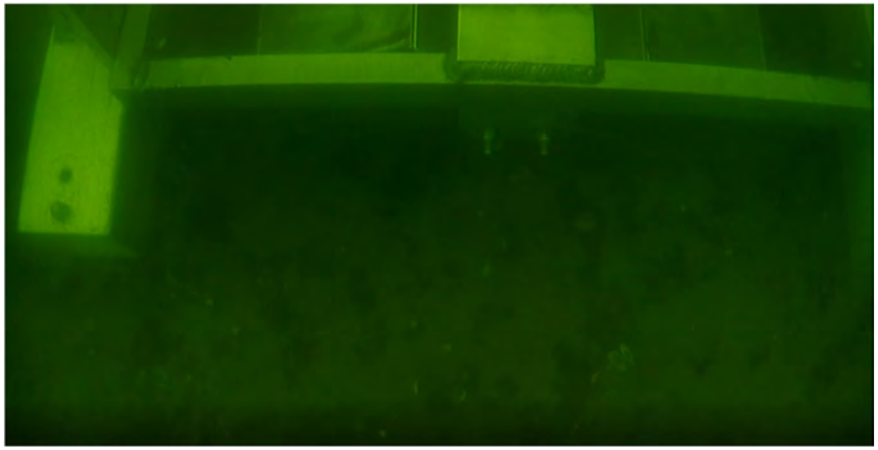
Photograph 20: SG20 Grab Attempt 1 – In-situ Sediment Surface

Date taken: *4/25/22*



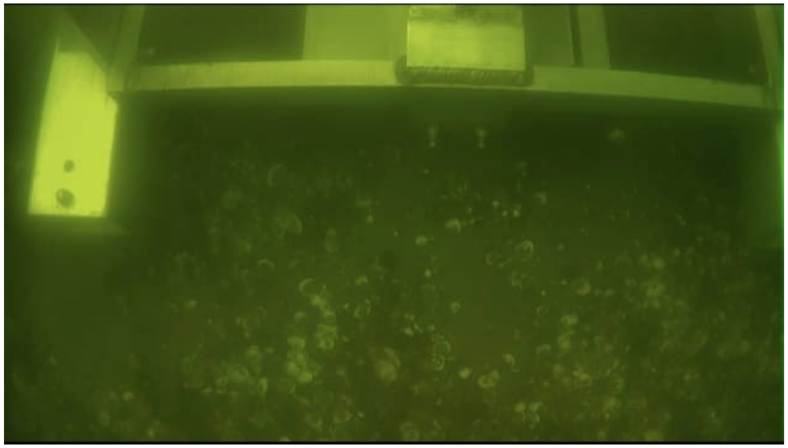
Photograph 21: SG21 Grab Attempt 1 – In-Situ Sediment Surface

Date taken: *4/25/22*



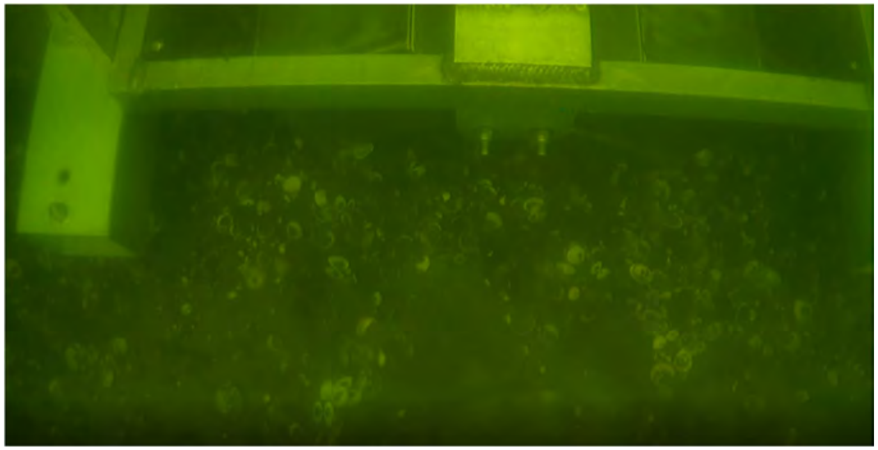
Photograph 22: SG22 Grab Attempt 1 – In-situ Sediment Surface

Date taken: *4/21/22*



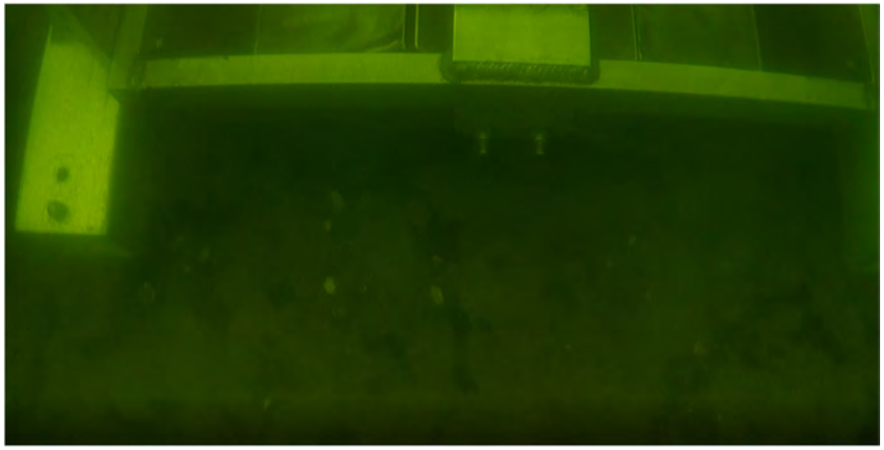
Photograph 23: SG23 Grab Attempt 2 – In-situ Sediment Surface

Date taken: *4/21/22*



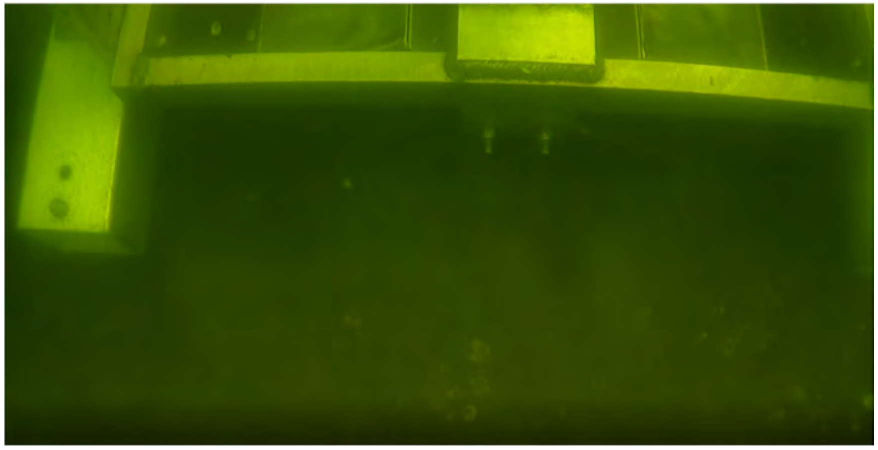
Photograph 24: SG24 Grab Attempt 1 – In-situ Sediment Surface

Date taken: *4/21/22*



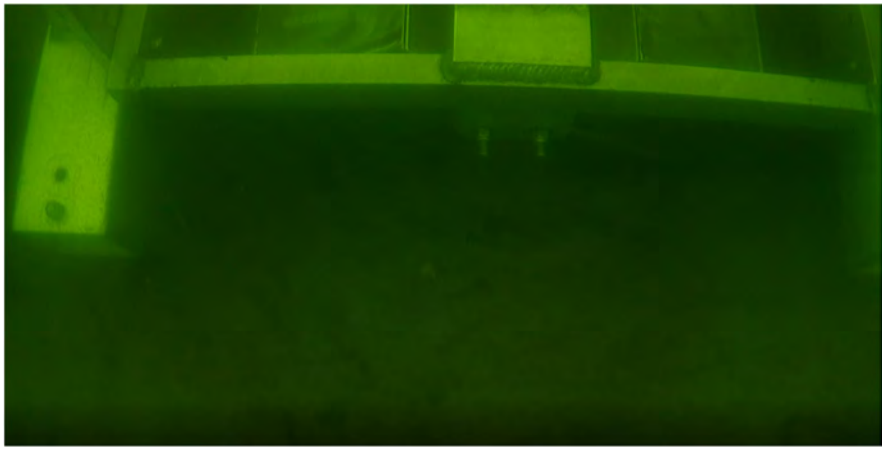
Photograph 25: SG25 Grab Attempt 1 – In-situ Sediment Surface

Date taken: *4/21/22*



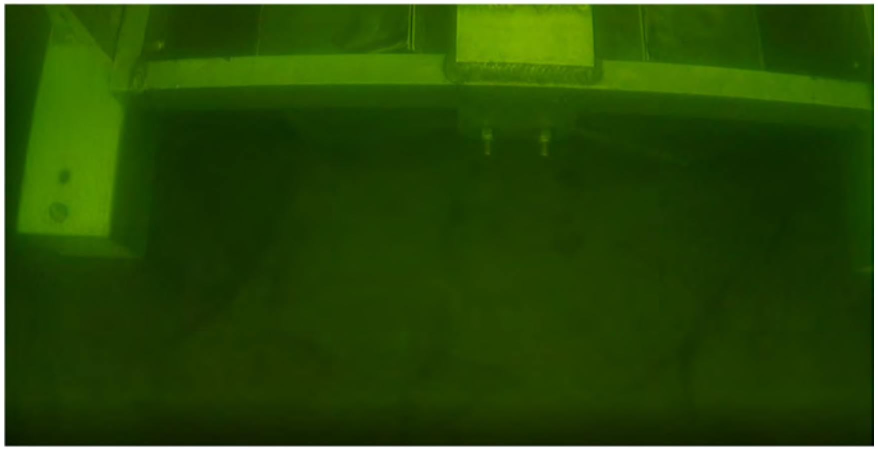
Photograph 26: SG26 Grab Attempt 1 – In-situ Sediment Surface

Date taken: *4/21/22*



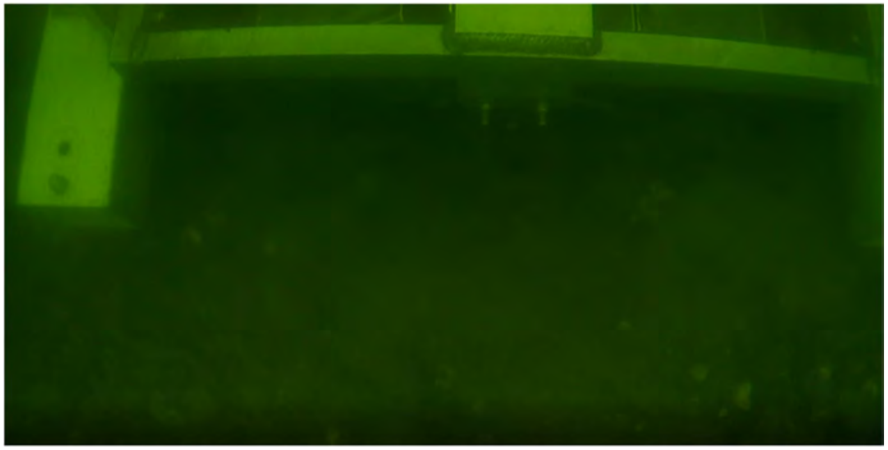
Photograph 27: SG27 Grab Attempt 1 – In-situ Sediment Surface

Date taken: *4/21/22*



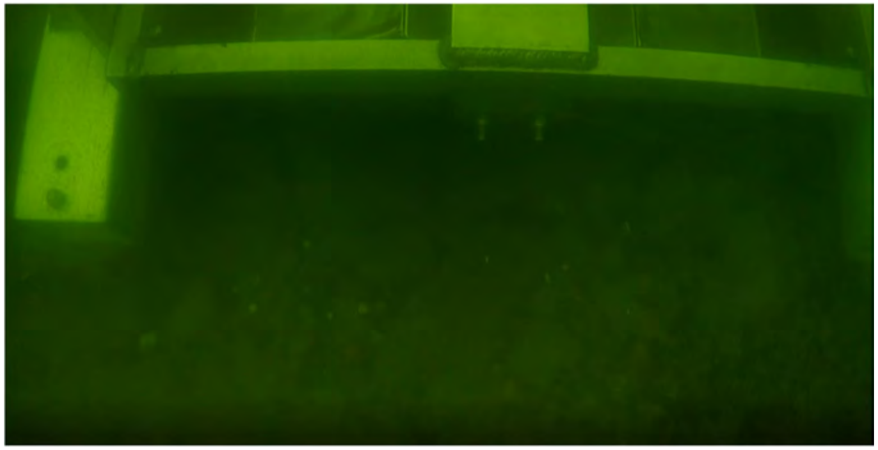
Photograph 28: SG28 Grab Attempt 1 – In-situ Sediment Surface

Date taken: *4/21/22*



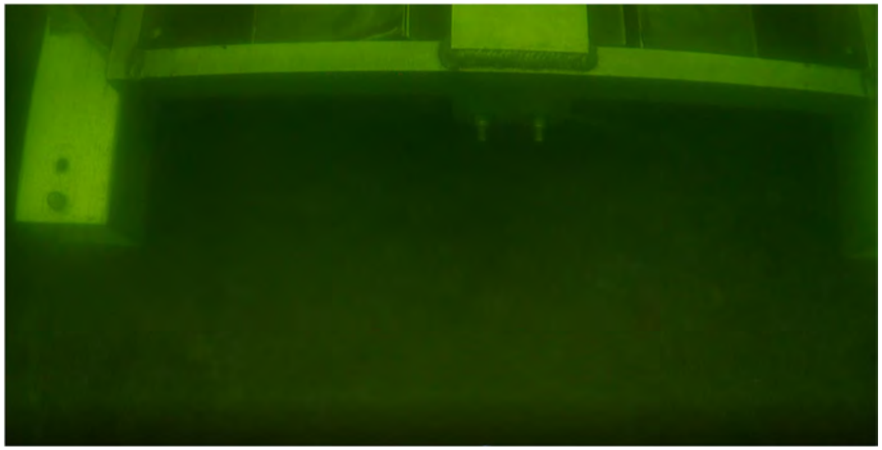
Photograph 29: SG29 Grab Attempt 1 – In-situ Sediment Surface

Date taken: *4/19/22*



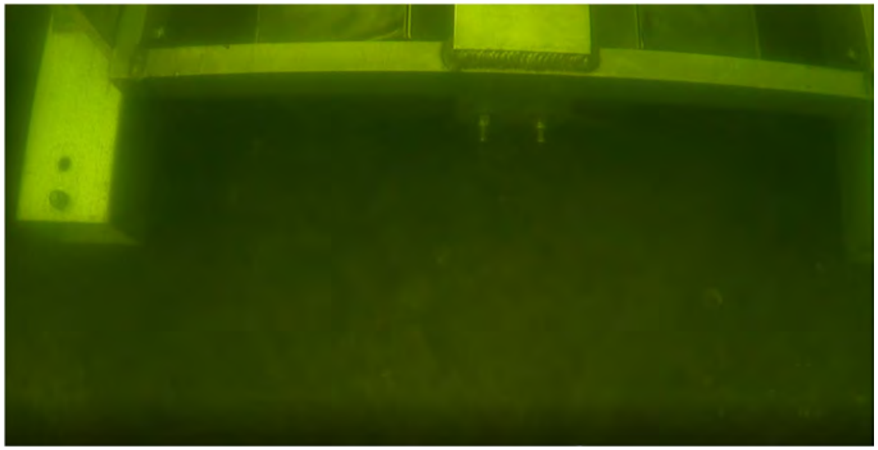
Photograph 30: SG30 Grab Attempt 1 – In-situ Sediment Surface

Date taken: *4/19/22*



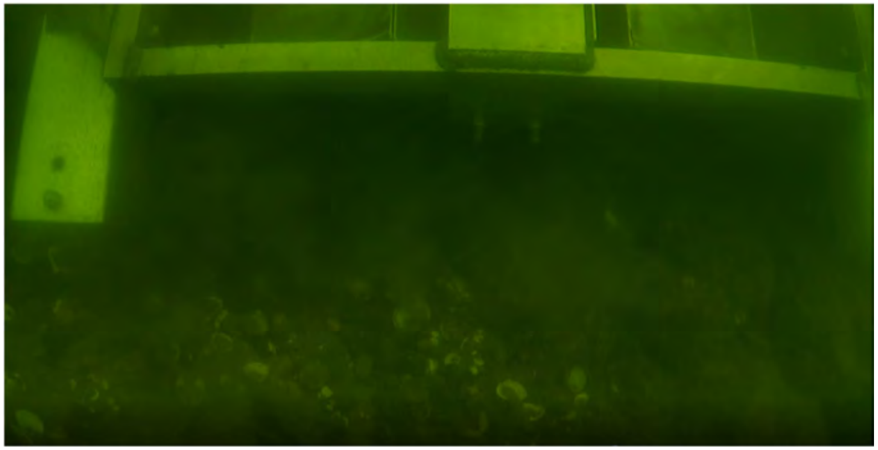
Photograph 31: SG31 Grab Attempt 1 – In-situ Sediment Surface

Date taken: *4/19/22*



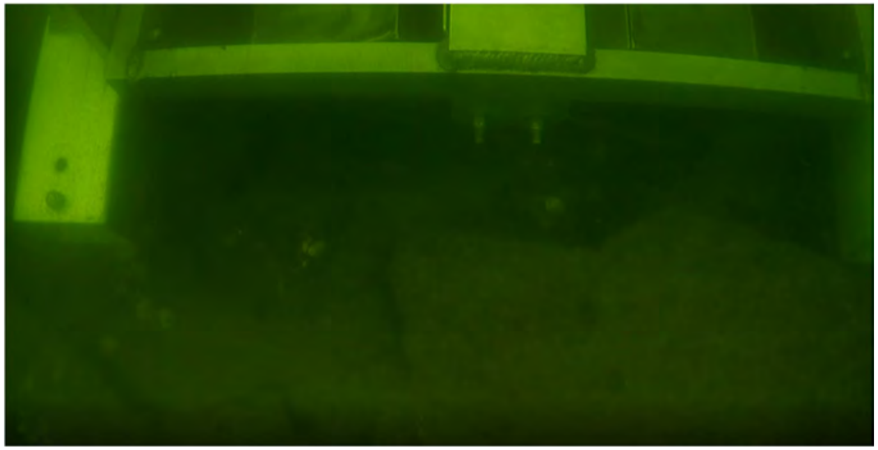
Photograph 32: SG32 Grab Attempt 1 – In-situ Sediment Surface

Date taken: *4/19/22*



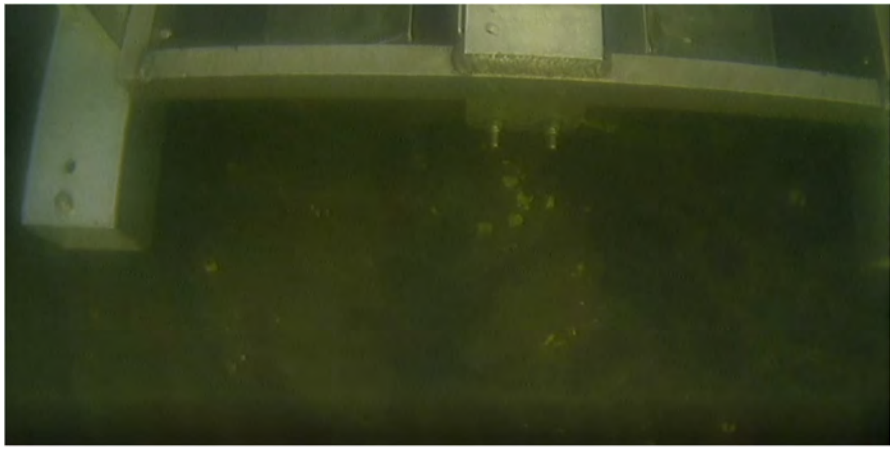
Photograph 33: SG33 Grab Attempt 1 – In-situ Sediment Surface

Date taken: *4/19/22*



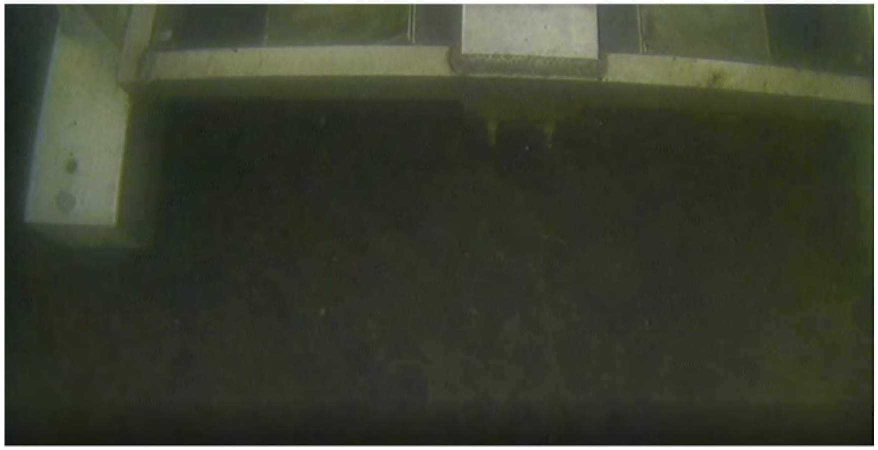
Photograph 34: SG34 Grab Attempt 1 – In-situ Sediment Surface

Date taken: *4/19/22*



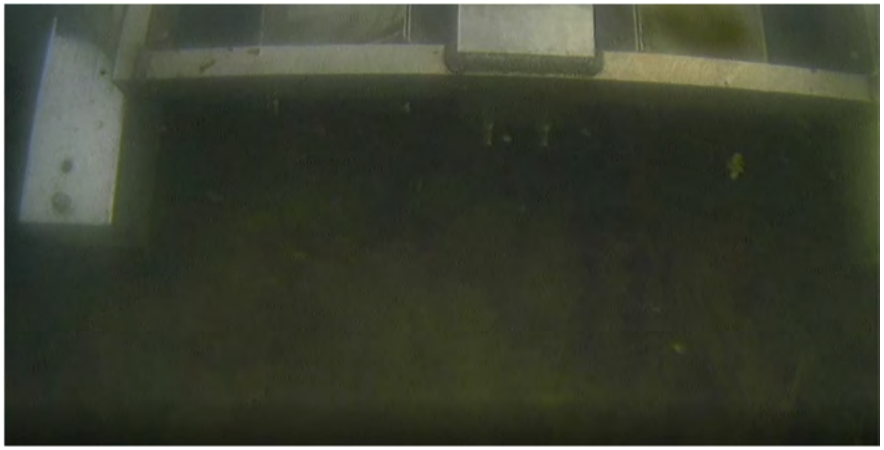
Photograph 35: D100 Grab Attempt 2 - In-situ Sediment Surface

Date taken: *4/29/22*



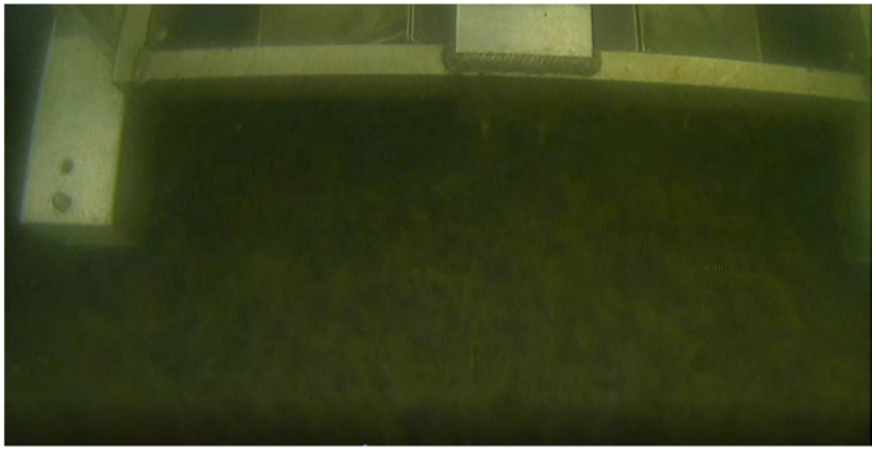
Photograph 36: D160 Grab Attempt 1 - In-situ Sediment Surface

Date taken: *4/28/22*



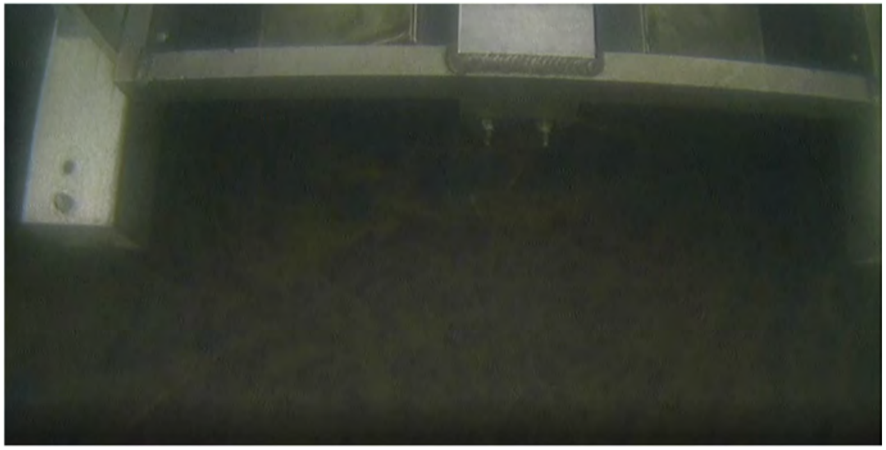
Photograph 37: D240 Grab Attempt 1 - In-situ Sediment Surface

Date taken: *4/28/22*



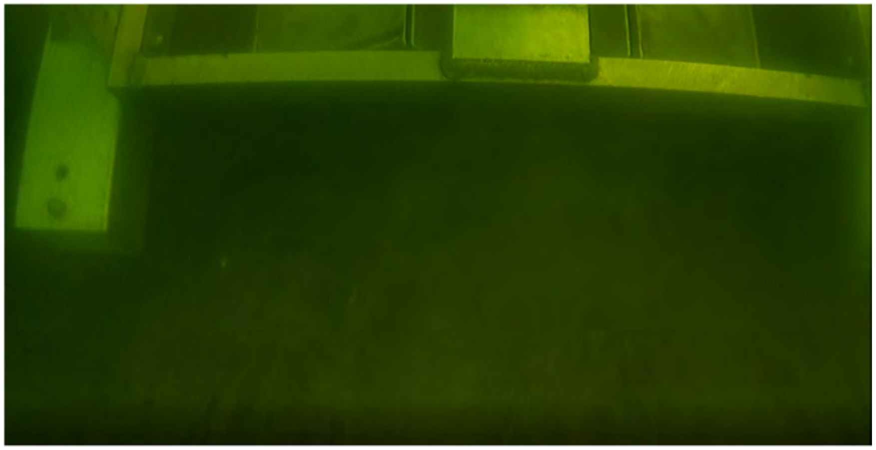
Photograph 38: E320 Grab Attempt 1 - In-situ Sediment Surface

Date taken: *4/28/22*



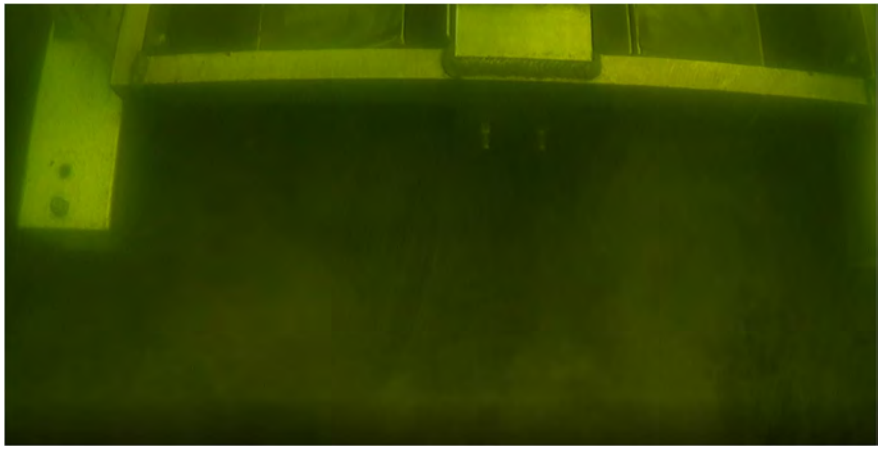
Photograph 39: E380 Grab Attempt 1 - In-situ Sediment Surface

Date taken: *4/28/22*



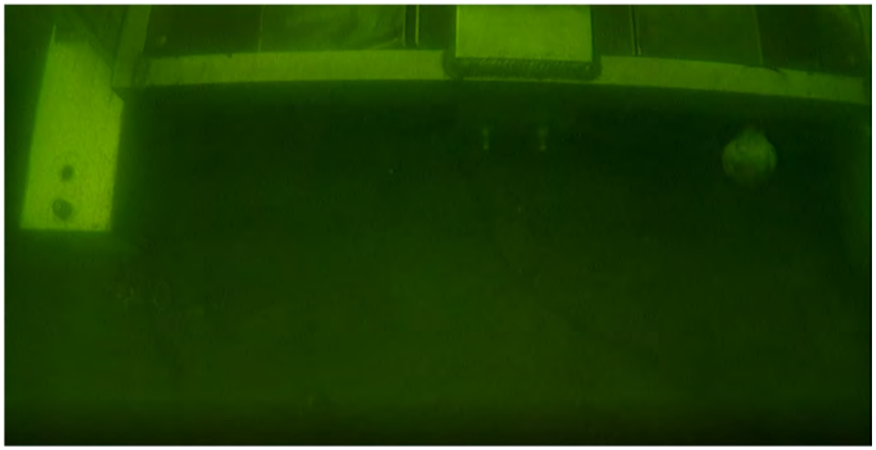
Photograph 40: E460 Grab Attempt 1 - In-situ Sediment Surface

Date taken: *4/29/22*



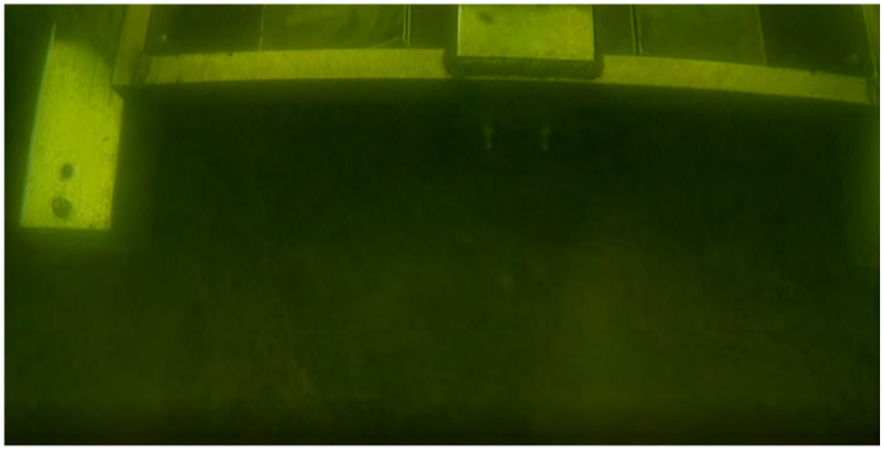
Photograph 41: H260 Grab Attempt 1 - In-situ Sediment Surface

Date taken: *4/29/22*



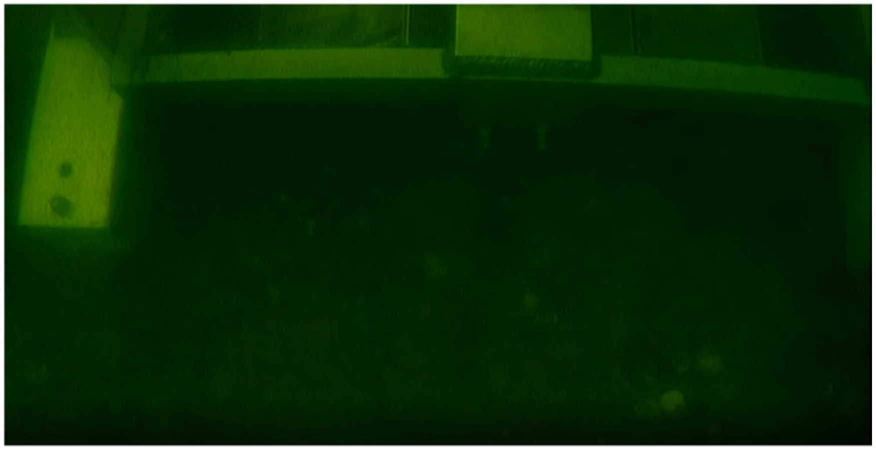
Photograph 42: H360 Grab Attempt 1 - In-situ Sediment Surface

Date taken: *4/29/22*



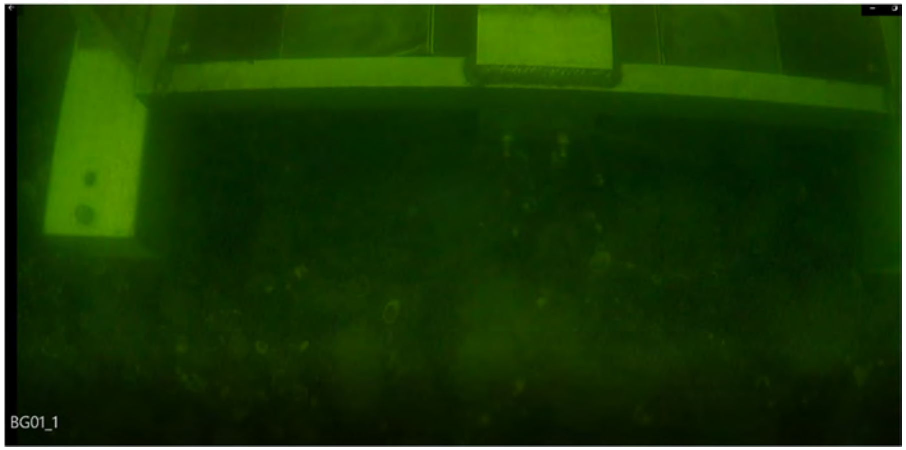
Photograph 43: I120 Grab Attempt 1 - In-situ Sediment Surface

Date taken: *4/29/22*



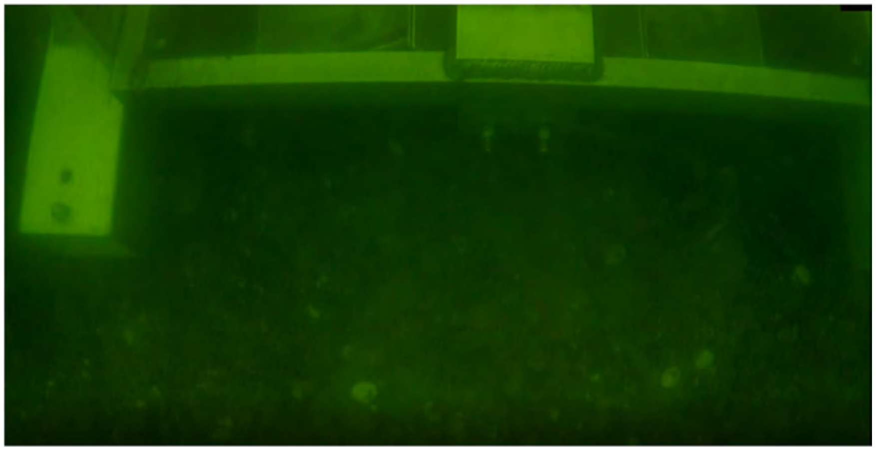
Photograph 44: L320 Grab Attempt 1 - In-situ Sediment Surface

Date taken: *4/29/22*



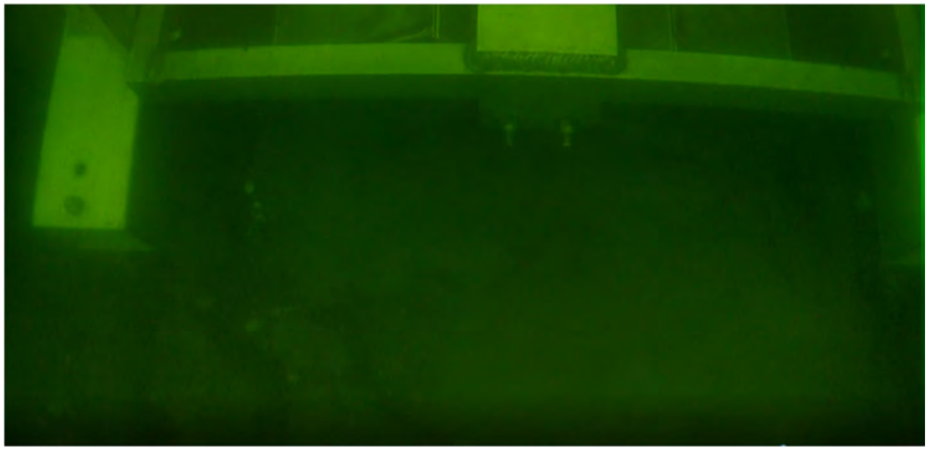
Photograph 45: BG01 Grab Attempt 1 - In-situ Sediment Surface

Date taken: *4/20/22*



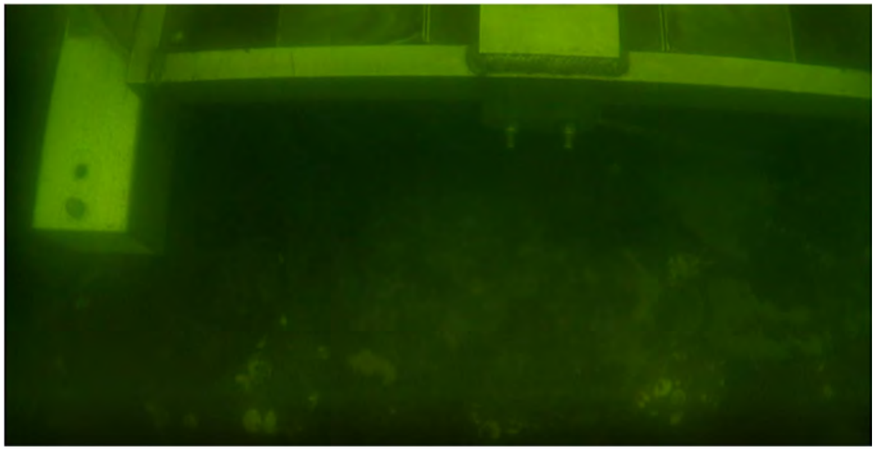
Photograph 46: BG02 Grab Attempt 1 - In-situ Sediment Surface

Date taken: *4/20/22*



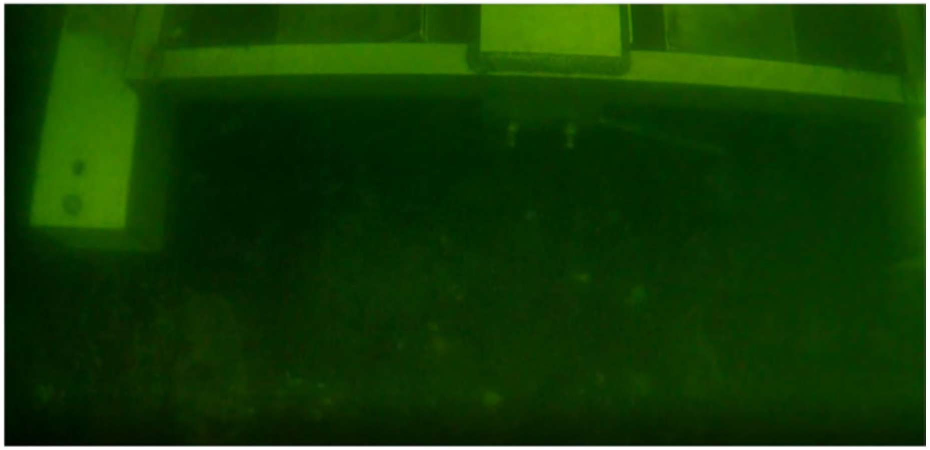
Photograph 47: BG03 Grab Attempt 1 - In-situ Sediment Surface

Date taken: *4/20/22*



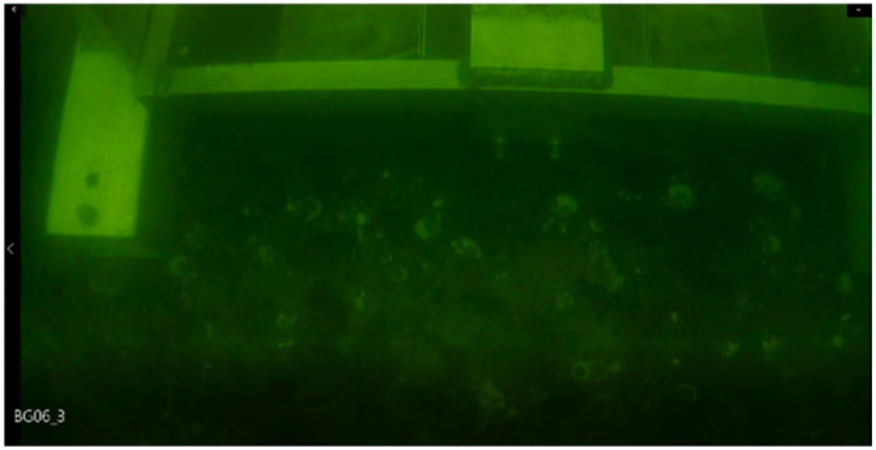
Photograph 48: BG04 Grab Attempt 1 - In-situ Sediment Surface

Date taken: *4/20/22*



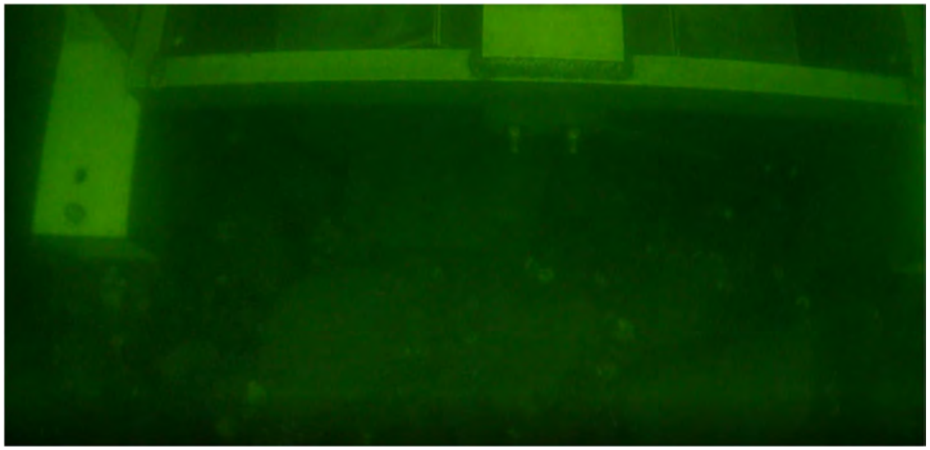
Photograph 49: BG05 Grab Attempt 1 - In-situ Sediment Surface

Date taken: *4/20/22*



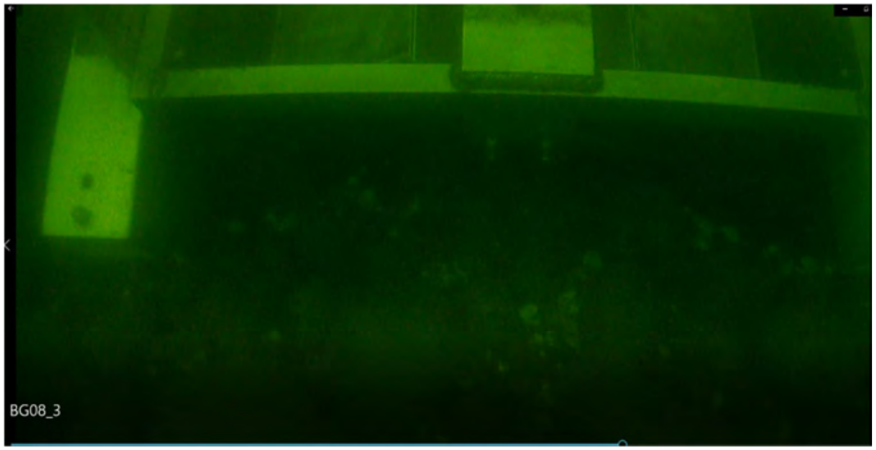
Photograph 50: BG06 Grab Attempt 3 - In-situ Sediment Surface

Date taken: *4/20/22*



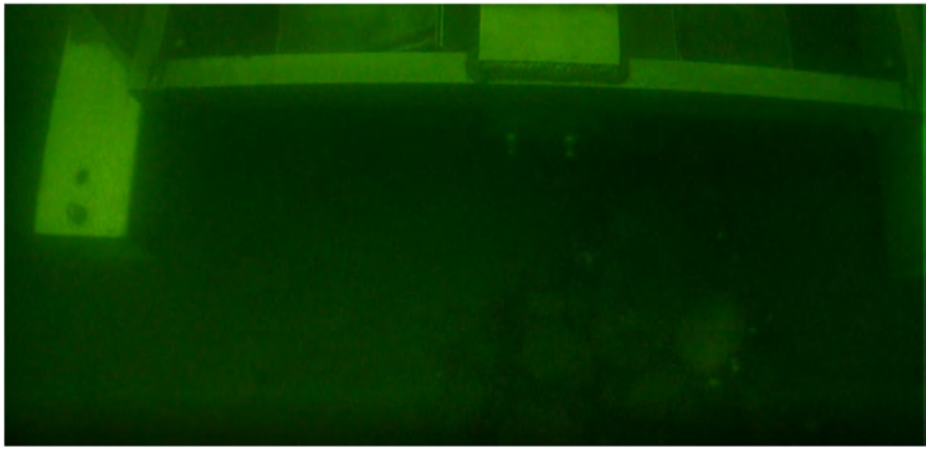
Photograph 51: BG07 Grab Attempt 1 - In-situ Sediment Surface

Date taken: *4/21/22*



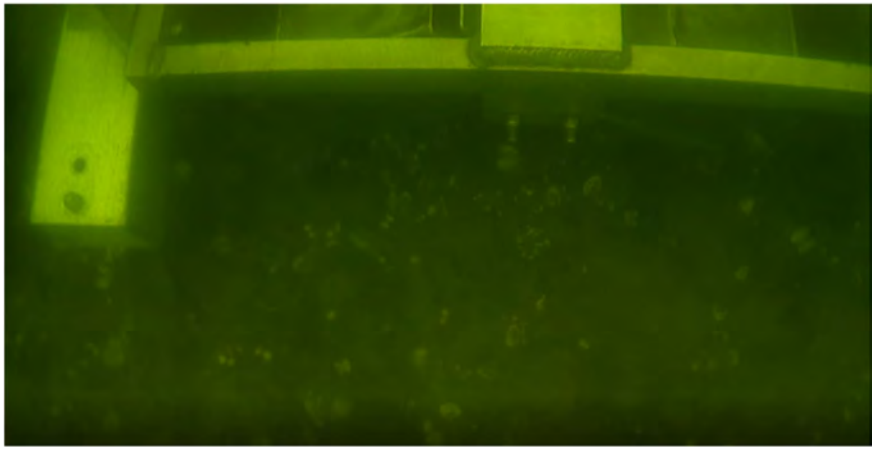
Photograph 52: BG08 Grab Attempt 3 - In-situ Sediment Surface

Date taken: *4/21/22*



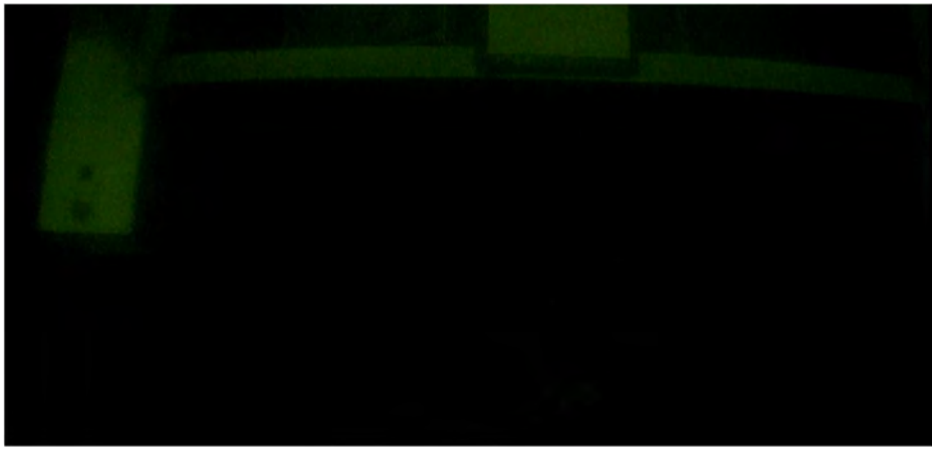
Photograph 53: BG09 Grab Attempt 2 - In-situ Sediment Surface

Date taken: *4/21/22*



Photograph 54: BG10A Grab Attempt 1 - In-situ Sediment Surface

Date taken: *4/20/22*

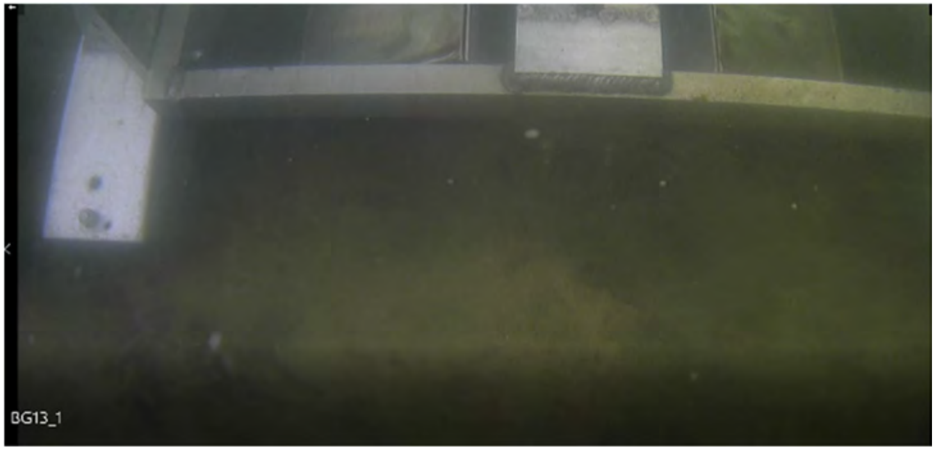


Photograph 55: BG11 Grab Attempt 1 - In-situ Sediment Surface

Date taken: 4/20/22

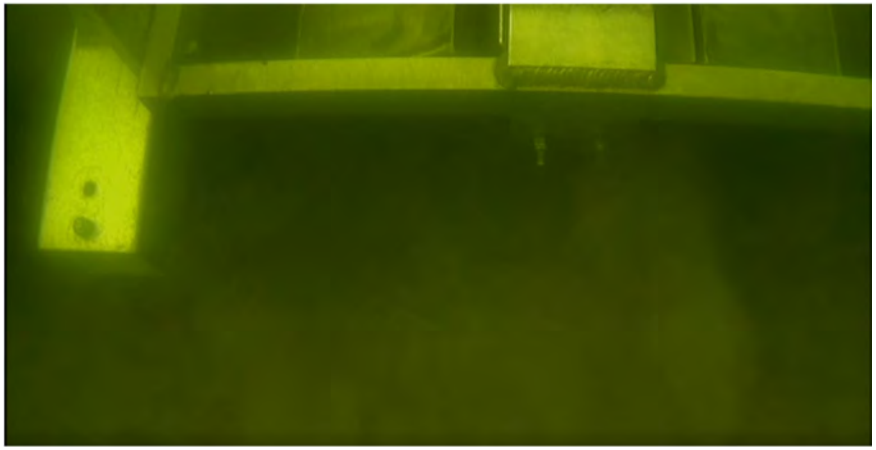
Photograph 56: BG12 Grab Attempt 3 - In-situ Sediment Surface

Date taken: 4/20/22



Photograph 57: BG13 Grab Attempt 1 - In-situ Sediment Surface

Date taken: 4/21/22



Photograph 58: BG14 Grab Attempt 2 - In-situ Sediment Surface

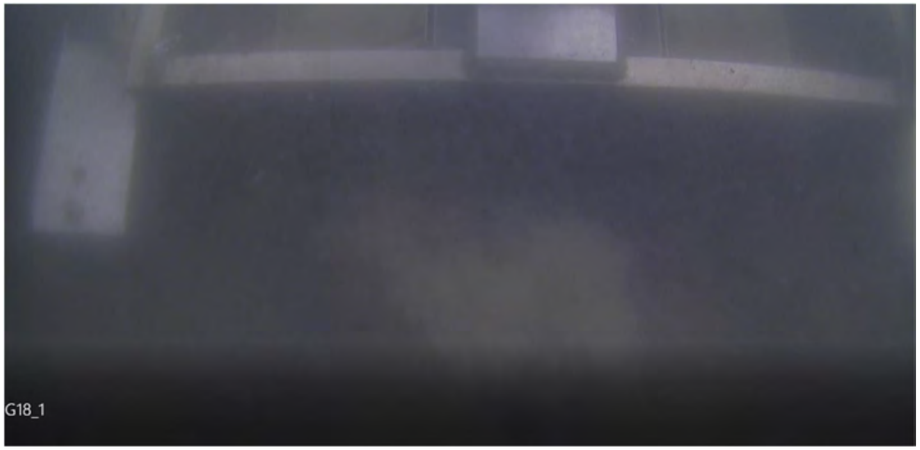
Date Taken: 4/21/22

Photograph 59: BG15 Grab Attempt 1 - In-situ Sediment Surface

Date taken: *4/27/22*

Photograph 60: BG16 Grab Attempt 1 - In-situ Sediment Surface

Date taken: *4/27/22*

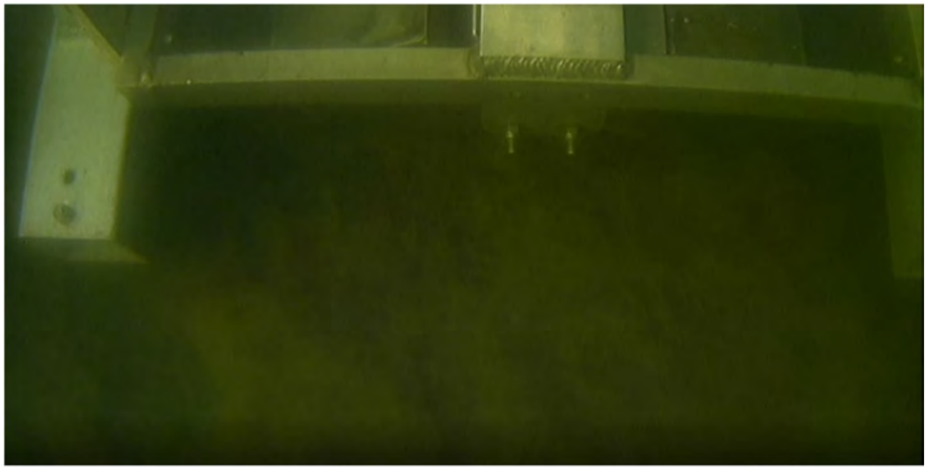


Photograph 61: BG18 Grab Attempt 1 - In-situ Sediment Surface

Date Taken: 4/27/22

Photograph 62: BG19 Grab Attempt 1 - In-situ Sediment Surface

Date Taken: 4/27/22



Photograph 63: BG20 Grab Attempt 1 - In-situ Sediment Surface

Date taken: *4/29/22*

Appendix C
TarGost Investigation Documentation

Appendix C. TarGOST Investigation Documentation

This appendix provides the field information from the TarGOST investigation event and includes the following:

- Table C-1 – TarGOST Locations and Details
- Appendix C-1 – Representative Field Activities Photolog

Notes:

DPT = direct-push technology

TarGOST = Tar-specific Green Optical Screening Tool

Table C-1
TarGOST Locations and Details

Table C-1.TarGOST Locations and Details

BNSF Wishram Sediment Remedial Investigation Report

Station	Date	X Coordinate[a]	Y Coordinate[a]	Bathymetric Elevation (ft)[b]	Maximum %RE	Refusal?	Refusal Type	Bottom Depth (ft bss)
E060	11/10/2022	45.655878N	120.969284W	154.0	5.6	Yes	Hard	16.35
E120	11/10/2022	45.655893N	120.969037W	154.0	9.6	Yes	Hard	23.27
E190	11/10/2022	45.655905N	120.968786W	153.5	14.4	Yes	Hard	32.77
E520	11/10/2022	45.655969N	120.977511W	154.5	6.4	Yes	Hard	21.29
EF000	11/10/2022	45.655838N	120.969533W	154.0	3.2	Yes	Hard	11.94
EF240	11/3/2022	1520587.525	117984.912	152.5	124	Yes	Hard	32.17
EF280	11/3/2022	1520630.239	117986.117	153.0	42.5	Yes	Hard	36.24
EF420	11/3/2022	1520769.128	117990.763	155.0	20.6	Yes	Hard	36.32
EF470	11/3/2022	1520819.304	117999.582	155.0	272.1	Yes	Hard	21.27
EN060	11/15/2022	45.655858N	120.969760W	155.0	300.7	Yes	Hard	9.29
F320	11/3/2022	1520675.983	117980.74	154.0	69.1	Yes	Gradual/Hard	37.77
F390	11/3/2022	1520738.654	117983.651	155.0	91.8	Yes	Hard	46.87
FGN160	11/14/2022	45.655752N	120.970127W	153.3	31.6	Yes	Gradual	11.32
FN100	11/15/2022	45.655803N	120.969912W	153.0	42.8	Yes	Gradual	12.73
G000	11/2/2022	1520347.122	117939.3	153.7	54.6	Yes	Gradual	14.08
G040	11/2/2022	1520393.13	117935.379	153.0	84.2	Yes	Hard	9.41
G080	11/2/2022	1520431.012	117940.989	153.0	122.5	Yes	Hard	25.76
G120	11/1/2022	1520469.673	117948.781	152.5	139.2	No	--	19.52
G160	11/1/2022	1520502.644	117945.668	152.0	69	No	--	29.51
G200	11/1/2022	1520546.368	117944.679	151.5	208.6	No	--	29.52
G260	11/1/2022	1520611.344	117947.939	151.0	130.3	No	--	30.97
G320	11/2/2022	1520669.44	117955.617	152.5	421	No	--	29.99
G360	11/2/2022	1520710.625	117957.561	152.0	252.6	No	--	30.00
G500	11/10/2022	45.655847N	120.967561W	142.0	2.8	Yes	Hard	10.08
GN040	11/10/2022	45.655753N	120.969718W	152.5	42.7	Yes	Hard	11.55
H460	11/10/2022	45.655774N	120.967714W	148.5	43	Yes	Hard	20.87
HN100	11/11/2022	45.655673N	120.969977W	153.0	206.8	Yes	Hard	10.67
HN200	11/14/2022	45.655645N	120.970288W	152.0	29.3	yes	Hard	7.99
HN280	11/14/2022	45.655635N	120.970603W	153.5	18.6	Yes	Hard	7.22

Table C-1.TarGOST Locations and Details

BNSF Wishram Sediment Remedial Investigation Report

Station	Date	X Coordinate[a]	Y Coordinate[a]	Bathymetric Elevation (ft)[b]	Maximum %RE	Refusal?	Refusal Type	Bottom Depth (ft bss)
I120	11/6/2022	1520477.315	117900.599	150.0	2.2	Yes	Hard	37.06
I160	11/6/2022	1520516.759	117910.94	150.5	86.6	No	--	16.51
I200	11/2/2022	1520556.123	117907.789	149.5	267.7	No	--	30.00
I280	11/6/2022	1520632.629	117914.993	149.0	300.8	No	--	20.01
I360	11/7/2022	1520711.68	117919.993	149.0	36.1	No	--	17.39
I400	11/7/2022	1520754.65	117921.197	146.4	19.9	No	--	20.46
I500	11/11/2022	45.655752N	120.967541W	132.6	11.4	Yes	Hard	3.6
J000	11/15/2022	45.655587N	120.969500W	149.0	1.9	Yes	Gradual	11.71
J060	11/11/2022	45.655601N	120.969243W	149.0	1.7	Yes	Hard	16.46
JN040	11/11/2022	45.655581N	120.969671W	150.7	1.8	Yes	Hard	13.62
JN100	11/14/2022	45.655585N	120.969893W	151.2	9.4	Yes	Hard	15.72
JN160	11/14/2022	45.655570N	120.970125W	151.3	56.6	Yes	Hard	8.09
K160	11/11/2022	45.655563N	120.968875W	145.0	6.9	Yes	Hard	16.04
K200	11/6/2022	1520558.463	117871.308	146.2	5.7	Yes	Hard	25.41
K280	11/6/2022	1520643.881	117871.895	143.9	17.4	Yes	Hard	26.74
K360	11/7/2022	1520711.709	117881.703	139.0	25.7	Yes	Hard	17.11
K400	11/7/2022	1520755.973	117885.452	136.3	16	Yes	Hard	14.71
K440	11/11/2022	45.655622N	120.967770W	135.5	14.4	Yes	Hard	12.58
KN220	11/14/2022	45.655492N	120.970369W	149.0	10.6	Yes	Hard	3.93
KN280	11/15/2022	45.655479N	120.970600W	149.0	11.3	Yes	Gradual	6.43
L120	11/15/2022	45.655503N	120.969019W	142.0	3.3	Yes	Gradual	12.97
L240	11/7/2022	1520596.445	117850.661	140.0	2.9	Yes	Hard	28.14
M190	11/11/2022	45.655469N	120.968755W	137.0	1.5	Yes	Hard	10.41
M280	11/6/2022	1520638.793	117833.27	136.0	8.8	Yes	Hard	13.61
M360	11/7/2022	1520719.134	117840.087	137.5	69.3	Yes	Hard	13.68
M400	11/7/2022	1520760.825	117841.298	131.8	8.3	Yes	Hard	17.32
MN100	11/15/2022	45.655411N	120.969812W	142.0	1.7	Yes	Hard	3.51
MN160	11/14/2022	45.655399N	120.970115W	143.3	5.6	Yes	Gradual	8.32
MN320	11/15/2022	45.655369N	120.970696W	145.0	--	Yes	Hard	0

Table C-1.TarGOST Locations and Details

BNSF Wishram Sediment Remedial Investigation Report

Station	Date	X Coordinate[a]	Y Coordinate[a]	Bathymetric Elevation (ft)[b]	Maximum %RE	Refusal?	Refusal Type	Bottom Depth (ft bss)
O280	11/11/2022	45.655373N	120.968370W	134.0	4.8	Yes	Hard	15.54
ON220	11/14/2022	45.655268N	120.970340W	140.0	--	Yes	Hard	0

Notes:

--	Not measured or not applicable
a	Horizontal (X,Y) coordinates are in North American Datum of 1983 (NAD83) State Plan Washington South (feet)
b	Bathymeteric elevations (vertical) are presented in North American Vertical Datum of 1988 (NAVD88) (feet)

Appendix C-1
Representative Field Activities Photolog

Photo Log

Project Title **Wishram Sediment Remedial Investigation**

Location Wishram, Washington

Date April 2022 and November 2022

Barge Setup and TarGOST Drilling

Photograph 1: Barge Setup Before Loading Equipment

***Date taken:* 10/18/2022**

Photograph 2: Barge with Equipment on Board

***Date taken:* 11/01/2022**

Photograph 3: Drill Rig Set Up with Wipers

Date taken: *11/01/2022*

Photograph 4: TarGOST Equipment Set Up

Date taken: *11/01/2022*

Photograph 5: TarGOST and Equipment in Conex Box

Date taken: *11/01/2022*

Photograph 6: Drill Rig Set Up for Core Collection

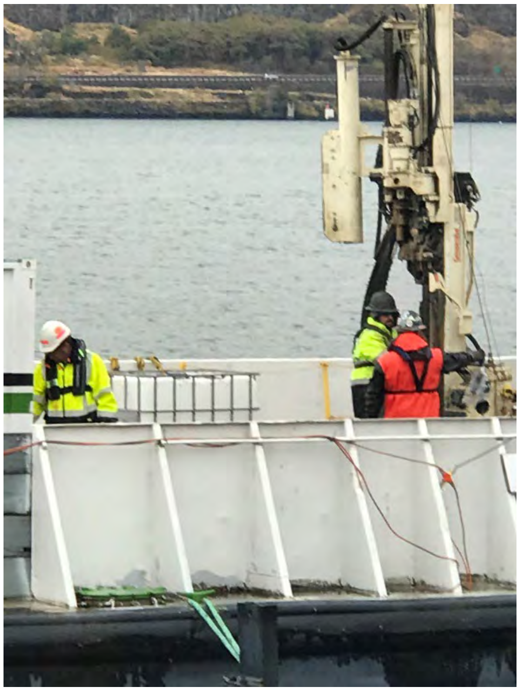
Date taken: *11/01/2022*

Photograph 7: Alternate Angle of Drill Rig Set Up

Date taken:11/01/2022

Photograph 8: Drill Rig and Tooling

Date taken: 11/01/2022



Photograph 9: Drill Rig and Operators

Date taken: 11/01/2022

Appendix D
Step 2 Core Sampling Documentation

Appendix D. Step 2 Core Sampling Documentation

This appendix provides the field information from the sediment core sampling events and includes the following:

- Table D-1 – Attempted and Retained Core Sediment Sample Locations and Details
- Table D-2 – TarGOST Ex-Situ Observations and Results
- Appendix D-1 – Sediment Core Sampling Logs
- Appendix D-2 – Field Notebook Scans
- Appendix D-3 – Retained and Sampled Grab Photolog
- Appendix D-4 – Representative Field Activities Photolog
- Appendix D-5 – Waste Disposal Documentation

Sediments were visually characterized for type, color, moisture content, texture, grain size and shape, consistency, visible evidence of staining, and any other observations. Sediment cores will be visually described following the Unified Soil Classification System-based visual-manual identification (modified slightly for sediment characterization) in accordance with the ASTM-2488 *Standard Practice For Description And Identification Of Soils (Visual-Manual Procedures)*. A logging key of the visual classification method was provided in Standard Operating Procedure Sediment Core Collection and Characterization (Attachment B of the Work Plan); the colors were designated using a Munsell color chart.

Descriptors used in sediment descriptions are as follows:

- Consistency measured as penetration of thumb
  - Less than 0.25 centimeter – hard (H)
  - 0.25 to 2 centimeters – firm (F)
  - 2 to 4 centimeters – soft (S)
  - Greater than 4 centimeters – very soft (VS)
- Structure
  - Homogeneous (H)
  - Stratified (S)
  - Laminated (L)
  - Mottled (M)
- Maximum particle size and grain shape
  - Small cobble (SC)
  - Coarse pebble (CP)
  - Medium pebble (MP)
  - Small pebble (SP)
  - Coarse sand (CS)
  - Medium sand (MS)
  - Fine sand (FS)
  - Very fine sand (VFS)
  - Silt (Z)
  - Sub-angular (SA)
  - Very angular (VA)
- Moisture content
  - Wet
  - Dry
  - Moist

- Odors
  - None (N)
  - Unclassified (UNC)
  - Sulfur-like (S)
  - Tar-like (T)
  - Petroleum hydrocarbon-like (PHC)
- Qualifying odor descriptors
  - Strong
  - Moderate
  - Faint
- Visual impacts
  - Nonaqueous phase liquid (NAPL)
  - Sheen
  - Stained
  - Coated
  - Blebs
  - Saturated

Table D-1

Attempted and Retained Core Sediment Sample Locations and Details

Table D-1. Attempted and Retained Sediment Core Sample Locations and Details

BNSF Wishram Sediment Remedial Investigation Report

Station ID	Core ID	Bathymetric Elevation[a] (ft NAVD88)	Sample Date	X Coordinate[b]	Y Coordinate[b]	Penetration Depth (ft from top of recovered core material)	Recovery (ft)	Recovery (%)	Retained?[c]	Distance from Target Location	Core Type
EF240	EF240-Attempt-1	152.5	11/9/2022	1520586.33	117986.28	6.6	4.7	71%	No	1.8	Vibracore
EF240	EF240-Attempt-2	152.5	11/9/2022	1520584.81	117983.99	7.2	5.3	74%	No	2.8	Vibracore
EF240	**EF240-Attempt-3**	**152.5**	**11/9/2022**	**1520586.61**	**117984.87**	**8.6**	**6.7**	**78%**	**Yes**	**1**	**Vibracore**
EF470	**EF470-Attempt-1**	**155.0**	**11/9/2022**	**1520820.63**	**117792.08**	**22.2**	**13.8**	**62%**	**Yes**	**3**	**DPT**
EF470	**EF470-Attempt-2**	**155.0**	**11/10/2022**	**1520815.71**	**117997.05**	**10.0**	**2.0**	**20%**	**Yes**	**2**	**DPT**
F390	**F390-Attempt-1**	**155.0**	**11/6/2022**	**1520738.83**	**117985.37**	**10.0**	**7.6**	**76%**	**Yes**	**2**	**Vibracore**
F390	F390-Attempt-2	155.0	11/6/2022	1520736.47	117985.49	11.7	6.9	59%	No	2.8	Vibracore
F390	F390-Attempt-3	155.0	11/6/2022	1520741.62	117983.07	6.4	5.0	78%	No	3	Vibracore
G000	**G000-Attempt-1**	**153.7**	**11/3/2022**	**1520346.14**	**117937.11**	**6.7**	**6.7**	**100%**	**Yes**	**2.3**	**Vibracore**
G000	G000-Attempt-2	153.7	11/3/2022	1520352.28	117938.61	6.6	6.3	95%	No	4.9	Vibracore
G000	G000-Attempt-3	153.7	11/3/2022	1520356.36	117940.63	5.4	5.0	93%	No	9	Vibracore
G000	**G000-Attempt-4**	**153.9**	**11/6/2022**	**1520344.52**	**117939.93**	**7.0**	**6.6**	**94%**	**Yes**	**2**	**Vibracore**
G000	G000-Attempt-5	153.9	11/6/2022	1520352.75	117940.33	5.9	5.9	100%	No	7	Vibracore
G000	G000-Attempt-6	153.9	11/6/2022	1520349.59	117940.29	5.7	5.5	96%	No	3	Vibracore
G000	G000-Attempt-7	153.9	11/7/2022	1520348.35	117937.75	7.3	3.6	49%	No	1.8	Vibracore
G000	G000-Attempt-8	153.9	11/7/2022	1520347.00	117936.40	7.5	0.8	11%	No	3	Vibracore
G000	**G000-Attempt-9**	**153.8**	**11/8/2022**	**1520344.57**	**117939.68**	**13.0**	**5.8**	**45%**	**Yes**	**10**	**DPT**
G020	G020-Attempt-1	153.7	11/3/2022	1520365.72	117931.75	5.3	NA	0%	No	2.1	Vibracore
G020	G020-Attempt-2	153.7	11/3/2022	1520369.22	117931.78	6.8	5.2	76%	No	2.7	Vibracore
G020	**G020-Attempt-3**	**153.7**	**11/3/2022**	**1520376.64**	**117932.45**	**7.5**	**5.2**	**69%**	**Yes**	**9.5**	**Vibracore**
G200	**G200-Attempt-1**	**151.0**	**11/7/2022**	**1520553.36**	**117947.86**	**7.0**	**5.7**	**81%**	**Yes**	**0.8**	**Vibracore**
G200	G200-Attempt-2	151.0	11/7/2022	1520547.37	117946.82	5.1	4.0	78%	No	6	Vibracore
G200	G200-Attempt-3	151.0	11/7/2022	1520552.72	117947.24	5.6	4.0	71%	No	1	Vibracore
I160	I160-Attempt-1	150.5	11/9/2022	1520516.06	117907.56	1.7	0.0	0%	No	2.8	Vibracore
I160	I160-Attempt-2	150.5	11/9/2022	1520519.24	117907.39	1.5	0.0	0%	No	4	Vibracore
I160	**I160-Attempt-3**	**150.5**	**11/9/2022**	**1520516.86**	**117904.29**	**2.2**	**1.3**	**59%**	**Yes**	**1**	**Vibracore**
I500	**I500-Attempt-1**	**132.6**	**11/13/2022**	**1520854.44**	**117930.82**	**2.8**	**0.8**	**29%**	**Yes**	**1**	**DPT**
J060	**J060-Attempt-1**	**149.0**	**11/13/2022**	**1520418.90**	**117881.98**	**4.9**	**2.0**	**40%**	**Yes**	**5**	**DPT**
J060	**J060-Attempt-2**	**149.0**	**11/13/2022**	**1520419.12**	**117876.88**	**9.8**	**5.0**	**51%**	**Yes**	**3**	**DPT**
K200	**K200-Attempt-1**	**146.2**	**11/9/2022**	**1520559.16**	**117873.27**	**2.1**	**1.6**	**76%**	**Yes**	**2**	**Vibracore**
K200	K200-Attempt-2	146.2	11/9/2022	1520561.71	117865.99	1.3	0.0	0%	No	6	Vibracore
K200	K200-Attempt-3	146.2	11/9/2022	1520560.64	117871.27	1.3	0.0	0%	No	2.5	Vibracore
K280	K280-Attempt-1	143.9	11/10/2022	1520646.36	117872.23	0.6	0.0	0%	No	2.5	Vibracore
K280	**K280-Attempt-2**	**143.9**	**11/10/2022**	**1520644.38**	**117877.45**	**8.7**	**7.5**	**86%**	**Yes**	**5**	**Vibracore**
K280	K280-Attempt-3	143.9	11/10/2022	1520643.32	117871.47	6.8	6.2	91%	No	0.7	Vibracore
K360	K360-Attempt-1	139.0	11/8/2022	1520714.76	117879.50	6.9	1.0	14%	No	10	DPT
K400	K400-Attempt-1	136.3	11/10/2022	1520756.37	117886.89	1.8	0.0	0%	No	1.5	Vibracore
K400	K400-Attempt-2	136.3	11/10/2022	1520755.42	117888.94	1.9	0.0	0%	No	2.5	Vibracore
K400	K400-Attempt-3	136.3	11/10/2022	1520755.83	117887.52	1.8	0.0	0%	No	2	Vibracore
KN400[d]	**KN400-Attempt-1**	**149.8**	**11/13/2022**	**1519970.77**	**117825.58**	**4.5**	**2.0**	**44%**	**Yes**	**0**	**DPT**
KN400[d]	KN400-Attempt-2	149.8	11/13/2022	1519970.73	117817.92	4.1	0.0	0%	No	10	DPT
O280	**O280-Attempt-1**	**134.0**	**11/13/2022**	**1520640.63**	**117798.25**	**3.4**	**0.7**	**19%**	**Yes**	**2**	**DPT**
O280	O280-Attempt-2	134.0	11/13/2022	1520637.55	117795.72	2.0	0.3	13%	No	3	DPT
SG06	SG06-Attempt-1	134.0	11/8/2022	1520542.18	117759.77	0.0	0.0	0%	No	2	Vibracore
SG06	SG06-Attempt-2	134.0	11/8/2022	1520538.77	117759.84	0.0	0.0	0%	No	4.8	Vibracore
SG06	SG06-Attempt-3	134.0	11/8/2022	1520536.10	117762.10	0.0	0.0	0%	No	7	Vibracore

[a] Bathymetric Survey data collected during Step 1 field effort, 2022, presented in North American Vertical Datum of 1988 (NAVD88) (feet)

[b] X-Y Coordinates in U.S. survey feet, North American Datum 1983 Washington State Plane South.

[c] Muliple attempts to collect cores may have been made at a specific station. Of these, the core with the best recovery percentage (penetration depth/recovery) of the attempts at a location was retained for core logging and potential sample collection

[d] Station originally noted as HN400. Station name was changed from HN300 to KN400 based on actual X,Y (no target X,Y existed at the time of collection)

Notes:

% = percent

ID = identification

DPT = Direct Push Technology

NAVD88 = North American Vertical Datum 1988

bold/shading = core retained for processing and potential sample collection (see Tables 2-5 and 2-6)

ft = feet

U.S. = United States

Table D-2

TarGOST Ex-Situ Observations and Results

Table D-2. TarGOST Ex-Situ Observations and Results

BNSF Wishram Sediment Remedial Investigation Report

		Sample Date and Time		As-recovered Depth Sampled (ft along core)		Representative In Situ Depth (ft bss)			
Station	Sample ID	Date	Time	Top	Bottom	Top	Bottom	Location of Ex-Situ TarGOST Scanning	Field Notes
F390	F390-0.55-0.85	11/7/2022	10:30	0.6	0.9	2.05	2.35	Lab Only	very dark grey sand, some roots and woody debris, shells
				0.6	0.9	2.05	2.35	Field Only	
				0.6	0.9	2.05	2.35	Field Only	
	F390-1.2-1.6	11/7/2022	10:30	1.2	1.6	2.7	3.1	Lab Only	very dark grey sand, some roots and woody debris, shells
	F390-3-3.6-3.0	11/7/2022	10:30	3.0	3.6	4.5	5.1	Lab & Field	very dark brown silty sand
	F390-5.5-5.8	11/7/2022	10:30	5.5	5.8	7.0	7.3	Lab & Field	very dark grey silty sand, some roots and woody debris
	F390-6.7-7.0	11/7/2022	10:30	6.7	7.0	8.2	8.5	Lab & Field	very dark grey sand, some roots and woody debris
G000	G000-0.9-1.29	11/8/2022	12:00	0.9	1.2	2.7	3.0	Lab Only	roots;slight petro odor after being jarred, not observed during logging
				0.9	1.2	2.7	3.0	Field Only	
				0.9	1.2	2.7	3.0	Field Only	
				0.9	1.2	2.7	3.0	Field Only	
	G000-3.7-4.0	11/8/2022	12:00	3.7	4.0	5.5	5.8	Lab & Field	dark grey sand
G020	G020-4.0-5.0	11/4/2022	10:35	4.0	5.0	5.8	6.8	Lab Only	black-very dark grey NAPL-saturated w/tar-like odor
	G020-4.0-5.0-2	11/4/2022	10:45	4.0	5.0	5.8	6.8	Lab Only	black-very dark grey NAPL-saturated w/tar-like odor
G200	G200-3.9-4.2	11/7/2022	14:00	3.9	4.2	5.4	5.7	Lab Only	black clay NAPL-saturated
K280	K280-0.9	11/10/2022	14:07	0.9		0.9		Field Only	black silty sand w/organics sheen and staining
	K280-2.0	11/10/2022	14:07	2.0		2.0		Lab & Field	very dark brown silty sand w/organics and sheen
	K280-1.5	11/10/2022	14:30	1.5		1.5		Lab Only	very dark brown silty sand w/organics and sheen
	K280-2.5-3.0	11/10/2022	14:30	2.5	3.0	2.5	3.0	Lab Only	very dark brown silty sand organics present
	K280-2.5	11/10/2022	14:07	2.5		2.5		Field Only	
	K280-3.0	11/10/2022	14:07	3.0		3.0		Field Only	
	K280-3.5	11/10/2022	14:07	3.5		3.5		Field Only	very dark brown silty sand organics present
	K280-4.0	11/10/2022	14:07	4.0		4.0		Field Only	very dark brown silty sand organics present

Table D-2. TarGOST Ex-Situ Observations and Results

BNSF Wishram Sediment Remedial Investigation Report

		Sample Date and Time		As-recovered Depth Sampled (ft along core)		Representative In Situ Depth (ft bss)			
Station	Sample ID	Date	Time	Top	Bottom	Top	Bottom	Location of Ex-Situ TarGOST Scanning	Field Notes
K360	K360-0.0-1.0	11/8/2022	15:35	0.0	1.0	0.0	1.0	Lab Only	very dark greyish brown gravel, sands and shell fragments
				0.0	1.0	0.0	1.0	Field Only	
				0.0	1.0	0.0	1.0	Field Only	
				0.0	1.0	0.0	1.0	Field Only	
				0.0	1.0	0.0	1.0	Field Only	
				0.0	1.0	0.0	1.0	Field Only	
				0.0	1.0	0.0	1.0	Field Only	
				0.0	1.0	0.0	1.0	Field Only	
				0.0	1.0	0.0	1.0	Field Only	
				0.0	1.0	0.0	1.0	Field Only	
				0.0	1.0	0.0	1.0	Field Only	
				0.0	1.0	0.0	1.0	Field Only	
				0.0	1.0	0.0	1.0	Field Only	
I160	I160-0.7-0.8	11/9/2022	10:58	0.7	0.8	2.1	2.2	Field Only	isolated lens of woody debris w/petroleum odor, no evidence of NAPL impact within sands above and below

Table D-2. TarGOST Ex-Situ Observations and Results

BNSF Wishram Sediment Remedial Investigation Report

Station	Sample ID	Sample Date and Time		Dakota Technologies - TarGOST Ex Situ Observations/ Results			Raw In-Lab Reading (%RE)	Raw In-Field Reading (%RE)	NAPL Impacts Observed		Cluster Plot Location
		Date	Time	Description of Media	UV Inspection Notes	TarGOST Inspection Notes[1]			YES	NO	
F390	F390-0.55-0.85	11/7/2022	10:30	organics	specks /organics otherwise non-detect	FP- plant material sand and clay	7.8	see 2 samples below		X	G1
				plant material				116.3		X	J1-J2
				shell				1.9		X	G1
	F390-1.2-1.6	11/7/2022	10:30	organics and shells	specks otherwise non-detect	FP- roots,wood, shells	0.8			X	MIXED
	F390-3-3.6-3.0	11/7/2022	10:30	organics w/ fuel odor	bright green/heavy staining on lid	PO- fuel oil PP- staining on lid	58.1	90.3	X		F3
	F390-5.5-5.8	11/7/2022	10:30	organics	orange/ slight lid staining	FP- peat-like	6	9		X	G1-H1
	F390-6.7-7.0	11/7/2022	10:30	organics	orange/ slight lid staining	FP- peat-like	20	20.8		X	H1
G000	G000-0.9-1.29	11/8/2022	12:00	organics (phc odor)	Specks /light stain on lid	PO- Diesel-like PP- light staining on lid	1.3	see 3 samples below	X		G1
				organics; black, fuel odor				4.1	X		H1
				organics grey, fuel odor				0.8	X		MIXED
				organics; black, fuel odor				23.4	X		H1
	G000-3.7-4.0	11/8/2022	12:00	unimpacted sand	Specks otherwise non-detect	ND -clean sand	0.3	0.2		X	MIXED
G020	G020-4.0-5.0	11/4/2022	10:35	impacted CH	Bright orange/staining on lid	NP- Tar PO -tar/naptha	37.1		X		G1-H1
	G020-4.0-5.0-2	11/4/2022	10:45	impacted CH	Bright orange/staining on lid	NP- Tar PO -tar/naptha	38.7		X		G1-H1
G200	G200-3.9-4.2	11/7/2022	14:00	tar-laden woody debris	Bright /staining on lid	NP- Tar PO -tar/naptha	30.6		X		G1-H1
K280	K280-0.9	11/10/2022	14:07	wood w/tar odor				200.6	X		F2
	K280-2.0	11/10/2022	14:07	SP-SM; fibrous "mud" w/sheen	Bright /staining on lid	NP-slight oil PO -oil-like	159.7	84.9	X		G2
	K280-1.5	11/10/2022	14:30	woody chunk	Bright /staining on lid	NP-NAPL soaked wood PO-Naptha FP-wood	88.3		X		G1
	K280-2.5-3.0	11/10/2022	14:30	SP-SM	orange liquid?/ stain on lid	ND -clean sand	1.3	see 2 samples below		X	F1
	K280-2.5	11/10/2022	14:07	sand and organic material				0.6		X	MIXED
	K280-3.0	11/10/2022	14:07	clean sand				0.5		X	MIXED
	K280-3.5	11/10/2022	14:07	clean sand				0.4		X	MIXED
	K280-4.0	11/10/2022	14:07	clean sand				0.3		X	MIXED

Table D-2. TarGOST Ex-Situ Observations and Results

BNSF Wishram Sediment Remedial Investigation Report

		Sample Date and Time		Dakota Technologies - TarGOST Ex Situ Observations/ Results					NAPL Impacts Observed		
Station	Sample ID	Date	Time	Description of Media	UV Inspection Notes	TarGOST Inspection Notes[1]	Raw In-Lab Reading (%RE)	Raw In-Field Reading (%RE)	YES	NO	Cluster Plot Location
K360	K360-0.0-1.0	11/8/2022	15:35	Cobbles, gravels, sands, and shells	shells visable	Gravel, Shells	0.4 (sed/gravel) - 29 (white shell)	see 12 samples below		X	MIXED
				surface gravel				1.2		X	MIXED
				shell fragment				123.2		X	G1
				shell frament and organic material				17		X	MIXED
				gravel				1		X	MIXED
				white side of shell				66.2		X	F1
				brown side of shell				7.6		X	I1-I2
				clean sand				2.5		X	G2
				green shell				42.7		X	G2
				white side of large shell fragment				21.9		X	F1
				dark side of large shell fragment				1.8		X	G1-G2
				quartz rock				0.3		X	MIXED
				organic material w/no odor				48.7		X	I1
I160	I160-0.7-0.8	11/9/2022	10:58	hard fragment of wood and tar-like material w/tar odor				24.1	X		H1

Sample Call-out Abbreviations:

NP - NAPL Present; discreet NAPL was observ

NS - NAPL Stain: staining of soil was observed

PP - PAHs Present; neither NP nor NS were pr

FP - False Positive; false positive was observed, such as organic, soil particles, wood, or roots.

PO - Positive Odor; sample gave an oder that indicates contamination of the variety expected for the project.

ND - Non-Detect; nothing remarkable was found. Otherwise considered clean soil

Appendix D-1
Sediment Core Sampling Logs

JACOBS®

Site Name: BNSF Wishram Sediment RI
Project Number: D3631600
Project Location: Wishram, WA

Core Log Part 1 - Collection Information

Station Information

Station/Core ID: EF240
Contractor: Gravity
Vessel: SAMISH
Captain: LOGAN NELSON
Crew: DEREK NELSON
Notes by: Brandon Jones-Stanley

Target X: 45.655895N
Target Y: 120.968586W
X,Y Datum: LAT/LONG ~~NAD83 Oregon St. Plane North Feet~~ BSS
Tide Gage: The Dalles Dam
Tide Datum: NAVD88
Depth Sounding Equip: Leadline
Visitors (Ecology Rep, Client, KJ,: None

Collection Date: 11/9/22
St. Arrival Time: 1200
St. Depart Time: 1310
Target Core Depth: 10
Coring Equip: Vibracore Lexan
Barrel length (ft): 10 Aluminum

Core Collection Attempts

Attempt	Time	LAT/LONG ~~International Feet~~ BSS Actual X	Actual Y	Ft from Target	Water Depth (ft)	Time of Water Depth	Pene-tration (ft)	Rec. (ft)	% Rec.	Description of core collection	Core accepted?
1	1219	45.65589874	120.96859070	1.8	10.6	1220	6.6	4.7	71	Refusal at 6.6FT	N
2	1235	45.65589243	120.968559658	2.8	10.7	1236	7.2	5.3	73	Refusal at 7.2FT	N
3	1247	45.65589488	120.96858959	1	10.6	1248	8.6	6.7	78	Refusal at 8.6FT	Y

Additional Collection Notes (debris, rip rap, probing information, material in catcher etc.): Note mudline elevations will be determined based on water depths and tide stages after field collection.

Attempt 1: Soft, then refusal at 6.6 FT.
Attempt 2: Smooth Drive then hard refusal at 7.2 FT
Attempt 3: Smoth Then hard refusal at 8.6 FT

Description of Core Sectioning for Transport to Shore - Note the intervals that are sectioned (e.g., 0 to 5 feet, 5 to 10 feet) and note how much headspace is in each tube.

Cores vertical for transport to barge.

Core Log Part 2 - Characterization & Sampling

Sample Summary (check boxes for analysis) - See back page for Core Log form

Sample ID	Sample Type (N/FD/MSD)	Sample Date/Time	Depth Interval (ft)	No. Jars	PAHs/SVOCs	TPH (DRO/RRO)	Grain Size	TOC					

Sample details captured directly in electronic Ph2 Sample Summary table located in the PDX server project file

Station/Core ID: ~~EF-240~~ EF240 (JUB)

Core Barrel Diameter: 4

Pg. 1 Of

Logged by: J. Vidmar / J. Ulrich

Attempt Number: 3 [illegible]

Barrel Lined: [✓ YES] NO OTHER (describe)

Sampled by: G. Riley

Sampling Date & Time: ~~11:10~~ 11-10-22 12:10, 12:15, 12:20

Time & Date Core Opened: 11:10 11-10-22

Recovered depth below mudline (ft)	Lithology Type (USCS Code)	Color (Munsell)	Consistency	Structure	Moisture Content	Maximum particle size	Odor	% gravel	% sand	% fines	PID Reading (ppm)	NAPL Description (see Attachment B of the SAP)
	SP	10YR 3/1	S	H	W	FS	N	0	95	5	0.0	None
	SP-SM	very Dark				FS		0	90	10	0.0	
		Gray				Z		0	0	100		
1	ML											
											0.0	Bleb 1.5ft
	SP-SM					VFS		0	90	10		NONE
2	ML					Z		0	0	100	0.0	sheen 2.0ft
												NONE
						FS		0	5	95	0.0	
3	ML											
											0.0	
4	SP	5Y 4/1	F			MS		0	95	5	0.0	
		Dark gray			M							
											0.0	
5												
											0.0	
	ML					FS		0	5	95		
6											0.0	
7												
8												
9												
10												

Comments

Core Catcher: FULL [✓ EMPTY] OTHER (describe)

Core Catcher NOT sampled

Material present in core catcher:

Shell Fragments occur 0.0 to 2.0 ft

Roots and woody debris occur at:
0.0 - 0.9 ft
2.6 - 2.8 ft
3.0 - 3.2 ft
3.6 - 3.8 ft
6.4 ft

Course pebble @ 5.7 ft

Presence of darker staining at
2.6 ft
3.6 ft
3.9 ft

6.7 out of 8.6 ft Recovery

Samples taken
~~0.0 to 1.0 ft~~ (SV)
1.0 - 2.0 ft 12:10 Dup 12:15
3.0 - 4.0 ft 12:20
~~12:10~~ [illegible]

Core Extraction & Decant Method: Pulled while horizontal, decanted topwater

Reviewed by: Date: 11/10/22

JACOBS

Site Name: BNSF Wishram Sediment RI
Project Number: D3631600
Project Location: Wishram, WA

Core Log Part 1 - Collection Information

Station Information

Station/Core ID: EF 470
Contractor: ~~Gravity~~ MARK MARINE
Vessel: Mark 12
Captain: Craig Mark
Crew: P. ALBERTI
B. HYKE
Notes by: J. Vidmar / J. ULRICH

Target X: 45.655939N
Target Y: 120.967680W
X,Y Datum: ~~NAD83 Oregon St. Plane North Feet~~ LAT/LONG
Tide Gage: The Dalles Dam
Tide Datum: NAVD88
Depth Sounding Equip: Leadline
Visitors (Ecology Rep, Client, KJ, NONE

Collection Date: 11-9-22
St. Arrival Time: 09:25
St. Depart Time: 1200
Target Core Depth: Refusal
Coring Equip. ~~Vibracore~~ GeoProbe Lexan
Barrel length (ft): 5

Core Collection Attempts

Attempt	Time	International Feet Actual X	International Feet Actual Y	Ft from Target	Water Depth (ft)	Time of Water Depth	Pene-tration (ft)	Rec. (ft)	% Rec.	Description of core collection	Core accepted?
~~N~~		~~45.655937~~	~~120.967670~~		~~7.37~~	~~09:30~~	~~7.75~~	~~0.16~~	~~2%~~		
1	0927	45.655937	120.967670	~3	7.37	09:30	22.16	13.83	62	—	Y

Additional Collection Notes (debris, rip rap, probing information, material in catcher etc.): Note mudline elevations will be determined based on water depths and tide stages after field collection.

17.0 ft @ 930 to mudline ← FROM BARGE SURFACE

0951 7.75 ft drive, [2 in recovery] (20 to 25 ft of rod), core catcher used

1020 5.00 ft Drive [51 in recovery] (25 to 30 ft), No core catcher used

1049 5.00 ft Drive [53 in recovery] (30 to 35 ft) No core catcher used

1114 4.16 ft Drive [60 in recovery] (30 to 39.16 ft), Material expanded in liner

Refusal @ 39.16 ft = 22.16 ft Below mudline

Final depth reading is 37.00 ft, Slough material filled Void Space

Description of Core Sectioning for Transport to Shore - Note the intervals that are sectioned (e.g., 0 to 5 feet, 5 to 10 feet) and note how much headspace is in each tube.

Core Log Part 2 - Characterization & Sampling

Sample Summary (check boxes for analysis) - See back page for Core Log form

Sample ID	Sample Type (N/FD/MSD)	Sample Date/Time	Depth Interval (ft)	No. Jars	PAHs/SVOCs	TPH (DRO/RRO)	Grain Size	TOC
		11/9/22 / 1420	11 - 12	3	X	X		

Sample details captured directly in electronic Ph2 Sample Summary table located in the PDX server project file

9.63 ft Barge surface to water

Station/Core ID: EF-470
Attempt Number: 1
Sampling Date & Time: 11-9-22 14:20
Core Barrel Diameter: 1.75
Barrel Lined: [✓ YES] NO OTHER (describe)
Logged by: J. Vidmar
Sampled by: G. Riley
Time & Date Core Opened: 10:15 11-10-22

Recovered depth below mudline (ft)	Lithology Type (USCS Code)	Color (Munsell)	Consistency	Structure	Moisture Content	Maximum particle size	Odor	% gravel	% sand	% fines	PID Reading (ppm)	NAPL Description (see Attachment B of the SAP)
1												
2												
3	No Recovery											
4												
5												
6												
7												
8	SP	GLEY 1 2.5/N Black	F	H	M	FS	N	0	95	5	*	None
9												
10	SP-SM		S					0	90	10		
11	ML					VFS		0	5	95		
12	GW		F			CP						
13	SP	2.5Y 3/3 Dark olive Brown						80	15	5		
14	SP-SM		S			SP MS		15	85	0		
15								0	90	10		
16	SP		F					0	95	5		
17			H									
18		10YR 4/2 Dark grayish Brown									0.0	
19											0.0	
20											0.0	
21											0.0	
22	GW					MP		75	25	0		
23												
24												
25												
26												
27												
28												
29												
30												

Comments

Core Catcher: FULL EMPTY [✓ OTHER] (describe)

Core Catcher NOT sampled

Material present in core catcher: Core Catchers not used FROM 7.75 FT BSS +

0.0 to 7.75 No Recovery

-Thin layers of roots @ 12.0 ft

*PID values not collected due to excessive wind.

—SAMPLES COLLECTED FROM 11-12 FT BSS

22.16 Total depth achieved.

13.83 ft of sediment recovery

Core Extraction & Decant Method: Pull vertical from geoprobe. Decanted top water

Reviewed by:

Date: 11/10/22

JACOBS

Site Name: BNSF Wishram Sediment RI
Project Number: D3631600
Project Location: Wishram, WA

Core Log Part 1 - Collection Information

Station Information

Station/Core ID: ~~EF-470-~~ ~~M~~ ~~SC-2~~ JUF EF470-2 SAD
Contractor: ~~Gravity~~ MARK MARINE
Vessel: Mark 12
Captain: Craig Mark
Crew: P. ALBERTI
B. HYKE
Notes by: J. Vidmar / J. ULRICH

Target X: 45.655895N
Target Y: 120.968586W
X,Y Datum: ~~NAD83 Oregon St. Plane North Feet~~ LAT/LONG JUF
Tide Gage: The Dalles Dam
Tide Datum: NAVD88
Depth Sounding Equip: Leadline
Visitors (Ecology Rep, Client, KJ, NONE

Collection Date: JUF ~~11-9-22~~ 11-10-22
St. Arrival Time: JUF ~~13:25~~ 08:15
St. Depart Time: 0850
Target Core Depth: REFUSAL
Coring Equip: SAD ~~Vibracore~~ Lexan GeoProbe
Barrel length (ft): 5 ft

Core Collection Attempts

		International Feet									
Attempt	Time	JUF Actual X	Actual Y	Ft from Target	Water Depth (ft)	Time of Water Depth	Penetration (ft)	Rec. (ft)	% Rec.	Description of core collection	Core accepted?
1	~~13:25~~ 0825	45.655932N	120.967644W	~2	~~7.85~~ 8.37 JV	~~13:28~~ 0830	10.0	2.0	20	—	N

Additional Collection Notes (debris, rip rap, probing information, material in catcher etc.): Note mudline elevations will be determined based on water depths and tide stages after field collection.

~~7:58~~ Depth to Mudline from Barge Surface: [18.0] - 9.63 = [8.37 water depth]

0829 5.00 ft drive [0.0 ft of recovery] No core catcher used

0848 8 in of Slough, 5.0 ft Drive [2.0 ft of recovery] No Core catcher used

Description of Core Sectioning for Transport to Shore - Note the intervals that are sectioned (e.g., 0 to 5 feet, 5 to 10 feet) and note how much headspace is in each tube.

Core Log Part 2 - Characterization & Sampling

Sample Summary (check boxes for analysis) - See back page for Core Log form

Sample ID	Sample Type (N/FD/MSD)	Sample Date/Time	Depth Interval (ft)	No. Jars	PAHs/SVOCs	TPH (DRO/RRO)	Grain Size	TOC				

Sample details captured directly in electronic Ph2 Sample Summary table located in the PDX server project file

9.63 = Barge surface to water

EF470-2

Station/Core ID: ~~EF-470-SC-2~~ UP
Core Barrel Diameter: 1.75
Logged by: J. Vidmar / J. Ulrich
Attempt Number: 1
Barrel Lined: [✓ YES] NO OTHER (describe)
Sampled by: –
Sampling Date & Time: NA
Time & Date Core Opened: 09:25 11-10-22

Recovered depth below mudline (ft)	Lithology Type (USCS Code)	Color (Munsell)	Consistency	Structure	Moisture Content	Maximum particle size	Odor	% gravel	% sand	% fines	PID Reading (ppm)	NAPL Description (see Attachment B of the SAP)	Comments
1													Core Catcher: FULL EMPTY [✓ OTHER] Not used (describe)
2													Core Catcher NOT sampled
3													Material present in core catcher:
4													
5													[0 to 5 ft No recovery] * No confidence in interval the material came from. Material will not be logged. AS INTERVAL SEE GENERAL NOTE BELOW RE: MATERIAL
6													
7													
8													
9													
10													[10.0 ft of Penetration] • No evidence of NAPL in collected material. • Material is SP
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													
27													
28													
29													
30													

Core Extraction & Decant Method:

Reviewed by: JLU Date: 11/11/22

JACOBS

Site Name: BNSF Wishram Sediment RI
Project Number: D3631600
Project Location: Wishram, WA

Core Log Part 1 - Collection Information

Station Information

Station/Core ID: F390
Contractor: Gravity
Vessel: SAMISH
Captain: LOGAN NELSON
Crew: JEFF SCHUT
Notes by: BRANDON JONES STANLEY

Target X: 45.655894
Target Y: 120.967995
X,Y Datum: ~~NAD83 Oregon St. Plane North Feet 3SS~~ Lat/Long
Tide Gage: The Dalles Dam
Tide Datum: NAVD88
Depth Sounding Equip: Leadline
Visitors (Ecology Rep, Client, KJ, None

Collection Date: 11/6/22
St. Arrival Time: 1304
St. Depart Time: 1545
Target Core Depth: 10
Coring Equip: Vibracore Lexan
Barrel length (ft): 10-Aluminum

Core Collection Attempts

Attempt	Time	~~BS International Feet~~ LAT/LONG Actual X	Actual Y	Ft from Target	Water Depth (ft)	Time of Water Depth	Penetration (ft)	Rec. (ft)	% Rec.	Description of core collection	Core accepted?
1	1332	45.655899	120.967994	2	8.8	13:34	10	7.6	76	Hard stop at 10FT	Y
2	1425	45.655899	120.968004	2.8	8.8	1426	11.7	6.9	59	Difficult past 9 ft	N
3	1513	45.655892	120.967983	3	8.9	1515	6.4	5	78	Hard stop at 6.4FT	N

Additional Collection Notes (debris, rip rap, probing information, material in catcher etc.): Note mudline elevations will be determined based on water depths and tide stages after field collection.

Attempt 1: Smooth drive to 10 ft, Then refusal

Attempt 2: [15 ft core barrel] Began slowing at ~9 ft. Refusal at 11.7 ft. Hard Sand in core catcher

Attempt 3: [10 FT Core Barrel]; Hard refusal at 6.4 FT

Description of Core Sectioning for Transport to Shore - Note the intervals that are sectioned (e.g., 0 to 5 feet, 5 to 10 feet) and note how much headspace is in each tube.

Cores stored vertical for transport to Barge.

Core Log Part 2 - Characterization & Sampling

Sample Summary (check boxes for analysis) - See back page for Core Log form

Sample ID	Sample Type (N/FD/MSD)	Sample Date/Time	Depth Interval (ft)	No. Jars	PAHs/SVOCs	TPH (DRO/RRO)	Grain Size	TOC				

Sample details captured directly in electronic Ph2 Sample Summary table located in the PDX server project file

Station/Core ID: F390
Attempt Number: 2
Sampling Date & Time: 11-7-22 10:30

Core Barrel Diameter: 4 in
Barrel Lined: [✓ YES] NO OTHER (describe)

Logged by: J. Vilmur
Sampled by: G. Riley
Time & Date Core Opened: 09:10 11-7-22

	Recovered depth below mudline (ft)	Lithology Type (USCS Code)	Color (Munsell)	Consistency	Structure	Moisture Content	Maximum particle size	Odor	% gravel	% sand	% fines	PID Reading (ppm)	NAPL Description (see Attachment B of the SAP)
1		SP	5Y 3/1 very Dark gray	F	H	M	FS	*	0	95	5	0.0	NO NAPL detected
2													
3	1											0.0	
4													
5												0.0	
6	2												
7												0.0	
8													
9	3											0.0	
10		ML	10YR 2/2 very Dark Brown				FS		0	10	90		
11				S								0.0	
12	4			F									
13												0.0	
14		SP-SM					FS		0	90	10	0.0	
15	5		5Y 3/1 very Dark Gray										
16												0.0	
17		SP		H			FS		0	95	5		
18	6											0.0	
19												0.0	
20													
21	7	ML	10YR 2/1 Black				FS		0	5	95	0.0	
22													
23													
24	8												
25													
26													
27	9												
28													
29													
30	10												

JV

Comments

Core Catcher: FULL [✓ EMPTY] OTHER (describe)

Core Catcher NOT sampled

Material present in core catcher: —

Shell fragments occur in the 0 to 3.0ft interval

Intervals of roots and woody debris occur @:
0.7 ft
3.0 - 3.6 ft
4.8 ft
5.5 - 5.7 ft
6.7 - 6.9 ft

* No odors detected. Please note that temps are cold and odors are difficult to notice.

7.6 ft/10 ft Recovery

Lab sample taken in 6.2 - 7.2 ft

core catcher: 4.5 in not sampled

Core Extraction & Decant Method: DECANTED

Reviewed by:

Date: 11/7/22

JACOBS

Site Name: BNSF Wishram Sediment RI
Project Number: D3631600
Project Location: Wishram, WA

Core Log Part 1 - Collection Information

Station Information

Station/Core ID: G000
Contractor: Gravity
Vessel: SAMISH
Captain: LOGAN NELSON
Crew: JEFF SCHUT
—
Notes by: LAURA TOCHKO

Target X: 45.655766 N
Target Y: 120.969525 W
X,Y Datum: ~~NAD83 Oregon St. Plane North Feet~~ LAT/LONG
Tide Gage: The Dalles Dam
Tide Datum: NAVD88
Depth Sounding Equip: Leadline
Visitors (Ecology Rep, Client, KJ, NONE

Collection Date: 11/3/22
St. Arrival Time: 0945
St. Depart Time: 1210
Target Core Depth: 15
Coring Equip: Vibracore Lexan/ALUMINUM
Barrel length (ft): 10

Core Collection Attempts

Attempt	Time	*International Feet*		Ft from Target	Water Depth (ft)	Time of Water Depth	Penetration (ft)	Rec. (ft)	% Rec.	Description of core collection	Core accepted?
		Actual X	Actual Y								
1	1050	45.65575998	-120.96952879	2.3	9.2	1054	6.7	6.7 ~~[illegible]~~	100	"SOFT" REFUSAL DUE TO SAND*	Yes
2	1121	45.65576419	-120.96950481	4.9	9.3	1121	6.6	6.3	95	" "	NO
3	1140	45.65576979	-120.96948892	9	9.3	1140	5.4	5	92	" "	NO

Additional Collection Notes (debris, rip rap, probing information, material in catcher etc.): Note mudline elevations will be determined based on water depths and tide stages after field collection.

ATTEMPT 1 PROBING WITH LEAD LINE HARD BUT NOT ROCK 10FT CORE
SAND ON OUTSIDE OF CORE BARREL.
* CAN'T PUSH FURTHER INTO SAND DUE TO COMPACTION ISSUES W/ BARREL
ATTEMPT 2 SAME AS ATTEMPT 1

ATTEMPT 3 SAME AS ATTEMPT 1

Description of Core Sectioning for Transport to Shore - Note the intervals that are sectioned (e.g., 0 to 5 feet, 5 to 10 feet) and note how much headspace is in each tube.

CORES STORED ~60° VERTICAL FOR TRANSPORT TO BARGE

Core Log Part 2 - Characterization & Sampling

Sample Summary (check boxes for analysis) - See back page for Core Log form

Sample ID	Sample Type (N/FD/MSD)	Sample Date/Time	Depth Interval (ft)	No. Jars	PAHs/SVOCs	TPH (DRO/RRO	Grain Size	TOC					

Sample details captured directly in electronic Ph2 Sample Summary table located in the PDX server project file

Station/Core ID: G000
Attempt Number: 1
Sampling Date & Time: 11-3-22 / 1350-1410
Core Barrel Diameter: 4 in
Barrel Lined: [✓ YES] NO OTHER (describe)
Logged by: J. Vidmar
Sampled by: G. Riley
Time & Date Core Opened: 12:45 / 11-3-22

Recovered depth below mudline (ft)	Lithology Type (USCS Code)	Color (Munsell)	Consistency	Structure	Moisture Content	Maximum particle size	Odor	% gravel	% sand	% fines	PID Reading (ppm)	NAPL Description (see Attachment B of the SAP)
1	SP	5Y 3/1 Very Dark gray	VS	H	W	VFS	N	0	95	5	0.0	
2	ML		S					0	5	95	0.0	
3											0.0	-Blb@ 3.3
4											0.0	- BLEBe 4.1 - BLEBe 4.3
5			F								0.0	-Blb@ 4.9
6	SP				M			0	95	5	0.0	
7												6.7/6.7 Recovery
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Comments

Core Catcher: FULL [✓ EMPTY] OTHER (describe)

Core Catcher NOT sampled

Material present in core catcher: NA

- Shell Fragments occur in the top 5 ft, most notably in the top 2 ft
- several roots and woody debris occur at 5 to 6.3 ft.

No PID Hits.
No odor.
Recovery of 6.7 feet

Core Extraction & Decant Method: Pulled while horizontal, decanted top water.

Reviewed by: Date: 11/3/22

2 OF 3

JACOBS®

Site Name: BNSF Wishram Sediment RI
Project Number: D3631600
Project Location: Wishram, WA

Core Log Part 1 - Collection Information

Station Information

Station/Core ID: G000

Contractor: Gravity

Vessel: SAMISH

Captain: Logan NELSON

Crew: Jeff SCHUST

Notes by: BranDon Jones Stanley

Target X: 45.655766

Target Y: 120.969525

X,Y Datum: ~~NAD83 Oregon St. Plane North Feet~~ BJS Lat/Long

Tide Gage: The Dalles Dam

Tide Datum: NAVD88

Depth Sounding Equip: Leadline

Visitors (Ecology Rep, Client, KJ, None

Collection Date: 11/6/22 / 11/7/22

St. Arrival Time: 10:05 / 0930

St. Depart Time: 1130 / 1100

Target Core Depth: 10

Coring Equip: Vibracore Lexan

Barrel length (ft): 10-Aluminum

Core Collection Attempts

Attempt	Time	~~International Feet~~ BJS Lat/Long Actual X	Actual Y	Ft from Target	Water Depth (ft)	Time of Water Depth	Penetration (ft)	Rec. (ft)	% Rec.	Description of core collection	Core accepted?
4	1009	45.655767	120.969535	2	10.3	1009	7.5 BJS	6.6	~~88~~ BJS 93	Easy to 6.3 then slow	Y
5	1042	45.655768	120.969503	7	10.4	1043	5.9	5.9	100	Hard stop @ 5.9 ft	N
6	1110	45.655768	120.969515	3	10.3	11:11	5.7	5.5	96	Hard stop @ 5.7 ft	N
7	948	45.655762	120.969520	1.8	9.2	951	7.3	3.6	~~0~~ BJS 49	Hard Stop @ 7.3	N
8	1010	45.655758	120.969525	3	9.2	1013	7.5	0.8	11	Hard Stop @ 7.5	N
~~9~~	~~0930~~										

Additional Collection Notes (debris, rip rap, probing information, material in catcher etc.): Note mudline elevations will be determined based on water depths and tide stages after field collection.

Attempt 4: Smooth driving to ~6 ft. then slow before hard refusal at 7.5 ft.

Attempt 5: Hard stop at 5.9 FT

Attempt 6: Hard stop at 57 ft

* Cores to be opened on boat. Decision will be made for sample collection

11/7/22

- Attempt 7: Start water flooding at 6 ft, Hard stop at 7.3 ft. Low Recovery

Description of Core Sectioning for Transport to Shore - Note the intervals that are sectioned (e.g., 0 to 5 feet, 5 to 10 feet) and note how much headspace is in each tube.

Cores stored vertical for transport to shore.

Core Log Part 2 - Characterization & Sampling

Sample Summary (check boxes for analysis) - See back page for Core Log form

Sample ID	Sample Type (N/FD/MSD)	Sample Date/Time	Depth Interval (ft)	No. Jars	PAHs/SVOCs	TPH (DRO/RRO)	Grain Size	TOC					

Sample details captured directly in electronic Ph2 Sample Summary table located in the PDX server project file

Attempt 8: Started water from top of mud line. Hard refusal, BJS low recovery

Station/Core ID: G100
Core Barrel Diameter: 4
Logged by: ~~J. Vidmar~~ J. Ulrich (JU)
Attempt Number: 4
Barrel Lined: [✓ YES] NO OTHER (describe)
Sampled by: –
Sampling Date & Time: – NA –
Time & Date Core Opened: 11:55 11-6-22

Recovered depth below mudline (ft)	Lithology Type (USCS Code)	Color (Munsell)	Consistency	Structure	Moisture Content	Maximum particle size	Odor	% gravel	% sand	% fines	PID Reading (ppm)	NAPL Description (see Attachment B of the SAP)
1	SP	10YR 4/1	F	H	M	FS	N	0	95	5	0.0	
2		DARK GRAY										NONE
3									70	30		
4									85	15		
5												
6									100	0		
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Comments

Core Catcher: [✓ FULL] EMPTY OTHER (describe)

Core Catcher NOT sampled

Material present in core catcher:

NO indication of NAPL present.

Recovery 6.6ft out of 7.1ft

Core Extraction & Decant Method: DECANT. PULL HORIZONTALLY

Reviewed by:

Date: 11/7/22

PG. 3 OF 3

JACOBS

Site Name: BNSF Wishram Sediment RI
Project Number: D3631600
Project Location: Wishram, WA

Core Log Part 1 - Collection Information

Station Information

Station/Core ID: G000

Contractor: ~~Gravity~~ JLU MARK MARINE

Vessel: Mark Marine

Captain: Craig Mark

Crew: P. Alberti
B. Hyke

Notes by: J. Vidmar / J. Ulrich

Target X: 45.655 766N

Target Y: 120.~~###~~ 969525

X,Y Datum: ~~NAD83 Oregon St. Plane North Feet~~ LAT/LONG JW

Tide Gage: The Dalles Dam

Tide Datum: NAVD88

Depth Sounding Equip: Leadline

Visitors (Ecology Rep, Client, KJ, NONE

Collection Date: 11-8-22

St. Arrival Time: 0910

St. Depart Time: 1000

Target Core Depth: Refusal

Coring Equip: JW ~~Vibracore~~ ~~Lexan~~ MACRO CORE DPT

Barrel length (ft): 5

Core Collection Attempts

Attempt	Time	International Feet		Ft from Target	Mudline ~~Water Depth~~ (ft)	Time of Water Depth	Penetration (ft)	Rec. (ft)	% Rec.	Description of core collection	ac
		Actual X	Actual Y								
9	0920	45.655767	120.969535	~10	19.5	0904	13.0	5.8	44	OPT MACRO CORE	Y
					DTW:						
					9.87						

Additional Collection Notes (debris, rip rap, probing information, material in catcher etc.): Note mudline elevations will be determined based on water depths and tide stages after field collection.

- MACRO CORE DPT METHOD. CORE CATCHER USED
- 0 to 5.0 ft drive [~~3.2 ft of recovery~~] JV 0.0 ft of REcovery
  5.0 to 10.0 ft [3.2 ft of Recovery]
  10.0 to 13.0 ft [2.6 ft of Recovery] 8 inches of heaving sand filled in the hole before last macrocore Push
  Total depth: 32.5 ft ~~below mudline~~ JUF

DEPTH TO MUDLINE FROM BARGE SURFACE = 19.5

WL = 19.5 - 9.63 =

Description of Core Sectioning for Transport to Shore - Note the intervals that are sectioned (e.g., 0 to 5 feet, 5 to 10 feet) and note how much headspace is in each tube.

Core Log Part 2 - Characterization & Sampling

Sample Summary (check boxes for analysis) - See back page for Core Log form

Sample ID	Sample Type (N/FD/MSD)	Sample Date/Time	Depth Interval (ft)	No. Jars	PAHs/SVOCs	TPH (DRO/RRO)	Grain Size	TOC					
No Sample													

Sample details captured directly in electronic Ph2 Sample Summary table located in the PDX server project file

* core depths logged as recovered. DPT recovery very low. Cannot confidently correlate recovered material to distinct intervals.

Station/Core ID: GR000
Attempt Number: 9
Sampling Date & Time: --

Core Barrel Diameter: 1.75 in
Barrel Lined: [✓ YES] NO OTHER (describe)

Logged by: J. Vidmar
Sampled by: --
Time & Date Core Opened: 11:20 11-8-22

	Recovered depth below mudline (ft)	Lithology Type (USCS Code)	Color (Munsell)	Consistency	Structure	Moisture Content	Maximum particle size	Odor	% gravel	% sand	% fines	PID Reading (ppm)	NAPL Description (see Attachment B of the SAP)
1		SP	10YR 4/1 Dark gray	F	H	M	FS	N	0	95	5	0.0	None
2													
3	1											0.0	
4													
5													
6	2	SP-SM							0	90	10	0.0	
7													
8												0.0	
9	3	SP							0	95	5		
10												0.0	
11													
12	4											0.0	
13													
14												0.0	
15	5												
16												0.0	
17													
18	6												
19													
20													
21													
22													
23													
24													
25													
26													
27													
28													
29													
30													

Comments

Core Catcher: [✓ FULL] EMPTY OTHER (describe)

Core Catcher NOT sampled

Material present in core catcher: SP

- Roots, Organic Material

→ FUEL ODOR OBSERVED IN DAKOTA SAMPLE FROM 0.9-1.2 FT

- 3.8 to 5.4 ft individual small-large gravels occur
- 3.0 to 4.6 Lithic Debitage identified by cultural specialist
- Bottom First core (3.3 ft) does not display continuity with 2nd length of core. Driller suggested heaving sands are present (8 in)

*5.8 ~~Bottom of~~ Cores from 13 ft of Penetration

*CORE DEPTHS LOGGED AS RECOVERED. DPT RECOVERY VERY LOW. CANNOT CONFIDENTLY CORRELATE MATERIAL TO DISTINCT INTERVALS. NO SAMPLES COLLECTED.

Core Extraction & Decant Method: DECANT & PULL HORIZONTALLY

Reviewed by: Jey

Date: 11/11/22

JACOBS

Site Name: BNSF Wishram Sediment RI
Project Number: D3631600
Project Location: Wishram, WA

Core Log Part 1 - Collection Information

Station Information

Station/Core ID: GD29
Contractor: Gravity
Vessel: SAMISH
Captain: LOGAN NELSON
Crew: JEFF SCHUT
Notes by: LAURA TORHEO

Target X: 45.65574971 N
Target Y: 120.96944706 W
X,Y Datum: NAD83 Oregon St. Plane North Feet
Tide Gage: The Dalles Dam
Tide Datum: NAVD88
Depth Sounding Equip: Leadline
Visitors (Ecology Rep, Client, KJ, NONE

Collection Date: 11/3/22 SAT
St. Arrival Time: 0910 14:10
St. Depart Time: 1635
Target Core Depth: 10'
Coring Equip: Vibracore Lexan ALUMINUM
Barrel length (ft): 10'

Core Collection Attempts

Attempt	Time	International Feet		Ft from Target	Water Depth (ft)	Time of Water Depth	Penetration (ft)	Rec. (ft)	% Rec.	Description of core collection	Core accepted?
		Actual X	Actual Y								
1	1444	45.65574561	-120.96945210	2.1	9.5	1444	5.3	NA	NA	HARD STOP @ 5.3 FT BML	NO
2	1520	45.65574575	-120.96943542	2.7	9.5	1526	6.8	5.2	76	SLOWED @ 6.8 FT BML	NO
3	1554	45.65574769	-120.96940942	7.5	9.7	1554	7.5	5.2	69	SLOWED @ 5.9 FT BML	YES*

Additional Collection Notes (debris, rip rap, probing information, material in catcher etc.): Note mudline elevations will be determined based on water depths and tide stages after field collection.

ATTEMPT 1: PROBING WITH LEAD LINE HARD BUT NOT ROCK
DURING EXTRACTION ON BOAT, RIVET WAS STUCK CAUSING SEDIMENT TO FALL OUT OF INNER BARREL. SILTY / CLAY MATERIAL IN CORE CATCHER.

ATTEMPT 2: PROBING WITH LEADLINE HARD BUT NOT ROCK

ATTEMPT 3: SAME AS ATTEMPT 2 FOR PROBING. BLACK NAPL SUSPECTED IN BOTTOM ~0.8 FT OF CORE. HYDROCARBON ODOR IDENTIFIED WHEN REMOVING INNER BARREL FROM OUTER BARREL

Description of Core Sectioning for Transport to Shore - Note the intervals that are sectioned (e.g., 0 to 5 feet, 5 to 10 feet) and note how much headspace is in each tube.

EXTRACTED INNER BARREL STORED ~60° VERTICAL FOR TRANSPORT TO DOCK

Core Log Part 2 - Characterization & Sampling

Sample Summary (check boxes for analysis) - See back page for Core Log form

Sample ID	Sample Type (N/FD/MSD)	Sample Date/Time	Depth Interval (ft)	No. Jars	PAHs/SVOCs	TPH (DRO/RRO)	Grain Size	TOC					

Sample details captured directly in electronic Ph2 Sample Summary table located in the PDX server project file

* ATTEMPT 3 ACCEPTED OVER ATTEMPT 2 DUE TO FURTHER PENETRATION AND ~~MORE~~ @ EVIDENCE OF NAPL @ BOTTOM OF CORE

Station/Core ID: SO20
Attempt Number: 3
Sampling Date & Time: 11-4-22 10:20

Core Barrel Diameter: 4 in
Barrel Lined: [✓ YES] NO OTHER (describe)

Logged by: J. Vidmar
Sampled by: G. Riley
Time & Date Core Opened: 0855 11-4-22

Recovered depth below mudline (ft)	Lithology Type (USCS Code)	Color (Munsell)	Consistency	Structure	Moisture Content	Maximum particle size	Odor	% gravel	% sand	% fines	PID Reading (ppm)	NAPL Description (see Attachment B of the SAP)
1	SP	10YR 3/1 very Dark gray	F	H	W	VFS	N	0	95	5	0.0	
2											0.0	
3 –												Bleb
4											0.0	
5												bleb
6 2	ML		S			Z		0	0	100	0.0	
7												
8	SP		F					0	95	5	0.0	bleb
9 –							T					
10	SP-SM					VFS		0	90	10	0.0	Sheen
11												
12 4	CH	10YR 3/1 Black	H		M	Z		0	0	100	0.5	saturated
13											1.5	
14		10YR 3/1 very Dark gray										
15 –												
16												
17												
18 6												
19												
20												
21 –												
22												
23												
24 8												
25												
26												
27 –												
28												
29												
30 10												

(JV)

Comments

Core Catcher: [✓ FULL] EMPTY OTHER
(describe)

Core Catcher NOT sampled

Material present in core catcher: SP ~~NA~~ (JV)

Shell fragments occurs in the top 4 ft.

• Blebs occurs in the top 3 ft most notably @: 1.3 ft, 2.0 ft, 2.9 ft

Sheen @ 3.5 ft

Saturated, Tar like odor, Strong @ 4.0 ft

~~5.2~~ (JV)

5.2 feet of recovery out of 7.5 f

Roots occur @ 4.0 ft down to the bottom of the core

~~Exterior~~ (JV)

Staining occured on the core liner in the bottom 6 inc of core.

Core Extraction & Decant Method: Pull while horizontal, decant top water

Reviewed by: Qll

Date: 11/4/22

JACOBS

Site Name: BNSF Wishram Sediment RI
Project Number: D3631600
Project Location: Wishram, WA

Core Log Part 1 - Collection Information

Station Information

Station/Core ID: G200
Contractor: Gravity
Vessel: SAMISH
Captain: LOGAN NELSON
Crew: DERRICK NELSON
Notes by: BRANDON JONES-STANLEY

Target X: 45.65579285
Target Y: 120.96871873
X,Y Datum: ~~NAD83 Oregon St. Plane North Feet~~ Lat/LONG - RSS
Tide Gage: The Dalles Dam
Tide Datum: NAVD88
Depth Sounding Equip: Leadline
Visitors (Ecology Rep, Client, KJ, None

Collection Date: 11/7/22
St. Arrival Time: 1110
St. Depart Time: 1235
Target Core Depth: 10
Coring Equip: Vibracore Lexan
Barrel length (ft): 10-Aluminum

Core Collection Attempts

Attempt	Time	~~RSS International Feet~~ LAT/LONG Actual X	Actual Y	Ft from Target	Water Depth (ft)	Time of Water Depth	Pene-tration (ft)	Rec. (ft)	% Rec.	Description of core collection	Core accepted?
1	1124	45.655792	120.968719	0.8	11.3	1125	7	5.7	81	SMOOTH, Then Hard Stop	Y
2	1152	45.655789	120.968742	6	11.2	1151	5.1	4	78	Hard stop at 5.1 FT	N
3	1207	45.655791	120.968721	1	11.2	1208	5.6	4	71	Hard stop at 5.6 FT	N

Additional Collection Notes (debris, rip rap, probing information, material in catcher etc.): Note mudline elevations will be determined based on water depths and tide stages after field collection.

Attempt 1: Hard stop at 7 ft.
Attempt 2: Hard stop at 5.1 ft
Attempt 3: Hard stop at 5.6 ft

Description of Core Sectioning for Transport to Shore - Note the intervals that are sectioned (e.g., 0 to 5 feet, 5 to 10 feet) and note how much headspace is in each tube.

Cores staged vertical for transport to barge.

Core Log Part 2 - Characterization & Sampling

Sample Summary (check boxes for analysis) - See back page for Core Log form

Sample ID	Sample Type (N/FD/MSD)	Sample Date/Time	Depth Interval (ft)	No. Jars	PAHs/SVOCs	TPH (DRO/RRO)	Grain Size	TOC					

Sample details captured directly in electronic Ph2 Sample Summary table located in the PDX server project file

Station/Core ID: G 2cc
Attempt Number: 1
Sampling Date & Time: 11-7-22 14:00

Core Barrel Diameter: 4
Barrel Lined: [✓ YES] NO OTHER (describe)

Logged by: J. Vidmar
Sampled by: G. Riley
Time & Date Core Opened: 13:05 11-7-22

Recovered depth below mudline (ft)		Lithology Type (USCS Code)	Color (Munsell)	Consistency	Structure	Moisture Content	Maximum particle size	Odor	% gravel	% sand	% fines	PID Reading (ppm)	NAPL Description (see Attachment B of the SAP)
1		SP	10YR 3/1 very dark gray	F	H	M	FS	N	0	95	5	0.0	
2													
3	1	ML		S			FS		0	5	95	0.0	
4													
5												0.0	
6	2			F			FS		0	95	5		
7		SP										0.0	*
8													
9	3	ML					Z		0	0	100		
10												0.0	- Saturated
11		CH	2.5Y 2.5/1 Black	H		Dry	Z	T	0	0	100		
12	4											0.0	- Saturated
13												0.1	
14													
15	5												
16												0.4	
17													
18	6												
19													
20													
21	7												
22													
23													
24	8												
25													
26													
27	9												
28													
29													
30	10												

IV

Comments

Core Catcher: [✓ FULL] EMPTY OTHER (describe)

Core Catcher NOT sampled

Material present in core catcher: ML

Organic Material Present at:
0.0 to 0.3 ft
3.4 to 3.7 ft
4.0 to 4.7 ft
5.0 to 5.4 ft

Color: 3.3 ft to 5.7 has bands alternating between 2.5Y 3.5/1 and 2.5Y 3/1 frequently

Distinct saturated areas at:
3.4 to 3.7 ft
4.0 to 4.7 ft
5.0 to 5.4 ft

-5.7 of 7.0 ft for recovery
Core catcher 4.5 in not sampled
-Sample collected at 4.0 to 5.0 ft

* EX-SITU SAMPLE COLLECTED FROM 3.9-4.2

Core Extraction & Decant Method:

Reviewed by:

Date: 11/8/22

JACOBS

Site Name: BNSF Wishram Sediment RI
Project Number: D3631600
Project Location: Wishram, WA

Core Log Part 1 - Collection Information

Station Information

Station/Core ID: I 160

Contractor: Gravity

Vessel: SAMISH

Captain: LOGAN NELSON

Crew: Derek NELSON

Notes by: Brandon Jones Stanley

Target X: 45.65569 N

Target Y: 120.968861 W

X,Y Datum: LAT/LONG ~~NAD83 Oregon St. Plane North Feet~~ BSS

Tide Gage: The Dalles Dam

Tide Datum: NAVD88

Depth Sounding Equip: Leadline

Visitors (Ecology Rep, Client, KJ,: None

Collection Date: 11/9/22

St. Arrival Time: 810

St. Depart Time: 9

Target Core Depth: 10

Coring Equip: Vibracore Lexan

Barrel length (ft): 10-Aluminum

Core Collection Attempts

Attempt	Time	LAT/LONG ~~International Feet~~ BSS Actual X	Actual Y	Ft from Target	Water Depth (ft)	Time of Water Depth	Pene-tration (ft)	Rec. (ft)	% Rec.	Description of core collection	Core accepted?
1	835	45.6556871	120.96886307	2.8	13.4	8:34	1.7	0	0	Hard stop at 1.7	N
2	846	45.65568130	120.96885122	4	13.4	848	1.5	0	0	Hard stop at. 1.5	N
3	857	45.65567277	120.96886044	1	13.7	859	2.2	1.3	59	Hard stop at 2.2	Y

Additional Collection Notes (debris, rip rap, probing information, material in catcher etc.): Note mudline elevations will be determined based on water depths and tide stages after field collection.

Attempt 1: Hard bottom w/ lead line. Hard stop at 1.7. No recovery

Attempt 2: Hard bottom w/ lead line. Hard stop at 1.5. No recovery

Attempt 3: Hard bottom w/ lead line. Hard stop at 2.2

Description of Core Sectioning for Transport to Shore - Note the intervals that are sectioned (e.g., 0 to 5 feet, 5 to 10 feet) and note how much headspace is in each tube.

Core stored vertical for transport to shore.

Core Log Part 2 - Characterization & Sampling

Sample Summary (check boxes for analysis) - See back page for Core Log form

Sample ID	Sample Type (N/FD/MSD)	Sample Date/Time	Depth Interval (ft)	No. Jars	PAHs/SVOCs	TPH (DRO/RRO)	Grain Size	TOC						

Sample details captured directly in electronic Ph2 Sample Summary table located in the PDX server project file

Station/Core ID: I160
Attempt Number: 3
Sampling Date & Time: NA

Core Barrel Diameter: 4 in
Barrel Lined: [✓ YES] NO OTHER (describe)

Pg. 1 Of

Logged by: G. Riley
Sampled by: NA
Time & Date Core Opened: 1045 11/09/22

Recovered depth below mudline (ft)	Lithology Type (USCS Code)	Color (Munsell)	Consistency	Structure	Moisture Content	Maximum particle size	Odor	% gravel	% sand	% fines	PID Reading (ppm)	NAPL Description (see Attachment B of the SAP)
	S~~M~~W	10YR 3/1	F	H	W	MS	N	0	95	5	0.0	NO NAPL observed
0.5	SW	very dark gray		H	M	ms		0	55	45		
0.7												0.7-0.8: Isolated lens, appears to be saturated woody debris. Surrounding sediment has no indication of NAPL
1 0.8							PHC					
1.3							N					
2												
3												
4												
5												
6												
7												
8												
9												
10												

Comments

Core Catcher: [✓ FULL] EMPTY OTHER
(describe)

Core Catcher NOT sampled

Material present in core catcher: ~~SM~~, GP, S, ML

Recovery 1.3/2.2 ft BML

Woody debris at 0.7-0.8Ft and in core catcher has PHC Smell.

No sample collected for lab analysis

0.7-0.8 collected for ex-situ TARgost analysis

Core Extraction & Decant Method: Core Pulled while horizontal, decanted top water

Reviewed by

Date 11/10/22

JACOBS®

Site Name: BNSF Wishram Sediment RI
Project Number: D3631600
Project Location: Wishram, WA

Core Log Part 1 - Collection Information

Station Information

Station/Core ID: I 500

Contractor: ~~Gravity~~ MARK MARINE

Vessel: Mark Marine

Captain: Craig Mark

Crew: B. HYKE
P. ALBERTI

Notes by: J. Vidmar / J. Wright

Target X: 45.655752N

Target Y: 120.967541W

X,Y Datum: ~~NAD83 Oregon St. Plane North Feet~~ LAT/LONG (JW)

Tide Gage: The Dalles Dam

Tide Datum: NAVD88

Depth Sounding Equip: Leadline

Visitors (Ecology Rep, Client, KJ, NONE

Collection Date: 11-13-22

St. Arrival Time: 08:33

St. Depart Time: 09:55

Target Core Depth: Refusal

Coring Equip: Vibracore Lexan

Barrel length (ft): 5

Core Collection Attempts

Attempt	Time	International Feet		Ft from Target	Water Depth (ft)	Time of Water Depth	Pene-tration (ft)	Rec. (ft)	% Rec.	Description of core collection	Core accepted?
		Actual X	Actual Y								
1	0913	45.655751N	120.967541W	~1	29.37	0913	2.75	0.8	29	HARD DRILLING	Y

Additional Collection Notes (debris, rip rap, probing information, material in catcher etc.): Note mudline elevations will be determined based on water depths and tide stages after field collection.

Macro Core DPT method used. No core catcher used.

0912 Mudline. 39.0 ft, 2.75 ft Penetration Refusal [0.8 ft of Recovery]

TD: 41.75 ft

WL = 39.0 - 9.63 = 29.37

Description of Core Sectioning for Transport to Shore - Note the intervals that are sectioned (e.g., 0 to 5 feet, 5 to 10 feet) and note how much headspace is in each tube.

Core Log Part 2 - Characterization & Sampling

Sample Summary (check boxes for analysis) - See back page for Core Log form

Sample ID	Sample Type (N/FD/MSD)	Sample Date/Time	Depth Interval (ft)	No. Jars	PAHs/SVOCs	TPH (DRO/RRO	Grain Size	TOC					
		11/13/22	0.0 - 0.8	2	X	X							

Sample details captured directly in electronic Ph2 Sample Summary table located in the PDX server project file

Barge Surface to water: 9.63 ft

Station/Core ID: I 500

Attempt Number: 1

Sampling Date & Time: 11/13/22 | 11:40

Core Barrel Diameter: 1.75 in

Barrel Lined: [✓ YES] NO OTHER (describe)

Logged by: J. Vidmar

Sampled by: G. Riley

Time & Date Core Opened: 09:45 11-13-22

Recovered depth below mudline (ft)	Lithology Type (USCS Code)	Color (Munsell)	Consistency	Structure	Moisture Content	Maximum particle size	Odor	% gravel	% sand	% fines	PID Reading (ppm)	NAPL Description (see Attachment B of the SAP)
1	SP	10YR 3/2 very Dark Grayish Brown	F	H	M	MS	N	0	95	5	0.0	None
2	GW					CF		85	10	5		
3 1												
4												
5												
6 2												
7												
8												
9 3												
10												
11												
12 4												
13												
14												
15 5												
16												
17												
18 6												
19												
20												
21 7												
22												
23												
24 8												
25												
26												
27 9												
28												
29												
30 10												

5V

Comments

Core Catcher: FULL EMPTY [✓ OTHER] (describe) Not used

Core Catcher NOT sampled

Material present in core catcher: N/A

- Abundant Shell material 0.0 to 0.8

[0.8 of 2.75 ft recovery]

* Logged as recovered. DPT Recovery low, cannot confidently correlate recovered material to distinct interval

Sample collected from 0.0 to 0.8 ft

Core Extraction & Decant Method: DECANT ~~[illegible]~~ PULL HORIZONTALLY

Reviewed by: [illegible] Date: 11/13/22

24.6 ft

Pg 1 of 3

JACOBS

Site Name: BNSF Wishram Sediment RI
Project Number: D3631600
Project Location: Wishram, WA

Core Log Part 1 - Collection Information

Station Information

Station/Core ID: ~~K~~ J060
Contractor: ~~Gravity~~ MARK MARINE
Vessel: Mark Marine
Captain: ~~Cat~~ Craig Mark
Crew: B. HYKE
P. ALBERTI
Notes by: J. Vidmar | J. UNRICH

Target X: 45.655601N
Target Y: 120.969243W
X,Y Datum: ~~NAD83 Oregon St. Plane North Feet~~ LAT / LONG
Tide Gage: The Dalles Dam
Tide Datum: NAVD88
Depth Sounding Equip: Leadline
Visitors (Ecology Rep, Client, KJ, NONE

Collection Date: 11-13-22
St. Arrival Time: 12:02
St. Depart Time: 15:38
Target Core Depth: Refusal
Coring Equip: ~~Vibracore~~ ~~Lexan~~ MACRO CORE DPT
Barrel length (ft): 5

Core Collection Attempts

Attempt	Time	International Feet		Ft from Target	Water Depth (ft)	Time of Water Depth	Penetration (ft)	Rec. (ft)	% Rec.	Description of core collection	Core accepted?
		Actual X	Actual Y								
1	1225	45.655610N	120.969243W	~5	16.67	1225	4.86	1.95	40	Difficult drilling	Y*
2	14:46	45.655596N	120.969242W	~3	18.53	1446	9.83	5.0	50% 51%	Difficult drilling	Y*

Additional Collection Notes (debris, rip rap, probing information, material in catcher etc.): Note mudline elevations will be determined based on water depths and tide stages after field collection.

Macro core DPT method used. No core catcher used. ATTEMPT 1 WL = ~~28.16~~ 26.3 - 9.63 = 16.67

1225 Mudline: 26.3ft 4.86 ft of penetration Refusal [1.95 ft of Recovery]
1.5 ft of free fall drop of core after moving through material - Approximately 3 to 4 inches
TD: ~~40.9 ft~~ ~~30.9 ft~~ 31.16 ft

~~3 ft~~
~~2 in~~
25ft 5in

14:46 mudline: 28.16 ft ATTEMPT 2 WL = 28.16 - 9.63 = 18.53
10 inch Free Fall drop of core after Moving through Material - Approximately 3 to 4 inches
0.0 to 5.0 ft - 0.0 ft of recovery
5.0 to 9.83 ft [5.0 ft of Recovery] TD ~~38 ft~~ 38.0 ft

Description of Core Sectioning for Transport to Shore - Note the intervals that are sectioned (e.g., 0 to 5 feet, 5 to 10 feet) and note how much headspace is in each tube.

* ATTEMPT 1 - SHALLOW REFUSAL. HOLD CORE. WILL SAMPLE FROM MATERIAL IN ~~UPPER~~ THIS INTERVAL
* ATTEMPT 2 - NO RECOVERY 0-5 FT INTERVAL, 96% RECOVERY IN 5-10 FT INTERVAL. WILL SAMPLE THIS INTERVAL. ~~5-10 FT~~

Core Log Part 2 - Characterization & Sampling

Sample Summary (check boxes for analysis) - See back page for Core Log form

Sample ID	Sample Type (N/FD/MSD)	Sample Date/Time	Depth Interval (ft)	No. Jars	PAHs/SVOCs	TPH (DRO/RRO)	Grain Size	TOC					
		11/14/22/1020	0.5-1.5										
		11/14/22/1030	8.5-9.5										

Sample details captured directly in electronic Ph2 Sample Summary table located in the PDX server project file

1 CORE LOG FOR EACH ATTEMPT. TOTAL OF 3 PAGES

Pg 2 of 3

Station/Core ID: J060
Attempt Number: 1
Sampling Date & Time: 11-14-22 10:20

Core Barrel Diameter: 1.75
Barrel Lined: [✓ YES] NO OTHER (describe)

Logged by: J. Vidmar
Sampled by: G. Riley
Time & Date Core Opened: 13:04 11-13-22

JV

Recovered depth below mudline (ft)		Lithology Type (USCS Code)	Color (Munsell)	Consistency	Structure	Moisture Content	Maximum particle size	Odor	% gravel	% sand	% fines	PID Reading (ppm)	NAPL Description (see Attachment B of the SAP)
1		SP	10YR 3/1	F	H	M	MS	N	0	95	5	0.0	None
2		SP-SM		S			MS		0	90	10	0.0	
3	1	ML	SAM	F			FS		0	5	95		
4												0.0	
5												0.0	
6	2												
7													
8													
9	3												
10													
11													
12	4												
13													
14													
15	5												
16													
17													
18	6												
19													
20													
21	7												
22													
23													
24	8												
25													
26													
27	9												
28													
29													
30	10												

Comments

Core Catcher: FULL EMPTY [✓ OTHER] (describe) Not used

Core Catcher NOT sampled

Material present in core catcher: NA

1.95 of 4.86 ft Recovery

* Logged as recovered.

Core dropped 1.5 ft after having hammered on firm ground. Cannot confidently correlate recovered material to distinct interval.

*Sampled 0.5 ~~ft~~ to 1.5 ft

Core Extraction & Decant Method: DECANT. PULL HORIZONTALLY

Reviewed by: JEU Date: 11/18/22

Pg 3 of 3

Station/Core ID: J060
Attempt Number: 2
Sampling Date & Time: 11-14-22 10:30

Core Barrel Diameter: 1.75
Barrel Lined: [✓ YES] NO OTHER (describe)

Logged by: J. Vidmar
Sampled by: G Riley
Time & Date Core Opened: 9:35 11-14-22

	Recovered depth below mudline (ft)	Lithology Type (USCS Code)	JV Color (Munsell)	Consistency	Structure	Moisture Content	Maximum particle size	Odor	% gravel	% sand	% fines	PID Reading (ppm)	NAPL Description (see Attachment B of the SAP)
1			~~10YR 3/2 4/2 Dark Grayish Brown~~		~~H~~ JV	~~M~~						0.0 JV	~~None~~ JV
2												0.0	
3	1												
4												0.0	
5													
6	2											0.0	
7													
8												0.0	
9	3											0.0	
10													
11												0.0	
12	4											0.0	
13													
14												0.0	
15	5	SP-SM	10YR 4/2 Dark Grayish Brown	F	H	M	MS	N	0	90	10	0.0	None
16													
17												0.0	
18	6	SP					CP		15	80	5	0.0	
19													
20			10YR 3/2 very Dark gray									0.0	
21	7												
22			10YR 4/2 Dark Grayish Brown									0.0	
23													
24	8											0.0	
25												0.0	
26													
27	9						FS		0	90	10	0.0	
28		SP-SM	GLEY 1 3/10Y very Dark greenish gray										
29												0.0	
30	10												

JV

Comments

Core Catcher: FULL EMPTY [✓ OTHER]
(describe) Not used
Core Catcher NOT sampled
Material present in core catcher: NA

0.0 ft of recovery 0.0 to 5.0ft

~~2.0~~ JWP ~2.0
~~4.0~~ JWP inches of material sloughed into hole before the 5.0 to 10.0 Below mudline drive.

~~5.0 ft~~ JWP ~~of~~ 4.83ft drive OF 5ft drive recovered
~~logged as recovered~~ JWP

-Trace organic/woody material @ 6.7ft

Sampled 8.5 to 9.5 Ft

Core Extraction & Decant Method: DECANT. PULL HORIZONTALLY

Reviewed by: JPL **Date:** 11/18/22

JACOBS

Site Name: BNSF Wishram Sediment RI
Project Number: D3631600
Project Location: Wishram, WA

Core Log Part 1 - Collection Information

Station Information

Station/Core ID: K200

Contractor: Gravity

Vessel: SAMISH

Captain: LOGAN NELSON

Crew: DEREK NELSON

Notes by: Brandon Jones-Stanley

Target X: 45.655583

Target Y: 120.968697

X,Y Datum: BSS ~~NAD83 Oregon St. Plane North Feet~~ LAT/LONG

Tide Gage: The Dalles Dam

Tide Datum: NAVD88

Depth Sounding Equip: Leadline

Visitors (Ecology Rep, Client, KJ, None

Collection Date: ~~9~~ BSS ~~11/8/22~~ BSS 11/9/22

St. Arrival Time: ~~1130~~ BSS 1000

St. Depart Time: 1110

Target Core Depth: 10

Coring Equip: Vibracore Lexan

Barrel length (ft): 10

Core Collection Attempts

Attempt	Time	LAT/LONG ~~International Feet~~ BSS Actual X	Actual Y	Ft from Target	Water Depth (ft)	Time of Water Depth	Penetration (ft)	Rec. (ft)	% Rec.	Description of core collection	Core accepted?
1	1033	45.65558838	120.96896432 BS	2	20.2	1029	2.1	1.6	76	Hard Stop at 2.1	Y
2	1047	45.65556846	120.96868417	6	20.2	1044	1.3	0	0	Hard Stop at 1.3	N
3	1056	45.65558293	120.96868849	2.5	19.6	1055	1.3	0	0	Hard stop at 1.3	N

Additional Collection Notes (debris, rip rap, probing information, material in catcher etc.): Note mudline elevations will be determined based on water depths and tide stages after field collection.

Attempt 1: Refusal at 2.1 ft.

Attempt 2: Refusal at 1.3 ft. Empty core catcher.

Attempt 3: Refusal at 1.3 ft. Empty core catcher.

Description of Core Sectioning for Transport to Shore - Note the intervals that are sectioned (e.g., 0 to 5 feet, 5 to 10 feet) and note how much headspace is in each tube.

Core stored vertical for transport to ~~sho~~ BSS Barge.

Core Log Part 2 - Characterization & Sampling

Sample Summary (check boxes for analysis) - See back page for Core Log form

Sample ID	Sample Type (N/FD/MSD)	Sample Date/Time	Depth Interval (ft)	No. Jars	PAHs/SVOCs	TPH (DRO/RRO	Grain Size	TOC					
		11/9/22 1235	0 - 0.4	3									
					X	X		X					

Sample details captured directly in electronic Ph2 Sample Summary table located in the PDX server project file

Station/Core ID: K200
Attempt Number: 1
Sampling Date & Time: 11/09/22 1235

Core Barrel Diameter: 4 in
Barrel Lined: [✓ YES] NO OTHER (describe)

Pg. 1 Of

Logged by: G. Riley
Sampled by: J. Vidmar
Time & Date Core Opened: 1200 11/09/22

Recovered depth below mudline (ft)	Lithology Type (USCS Code)	Color (Munsell)	Consistency	Structure	Moisture Content	Maximum particle size	Odor	% gravel	% sand	% fines	PID Reading (ppm)	NAPL Description (see Attachment B of the SAP)
	SP	10YR 3/1 Very dark gray	F	H	M	MS	N	0	95	5	0.0	NO NAPL observed
0.4 - 1.0	SP-SM	10YR 2/1 Black				FS	PHC	0	90	10	0.0	Stained Blebs
											0.0	
2												
3												
4												
5												
6												
7												
8												
9												
10												

Comments

Core Catcher: [✓ FULL] EMPTY OTHER
(describe)

Core Catcher NOT sampled

Material present in core catcher: SP-SM, Blebs present

Recovery 1.6/2.2 ft bml

* EX SITU SAMPLE FOR DAKOTA COLLECTED FROM 1.6 FT BSS

- LAB COLLECTED SAMPLE FROM 0-0.4 FT BSS

Core Extraction & Decant Method: Core pulled while horizontal, Top water decanted

Reviewed by: Date: 11/10/22

JACOBS

Site Name: BNSF Wishram Sediment RI
Project Number: D3631600
Project Location: Wishram, WA

Core Log Part 1 - Collection Information

Station Information

Station/Core ID: K280

Contractor: Gravity

Vessel: SAMISH

Captain: LOGAN NELSON

Crew: DEREK NELSON

Notes by: BranDon Jones-Stanley

Target X: 45.655586

Target Y: 120.968363

X,Y Datum: LAT/LONG ~~NAD83 Oregon St. Plane North Feet~~ BJS

Tide Gage: The Dalles Dam

Tide Datum: NAVD88

Depth Sounding Equip: Leadline

Visitors (Ecology Rep, Client, KJ, None

Collection Date: 11/10/22

St. Arrival Time: 830

St. Depart Time: 945

Target Core Depth: 10'

Coring Equip: Vibracore Lexan

Barrel length (ft): 10-Aluminum

Core Collection Attempts

Attempt	Time	LAT/LONG ~~International Feet~~ BJS Actual X	Actual Y	Ft from Target	Water Depth (ft)	Time of Water Depth	Pene-tration (ft)	Rec. (ft)	% Rec.	Description of core collection	Core accepted?
1	849	45.65558696	120.96835330	2.5	20.3	850	0.6	0	0	Hard refusal at 0.6	N
2	901	45.65560923	120.96836120	5	19.1	902	8.7	7.5	86	Refusal at 8.7	Y
3	919	45.65558482	120.96836518	0.7	20.2	920	6.8	6.2	91	Refusal at 6.8	N

Additional Collection Notes (debris, rip rap, probing information, material in catcher etc.): Note mudline elevations will be determined based on water depths and tide stages after field collection.

Attempt 1: Noted rocky bottom w/ lead line. Hard stop at 0.6 FT.
Attempt 2: Refusal at 8.7 ft. Noted fuel like odor from barrel.
Attempt 3: Refusal at 6.8 ft.

Description of Core Sectioning for Transport to Shore - Note the intervals that are sectioned (e.g., 0 to 5 feet, 5 to 10 feet) and note how much headspace is in each tube.

Cores stored vertical for transport to barge.

Core Log Part 2 - Characterization & Sampling

Sample Summary (check boxes for analysis) - See back page for Core Log form

Sample ID	Sample Type (N/FD/MSD)	Sample Date/Time	Depth Interval (ft)	No. Jars	PAHs/SVOCs	TPH (DRO/RRO	Grain Size	TOC				

Sample details captured directly in electronic Ph2 Sample Summary table located in the PDX server project file

Station/Core ID: K280
Attempt Number: 2
Sampling Date & Time: —
Core Barrel Diameter: 4 in
Barrel Lined: [✓ YES] NO OTHER (describe)
Pg. 1 Of
Logged by: J. Vidmar
Sampled by: N/A
Time & Date Core Opened: 13:15 11-10-22

Recovered depth below mudline (ft)	Lithology Type (USCS Code)	Color (Munsell)	Consistency	Structure	Moisture Content	Maximum particle size	Odor*	% gravel	% sand	% fines	PID Reading (ppm)	NAPL Description (see Attachment B of the SAP)
	SP-SM	10YR 2/1 Black	S	H	W	MS	PHC	0	90	10	0.0	Sheen
	ML	10YR 2/2 very Dark Brown				Z		0	0	100	0.0	Stained
1												
											0.1 0.1	Stained Saturated Sheen
2	SP-SM		F			FS		0	90	10	0.0	
											0.0	
											0.0	Sheen
3			S									
											0.0	
											0.0	
4	ML SP-SM		F			Z FS	N	0 0	0 90	100 10	0.0	None
											0.0	
5											0.0	
		10YR 3/2 very Dark Gray									0.0	
6					M						0.0	
			H								0.0	
7											0.0	
8												
9												
10												

Comments

Core Catcher: FULL [✓ EMPTY] OTHER (describe)

Core Catcher NOT sampled

Material present in core catcher: —

- Abundant Shells on top of core and to 1 inch

Organic material present at:
~~to inch~~
0.1 ft
0.9 to 1.1 ft
1.4 to 1.6 ft
1.9 to 2.1 ft
2.4 ft
2.9 ft
3.0 to 3.5 ft
3.9 to 4.2 ft

* Note that Cold temperature and wind is making odor difficult to detect.

7.5 out of 8.7 ft recovery

Core Extraction & Decant Method: Pulled while horizontal, decanted top water.

Reviewed by:
Date: 11/11/22

[2.5 to 3.0 Dakota Sample]

JD 17.1

JACOBS

Site Name: BNSF Wishram Sediment RI
Project Number: D3631600
Project Location: Wishram, WA

Core Log Part 1 - Collection Information

Station Information

Station/Core ID: ~~K-360~~ [illegible] K360
Contractor: ~~Gravity~~ MARK MARINE
Vessel: Mark [illegible] 2
Captain: CRAIG MARK
Crew: P. ALBERTI
G. GRAY
Notes by: J. Vidmar | J. Ulrich

Target X: 45.655614N
Target Y: 120.968098W
X,Y Datum: ~~NAD83 Oregon St. Plane North Feet~~ LAT / LONG [illegible]
Tide Gage: The Dalles Dam
Tide Datum: NAVD88
Depth Sounding Equip: Leadline
Visitors (Ecology Rep, Client, KJ, E. HAMM (JACOBS)

Collection Date: 11-8-22
St. Arrival Time: 1500
St. Depart Time: 1600
Target Co[illegible] Depth: to REFUSAL
[illegible] Coring Equip: Geoprobe ~~Vibracore~~ ~~Lexan~~ macrocore
Barrel length (ft): 5ft

Core Collection Attempts

Attempt	Time	International Feet Actual X	Actual Y	Ft from Target	Water Depth (ft)	Time of Water Depth	Pene-tration (ft)	Rec. (ft)	% Rec.	Description of core collection	Core accepted?
1	1535	45.655608N	120.968096W	~10	30.1	1535	6.91	1.0	14%	DIFFICULT DRILLING	N

Additional Collection Notes (debris, rip rap, probing information, material in catcher etc.): Note mudline elevations will be determined based on water depths and tide stages after field collection.

1st drive 0.0 to 5.0 feet: 1.0ft recovery

2nd drive 5 to 6ft 11in: 0.0ft recovery

Total recovery 1.0ft

Description of Core Sectioning for Transport to Shore - Note the intervals that are sectioned (e.g., 0 to 5 feet, 5 to 10 feet) and note how much headspace is in each tube.

Core Log Part 2 - Characterization & Sampling

Sample Summary (check boxes for analysis) - See back page for Core Log form

Sample ID	Sample Type (N/FD/MSD)	Sample Date/Time	Depth Interval (ft)	No. Jars	PAHs/SVOCs	TPH (DRO/RRO	Grain Size	TOC					

Sample details captured directly in electronic Ph2 Sample Summary table located in the PDX server project file

Depth to mudline: 34' 2" @ 13:15

Station/Core ID: K360

Attempt Number: 1

Sampling Date & Time: —

Core Barrel Diameter: 1.75

Barrel Lined: [✓ YES] NO OTHER (describe)

Logged by: J Vidmar

Sampled by: —

Time & Date Core Opened: 14:40 11-8-22

Recovered depth below mudline (ft)	Lithology Type (USCS Code)	Color (Munsell)	Consistency	Structure	Moisture Content	Maximum particle size	Odor	% gravel	% sand	% fines	PID Reading (ppm)	NAPL Description (see Attachment B of the SAP)
1	GW~~GP~~ JV	10YR 3/2	F	H	M	CF	N	80	20	0	0.0	None
2	SP	very Dark grayish Brown						10	90	0	0.0	observed
3 1	GW~~GP~~ JV							90	10	0	0.0	
4												
5												
6 2												
7												
8												
9 3												
10												
11												
12 4												
13												
14												
15 5												
16												
17												
18 6												
19												
20												
21 7												
22												
23												
24 8												
25												
26												
27 9												
28												
29												
30 10												

JV

Comments

Core Catcher: [✓ FULL] EMPTY OTHER (describe)

Core Catcher NOT sampled ✓

Material present in core catcher: GW

1.0

Shell ~~#~~ fragments occur 0.0 to 1.0 ft

1.0 ft of recovery from 6.91 ft

* CORE DEPTH LOGGED AS RECOVERED DUE TO VERY LOW RECOVERY VOLUME. CANNOT CONFIDENTLY CORRELATE MATERIAL TO DISTINCT INTERALS

Core Extraction & Decant Method: Decant. Pull horizontally

Reviewed by: JL Date: 11/11/22

JACOBS®

Site Name: BNSF Wishram Sediment RI
Project Number: D3631600
Project Location: Wishram, WA

Core Log Part 1 - Collection Information

Station Information

Station/Core ID: K400
Contractor: Gravity
Vessel: SAMISH
Captain: LOGAN NELSON
Crew: DEREK NELSON
Notes by: Brandon Jones Stanley

Target X: 45.655625
Target Y: 120.967925
X,Y Datum: LAT/LONG NAD83 Oregon St. Plane North Feet
Tide Gage: The Dalles Dam
Tide Datum: NAVD88
Depth Sounding Equip: Leadline
Visitors (Ecology Rep, Client, KJ, None

Collection Date: 11/10/22
St. Arrival Time: 1025
St. Depart Time: 1115
Target Core Depth: 10'
Coring Equip: Vibracore Lexan
Barrel length (ft): 10-Aluminum

Core Collection Attempts

Attempt	Time	International Feet		Ft from Target	Water Depth (ft)	Time of Water Depth	Pene-tration (ft)	Rec. (ft)	% Rec.	Description of core collection	Core accepted?
		Actual X	Actual Y								
1	1042	45.65562896	120.96792347	1.5	26	1044	1.8	0	0	Refusal at 1.8'	N
2	1052	45.65563456	120.96792726	2.5	25.9	1053	1.9	0	0	Refusal at 1.9'	N
3	1059	45.65563068	120.96792560	2	25.6	1100	1.8	0	0	Refusal at 1.8'	N

Additional Collection Notes (debris, rip rap, probing information, material in catcher etc.): Note mudline elevations will be determined based on water depths and tide stages after field collection.

Attempt 1: Refusal at 1.8 ft. Rocks and clams in core catcher
Attempt 2: Refusal at 1.9 ft. Rocks in catcher
Attempt 3: Hard bottom w/ lead line. Nothing in catcher

Description of Core Sectioning for Transport to Shore - Note the intervals that are sectioned (e.g., 0 to 5 feet, 5 to 10 feet) and note how much headspace is in each tube.

Core Log Part 2 - Characterization & Sampling

Sample Summary (check boxes for analysis) - See back page for Core Log form

Sample ID	Sample Type (N/FD/MSD)	Sample Date/Time	Depth Interval (ft)	No. Jars	PAHs/SVOCs	TPH (DRO/RRO)	Grain Size	TOC					

Sample details captured directly in electronic Ph2 Sample Summary table located in the PDX server project file

Station/Core ID: K400

Attempt Number: —

Sampling Date & Time: —

Core Barrel Diameter: ~~YES~~ 4

Pg. 1 Of

Barrel Lined: [✓ YES] NO OTHER (describe)

Logged by: J. ULRICH

Sampled by: —

Time & Date Core Opened: —

Recovered depth below mudline (ft)	Lithology Type (USCS Code)	Color (Munsell)	Consistency	Structure	Moisture Content	Maximum particle size	Odor	% gravel	% sand	% fines	PID Reading (ppm)	NAPL Description (see Attachment B of the SAP)	Comments
													Core Catcher: FULL EMPTY OTHER (describe) Core Catcher NOT sampled
1													Material present in core catcher:
2													0% RECOVERY NOTHING TO LOG
3													
4													
5													
6													
7													
8													
9													
10													

Core Extraction & Decant Method:

Reviewed by: JLU

Date 11/10/22

24ft 1in

JACOBS

Site Name: BNSF Wishram Sediment RI
Project Number: D3631600
Project Location: Wishram, WA

Core Log Part 1 - Collection Information

Station Information

Station/Core ID: ~~#N300~~ KN400*
Contractor: ~~Gravity~~ (JUF) MARK MARINE
Vessel: Mark Marine
Captain: Craig Mark
Crew: B. HYRE
P. ALBERTI
Notes by: J. Vidmar | J. ULRICH

Target X: ~~46. (JUF) 45.655648N~~ JUF NA
Target Y: ~~120.970677W~~ (JUF) NA
X,Y Datum: ~~NAD83 Oregon St. Plane North Feet~~ LAT/LONG (JUF)
Tide Gage: The Dalles Dam
Tide Datum: NAVD88
Depth Sounding Equip: Leadline
Visitors (Ecology Rep, Client, KJ, NONE

Collection Date: 11-13-22
St. Arrival Time: 13.24
St. Depart Time: 14.25
Target Core Depth: Refusal
Coring Equip: (JUF) ~~Vibracore~~ ~~Lexan~~ MACRO CORE DPT
Barrel length (ft): 5

Core Collection Attempts

Attempt	Time	International Feet		Ft from Target	Water Depth (ft)	Time of Water Depth	Penetration (ft)	Rec. (ft)	% Rec.	Description of core collection	Core accepted?
		Actual X	Actual Y								
1	13:30	45.655448N	120.970994W	0	—	—	4.50	2.00	44	difficult drilling	Y
2	1400	45.655427N	120.970994W	~10	—	—	4.08	0.00	0	difficult drilling	N

Additional Collection Notes (debris, rip rap, probing information, material in catcher etc.): Note mudline elevations will be determined based on water depths and tide stages after field collection.

Macro core DPT Method used, No core catcher used.

Attempt 1 13:30 Mudline: 26.08 ft 4.50ft of Penetration Refusal [2.00 ft of Recovery]

TD: 30.58 Ft.

~~26ft 8in~~ (JV)

Attempt 2 1400 Mudline: 25.92ft Penetration ~~4~~ 4.08 Refusal [0.00 ft of Recovery]

TD: 30.00ft

Description of Core Sectioning for Transport to Shore - Note the intervals that are sectioned (e.g., 0 to 5 feet, 5 to 10 feet) and note how much headspace is in each tube.

NO TARGET X, Y FOR THIS LOC. GRID DOES NOT EXTEND TO THIS AREA. STATION IS CHOSEN IN THE FIELD USING SHORELINE + ESTIMATED. *RENAMED STATION TO KN400 BASED ON ACTUAL

Core Log Part 2 - Characterization & Sampling

Sample Summary (check boxes for analysis) - See back page for Core Log form

Sample ID	Sample Type (N/FD/MSD)	Sample Date/Time	Depth Interval (ft)	No. Jars	PAHs/SVOCs	TPH (DRO/RRO)	Grain Size	TOC					
		11/13/22 15:00	1.0 to 2.0ft	2									

Sample details captured directly in electronic Ph2 Sample Summary table located in the PDX server project file

24ft 5in. Tape

25ft 11in. casing

Station/Core ID: ~~HN 300t~~ KN400*

Attempt Number: 1

Sampling Date & Time: 11-13-22 15:00

Core Barrel Diameter: 1.75

Barrel Lined: [✓ YES] NO OTHER (describe)

Logged by: J. Vidmar

Sampled by: G. Riley

Time & Date Core Opened: 14:10 11-13-22

	Recovered depth below mudline (ft)	Lithology Type (USCS Code)	Color (Munsell)	Consistency	Structure	Moisture Content	Maximum particle size	Odor	% gravel	% sand	% fines	PID Reading (ppm)	NAPL Description (see Attachment B of the SAP)
1		SP	2.5Y 3/1 Very Dark Gray	F	H	M	FS	N	0	95	5	0.0	None
2												0.0	
3	1												
4				H								0.0	
5												0.0	
6	2												
7													
8													
9	3												
10													
11													
12	4												
13													
14													
15	5												
16													
17													
18	6												
19													
20													
21	7												
22													
23													
24	8												
25													
26													
27	9												
28													
29													
30	10												

JV

Comments

Core Catcher: FULL EMPTY [✓ OTHER] (describe) Not used

Core Catcher NOT sampled

Material present in core catcher: N/A

Some Shell material occurs from 0.0 to 1.2 ft

2.00 out of 4.5ft of Recovery 0.25 ft came from cutting shoe

* Logged as recovered

Cannot confidently correlate recovered material to distinct interval.

Sampled interval 1.0 to 2.0 ft

* STATION NAME CHANGED TO KN400 POST CORE LOGGING BASED ON ACTUAL X, Y (NO TARGET X, Y @ TIME OF COLLECTION - STATION LOC ESTIMATED)

Core Extraction & Decant Method:

Reviewed by:

Date: 11/16/22

2.5Y 3/1 Very Dark gray

ft Target

1.58 ft

35

4ft, 4in

JACOBS

Site Name: BNSF Wishram Sediment RI
Project Number: D3631600
Project Location: Wishram, WA

Core Log Part 1 - Collection Information

Station Information

Station/Core ID: O 280

Contractor: ~~Gravity~~ WO SAD MARK MARINE

Vessel: ~~Craig Mark~~ Mark Marine

Captain: Craig Mark

Crew: B. HYKE
P. ALBERTI

Notes by: J. Vidmar / J. WELCH

Target X: 45.655373N

Target Y: 120.968370W

X,Y Datum: ~~NAD83 Oregon St. Plane North Feet~~ LAT/LONG SAD

Tide Gage: The Dalles Dam

Tide Datum: NAVD88

Depth Sounding Equip: Leadline

Visitors (Ecology Rep, Client, KJ, NONE

Collection Date: 11-13-22

St. Arrival Time: 10:05

St. Depart Time:

Target Core Depth: Refusal ~~Vibracore~~ SAD

Coring Equip: Lexan

Barrel length (ft): 5

Core Collection Attempts

Attempt	Time	International Feet		Ft from Target	Water Depth (ft)	Time of Water Depth	Penetration (ft)	Rec. (ft)	% Rec.	Description of core collection	Core accepted?
		Actual X	Actual Y								
1	10:25	45.655384N	120.968374W	~2	27.62	1024	3.42	0.66	19	HARD DRIVING	Y
2	1131	45.655377N	120.968386W	~3	27.62	1131	2.00	0.25	12.5	"	N

Additional Collection Notes (debris, rip rap, probing information, material in catcher etc.): Note mudline elevations will be determined based on water depths and tide stages after field collection.

Macro core DPT method used. No core catcher used WL = 37.25 - 9.63 = 27.62

Attempt 1 1024 Mudline: 37.25 ft 3.42 ft of penetration Refusal [0.66 ft of recovery]

48 in TO: ~~40.33 ft~~ SAD 40.66 ft

Attempt 2 mudline
1131 37.25 ft 2.0 ft of Penetration, Refusal WL = 37.25 - 9.63 = 27.62
Large cobble at the bottom of core liner. [0.25 ft of recovery]

Description of Core Sectioning for Transport to Shore - Note the intervals that are sectioned (e.g., 0 to 5 feet, 5 to 10 feet) and note how much headspace is in each tube.

Core Log Part 2 - Characterization & Sampling

Sample Summary (check boxes for analysis) - See back page for Core Log form

Sample ID	Sample Type (N/FD/MSD)	Sample Date/Time	Depth Interval (ft)	No. Jars	PAHs/SVOCs	TPH (DRO/RRO)	Grain Size	TOC				
		11/13/22 / 1150	0 - 0.7	2	X	X						

Sample details captured directly in electronic Ph2 Sample Summary table located in the PDX server project file

Station/Core ID: O 28C
Attempt Number: 1
Sampling Date & Time: 11/13/22 | 11:50

Core Barrel Diameter: 1.75 in
Barrel Lined: [✓ YES] NO OTHER (describe)

Logged by: J Vidmar
Sampled by: G. RILEY
Time & Date Core Opened: 10:52 11-13-22

Recovered depth below mudline (ft)	Lithology Type (USCS Code)	Color (Munsell)	Consistency	Structure	Moisture Content	Maximum particle size	Odor	% gravel	% sand	% fines	PID Reading (ppm)	NAPL Description (see Attachment B of the SAP)
1 2	SP	10YR 3/2 very dark Grayish Brown	F	H	M	MS	N	0	95	5	0.0 0.0	None
3 1												
4												
5												
6 2												
7												
8												
9 3												
10												
11												
12 4												
13												
14												
15 5												
JV 16												
17												
18 6												
19												
20												
21 7												
22												
23												
24 8												
25												
26												
27 9												
28												
29												
30 10												

Comments

Core Catcher: FULL EMPTY [✓ OTHER]
(describe) Not used

Core Catcher NOT sampled

Material present in core catcher: NA

individual ~~cobbles~~ medium pebbles in column

0.66 of 3.42 ft Recovery

* Logged as recovered.
DPT recovery Low
cannot confidently correlate recovered material to distinct interval

- COLLECT SAMPLE
0 - 0.7 FT

Core Extraction & Decant Method: DECANT. PULL HORIZONTALLY

Reviewed by: JM Date: 11/18/22

JACOBS®

Site Name: BNSF Wishram Sediment RI
Project Number: D3631600
Project Location: Wishram, WA

Core Log Part 1 - Collection Information

Station Information

Station/Core ID: SG06
Contractor: Gravity
Vessel: SAMISH
Captain: LOGAN NELSON
Crew: DEREK NELSON
Notes by: Branden Jones-Stanley

Target X: 45.65527688
Target Y: 120.96875808
X,Y Datum: LAT/LONG ~~NAD83 Oregon St. Plane North Feet~~ BSS
Tide Gage: The Dalles Dam
Tide Datum: NAVD88
Depth Sounding Equip: Leadline
Visitors (Ecology Rep, Client, KJ, NONE

Collection Date: 11/8/22
St. Arrival Time: 0900
St. Depart Time: 1048
Target Core Depth: 10
Coring Equip: Vibracore Lexan
Barrel length (ft): 10-Aluminum

Core Collection Attempts

Attempt	Time	International Feet Actual X	Actual Y	Ft from Target	Water Depth (ft)	Time of Water Depth	Penetration (ft)	Rec. (ft)	% Rec.	Description of core collection	Core accepted?
1	1010	45.65527688	120.96875608	2	30.4	1017	0	0	0	EMPTY Catcher	N
2	1025	45.655277	120.968771	4.8	30.2	1028	0	0	0	Rocks in Catcher	N
3	1038	45.655283	120.968782	7	30	1039	0	0	0	Rocks in Catcher	N

Additional Collection Notes (debris, rip rap, probing information, material in catcher etc.): Note mudline elevations will be determined based on water depths and tide stages after field collection.

Attempt 1: Core barrel appears to be bouncing of surface. Note hard bottom w/ lead line.

Attempt 2: Hard bottom noted w/ lead line. Some rocks in core catcher.

Attempt 3: Hard bottom w/ lead line. Rocks in core catcher. No penetration.

Description of Core Sectioning for Transport to Shore - Note the intervals that are sectioned (e.g., 0 to 5 feet, 5 to 10 feet) and note how much headspace is in each tube.

Core Log Part 2 - Characterization & Sampling

Sample Summary (check boxes for analysis) - See back page for Core Log form

Sample ID	Sample Type (N/FD/MSD)	Sample Date/Time	Depth Interval (ft)	No. Jars	PAHs/SVOCs	TPH (DRO/RRO)	Grain Size	TOC					

Sample details captured directly in electronic Ph2 Sample Summary table located in the PDX server project file

Station/Core ID: SG016
Attempt Number: —
Sampling Date & Time: N/A

Core Barrel Diameter: 4 IN
Barrel Lined: [✓ YES] NO OTHER (describe)

Pg. 1 Of

Logged by: J. ULRICH
Sampled by: N/A
Time & Date Core Opened: N/A

Recovered depth below mudline (ft)	Lithology Type (USCS Code)	Color (Munsell)	Consistency	Structure	Moisture Content	Maximum particle size	Odor	% gravel	% sand	% fines	PID Reading (ppm)	NAPL Description (see Attachment B of the SAP)
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												

Comments

Core Catcher: FULL [✓ EMPTY] OTHER (describe)

Core Catcher NOT sampled

Material present in core catcher:

NO RECOVERY
@ ATTEMPTS
1, 2, OR 3.
NOTHING TO
LOG

Core Extraction & Decant Method:

Reviewed by:

Date 11/8/22

Appendix D-2
Field Notebook Scans

Location ~~BOISE~~ JUP WISHRAM, WA Date 11/1/22

Project / Client BNSF WISHRAM SED R.I

TASK: KICKOFF DAY 1 OF TARGOST WORK. ~~B~~ JUP

PERSONNEL: DUSTY BERGGREN (DB)
JENNIFER ULRICH (JU) } JACOBS
KRIS IVARSON (KI)
SHANE DEGROSS (SD) > BNSF
CRAIG MARK
GEORGE GRAY } MARK MARINE
PERRY ALBERTLE
KEENAN BOHACK } WESTERN STATES
JOSH QUAMME
STEVE ADAMECK > DAKOTA

WEATHER: OVERCAST, RAIN, 50°F

0800 - ONSITE CELILO PARK. CONDUCT H&S BRIEFING. GO OVER AHAS/HIIRAS FOR TARGOST WORK. TOPICS INCLUDE:

- WORKING FROM A BARGE/OVER WATER WORK.
- HAZARDS ~~ASSCO~~ JUP OF ENTERING/EXITING BARGE USING LADDERS
  - WORK TOGETHER
  - 3 POINTS OF CONTACT
  - SLIPS
  - PFDs/HARD HATS

- LIMITING ITEMS ON EACH PERSON WHEN USING LADDER
- HAZARDS OF OPERATING A DRILL RIG
  - KILL SWITCHES
  - EXCLUSION ZONES

0845 - BOARD TUG & SUPPORT VESSEL TO TRANSFER SUPPLIES | PERSONNEL

0930 - SET UP TARGOST & CONEXS.

1130 - ONSITE $\boxed{G260}$ ~~SEE~~ JUB. SEE DAILY & TARGOST LOGS FOR DETAILS

~~*NAPL OBSERVED~~ JUB

* % RE SIGNALS ~5 - 8.5 FT BSS

TD= 31.40 FT ~~FROM BARGE~~

1220 - OFF G260. KI & SD OFF BARGE

1305 - ONSITE $\boxed{G200}$

* % RE SIGNAL ~ 5 - 10 FT BSS

TD = 30.02 ~~FIBARGE~~ ~~FT FROM BARGE~~ JUB

1435 - ONSITE $\boxed{G160}$

* % RE SIGNAL ~ 5.5 - 8.5

TD = 30.01 BSS ~~FT FROM BARGE~~

* LATE ENTRY * → 1115: MEASURED HEIGHT [illegible] ~~MUDLINE~~ OF BARGE FROM DECK TO WATER = 9.7 FT *

Project / Client BNSF WISHRAM SED RI

1510 - TALK W/ PM RE: STEPOUTS.
WILL ADVANCE NEXT STATION
TO 20FT BSS IF % RE SIGNAL
IN-LINE W/ LAST 3 LOCS.
WILL ADVANCE TO 30FT BSS
IF NO % RE SIGNAL ENCOUNTERED

1530 - SETUP ON G120
* % RE SIGNAL ~ 4.4 - 8 FT BSS
TD = 20.02 FT BELOW BARGE
- DRILLER NOTED DIFFICULTY
OF @ ~15 FT (MOREDENSE)

1600 - DEMOB FOR DAY.
* PD TEAM INFORMS CREW
TO ADVANCE FUTURE PROBES
THE PLANNED 30FT BSS DEPTH

1645 - OFFSITE

11/1/22

Location WISHRAM, WA Date 11/2/22

Project / Client BNSF WISHRAM SED RI

<u>TASK</u>: CONTINUE TARGOST WORK. KICK OFF SEDIMENT CORING STAGE OF WORK @ 1000

<u>PERSONNEL</u>: J. ULRICH, D. BERGGREN } JACOBS

JUF ~~STF~~ S. ADAMEK > DAKOTA

TUG CAPTAIN: C. MARK, P. ALBERTI } MARK MARINE

SUPPORT VESSEL CAPTAIN: B. HYKE

LEAD DRILLER: K. BOHACK, J. QUAMME } WESTERN STATES

<u>WEATHER</u>: CLEAR, CALM, 50°F

0800 - CREW MEETS @ CELILO PARK HEAD TO BARGE

0830 - CONDUCT H&S BRIEFING. TOPICS INCLUDE:

- LADDER SAFETY
- WORKING W/ MULTIPLE CREWS ONBOARD
- PROPER PPE
- COLD STRESS

0850 - ONSITE G080 (SEE DAILIES & TARGOST LOGS). DRILL RIG OPERATOR REFUELS RIG.

Location WISHRAM, WA Date 11/2/22

Project / Client BNSF WISHRAM SED RI

0914 - MEASURE BARGE DECK TO WATER LINE = 9.5 FT

* CORRECTION TO 11/1/22 TARGOST TDS & PROFILE DATA : DAKOTA HAD ADJUSTED MEASUREMENT BY -0.5 FT TO ACCOUNT FOR THE DRILLING ROD THREAD & WIPES (2X RUBBER GASKETS) STICKING UP ABOVE THE BARGE DECK. JUF. TARGOST LOGS ARE BEING CORRECTED TODAY TO REFLECT. CORRECTIONS TO THESE LOG BOOK NOTES ARE AS FOLLOWS:

BELOW BARGE DECK

- G260 TD = 30.90 FT ~~BSS~~ JUF (BBD)
- G200 TD = 29.97 FT ~~BSS~~ JUF BBD
- G160 TD = 29.96 FT ~~BSS~~ JUF BBD
- G120 TD = 19.97 FT BBD

1015 - ONSITE G040 see dailies TARGOST LOGS

~~ONSITE~~ JUF * LATE ENTRY *

0940 - JU HEADS TO SHORE TO MEET

Location WISHRAM, WA Date ~~9/~~ 11/2/22

Project / Client BNSF WISHRAM SED RI

SEDIMENT CORE PROCESSING TEAM

PERSONNEL: L. TOCHKO
G. RILEY
J. VIDMAR
ARCHEOLOGIST/CULTURAL A. SHEEPHERD-BECKER
} JACOBS

S. HINZ
J. SCHET
L. NELSON
} GRAVITY

1000 - JACOBS SED TEAM ONSITE S.HINZ ALSO ONSITE W/ VESSEL. WAITING FOR REMAINING GRAVITY CREW

1130 - L. NELSON ON ROUTE W/ VIBRACORE HEAD. TEAM CONDUCTS H&S BRIEFING. TOPICS INCLUDE:

- ENTERING/EXITING THE BOAT & BARGE
- COLD WEATHER
- PROPER PPE (LEVEL D + HARDHATS + LIFE JACKET
- SLIPS/TRIPS/FALLS
- PINCH POINTS
- CHANGING WEATHER

Location WISHRAM, WA Date 11/2/22

Project / Client BNSF WISHRAM, SED. RI Ph. 2

1145 - ONSITE BARGE. RUN THROUGH ~~& RUN~~ JLF SEDIMENT CORE COLLECTION & TRANSFER PROCEDURE, SETUP CORE PROCESSING.

1300 - SED CORE COLLECTION TEAM HEADS TO SHORE TO PICKUP REMAINING CREW/VIBRACORE

*ADDITIONAL ACTIONS

- TARGOST TEAM MOVES THROUGH STATIONS PER CONVERSATION W/ PROJECT SME/PM/ETC (SEE TARGOST DAILY & TARGOST LOGS).

1440 - SED CORE TEAM HEAD TO $\boxed{\text{S606}}$.

1450 - SED TEAM RELAYS THEY ARE HAVING BOAT ISSUES.

1548 - SED CORE COLLECTION TEAM UNABLE TO COLLECT DUE TO GENERATOR ISSUES & INABILITY TO SET ACHOR. TEAM WILL CALL IT FOR THE DAY.

Location WISHRAM, WA Date 11/2/22

Project / Client BNSF WISHRAM, SED RI Ph.2

LATE ENTRY 1500 - TARGOST TEAM ASSESSES ACCESS TO E LINE. CANNOT ACCESS w/ BARGE (E LINE ALMOST ONSHORE). F LINE MAY BE POSSIBLE AFTER FLIPPING THE BARGE. TEAM WILL DO SO FIRST THING ON 11/3.

1630 - SECURED SAMPLE SETUP ON BARGE & HEAD TO SHORE.

1645 - OFFSITE

Jennifer Ulrich 11/2/22

Location ~~BA~~ JUF WISHRAM, WA Date 11/3/22

Project / Client BNSF WISHRAM, SED RI Ph. 2

TASK: CONTINUE TARGOST & SEDIMENT CORING

PERSONNEL: J. ULRICH
L. TUCHKO
G. RILEY
J. VIDMAR
A. SHEPPHERD - BECKER
D. BERGGREN
} JACOBS

~~TUG~~ JUF CAPTAIN: L. NELSON
J. SCHUT
} GRAVITY

TUG ~~SUPPORT~~ JUF CAPTAIN: CRAIG MARK
PERRY ALBERTI
SUPPORT VESSEL CAPTAIN: BOB HYKE
} MARK MARINE

KEENAN BOHACK
JOSH QUAMME
} WESTERN STATES

0800 - TEAM ONSITE. JUF STAYS W/ SED CORE COLLECTION TEAM TO DISCUSS DAYS PLAN / HSE TAILGATE. REMAINING CREW HEADS TO BARGE TO CONDUCT HSE BRIEFING & CONTINUE W/ TARGOST (SEE TARGOST DAILIES & LOGS)

0945 - SED CORE TEAM ARRIVES ON

Location WISHRAM, WA Date 11/3/22

Project / Client BNSF WISHRAM, SED RI Ph.2

STATION G000. STATION IS A LATERAL EXTENT CONFIRMATION POINT (SEE CORE LOG & DAILY).

★ BNSF-G000-SC- - 110322 SHIPPED

1245 - ~~A~~ JMP CORE G000-1 (REC = 6.7/6.7) PROCESSED ON BARGE. SAMPLES COLLECTED INTERMITTENT BLEBS OF NAPL NOTED ~3.3, 4.0-~~5.2~~ JMP 5.2 FT. RELAY TO PROJECT SME/PM/ETC.

1410 - SED CORE TEAM MOVES TO G020 [NO PREVIOUS TARGOST DATA @ THIS STATION] TO ~~ATTEMPT~~ JMP COLLECT ADDITIONAL CORE ~~FOR~~ JMP DATA (SEE LOG)

1620 - SED CORE TEAM RELAY THAT BOTTOM OF G020-3 HAS VISIBLE/OLFACTORY SIGNS OF NAPL. TEAM BRINGS CORES TO BAGE. ~~WITH~~ JMP

1630 - BARGE MOVED TO PROTECTED LOCATION. WINDS ANTICIPATED TO PICKUP W/ STRONG GUSTS (↑ 50MPH) ON FRIDAY. TARGOST TEAM

Location WISHRAM, WA Date 11/3/22

Project / Client BNSF WISHRAM, SED RI Ph.2

WILL NOT WORK FRIDAY
DUE TO WEATHER.
SEDIMENT CORE CREW
WILL COME OUT IN AM
W/ GRAVITY TO PROCESS
CORE G020-3.

1700 - OFFSITE

Jennifer Wich

Location WISHRAM, WA Date 11/4/22

Project / Client BNSF WISHRAM, SED RI Ph.2

TASK: PROCESS G020-3 (5.2/7.5FT RECOV)

PERSONNEL: J. ULLRICH
L. TOCZKO
C. RILEY
J. VIDMAR
A. SHEPPHER-BECKER } JACOBS

CAPTAIN: L. NELSON
J. SCHUT } GRAVITY

WEATHER: PARTLY CLOUDY, CALM IN AM
WIND GUST FORECAST TO
REACH ~ 50 MPH ~ 1200.

0800 - TEAM ONSITE. HEAD TO BARGE.

0900 - JUF HAS MEETING W/ PROJECT MNGMT TEAM WHILE SED ~~COR~~ UP TEAM OPENS CORE G020-3. RELAY OBSERVATIONS:

- STRONG NAPL ODOR @ ~~BOTTOM~~ 4 FT ~ 4 - BOTTOM
- BLEBS OBSERVED IN TOP 3 FT
- SHEEN @ ~ 3.5 FT
- SAND @ BOTTOM IS CLEARLY COMPACTED

Location WISHRAM, WA Date 11/4/22

Project / Client BNSF WISHRAM SED RI Ph.2

VERY DENSE. SED CORE COLLECTION TEAM HAD TO DRIVE HARD DURING COLLECTION.

1020 - COLLECT SAMPLE FROM UPPER ~ 0.0 - 1.0 FT INERVAL

WILL ~~SUBMIT~~ SHIP TO LAB MONDAY.

PREP ~~BOA~~ JUP BARGE FOR STRONG WINDS.

JUF

1130 - OFFSITE

Jennifer Ulrich 11/4/22

Location WISHRAM, WA Date 11/6/22

Project / Client BNSF WISHRAM SED RI Ph.2

TASK: CONTINUE TARGOST & SED CORING

PERSONNEL: J. ULRICH

B. JONES-STANLEY
D. BERGGREN
G. RILEY
J. VIDMAR
A. SHEPPHERD BECKER
} JACOBS

* STEVE ADAMEK
↓
DAKOTA

TUG CAPTAIN: C. MARK
G. GRAY
SUPPORT VESSEL CAPTAIN: P. ALBERTI
} MARK MARINE

K. BOHACK
J. QUAMME
} WESTERN STATES

L. NELSON
J. SCHUT
} GRAVITY

WEATHER: OVERCAST, WINDS ~5-8MPH + 45°F

0800 - TEAM ONSITE. CONDUCT H&S BRIEFING. J. ULRICH & B. JONES-STANLEY HEAD OUT W/ GRAVITY TO DISCUSS APPROACH/DAYS PLAN. ~~TARGOST~~ JUF REST OF TEAM HEADS TO BARGE

Location WISHRAM, WA Date 11/6/22

Project / Client BNSF WISHRAM, SED RI Ph.2

(SEE TARGOST DAILY & LOGS).

0830- PLAN FOR SED CORE IS
TO RE-OCCUPY G000 &
ATTEMPT TO ADVANCE TO
10 FT BSS.

1005 - ONSITE G000 BEGIN ATTEMPTS
4-6 (SEE CORE LOG & DAILY)
• MAX DRIVE = 7.1 FT BSS
↙ LREC = 6.6/7.1. WILL

G000-4 OPEN CORE ON BOARD
BARGE TO ASSESS FOR
NAPL IMPACTS.

1155 - OPEN CORE G000-4.
NO NAPL IMPACTS OBSERVED.
NO SAMPLES COLLECTED.
TEAM WILL NEED TO RETURN
TO G000 @ LATER TIME
TO ATTEMPT DEEPER
PENETRATION.

1245- SED CORE TEAM TO STATION
F390 (SEE CORE LOG)
* 3 ATTEMPTS MADE
w/ MAX PENETRATION

Location WISHRAM, WA Date 11/6/22

Project / Client BNSF WISHRAM, SED RI PH. 2

OF 11.7 FT ~~BBS~~ (JWF) BSS, HOWEVER, BEST RECOVERY WAS 7.6/10 FT BSS.

1545 - CORES BROUGHT TO BARGE. SUNSET OCCURS ~ 4 (JWF) 1630 NOW W/ DAYLIGHT SAVINGS TIME END STORE CORES UPRIGHT FOR PROCESSING TOMORROW AM. HEAD TO SHORE.

1630 - OFF SITE

Jennifer Welch 11/6/22

Location WISHRAM, WA
Date 11/7/2022

Project / Client BNSF WISHRAM SED RI Ph. 2

TASK: CONTINUE TARGOST & SED CORING

PERSONNEL:
J. ULRICH
A. SHEPPHERD-BECKER
D. BERGGREN
B. JONES-STANLEY } JACOBS
G. RILEY
J. VIDMAR
STEVE ADAMEK } DAKOTA
K. BOHACK } WESTERN STATES
J. QUAMME

TUG CAPTAIN: C. MARK
G. GRAY } MARK MARINE
SUPPORT VESSEL CAPTAIN: P. ALBERTI
L. NELSON } GRAVITY
D. NELSON

WEATHER: PARTLY CLOUDY, 47°F, LITE WINDS

0715 - TEAM ONSITE. CONDUCT H&S BRIEFING. TOPICS INCLUDE:

- CHANGING CONDITIONS
- OVERWATER WORK
- COLDSTRESS

* HEAD TO BARGE → GRAVITY TO PLANNED VIBRACORE STATIONS (SEE DAILY + CORE LOGS)

Location WISHRAM, WA

Date 11/7/22

Project / Client BNSF WISHRAM SED RI, Ph.2

*MOVE FORWARD W/ TARGOST (SEE TARGOST LOG & DAILY)

0910 - GRAVITY CREW HAS TOOLING ON-BOARD TO ATTEMPT "JETTING" OUT THE UPPER ~0-5FT BSS IN AN EFFORT TO REACH DEPTH (AIMING FOR @ LEAST 10 FT BSS TO CORRELATE TO TARGOST RESULTS). (ATTEMPTS 7 & 8)

0945 - ATTEMPT "JETTING" TECHNIQUE @ G000 W/ UNSUCCESSFUL RESULTS. ~~NO CORE~~ JUF (LOW RECOVERY 3.6/7.3 FT NOT EXCEEDING OTHER ATTEMPTS [1-6] W/ MAX OF 6.6/7.1 FT).

*SWITCH BACK TO STANDARD VIBRACORE METHOD. WILL COME BACK TO G000 @ LATER POINT.

LATE ENTRY 0905 - SED CORE TEAM OPEN F390 ATTEMPT 1 FOR PROCESSING

1110 - GRAVITY COLLECTS CORES (3 ATTEMPTS) FROM STATION G200

13:05 - PROCESS CORE G200-1. CORE IS ECY & BNSF IMPACTED. COLLECT FROM BOTTOM 4.0-5.0 FT INTERVAL ONLY & ~~HOLD~~ ARCHIVE.

↓ ONSHORE

1530 - OFFSITE

11/7/22

Location WISHRAM, WA

Date 11/8/22

Project / Client BNSF WISHRAM, SED RI Ph. 2

TASK: SWITCH TO DPT MACROCORE DRILLING & CONTINUE VIBRACORE SAMPLING

PERSONNEL:
J. ULRICH
B. JONES-STANLEY
A. SHEPPHERD-BECKER
G. RILEY
J. VIDMAR
HSM: E. HAMM
JACOBS

TUG CAPTAIN: C. MARK
SUPPORT VESSEL CAPTAIN: P. ALBERTI
G. GRAY
MARK MARINE

L. NELSON
D. NELSON
GRAVITY

S. ADAMEK
DAKOTA

K. BOHACK
J. QUAMME
WESTERN STATES

WEATHER: OVERCAST, WINDY (5-7MPH), LITE RAIN

0730 - TEAM ONSITE. E. HAMM JOINS & WILL BE CONDUCTING AN H&S AUDIT TODAY. HEAD TO BARGE

0810 - CONDUCT H & S BRIEFING. TOPICS INCLUDE:

- OVER WATER WORK

Location WISHRAM, WA Date 11/8/22

Project / Client BNSF WISHRAM, SED RI
Ph. 2

- CHANGING CONDITIONS
- NEW TASK - MACRO-CORING W/ DPT ON BARGE; NO TARGOST TODAY
- PROCESS FOR NEW TASK
  - COMMUNICATION
  - H&S HAZARDS
  - DECON

0815 - GRAVITY WILL NEED TO WAIT TO SET UP ON TARGET (SG06) UNTIL BARGE IS IN PLACE DUE TO WHERE THEY NEED TO SET THEIR ANCHORS (SEE SED. CORE LOG FOR DETAILS ON ADVANCEMENT/ ATTEMPTS @ STATION(S) COMPLETED TODAY

0910 - BARGE POSITIONED ON STATION $\boxed{\text{G000}}$. REOCCUPYING W/ MACRO-CORE (USING WESTERN STATES GEOPROBE RIG W/ DUAL TUBING SET UP) TO ATTEMPT COLLECTING SEDIMENTS FROM DEPTH (EXPECTING REFUSAL

Location WISHRAM, WA Date 11/8/22

Project / Client BNSF WISHRAM SED RI, PH2

~15 FT BSS BASED ON TARGOST DATA.

0920 - BEGIN ADVANCING CORE. (SEE DAILY REPORT & CORE LOGS)

DPT DEPTH CORRECTION
~~1315~~ JUF FOR LOGS:

0. 0FT — MEASUREMENT TO MUDLINE FROM BARGE SURFACE

19.5FT

— MUDLINE

*VERY LOW RECOVERY & HEAVING SAND ON G000-9 5.8/13FT. CANNOT CONFIDENTLY STATE WHICH DEPTH INTERVALS ARE REPRESENTED IN RECOVERED MATERIAL. LOG AS RECOVERED. NO SAMPLE.

~~*LATE ENTRY* 090~~ JUF

1050 - ALL 3 VIBRACORE ATTEMPTS @ SG06 WERE 0.0/0.0 FT. NO SAMPLES COLLECTED

1405 - GRAVITY HAS BEEN ATTEMPTING TO SETUP ON STATION K200 BUT ARE UNABLE DUE TO WINDS & CURRENT. GRAVITY WILL BE DONE FOR THE DAY DUE TO WEATHER

Location WISHRAM, WA Date 11/8/22

Project / Client BNSF WISHRAM SED RI, Ph. 2

1330 - *CULTURAL MONITOR FINDS LITHIC DEBITAGE ~~TO WEATHER~~ JUB IN G000

1535 - ADVANCE DPT @ ~~K 36~~ JUB K360 w/ LIMITED RECOVERY/PENETRATION (1.0/6.91 FT). CANNOT CONFIDENTLY CORRELATE ~~MAR~~ JUB MATERIAL TO A DISTINCT INTERVAL. LOG AS RECOVERED.

1615 - HEAD TO SHORE.

1645 - OFFSITE

11/8/22

Location WISHRAM, WA

Date 11/9/22

Project / Client BNSF WISHRAM SED RI. Ph.2

TASK: CONTINUE MACROCORING & VIBRACORING

PERSONNEL: J. ULRICH
D. BERGGREN
B. JONES-STANLEY
G. RILEY
J. VIDMAR
} A. SHEPPHERD-BECKER JACOBS

K. BOHACK
J. QUAMME
→ WESTERN STATES

L. NELSON
D. NELSON
} GRAVITY

S. ADAMEK > DAKOTA

C. MARK
P. ALBERTI
B. HYKE
} MARK MARINE

WEATHER: CLEAR, LITE WINDS IN AM

0730 - CREW ONSITE. CONDUCT H&S BRIEFING. TOPICS INCLUDE:
- SLIP|TRIPS|FALLS
- HEAVY LIFTING
- 3-POINTS OF CONTACT ON LADDERS

0800 - GRAVITY HEADS TO COLLECT VIBRACORE (SEE DAILY REPORT & CORE LOGS)

Location WISHRAM, WA Date 11/9/22

Project / Client BNSF WISHRAM SED RI Ph.2

0830 - ~~COLLECT~~ JWP RUN EX SITU SAMPLE OF K360 UPPER SECTION (SHELLS/GRAVEL) ON TARGOST TO ASSESS RESPONSE SEEN ON TARGOST LOG (LRG PURPLE/RED) → SHELL RE = PURPLE

0900 - ALL 3 ATTEMPTS @ I160 W/ VIBRACORE HAD MINIMAL PENETRATION/RECOVERY (MAX = 1.3/2.2 FT BSS). PROCESS ATTEMPT 3 (MAX). NO NAPL OBSERVED, HOWEVER WOODY DEBRIS @ 0.7-0.8 FT BSS HAS PHC ODOR. SURROUNDING SED HAS NO INDICATION OF NAPL. RUN EX SITU TARGOST PROFILE. NO LAB SAMPLE.

0925 - SETUP W/ DPT ON EF470 AFTER ADVANCING 0-5 FT RUN, CASING JWP DROPPED AN ADDITIONAL 2.75 FT (ASSUMED TO HAVE ENCOUNTERED A VOID SPACE [MAYBE BETWEEN RIP-RAP?]. INTERVAL HAD VERY LOW RECOVERY (~2 IN).

Location WISHRAM, WA Date 11/9/22

Project / Client BNSF WISHRAM SED RI Ph 2

DRILLERS TROUBLESHOOT BY REMOVING CORE CATCHER. FURTHER PUSHES (7.75 FT BSS +) HAD NEARLY 100% RECOVERY. ALL CORE LOG NOTES FOR THIS LOCATION REPRESENT 7.75 FT BSS TO BOTTOM DEPTH (SEE CORE LOG & DAILY)

1115 - GRAVITY BRINGS 1 $\boxed{\text{K200}}$ ATTEMPTS TO BARGE. VERY LOW RECOVERY PENETRATION (MAX = 1.6/2.1). OTHER 8 [illegible] ATTEMPTS HERE = 0% RECOVERY.

- NAPL OBSERVED 0.4-1.6 FT
- COLLECT EX SITU SAMPLE
- COLLECT LOW-VOLUME LAB SAMPLE FROM 0.0-0.4 FT BSS INTERVAL

1230 - MOVE BARGE ~ 5 FT SOUTH OF EF470 TO ATTEMPT TO COLLECT 0-10 FT INTERVAL W/ DPT TOOLING (NO CORE CATCHER)

1315 - 3 ATTEMPTS @ $\boxed{\text{EF240}}$ BROUGHT TO BARGE FOR PROCESSING. CALLING IT FOR DAY DUE TO WEATHER.

Location WISHRAM, WA Date 11/9/22

Project / Client BNSF WISHRAM SED RI Ph.2

WILL OPEN DEEPER OF THE 3 W/ SLIGHTLY LOWER 6.7/8.6 FT BSS RECOVERY (SEE CORE LOG)

PLAN TO:. COLLECT LAB SAMPLES

- SM. BLEB ~~APPEARED~~ OBSERVED @ 1.5 FT BSS WILL COLLECT~~ING~~ (UP) (LP) SED.
- SM. BLEB OBSERVED @ 2.0 FT BSS
- COLLECT EX-SITU DAKOTA SAMPLE (BARGE ONLY - NOT TO DAKOTA LAB)

1350 - WINDS HAVE PICKED UP SUBSTANTIALLY. CANNOT EFFICIENTLY PROCESS CORES.

1425 - HEAD TO SHORE

1445 - OFFSITE

11/9/22

Rite in the Rain

Location WISHRAM, WA Date 11/10/22

Project / Client BNSF WISHRAM SED RI Ph.2

TASK: ADVANCE EF470-2 TO 10 FT BSS.
COLLECT VIBRACORE SAMPLES
FROM 2 MORE STATIONS
RETURN TO TARGOST

PERSONNEL: J. ULRICH
A. SHEPPHERD-BECKER D. BERGGREN
B. JONES-STANLEY } JACOBS
C. RILEY
J. VIDMAR
S. ADAMEK > DAKOTA
K. BOHACK } WESTERN
J. QUAMME } STATES
L. NELSON } GRAVITY
D. NELSON
C. MARK } MARK
P. ALBERTI } MARINE
B. HYKE

WEATHER: CLEAR, LITE WIND

0730 - CREW ONSITE, CONDUCT H&S BRIEFING. SEE H&S ELECTRONIC FORM.

0815 - WARM UP DRILL RIG & ADVANCE @ EF470-2 w/ DPT.
0-5 FT BSS = 0% RECOVERY

Location WISHRAM, WA Date 11/10/22

Project / Client BNSF WISHRAM SED RI Ph.2

5-10 FT BSS = 2 FT RECOVERY.
CANNOT BE SURE WHICH INTERVAL
IS REPRESENTED. WILL LOG
GENERAL LITHOLOGY. NO
EVIDENCE OF NAPL.
~~#~~ TRANSITION DRILL RIG BACK TO
TARGOST.

0925 - GRAVITY ATTEMPTS VIBRACORE
@ K280. WILL PROCESS
DEEPER OF ATTEMPTS W/
SLIGHTLY LOW % RECOVERY
7.5/8.7 FT BSS.

1100 - ALL 3 ATTEMPTS @ K400 W/
VIBRACORE HAD 0% RECOVERY
COMMUNICATE W/ PM. WILL
SEND GRAVITY HOME FOR
DURATION OF Ph.2 DUE TO
LIMITED DEPTH PENETRATION/
RECOVERY.

1110 - OPEN CORE EF240 & PROCESS.
(SEE CORE LOG). SAMPLES COLLECTED
- SED CORE TEAM FINISHES
~~REVIEWING~~ UP CLEANING UP
CORES & WRAPPING UP

Location WISHRAM, WA Date 11/10/22

Project / Client BNSF WISHRAM

UNTIL RETURN ON SUNDAY.
TARGOST WILL CONTINUE
TOMORROW (SEE TARGOST
~~TRACKING G~~UP DAILY)

1700 - HEAD TO SHORE.

1730 - OFFSITE

11/10/22

Location WISHRAM, WA Date 11/13/22

Project / Client BNSF WISHRAM, SED RI, Ph.2

TASK: COLLECT SED CORES USING DPT

PERSONNEL: J. ULRICH
L. TOCHKO
G. RILEY
J. VIDMAR
} JACOBS

K. BOHACIK
J. QUAMME
} WENTING STAKES

C. MARK
B. HYKE
} MARK MARINE

WEATHER: FOGGY, COLD (29°F), CALM

0730 - CREW ONSITE. CONDUCT H&S BRIEFING ONBOARD (SEE ~~HHR~~ JWP DAILY TAILGATE)

* WILL ATTEMPT TO ADVANCE 3 CORES TODAY (I500, O280, J060)

0830 - GET SETUP ON I500. LET RIG WARM UP & PREP FOR DRILLING (SEE CORE LOG & DAILY REPORT).

REFUSAL @ 2.75 FT BSS

~ 2 IN "RECOVERY" IN CUTTING SHOE ~~ONLY~~ JWP (GRAVEL & COBBLES)

→ 0.8 FT RECOVERY. WILL COLLECT LIMITED VOLUME SAMPLE (TPH & SVOCS/PAHs)

Location WISHRAM, WA Date 11/13/22

Project / Client BNSF WISHRAM, SED RI, Ph.2

1000 - SETUP ON [0280] 1ST ATTEMPT
LOW PENETRATION & RECOVERY
0.8/2.7 FT BSS. STEP OVER
~3 FT & RETRY

1148 - ATTEMPT 2 LOW PENETRATION/
RECOVERY, LESS THAN ATTEMPT 1
COLLECT ~~ST~~ JUP LOW VOLUME
SAMPLE FROM [0280-1]
(TPH & SVOCs/PAHs)

1205 - SETUP ON [J060]
1ST ATTEMPT LOW PENETRATION/
LOW RECOVERY (1.95/4.86 FTBSS)

1324 - ~~*HEAD~~ JUP TO [HN300] ATTEMPT 1:
2.0/4.5 FT BSS. REVIEW
CORE - NO EVIDENCE OF
CONTAMINATION. WILL TRY
TO ADVANCE DEEPER W/
ATTEMPT 2.

1400 - ~~ATTEMP~~ JUP HN300 ATTEMPT 2
less Penetration / recovery
than Attempt 1. ~~COLLE~~ JUP
NO SIGNS OF CONTAMINATION.
COLLECT SAMPLE FROM BOTTOM
OF INTERVAL (0.75-1.75 FT)

Location WISHRAM, WA Date 11/13/22

Project / Client BNSF WISHRAM, SED RI Ph.2

CANNOT CONFIDENTLY CORRELATE
MATERIAL TO DISTINCT INTERVALS.
LOG AS RECOVERED.

1445 - SETUP ON J060 ATTEMPT 2.
DRILLERS OBSERVE CASING ~~SHPP~~ JUP
DROPPING @ ~ JUP SURFACE AFTER
~~PUSHING~~ JUP DRIVING THROUGH
A HARD TOP LAYER. CORE
ADVANCED TO ~10FT BSS.
RECOVERY FROM 0-5FT
INTERVAL = ~~2.0FT~~ JUP 0%
RECOVERY IN 5-10FT INTERVAL
= 100%.
HOLD ~~SAMPLE~~ JUP CORES OVERNIGHT
TO PROCESS TOMORROW MORNING

1630 - OFFSITE

11/13/22

Location WISHRAM, WA Date 11/14/22

Project / Client BNSF WISHRAM, SED RI Ph.2

TASK: WRAP UP SEDIMENT CORE PROCESSING & CONTINUE TARCOST

PERSONNEL: J. ULRICH
L. TOCHKO
G. RILEY
J. VIDMAR
A. SHEPPHERD BECKER
} JACOBS
TOM. RUDOLPH > DAKOTA
K. BOHACH
J. QUAMME
} WESTERN STATES
C. MARK
P. ALBERTI
B. HYKE
} MARK MARINE

0830 - CREW ONSITE. JACOBS STAFF WILL COMPLETE PROCESSING OF CORES (JUP) J060, COLLECTION OF REMAINING IDW DRUMS (6 DRUMS TOTAL; 2X SED, 1X WATER, 3X SOILED PPE, SAMPLE EQUIPMENT [PANS/SPOONS/GLOVES], CORE LINERS & PLASTIC COVERING FOR SAMPLE TABLE) (JUP) SEE IDW TRACKING LOG).

Location WISHRAM, WA Date 11/14/22

Project / Client BNSF WISHRAM, SED RI Ph. 2

TARGOST CONTINUES (SEE TARGOST LOGS + DAILY REPORTS)

1205 - SEDIMENT CORE PROCESSING TEAM WRAPS UP FOR THE EVENT. J. VIOMAR, L. TOCHKO, & G. RILEY OFFSITE. CREW WILL ALSO SHIP OUT ALL SED CORE, EB, + IDW SAMPLES TODAY.

1530 - WRAP UP TARGOST FOR THE DAY. OFFSITE

11/14/22

Location WISHRAM, WA Date 11/15/22

Project / Client BNSF WISHRAM, SED RI Ph.2

TASK: COMPLETE TARGOST FOR PHASE 2 SED RI PROJECT

PERSONNEL: J. ULRICH > JACOBS
T. RUDOLPH > DAKOTA
K. BOHACH } WESTERN STATES
J. QUAMME }
C. MARK } MARK MARINE
P. ALBERTI }
B. HYKE }

WEATHER: OVERCAST, 38°F, LITE WIND

0830 - CREW ONSITE. DISCUSS DAYS PLAN & CONDUCT H&S BRIEFING. TEAM WILL COMPLETE TARGOST WORK TODAY. DAKOTA WILL WRAP UP THEIR EQUIPMENT & HAVE IT PACKED FOR SHIPMENT (TO BE FACILITATED BY WESTERN STATES).

0845 - ~~SETUP ON~~ (JUF) HEAD OUT TO SETUP ON FIRST STATION. ALLOW DRILL RIG & TARGOST TO WARM UP. R1 HAVING ISSUES HOLDING A CHARGE. TROUBLESHOOT.

1000 - R1 ~~FIX~~ (JUF) WORKING

Location WISHRAM, WA Date 11/15/22

Project / Client BNSF WISHRAM,

1012 - BEGIN TARGOST WORK (SEE TARGOST LOGS & DAILY REPORT)

1400 - WRAP UP TARGOST (7 STATIONS TODAY). COMMUNICATE W/ PM TEAM. BEGIN DEMOB (PACKING WILL BE LIMITED TO SMALLER ITEMS FOR NOW - MAIN DEMOB WILL OCCUR @ MARK MARINE DOCK IN CAMAS, WA ONCE THE BARGE HAS MADE IT DOWN RIVER [HEAVY WINDS EXPECTED THRU WEEKEND]).

1545 - OFFSITE. END OF PH2. FIELDWORK.

11/15/22

Appendix D-3
Retained and Sampled Grab Photolog

Project Title: Wishram Sediment Remedial Investigation Report

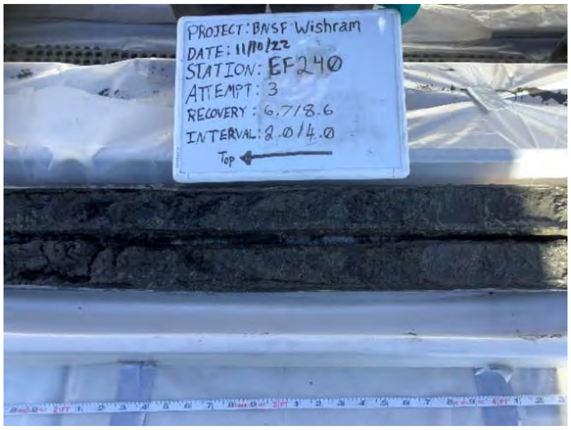
Location: Wishram, Washington

Date: November 3, 2022, and November 15, 2022

Select Core Photos

Photograph 1: EF240 Attempt 3 Interval 0 ft to 2 ft

Date taken: 11/10/22



Photograph 2: EF240 Attempt 3 Interval 2 ft to 4 ft

Date taken: 11/10/22

Photograph 3: EF240 Attempt 3 Interval 4 ft to 6 ft

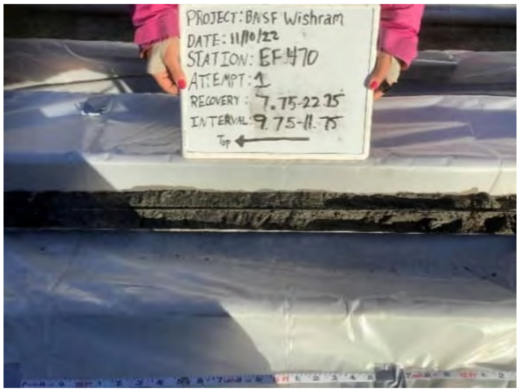
Date taken: 11/10/22

Photograph 4: EF240 Attempt 3 Interval 6 ft to 6.7 ft

Date taken: 11/10/22

Photograph 5: EF470 Attempt 1 Interval 7.75 ft to 9.75 ft

Date taken: 11/10/22



Photograph 6: EF470 Attempt 1 Interval 9.75 ft to 11.75 ft

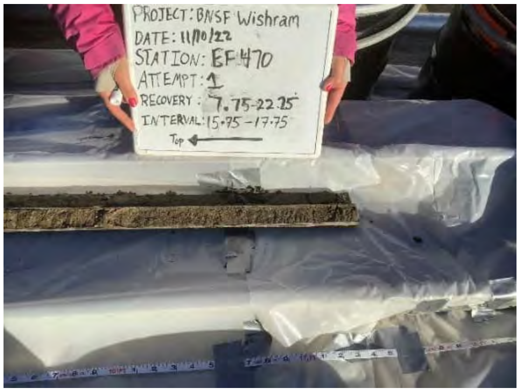
Date taken: 11/10/22

Photograph 7: EF470 Attempt 1 Interval 11.75 ft to 13.75 ft

Date taken: 11/10/22

Photograph 8: EF470 Attempt 1 Interval 13.75 ft to 15.75 ft

Date taken: 11/10/22



Photograph 9: EF470 Attempt 1 Interval 15.75 ft to 17.75 ft

Date taken: 11/10/22

Photograph 10: EF470 Attempt 1 Interval 17.75 ft to 19.75 ft

Date taken: 11/10/22

Select Core Photos

Photograph 11: EF470 Attempt 1 Interval 19.75 ft to 21.75 ft

Date taken: 11/10/22

Photograph 12: EF470 Attempt 1 Interval 21.75 ft to 22.25 ft

Date taken: 11/10/22

Photograph 13: F390 Attempt 1 Interval 0 ft to 2 ft

Date taken: 11/7/22

Photograph 14: F390 Attempt 1 Interval 2 ft to 4 ft

Date taken: 11/7/22

Photograph 15: F390 Attempt 1 Interval 4 ft to 6 ft

Date taken: 11/7/22

Photograph 16: F390 Attempt 1 Interval 6 ft to 7.6 ft

Date taken: 11/7/22

Photograph 17: G000 Attempt 1 Interval 0.0 ft to 2.0 ft

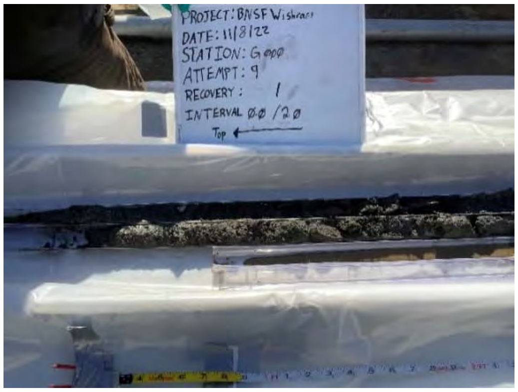
Date taken: 11/3/22

Photograph 18: G000 Attempt 1 Interval 2.0 ft to 4.0 ft

Date taken: 11/3/22

Photograph 19: G000 Attempt 1 Interval 4.0 ft to 6.7 ft

Date taken: 11/3/22



Photograph 20: G000 Attempt 9 Interval 0.0 ft to 2.0 ft

Date taken: 11/8/22

Photograph 21: G000 Attempt 9 Interval 2.0 ft to 4.0 ft

Date taken: 11/8/22

Photograph 22: G000 Attempt 9 Interval 4.0 ft to 5.8 ft

Date taken: 11/8/22

Photograph 23: G020 Attempt 3 Interval 0.0 ft to 2.0 ft

Date taken: 11/4/22

Photograph 24: G020 Attempt 3 Interval 2.0 ft to 4.0 ft

Date taken: 11/4/22

Photograph 25: G020 Attempt 3 Interval 4.0 ft to 5.2 ft

Date taken: 11/4/22

Photograph 26: G200 Attempt 1 Interval 0.0 ft to 2.0 ft

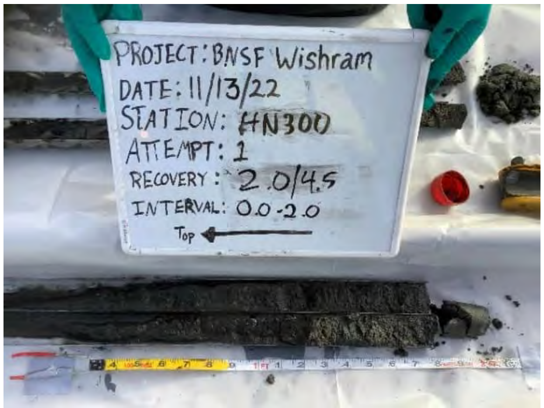
Date taken: 11/07/22

Photograph 27: G200 Attempt 1 Interval 2.0 ft to 4.0 ft

Date taken: 11/07/22

Photograph 28: G200 Attempt 1 Interval 4.0 ft to 5.7 ft

Date taken: 11/07/22

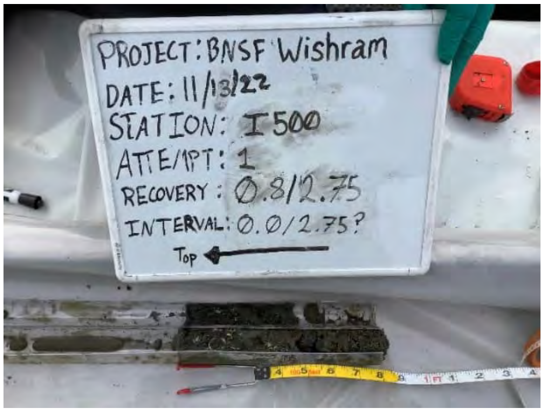


Photograph 29: HN300 (station renamed to KN300) Attempt 1 Interval 0.0 ft to 2.0 ft

Date taken: 11/13/22

Photograph 30: I160 Attempt 3 Interval 0.0 ft to 1.3 ft

Date taken: 11/9/22



Photograph 31: I500 Attempt 1 Interval 0.0 ft to 2.75 ft

Date taken: 11/13/22

Photograph 32: I500 Attempt 1 Material in Drill Shoe

Date taken: 11/13/22

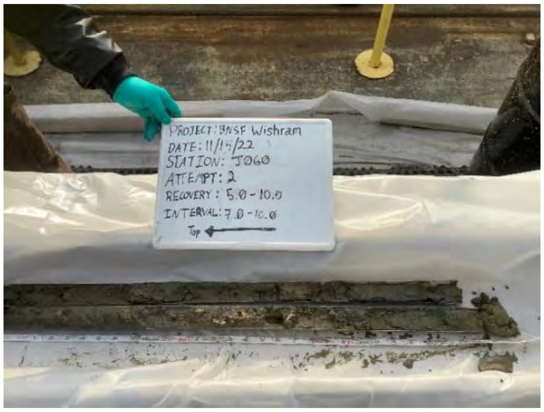
Photograph 33: J060 Attempt 1 Interval 0.0 ft to 1.95 ft

Date taken: 11/13/22

Photograph 34: J060 Attempt 2 Interval 5.0 ft to 7.0 ft

Date taken: 11/14/22

Select Core Photos



Photograph 35: J060 Attempt 2 Interval 7.0 ft to 10.0 ft

Date taken: 11/14/22

Photograph 36: K200 Attempt 1 Interval 0.0 ft to 1.6 ft

Date taken: 11/14/22

Photograph 37: K280 Attempt 2 Interval 0.0 ft to 2.0 ft

Date taken: 11/10/22

Photograph 38: K280 Attempt 2 Interval 2.0 ft to 4.0 ft

Date taken: 11/10/22

Photograph 39: K280 Attempt 2 Interval 4.0 ft to 6.0 ft

Date taken: 11/10/22

Photograph 40: K280 Attempt 2 Interval 6.0 ft to 7.5 ft

Date taken: 11/10/22

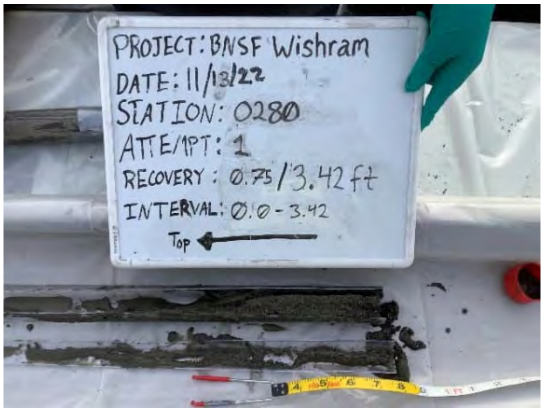
Select Core Photos

Photograph 41: K360 Attempt 2 Interval 0.0 ft to 1.0 ft

Date taken: 11/08/22

Photograph 42: K360 Attempt 2 Material stuck in drill shoe

Date taken: 11/08/22



Photograph 43: O280 Attempt 1 Interval 0.0 ft to 0.75 ft

Date taken: 11/13/22

Photograph 44: O280 Attempt 2 Interval 0.0 ft to 0.4 ft

Date taken: 11/13/22

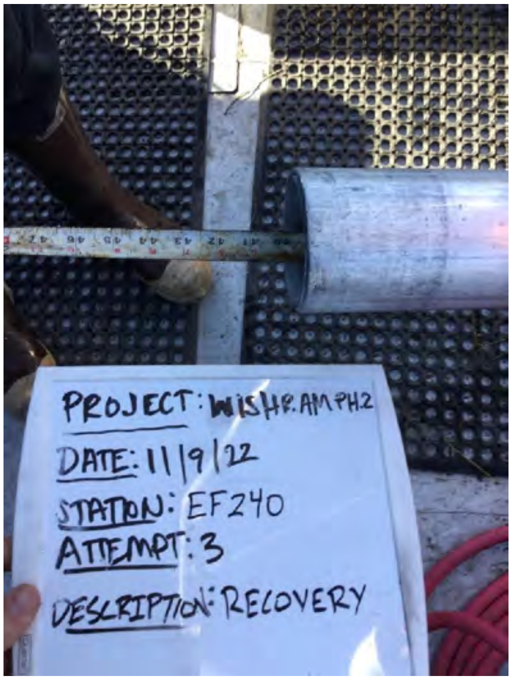
Appendix D-4
Representative Field Activities Photolog

Project Title: Wishram Sediment Remedial Investigation Report

Location: Wishram, Washington

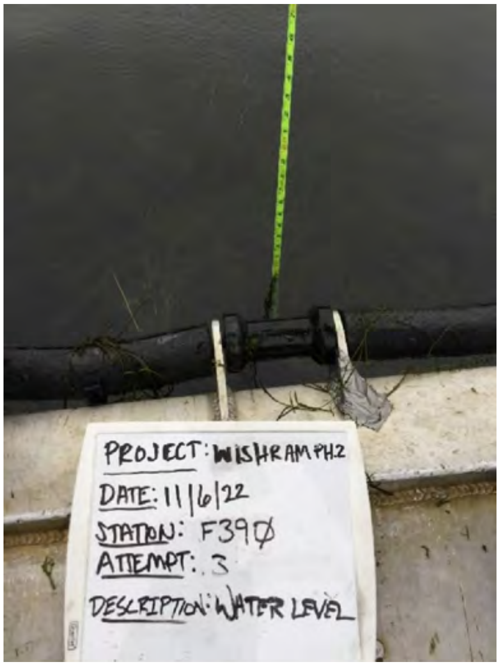
Date: November 3, 2022, and November 15, 2022

Representative Core Field Activities



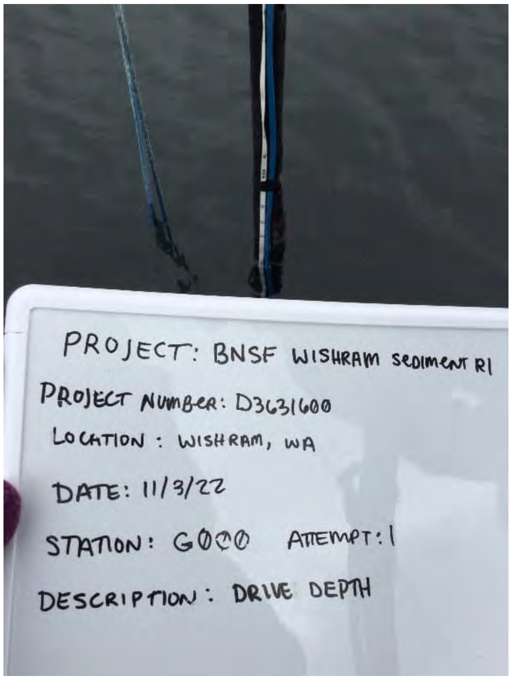
Photograph 1: EF240 Attempt 3 Recovery

Date taken: *11/9/22*



Photograph 2: F390 Attempt 3 Water Level

Date taken: *11/6/22*

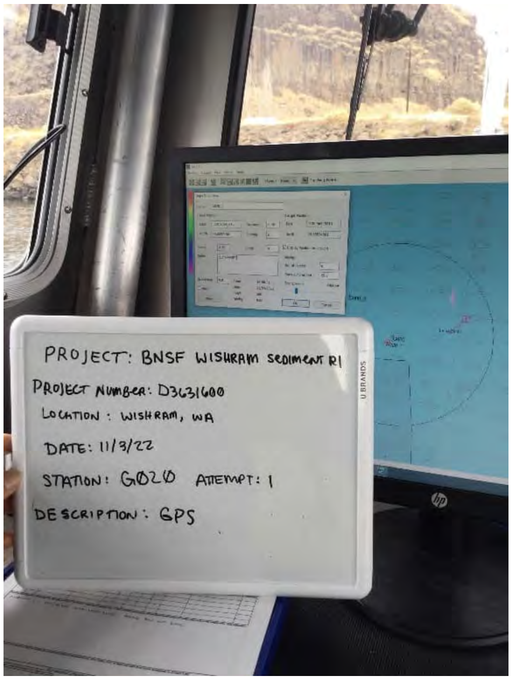


Photograph 3: G000 Attempt 1 Drive

Date taken: *11/3/22*

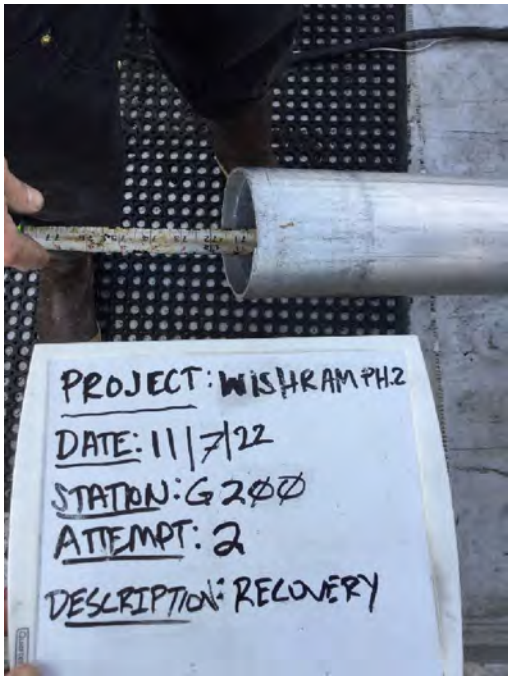
Photograph 4: G000 Attempt 1 Cutting Core Barrel

Date taken: *11/3/22*



Photograph 5: G020 GPS

Date taken: *11/3/22*

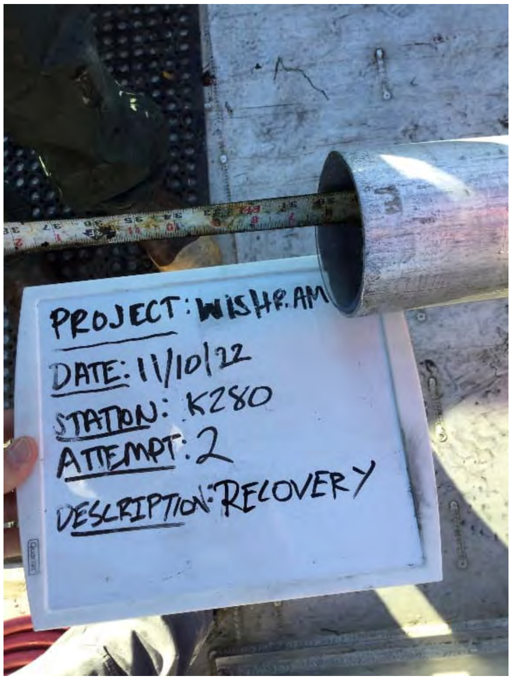


Photograph 6: G200 Attempt 2 Recovery

Date taken: *11/7/22*

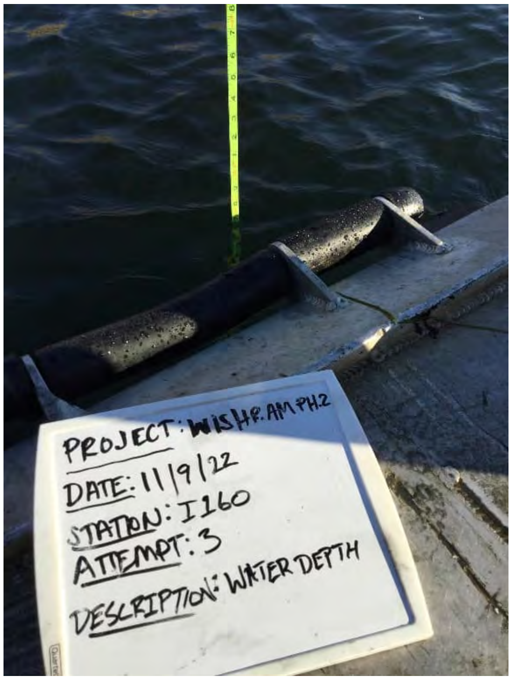
Photograph 7: K200 Attempt 1 Drive

Date taken: *11/9/22*



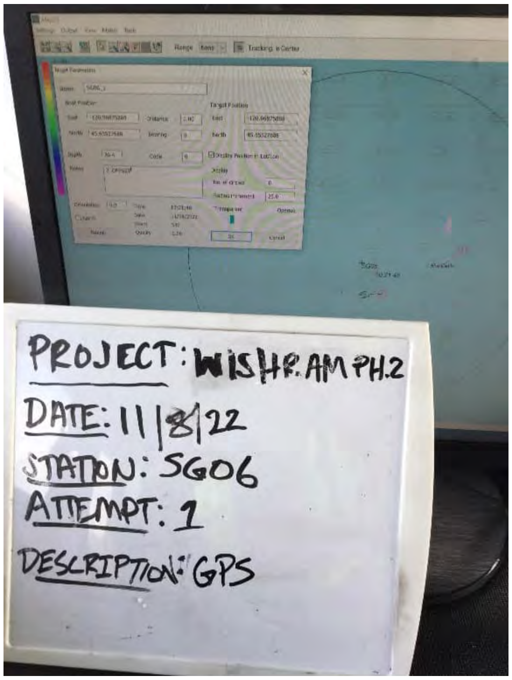
Photograph 8: K280 Attempt 2 Recovery

Date taken: *11/10/22*



Photograph 9: I160 Attempt 3 Water Depth

Date taken: *11/9/22*



Photograph 10: SG06 Attempt 1 GPS

Date taken: *11/8/22*

Appendix D-5

Waste Disposal Documentation

Job 186359

186593 01/11/23

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number: N / A

2. Page 1 of 1

3. Emergency Response Phone: 800-899-4672

4. Waste Tracking Number: 186593-01

5. Generator's Name and Mailing Address
BNSF Railway
605 Puyallup Ave
Tacoma WA 98421

Att: Shane DeGross

Generator's Phone: 253 208-9043

Generator's Site Address (if different than mailing address)
BNSF Railway
500 Main St.
Wishram WA 98673

6. Transporter 1 Company Name: NRC Environmental Services
U.S. EPA ID Number: CAR000030114

7. Transporter 2 Company Name:
U.S. EPA ID Number:

8. Designated Facility Name and Site Address
Waste Management Hillsboro Landfill
3205 SE Minter Bridge Landfill
Hillsboro OR 97123

Facility's Phone: 503 640-9427

U.S. EPA ID Number: 110005971136

9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.
1. Material Not Regulated by D.O.T. (Investigation Derived Waste Soil)	002	DM	00210	P
2. Material Not Regulated by D.O.T. (Investigation Derived Wastewater)	001	DM	00070	G
3. Material Not Regulated by D.O.T. (PPE and Debris)	003	DM	00030	P
4.				

13. Special Handling Instructions and Additional Information
1) 2x55DM Profile# 139384OR Job#: 186593
2) 1x55DM Profile# 139386OR PO#: 186593.74088
3) 3x55DM Profile# 139387OR PM: SC

14. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: Steven Chang as Agent for BNSF
Signature:
Month 12 Day 29 Year 22

15. International Shipments ☐ Import to U.S. ☐ Export from U.S.
Port of entry/exit:
Transporter Signature (for exports only):
Date leaving U.S.:

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Canon Vaxe
Signature:
Month 1 Day 11 Year 23

Transporter 2 Printed/Typed Name:
Signature:
Month Day Year

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator)
U.S. EPA ID Number:
Facility's Phone:

17c. Signature of Alternate Facility (or Generator)
Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name: Lisa Gilliland
Signature: Lisa
Month 1 Day 11 Year 23

GENERATOR
INT'L
TRANSPORTER
DESIGNATED FACILITY

169-BLC-O 5 11977 (Rev. 9/09)

TRANSPORTER #1

Job 186539

11123

WASTE MANAGEMENT

Hillsboro Landfill, Inc
3205 SE Minter Bridge
Hillsboro, OR, 97123
Ph: (503)-640-9427

Original
Ticket# 1671094

Customer Name US ECOLOGY US ECOLOGY
Ticket Date 01/11/2023
Payment Type Credit Account
Manual Ticket#
Hauling Ticket#
Route
State Waste Code
Manifest 186593-01
Destination
PO 186593
Profile 139386OR (Investigation Derived Wastewater)
Generator 168-BNSF MAIN ST BNSF 500 MAIN ST WISHRAM WA 98673

Carrier US ECOLOGY
Vehicle# 13465
Container
Driver
Check#
Billing # 0004570
Gen EPA ID
Grid

Volume

	Time	Scale	Operator	Inbound
In	01/11/2023 12:56:23	Outbound	LGILLILA	
Out	01/11/2023 13:13:38	Outbound	LGILLILA	

Gross	11920 lb
Tare	11700 lb
Net	220 lb
Tons	0.11

Comments

Consumer Comments? We want to know. Please call.

Product		LD%	Qty	UOM	Rate	Tax	Amount	Origin
1	Special Misc-Each-	100	1.00	Each				KLICKITAT
2	FUEL-Fuel Surcharg	100		%				
3	EVF-P-Standard Env	100		%				

Total Tax
Total Ticket

Driver`s Signature

end 2:00

Job 186539

11123

WASTE MANAGEMENT

Hillsboro Landfill, Inc
3205 SE Minter Bridge
Hillsboro, OR, 97123
Ph: (503)-640-9427

Original
Ticket# 1671083

Customer Name US ECOLOGY US ECOLOGY
Ticket Date 01/11/2023
Payment Type Credit Account
Manual Ticket#
Hauling Ticket#
Route
State Waste Code
Manifest 186593-01
Destination
PO 186593
Profile 139387OR (PPE and Debris)
Generator 168-BNSF MAIN ST BNSF 500 MAIN ST WISHRAM WA 98673

Carrier US ECOLOGY
Vehicle# 13465
Container
Driver
Check#
Billing # 0004570
Gen EPA ID
Grid

Volume

	Time	Scale	Operator	Inbound		
In	01/11/2023 12:10:59	Outbound	lgillila		Gross	13080 lb
Out	01/11/2023 12:30:47	Outbound	lgillila		Tare	12760 lb
					Net	320 lb
					Tons	0.16

Comments

Consumer Comments? We want to know. Please call.

Product		LD%	Qty	UOM	Rate	Tax	Amount	Origin
1	Special Misc-Each-	100	3.00	Each				KLICKITAT
2	EVF-P-Standard Env	100		%				KLICKITAT
3	FUEL-Fuel Surcharg	100		%				KLICKITAT

Total Tax
Total Ticket

Driver`s Signature

Job 186539

11123

WASTE MANAGEMENT

Hillsboro Landfill, Inc
3205 SE Minter Bridge
Hillsboro, OR, 97123
Ph: (503)-640-9427

Original
Ticket# 1671090

Customer Name US ECOLOGY US ECOLOGY
Ticket Date 01/11/2023
Payment Type Credit Account
Manual Ticket#
Hauling Ticket#
Route
State Waste Code
Manifest 186539-01
Destination
PO 186593
Profile 139384OR (Investigation Derived Waste Soil)
Generator 168-BNSF MAIN ST BNSF 500 MAIN ST WISHRAM WA 98673

Carrier US ECOLOGY
Vehicle# 13465
Container
Driver
Check#
Billing # 0004570
Gen EPA ID
Grid

Volume

	Time	Scale	Operator	Inbound		
					Gross	12760 lb
In	01/11/2023 12:32:14	Outbound	lgillila		Tare	11900 lb
Out	01/11/2023 12:52:27	Outbound	LGILLILA		Net	860 lb
					Tons	0.43

Comments

Consumer Comments? We want to know. Please call.

Product		LD%	Qty	UOM	Rate	Tax	Amount	Origin
1	ENVCLEANUP SPWPCS-	100	1.00	Each				KLICKITAT
2	FUEL-Fuel Surcharg	100		%				KLICKITAT
3	EVF-P-Standard Env	100		%				KLICKITAT

Total Tax
Total Ticket

Driver`s Signature

Appendix E
SPI Camera Report

Appendix E. SPI Camera Report

This appendix provides the report information from the SPI Camera sampling event and includes the following:

- Appendix E-1 – SPI Technical Memorandum

Appendix E-1

SPI Technical Memorandum

Technical Memorandum

To: Kris Ivarson - Jacobs

From: Gravity Marine LLC

Date: April 15th, 2022

Subject: *BNSF Wishram Site SPI Survey*

Overview

Gravity Marine, LLC (Gravity) was contracted by Jacobs to conduct a Sediment Profile Imagery (SPI) Survey with co-located surface sediment grabs on the Columbia River near Wishram, Washington. The survey was performed on April 12th, 2022. This memo summarizes the equipment used, methodology and data collected from the survey.

Survey Methodology

Survey Vessel and Crew

Gravity used its research vessel (R/V) Cayuse (Figure 1) for the survey, which is a 27-foot aluminum landing craft with twin 380hp gas engines with jet drive propulsion. A forward A-frame and winch system capable of deploying up to 2000lbs of equipment off the bow. This vessel was selected to make use of its shallow draft hull and spacious working deck to accommodate both the SPI and sediment grab sampler deployments. Gravity's USCG captains and scientists Ed Sloan and Mike Duffield operated the boat and the equipment (Table 1).

Figure 1 R/V Cayuse

Survey Equipment

The following survey equipment were used to conduct the survey.

Table 1. Survey Equipment

Sensor Category	Manufacturer/Model
SPI Camera (Figure 2)	Ocean Instruments
Positioning System	Trimble SPS 461 (dual antenna)
Salish Grab Sampler	Ocean Instruments
Sediment Oxygen Sensor	Unisense Microrespiration System

Figure 2 Sediment Profile Imagery (SPI) System

Data Acquisition

Position data from each attempt at a sample location were recorded using the survey software HYPACK 2022. With each sample point an X, Y, Lat, Long, Date, Time and any notes were recorded at the moment the grab sampler or SPI system touched the river bottom. Approximately 15 seconds of digital video from the SPI system was recorded at every deployment. Digital photographs were also collected of sediment captured in the grab sampler after retrieval from the riverbed.

Geodetic Settings

Geodetic settings were configured in HYPACK prior to data acquisition. Geodetic settings are summarized in Table 2.

Table 2. Survey Geodetic Parameters

Parameter	Setting
Grids	State Plane NAD 1983
Zone	WA South FIPS 4602
Horizontal Unit	U.S. Survey Feet
Vertical Datum	NAVD88

Data Collection Methodology and Locations

Prior to beginning the survey, a series of checks were performed to ensure that all the systems were functioning and data were recording properly. The GPS positioning system was checked and heading and vessel offsets were confirmed to be working properly. The SPI camera was setup on R/V Cayuse and a preliminary test of the SPI video equipment (e.g., camera, frame) was conducted before deployment at the site. The grab sampler was also rigged and tested before deployment. Once all systems were confirmed operational, SPI surveys and grab sampling commenced. Positioning coordinated for the SPI and Grab samples are provided in Table 3.

Table 3. SPI and Sediment Grab Position Data

Name	X	Y	WGS84 Lat	WGS84 Lon	Time	Date
SG04-SPI-1	1520427.92	117639.31	45.65494468 N	120.96920207 W	9:16:15	4/12/2022
SG04-SPI-2	1520423.81	117639.23	45.6549444 N	120.96921814 W	9:24:01	4/12/2022
SG04-SPI-3	1520421.91	117643.76	45.65495679 N	120.96922568 W	9:24:29	4/12/2022
SG04-GRAB-1	1520422.23	117640.03	45.65494657 N	120.96922434 W	9:30:36	4/12/2022
SG04-GRAB-2	1520424.95	117639.69	45.65494568 N	120.9692137 W	9:40:56	4/12/2022
SG04-GRAB-3	1520425.58	117641.09	45.65494953 N	120.96921126 W	9:44:37	4/12/2022
SG11-SPI-1	1520808.93	117996.53	45.65593046 N	120.9677205 W	9:55:56	4/12/2022
SG11-SPI-2	1520808.28	118001.42	45.65594386 N	120.96772315 W	9:59:18	4/12/2022
SG11-SPI-3	1520809.88	117992.34	45.65591899 N	120.96771668 W	10:01:45	4/12/2022
SG11-SPI-4	1520804.42	117997.67	45.65593351 N	120.96773816 W	10:03:35	4/12/2022
SG11-GRAB-1-ACT	1520809.67	118002.17	45.65594594 N	120.96771773 W	10:10:48	4/12/2022
SG19-SPI-1	1521191.27	118114.5	45.65626017 N	120.96622813 W	10:26:51	4/12/2022
SG19-SPI-2	1521182.87	118112	45.65625317 N	120.96626092 W	10:27:45	4/12/2022
SG19-SPI-3	1521178.44	118113.57	45.65625741 N	120.96627828 W	10:29:30	4/12/2022
SG19-GRAB-1	1521180.72	118111.89	45.65625284 N	120.96626933 W	10:35:21	4/12/2022
SG19-GRAB-2	1521184.73	118111.88	45.65625288 N	120.96625365 W	10:39:54	4/12/2022
SG19-GRAB-3	1521182.32	118115.5	45.65626276 N	120.96626316 W	10:42:49	4/12/2022
SG19-GRAB-4	1521181.73	118108.42	45.65624334 N	120.9662653 W	10:45:22	4/12/2022
SG21-SPI-1	1521170.73	117865.94	45.65557823 N	120.96630271 W	11:21:29	4/12/2022
SG21-SPI-2	1521163.8	117867.29	45.65558182 N	120.96632984 W	11:23:51	4/12/2022
SG21-SPI-3	1521171.31	117877.01	45.6556086 N	120.9663007 W	11:30:10	4/12/2022
SG21-GRAB-1	1521172.56	117862.55	45.65556896 N	120.96629547 W	11:35:17	4/12/2022
SG21-GRAB-2	1521162.96	117870.59	45.65559086 N	120.9663332 W	11:37:03	4/12/2022
SG21-GRAB-3	1521171.01	117876.71	45.65560777 N	120.96630186 W	11:39:13	4/12/2022
SG29-SPI-1	1521738.2	118238.07	45.65660787 N	120.96409227 W	11:56:24	4/12/2022
SG29-SPI-2	1521729.78	118235.47	45.6566006 N	120.96412514 W	11:57:10	4/12/2022
SG29-SPI-3	1521728.96	118241.87	45.65661814 N	120.96412849 W	11:58:32	4/12/2022
SG29-GRAB-1	1521738.31	118237.31	45.65660578 N	120.96409182 W	12:03:06	4/12/2022
SG29-GRAB-2	1521730.46	118244.82	45.65662625 N	120.96412269 W	12:05:24	4/12/2022
SG29-GRAB-3	1521730.68	118234.58	45.65659817 N	120.9641216 W	12:09:15	4/12/2022
SG31-SPI-1	1521954.63	117995.88	45.65594722 N	120.96324038 W	12:24:52	4/12/2022
SG31-SPI-2	1521953.93	118001.26	45.65596196 N	120.96324324 W	12:28:51	4/12/2022
SG31-SPI-3	1521963.41	117997.39	45.6559515 N	120.96320608 W	12:29:53	4/12/2022
SG31-GRAB-1	1521958.97	117994.35	45.65594309 N	120.96322337 W	12:38:52	4/12/2022
SG31-GRAB-2	1521962.15	118002.74	45.65596615 N	120.96321113 W	12:41:45	4/12/2022
SG31-GRAB-3	1521947.23	117999.91	45.65595815 N	120.96326941 W	12:43:52	4/12/2022
BG01	1542520.03	115845.52	45.65035291 N	120.88278091 W	12:50:33	4/12/2022
BG04	1533374.56	112577.6	45.64126418 N	120.91847175 W	12:52:05	4/12/2022
BO01-SPI-1	1542533.19	115840.21	45.65033853 N	120.88272935 W	13:18:24	4/12/2022
BG01-SPI-2	1542510.75	115852.92	45.65037308 N	120.88281734 W	13:21:29	4/12/2022
BG01-SPI-3	1542505.92	115876.37	45.65043732 N	120.88283667 W	13:22:56	4/12/2022

Notes:

1) No grab attempt was conducted at BG01 because the SPI data has shown that the substrate was rocky.
2) No equipment was deployed at BG04 due to winds increasing significantly.

SPI Data Acquisition

The SPI frame weighs approximately 125lbs and additional weight is added for downward pressure on the camera (see Figure 2). For the first attempt, an additional 180lbs was added to the system and the maximum additional weight of 230lbs was added for all subsequent attempts. The SPI system was unable to penetrate the riverbed at the targeted locations due to the hard, rocky substrate. The field crew made several attempts at each site. Each attempted SPI location was recorded. Video was collected at each location once the SPI system was on the river bottom. Example images of SPI screen shots are provided in Figures 3 through 6 for several sites below. These show that the riverbed is primarily comprised of rock with some vegetative matter.

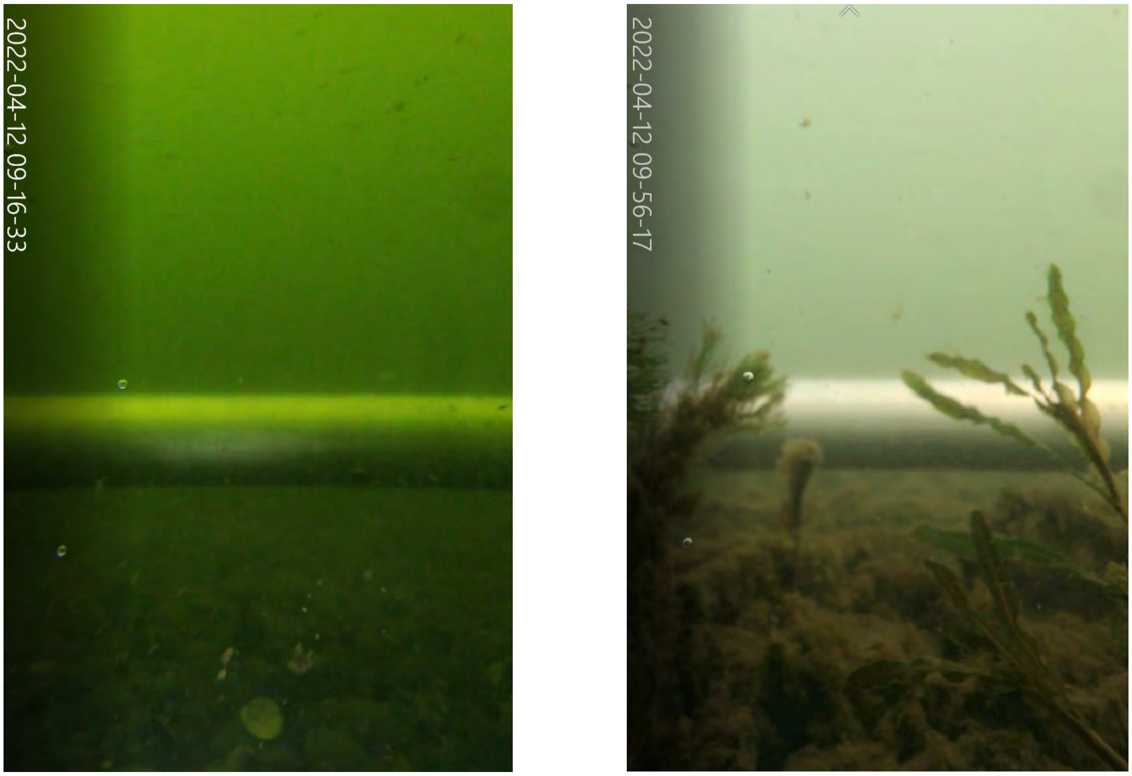


Figure 3 SPI images from SG04 (left) and SG11 (right)

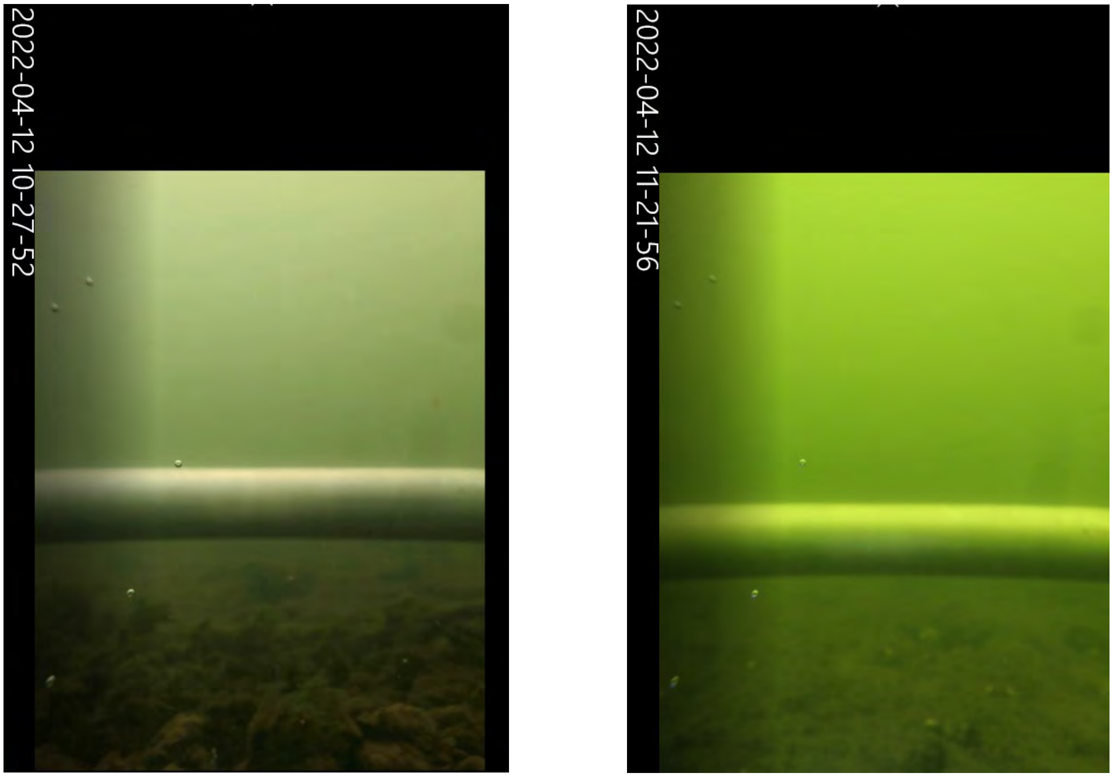


Figure 4 SPI images from SG19 (left) and SG21 (right)

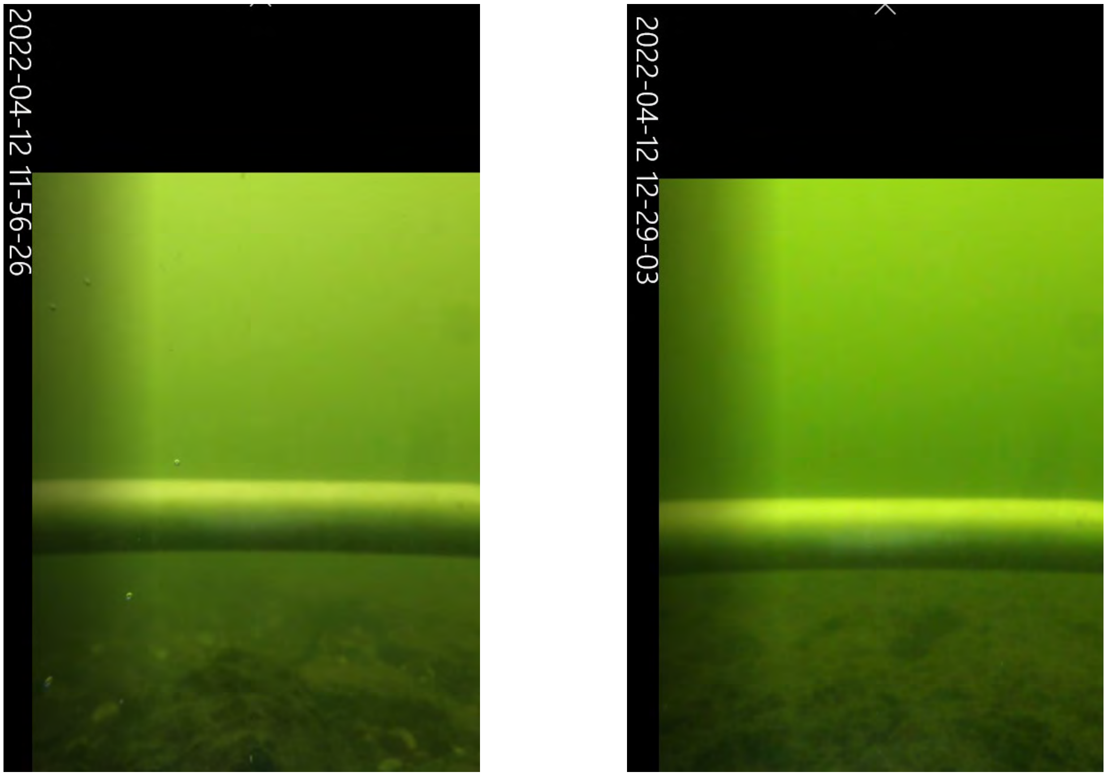


Figure 5 SPI images from SG29 (left) and SG31 (right)

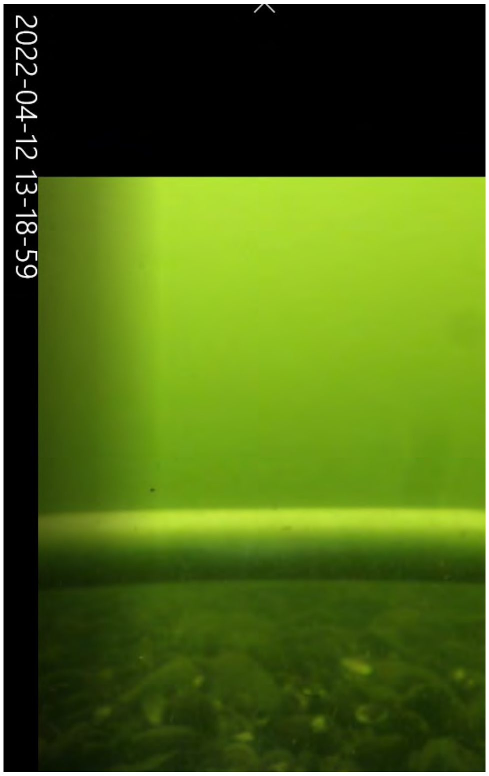


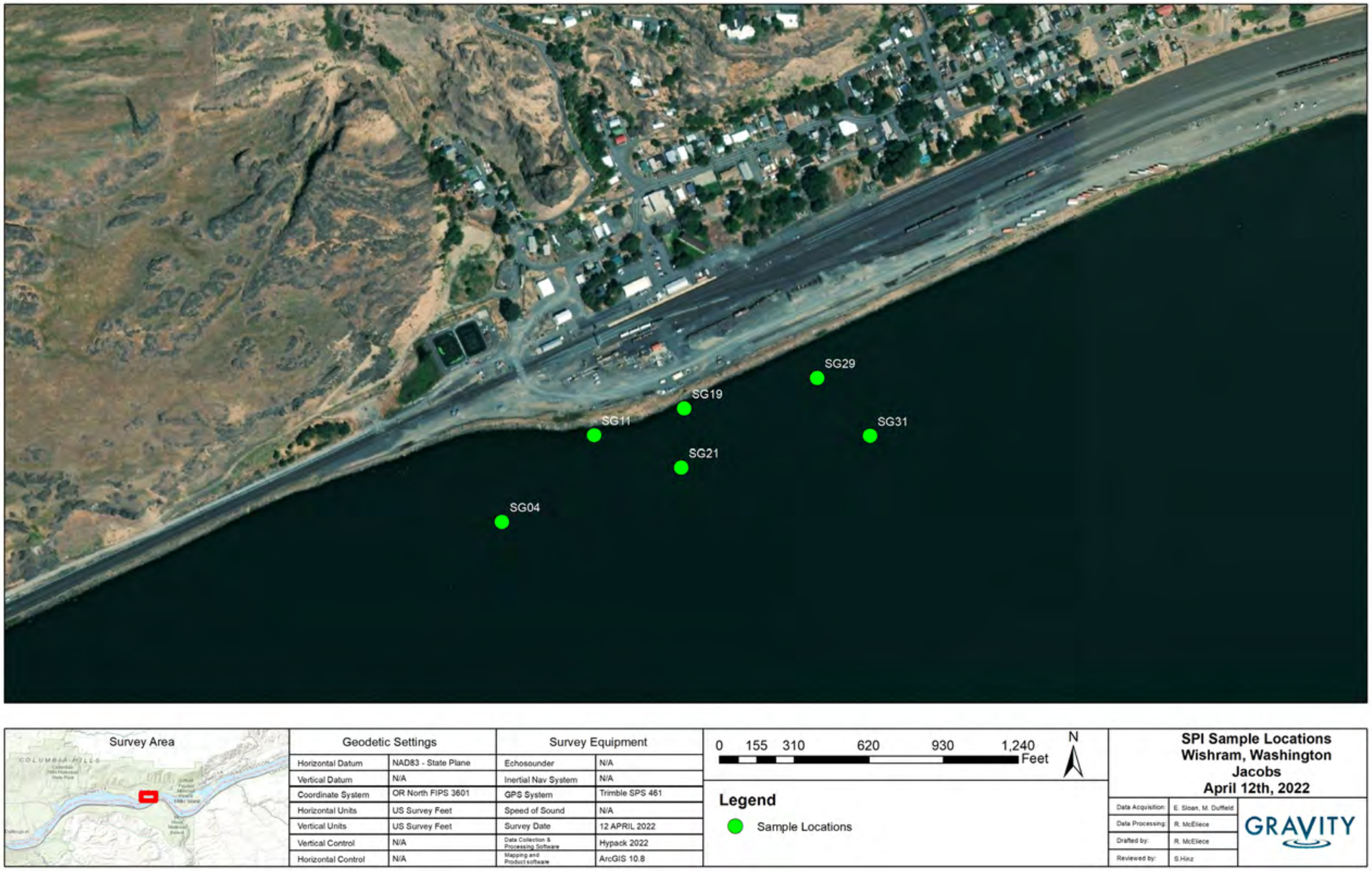
Figure 6 Figure 4 SPI images from BG01

Surface Sediment Grab Sampling and Sediment Oxygen Measurements

A Salish grab sampler was used for the surface sediment grabs. The sampler was unable to penetrate the river bottom due to the hard, rocky substrate. Considering this, insufficient sediment volume was also available for oxygen sensor measurements. Figures 7 and 8 show photos of grab sample attempts. Sample locations for the deployments are shown in Figures 9 and 10.

Figure 7 Grab Samples SG11-1 (left) and SG29-2 (right)

Figure 8 Grab Samples SG29-3 (left) and SG31-1 (right)



Geodetic Settings		Survey Equipment	
Horizontal Datum	NAD83 - State Plane	Echosounder	N/A
Vertical Datum	N/A	Inertial Nav System	N/A
Coordinate System	OR North FIPS 3601	GPS System	Trimble SPS 461
Horizontal Units	US Survey Feet	Speed of Sound	N/A
Vertical Units	US Survey Feet	Survey Date	12 APRIL 2022
Vertical Control	N/A	Data Collection & Processing Software	Hypack 2022
Horizontal Control	N/A	Mapping and Product software	ArcGIS 10.8

SPI Sample Locations
Wishram, Washington
Jacobs
April 12th, 2022

Data Acquisition:	E. Sloan, M. Duffield
Data Processing:	R. McEliece
Drafted by:	R. McEliece
Reviewed by:	S.Hinz

Figure 9 Map showing the SPI and Grab sample locations on the project site

Geodetic Settings	
Horizontal Datum	NAD83 - State Plane
Vertical Datum	N/A
Coordinate System	OR North FIPS 3601
Horizontal Units	US Survey Feet
Vertical Units	US Survey Feet
Vertical Control	N/A
Horizontal Control	N/A

Survey Equipment	
Echosounder	N/A
Inertial Nav System	N/A
GPS System	Trimble SPS 461
Speed of Sound	N/A
Survey Date	12 APRIL 2022
Data Collection & Processing Software	Hypack 2022
Mapping and Product software	ArcGIS 10.8

0 875 1,750 3,500 5,250 7,000 Feet

N

Legend

🔴 Background Samples

🟢 Sample Locations

Background Sample Locations
Wishram, Washington
Jacobs
April 12th, 2022

Data Acquisition:	E. Sloan, M. Duffield
Data Processing:	R. McEliece
Drafted by:	R. McEliece
Reviewed by:	S.Hinz

Figure 10 Map showing the location of the background samples

Appendix F
Preliminary Natural Background Values

Appendix F-1. Preliminary Natural Background Values

Preliminary natural background values are calculated here using the 90/90 upper tolerance limit (UTL), which represents a 90 percent upper confidence bound on the 90th percentile. It offers a value with 90 percent confidence that at least 90 percent of background values would fall below. This translates to one in 10 background samples being expected to exceed the UTL. The lower the confidence level or percentile coverage, the lower the UTL value. Depending upon the distributional characteristics of a data set, one of two approaches (parametric or non-parametric procedures) is used to determine UTL values.

Statistical Basis for Determining Upper Tolerance Limits

Parametric tolerance limits assume a defined statistical distribution (e.g., normal, lognormal, or gamma) of the sample background data used to construct the limit. Validity of this assumption is essential to the applicability of the method because a tolerance limit with high coverage can be viewed as an estimate of a quantile or percentile associated with the tail probability of the underlying distribution. If the background sample data do not fit a defined statistical distribution, data can be transformed using an appropriate transformation so that the transformed data fit a normal distribution. Alternatively, a non-parametric approach may be used. If a suitable transformation is found, the UTL is calculated using the transformed measurements and is then back-transformed to the raw concentration scale. If a data set does not comply with the assumption of normality or a suitable transformation is not found, and does not fit a lognormal or gamma distribution, then a non-parametric tolerance limit is considered. Non-parametric tolerance limits generally require a much larger number of observations to provide the same levels of coverage and confidence as a parametric limit. U.S. Environmental Protection Agency (EPA) guidance (EPA, 2006) recommends that a parametric model be fit to the data if possible.

Assumptions

To construct an appropriate UTL, the following assumptions should be satisfied by the background data:

- Parametric tolerance limits assume that the data follow a discernable distribution. If data do not fit an identified distribution, then a suitable transformation is needed to normalize the measurements, or a nonparametric approach would be needed.
- Non-parametric tolerance limits do not assume normality or any distributional form.
- Tolerance limits assume that the population is stable over the period during which measurements are collected. Ideally, no obvious temporal trends or seasonal patterns should exist in the background data. However, in real world datasets, some such patterns may be unavoidable.
- Although non-parametric tolerance limits do not require an assumption of normality, other assumptions of tolerance limits apply equally to parametric and non-parametric methods. Specifically, the sample data should be statistically independent and show no evidence of autocorrelation, trends, or seasonal effects in background.
- The presence of outliers, which are data points that do not fit into the distribution of the remainder of the data, may affect distribution tests and estimates of tolerance limits. Potential outliers may be identified statistically or graphically, and the implications for distribution fitting and estimation of tolerance limits should be considered. Unless outliers are determined to be erroneous data, in general they should not be removed.

Approach for Determining Upper Tolerance Limits

Software

Data manipulation, visualization, and analysis were performed using R statistical software (R version 4.2.1, 2022). R routines either mirrored or were analogous to ProUCL statistical approaches for the following tests. The ProUCL technical guidance was consulted to verify these approaches, and all analyses were performed exclusively in R. This approach allows for a more complete and flexible analysis of distributional assumptions, as well as robust and streamlined data manipulation and analysis without requiring multiple software programs. R packages used include *tidyverse* (Wickham et al., 2019), *NADA* (Lee, 2020), *EnvStats* (Millard, 2013), *fitdistrplus* (Delignette-Muller and Dutang, 2015), *tolerance* (Young, 2010), *outliers* (Komsta, 2011), and *flexsurv* (Jackson, 2016).

Outlier Evaluation

Concentration data for each analyte were evaluated for mathematical outliers. Dixon's Extreme Value test was used to test for outliers as only eight data points were available for each analyte (EPA, 2006). Outlier tests were not performed on analytes containing censored data. In these cases, outliers were evaluated based on Q-Q plots and professional judgement. No outliers were removed as a result of this analysis.

Upper Tolerance Limit Calculations

Data from eight background locations were available for UTL calculations. The single field duplicate sample was averaged with the parent when both samples were detects or non-detects. If one sample was a detect and the other a non-detect, the detected value was selected to represent the single sample location. UTLs were not calculated when there were less than 3 detects or less than 8 total observations for an analyte. The maximum detect was selected as the preliminary natural background value when there were fewer than 3 detects, and the maximum practical quantitation limit (PQL) was used as the preliminary natural background value in cases where no detects were observed for a particular chemical.

Upper tolerance limits were calculated for fourteen analytes. 90/90 UTLs were not calculated for the remaining analytes due to lack of detections. For chemical classes that required summing individual congeners or chemicals to calculate a total, single values were handled according to the Washington State Department of Ecology (Ecology) Sediment Cleanup User's Manual (SCUM). Attachment F-1 contains text file outputs from R and plots for each analyte where a 90/90 UTL was calculated. Attachment F-2 contains the calculations for the dioxin/furan and dioxin-like PCB toxic equivalents (TEQs). Attachment F-3 contains the carcinogenic PAH summation calculations. Attachment F-4 contains the total PAH calculations.

Preliminary Natural Background Values

Based on feedback from Washington's Department of Ecology, it was decided that the large proportion of non-detects in the background data set results in unreliable 90/90 UTLs. Due to the high degree of uncertainty for the UTLs, maximum detects or maximum PQLs for analytes with no detects were selected as preliminary natural background values. Table F-1 presents all the preliminary natural background values.

References

Christopher Jackson (2016). flexsurv: A Platform for Parametric Survival Modeling in R. Journal of Statistical Software, 70(8), 1-33. doi:10.18637/jss.v070.i08

Derek S. Young (2010). tolerance: An R Package for Estimating Tolerance Intervals. Journal of Statistical Software, 36(5), 1-39. URL http://www.jstatsoft.org/v36/i05/

Lopaka Lee (2020). NADA: Nondetects and Data Analysis for Environmental Data. R package version 1.6-1.1. https://CRAN.R-project.org/package=NADA

Lukasz Komsta (2011). outliers: Tests for outliers. R package version 0.14. https://CRAN.R-project.org/package=outliers

Marie Laure Delignette-Muller, Christophe Dutang (2015). fitdistrplus: An R Package for Fitting Distributions. Journal of Statistical Software, 64(4), 1-34. URL http://www.jstatsoft.org/v64/i04/.

Millard SP (2013). _EnvStats: An R Package for Environmental Statistics_. Springer, New York. ISBN 978-1-4614-8455-4, <URL: http://www.springer.com>.

R Core Team (2022). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.

U.S. Environmental Protection Agency (EPA). 2006. *Data Quality Assessment: Statistical Methods for Practitioners*. Office of Environmental Information. Washington, DC.

Table F-1. Preliminary Natural Background Values

Table F-1. Preliminary Natural Background Values

BNSF Wishram Sediment Remedial Investigation Report

			Statistics on Sample Specific MDLs					Statistics on Detected Values					Dixon's test			Distribution Fits		
Chemical Name	Units	Total number	Non Detects	Minimum Non Detect	Mean Non Detect	Standard Deviation Non Detect	Maximum Non Detect (PQL)	Detects	Minimum Detect	Mean Detect	Standard Deviation Detects	Maximum Detect	Normal	Lognormal	Gamma	Normal	Lognormal	Gamma
Benzoic Acid	mg/kg	8	7	0.153	0.303	0.2161	0.766	1	0.327	0.327	NA	0.327	-	-	-	-	-	-
Phenol	mg/kg	8	7	0.0174	0.034	0.0245	0.087	1	0.0534	0.0534	NA	0.0534	-	-	-	-	-	-
Silver	mg/kg	8	7	0.19	0.222	0.0311	0.275	1	0.41	0.41	NA	0.41	-	-	-	-	-	-
3 & 4-Methylphenol (m,p-Cresols)	mg/kg	8	6	0.0135	0.029	0.0200	0.0675	2	0.0455	0.15125	0.150	0.257	-	-	-	-	-	-
Cadmium	mg/kg	8	5	0.042	0.0499	0.0073	0.0605	3	0.11	0.307	0.206	0.52	-	-	-	Yes	Yes	Yes
Mercury	mg/kg	8	5	0.011	0.0124	0.0015	0.015	3	0.012	0.032	0.024	0.058	-	-	-	Yes	Yes	Yes
Sulfide	mg/kg	8	5	38.9	42.64	6.0715	53.2	3	76.4	140.8	56.094	179	-	-	-	Yes	Yes	Yes
Ammonia as N	mg/kg	8	3	11	11.333	0.5774	12	5	22	41.9	19.976	69.5	-	-	-	Yes	Yes	Yes
Selenium	mg/kg	8	3	0.12	0.123	0.0058	0.13	5	0.12	0.252	0.130	0.45	-	-	-	Yes	Yes	Yes
Diesel Fuel	mg/kg	8	2	9.2	9.7	0.7071	10.2	6	10.5	26.467	17.427	58.2	-	-	-	Yes	Yes	Yes
Arsenic	mg/kg	8	1	0.16	0.16	NA	0.16	7	0.16	1.393	1.347	3.3	-	-	-	Yes	Yes	Yes
Chromium	mg/kg	8	1	0.2	0.2	NA	0.2	7	2.1	7.479	5.546	15.7	-	-	-	Yes	Yes	Yes
Nickel	mg/kg	8	1	0.29	0.29	NA	0.29	7	1.9	7.25	5.961	15.3	-	-	-	Yes	Yes	Yes
Copper	mg/kg	8	NA	NA	NA	NA	NA	8	1.6	8.35625	4.496	16.2	No	No	No	Yes	Yes	Yes
Lead	mg/kg	8	NA	NA	NA	NA	NA	8	0.092	2.5515	3.190	8.6	No	No	No	No	Yes	Yes
TPH as Motor Oil	mg/kg	8	NA	NA	NA	NA	NA	8	18	106.0125	107.40599	318	No	No	No	No	Yes	Yes
Zinc	mg/kg	8	NA	NA	NA	NA	NA	8	2	35.025	40.030908	106	No	No	No	No	Yes	Yes
1-Methylnaphthalene	mg/kg	8	8	0.0055	0.0105	0.0073	0.0276	NA	NA	NA	NA	NA	-	-	-	-	-	-
2-Methylnaphthalene	mg/kg	8	8	0.0056	0.0107	0.0074	0.028	NA	NA	NA	NA	NA	-	-	-	-	-	-
Acenaphthene	mg/kg	8	8	0.0070	0.0133	0.0092	0.0349	NA	NA	NA	NA	NA	-	-	-	-	-	-
Acenaphthylene	mg/kg	8	8	0.0061	0.0116	0.0080	0.0304	NA	NA	NA	NA	NA	-	-	-	-	-	-
Anthracene	mg/kg	8	8	0.0077	0.0147	0.0102	0.0385	NA	NA	NA	NA	NA	-	-	-	-	-	-
Benzo(a)anthracene	mg/kg	8	8	0.0076	0.0145	0.0101	0.038	NA	NA	NA	NA	NA	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	8	8	0.0080	0.0153	0.0106	0.0401	NA	NA	NA	NA	NA	-	-	-	-	-	-
Benzo(b)fluoranthene	mg/kg	8	8	0.0081	0.0153	0.0107	0.0404	NA	NA	NA	NA	NA	-	-	-	-	-	-
Benzo(g,h,i)perylene	mg/kg	8	8	0.0079	0.0150	0.0105	0.0396	NA	NA	NA	NA	NA	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	8	8	0.0077	0.0146	0.0102	0.0384	NA	NA	NA	NA	NA	-	-	-	-	-	-
Bis (2-ethylhexyl) phthalate	mg/kg	8	8	0.0548	0.1043	0.0726	0.274	NA	NA	NA	NA	NA	-	-	-	-	-	-
Carbazole	mg/kg	8	8	0.0134	0.0254	0.0177	0.0668	NA	NA	NA	NA	NA	-	-	-	-	-	-
Chrysene	mg/kg	8	8	0.0086	0.0163	0.0114	0.043	NA	NA	NA	NA	NA	-	-	-	-	-	-
Di-N-Butylphthalate	mg/kg	8	8	0.0148	0.0282	0.0196	0.074	NA	NA	NA	NA	NA	-	-	-	-	-	-
Di-n-octyl phthalate	mg/kg	8	8	0.0292	0.0557	0.0390	0.147	NA	NA	NA	NA	NA	-	-	-	-	-	-
Dibenzo(a,h)anthracene	mg/kg	8	8	0.0120	0.0228	0.0159	0.06	NA	NA	NA	NA	NA	-	-	-	-	-	-
Dibenzofuran	mg/kg	8	8	0.0142	0.0269	0.0187	0.0707	NA	NA	NA	NA	NA	-	-	-	-	-	-
Fluoranthene	mg/kg	8	8	0.0078	0.0149	0.0104	0.0391	NA	NA	NA	NA	NA	-	-	-	-	-	-
Fluorene	mg/kg	8	8	0.0070	0.0134	0.0093	0.0352	NA	NA	NA	NA	NA	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	8	8	0.0122	0.0232	0.0162	0.0611	NA	NA	NA	NA	NA	-	-	-	-	-	-
Naphthalene	mg/kg	8	8	0.0109	0.0206	0.0144	0.0543	NA	NA	NA	NA	NA	-	-	-	-	-	-
Pentachlorophenol	mg/kg	8	8	0.0116	0.0221	0.0154	0.0581	NA	NA	NA	NA	NA	-	-	-	-	-	-

Table F-1. Preliminary Natural Background Values

BNSF Wishram Sediment Remedial Investigation Report

			Statistics on Sample Specific MDLs					Statistics on Detected Values					Dixon's test			Distribution Fits		
Chemical Name	Units	Total number	Non Detects	Minimum Non Detect	Mean Non Detect	Standard Deviation Non Detect	Maximum Non Detect (PQL)	Detects	Minimum Detect	Mean Detect	Standard Deviation Detects	Maximum Detect	Normal	Lognormal	Gamma	Normal	Lognormal	Gamma
Phenanthrene	mg/kg	8	8	0.0086	0.0163	0.0114	0.043	NA	NA	NA	NA	NA	-	-	-	-	-	-
Pyrene	mg/kg	8	8	0.0084	0.0160	0.0112	0.0421	NA	NA	NA	NA	NA	-	-	-	-	-	-
TEQs and Totals																		
Total PAH[a]	mg/kg	8	8	0.0122	0.02251111	0.01529039	0.0611	NA	NA	NA	NA	NA	-	-	-	-	-	-
Dioxin/Furans + Dioxin-like PCBs TEQs[b]	ng/kg	8	8	0.407	0.463	0.049	0.532	NA	-	-	-	-	No	No	No	Yes	Yes	Yes
Dioxin/Furan TEQs[b]	ng/kg	8	8	0.386	0.442	0.049	0.510	NA	-	-	-	-	-	-	-	-	-	-
Dioxin-like PCBs TEQs[b]	ng/kg	8	8	0.0212	0.0217	0.000607	0.0231	NA	-	-	-	-	-	-	-	-	-	-
cPAH TEQs[b]	Unitless	8	8	0.00804	0.0152825	0.01061091	0.0401	NA	NA	NA	NA	NA	-	-	-	-	-	-

[a] Comparison to benthic criteria

[b] Bioaccumulative chemicals

Notes:

Summary statistics calculated using the method detection limit for nondetects

There were no PAH detections. Summary statistics are based on the greatest MDL of all congeners. Preliminary natural background is represented by the maximum PQL

Dioxins/furans and dioxin-like PCB TEQ sums were calculated using one half method detection limits for nondetects. See Appendix F, Attachment F-2 for calculations.

Values for dioxins/furans and dioxin-like PCB TEQ sums are considered nondetect in summary statistics due to high proportion (> 50%) of nondetected congeners.

Summary statistics for cPAH TEQs are the method detection limits for benzo(a)pyrene. The preliminary natural background value is represented by the maximum PQL for benzo(a)pyrene

Individual analytes with 100% nondetects have the preliminary natural background value set at the maximum PQL

AIC = Akieke Information Criterion

MDL = Method detection limit

PAH = Polycyclic aromatic hydrocarbon

PQL = Practical Quantitation Limit

TEQ = Toxic Equivalent

UTL = Upper Tolerance Limit

Table F-1. Preliminary Natural Background Values

BNSF Wishram Sediment Remedial Investigation Rep

Chemical Name	Units	Lowest AIC	90/90 UTLs					Selected 90/90 UTL	Selected Preliminary Natural Background	Notes
			Selected Distribution	Normal	Lognormal	Gamma	NonParametric			
Benzoic Acid	mg/kg	-	-	-	-	-	-	-	0.33	Max Detect
Phenol	mg/kg	-	-	-	-	-	-	-	0.053	Max Detect
Silver	mg/kg	-	-	-	-	-	-	-	0.41	Max Detect
3 & 4-Methylphenol (m,p-Cresols)	mg/kg	-	-	-	-	-	-	-	0.26	Max Detect
Cadmium	mg/kg	Normal	Normal	0.717	2.448	0.573	0.52	0.7174501	0.52	Max Detect
Mercury	mg/kg	Gamma	Gamma	0.070	0.102	0.053	0.058	0.05317669	0.058	Max Detect
Sulfide	mg/kg	Normal	Normal	281.483	609.565	226.5136	179	281.4833	180	Max Detect
Ammonia as N	mg/kg	Normal	Normal	89.467	181.277	90.48335	69.5	89.4674	70	Max Detect
Selenium	mg/kg	Gamma	Gamma	0.514	0.678	0.481	0.45	0.4813511	0.45	Max Detect
Diesel Fuel	mg/kg	Gamma	Gamma	62.160	88.107	62.60963	58.2	62.60963	58	Max Detect
Arsenic	mg/kg	Gamma	Gamma	4.172	11.965	5.627315	3.3	5.627315	3.3	Max Detect
Chromium	mg/kg	Normal	Normal	19.459	95.057	27.38636	15.7	19.45882	16	Max Detect
Nickel	mg/kg	Normal	Normal	19.894	73.672	26.778	15.3	19.89383	15	Max Detect
Copper	mg/kg	Normal	Normal	18.330	33.216	23.54675	16.2	18.33031	16	Max Detect
Lead	mg/kg	Lognormal	Gamma	9.628	36.028	14.54901	8.6	14.54901	8.6	Max Detect
TPH as Motor Oil	mg/kg	Lognormal	Gamma	344.303	668.463	451.0447	318	451.0447	320	Max Detect
Zinc	mg/kg	Lognormal	Gamma	123.837	366.321	180.2266	106	180.2266	110	Max Detect
1-Methylnaphthalene	mg/kg	-	-	-	-	-	-	-	0.22	Max PQL
2-Methylnaphthalene	mg/kg	-	-	-	-	-	-	-	0.22	Max PQL
Acenaphthene	mg/kg	-	-	-	-	-	-	-	0.22	Max PQL
Acenaphthylene	mg/kg	-	-	-	-	-	-	-	0.22	Max PQL
Anthracene	mg/kg	-	-	-	-	-	-	-	0.22	Max PQL
Benzo(a)anthracene	mg/kg	-	-	-	-	-	-	-	0.22	Max PQL
Benzo(a)pyrene	mg/kg	-	-	-	-	-	-	-	0.22	Max PQL
Benzo(b)fluoranthene	mg/kg	-	-	-	-	-	-	-	0.22	Max PQL
Benzo(g,h,i)perylene	mg/kg	-	-	-	-	-	-	-	0.22	Max PQL
Benzo(k)fluoranthene	mg/kg	-	-	-	-	-	-	-	0.22	Max PQL
Bis (2-ethylhexyl) phthalate	mg/kg	-	-	-	-	-	-	-	2.2	Max PQL
Carbazole	mg/kg	-	-	-	-	-	-	-	2.2	Max PQL
Chrysene	mg/kg	-	-	-	-	-	-	-	0.22	Max PQL
Di-N-Butylphthalate	mg/kg	-	-	-	-	-	-	-	2.20	Max PQL
Di-n-octyl phthalate	mg/kg	-	-	-	-	-	-	-	2.2	Max PQL
Dibenzo(a,h)anthracene	mg/kg	-	-	-	-	-	-	-	0.2	Max PQL
Dibenzofuran	mg/kg	-	-	-	-	-	-	-	2.2	Max PQL
Fluoranthene	mg/kg	-	-	-	-	-	-	-	0.22	Max PQL
Fluorene	mg/kg	-	-	-	-	-	-	-	0.22	Max PQL
Indeno(1,2,3-cd)pyrene	mg/kg	-	-	-	-	-	-	-	0.22	Max PQL
Naphthalene	mg/kg	-	-	-	-	-	-	-	0.22	Max PQL
Pentachlorophenol	mg/kg	-	-	-	-	-	-	-	2.2	Max PQL

Table F-1. Preliminary Natural Background Values

BNSF Wishram Sediment Remedial Investigation Rep

Chemical Name	Units	Lowest AIC	90/90 UTLs					Selected 90/90 UTL	Selected Preliminary Natural Background	Notes
			Selected Distribution	Normal	Lognormal	Gamma	NonParametric			
Phenanthrene	mg/kg	-	-	-	-	-	-	-	0.22	Max PQL
Pyrene	mg/kg	-	-	-	-	-	-	-	0.22	Max PQL
TEQs and Totals										
Total PAH[a]	mg/kg	-	-	-	-	-	-	-	0.22	Value is the max sum PAH quantitation limit for each chemical group. No detects, no UTL calculated
Dioxin/Furans + Dioxin-like PCBs TEQs[b]	ng/kg	Lognormal	Lognormal	0.5716682	0.5818054	0.5780616	0.532113	0.5818054	0.53	Value is the max sum TEQ
Dioxin/Furan TEQs[b]	ng/kg	-	-	-	-	-	-	-	0.51	Value is the max sum TEQ
Dioxin-like PCBs TEQs[b]	ng/kg	-	-	-	-	-	-	-	0.023	Value is the max sum TEQ
cPAH TEQs[b]	Unitless	-	-	-	-	-	-	-	0.22	Value is based on max quantitation limit of Benzo (a) pyrene, the reference chemical for the TEFs.

[a] Comparison to benthic criteria

[b] Bioaccumulative chemicals

Notes:

Summary statistics calculated using the method detection

There were no PAH detections. Summary statistics are bas

Dioxins/furans and dioxin-like PCB TEQ sums were calcula

Values for dioxins/furans and dioxin-like PCB TEQ sums ar

Summary statistics for cPAH TEQs are the method detectic

Individual analytes with 100% nondetects have the prelim

AIC = Akieke Information Criterion

MDL = Method detection limit

PAH = Polycyclic aromatic hydrocarbon

PQL = Practical Quantitation Limit

TEQ = Toxic Equivalent

UTL = Upper Tolerance Limit

Attachment F-1
Statistical Results and Plots from R

```
[1] "Ammonia as N"
[1] "Summary Stats"
      median     mean       sd
K-M 22.00000 34.43750 19.11609
ROS 26.00000 30.13387 22.20683
MLE 19.00471 31.86114 42.87197
all:
      n   n.cen pct.cen     min     max
    8.0     3.0    37.5    11.0    69.5

limits:
  limit n uncen pexceed
1    11 2     0   0.625
2    12 1     5   0.625

# A tibble: 2 Ã— 5
  Detection  number   min   med   max
  <chr>       <int> <dbl> <dbl> <dbl>
1 Detect          5    22    32  69.5
2 Non-Detect      3    11    11  12
[1] "............................"
[1] "Fit Distribution Plus fits"
[1] "Normal"
Fitting of the distribution ' norm ' By maximum likelihood on
censored data
Parameters
     estimate Std. Error
mean 22.85374   11.75384
sd   30.02969   10.41195
Loglikelihood:  -26.6407   AIC:  57.28141   BIC:  57.44029
Correlation matrix:
           mean         sd
mean  1.0000000 -0.2919502
sd   -0.2919502  1.0000000

[1] "Lognormal"
Fitting of the distribution ' lnorm ' By maximum likelihood on
censored data
Parameters
        estimate Std. Error
meanlog 2.944624  0.3962435
sdlog   1.016909  0.3582013
Loglikelihood:  -28.08418   AIC:  60.16836   BIC:  60.32725
Correlation matrix:
           meanlog      sdlog
meanlog  1.0000000 -0.2916839
sdlog   -0.2916839  1.0000000

[1] "Gamma"
Fitting of the distribution ' gamma ' By maximum likelihood on
censored data
Parameters
```

```
        estimate Std. Error
shape 1.04661217 0.67356650
rate  0.03709983 0.02637032
Loglikelihood:  -27.44306   AIC:  58.88613   BIC:  59.04501
Correlation matrix:
          shape      rate
shape 1.0000000 0.8733389
rate  0.8733389 1.0000000

[1] "AIC"
[1] "Normal"
[1] 57.28141
[1] "Lognormal"
[1] 60.16836
[1] "Gamma"
[1] 58.88613
[1] "..............................."
[1] "Goodness of fit"
[1] "Normal"
$distribution
[1] "Normal"

$dist.abb
[1] "norm"

$distribution.parameters
    mean       sd
22.85513 30.02454

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W
0.9489652

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 11 12

$percent.censored
[1] 37.5

$parameters
```

```
    N DELTA
8.000 0.375

$z.value
[1] -1.367702

$p.value
[1] 0.9142973

$alternative
[1] "True cdf does not equal the\n
Normal Distribution."

$method
[1] "Shapiro-Francia GOF\n
(Multiply Censored Data)"

$data
[1] 12.0 32.0 22.0 11.0 69.5 56.0 11.0 30.0

$data.name
[1] "onechem$valueF"

$censored
[1]  TRUE FALSE FALSE  TRUE FALSE FALSE  TRUE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Normal-> log transformed"
$distribution
[1] "Normal"

$dist.abb
[1] "norm"

$distribution.parameters
     mean        sd
1.2788612 0.4414877

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W
0.9481029
```

```
$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 1.041393 1.079181

$percent.censored
[1] 37.5

$parameters
    N DELTA
8.000 0.375

$z.value
[1] -1.334563

$p.value
[1] 0.9089903

$alternative
[1] "True cdf does not equal the\n
Normal Distribution."

$method
[1] "Shapiro-Francia GOF\n
(Multiply Censored Data)"

$data
[1] 1.079181 1.505150 1.342423 1.041393 1.841985 1.748188
1.041393 1.477121

$data.name
[1] "onechem$valueF.log10"

$censored
[1]  TRUE FALSE FALSE  TRUE FALSE FALSE  TRUE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Normal-> gamma transformed"
$distribution
[1] "Normal"

$dist.abb
[1] "norm"
```

```
$distribution.parameters
    mean       sd
2.723472 1.012618

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W
0.9513089

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 2.223980 2.289428

$percent.censored
[1] 37.5

$parameters
    N DELTA
8.000 0.375

$z.value
[1] -1.460684

$p.value
[1] 0.9279489

$alternative
[1] "True cdf does not equal the\n
Normal Distribution."

$method
[1] "Shapiro-Francia GOF\n
(Multiply Censored Data)"

$data
[1] 2.289428 3.174802 2.802039 2.223980 4.111449 3.825862
2.223980 3.107233

$data.name
[1] "onechem$valueF.cuberoot"

$censored
```

```
[1]  TRUE FALSE FALSE  TRUE FALSE FALSE  TRUE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Lognormal"
$distribution
[1] "Lognormal"

$dist.abb
[1] "lnorm"

$distribution.parameters
 meanlog    sdlog 
2.944687 1.016563 

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W 
0.9481029 

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 11 12

$percent.censored
[1] 37.5

$parameters
    N DELTA 
8.000 0.375 

$z.value
[1] -1.334563

$p.value
[1] 0.9089903

$alternative
[1] "True cdf does not equal the\n
```

```
Lognormal Distribution."

$method
[1] "Shapiro-Francia GOF\n
(Multiply Censored Data)"

$data
[1] 12.0 32.0 22.0 11.0 69.5 56.0 11.0 30.0

$data.name
[1] "onechem$valueF"

$censored
[1]  TRUE FALSE FALSE  TRUE FALSE FALSE  TRUE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Gamma"
$distribution
[1] "Gamma"

$dist.abb
[1] "gamma"

$distribution.parameters
    shape     scale
 1.047165 26.943893

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W
0.9516824

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 11 12

$percent.censored
[1] 37.5
```

```
$parameters
    N DELTA
8.000 0.375

$z.value
[1] -1.475911

$p.value
[1] 0.9300161

$alternative
[1] "True cdf does not equal the\n
Gamma Distribution."

$method
[1] "Shapiro-Francia GOF\n
(Multiply Censored Data)\n                                 Based
on Chen & Balakrisnan (1995)"

$data
[1] 12.0 32.0 22.0 11.0 69.5 56.0 11.0 30.0

$data.name
[1] "onechem$valueF"

$censored
[1]  TRUE FALSE FALSE  TRUE FALSE FALSE  TRUE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "..............................."
[1] "All UTL Results"
[1] "Normal"
$distribution
[1] "Normal"

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 11 12

$percent.censored
[1] 37.5
```

```
$parameters
    mean       sd 
22.85513 30.02454 

$n.param.est
[1] 2

$method
[1] "MLE"

$data.name
[1] "valueF"

$censoring.name
[1] "censored"

$bad.obs
[1] 0

$interval
$name
[1] "Tolerance"

$coverage
[1] 0.9

$coverage.type
[1] "content"

$limits
    LTL     UTL 
   -Inf 89.4674 

$type
[1] "upper"

$method
[1] "Exact for\n                                 Complete Data"

$conf.level
[1] 0.9

$sample.size
[1] 8

$dof
[1] 7

attr(,"class")
[1] "intervalEstimateCensored"

attr(,"class")
```

```
[1] "estimateCensored"
[1] "Lognormal"
$distribution
[1] "Lognormal"

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 11 12

$percent.censored
[1] 37.5

$parameters
 meanlog    sdlog 
2.944687 1.016563 

$n.param.est
[1] 2

$method
[1] "MLE"

$data.name
[1] "valueF"

$censoring.name
[1] "censored"

$bad.obs
[1] 0

$interval
$name
[1] "Tolerance"

$coverage
[1] 0.9

$coverage.type
[1] "content"

$limits
     LTL      UTL 
  0.0000 181.2773 

$type
[1] "upper"
```

```
$method
[1] "Exact for\n                                Complete Data"

$conf.level
[1] 0.9

$sample.size
[1] 8

$dof
[1] 7

attr(,"class")
[1] "intervalEstimateCensored"

attr(,"class")
[1] "estimateCensored"
[1] "Gamma -HW"
[1] 94.10836
[1] "Gamma -WH"
[1] 90.48335
[1] "Non parametric"
$distribution
[1] "None"

$sample.size
[1] 8

$data.name
[1] "valueF"

$bad.obs
[1] 0

$interval
$name
[1] "Tolerance"

$coverage
[1] 0.9

$coverage.type
[1] "content"

$limit.ranks
[1] 8

$limits
 LTL  UTL
-Inf 69.5
```

```
$type
[1] "upper"

$method
[1] "Exact"

$conf.level
[1] 0.5695328

$sample.size
[1] 8

attr(,"class")
[1] "intervalEstimate"

attr(,"class")
[1] "estimate"
[1] "..............................."
```

```
[1] "Arsenic"
[1] "Summary Stats"
       median     mean       sd
K-M 0.4700000 1.238750 1.334952
ROS 0.5050000 1.223026 1.336591
MLE 0.5753939 1.466400 3.437427
all:
      n   n.cen pct.cen     min     max 
   8.00    1.00   12.50    0.16    3.30 

limits:
  limit n uncen pexceed
1  0.16 1     7   0.875

# A tibble: 2 × 5
  Detection  number   min   med   max
  <chr>       <int> <dbl> <dbl> <dbl>
1 Detect          7  0.16  0.54  3.3 
2 Non-Detect      1  0.16  0.16  0.16
[1] "............................"
[1] "Fit Distribution Plus fits"
[1] "Normal"
Fitting of the distribution ' norm ' By maximum likelihood on censored data 
Parameters
     estimate Std. Error
mean 1.138574  0.4920651
sd   1.367375  0.3737865
Loglikelihood:  -13.09538   AIC:  30.19075   BIC:  30.34964 
Correlation matrix:
            mean          sd
mean  1.00000000 -0.07377906
sd   -0.07377906  1.00000000

[1] "Lognormal"
Fitting of the distribution ' lnorm ' By maximum likelihood on censored data 
Parameters
          estimate Std. Error
meanlog -0.5526581  0.4912729
sdlog    1.3679163  0.3758672
Loglikelihood:  -11.32745   AIC:  26.65489   BIC:  26.81378 
Correlation matrix:
            meanlog       sdlog
meanlog  1.00000000 -0.07177694
sdlog   -0.07177694  1.00000000

[1] "Gamma"
Fitting of the distribution ' gamma ' By maximum likelihood on censored data 
Parameters
       estimate Std. Error
shape 0.7139733  0.3360124
```

```
rate  0.5819583  0.3657023
Loglikelihood:  -11.19889   AIC:  26.39778   BIC:  26.55666
Correlation matrix:
          shape      rate
shape 1.0000000 0.7460449
rate  0.7460449 1.0000000

[1] "AIC"
[1] "Normal"
[1] 30.19075
[1] "Lognormal"
[1] 26.65489
[1] "Gamma"
[1] 26.39778
[1] "............................"
[1] "Goodness of fit"
[1] "Normal"
$distribution
[1] "Normal"

$dist.abb
[1] "norm"

$distribution.parameters
    mean       sd
1.138463 1.367248

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W
0.8682349

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 0.16

$percent.censored
[1] 12.5

$parameters
```

```
    N DELTA
8.000 0.125

$z.value
[1] 0.9737376

$p.value
[1] 0.1650934

$alternative
[1] "True cdf does not equal the\n                                 Normal
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Singly Censored Data)"

$data
[1] 0.16 3.30 0.18 0.16 0.47 0.54 2.50 2.60

$data.name
[1] "onechem$valueF"

$censored
[1]  TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Normal-> log transformed"
$distribution
[1] "Normal"

$dist.abb
[1] "norm"

$distribution.parameters
      mean         sd
-0.2400348  0.5940510

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W
0.8918419
```

```
$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] -0.79588

$percent.censored
[1] 12.5

$parameters
    N DELTA
8.000 0.125

$z.value
[1] 0.6080258

$p.value
[1] 0.2715852

$alternative
[1] "True cdf does not equal the\n                                 Normal
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Singly Censored Data)"

$data
[1] -0.7958800  0.5185139 -0.7447275 -0.7958800 -0.3279021 -0.2676062  0.3979400
0.4149733

$data.name
[1] "onechem$valueF.log10"

$censored
[1]  TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Normal-> gamma transformed"
$distribution
[1] "Normal"

$dist.abb
```

```
[1] "norm"

$distribution.parameters
     mean        sd 
0.9034928 0.4233271 

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W 
0.8901861 

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 0.5428835

$percent.censored
[1] 12.5

$parameters
    N DELTA 
8.000 0.125 

$z.value
[1] 0.6361701

$p.value
[1] 0.2623328

$alternative
[1] "True cdf does not equal the\n                                 Normal
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Singly Censored Data)"

$data
[1] 0.5428835 1.4888056 0.5646216 0.5428835 0.7774980 0.8143253 1.3572088 1.3750689

$data.name
[1] "onechem$valueF.cuberoot"
```

```
$censored
[1]  TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Lognormal"
$distribution
[1] "Lognormal"

$dist.abb
[1] "lnorm"

$distribution.parameters
   meanlog      sdlog 
-0.5527005  1.3678530 

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W 
0.8918419 

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 0.16

$percent.censored
[1] 12.5

$parameters
    N DELTA 
8.000 0.125 

$z.value
[1] 0.6080258

$p.value
```

```
[1] 0.2715852

$alternative
[1] "True cdf does not equal the\n                                 Lognormal
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Singly Censored Data)"

$data
[1] 0.16 3.30 0.18 0.16 0.47 0.54 2.50 2.60

$data.name
[1] "onechem$valueF"

$censored
[1]  TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Gamma"
$distribution
[1] "Gamma"

$dist.abb
[1] "gamma"

$distribution.parameters
    shape     scale 
0.7138844 1.7186461 

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W 
0.8933663 

$sample.size
[1] 8

$censoring.side
[1] "left"
```

```
$censoring.levels
[1] 0.16

$percent.censored
[1] 12.5

$parameters
    N DELTA
8.000 0.125

$z.value
[1] 0.5817334

$p.value
[1] 0.2803731

$alternative
[1] "True cdf does not equal the\n                                 Gamma
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Singly Censored Data)\n
                               Based on Chen & Balakrisnan (1995)"

$data
[1] 0.16 3.30 0.18 0.16 0.47 0.54 2.50 2.60

$data.name
[1] "onechem$valueF"

$censored
[1]  TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "..............................."
[1] "All UTL Results"
[1] "Normal"
$distribution
[1] "Normal"

$sample.size
[1] 8

$censoring.side
[1] "left"
```

```
$censoring.levels
[1] 0.16

$percent.censored
[1] 12.5

$parameters
    mean       sd 
1.138463 1.367248 

$n.param.est
[1] 2

$method
[1] "MLE"

$data.name
[1] "valueF"

$censoring.name
[1] "censored"

$bad.obs
[1] 0

$interval
$name
[1] "Tolerance"

$coverage
[1] 0.9

$coverage.type
[1] "content"

$limits
     LTL      UTL 
    -Inf 4.171831 

$type
[1] "upper"

$method
[1] "Exact for\n                                 Complete Data"

$conf.level
[1] 0.9

$sample.size
[1] 8
```

```
$dof
[1] 7

attr(,"class")
[1] "intervalEstimateCensored"

attr(,"class")
[1] "estimateCensored"
[1] "Lognormal"
$distribution
[1] "Lognormal"

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 0.16

$percent.censored
[1] 12.5

$parameters
   meanlog      sdlog
-0.5527005  1.3678530

$n.param.est
[1] 2

$method
[1] "MLE"

$data.name
[1] "valueF"

$censoring.name
[1] "censored"

$bad.obs
[1] 0

$interval
$name
[1] "Tolerance"

$coverage
[1] 0.9
```

```
$coverage.type
[1] "content"

$limits
     LTL      UTL 
 0.00000 11.96529 

$type
[1] "upper"

$method
[1] "Exact for\n                                 Complete Data"

$conf.level
[1] 0.9

$sample.size
[1] 8

$dof
[1] 7

attr(,"class")
[1] "intervalEstimateCensored"

attr(,"class")
[1] "estimateCensored"
[1] "Gamma -HW"
[1] 6.160103
[1] "Gamma -WH"
[1] 5.627315
[1] "Non parametric"
$distribution
[1] "None"

$sample.size
[1] 8

$data.name
[1] "valueF"

$bad.obs
[1] 0

$interval
$name
[1] "Tolerance"

$coverage
```

```
[1] 0.9

$coverage.type
[1] "content"

$limit.ranks
[1] 8

$limits
 LTL  UTL 
-Inf  3.3 

$type
[1] "upper"

$method
[1] "Exact"

$conf.level
[1] 0.5695328

$sample.size
[1] 8

attr(,"class")
[1] "intervalEstimate"

attr(,"class")
[1] "estimate"
[1] "..............................."
```

```
[1] "Cadmium"
[1] "Summary Stats"
        median      mean        sd
K-M         NA 0.1837500 0.1715668
ROS 0.01388051 0.1236753 0.1871587
MLE 0.03015528 0.2148646 1.5158169
all:
      n   n.cen pct.cen     min     max 
  8.000   5.000  62.500   0.042   0.520 

limits:
   limit n uncen pexceed
1 0.0420 1     0   0.375
2 0.0460 1     0   0.375
3 0.0470 1     0   0.375
4 0.0540 1     0   0.375
5 0.0605 1     3   0.375

# A tibble: 2 × 5
  Detection  number   min   med    max
  <chr>       <int> <dbl> <dbl>  <dbl>
1 Detect          3 0.11  0.29  0.52  
2 Non-Detect      5 0.042 0.047 0.0605
[1] "............................"
[1] "Fit Distribution Plus fits"
[1] "Normal"
Fitting of the distribution ' norm ' By maximum likelihood on censored data 
Parameters
        estimate Std. Error
mean -0.05213941  0.1810361
sd    0.34690734  0.1635032
Loglikelihood:  -3.962012   AIC:  11.92402   BIC:  12.08291 
Correlation matrix:
           mean         sd
mean  1.0000000 -0.6091108
sd   -0.6091108  1.0000000

[1] "Lognormal"
Fitting of the distribution ' lnorm ' By maximum likelihood on censored data 
Parameters
         estimate Std. Error
meanlog -3.501213  1.0358532
sdlog    1.981566  0.9512762
Loglikelihood:  -5.178751   AIC:  14.3575   BIC:  14.51638 
Correlation matrix:
           meanlog      sdlog
meanlog  1.0000000 -0.6155441
sdlog   -0.6155441  1.0000000

[1] "Gamma"
```

```
Fitting of the distribution ' gamma ' By maximum likelihood on censored data
Parameters
       estimate Std. Error
shape 0.2562401  0.1964336
rate  2.1157741  2.1488055
Loglikelihood:  -4.606236   AIC:  13.21247   BIC:  13.37136
Correlation matrix:
          shape      rate
shape 1.0000000 0.7253641
rate  0.7253641 1.0000000

[1] "AIC"
[1] "Normal"
[1] 11.92402
[1] "Lognormal"
[1] 14.3575
[1] "Gamma"
[1] 13.21247
[1] "..............................."
[1] "Goodness of fit"
[1] "Normal"
$distribution
[1] "Normal"

$dist.abb
[1] "norm"

$distribution.parameters
       mean          sd
-0.05211778  0.34687184

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W
0.9972313

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 0.0420 0.0460 0.0470 0.0540 0.0605
```

```
$percent.censored
[1] 62.5

$parameters
    N DELTA
8.000 0.625

$z.value
[1] -7.522766

$p.value
[1] 1

$alternative
[1] "True cdf does not equal the\n                                 Normal
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Multiply Censored Data)"

$data
[1] 0.0460 0.5200 0.0470 0.0420 0.0605 0.0540 0.1100 0.2900

$data.name
[1] "onechem$valueF"

$censored
[1]  TRUE FALSE  TRUE  TRUE  TRUE  TRUE FALSE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Normal-> log transformed"
$distribution
[1] "Normal"

$dist.abb
[1] "norm"

$distribution.parameters
      mean         sd
-1.5206367  0.8606591

$n.param.est
[1] 2

$estimation.method
[1] "MLE"
```

```
$statistic
       W
0.931286

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] -1.376751 -1.337242 -1.327902 -1.267606 -1.218245

$percent.censored
[1] 62.5

$parameters
    N DELTA
8.000 0.625

$z.value
[1] -1.242146

$p.value
[1] 0.8929086

$alternative
[1] "True cdf does not equal the\n                                 Normal
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Multiply Censored Data)"

$data
[1] -1.3372422 -0.2839967 -1.3279021 -1.3767507 -1.2182446 -1.2676062 -0.9586073
-0.5376020

$data.name
[1] "onechem$valueF.log10"

$censored
[1]  TRUE FALSE  TRUE  TRUE  TRUE  TRUE FALSE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Normal-> gamma transformed"
```

```
$distribution
[1] "Normal"

$dist.abb
[1] "norm"

$distribution.parameters
     mean        sd 
0.2754567 0.3502976 

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W 
0.9625239 

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 0.3476027 0.3583048 0.3608826 0.3779763 0.3925712

$percent.censored
[1] 62.5

$parameters
    N DELTA 
8.000 0.625 

$z.value
[1] -2.427733

$p.value
[1] 0.9924032

$alternative
[1] "True cdf does not equal the\n                                 Normal
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Multiply Censored Data)"

$data
```

```
[1] 0.3583048 0.8041452 0.3608826 0.3476027 0.3925712 0.3779763 0.4791420 0.6619106

$data.name
[1] "onechem$valueF.cuberoot"

$censored
[1]  TRUE FALSE  TRUE  TRUE  TRUE  TRUE FALSE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Lognormal"
$distribution
[1] "Lognormal"

$dist.abb
[1] "lnorm"

$distribution.parameters
  meanlog     sdlog
-3.501395  1.981741

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
       W
0.931286

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 0.0420 0.0460 0.0470 0.0540 0.0605

$percent.censored
[1] 62.5

$parameters
    N DELTA
8.000 0.625
```

```
$z.value
[1] -1.242146

$p.value
[1] 0.8929086

$alternative
[1] "True cdf does not equal the\n                                 Lognormal
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Multiply Censored Data)"

$data
[1] 0.0460 0.5200 0.0470 0.0420 0.0605 0.0540 0.1100 0.2900

$data.name
[1] "onechem$valueF"

$censored
[1]  TRUE FALSE  TRUE  TRUE  TRUE  TRUE FALSE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Gamma"
$distribution
[1] "Gamma"

$dist.abb
[1] "gamma"

$distribution.parameters
    shape     scale 
0.2563079 0.4725817 

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W 
0.9648384 

$sample.size
[1] 8
```

```
$censoring.side
[1] "left"

$censoring.levels
[1] 0.0420 0.0460 0.0470 0.0540 0.0605

$percent.censored
[1] 62.5

$parameters
    N DELTA
8.000 0.625

$z.value
[1] -2.552403

$p.value
[1] 0.9946509

$alternative
[1] "True cdf does not equal the\n                                 Gamma
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Multiply Censored
Data)\n                                 Based on Chen & Balakrisnan (1995)"

$data
[1] 0.0460 0.5200 0.0470 0.0420 0.0605 0.0540 0.1100 0.2900

$data.name
[1] "onechem$valueF"

$censored
[1]  TRUE FALSE  TRUE  TRUE  TRUE  TRUE FALSE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "..............................."
[1] "All UTL Results"
[1] "Normal"
$distribution
[1] "Normal"

$sample.size
[1] 8
```

```
$censoring.side
[1] "left"

$censoring.levels
[1] 0.0420 0.0460 0.0470 0.0540 0.0605

$percent.censored
[1] 62.5

$parameters
       mean          sd
-0.05211778  0.34687184

$n.param.est
[1] 2

$method
[1] "MLE"

$data.name
[1] "valueF"

$censoring.name
[1] "censored"

$bad.obs
[1] 0

$interval
$name
[1] "Tolerance"

$coverage
[1] 0.9

$coverage.type
[1] "content"

$limits
      LTL       UTL
     -Inf 0.7174501

$type
[1] "upper"

$method
[1] "Exact for\n                                 Complete Data"

$conf.level
```

```
[1] 0.9

$sample.size
[1] 8

$dof
[1] 7

attr(,"class")
[1] "intervalEstimateCensored"

attr(,"class")
[1] "estimateCensored"
[1] "Lognormal"
$distribution
[1] "Lognormal"

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 0.0420 0.0460 0.0470 0.0540 0.0605

$percent.censored
[1] 62.5

$parameters
  meanlog     sdlog
-3.501395  1.981741

$n.param.est
[1] 2

$method
[1] "MLE"

$data.name
[1] "valueF"

$censoring.name
[1] "censored"

$bad.obs
[1] 0

$interval
$name
```

```
[1] "Tolerance"

$coverage
[1] 0.9

$coverage.type
[1] "content"

$limits
     LTL      UTL 
0.000000 2.448029 

$type
[1] "upper"

$method
[1] "Exact for\n                                 Complete Data"

$conf.level
[1] 0.9

$sample.size
[1] 8

$dof
[1] 7

attr(,"class")
[1] "intervalEstimateCensored"

attr(,"class")
[1] "estimateCensored"
[1] "Gamma -HW"
[1] 0.592645
[1] "Gamma -WH"
[1] 0.5730139
[1] "Non parametric"
$distribution
[1] "None"

$sample.size
[1] 8

$data.name
[1] "valueF"

$bad.obs
[1] 0

$interval
```

```
$name
[1] "Tolerance"

$coverage
[1] 0.9

$coverage.type
[1] "content"

$limit.ranks
[1] 8

$limits
 LTL  UTL
-Inf 0.52

$type
[1] "upper"

$method
[1] "Exact"

$conf.level
[1] 0.5695328

$sample.size
[1] 8

attr(,"class")
[1] "intervalEstimate"

attr(,"class")
[1] "estimate"
[1] "..............................."
```

```
[1] "Copper"
[1] "------------------"
[1] "AIC"
[1] "Normal"
[1] 49.68459
[1] "Log10"
[1] 51.14703
[1] "Gamma"
[1] 49.75092
[1] "------------------"
[1] "GOF Tests"
[1] "Normal"
[1] "Shapiro-Wilk GOF"
[1] 0.8893139
[1] "Lognormal"
[1] "Shapiro-Wilk GOF"
[1] 0.2235177
[1] "Gamma"
[1] "ProUCL Anderson-Darling Gamma GOF"
[1] ">= 0.10"
[1] "------------------"
[1] "Outlier Tests -Dixon's Test"
[1] "Normal"
[1] "Dixon test for outliers"
[1] "highest value 16.2 is an outlier"
        1
0.5508634
[1] "Log10"
[1] "Dixon test for outliers"
[1] "lowest value 0.204119982655925 is an outlier"
         1
0.05116856
[1] "Gamma Approximation"
[1] "Dixon test for outliers"
[1] "lowest value 1.16960709528515 is an outlier"
        1
0.1269028
[1] "------------------"
[1] "Background Threshold Values"
[1] "Normal"
[1] 8
     LTL      UTL
    -Inf 18.33031
[1] 0.9
[1] "Lognormal"
[1] 8
     LTL      UTL
 0.00000 33.21648
[1] 0.9
[1] "Gamma"
```

```
[1] 8
     LTL      UTL 
 0.00000 23.54675 
[1] 0.9
[1] "Non parametric"
[1] 8
 LTL  UTL 
-Inf 16.2 
[1] 0.5695328
```

```
[1] "DF_TEQ"
[1] "------------------"
[1] "AIC"
[1] "Normal"
[1] -22.686
[1] "Log10"
[1] -22.8506
[1] "Gamma"
[1] -22.80725
[1] "------------------"
[1] "GOF Tests"
[1] "Normal"
[1] "Shapiro-Wilk GOF"
[1] 0.2223417
[1] "Lognormal"
[1] "Shapiro-Wilk GOF"
[1] 0.2258521
[1] "Gamma"
[1] "ProUCL Anderson-Darling Gamma GOF"
[1] ">= 0.10"
[1] "------------------"
[1] "Outlier Tests -Dixon's Test"
[1] "Normal"
[1] "Dixon test for outliers"
[1] "highest value 0.532113035 is an outlier"
        1
0.6717121
[1] "Log10"
[1] "Dixon test for outliers"
[1] "highest value -0.273996102174257 is an outlier"
        1
0.6096396
[1] "Gamma Approximation"
[1] "Dixon test for outliers"
[1] "highest value 0.810341285334729 is an outlier"
        1
0.6300042
[1] "------------------"
[1] "Background Threshold Values"
[1] "Normal"
[1] 8
      LTL       UTL
     -Inf 0.5716682
[1] 0.9
[1] "Lognormal"
[1] 8
      LTL       UTL
0.0000000 0.5818054
[1] 0.9
[1] "Gamma"
```

```
[1] 8
      LTL       UTL 
0.0000000 0.5780616 
[1] 0.9
[1] "Non parametric"
[1] 8
     LTL      UTL 
    -Inf 0.532113 
[1] 0.5695328
```

```
[1] "Diesel Fuel"
[1] "Summary Stats"
      median     mean       sd
K-M 15.80000 22.47500 16.88583
ROS 17.65000 21.07156 17.79665
MLE 16.32622 21.79002 19.26080
all:
      n   n.cen pct.cen     min     max 
    8.0     2.0    25.0     9.2    58.2 

limits:
  limit n uncen pexceed
1   9.2 1     0    0.75
2  10.2 1     6    0.75

# A tibble: 2 × 5
  Detection  number   min   med   max
  <chr>       <int> <dbl> <dbl> <dbl>
1 Detect          6  10.5  20.0  58.2
2 Non-Detect      2   9.2   9.7  10.2
[1] "............................."
[1] "Fit Distribution Plus fits"
[1] "Normal"
Fitting of the distribution ' norm ' By maximum likelihood on censored data 
Parameters
     estimate Std. Error
mean 19.15632   7.203390
sd   19.38981   5.869629
Loglikelihood:  -28.07232   AIC:  60.14465   BIC:  60.30353 
Correlation matrix:
           mean         sd
mean  1.0000000 -0.1691321
sd   -0.1691321  1.0000000

[1] "Lognormal"
Fitting of the distribution ' lnorm ' By maximum likelihood on censored data 
Parameters
         estimate Std. Error
meanlog 2.7926589  0.2810752
sdlog   0.7599137  0.2328499
Loglikelihood:  -27.49343   AIC:  58.98687   BIC:  59.14575 
Correlation matrix:
           meanlog      sdlog
meanlog  1.0000000 -0.1672734
sdlog   -0.1672734  1.0000000

[1] "Gamma"
Fitting of the distribution ' gamma ' By maximum likelihood on censored data 
Parameters
        estimate Std. Error
```

```
shape 1.66681757 0.95897957
rate  0.07845075 0.04900202
Loglikelihood:  -27.47331   AIC:  58.94662   BIC:  59.1055
Correlation matrix:
          shape      rate
shape 1.0000000 0.8981662
rate  0.8981662 1.0000000

[1] "AIC"
[1] "Normal"
[1] 60.14465
[1] "Lognormal"
[1] 58.98687
[1] "Gamma"
[1] 58.94662
[1] "............................."
[1] "Goodness of fit"
[1] "Normal"
$distribution
[1] "Normal"

$dist.abb
[1] "norm"

$distribution.parameters
    mean       sd
19.15163 19.38526

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W
0.9043964

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1]  9.2 10.2

$percent.censored
[1] 25
```

```
$parameters
    N DELTA
 8.00  0.25

$z.value
[1] 0.1299529

$p.value
[1] 0.4483018

$alternative
[1] "True cdf does not equal the\n                                 Normal
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Multiply Censored Data)"

$data
[1] 15.8 19.5 34.2  9.2 58.2 20.6 10.5 10.2

$data.name
[1] "onechem$valueF"

$censored
[1] FALSE FALSE FALSE  TRUE FALSE FALSE FALSE  TRUE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Normal-> log transformed"
$distribution
[1] "Normal"

$dist.abb
[1] "norm"

$distribution.parameters
    mean       sd
1.212886 0.329995

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W
```

```
0.9754265

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 0.9637878 1.0086002

$percent.censored
[1] 25

$parameters
    N DELTA
 8.00  0.25

$z.value
[1] -2.498327

$p.value
[1] 0.993761

$alternative
[1] "True cdf does not equal the\n                                 Normal
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Multiply Censored Data)"

$data
[1] 1.1986571 1.2900346 1.5340261 0.9637878 1.7649230 1.3138672 1.0211893 1.0086002

$data.name
[1] "onechem$valueF.log10"

$censored
[1] FALSE FALSE FALSE  TRUE FALSE FALSE FALSE  TRUE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Normal-> gamma transformed"
$distribution
[1] "Normal"

$dist.abb
```

```
[1] "norm"

$distribution.parameters
     mean        sd 
2.5798313 0.7204409 

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W 
0.9635655 

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 2.095379 2.168703

$percent.censored
[1] 25

$parameters
    N DELTA 
 8.00  0.25 

$z.value
[1] -1.736379

$p.value
[1] 0.9587516

$alternative
[1] "True cdf does not equal the\n                                 Normal
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Multiply Censored Data)"

$data
[1] 2.509299 2.691606 3.245952 2.095379 3.875321 2.741295 2.189760 2.168703

$data.name
[1] "onechem$valueF.cuberoot"
```

```
$censored
[1] FALSE FALSE FALSE  TRUE FALSE FALSE FALSE  TRUE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Lognormal"
$distribution
[1] "Lognormal"

$dist.abb
[1] "lnorm"

$distribution.parameters
  meanlog     sdlog 
2.7927725 0.7598415 

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W 
0.9754265 

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1]  9.2 10.2

$percent.censored
[1] 25

$parameters
    N DELTA 
 8.00  0.25 

$z.value
[1] -2.498327

$p.value
```

```
[1] 0.993761

$alternative
[1] "True cdf does not equal the\n                                 Lognormal
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Multiply Censored Data)"

$data
[1] 15.8 19.5 34.2  9.2 58.2 20.6 10.5 10.2

$data.name
[1] "onechem$valueF"

$censored
[1] FALSE FALSE FALSE  TRUE FALSE FALSE FALSE  TRUE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Gamma"
$distribution
[1] "Gamma"

$dist.abb
[1] "gamma"

$distribution.parameters
    shape     scale
 1.666585 12.746521

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W
0.9630048

$sample.size
[1] 8

$censoring.side
[1] "left"
```

```
$censoring.levels
[1]  9.2 10.2

$percent.censored
[1] 25

$parameters
    N DELTA
 8.00  0.25

$z.value
[1] -1.706836

$p.value
[1] 0.9560737

$alternative
[1] "True cdf does not equal the\n                                 Gamma
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Multiply Censored
Data)\n                                 Based on Chen & Balakrisnan (1995)"

$data
[1] 15.8 19.5 34.2  9.2 58.2 20.6 10.5 10.2

$data.name
[1] "onechem$valueF"

$censored
[1] FALSE FALSE FALSE  TRUE FALSE FALSE FALSE  TRUE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "..............................."
[1] "All UTL Results"
[1] "Normal"
$distribution
[1] "Normal"

$sample.size
[1] 8

$censoring.side
[1] "left"
```

```
$censoring.levels
[1]  9.2 10.2

$percent.censored
[1] 25

$parameters
    mean       sd
19.15163 19.38526

$n.param.est
[1] 2

$method
[1] "MLE"

$data.name
[1] "valueF"

$censoring.name
[1] "censored"

$bad.obs
[1] 0

$interval
$name
[1] "Tolerance"

$coverage
[1] 0.9

$coverage.type
[1] "content"

$limits
     LTL      UTL
    -Inf 62.15966

$type
[1] "upper"

$method
[1] "Exact for\n                                 Complete Data"

$conf.level
[1] 0.9

$sample.size
[1] 8
```

```
$dof
[1] 7

attr(,"class")
[1] "intervalEstimateCensored"

attr(,"class")
[1] "estimateCensored"
[1] "Lognormal"
$distribution
[1] "Lognormal"

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1]  9.2 10.2

$percent.censored
[1] 25

$parameters
  meanlog     sdlog 
2.7927725 0.7598415 

$n.param.est
[1] 2

$method
[1] "MLE"

$data.name
[1] "valueF"

$censoring.name
[1] "censored"

$bad.obs
[1] 0

$interval
$name
[1] "Tolerance"

$coverage
[1] 0.9
```

```
$coverage.type
[1] "content"

$limits
     LTL      UTL
 0.00000 88.10704

$type
[1] "upper"

$method
[1] "Exact for\n                                 Complete Data"

$conf.level
[1] 0.9

$sample.size
[1] 8

$dof
[1] 7

attr(,"class")
[1] "intervalEstimateCensored"

attr(,"class")
[1] "estimateCensored"
[1] "Gamma -HW"
[1] 64.06107
[1] "Gamma -WH"
[1] 62.60963
[1] "Non parametric"
$distribution
[1] "None"

$sample.size
[1] 8

$data.name
[1] "valueF"

$bad.obs
[1] 0

$interval
$name
[1] "Tolerance"

$coverage
```

```
[1] 0.9

$coverage.type
[1] "content"

$limit.ranks
[1] 8

$limits
 LTL  UTL 
-Inf 58.2 

$type
[1] "upper"

$method
[1] "Exact"

$conf.level
[1] 0.5695328

$sample.size
[1] 8

attr(,"class")
[1] "intervalEstimate"

attr(,"class")
[1] "estimate"
[1] "............................."
```

```
[1] "Lead"
[1] "------------------"
[1] "AIC"
[1] "Normal"
[1] 44.19404
[1] "Log10"
[1] 33.16471
[1] "Gamma"
[1] 33.75963
[1] "------------------"
[1] "GOF Tests"
[1] "Normal"
[1] "Shapiro-Wilk GOF"
[1] 0.02522762
[1] "Lognormal"
[1] "Shapiro-Wilk GOF"
[1] 0.7042881
[1] "Gamma"
[1] "ProUCL Anderson-Darling Gamma GOF"
[1] ">= 0.10"
[1] "------------------"
[1] "Outlier Tests -Dixon's Test"
[1] "Normal"
[1] "Dixon test for outliers"
[1] "highest value 8.6 is an outlier"
        1
0.5813936
[1] "Log10"
[1] "Dixon test for outliers"
[1] "lowest value -1.03621217265444 is an outlier"
        1
0.8394628
[1] "Gamma Approximation"
[1] "Dixon test for outliers"
[1] "highest value 2.04879961451827 is an outlier"
        1
0.8333676
[1] "------------------"
[1] "Background Threshold Values"
[1] "Normal"
[1] 8
     LTL      UTL
    -Inf 9.628346
[1] 0.9
[1] "Lognormal"
[1] 8
     LTL      UTL
 0.00000 36.02814
[1] 0.9
[1] "Gamma"
```

```
[1] 8
     LTL      UTL
 0.00000 14.54901
[1] 0.9
[1] "Non parametric"
[1] 8
 LTL  UTL
-Inf  8.6
[1] 0.5695328
```

```
[1] "Mercury"
[1] "Summary Stats"
         median       mean         sd
K-M          NA 0.01937500 0.01862395
ROS 0.003737230 0.01348027 0.01970720
MLE 0.008475791 0.01586642 0.02510844
all:
      n   n.cen pct.cen     min     max 
  8.000   5.000  62.500   0.011   0.058 

limits:
  limit n uncen pexceed
1 0.011 1     0    0.40
2 0.012 3     1    0.40
3 0.015 1     2    0.25

# A tibble: 2 × 5
  Detection  number   min   med   max
  <chr>       <int> <dbl> <dbl> <dbl>
1 Detect          3 0.012 0.025 0.058
2 Non-Detect      5 0.011 0.012 0.015
[1] "............................."
[1] "Fit Distribution Plus fits"
[1] "Normal"
Fitting of the distribution ' norm ' By maximum likelihood on censored data 
Parameters
        estimate Std. Error
mean 0.001384133 0.01611085
sd   0.030982542 0.01415171
Loglikelihood:  3.404809   AIC:  -2.809618   BIC:  -2.650735 
Correlation matrix:
           mean         sd
mean  1.0000000 -0.5982198
sd   -0.5982198  1.0000000

[1] "Lognormal"
Fitting of the distribution ' lnorm ' By maximum likelihood on censored data 
Parameters
         estimate Std. Error
meanlog -4.770617  0.5832672
sdlog    1.119827  0.5189393
Loglikelihood:  3.560116   AIC:  -3.120233   BIC:  -2.96135 
Correlation matrix:
           meanlog      sdlog
meanlog  1.0000000 -0.6022826
sdlog   -0.6022826  1.0000000

[1] "Gamma"
Fitting of the distribution ' gamma ' By maximum likelihood on censored data 
Parameters
```

```
        estimate Std. Error
shape  0.5671852   0.493439
rate  39.5318097  36.134906
Loglikelihood:  3.601869   AIC:  -3.203739   BIC:  -3.044856
Correlation matrix:
          shape      rate
shape 1.0000000 0.8545754
rate  0.8545754 1.0000000

[1] "AIC"
[1] "Normal"
[1] -2.809618
[1] "Lognormal"
[1] -3.120233
[1] "Gamma"
[1] -3.203739
[1] "............................"
[1] "Goodness of fit"
[1] "Normal"
$distribution
[1] "Normal"

$dist.abb
[1] "norm"

$distribution.parameters
       mean          sd
0.001384042 0.030983970

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W
0.9659108

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 0.011 0.012 0.015

$percent.censored
[1] 62.5
```

```
$parameters
    N DELTA 
8.000 0.625 

$z.value
[1] -2.612977

$p.value
[1] 0.9955121

$alternative
[1] "True cdf does not equal the\n                                 Normal 
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Multiply Censored Data)"

$data
[1] 0.012 0.025 0.012 0.012 0.058 0.015 0.011 0.012

$data.name
[1] "onechem$valueF"

$censored
[1]  TRUE FALSE  TRUE  TRUE FALSE  TRUE  TRUE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Normal-> log transformed"
$distribution
[1] "Normal"

$dist.abb
[1] "norm"

$distribution.parameters
      mean         sd 
-2.0718198  0.4863288 

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
```

```
       W 
0.999566 

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] -1.958607 -1.920819 -1.823909

$percent.censored
[1] 62.5

$parameters
    N DELTA 
8.000 0.625 

$z.value
[1] -11.14679

$p.value
[1] 1

$alternative
[1] "True cdf does not equal the\n                                 Normal
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Multiply Censored Data)"

$data
[1] -1.920819 -1.602060 -1.920819 -1.920819 -1.236572 -1.823909 -1.958607 -1.920819

$data.name
[1] "onechem$valueF.log10"

$censored
[1]  TRUE FALSE  TRUE  TRUE FALSE  TRUE  TRUE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Normal-> gamma transformed"
$distribution
[1] "Normal"
```

```
$dist.abb
[1] "norm"

$distribution.parameters
     mean        sd 
0.1937046 0.1099956 

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
       W 
0.997165 

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 0.2223980 0.2289428 0.2466212

$percent.censored
[1] 62.5

$parameters
    N DELTA 
8.000 0.625 

$z.value
[1] -7.476448

$p.value
[1] 1

$alternative
[1] "True cdf does not equal the\n                                 Normal
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Multiply Censored Data)"

$data
[1] 0.2289428 0.2924018 0.2289428 0.2289428 0.3870877 0.2466212 0.2223980 0.2289428

$data.name
```

```
[1] "onechem$valueF.cuberoot"

$censored
[1]  TRUE FALSE  TRUE  TRUE FALSE  TRUE  TRUE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Lognormal"
$distribution
[1] "Lognormal"

$dist.abb
[1] "lnorm"

$distribution.parameters
  meanlog     sdlog
-4.770541  1.119814

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
       W
0.999566

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 0.011 0.012 0.015

$percent.censored
[1] 62.5

$parameters
    N DELTA
8.000 0.625

$z.value
[1] -11.14679
```

```
$p.value
[1] 1

$alternative
[1] "True cdf does not equal the\n                                 Lognormal
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Multiply Censored Data)"

$data
[1] 0.012 0.025 0.012 0.012 0.058 0.015 0.011 0.012

$data.name
[1] "onechem$valueF"

$censored
[1]  TRUE FALSE  TRUE  TRUE FALSE  TRUE  TRUE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Gamma"
$distribution
[1] "Gamma"

$dist.abb
[1] "gamma"

$distribution.parameters
     shape      scale
1.37360495 0.01144819

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W
0.9964933

$sample.size
[1] 8

$censoring.side
[1] "left"
```

```
$censoring.levels
[1] 0.011 0.012 0.015

$percent.censored
[1] 62.5

$parameters
    N DELTA
8.000 0.625

$z.value
[1] -7.060637

$p.value
[1] 1

$alternative
[1] "True cdf does not equal the\n                                 Gamma
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Multiply Censored
Data)\n                                Based on Chen & Balakrisnan (1995)"

$data
[1] 0.012 0.025 0.012 0.012 0.058 0.015 0.011 0.012

$data.name
[1] "onechem$valueF"

$censored
[1]  TRUE FALSE  TRUE  TRUE FALSE  TRUE  TRUE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "..............................."
[1] "All UTL Results"
[1] "Normal"
$distribution
[1] "Normal"

$sample.size
[1] 8

$censoring.side
[1] "left"
```

```
$censoring.levels
[1] 0.011 0.012 0.015

$percent.censored
[1] 62.5

$parameters
       mean          sd 
0.001384042 0.030983970 

$n.param.est
[1] 2

$method
[1] "MLE"

$data.name
[1] "valueF"

$censoring.name
[1] "censored"

$bad.obs
[1] 0

$interval
$name
[1] "Tolerance"

$coverage
[1] 0.9

$coverage.type
[1] "content"

$limits
      LTL       UTL 
     -Inf 0.0701249 

$type
[1] "upper"

$method
[1] "Exact for\n                                 Complete Data"

$conf.level
[1] 0.9

$sample.size
```

```
[1] 8

$dof
[1] 7

attr(,"class")
[1] "intervalEstimateCensored"

attr(,"class")
[1] "estimateCensored"
[1] "Lognormal"
$distribution
[1] "Lognormal"

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 0.011 0.012 0.015

$percent.censored
[1] 62.5

$parameters
  meanlog     sdlog
-4.770541  1.119814

$n.param.est
[1] 2

$method
[1] "MLE"

$data.name
[1] "valueF"

$censoring.name
[1] "censored"

$bad.obs
[1] 0

$interval
$name
[1] "Tolerance"

$coverage
```

```
[1] 0.9

$coverage.type
[1] "content"

$limits
      LTL       UTL
0.0000000 0.1016592

$type
[1] "upper"

$method
[1] "Exact for\n                                 Complete Data"

$conf.level
[1] 0.9

$sample.size
[1] 8

$dof
[1] 7

attr(,"class")
[1] "intervalEstimateCensored"

attr(,"class")
[1] "estimateCensored"
[1] "Gamma -HW"
[1] 0.053303
[1] "Gamma -WH"
[1] 0.05317669
[1] "Non parametric"
$distribution
[1] "None"

$sample.size
[1] 8

$data.name
[1] "valueF"

$bad.obs
[1] 0

$interval
$name
[1] "Tolerance"
```

```
$coverage
[1] 0.9

$coverage.type
[1] "content"

$limit.ranks
[1] 8

$limits
  LTL   UTL
 -Inf 0.058

$type
[1] "upper"

$method
[1] "Exact"

$conf.level
[1] 0.5695328

$sample.size
[1] 8

attr(,"class")
[1] "intervalEstimate"

attr(,"class")
[1] "estimate"
[1] "............................"
```

```
[1] "Nickel"
[1] "Summary Stats"
      median     mean        sd
K-M 3.150000 6.581250  5.894220
ROS 3.375000 6.419110  5.998168
MLE 3.403163 8.892146 21.465423
all:
      n   n.cen pct.cen     min     max 
   8.00    1.00   12.50    0.29   15.30 

limits:
  limit n uncen pexceed
1  0.29 1     7   0.875

# A tibble: 2 × 5
  Detection  number   min   med   max
  <chr>       <int> <dbl> <dbl> <dbl>
1 Detect          7  1.9   3.6  15.3 
2 Non-Detect      1  0.29  0.29  0.29
[1] "............................."
[1] "Fit Distribution Plus fits"
[1] "Normal"
Fitting of the distribution ' norm ' By maximum likelihood on censored data 
Parameters
     estimate Std. Error
mean 5.952405   2.257221
sd   6.283275   1.724575
Loglikelihood:  -23.84123   AIC:  51.68246   BIC:  51.84135 
Correlation matrix:
            mean          sd
mean  1.00000000 -0.07196392
sd   -0.07196392  1.00000000

[1] "Lognormal"
Fitting of the distribution ' lnorm ' By maximum likelihood on censored data 
Parameters
        estimate Std. Error
meanlog 1.224784  0.4950312
sdlog   1.386161  0.3870250
Loglikelihood:  -25.149   AIC:  54.298   BIC:  54.45688 
Correlation matrix:
            meanlog       sdlog
meanlog  1.00000000 -0.06234318
sdlog   -0.06234318  1.00000000

[1] "Gamma"
Fitting of the distribution ' gamma ' By maximum likelihood on censored data 
Parameters
       estimate Std. Error
shape 0.8346275 0.40053987
```

```
rate  0.1312480 0.08083974
Loglikelihood:  -23.96594   AIC:  51.93188   BIC:  52.09077
Correlation matrix:
          shape      rate
shape 1.0000000 0.7779848
rate  0.7779848 1.0000000

[1] "AIC"
[1] "Normal"
[1] 51.68246
[1] "Lognormal"
[1] 54.298
[1] "Gamma"
[1] 51.93188
[1] "..............................."
[1] "Goodness of fit"
[1] "Normal"
$distribution
[1] "Normal"

$dist.abb
[1] "norm"

$distribution.parameters
    mean       sd
5.951527 6.284296

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
       W
0.866922

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 0.29

$percent.censored
[1] 12.5

$parameters
```

```
    N DELTA
8.000 0.125

$z.value
[1] 0.9921042

$p.value
[1] 0.1605734

$alternative
[1] "True cdf does not equal the\n                                 Normal
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Singly Censored Data)"

$data
[1]  0.29 15.30  1.90  2.30  3.15  3.60  9.50 15.00

$data.name
[1] "onechem$valueF"

$censored
[1]  TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Normal-> log transformed"
$distribution
[1] "Normal"

$dist.abb
[1] "norm"

$distribution.parameters
     mean        sd
0.5318828 0.6019212

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W
0.9099861
```

```
$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] -0.537602

$percent.censored
[1] 12.5

$parameters
    N DELTA
8.000 0.125

$z.value
[1] 0.2678723

$p.value
[1] 0.3943988

$alternative
[1] "True cdf does not equal the\n                                 Normal
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Singly Censored Data)"

$data
[1] -0.5376020  1.1846914  0.2787536  0.3617278  0.4983106  0.5563025  0.9777236
1.1760913

$data.name
[1] "onechem$valueF.log10"

$censored
[1]  TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Normal-> gamma transformed"
$distribution
[1] "Normal"

$dist.abb
```

```
[1] "norm"

$distribution.parameters
     mean        sd 
1.6227679 0.6742915 

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W 
0.8985143 

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 0.6619106

$percent.censored
[1] 12.5

$parameters
    N DELTA 
8.000 0.125 

$z.value
[1] 0.4900739

$p.value
[1] 0.3120408

$alternative
[1] "True cdf does not equal the\n                                 Normal
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Singly Censored Data)"

$data
[1] 0.6619106 2.4825451 1.2385623 1.3200061 1.4658972 1.5326189 2.1179118 2.4662121

$data.name
[1] "onechem$valueF.cuberoot"
```

```
$censored
[1]  TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Lognormal"
$distribution
[1] "Lognormal"

$dist.abb
[1] "lnorm"

$distribution.parameters
 meanlog    sdlog
1.224705 1.385975

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W
0.9099861

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 0.29

$percent.censored
[1] 12.5

$parameters
    N DELTA
8.000 0.125

$z.value
[1] 0.2678723

$p.value
```

```
[1] 0.3943988

$alternative
[1] "True cdf does not equal the\n                                 Lognormal
Distribution."

$method
[1] "Shapiro-Francia GOF\n                             (Singly Censored Data)"

$data
[1]  0.29 15.30  1.90  2.30  3.15  3.60  9.50 15.00

$data.name
[1] "onechem$valueF"

$censored
[1]  TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Gamma"
$distribution
[1] "Gamma"

$dist.abb
[1] "gamma"

$distribution.parameters
    shape     scale
0.8346143 7.6204278

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W
0.9001718

$sample.size
[1] 8

$censoring.side
[1] "left"
```

```
$censoring.levels
[1] 0.29

$percent.censored
[1] 12.5

$parameters
    N DELTA
8.000 0.125

$z.value
[1] 0.4595694

$p.value
[1] 0.3229127

$alternative
[1] "True cdf does not equal the\n                                 Gamma
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Singly Censored Data)\n
                               Based on Chen & Balakrisnan (1995)"

$data
[1]  0.29 15.30  1.90  2.30  3.15  3.60  9.50 15.00

$data.name
[1] "onechem$valueF"

$censored
[1]  TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "..............................."
[1] "All UTL Results"
[1] "Normal"
$distribution
[1] "Normal"

$sample.size
[1] 8

$censoring.side
[1] "left"
```

```
$censoring.levels
[1] 0.29

$percent.censored
[1] 12.5

$parameters
    mean       sd 
5.951527 6.284296 

$n.param.est
[1] 2

$method
[1] "MLE"

$data.name
[1] "valueF"

$censoring.name
[1] "censored"

$bad.obs
[1] 0

$interval
$name
[1] "Tolerance"

$coverage
[1] 0.9

$coverage.type
[1] "content"

$limits
     LTL      UTL 
    -Inf 19.89383 

$type
[1] "upper"

$method
[1] "Exact for\n                                 Complete Data"

$conf.level
[1] 0.9

$sample.size
[1] 8
```

```
$dof
[1] 7

attr(,"class")
[1] "intervalEstimateCensored"

attr(,"class")
[1] "estimateCensored"
[1] "Lognormal"
$distribution
[1] "Lognormal"

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 0.29

$percent.censored
[1] 12.5

$parameters
 meanlog    sdlog
1.224705 1.385975

$n.param.est
[1] 2

$method
[1] "MLE"

$data.name
[1] "valueF"

$censoring.name
[1] "censored"

$bad.obs
[1] 0

$interval
$name
[1] "Tolerance"

$coverage
[1] 0.9
```

```
$coverage.type
[1] "content"

$limits
     LTL      UTL 
 0.00000 73.67186 

$type
[1] "upper"

$method
[1] "Exact for\n                                 Complete Data"

$conf.level
[1] 0.9

$sample.size
[1] 8

$dof
[1] 7

attr(,"class")
[1] "intervalEstimateCensored"

attr(,"class")
[1] "estimateCensored"
[1] "Gamma -HW"
[1] 29.81443
[1] "Gamma -WH"
[1] 26.778
[1] "Non parametric"
$distribution
[1] "None"

$sample.size
[1] 8

$data.name
[1] "valueF"

$bad.obs
[1] 0

$interval
$name
[1] "Tolerance"

$coverage
```

```
[1] 0.9

$coverage.type
[1] "content"

$limit.ranks
[1] 8

$limits
 LTL  UTL 
-Inf 15.3 

$type
[1] "upper"

$method
[1] "Exact"

$conf.level
[1] 0.5695328

$sample.size
[1] 8

attr(,"class")
[1] "intervalEstimate"

attr(,"class")
[1] "estimate"
[1] "............................"
```

```
[1] "Selenium"
[1] "Summary Stats"
       median      mean        sd
K-M 0.1200000 0.2025000 0.1253433
ROS 0.1500000 0.1818856 0.1383164
MLE 0.1512789 0.1900899 0.1446339
all:
      n   n.cen pct.cen     min     max 
   8.00    3.00   37.50    0.12    0.45 

limits:
  limit n uncen   pexceed
1  0.12 2     1 0.6666667
2  0.13 1     4 0.5000000

# A tibble: 2 × 5
  Detection  number   min   med   max
  <chr>       <int> <dbl> <dbl> <dbl>
1 Detect          5  0.12  0.2   0.45
2 Non-Detect      3  0.12  0.12  0.13
[1] "............................."
[1] "Fit Distribution Plus fits"
[1] "Normal"
Fitting of the distribution ' norm ' By maximum likelihood on censored data 
Parameters
      estimate Std. Error
mean 0.1609213 0.06260481
sd   0.1590724 0.05411550
Loglikelihood:  -0.2642299   AIC:  4.52846   BIC:  4.687343 
Correlation matrix:
           mean         sd
mean  1.0000000 -0.2912715
sd   -0.2912715  1.0000000

[1] "Lognormal"
Fitting of the distribution ' lnorm ' By maximum likelihood on censored data 
Parameters
          estimate Std. Error
meanlog -1.8886365  0.2653028
sdlog    0.6758095  0.2318766
Loglikelihood:  -0.1622908   AIC:  4.324582   BIC:  4.483465 
Correlation matrix:
           meanlog      sdlog
meanlog  1.0000000 -0.2916242
sdlog   -0.2916242  1.0000000

[1] "Gamma"
Fitting of the distribution ' gamma ' By maximum likelihood on censored data 
Parameters
       estimate Std. Error
```

```
shape  1.960936   1.310097
rate  10.631420   7.270439
Loglikelihood:  -0.09794085   AIC:  4.195882   BIC:  4.354765
Correlation matrix:
          shape      rate
shape 1.0000000 0.9277779
rate  0.9277779 1.0000000

[1] "AIC"
[1] "Normal"
[1] 4.52846
[1] "Lognormal"
[1] 4.324582
[1] "Gamma"
[1] 4.195882
[1] "............................."
[1] "Goodness of fit"
[1] "Normal"
$distribution
[1] "Normal"

$dist.abb
[1] "norm"

$distribution.parameters
     mean        sd
0.1609243 0.1590708

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
       W
0.963092

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 0.12 0.13

$percent.censored
[1] 37.5
```

```
$parameters
    N DELTA 
8.000 0.375 

$z.value
[1] -2.008678

$p.value
[1] 0.9777144

$alternative
[1] "True cdf does not equal the\n                                 Normal
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Multiply Censored Data)"

$data
[1] 0.12 0.45 0.13 0.12 0.20 0.18 0.12 0.31

$data.name
[1] "onechem$valueF"

$censored
[1]  TRUE FALSE  TRUE  TRUE FALSE FALSE FALSE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Normal-> log transformed"
$distribution
[1] "Normal"

$dist.abb
[1] "norm"

$distribution.parameters
      mean         sd 
-0.8202218  0.2935086 

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W 
```

```
0.9851084

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] -0.9208188 -0.8860566

$percent.censored
[1] 37.5

$parameters
    N DELTA
8.000 0.375

$z.value
[1] -3.803819

$p.value
[1] 0.9999288

$alternative
[1] "True cdf does not equal the\n                                 Normal
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Multiply Censored Data)"

$data
[1] -0.9208188 -0.3467875 -0.8860566 -0.9208188 -0.6989700 -0.7447275 -0.9208188
-0.5086383

$data.name
[1] "onechem$valueF.log10"

$censored
[1]  TRUE FALSE  TRUE  TRUE FALSE FALSE FALSE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Normal-> gamma transformed"
$distribution
[1] "Normal"
```

```
$dist.abb
[1] "norm"

$distribution.parameters
     mean        sd 
0.5363001 0.1366322 

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W 
0.9852743 

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 0.4932424 0.5065797

$percent.censored
[1] 37.5

$parameters
    N DELTA 
8.000 0.375 

$z.value
[1] -3.825982

$p.value
[1] 0.9999349

$alternative
[1] "True cdf does not equal the\n                                 Normal
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Multiply Censored Data)"

$data
[1] 0.4932424 0.7663094 0.5065797 0.4932424 0.5848035 0.5646216 0.4932424 0.6767899

$data.name
```

```
[1] "onechem$valueF.cuberoot"

$censored
[1]  TRUE FALSE  TRUE  TRUE FALSE FALSE FALSE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Lognormal"
$distribution
[1] "Lognormal"

$dist.abb
[1] "lnorm"

$distribution.parameters
   meanlog      sdlog 
-1.8886304  0.6758286 

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W 
0.9851084 

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 0.12 0.13

$percent.censored
[1] 37.5

$parameters
    N DELTA 
8.000 0.375 

$z.value
[1] -3.803819
```

```
$p.value
[1] 0.9999288

$alternative
[1] "True cdf does not equal the\n                                 Lognormal
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Multiply Censored Data)"

$data
[1] 0.12 0.45 0.13 0.12 0.20 0.18 0.12 0.31

$data.name
[1] "onechem$valueF"

$censored
[1]  TRUE FALSE  TRUE  TRUE FALSE FALSE FALSE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Gamma"
$distribution
[1] "Gamma"

$dist.abb
[1] "gamma"

$distribution.parameters
     shape      scale
1.96085609 0.09406627

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W
0.9852183

$sample.size
[1] 8

$censoring.side
[1] "left"
```

```
$censoring.levels
[1] 0.12 0.13

$percent.censored
[1] 37.5

$parameters
    N DELTA
8.000 0.375

$z.value
[1] -3.818477

$p.value
[1] 0.9999329

$alternative
[1] "True cdf does not equal the\n                                 Gamma
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Multiply Censored
Data)\n                                Based on Chen & Balakrisnan (1995)"

$data
[1] 0.12 0.45 0.13 0.12 0.20 0.18 0.12 0.31

$data.name
[1] "onechem$valueF"

$censored
[1]  TRUE FALSE  TRUE  TRUE FALSE FALSE FALSE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "............................"
[1] "All UTL Results"
[1] "Normal"
$distribution
[1] "Normal"

$sample.size
[1] 8

$censoring.side
[1] "left"
```

```
$censoring.levels
[1] 0.12 0.13

$percent.censored
[1] 37.5

$parameters
     mean        sd 
0.1609243 0.1590708 

$n.param.est
[1] 2

$method
[1] "MLE"

$data.name
[1] "valueF"

$censoring.name
[1] "censored"

$bad.obs
[1] 0

$interval
$name
[1] "Tolerance"

$coverage
[1] 0.9

$coverage.type
[1] "content"

$limits
      LTL       UTL 
     -Inf 0.5138378 

$type
[1] "upper"

$method
[1] "Exact for\n                                 Complete Data"

$conf.level
[1] 0.9

$sample.size
```

```
[1] 8

$dof
[1] 7

attr(,"class")
[1] "intervalEstimateCensored"

attr(,"class")
[1] "estimateCensored"
[1] "Lognormal"
$distribution
[1] "Lognormal"

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 0.12 0.13

$percent.censored
[1] 37.5

$parameters
   meanlog      sdlog 
-1.8886304  0.6758286 

$n.param.est
[1] 2

$method
[1] "MLE"

$data.name
[1] "valueF"

$censoring.name
[1] "censored"

$bad.obs
[1] 0

$interval
$name
[1] "Tolerance"

$coverage
```

```
[1] 0.9

$coverage.type
[1] "content"

$limits
     LTL      UTL 
0.000000 0.677571 

$type
[1] "upper"

$method
[1] "Exact for\n                                 Complete Data"

$conf.level
[1] 0.9

$sample.size
[1] 8

$dof
[1] 7

attr(,"class")
[1] "intervalEstimateCensored"

attr(,"class")
[1] "estimateCensored"
[1] "Gamma -HW"
[1] 0.4876551
[1] "Gamma -WH"
[1] 0.4813511
[1] "Non parametric"
$distribution
[1] "None"

$sample.size
[1] 8

$data.name
[1] "valueF"

$bad.obs
[1] 0

$interval
$name
[1] "Tolerance"
```

```
$coverage
[1] 0.9

$coverage.type
[1] "content"

$limit.ranks
[1] 8

$limits
 LTL  UTL
-Inf 0.45

$type
[1] "upper"

$method
[1] "Exact"

$conf.level
[1] 0.5695328

$sample.size
[1] 8

attr(,"class")
[1] "intervalEstimate"

attr(,"class")
[1] "estimate"
[1] "............................."
```

```
[1] "Sulfide"
[1] "Summary Stats"
      median      mean        sd
K-M       NA 100.55000  51.36148
ROS 28.15584  70.39740  65.55735
MLE 30.45582  75.81971 172.85569
all:
      n   n.cen pct.cen     min     max 
    8.0     5.0    62.5    38.9   179.0 

limits:
  limit n uncen pexceed
1  38.9 1     0   0.375
2  39.0 1     0   0.375
3  39.7 1     0   0.375
4  42.4 1     0   0.375
5  53.2 1     3   0.375

# A tibble: 2 × 5
  Detection  number   min   med   max
  <chr>       <int> <dbl> <dbl> <dbl>
1 Detect          3  76.4 167   179  
2 Non-Detect      5  38.9  39.7  53.2
[1] "............................"
[1] "Fit Distribution Plus fits"
[1] "Normal"
Fitting of the distribution ' norm ' By maximum likelihood on censored data 
Parameters
      estimate Std. Error
mean  10.71952   63.79740
sd   122.08251   58.35872
Loglikelihood:  -21.61591   AIC:  47.23181   BIC:  47.3907 
Correlation matrix:
           mean         sd
mean  1.0000000 -0.6140383
sd   -0.6140383  1.0000000

[1] "Lognormal"
Fitting of the distribution ' lnorm ' By maximum likelihood on censored data 
Parameters
        estimate Std. Error
meanlog 3.415936  0.7064146
sdlog   1.350620  0.6501454
Loglikelihood:  -22.78156   AIC:  49.56312   BIC:  49.722 
Correlation matrix:
           meanlog      sdlog
meanlog  1.0000000 -0.6166338
sdlog   -0.6166338  1.0000000

[1] "Gamma"
```

```
Fitting of the distribution ' gamma ' By maximum likelihood on censored data
Parameters
         estimate  Std. Error
shape 0.480385770 0.405138043
rate  0.007918665 0.007179418
Loglikelihood:  -22.30319   AIC:  48.60637   BIC:  48.76526
Correlation matrix:
          shape      rate
shape 1.0000000 0.8306351
rate  0.8306351 1.0000000

[1] "AIC"
[1] "Normal"
[1] 47.23181
[1] "Lognormal"
[1] 49.56312
[1] "Gamma"
[1] 48.60637
[1] "..............................."
[1] "Goodness of fit"
[1] "Normal"
$distribution
[1] "Normal"

$dist.abb
[1] "norm"

$distribution.parameters
     mean        sd
 10.73369 122.03658

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W
0.7362238

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 38.9 39.0 39.7 42.4 53.2
```

```
$percent.censored
[1] 62.5

$parameters
    N DELTA
8.000 0.625

$z.value
[1] 1.388449

$p.value
[1] 0.08250023

$alternative
[1] "True cdf does not equal the\n                                 Normal
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Multiply Censored Data)"

$data
[1]  39.7 167.0  42.4  39.0  53.2  76.4  38.9 179.0

$data.name
[1] "onechem$valueF"

$censored
[1]  TRUE FALSE  TRUE  TRUE  TRUE FALSE  TRUE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Normal-> log transformed"
$distribution
[1] "Normal"

$dist.abb
[1] "norm"

$distribution.parameters
     mean        sd
1.4836703 0.5865649

$n.param.est
[1] 2

$estimation.method
[1] "MLE"
```

```
$statistic
        W 
0.7059911 

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 1.589950 1.591065 1.598791 1.627366 1.725912

$percent.censored
[1] 62.5

$parameters
    N DELTA 
8.000 0.625 

$z.value
[1] 1.60065

$p.value
[1] 0.0547272

$alternative
[1] "True cdf does not equal the\n                                 Normal
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Multiply Censored Data)"

$data
[1] 1.598791 2.222716 1.627366 1.591065 1.725912 1.883093 1.589950 2.252853

$data.name
[1] "onechem$valueF.log10"

$censored
[1]  TRUE FALSE  TRUE  TRUE  TRUE FALSE  TRUE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Normal-> gamma transformed"
$distribution
```

```
[1] "Normal"

$dist.abb
[1] "norm"

$distribution.parameters
    mean       sd 
2.995064 1.978479 

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W 
0.7154074 

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 3.388310 3.391211 3.411381 3.487027 3.761005

$percent.censored
[1] 62.5

$parameters
    N DELTA 
8.000 0.625 

$z.value
[1] 1.536993

$p.value
[1] 0.06214754

$alternative
[1] "True cdf does not equal the\n                                 Normal 
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Multiply Censored Data)"

$data
[1] 3.411381 5.506878 3.487027 3.391211 3.761005 4.243242 3.388310 5.635741
```

```
$data.name
[1] "onechem$valueF.cuberoot"

$censored
[1]  TRUE FALSE  TRUE  TRUE  TRUE FALSE  TRUE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Lognormal"
$distribution
[1] "Lognormal"

$dist.abb
[1] "lnorm"

$distribution.parameters
 meanlog    sdlog 
3.416277 1.350616 

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W 
0.7059911 

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 38.9 39.0 39.7 42.4 53.2

$percent.censored
[1] 62.5

$parameters
    N DELTA 
8.000 0.625 

$z.value
```

```
[1] 1.60065

$p.value
[1] 0.0547272

$alternative
[1] "True cdf does not equal the\n                                 Lognormal
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Multiply Censored Data)"

$data
[1]  39.7 167.0  42.4  39.0  53.2  76.4  38.9 179.0

$data.name
[1] "onechem$valueF"

$censored
[1]  TRUE FALSE  TRUE  TRUE  TRUE FALSE  TRUE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "Gamma"
$distribution
[1] "Gamma"

$dist.abb
[1] "gamma"

$distribution.parameters
     shape      scale 
  0.480422 126.284304 

$n.param.est
[1] 2

$estimation.method
[1] "MLE"

$statistic
        W 
0.7165599 

$sample.size
[1] 8
```

```
$censoring.side
[1] "left"

$censoring.levels
[1] 38.9 39.0 39.7 42.4 53.2

$percent.censored
[1] 62.5

$parameters
    N DELTA
8.000 0.625

$z.value
[1] 1.529057

$p.value
[1] 0.06312513

$alternative
[1] "True cdf does not equal the\n                                 Gamma
Distribution."

$method
[1] "Shapiro-Francia GOF\n                                 (Multiply Censored
Data)\n                                 Based on Chen & Balakrisnan (1995)"

$data
[1]  39.7 167.0  42.4  39.0  53.2  76.4  38.9 179.0

$data.name
[1] "onechem$valueF"

$censored
[1]  TRUE FALSE  TRUE  TRUE  TRUE FALSE  TRUE FALSE

$censoring.name
[1] "onechem$Censored"

attr(,"class")
[1] "gofCensored"
[1] "............................"
[1] "All UTL Results"
[1] "Normal"
$distribution
[1] "Normal"

$sample.size
[1] 8
```

```
$censoring.side
[1] "left"

$censoring.levels
[1] 38.9 39.0 39.7 42.4 53.2

$percent.censored
[1] 62.5

$parameters
     mean        sd
 10.73369 122.03658

$n.param.est
[1] 2

$method
[1] "MLE"

$data.name
[1] "valueF"

$censoring.name
[1] "censored"

$bad.obs
[1] 0

$interval
$name
[1] "Tolerance"

$coverage
[1] 0.9

$coverage.type
[1] "content"

$limits
     LTL      UTL
    -Inf 281.4833

$type
[1] "upper"

$method
[1] "Exact for\n                                 Complete Data"

$conf.level
[1] 0.9
```

```
$sample.size
[1] 8

$dof
[1] 7

attr(,"class")
[1] "intervalEstimateCensored"

attr(,"class")
[1] "estimateCensored"
[1] "Lognormal"
$distribution
[1] "Lognormal"

$sample.size
[1] 8

$censoring.side
[1] "left"

$censoring.levels
[1] 38.9 39.0 39.7 42.4 53.2

$percent.censored
[1] 62.5

$parameters
 meanlog    sdlog
3.416277 1.350616

$n.param.est
[1] 2

$method
[1] "MLE"

$data.name
[1] "valueF"

$censoring.name
[1] "censored"

$bad.obs
[1] 0

$interval
$name
[1] "Tolerance"
```

```
$coverage
[1] 0.9

$coverage.type
[1] "content"

$limits
     LTL      UTL
  0.0000 609.5647

$type
[1] "upper"

$method
[1] "Exact for\n                                 Complete Data"

$conf.level
[1] 0.9

$sample.size
[1] 8

$dof
[1] 7

attr(,"class")
[1] "intervalEstimateCensored"

attr(,"class")
[1] "estimateCensored"
[1] "Gamma -HW"
[1] 231.5044
[1] "Gamma -WH"
[1] 226.5136
[1] "Non parametric"
$distribution
[1] "None"

$sample.size
[1] 8

$data.name
[1] "valueF"

$bad.obs
[1] 0

$interval
$name
```

```
[1] "Tolerance"

$coverage
[1] 0.9

$coverage.type
[1] "content"

$limit.ranks
[1] 8

$limits
 LTL  UTL
-Inf  179

$type
[1] "upper"

$method
[1] "Exact"

$conf.level
[1] 0.5695328

$sample.size
[1] 8

attr(,"class")
[1] "intervalEstimate"

attr(,"class")
[1] "estimate"
[1] "..............................."
```

```
[1] "TPH as Motor Oil"
[1] "------------------"
[1] "AIC"
[1] "Normal"
[1] 100.4606
[1] "Log10"
[1] 93.41827
[1] "Gamma"
[1] 94.44309
[1] "------------------"
[1] "GOF Tests"
[1] "Normal"
[1] "Shapiro-Wilk GOF"
[1] 0.03107355
[1] "Lognormal"
[1] "Shapiro-Wilk GOF"
[1] 0.3387151
[1] "Gamma"
[1] "ProUCL Anderson-Darling Gamma GOF"
[1] ">= 0.10"
[1] "------------------"
[1] "Outlier Tests -Dixon's Test"
[1] "Normal"
[1] "Dixon test for outliers"
[1] "highest value 318 is an outlier"
        1
0.1923977
[1] "Log10"
[1] "Dixon test for outliers"
[1] "highest value 2.50242711998443 is an outlier"
        1
0.8558348
[1] "Gamma Approximation"
[1] "Dixon test for outliers"
[1] "highest value 6.82562419655711 is an outlier"
        1
0.5879484
[1] "------------------"
[1] "Background Threshold Values"
[1] "Normal"
[1] 8
     LTL      UTL
    -Inf 344.3028
[1] 0.9
[1] "Lognormal"
[1] 8
     LTL      UTL
  0.0000 668.4628
[1] 0.9
[1] "Gamma"
```

```
[1] 8
     LTL       UTL 
  0.0000 451.0447 
[1] 0.9
[1] "Non parametric"
[1] 8
 LTL  UTL 
-Inf  318 
[1] 0.5695328
```

```
[1] "Zinc"
[1] "------------------"
[1] "AIC"
[1] "Normal"
[1] 84.66919
[1] "Log10"
[1] 76.05883
[1] "Gamma"
[1] 76.64107
[1] "------------------"
[1] "GOF Tests"
[1] "Normal"
[1] "Shapiro-Wilk GOF"
[1] 0.02748671
[1] "Lognormal"
[1] "Shapiro-Wilk GOF"
[1] 0.5384732
[1] "Gamma"
[1] "ProUCL Anderson-Darling Gamma GOF"
[1] ">= 0.10"
[1] "------------------"
[1] "Outlier Tests -Dixon's Test"
[1] "Normal"
[1] "Dixon test for outliers"
[1] "highest value 106 is an outlier"
        1
0.8529317
[1] "Log10"
[1] "Dixon test for outliers"
[1] "lowest value 0.301029995663981 is an outlier"
        1
0.5490441
[1] "Gamma Approximation"
[1] "Dixon test for outliers"
[1] "highest value 4.73262349116337 is an outlier"
        1
0.6880584
[1] "------------------"
[1] "Background Threshold Values"
[1] "Normal"
[1] 8
     LTL      UTL
    -Inf 123.8373
[1] 0.9
[1] "Lognormal"
[1] 8
     LTL      UTL
  0.0000 366.3214
[1] 0.9
[1] "Gamma"
```

```
[1] 8
     LTL      UTL 
  0.0000 180.2266 
[1] 0.9
[1] "Non parametric"
[1] 8
 LTL  UTL 
-Inf  106 
[1] 0.5695328
```

Attachment F-2

Toxicity Equivalence Calculations for Dioxins and Dioxin-like Compounds – Background

Attachment F-2 Toxicity Equivalence Calculations for Dioxins and Dioxin-like Compounds - Background

BNSF Wishram Railyard Remedial Investigation Report

		Sample Name		BNSF-BG13-042122-0-10		BNSF-BG14-042722-0-5.5		BNSF-BG15-042722-0-10		BNSF-BG16-042722-0-10		BNSF-BG17-042722-0-10		FD02-042722-0-10		BNSF-BG18-042722-0-10		BNSF-BG19-042722-0-10		BNSF-BG20-042922-0-10	
		Sample Type		N		N		N		N		N		FD		N		N		N	
		Sample Location		BG13		BG14		BG15		BG16		BG17		BG17		BG18		BG19		BG20	
		Sample Date		4/21/2022		4/27/2022		4/27/2022		4/27/2022		4/27/2022		4/27/2022		4/27/2022		4/27/2022		4/29/2022	
Chemical	**CAS**	**Unit**	**TEF**																		
1,2,3,4,6,7,8-HpCDD	35822-46-9	ng/kg	0.01	0.51	U	**4.1**	J	0.51	U	0.52	U	**12**	J	**1.5**	J	**4.3**	J	0.49	U	0.65	UJ
1,2,3,4,6,7,8-HpCDF	67562-39-4	ng/kg	0.01	0.64	U	**0.95**	J	0.63	U	0.65	U	**1.1**	J	0.63	U	0.65	U	0.62	U	0.82	UJ
1,2,3,4,7,8,9-HpCDF	55673-89-7	ng/kg	0.01	0.44	U	0.43	U	0.44	U	0.45	U	0.43	U	0.43	U	0.44	U	0.42	U	0.56	UJ
1,2,3,4,7,8-HxCDD	39227-28-6	ng/kg	0.10	0.42	U	0.41	U	0.41	U	0.43	U	0.41	U	0.41	U	0.42	U	0.4	U	0.54	UJ
1,2,3,4,7,8-HxCDF	70648-26-9	ng/kg	0.10	0.41	U	0.4	U	0.41	U	0.42	U	0.4	U	0.4	U	0.42	U	0.4	U	0.53	UJ
1,2,3,6,7,8-HxCDD	57653-85-7	ng/kg	0.10	0.46	U	0.45	U	0.46	U	0.47	U	0.45	U	0.45	U	0.47	U	0.45	U	0.59	UJ
1,2,3,6,7,8-HxCDF	57117-44-9	ng/kg	0.10	0.38	U	0.37	U	0.38	U	0.39	U	0.38	U	0.38	U	0.39	U	0.37	U	0.49	UJ
1,2,3,7,8,9-HxCDD	19408-74-3	ng/kg	0.10	0.4	U	0.39	U	0.39	U	0.4	U	0.39	U	0.39	U	0.4	U	0.38	U	0.51	UJ
1,2,3,7,8,9-HxCDF	72918-21-9	ng/kg	0.10	0.48	U	0.47	U	0.47	U	0.49	U	0.47	U	0.47	U	0.48	U	0.46	U	0.61	UJ
1,2,3,7,8-PeCDD	40321-76-4	ng/kg	1	0.21	U	0.2	U	0.2	U	0.21	U	0.2	U	0.2	U	0.21	U	0.2	U	0.26	UJ
1,2,3,7,8-PeCDF	57117-41-6	ng/kg	0.03	0.21	U	0.21	U	0.21	U	0.22	U	0.21	U	0.21	U	0.22	U	0.21	U	0.27	UJ
2,3,4,6,7,8-HxCDF	60851-34-5	ng/kg	0.10	0.41	U	0.4	U	0.41	U	0.42	U	0.4	U	0.4	U	0.41	U	0.4	U	0.53	UJ
2,3,4,7,8-PeCDF	57117-31-4	ng/kg	0.30	0.22	U	0.22	U	0.22	U	0.23	U	0.22	U	0.22	U	0.22	U	0.21	U	0.28	UJ
2,3,7,8-TCDD	1746-01-6	ng/kg	1	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.19	U	0.18	U	0.24	UJ
2,3,7,8-TCDF	51207-31-9	ng/kg	0.10	0.21	U	**0.33**	J	0.21	U	0.21	U	0.21	U	0.21	U	0.21	U	0.2	U	0.27	UJ
OCDD	3268-87-9	ng/kg	0.0003	2	U	**42**		1.9	U	2	U	**200**	J	**12**	J	**50**		1.9	U	2.5	UJ
OCDF	39001-02-0	ng/kg	0.0003	1.4	U	**1.9**	J	1.4	U	1.5	U	1.4	U	1.4	U	1.4	U	1.4	U	1.8	UJ
2,3,3',4,4',5'-Hexachlorobiphenyl	69782-90-7	ng/kg	0.00003	0.81	U	0.818	U	0.85	U	0.824	U	0.825	U	0.822	U	0.828	U	0.828	U	0.819	UJ
2,3,3',4,4',5-Hexachlorobiphenyl	38380-08-4	ng/kg	0.00003	1.9	U	1.92	U	**2.13**	J	1.93	U	1.93	U	1.93	U	1.94	U	1.94	U	1.92	UJ
PCB-105	32598-14-4	ng/kg	0.00003	**2.95**	J	2.82	U	**10.7**	J	2.84	U	2.84	U	2.83	U	2.85	U	2.85	U	**4.5**	J
PCB-114	74472-37-0	ng/kg	0.00003	0.621	U	0.627	U	0.651	U	0.631	U	0.632	U	0.63	U	0.634	U	0.634	U	0.627	UJ
PCB-118	31508-00-6	ng/kg	0.00003	**5.98**	J	5.27	U	**25.4**		**6.37**	J	5.31	U	5.3	U	5.33	U	5.33	U	**8.56**	J
PCB-123	65510-44-3	ng/kg	0.00003	0.578	U	0.584	U	0.607	U	0.588	U	0.588	U	0.587	U	0.591	U	0.591	U	0.584	UJ
PCB-126	57465-28-8	ng/kg	0.10	0.321	U	0.325	U	0.337	U	0.327	U	0.327	U	0.326	U	0.329	U	0.329	U	0.325	UJ
PCB-167	52663-72-6	ng/kg	0.00003	1.23	U	1.24	U	**2.04**	J	1.25	U	1.25	U	1.25	U	1.26	U	1.26	U	1.24	UJ
PCB-169	32774-16-6	ng/kg	0.03	0.309	U	0.312	U	0.324	U	0.314	U	0.314	U	0.313	U	0.316	U	0.316	U	0.312	UJ
PCB-189	39635-31-9	ng/kg	0.00003	0.732	U	0.739	U	0.768	U	0.744	U	0.745	U	0.743	U	0.748	U	0.748	U	0.739	UJ
PCB-77	32598-13-3	ng/kg	0.0001	2.07	U	2.09	U	2.17	U	**2.31**	J	2.1	U	2.1	U	2.11	U	2.11	U	**2.88**	J
PCB-81	70362-50-4	ng/kg	0.0003	0.457	U	0.461	U	0.48	U	0.465	U	0.465	U	0.464	U	0.467	U	0.467	U	0.462	UJ

Chemical	**CAS**	**Unit**	**TEF**																		
1,2,3,4,6,7,8-HpCDD	35822-46-9	ng/kg	0.01	0.00255		0.041		0.00255		0.0026		0.12		0.015		0.043		0.00245		0.00325	
1,2,3,4,6,7,8-HpCDF	67562-39-4	ng/kg	0.01	0.0032		0.0095		0.00315		0.00325		0.011		0.00315		0.00325		0.0031		0.0041	
1,2,3,4,7,8,9-HpCDF	55673-89-7	ng/kg	0.01	0.0022		0.00215		0.0022		0.00225		0.00215		0.00215		0.0022		0.0021		0.0028	
1,2,3,4,7,8-HxCDD	39227-28-6	ng/kg	0.10	0.021		0.0205		0.0205		0.0215		0.0205		0.0205		0.021		0.02		0.027	
1,2,3,4,7,8-HxCDF	70648-26-9	ng/kg	0.10	0.0205		0.02		0.0205		0.021		0.02		0.02		0.021		0.02		0.0265	
1,2,3,6,7,8-HxCDD	57653-85-7	ng/kg	0.10	0.023		0.0225		0.023		0.0235		0.0225		0.0225		0.0235		0.0225		0.0295	
1,2,3,6,7,8-HxCDF	57117-44-9	ng/kg	0.10	0.019		0.0185		0.019		0.0195		0.019		0.019		0.0195		0.0185		0.0245	
1,2,3,7,8,9-HxCDD	19408-74-3	ng/kg	0.10	0.02		0.0195		0.0195		0.02		0.0195		0.0195		0.02		0.019		0.0255	
1,2,3,7,8,9-HxCDF	72918-21-9	ng/kg	0.10	0.024		0.0235		0.0235		0.0245		0.0235		0.0235		0.024		0.023		0.0305	
1,2,3,7,8-PeCDD	40321-76-4	ng/kg	1	0.105		0.1		0.1		0.105		0.1		0.1		0.105		0.1		0.13	
1,2,3,7,8-PeCDF	57117-41-6	ng/kg	0.03	0.00315		0.00315		0.00315		0.0033		0.00315		0.00315		0.0033		0.00315		0.00405	
2,3,4,6,7,8-HxCDF	60851-34-5	ng/kg	0.10	0.0205		0.02		0.0205		0.021		0.02		0.02		0.0205		0.02		0.0265	
2,3,4,7,8-PeCDF	57117-31-4	ng/kg	0.30	0.033		0.033		0.033		0.0345		0.033		0.033		0.033		0.0315		0.042	
2,3,7,8-TCDD	1746-01-6	ng/kg	1	0.095		0.095		0.095		0.095		0.095		0.095		0.095		0.09		0.12	
2,3,7,8-TCDF	51207-31-9	ng/kg	0.10	0.0105		0.033		0.0105		0.0105		0.0105		0.0105		0.0105		0.01		0.0135	
OCDD	3268-87-9	ng/kg	0.0003	0.0003		0.0126		0.000285		0.0003		0.06		0.0036		0.015		0.000285		0.000375	
OCDF	39001-02-0	ng/kg	0.0003	0.00021		0.00057		0.00021		0.000225		0.00021		0.00021		0.00021		0.00021		0.00027	

Attachment F-2 Toxicity Equivalence Calculations for Dioxins and Dioxin-like Compounds - Background

BNSF Wishram Railyard Remedial Investigation Report

Sample Name				BNSF-BG13-042122-0-10		BNSF-BG14-042722-0-5.5		BNSF-BG15-042722-0-10		BNSF-BG16-042722-0-10		BNSF-BG17-042722-0-10		FD02-042722-0-10		BNSF-BG18-042722-0-10		BNSF-BG19-042722-0-10		BNSF-BG20-042922-0-10	
Sample Type				N		N		N		N		N		FD		N		N		N	
Sample Location				BG13		BG14		BG15		BG16		BG17		BG17		BG18		BG19		BG20	
Sample Date				4/21/2022		4/27/2022		4/27/2022		4/27/2022		4/27/2022		4/27/2022		4/27/2022		4/27/2022		4/29/2022	
2,3,3',4,4',5'-Hexachlorobiphenyl	69782-90-7	ng/kg	0.00003	0.00001215		0.00001227		0.00001275		0.00001236		0.000012375		0.00001233		0.00001242		0.00001242		0.000012285	
2,3,3',4,4',5-Hexachlorobiphenyl	38380-08-4	ng/kg	0.00003	0.0000285		0.0000288		0.0000639		0.00002895		0.00002895		0.00002895		0.0000291		0.0000291		0.0000288	
PCB-105	32598-14-4	ng/kg	0.00003	0.0000885		0.0000423		0.000321		0.0000426		0.0000426		0.00004245		0.00004275		0.00004275		0.000135	
PCB-114	74472-37-0	ng/kg	0.00003	0.000009315		0.000009405		0.000009765		0.000009465		0.00000948		0.00000945		0.00000951		0.00000951		0.000009405	
PCB-118	31508-00-6	ng/kg	0.00003	0.0001794		0.00007905		0.000762		0.0001911		0.00007965		0.0000795		0.00007995		0.00007995		0.0002568	
PCB-123	65510-44-3	ng/kg	0.00003	0.00000867		0.00000876		0.000009105		0.00000882		0.00000882		0.000008805		0.000008865		0.000008865		0.00000876	
PCB-126	57465-28-8	ng/kg	0.10	0.01605		0.01625		0.01685		0.01635		0.01635		0.0163		0.01645		0.01645		0.01625	
PCB-167	52663-72-6	ng/kg	0.00003	0.00001845		0.0000186		0.0000612		0.00001875		0.00001875		0.00001875		0.0000189		0.0000189		0.0000186	
PCB-169	32774-16-6	ng/kg	0.03	0.004635		0.00468		0.00486		0.00471		0.00471		0.004695		0.00474		0.00474		0.00468	
PCB-189	39635-31-9	ng/kg	0.00003	0.00001098		0.000011085		0.00001152		0.00001116		0.000011175		0.000011145		0.00001122		0.00001122		0.000011085	
PCB-77	32598-13-3	ng/kg	0.0001	0.0001035		0.0001045		0.0001085		0.000231		0.000105		0.000105		0.0001055		0.0001055		0.000288	
PCB-81	70362-50-4	ng/kg	0.0003	0.00006855		0.00006915		0.000072		0.00006975		0.00006975		0.0000696		0.00007005		0.00007005		0.0000693	
Calculated 2,3,7,8-TCDD TEQ:				**0.424**		**0.496**		**0.420**		**0.430**		**0.601**		**0.432**		**0.482**		**0.407**		**0.532**	
Calculated Dioxins & Furans TEQ:				**0.403**		**0.474**		**0.397**		**0.408**		**0.580**		**0.411**		**0.460**		**0.386**		**0.510**	
Calculated Dioxin-like PCBs TEQ:				**0.021**		**0.021**		**0.023**		**0.022**		**0.021**		**0.021**		**0.022**		**0.022**		**0.022**	

Notes:

CAS = Chemical Abstracts Service

TEF = toxicity equivalency factor

TEQ = toxicity equivalence

Attachment F-3

Toxicity Equivalence Calculations for Carcinogenic PAHs – Background

Attachment F-3 Toxicity Equivalence Calculations for Carcinogenic PAH - Background

BNSF Wishram Railyard Remedial Investigation Report

Sample Name			**BNSF-BG13-042122-0-10**			**BNSF-BG14-042722-0-5.5**		
Sample Type			**N**			**N**		
Sample Location			**BG13**			**BG14**		
Analyte	Units	TEF	4/21/2022		TEQ	4/27/2022		TEQ
Benzo(a)anthracene	mg/kg	0.1	0.0155	U		0.00935	U	
Benzo(a)pyrene	mg/kg	1	0.0164	U		0.00986	U	
Benzo(b)fluoranthene	mg/kg	0.1	0.0164	U		0.00989	U	
Benzo(k)fluoranthene	mg/kg	0.01	0.0156	U		0.00943	U	
Chrysene	mg/kg	0.001	0.0175	U		0.0105	U	
Dibenzo(a,h)anthracene	mg/kg	1.0	0.0245	U		0.0147	U	
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	0.0249	U		0.015	U	
1/2 NON-DETECTS								
Benzo(a)anthracene	mg/kg	0.1	0.00775	U	0.00078	0.004675	U	0.00047
Benzo(a)pyrene	mg/kg	1	0.0082	U	0.00820	0.00493	U	0.00493
Benzo(b)fluoranthene	mg/kg	0.1	0.0082	U	0.00082	0.004945	U	0.00049
Benzo(k)fluoranthene	mg/kg	0.01	0.0078	U	0.00008	0.004715	U	0.00005
Chrysene	mg/kg	0.001	0.00875	U	0.00001	0.00525	U	0.00001
Dibenzo(a,h)anthracene	mg/kg	1.0	0.01225	U	0.01225	0.00735	U	0.00735
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	0.01245	U	0.00125	0.0075	U	0.00075
Sum TEQ					**0.0234**			**0.0140**

Notes:

Bolded concentrations are detects

J = estimated detected value

Screening criteria from Table 4-2 of the Final RI Work Plan

TEFs from Table 6-1 of SCUM II

TEF = toxicity equivalency factor

TEQ = toxicity equivalence

U = undetected value

Attachment F-3 Toxicity Equivalence Calculations for Carcinogenic PAH - Background

BNSF Wishram Railyard Remedial Investigation Report

		Sample Name	BNSF-BG15-042722-0-10			BNSF-BG16-042722-0-10		
		Sample Type	**N**			**N**		
		Sample Location	**BG15**			**BG16**		
Analyte	Units	TEF	4/27/2022		TEQ	4/27/2022		TEQ
Benzo(a)anthracene	mg/kg	0.1	0.0083	U		0.00763	U	
Benzo(a)pyrene	mg/kg	1	0.00876	U		0.00804	U	
Benzo(b)fluoranthene	mg/kg	0.1	0.00878	U		0.00807	U	
Benzo(k)fluoranthene	mg/kg	0.01	0.00837	U		0.00769	U	
Chrysene	mg/kg	0.001	0.00936	U		0.0086	U	
Dibenzo(a,h)anthracene	mg/kg	1.0	0.0131	U		0.012	U	
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	0.0133	U		0.0122	U	
1/2 NON-DETECTS								
Benzo(a)anthracene	mg/kg	0.1	0.00415	U	0.00042	0.003815	U	0.00038
Benzo(a)pyrene	mg/kg	1	0.00438	U	0.00438	0.00402	U	0.00402
Benzo(b)fluoranthene	mg/kg	0.1	0.00439	U	0.00044	0.004035	U	0.00040
Benzo(k)fluoranthene	mg/kg	0.01	0.004185	U	0.00004	0.003845	U	0.00004
Chrysene	mg/kg	0.001	0.00468	U	0.00000	0.0043	U	0.00000
Dibenzo(a,h)anthracene	mg/kg	1.0	0.00655	U	0.00655	0.006	U	0.00600
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	0.00665	U	0.00067	0.0061	U	0.00061
		Sum TEQ			**0.0125**			**0.0115**

Notes:

Bolded concentrations are detects

J = estimated detected value

Screening criteria from Table 4-2 of the Final RI Work Plan

TEFs from Table 6-1 of SCUM II

TEF = toxicity equivalency factor

TEQ = toxicity equivalence

U = undetected value

Attachment F-3 Toxicity Equivalence Calculations for Carcinogenic PAH - Background

BNSF Wishram Railyard Remedial Investigation Report

Sample Name			BNSF-BG17-042722-0-10			FD02-042722-0-10			BNSF-BG18-042722-0-10			BNSF-BG19-042722-0-10			BNSF-BG20-042922-0-10		
Sample Type			N			FD			N			N			N		
Sample Location			BG17			BG17			BG18			BG19			BG20		
Analyte	Units	TEF	4/27/2022		TEQ	4/27/2022		TEQ	4/27/2022		TEQ	4/27/2022		TEQ	4/29/2022		TEQ
Benzo(a)anthracene	mg/kg	0.1	0.0101	U		0.0107	U		0.00997	U		0.038	U		0.0166	UJ	
Benzo(a)pyrene	mg/kg	1	0.0107	U		0.0113	U		0.0105	U		0.0401	U		0.0176	UJ	
Benzo(b)fluoranthene	mg/kg	0.1	0.0107	U		0.0113	U		0.0105	U		0.0404	U		0.0176	UJ	
Benzo(k)fluoranthene	mg/kg	0.01	0.0102	U		0.0108	U		0.0101	U		0.0384	U		0.0168	UJ	
Chrysene	mg/kg	0.001	0.0114	U		0.0121	U		0.0112	U		0.043	U		0.0188	UJ	
Dibenzo(a,h)anthracene	mg/kg	1.0	0.0159	U		0.0169	U		0.0157	U		0.06	U		0.0263	UJ	
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	0.0162	U		0.0172	U		0.016	U		0.0611	U		0.0267	UJ	
1/2 NON-DETECTS																	
Benzo(a)anthracene	mg/kg	0.1	0.00505	U	0.00051	0.00535	U	0.00054	0.004985	U	0.00050	0.019	U	0.00190	0.0083	UJ	0.00083
Benzo(a)pyrene	mg/kg	1	0.00535	U	0.00535	0.00565	U	0.00565	0.00525	U	0.00525	0.02005	U	0.02005	0.0088	UJ	0.00880
Benzo(b)fluoranthene	mg/kg	0.1	0.00535	U	0.00054	0.00565	U	0.00057	0.00525	U	0.00053	0.0202	U	0.00202	0.0088	UJ	0.00088
Benzo(k)fluoranthene	mg/kg	0.01	0.0051	U	0.00005	0.0054	U	0.00005	0.00505	U	0.00005	0.0192	U	0.00019	0.0084	UJ	0.00008
Chrysene	mg/kg	0.001	0.0057	U	0.00001	0.00605	U	0.00001	0.0056	U	0.00001	0.0215	U	0.00002	0.0094	UJ	0.00001
Dibenzo(a,h)anthracene	mg/kg	1.0	0.00795	U	0.00795	0.00845	U	0.00845	0.00785	U	0.00785	0.03	U	0.03000	0.01315	UJ	0.01315
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	0.0081	U	0.00081	0.0086	U	0.00086	0.008	U	0.00080	0.03055	U	0.00306	0.01335	UJ	0.00134
Sum TEQ					**0.0152**			**0.0161**			**0.0150**			**0.0572**			**0.0251**

Notes:

Bolded concentrations are detects

J = estimated detected value

Screening criteria from Table 4-2 of the Final RI Work Plan

TEFs from Table 6-1 of SCUM II

TEF = toxicity equivalency factor

TEQ = toxicity equivalence

U = undetected value

Attachment F-4
Total Polycyclic Aromatic Hydrocarbons - Background

Attachment F-4 Total Polycyclic Aromatic Hydrocarbons - Background

BNSF Wishram Railyard Remedial Investigation Report

	Sample Name	BNSF-BG13-042122-0-10		BNSF-BG14-042722-0-5.5		BNSF-BG15-042722-0-10		BNSF-BG16-042722-0-10		BNSF-BG17-042722-0-10		FD02-042722-0-10		BNSF-BG18-042722-0-10	
	Sample Type	N		N		N		N		N		FD		N	
	Sample Location	BG13		BG14		BG15		BG16		BG17		BG17		BG18	
Analyte	Units	4/21/2022		4/27/2022		4/27/2022		4/27/2022		4/27/2022		4/27/2022		4/27/2022	
1-Methylnaphthalene	mg/kg	0.0113	U	0.00678	U	0.00603	U	0.00554	U	0.00733	U	0.00779	U	0.00723	U
2-Methylnaphthalene	mg/kg	0.0114	U	0.00688	U	0.00611	U	0.00561	U	0.00744	U	0.00789	U	0.00733	U
Acenaphthene	mg/kg	0.0143	U	0.00858	U	0.00762	U	0.007	U	0.00928	U	0.00985	U	0.00915	U
Acenaphthylene	mg/kg	0.0124	U	0.00747	U	0.00663	U	0.00609	U	0.00807	U	0.00857	U	0.00796	U
Anthracene	mg/kg	0.0157	U	0.00944	U	0.00839	U	0.00771	U	0.0102	U	0.0108	U	0.0101	U
Benzo(a)anthracene	mg/kg	0.0155	U	0.00935	U	0.0083	U	0.00763	U	0.0101	U	0.0107	U	0.00997	U
Benzo(a)pyrene	mg/kg	0.0164	U	0.00986	U	0.00876	U	0.00804	U	0.0107	U	0.0113	U	0.0105	U
Benzo(b)fluoranthene	mg/kg	0.0164	U	0.00989	U	0.00878	U	0.00807	U	0.0107	U	0.0113	U	0.0105	U
Benzo(g,h,i)perylene	mg/kg	0.0161	U	0.0097	U	0.00861	U	0.00791	U	0.0105	U	0.0111	U	0.0103	U
Benzo(k)fluoranthene	mg/kg	0.0156	U	0.00943	U	0.00837	U	0.00769	U	0.0102	U	0.0108	U	0.0101	U
Chrysene	mg/kg	0.0175	U	0.0105	U	0.00936	U	0.0086	U	0.0114	U	0.0121	U	0.0112	U
Dibenzo(a,h)anthracene	mg/kg	0.0245	U	0.0147	U	0.0131	U	0.012	U	0.0159	U	0.0169	U	0.0157	U
Fluoranthene	mg/kg	0.0159	U	0.00957	U	0.0085	U	0.00781	U	0.0103	U	0.011	U	0.0102	U
Fluorene	mg/kg	0.0143	U	0.00863	U	0.00767	U	0.00704	U	0.00933	U	0.00991	U	0.0092	U
Indeno(1,2,3-cd)pyrene	mg/kg	0.0249	U	0.015	U	0.0133	U	0.0122	U	0.0162	U	0.0172	U	0.016	U
Naphthalene	mg/kg	0.0221	U	0.0133	U	0.0118	U	0.0109	U	0.0144	U	0.0153	U	0.0142	U
Phenanthrene	mg/kg	0.0175	U	0.0105	U	0.00935	U	0.00859	U	0.0114	U	0.0121	U	0.0112	U
Pyrene	mg/kg	0.0172	U	0.0103	U	0.00917	U	0.00842	U	0.0112	U	0.0118	U	0.011	U
DETECTS															
1-Methylnaphthalene	mg/kg														
2-Methylnaphthalene	mg/kg														
Acenaphthene	mg/kg														
Acenaphthylene	mg/kg														
Anthracene	mg/kg														
Benzo(a)anthracene	mg/kg														
Benzo(a)pyrene	mg/kg														
Benzo(b)fluoranthene	mg/kg														
Benzo(g,h,i)perylene	mg/kg														
Benzo(k)fluoranthene	mg/kg														
Chrysene	mg/kg														
Dibenzo(a,h)anthracene	mg/kg														
Fluoranthene	mg/kg														
Fluorene	mg/kg														
Indeno(1,2,3-cd)pyrene	mg/kg														
Naphthalene	mg/kg														
Phenanthrene	mg/kg														
Pyrene	mg/kg														
1/2 NON-DETECTS															
1-Methylnaphthalene	mg/kg	0.00565	U	0.00339	U	0.003015	U	0.00277	U	0.003665	U	0.003895	U	0.003615	U
2-Methylnaphthalene	mg/kg	0.0057	U	0.00344	U	0.003055	U	0.002805	U	0.00372	U	0.003945	U	0.003665	U
Acenaphthene	mg/kg	0.00715	U	0.00429	U	0.00381	U	0.0035	U	0.00464	U	0.004925	U	0.004575	U
Acenaphthylene	mg/kg	0.0062	U	0.003735	U	0.003315	U	0.003045	U	0.004035	U	0.004285	U	0.00398	U
Anthracene	mg/kg	0.00785	U	0.00472	U	0.004195	U	0.003855	U	0.0051	U	0.0054	U	0.00505	U
Benzo(a)anthracene	mg/kg	0.00775	U	0.004675	U	0.00415	U	0.003815	U	0.00505	U	0.00535	U	0.004985	U

Attachment F-4 Total Polycyclic
Aromatic Hydrocarbons - Background

BNSF Wishram Railyard Remedial
Investigation Report

Sample Name		BNSF-BG13-042122-0-10		BNSF-BG14-042722-0-5.5		BNSF-BG15-042722-0-10		BNSF-BG16-042722-0-10		BNSF-BG17-042722-0-10		FD02-042722-0-10		BNSF-BG18-042722-0-10	
Sample Type		**N**		**N**		**N**		**N**		**N**		**FD**		**N**	
Sample Location		**BG13**		**BG14**		**BG15**		**BG16**		**BG17**		**BG17**		**BG18**	
Benzo(a)pyrene	mg/kg	0.0082	U	0.00493	U	0.00438	U	0.00402	U	0.00535	U	0.00565	U	0.00525	U
Benzo(b)fluoranthene	mg/kg	0.0082	U	0.004945	U	0.00439	U	0.004035	U	0.00535	U	0.00565	U	0.00525	U
Benzo(g,h,i)perylene	mg/kg	0.00805	U	0.00485	U	0.004305	U	0.003955	U	0.00525	U	0.00555	U	0.00515	U
Benzo(k)fluoranthene	mg/kg	0.0078	U	0.004715	U	0.004185	U	0.003845	U	0.0051	U	0.0054	U	0.00505	U
Chrysene	mg/kg	0.00875	U	0.00525	U	0.00468	U	0.0043	U	0.0057	U	0.00605	U	0.0056	U
Dibenzo(a,h)anthracene	mg/kg	0.01225	U	0.00735	U	0.00655	U	0.006	U	0.00795	U	0.00845	U	0.00785	U
Fluoranthene	mg/kg	0.00795	U	0.004785	U	0.00425	U	0.003905	U	0.00515	U	0.0055	U	0.0051	U
Fluorene	mg/kg	0.00715	U	0.004315	U	0.003835	U	0.00352	U	0.004665	U	0.004955	U	0.0046	U
Indeno(1,2,3-cd)pyrene	mg/kg	0.01245	U	0.0075	U	0.00665	U	0.0061	U	0.0081	U	0.0086	U	0.008	U
Naphthalene	mg/kg	0.01105	U	0.00665	U	0.0059	U	0.00545	U	0.0072	U	0.00765	U	0.0071	U
Phenanthrene	mg/kg	0.00875	U	0.00525	U	0.004675	U	0.004295	U	0.0057	U	0.00605	U	0.0056	U
Pyrene	mg/kg	0.0086	U	0.00515	U	0.004585	U	0.00421	U	0.0056	U	0.0059	U	0.0055	U

Total Detects	0		0		0		0		0		0		0	
Total Non-Detects	0.1495		0.08994		0.079925		0.073425		0.097325		0.103205		0.09592	
Total PAHs (mg/kg)	0.1495		0.08994		0.079925		0.073425		0.097325		0.103205		0.09592	
Total PAHs (ug/kg)	149.5		89.9		79.9		73.4		97.3		103.2		95.9	

Notes:
J = estimated value
mg/kg = milligrams per kilogram
U = not detected above the practical quantitative limit

Attachment F-4 Total Polycyclic Aromatic Hydrocarbons - Background

BNSF Wishram Railyard Remedial Investigation Report

	Sample Name	BNSF-BG19-042722-0-10		BNSF-BG20-042922-0-10	
	Sample Type	N		N	
	Sample Location	BG19		BG20	
Analyte	Units	4/27/2022		4/29/2022	
1-Methylnaphthalene	mg/kg	0.0276	U	0.0121	UJ
2-Methylnaphthalene	mg/kg	0.028	U	0.0123	UJ
Acenaphthene	mg/kg	0.0349	U	0.0154	UJ
Acenaphthylene	mg/kg	0.0304	U	0.0133	UJ
Anthracene	mg/kg	0.0385	U	0.0169	UJ
Benzo(a)anthracene	mg/kg	0.038	U	0.0166	UJ
Benzo(a)pyrene	mg/kg	0.0401	U	0.0176	UJ
Benzo(b)fluoranthene	mg/kg	0.0404	U	0.0176	UJ
Benzo(g,h,i)perylene	mg/kg	0.0396	U	0.0173	UJ
Benzo(k)fluoranthene	mg/kg	0.0384	U	0.0168	UJ
Chrysene	mg/kg	0.043	U	0.0188	UJ
Dibenzo(a,h)anthracene	mg/kg	0.06	U	0.0263	UJ
Fluoranthene	mg/kg	0.0391	U	0.0171	UJ
Fluorene	mg/kg	0.0352	U	0.0154	UJ
Indeno(1,2,3-cd)pyrene	mg/kg	0.0611	U	0.0267	UJ
Naphthalene	mg/kg	0.0543	U	0.0237	UJ
Phenanthrene	mg/kg	0.043	U	0.0188	UJ
Pyrene	mg/kg	0.0421	U	0.0185	UJ
DETECTS					
1-Methylnaphthalene	mg/kg				
2-Methylnaphthalene	mg/kg				
Acenaphthene	mg/kg				
Acenaphthylene	mg/kg				
Anthracene	mg/kg				
Benzo(a)anthracene	mg/kg				
Benzo(a)pyrene	mg/kg				
Benzo(b)fluoranthene	mg/kg				
Benzo(g,h,i)perylene	mg/kg				
Benzo(k)fluoranthene	mg/kg				
Chrysene	mg/kg				
Dibenzo(a,h)anthracene	mg/kg				
Fluoranthene	mg/kg				
Fluorene	mg/kg				
Indeno(1,2,3-cd)pyrene	mg/kg				
Naphthalene	mg/kg				
Phenanthrene	mg/kg				
Pyrene	mg/kg				
1/2 NON-DETECTS					
1-Methylnaphthalene	mg/kg	0.0138	U	0.00605	UJ
2-Methylnaphthalene	mg/kg	0.014	U	0.00615	UJ
Acenaphthene	mg/kg	0.01745	U	0.0077	UJ
Acenaphthylene	mg/kg	0.0152	U	0.00665	UJ
Anthracene	mg/kg	0.01925	U	0.00845	UJ
Benzo(a)anthracene	mg/kg	0.019	U	0.0083	UJ

Attachment F-4 Total Polycyclic Aromatic Hydrocarbons - Background

BNSF Wishram Railyard Remedial Investigation Report

Sample Name		BNSF-BG19-042722-0-10		BNSF-BG20-042922-0-10	
Sample Type		N		N	
Sample Location		BG19		BG20	
Benzo(a)pyrene	mg/kg	0.02005	U	0.0088	UJ
Benzo(b)fluoranthene	mg/kg	0.0202	U	0.0088	UJ
Benzo(g,h,i)perylene	mg/kg	0.0198	U	0.00865	UJ
Benzo(k)fluoranthene	mg/kg	0.0192	U	0.0084	UJ
Chrysene	mg/kg	0.0215	U	0.0094	UJ
Dibenzo(a,h)anthracene	mg/kg	0.03	U	0.01315	UJ
Fluoranthene	mg/kg	0.01955	U	0.00855	UJ
Fluorene	mg/kg	0.0176	U	0.0077	UJ
Indeno(1,2,3-cd)pyrene	mg/kg	0.03055	U	0.01335	UJ
Naphthalene	mg/kg	0.02715	U	0.01185	UJ
Phenanthrene	mg/kg	0.0215	U	0.0094	UJ
Pyrene	mg/kg	0.02105	U	0.00925	UJ

Total Detects	0		0	
Total Non-Detects	0.36685		0.1606	
Total PAHs (mg/kg)	0.36685		0.1606	
Total PAHs (ug/kg)	366.9		160.6	

Notes:

J = estimated value

mg/kg = milligrams per kilogram

U = not detected above the practical quantitative li

Appendix G
TarGOST Report

Appendix G. TarGOST Report

This appendix provides the report information from the TarGOST sampling events and includes the following:

- Appendix G-1 – Dakota Technologies TarGOST Final Report
- Appendix G-2 – Sample Callout Terminology
- Appendix G-3 – TarGOST Logs including Ex-Situ Samples
- Appendix G-4 – UV and White Light Photos
- Table G-1 Ex-Situ Sample Results

Appendix G-1

Dakota Technologies TarGOST Final Report, March 2023

High Resolution Site Characterization Report – TarGOST® Investigation

Client: **Jacobs**

Project Name: **BNSF Wishram**

Location: **Wishram, WA**

Prepared by:

Tom Rudolph and Randy St. Germain

Dakota Technologies, Inc.

2201 12th Street North, Suite A

Fargo, ND 58102

(701) 237-4908

stgermain@dakotatechnologies.com

trudolph@dakotatechnologies.com

March 10, 2023

Table of Contents

1.0 TarGOST SYSTEM

1.1 Quantitative Response

The Tar-specific Green Optical Screening Tool (TarGOST®) is a laser-induced fluorescence (LIF) screening tool designed specifically to detect non-aqueous phase liquid (NAPL) in the subsurface. It responds almost exclusively to heavy molecular weight LNAPL and DNAPL contaminants, including coal tars found at former manufactured gas plants (MGPs) and creosote at wood treater sites where the NAPL is often the contaminant of concern. It accomplishes this by sensing the fluorescence of large polycyclic aromatic hydrocarbons (PAHs) dissolved in the NAPLs. TarGOST is a modification of the Ultra-Violet Optical Screening Tool (UVOST®) that spun from LIF tools developed in the early 1990's under U.S. Air Force funding. The UVOST platform is another mature technology that is specifically designed to detect light to middle weight LNAPLs. TarGOST® has been in commercial use since 2003 and over 500 "heavy NAPL" sites have been successfully characterized using TarGOST.

The TarGOST measurements begin with sending ultra-fast pulses of green laser light through a fiber optic cable strung within probe rods on a direct push drill rig or cone penetrometer rig. This laser excitation light is ultimately directed out a sapphire window in the side of the direct push probe as it is advanced at the rate of approximately 2cm/s. As the probe is advanced, the soil immediately adjacent to the window is exposed to the flashes of laser light. If heavy PAH containing NAPLs (i.e., bunker fuel, coal tar, creosote) are present, fluorescence is emitted by PAHs in the NAPL in the soil's pore spaces. A portion of this fluorescence comes back into the window, is captured, and is transmitted through a return fiber back to the surface to be analyzed. Responses are indicated in real-time on a graph of signal vs. depth. Due to complicated processes in the NAPL (energy transfer, photon cycling, and other phenomena that quench the fluorescence), the fluorescence intensity often does not scale linearly with soil pore saturation of NAPL as is often the case with lighter refined fuels. To correct for this non-monotonic response, the TarGOST software scatter-corrects the fluorescence data using proprietary algorithms.

Prior to conducting each log, measurements of the Reference Emitter (RE) and a clean window (Background) are recorded. This is to calibrate the response of the system to a standard fluorescent material (the RE) and to measure the cleanliness of the internal surfaces in the light path (e.g., fiber optics, mirror, window, filters). It is **not** a method of converting fluorescence to a known concentration but can be used to estimate concentration when carefully correlated with other lines of evidence. All down-hole measurements are normalized by the RE and converted to a percentage of that log's RE response. A downhole reading of 100% RE has a scatter-normalized fluorescence response that is identical in magnitude to that of the RE "standard" that was taken just prior to logging. Background (clean window) measurements are not applied to the in-situ data collected but it is measured and stored as a general data quality indicator that assures data analysts that there were no significant defects, such as a dirty window from leakage in a previous log, a cracked window, or contamination of the mirror with fluorescent dust inside the probe.

The RE's function is to both: 1) reflect laser light and 2) fluoresce at known and consistent intensities. The RE serves two main purposes:

1) Qualitative examination of the performance of the instrument – The measured waveform of the RE needs to be the correct shape to confirm that all four monitored wavelengths (fiber optics, filters, etc.) are intact and functioning properly.

2) Quantitative calibration of the instrument – The RE is used to achieve the proper signal intensity (obtained by adjusting laser energy). Keeping the RE waveform intensity in the proper range assures that the instrument is in the optimum range to allow a monotonic response across multiple orders of pore saturation.

Importantly, the intensity of the excitation laser light pulses used to excite the PAHs has a direct relationship to the resulting fluorescence intensity. Therefore, the more intense the excitation pulse, the more intense the fluorescence. The laser intensity is controlled by the operator via a mechanical device that limits with a turn of a screw the laser intensity being launched into the excitation fiber optic. Prior to each TarGOST logging event the operator places the RE on the cleaned sapphire window and adjusts the intensity of the laser excitation in order to achieve a return fluorescence intensity from the RE that is bright enough to be readily sensed by the detection system but is also not too bright so as to overwhelm the detection system and result in saturation. The RE's fluorescence waveform is then stored within the TarGOST log's data file, traveling with that data as a permanent record of this "single point calibration" made just prior to logging the location.

The RE's total fluorescence ideally falls between 1,600 and 2,500pVs for TarGOST. PVs, or picovolt-seconds, is a measure of waveform area, or total fluorescence. Precise RE intensity tuning by adjusting the laser excitation light to achieve an exact value is unnecessary because all reported data have been normalized by conversion to a percentage of the RE fluorescence (%RE). Background values can range from 0 to 50 pVs. As the background increases beyond 50 pVs a change to the optics should be made to ensure the scatter correction applied to the data is effective. RE and Background values for each boring are shown in the field work summary portion in Appendix B.

The relative quantity of the NAPL present in the pore spaces of the soil is represented by the main plot of a TarGOST log which is the **Signal %RE** in the left-most plot, an example of which is shown in Figure 1. The color used to fill main Signal %RE log is computed using the three fluorescence channels of the waveform and these are colored-coded with blue, green, and red as seen in the Callout waveforms at far left. The scattered (i.e., reflected) laser light is the left-most peak in the waveforms and it is colored-coded gray and while this scattered light is measured and stored, it is typically ignored in the vertical scaling used for displaying waveforms because it's the fluorescence we're most interested in examining.

The scattered light's intensity vs depth is plotted in the **Scatter** graph. The total **Fluorescence**, which is the sum of three fluorescence peaks, is also graphed (in most cases) because close inspection of the true fluorescence data (without scatter correction) is often useful for detecting/discerning low level NAPL saturations and false positives. The Scatter signal is useful for identifying soil color changes and for confirming "hits" of NAPL, which absorbs the laser light causing the Scatter to decrease. Lower intensity Fluorescence accompanied by a Scatter response that rises and falls in unison with Fluorescence is often an indicator of false positives like wood, calcites, and other light-colored naturally fluorescing soils.

The example log in Figure 1 demonstrates this phenomenon nicely. At this example site there was buried wood (color-coded seafoam green) at ~27 ft that fluoresced far more intensely than the target tar (color-coded yellow) fluorescing at 9 ft, 12 ft, and 29 ft. Discernment between the wood and tar is readily accomplished by looking at how the scattered excitation and fluorescence emission behave with respect to each other.

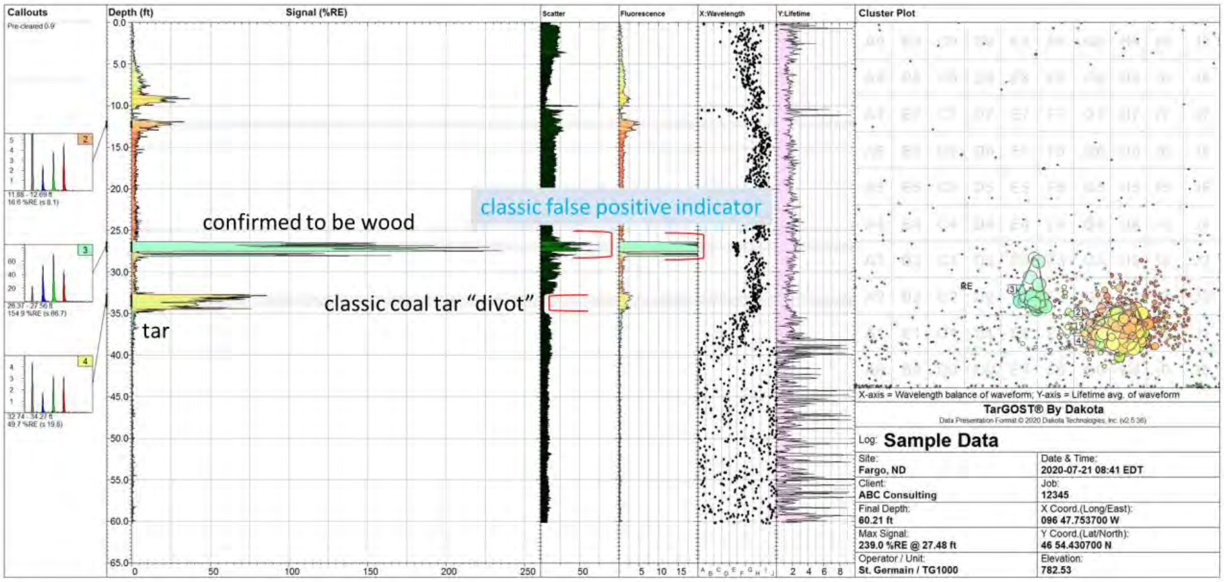


Figure 1 Example TarGOST log

1.2 *TarGOST's Semi-Quantitative Response*

A TarGOST data log typically contains thousands of multi-wavelength waveforms with each waveform containing both quantitative and qualitative information about the soil passing just outside the transparent sapphire window of the probe. Each waveform is stored along with the depth (bgs) of the window, which is tracked by a string potentiometer attached to the direct push machine that advances the probe into the ground. The brief flash of fluorescence that occurs as a result of each pulsed laser excitation event is converted to a current pulse by an uphole photomultiplier tube and that current pulse is captured on a high-speed digital storage oscilloscope, resulting in a waveform.

The quantitative information contained in the waveform is represented by the waveform's magnitude, which in turn represents the total fluorescence intensity coming off the soil with each pulse of laser excitation. The magnitude of the waveform is calculated in pico-Volt-seconds (pVs) which is the cross section of the y-axis voltage (V) measured over the x-axis which is time (pico-seconds). The fluorescence is then normalized by the back-scattered laser excitation light in a proprietary fashion. This extends the linear range of the Signal (%RE) vs NAPL pore saturation. Without normalization the fluorescence for most heavy NAPLs quickly plateaus or even rolls over with increasing NAPL pore saturation, which yields more of an absence/presence capability. TarGOST's semi-quantitative response tells the investigator where there's more/less NAPL, as opposed to the poorly behaved, often nonmonotonic response provided by sensors that rely on the fluorescence response alone.

NAPLs fluoresce with varying intensities, so the semi-quantitative behavior of TarGOST is always going to be influenced by the NAPL types and the soil particle sizes. Some NAPLs fluoresce more brightly, and large soil particle sizes allow larger pore space areas of NAPL to press up against the sapphire window, causing larger Signal %REs vs poorly fluorescing NAPLs and soils with small particle sizes. Figure 2 illustrates how the Signal %RE is non-monotonic for single NAPL types on the same soil, but the response "gets complicated" for multiple NAPL types and extremes in soil grain sizes.

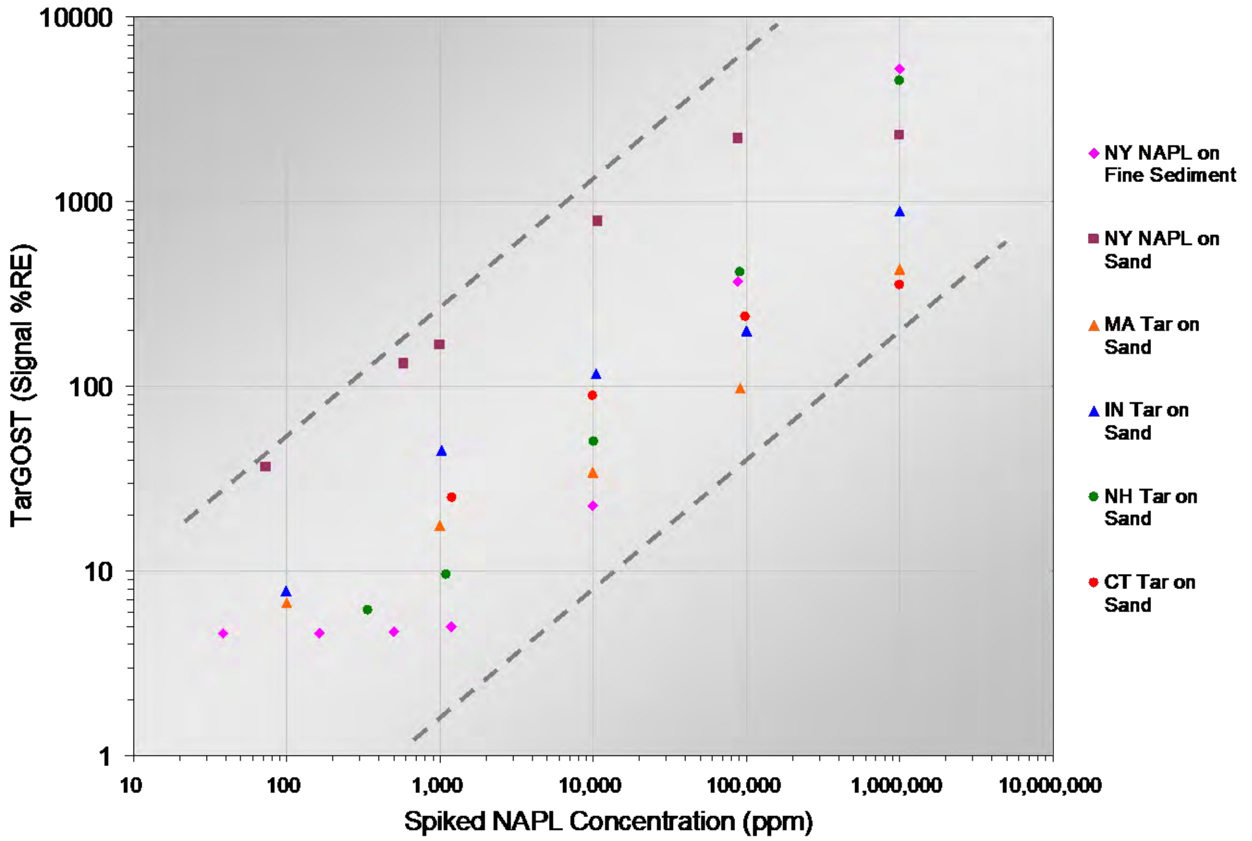


Figure 2 Semi-quantitative behavior of NAPLs – various NAPLs measured bench-top style

1.3 TarGOST's Qualitative Response

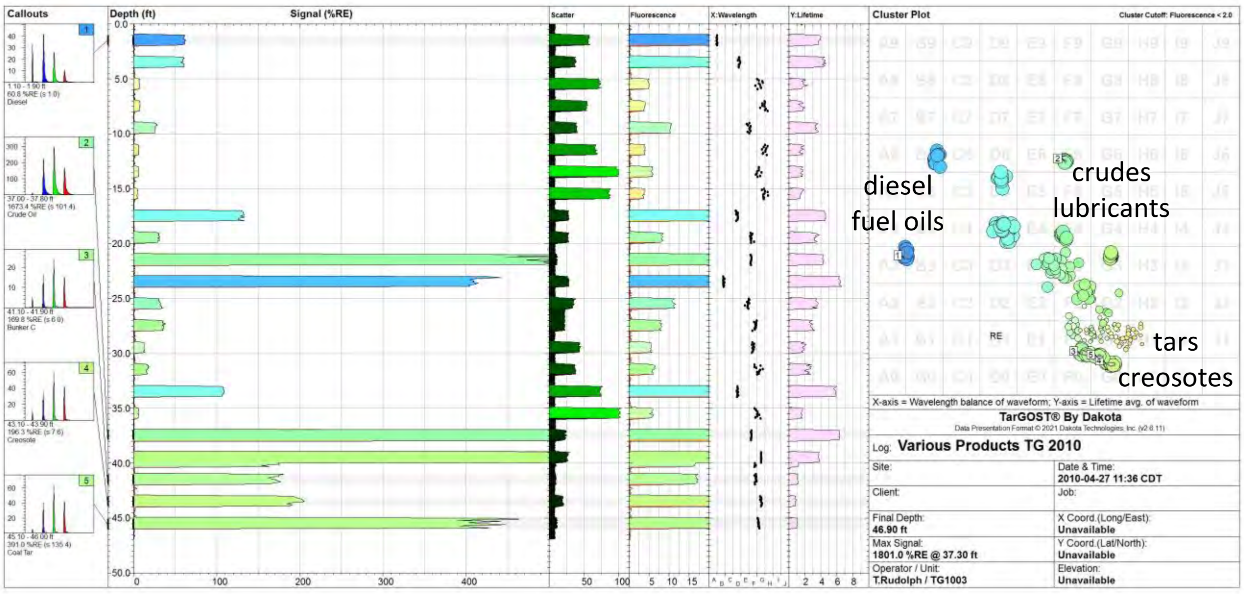
A straightforward "more NAPL present produces more fluorescence" relationship generally holds true for most NAPL, but only at sites where no confounding false positive fluorophores such as natural organics and non-target NAPLs are encountered. This ideal scenario, where there's only one fluorescent NAPL type and it is representative of all the NAPL at the site is, unfortunately, extremely rare. As previously demonstrated in Figure 1's interference due to buried wood, there is almost always a confounding "false positive" fluorescence to deal with. This dictates that we must also utilize the qualitative information inherent in each waveform in order to successfully interpret fluorescence-based sensor data. The qualitative aspect of a NAPL's fluorescence is contained in the relative response of each of the three fluorescence colors captured in each waveform. In addition to the fluorescence color, the rate at which the fluorescence decays away after brief nanosecond long excitation by the laser pulse (i.e., their lifetime) tells us even more about the fluorescent material's chemistry.

Taking stock of any/all false positives is critically important for TarGOST investigations, because the NAPL fluorescence responses are often small and scattered because, after all, they represent the highly heterogenous NAPL distribution. Fortunately for us, the color and lifetime information embedded in each waveform can be harnessed to identify responses as being target vs non-target. This almost always allows for isolation of only the target NAPL waveforms vs the non-target false positive responses by using post-processing.

The process of identifying both the quantitative and qualitative properties of the site NAPL and possible false positives starts early, in many cases well ahead of mobilization. Complimentary benchtop testing of samples of available site NAPLs and soils, using RE for all phases of the work so that all measurements are directly relatable to each other, is highly recommended. Benchtop testing allows project managers to know ahead of time whether the target NAPL yields enough fluorescence, and what shape of waveform (i.e., signature) their target NAPLs produce. Waveforms of potential false positives are often acquired during benchtop testing as well, to assess whether their fluorescence might overwhelm or otherwise confound the ability to discern target fluorescence present in and amongst these potentially confounding materials. By the time the TarGOST system is fielded the various stakeholders often know what NAPL fluorescence waveforms and known false positive waveforms look like, so they know if/when to take action to identify new/unusual waveforms encountered in the field.

1.4 Waveform Analysis/Interpretation

A typical TarGOST log contains many thousands of waveforms, so using just five callouts alone (located at the left of TarGOST logs) to interpret the fluorescence response of the entire log limits our ability to compare/contrast depth zones in one log. Cluster plots were developed to help us consolidate thousands of waveform “signatures” into one simple graphic that consolidates all the different types of fluorescence behavior into one graphic. There is perhaps no better way to appreciate the cluster plot’s utility than by examining the TarGOST system’s response to a wide and varied sampling of NAPLs. The log shown in Figure 3 shows the resulting TarGOST log when a wide range of NAPL types was measured in series. Each sample was measured ten times and every waveform in the log has been assigned a position on the cluster plot at far right and is represented as a “bubble” that scales with fluorescence intensity, with very dim fluorescence producing the smallest bubbles ranging up to large bubbles for bright fluorescence.



X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Data Presentation Format © 2021 Dakota Technologies, Inc. (v2.6.11)

Log: **Various Products TG 2010**

Site:

Date & Time: **2010-04-27 11:36 CDT**

Client:

Job:

Final Depth: **46.90 ft**

X Coord.(Long/East): **Unavailable**

Max Signal: **1801.0 %RE @ 37.30 ft**

Y Coord.(Lat/North): **Unavailable**

Operator / Unit: **T.Rudolph / TG1003**

Elevation: **Unavailable**

Figure 3. A benchtop study of TarGOST response to a wide variety of NAPLs

The fluorescence of each NAPL varies based on its PAH content and other aspects of its chemistry such as aliphatics content. Therefore, a wide variety of NAPLs will fluoresce in a wide variety of colors and lifetimes. The highly variable waveforms, along with their variable cluster plot bubble locations, are ranging “all over the map” because they represent wide-ranging chemistries of the NAPLs tested. But there is a trend that is quite useful, heavy NAPLs such as tars and creosotes have short lifetimes and are usually red-shifted, while the lighter mid-weight refined products have longer lifetimes and are much more blue-shifted.

Figure 3 demonstrates TarGOST’s qualitative capability in a nutshell, showing how it can sense the chemistry of NAPLs (and/or false positives) by recording in detail the nature of their fluorescence, which varies considerably with chemistry. It’s our job as data interpreters to develop the relationship between the fluorescence being logged and what materials are acting as the source of that fluorescence. After identifying all the “players” in our fluorescent data set, we can then identify target NAPL fluorescence that we’re interested in retaining for our CSM vs. non-target false positives or NAPL types that we’d like to exclude from the CSM. Only after we’ve done our job of vetting the origins of all the responses can we trust that the TarGOST survey is representative of the NAPL CSM that suits our goals for the site.

Looking closely at fluorescence waveform of diesel (far left in Figure 4) you can see that the three fluorescence peaks (the right-most peaks colored blue, green, and red) for a refined fuel like diesel are dominated by the blue peak. This is called blue-shifting and the vast majority of middle-weight LNAPLs are blue-shifted. Note that the peaks in each waveform always have an immediate increase in intensity on the left-hand side. That is because the laser has excited the fluorescence almost instantaneously, so fluorescence begins in an almost instant fashion on the left side of each peak (or pulse) of fluorescence.

However, the rate of fluorescence decay is not controlled by the laser, but rather the PAHs waiting various periods of time prior to emitting their fluorescence. That is what is controlling the rate of decrease on the right-hand side of each peak. The fluorescence detector is tracking the NAPL's fluorescence which fades away quickly (or slowly in some cases) after the momentary excitation by the short burst of laser excitation.

Longer lifetimes (slower decays) are observed in refined NAPLs like diesel and crude oil occur because their NAPL chemistries don't encourage quenching or energy transfer, so it's a relatively "friendly" place for excited PAHs to exist without being quenched by neighboring molecules prior to fluorescing. In contrast to the refined NAPLs, the tar and creosote waveforms at far right in Figure 4 are much different. The three fluorescence peaks of their waveforms are not blue dominant but instead they are fairly balanced. In many cases coal tars and other heavy NAPLs are even red-shifted to some degree (but not in this particular NAPL set).

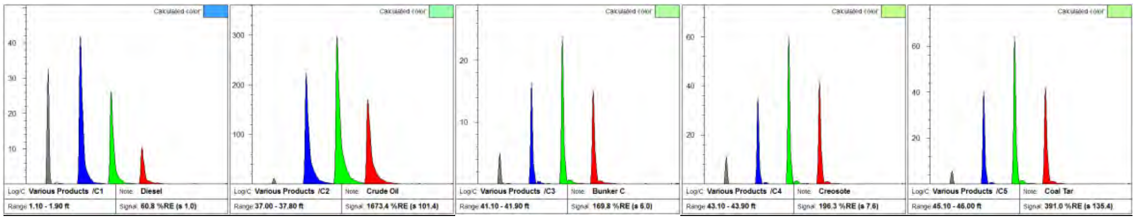


Figure 4. Waveforms from a variety of NAPLs measured with TarGOST (product type shown in each)

Heavy NAPLs contain an excess of PAHs that are closely packed together, and this is an extremely "unfriendly" chemistry for excited state PAHs. Their chemistry promotes excited state energy transfer and other quenching processes that render the lifetimes much shorter. In other words, tars and other black sticky "heavies" are a very poor environment for excited state PAHs to exist in, as demonstrated by the extremely narrow width of the three fluorescence peaks in the three heavy NAPLs at right in Figure 4.

Finally, let us closely examine this set of NAPL samples plotted in their cluster diagram in Figure 5. Notice that the LNAPLs have longer lifetimes and a blue-shift in fluorescence, so their bubbles are placed high and to the left. The heavy NAPLs, with their short lifetimes and mid- to red-shifting, have their bubbles plotted lower on the lifetime axis and further to the right on the color axis.

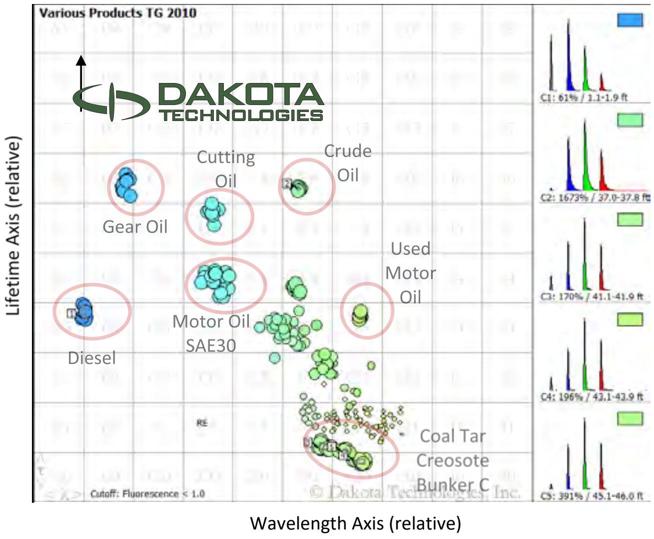


Figure 5. Cluster plot for a wide variety of NAPLs on TarGOST (with example callouts)

1.5 Electrical Conductivity

Electrical Conductivity (EC) data were collected simultaneously with the TarGOST data. EC is a measure of the soil's ability to conduct an electrical current between two poles on the TarGOST/EC probe. Conductivity is the reciprocal of electrical resistivity and has the units (in our application) of millisiemens per meter (mS/m). Since soil is in the pathway of the charge flow, the grain size can be inferred by comparing the EC log to lithology observed in a soil boring. Generally, conductivity readings in the 100s indicate smaller grain size (silt and clay). Larger grain size (sand and gravels) is typically in the 10s of mS/m range. Prior to every log, the dipole of the TarGOST probe is checked for proper operation by performing a conductivity test with a test block of known values. Some of the data indicates NAPL in zones of larger grain size as one would expect. For example, G080-TG or GN040-TG. On other logs it is difficult to see a relationship between grain size and vertical NAPL distribution.

2.0 Site-Specific Fluorescence Data Discussion

2.1 Pre-mobilization Benchtop Testing

Ideally, the fluorescence color, intensity and lifetime of natural soils, wood, and/or various NAPLs at the site would be recognizable and identifiable without effort. Unfortunately, this is not possible, so prior to mobilization often samples are bench-tested with TarGOST in order to establish what response can be expected from available target and non-target materials sent by the client.

Jacobs provided frozen core samples for bench-top TarGOST screening in September of 2018. Cores that contained visually significant NAPL registered a 100-200%RE response and the waveforms fell into the **F1** area of the cluster diagram.

A single sample of NAPL-impacted soil was benchtop tested with TarGOST in August of 2018. The TarGOST response was a more muted 40-60%RE that landed in **F0** area.

2.2 On-Site Fluorescence Observations

2.2.1 False Positive Fluorescence

TarGOST project sites often produce a variety of fluorescence responses due to a variety of petroleum hydrocarbon NAPLs (fuels, greases, oils) along with other fluorophores such as peat, cement cutting slurry, calcites, crushed limestone, shell hash, garbage, wood, etc. Sediment investigations commonly encounter interference from the unique environment such as plants/algae (due to their chlorophyll), wood fragments and shells. These non-target (false positive) materials often generate enough fluorescence to cause interference. Fortunately, their fluorescence waveforms usually differ enough from the target NAPL fluorescence waveforms to allow for discernment.

To better understand the origins of all significant fluorescence at the site, targeted validation sampling took place both during and after the TarGOST field investigation. Materials from soil cores were placed on the TarGOST system in benchtop fashion and logged to provide information with respect to false positive and NAPL waveform types. These ex-situ TarGOST logs are included in Appendix A: TarGOST Logs for BNSF Wishram w Ex Situ Field Logs included with this report. These ex-situ results are located below their respective in-situ field logs in Appendix A.

Some ex-situ screening log callouts contain abbreviations defined here:
NP – NAPL Present
 discreet NAPL was observed – even tiny weeps count (visually identified in any fashion – even UV)

NS – NAPL Stain
 staining of soil was observed but not discrete pools, globules, droplets or weeps

PP – PAHs Present
 neither NP nor NS were present, but jar lids placed under UV light or UV black nitrile glove test confirmed enough PAHs to show themselves via solid phase extraction’s superior detection capability

FP – False Positive
 some sort of false positive was observed – organic, soil particles, wood, roots, etc.

PO – Positive Odor
sample gave an odor that indicates contamination of the variety expected for this project – if outside of ordinary briefly explain

ND Non-Detect
nothing remarkable was found worth noting – otherwise considered clean soil
[making this mandatory helps eliminates inadvertently forgetting to examine/note a sample

Example: jar from former MGP smelled of aromatics, but the only other evidence of contamination was blue fluorescence in the lid, so notes under the callout are:
PP PO

Modestly intense interference fluorescence from chlorophyll and shell beds were observed at multiple locations at the site and confirmed with the ex-situ screening. Their waveforms and cluster plot locations are shown Figures 6 and 7.

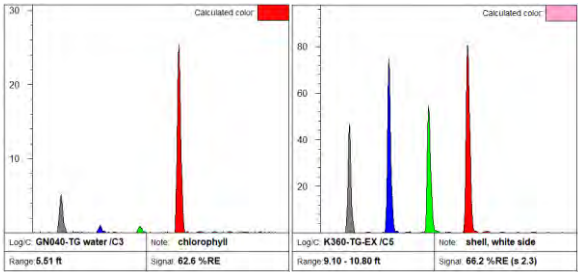


Figure 6. Chlorophyll and shell waveforms observed at the BNSF Wishram site

The chlorophyll waveform is dominated by the red channel with a short lifetime. This was often seen in the first several feet of many of the logs. On the cluster plots this signal plots in the **J1,J2** region. This type of fluorescence was later deemed **CHLOROPHJ1** fluorescence in the non-negative least squares processing (discussed later).

The shell bed waveform is novel/unique because the blue and red channels dominate the intensity with the green channel being about 2/3 as intense. The waveform also has a short lifetime. On the cluster plot this signal plots in the **E1,E2,F1,F2** area. This type of fluorescence was later deemed **SHELLE2** fluorescence in the non-negative least squares processing (discussed later).

Organic material was found to fluoresce in the H1 area (illustrated in Figure 9). This type of fluorescence was later deemed **OMH1** fluorescence in the non-negative least squares processing (discussed later). This fluorescence com-mingled to some degree with heavier versions of NAPL fluorescence, so teasing this out from more degraded or heavier NAPLs isn't feasible, even with non-negative least squares (NNLS).

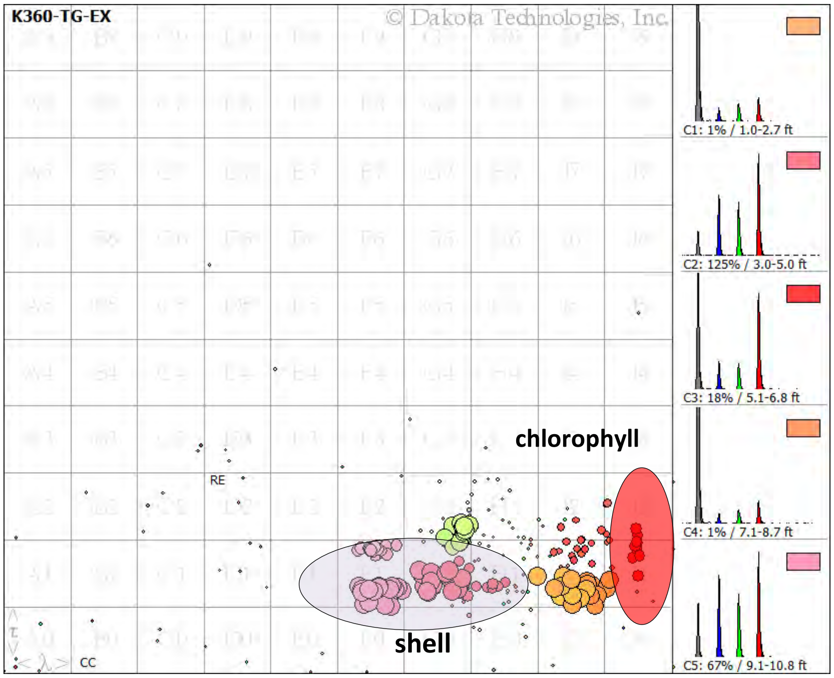


Figure 7. Cluster plot zones occupied by natural fluorescence at BNSF Wishram

Another false positive involved the method in which the TarGOST is deployed from a barge in deep waters requiring the use of an outer casing for lateral rod string support in the water column. This casing is pushed into the sediment minimally to set or anchor it. The result is that the first few inches to feet of TarGOST data that is collected is often inside this casing. Data within this interval is unreliable because of potential disturbance of the sediments and fluorescence of foreign materials in the casing. Data collected inside the casing it is noted in the callout section of each log.

2.2.2 Target NAPL Fluorescence

There was a range of waveforms that represented NAPL at the BNSF Wishram site which were later confirmed by targeted sampling and ex-situ screening. These waveforms and their cluster plot locations are outlines below:

D4 to E3 (suspected fuel NAPL) long lifetime, blue shifted waveform. Logs with this waveform are reminiscent of what we observe for a middle distillate fuel-like NAPL. An example of this waveform can be found in log **F390-TG** from 6-7’. This type of fluorescence was later deemed **NAPLE4** fluorescence in the NNLS waveform processing (discussed later).

F3 to G2 (suspected heavier NAPL) moderate lifetime with a green dominate waveform. This was often observed grading below the **H1** waveform on the logs, and it could be the more intact form of **H1** NAPL. An example of this waveform can be found in log **G320-TG** from 8-9.5’. This type of fluorescence was later deemed **NAPLG2** fluorescence in the non-negative least squares processing (discussed later).

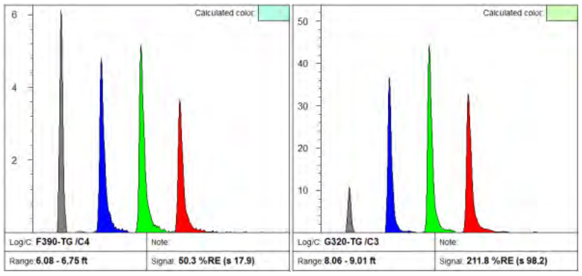


Figure 8 Two main types of NAPL fluorescence observed at the BNSF Wishram site

Figure 9 contains a cluster plot with approximate zones highlighted to reference the main classes of fluorescence observed at BNSF Wishram.

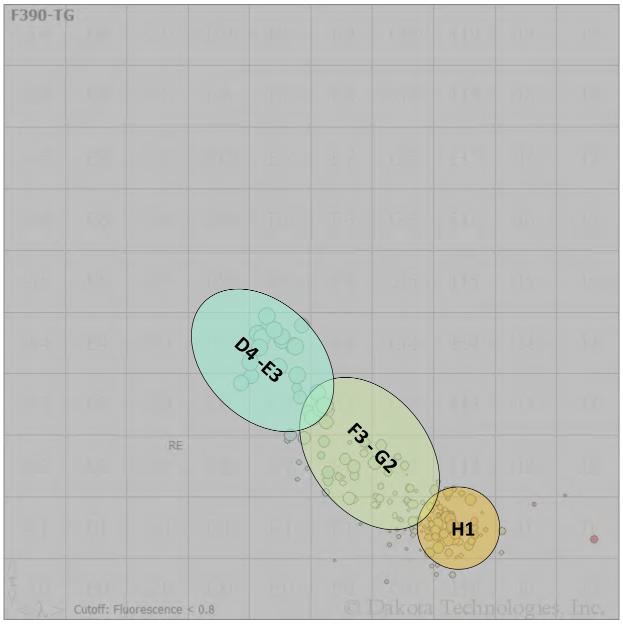


Figure 9. Cluster plot zones occupied by dominant classes of fluorescence at BNSF Wishram

As mentioned previously in the false positive discussion, data from ex-situ TarGOST analysis of samples proved valuable for confirming the suspected NAPL responses. NAPL was confirmed at a number of locations containing the **D4 to E3** and/or **F3 to G2** waveforms. A "fuel odor" noted in F390-TG false pos also generated a **D4 to E3** waveform that supports the theory that this NAPL is the lightest weight NAPL of the NAPL fluorescence responses at the site.

However, other ex-situ data (**G000-TG-EX** 0.9-1.2 ft) had an associated "fuel odor" according to the technician, but in soils that exhibited **H1** waveforms. One possible explanation is that the fluorescence of organics stained with fuel NAPL caused the **H1** dominated response in **G000-TG-EX**. In other words, that soil did contain enough fuel impacts to impart an odor, but not enough NAPL to out-fluoresce the naturally fluorescent organics or to be recognizable as NAPL visually.

3.0 NON-NEGATIVE LEAST SQUARES DATA FILTERING

Dakota met online with Jacobs scientists to discuss the in-situ TarGOST data along with the ex-situ TarGOST screenings of sampled soils. The team decided it would be beneficial to perform a NNLS analysis of the data in order to separate the identified false positives (**CLOROPHJ1**, **OMH1**, and **SHELLE2**) from validated NAPL responses (**NAPLE4** and **NAPLG2**). The purpose of the NNLS was to isolate, as best we could, a data set that represents only the extent of NAPL at the site. This is difficult to do precisely when the natural organics fluoresce in a highly variable manner and at intensities rivaling the NAPLs, as demonstrated by the benchtop LIF readings of various samples in pages 72-74 of Appendix A. The NNLS waveform names were chosen to represent the type of material, with the last two characters denoting their location on the cluster plots.

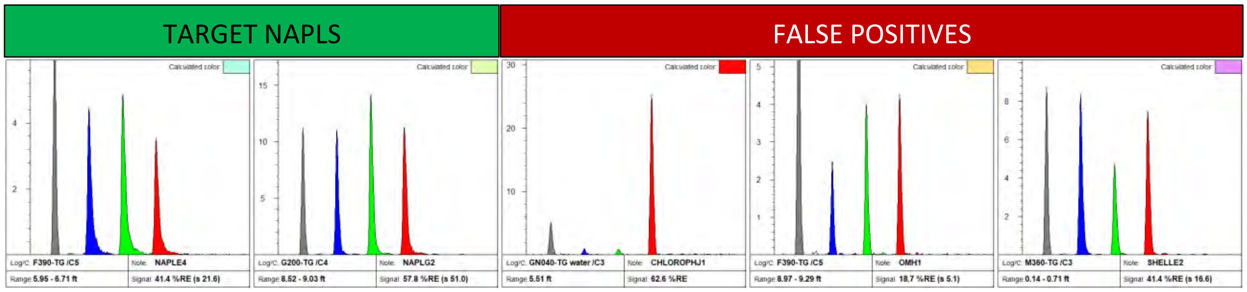


Figure 10. Basis Set waveforms used for NNLS fluorescence filtering

Appendix C contains images that document the NNLS processing setup and resulting data output. The first eight images depict the Basis Set waveform selection process, where the Basis Set waveforms shown in Figure 10 were harvested from field logs. The remaining figures contain the relative contribution for each of the Basis Set waveforms for each field log. The residual column at far right illustrates how well the sum of the Basis Set waveforms matched the original Field Data waveforms. The data in these graphs were also saved as numerical text files (depth vs %RE) and were made available to Jacobs for subsequent NAPL mapping and visualization.

Making the connection between the NNLS post processing logs and the field logs with their associated cluster diagrams is admittedly challenging. A cluster diagram overlay to assist with this dilemma was developed for this project and is shown in Figure 11. This overlay helps to bridge the gap between the field logs and the NNLS processing. Each polygon’s shape is based on the shape of the callout when the same waveforms used in the Basis Set are called out on the field log from which the Basis Set waveform was harvested. The color of each overlay polygon also matches the colors used in the NNLS processing output for each fluorescence type. Notice the Basis Set labels in the field log overlay are in the same order as the NNLS outputs (a NNLS graphic snip is shown at top of Figure 11).

Figure 11. Cluster diagram overlay of the Basis Set waveforms used in the NNLS processing employing dashed lines with colors that match the NNLS Basis set waveform colors.

Field logs from which the Basis Set waveforms were harvested contain callouts indicating what depth horizons contain the data selected for use as Basis Set waveforms. Those callouts are identified by name and are located on pages 12, 20, 26, and 56 in Appendix A. For instance, SHELLE2 was harvested from M360-TG from .07 - .69 ft which is shown in Callout 3 on page 56. It is difficult to see, but the violet dashed line of the overlay perfectly covers the standard gray line of Callout 3. It is worth noting that you can select, move, or even delete the overlay if it becomes a distraction for any reason.

4.0 LOGGING ACTIVITY

A detailed summary table of logging activity can be found in Appendix B.

Appendix A: TarGOST Logs for BNSF Wishram w Ex Situ

[Contained in separate PDF]

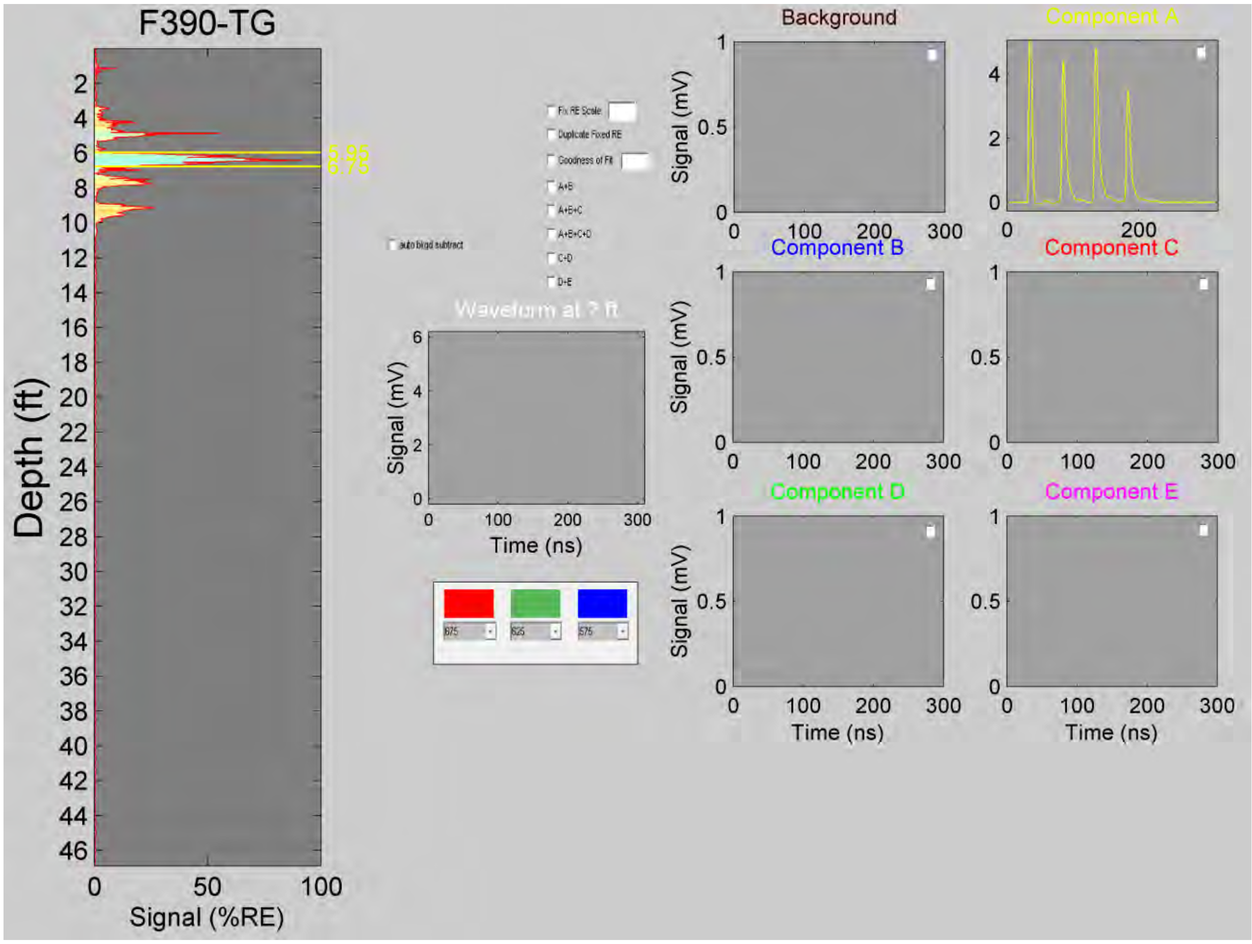
Appendix B: Logging Summary for BNSF Wishram

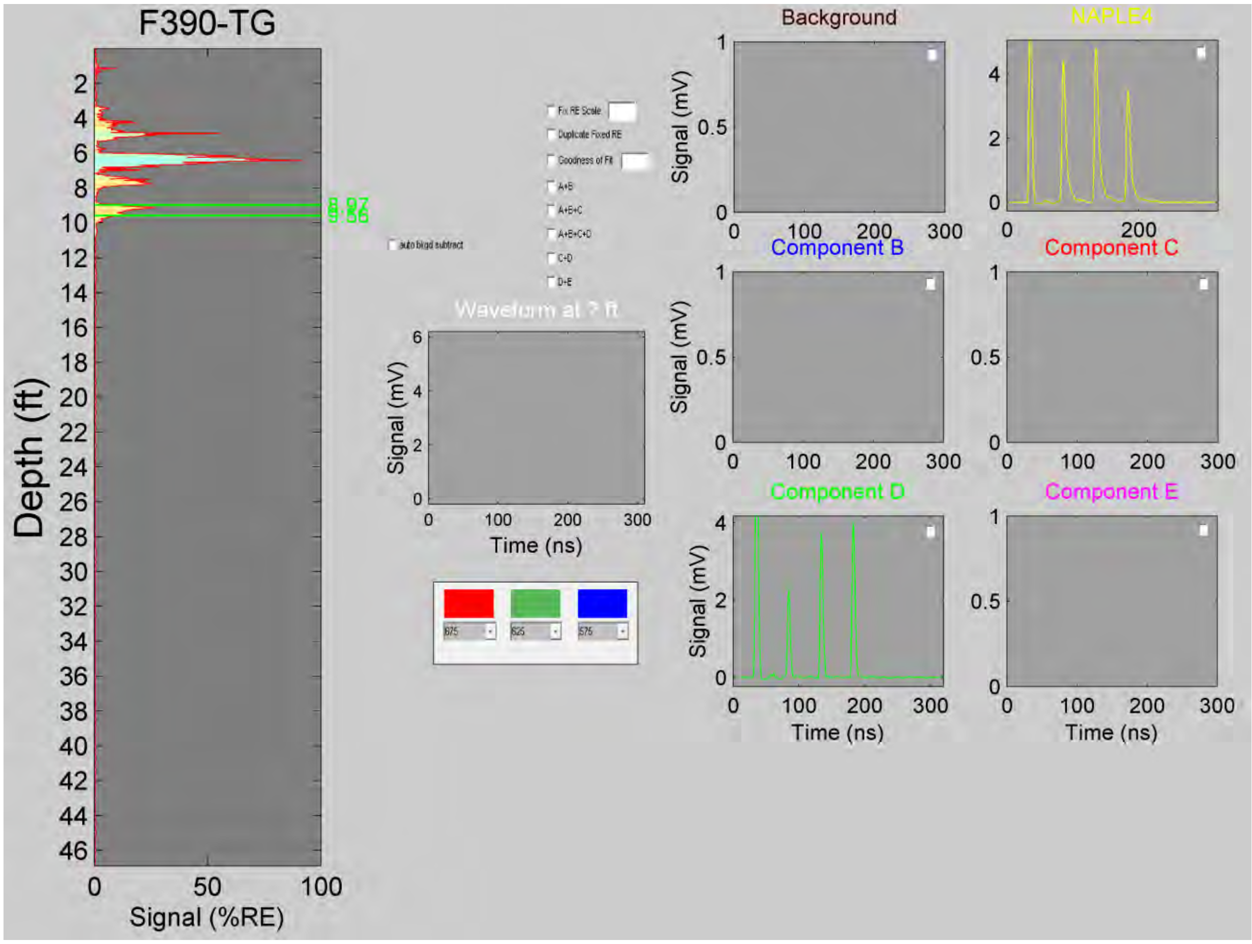
File	Date/Time	Final Depth (ft)	Max Signal (%RE)	Max Signal Depth (ft)	QA/QC -parameters in ()	
					RE Area (1600-2500)	Background Area (0-50)
G260-TG	11/1/2022 11:41	30.91	186.8	5.91	2177	0
G200-TG	11/1/2022 13:18	29.52	208.6	7.83	2101	21
G160-TG	11/1/2022 14:32	29.51	69	5.07	2072	20
G120-TG	11/1/2022 15:39	19.52	139.2	6.74	2199	18
G080-TG	11/2/2022 9:21	25.76	122.4	1.05	2164	20
G040-TG	11/2/2022 10:24	9.41	84.2	6.61	2034	19
G000-TG	11/2/2022 11:21	14.08	54.6	1.71	1966	18
G360-TG	11/2/2022 13:04	30	252.6	7.06	1832	17
G320-TG	11/2/2022 14:02	29.99	421	8.31	2253	18
I200-TG	11/2/2022 15:42	30	267.7	6.41	2337	19
EF240-TG	11/3/2022 9:30	32.17	124	1.66	2477	20
EF280-TG	11/3/2022 10:41	36.24	42.5	1.42	2162	17
F320-TG	11/3/2022 12:00	37.77	69.1	6.02	2059	17
F390-TG	11/3/2022 13:14	46.87	91.8	6.42	2112	17
EF420-TG	11/3/2022 14:19	36.32	20.6	7.34	2111	18
EF470-TG	11/3/2022 15:17	21.27	272	0.01	2058	17
I280-TG	11/6/2022 9:21	20.01	300.8	4.75	2245	18
K280-TG	11/6/2022 10:43	26.74	17.4	0.48	2068	18
M280-TG	11/6/2022 12:19	13.61	8.8	0.03	2225	18
K200-TG	11/6/2022 13:21	25.41	5.7	0.42	2130	19
I160-TG	11/6/2022 14:24	16.51	86.5	0.9	2031	17
I120-TG	11/6/2022 15:03	37.06	2.2	0.24	2007	18
L240-TG	11/7/2022 8:30	28.14	2.9	0.32	2296	19
I360-TG	11/7/2022 9:45	17.39	36.1	3.05	2135	20
K360-TG	11/7/2022 10:36	17.11	25.7	1.19	2039	17
M360-TG	11/7/2022 11:46	13.68	69.3	0.43	2094	19
I400-TG	11/7/2022 13:07	20.46	19.9	1.6	1953	18
K400-TG	11/7/2022 14:12	14.71	21.1	0.21	1924	0
M400-TG	11/7/2022 14:51	17.32	8.3	0.89	2031	16
EF000-TG	11/10/2022 10:05	11.94	3.2	0.93	2084	21
E060-TG	11/10/2022 10:40	16.35	5.6	1.36	2035	20
E120-TG	11/10/2022 11:18	23.26	9.6	0.87	1947	17
E190-TG	11/10/2022 12:08	32.77	14.4	1.19	1895	18
GN040-TG	11/10/2022 13:04	11.55	42.7	8.19	1775	18
G500-TG	11/10/2022 13:44	10.04	2.8	-0.11	1886	16
E520-TG	11/10/2022 14:28	21.28	6.4	2.61	2019	19
H460-TG	11/10/2022 15:07	20.87	43	5.1	1960	18
I500-TG	11/11/2022 8:37	3.6	11.4	0.16	2193	22
K440-TG	11/11/2022 9:25	12.58	14.4	0.71	1985	20
K160-TG	11/11/2022 10:22	16.04	6.9	10.85	2028	20
J060-TG	11/11/2022 11:22	16.46	1.7	2.73	2035	22
JN040-TG	11/11/2022 12:05	13.62	1.8	0.53	1978	18
HN100-TG	11/11/2022 12:49	10.67	206.5	7.33	2024	22
M190-TG	11/11/2022 13:23	10.41	1.5	0.1	2028	20
O280-TG	11/11/2022 13:58	15.54	4.8	1.67	2077	22
HN200-TG	11/14/2022 10:17	7.99	39.2	7.89	2155	0
JN160-TG	11/14/2022 10:51	8.09	56.5	7.86	2213	21
JN100-TG	11/14/2022 11:25	15.72	9.4	5.5	2067	18
MN160-TG	11/14/2022 12:12	8.32	5.6	0.15	1994	20
KN220-TG	11/14/2022 12:50	3.93	10.6	1.14	2046	21
HN280-TG	11/14/2022 13:30	7.22	18.6	1.09	2053	20
FGN160-TG	11/14/2022 15:03	11.32	31.6	0.7	2066	19
FN100-TG	11/15/2022 10:15	12.73	42.8	0.23	2058	20
EN060-TG	11/15/2022 10:46	9.28	300.5	0.48	1982	17
KN280-TG	11/15/2022 11:25	6.43	11.3	4.11	1955	17

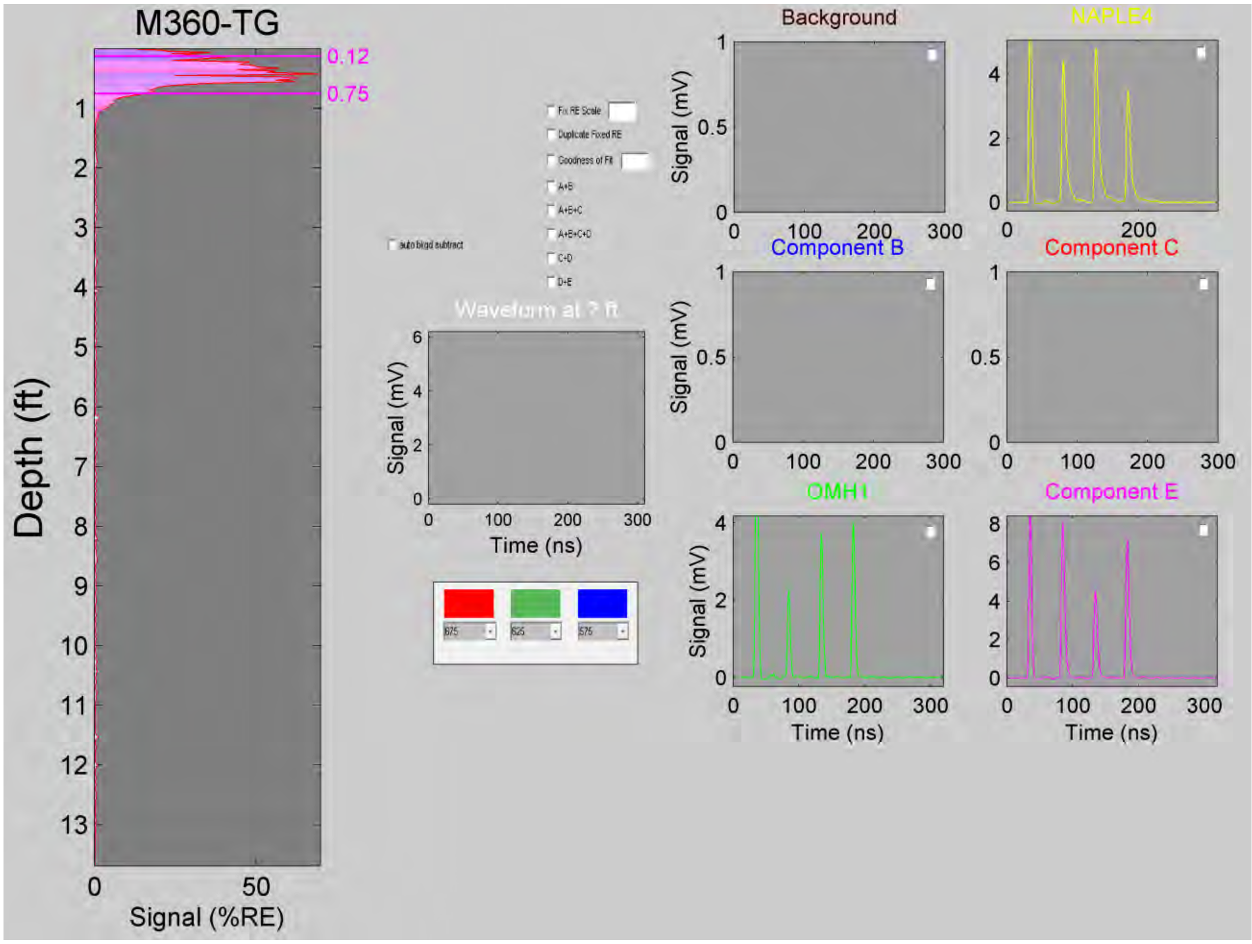
File	Date/Time	Final Depth (ft)	Max Signal (%RE)	Max Signal Depth (ft)	QA/QC -parameters in ()	
					RE Area (1600-2500)	Background Area (0-50)
MN100-TG	11/15/2022 11:59	3.51	1.7	0.25	1954	19
J000-TG	11/15/2022 13:09	11.71	1.9	2.54	1844	21
L120-TG	11/15/2022 13:49	12.97	3.3	0.11	1833	14
Ex-situ emulation logs						
F390-TG false pos	11/7/2022 11:17	14.9	125.3	14.8	1989	19
K360-TG-EX	11/9/2022 8:52	26.9	134.4	4.7	2177	21
I160-TG-EX	11/9/2022 10:58	6.9	41.8	4.8	1924	18
GN040-TG water	11/10/2022 13:02	13.98	85.4	5.51	1775	0
K280-TG-EX	11/10/2022 14:07	15.9	266.6	2.9	1967	19
Wishram Samples	12/16/2022 12:26	NA	NA	NA	NA	NA

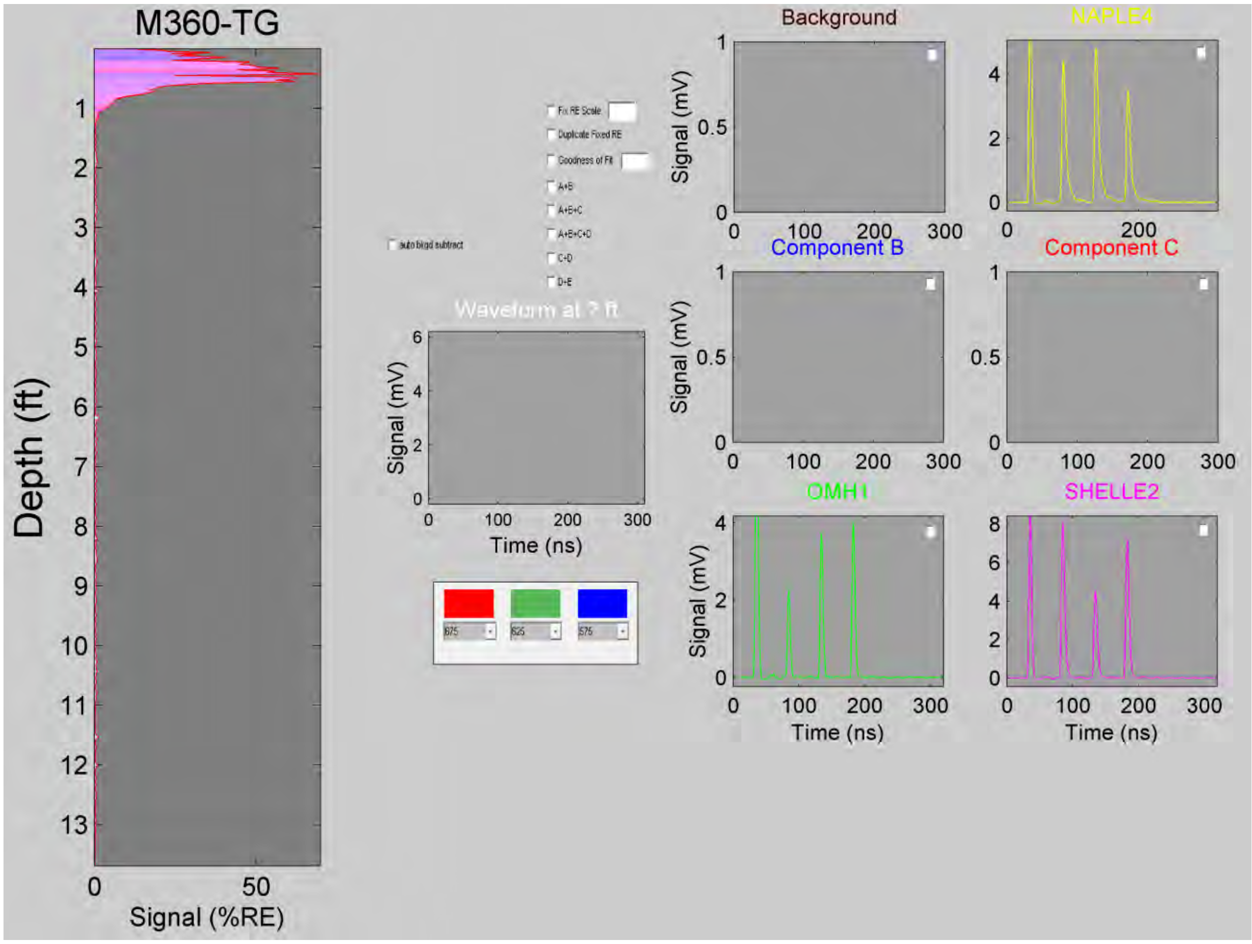
File Count=64
Total Depth=1172.3
Max Depth=46.9
Max Signal=421.0

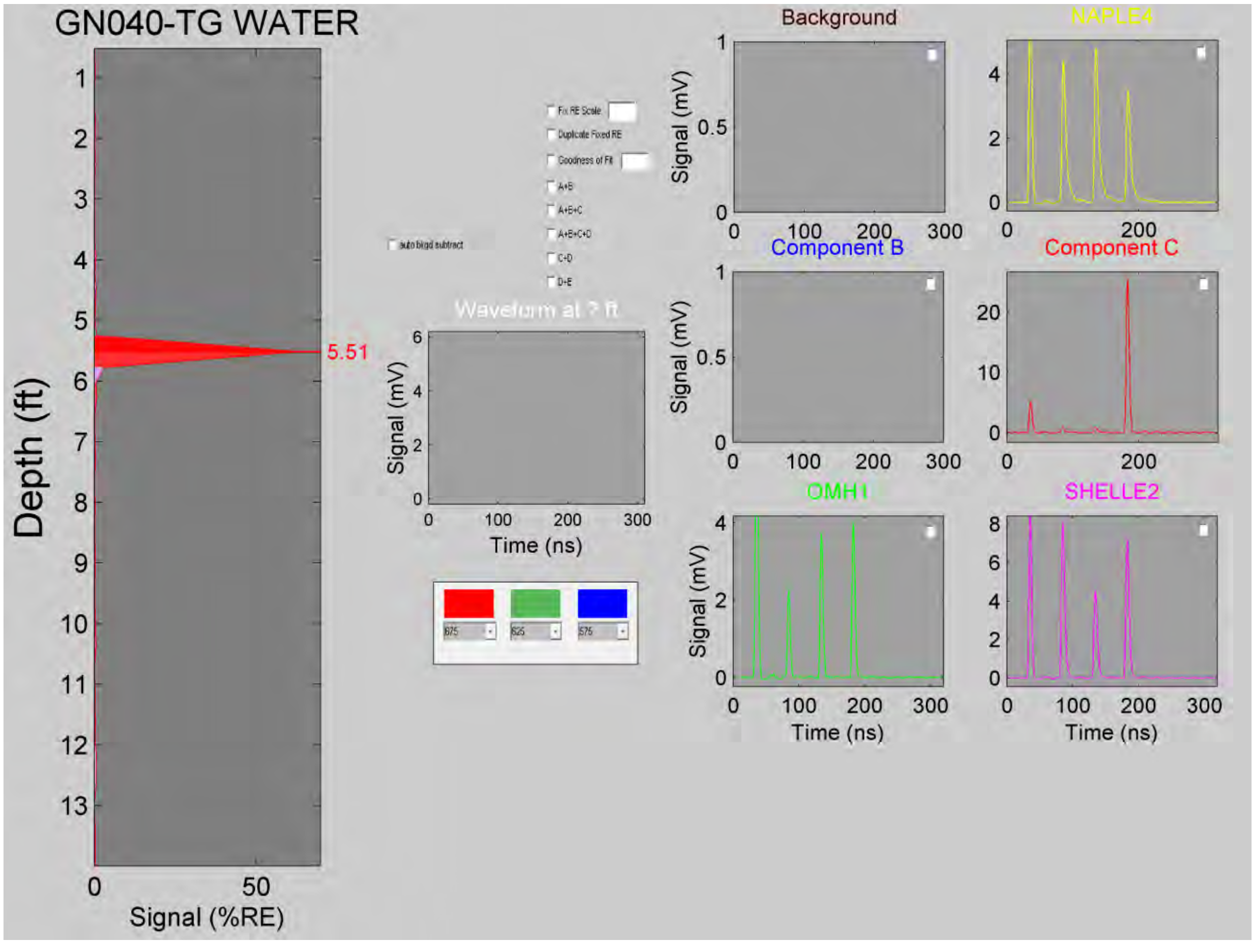
Appendix C: NNLS LOGS

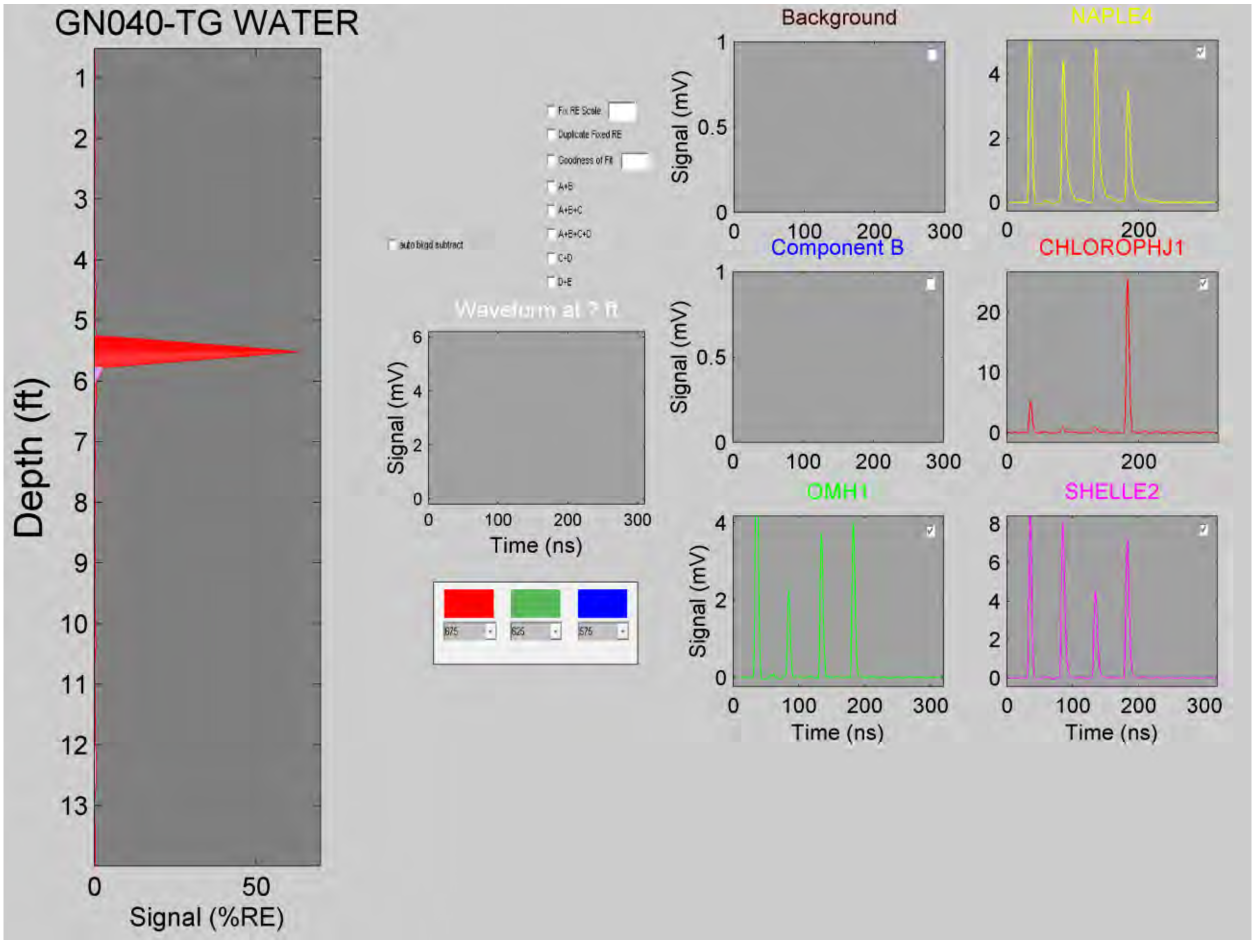

F390-TG
Depth (ft)
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
0
50
100
Signal (%RE)
5.95
6.75
☐ Fix RE Scale
☐ Duplicate Fixed RE
☐ Goodness of Fit
☐ A+B
☐ A+B+C
☐ A+B+C+D
☐ C+D
☐ D+E
☐ auto bkgd subtract
Waveform at ? ft
Signal (mV)
Time (ns)
675
625
575
Background
Component A
Component B
Component C
Component D
Component E
Signal (mV)
Time (ns)

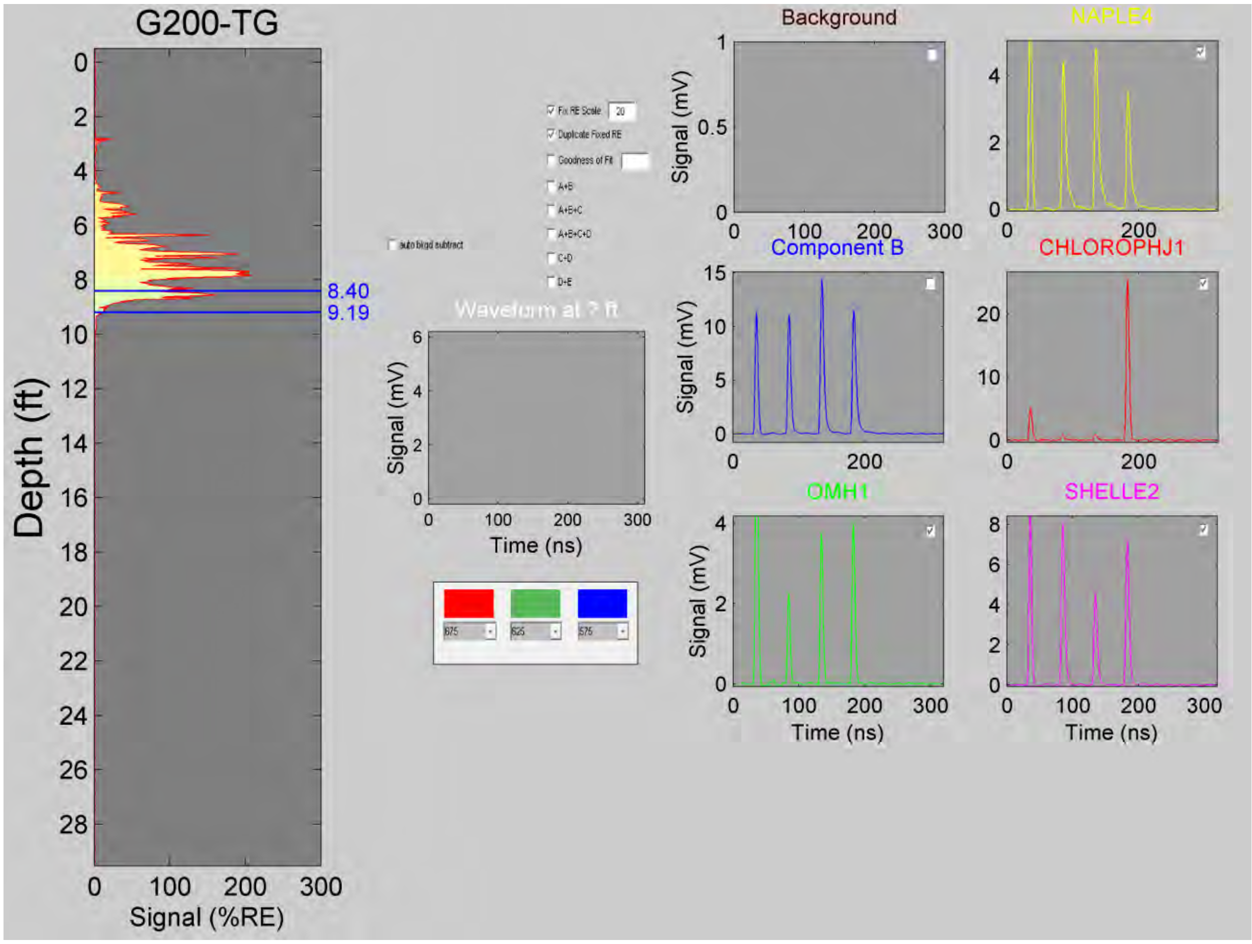

F390-TG
Depth (ft)
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
0
50
100
Signal (%RE)
8.97
9.06
☐ auto bkgd subtract
☐ Fix RE Scale
☐ Duplicate Fixed RE
☐ Goodness of Fit
☐ A+B
☐ A+B+C
☐ A+B+C+D
☐ C+D
☐ D+E
Waveform at ? ft
Signal (mV)
6
4
2
0
0
100
200
300
Time (ns)
675
525
575
Background
Signal (mV)
1
0.5
0
0
100
200
300
NAPLE4
4
2
0
0
200
Component B
Signal (mV)
1
0.5
0
0
100
200
300
Component C
1
0.5
0
0
100
200
300
Component D
Signal (mV)
4
2
0
0
100
200
300
Time (ns)
Component E
1
0.5
0
0
100
200
300
Time (ns)


M360-TG
0.12
0.75
Depth (ft)
1
2
3
4
5
6
7
8
9
10
11
12
13
0
50
Signal (%RE)
☐ Fix RE Scale
☐ Duplicate Fixed RE
☐ Goodness of Fit
☐ A+B
☐ A+B+C
☐ A+B+C+D
☐ C+D
☐ D+E
☐ auto bkgd subtract
Waveform at ? ft
Signal (mV)
Time (ns)
675
625
575
Background
NAPLE4
Component B
Component C
OMH1
Component E
0
100
200
300

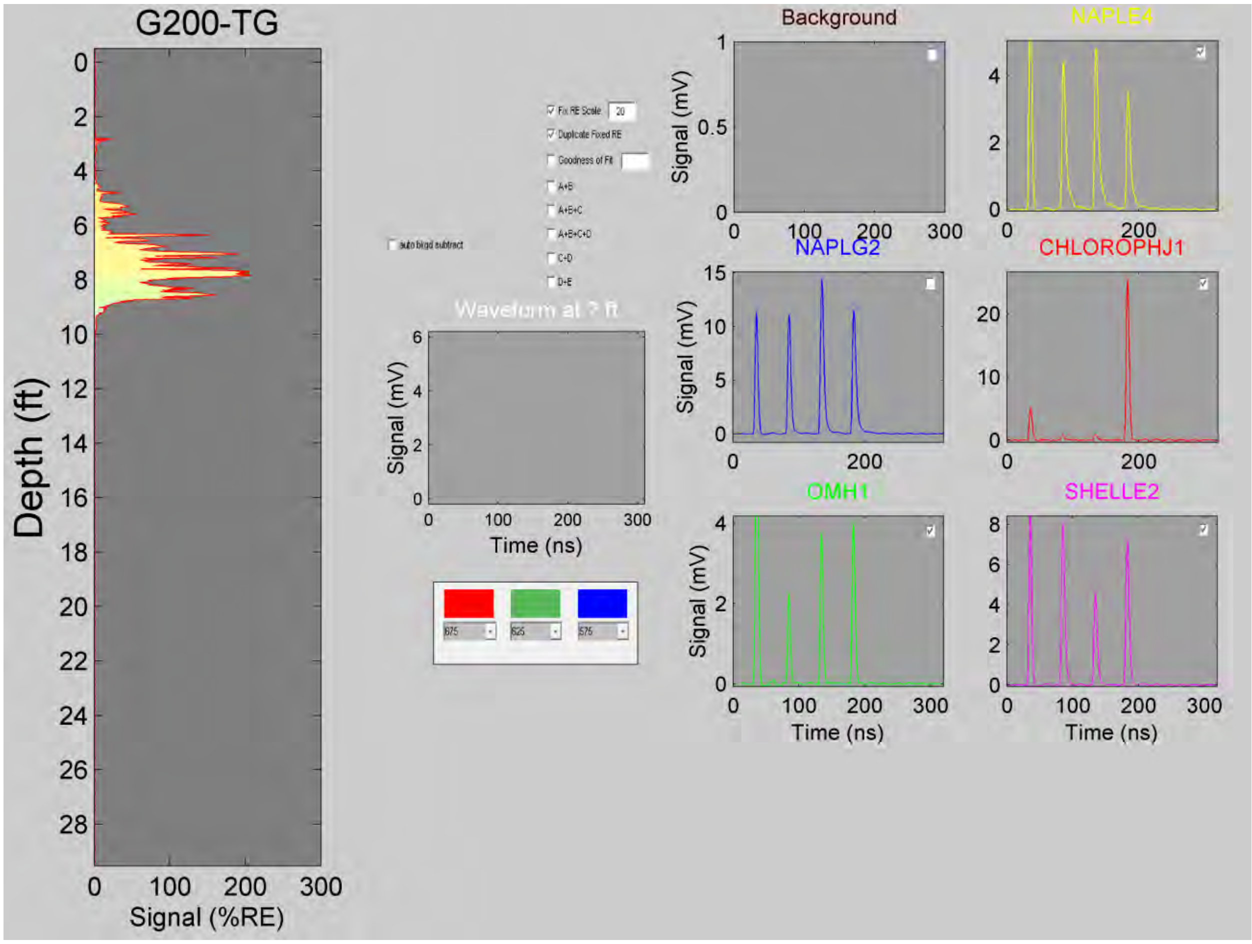

M360-TG
Depth (ft)
1
2
3
4
5
6
7
8
9
10
11
12
13
0
50
Signal (%RE)
☐ Fix RE Scale
☐ Duplicate Fixed RE
☐ Goodness of Fit
☐ A+B
☐ A+B+C
☐ A+B+C+D
☐ C+D
☐ D+E
☐ auto bkgd subtract
Waveform at ? ft
Signal (mV)
6
4
2
0
100
200
300
Time (ns)
675
525
575
Background
1
0.5
0
NAPLE4
Component B
Component C
OMH1
SHELLE2
8
6
4
2
0
100
200
300
Time (ns)


GN040-TG WATER
Depth (ft)
1
2
3
4
5
6
7
8
9
10
11
12
13
5.51
0
50
Signal (%RE)
☐ Fix RE Scale
☐ Duplicate Fixed RE
☐ Goodness of Fit
☐ A+B
☐ A+B+C
☐ A+B+C+D
☐ C+D
☐ D+E
☐ auto bkgd subtract
Waveform at ? ft
Signal (mV)
6
4
2
0
0
100
200
300
Time (ns)
🟥 675
🟩 525
🟦 575
Background
Signal (mV)
1
0.5
0
0
100
200
300
NAPLE4
4
2
0
0
200
Component B
Signal (mV)
1
0.5
0
0
100
200
300
Component C
20
10
0
0
200
OMH1
Signal (mV)
4
2
0
0
100
200
300
Time (ns)
SHELLE2
8
6
4
2
0
0
100
200
300
Time (ns)


GN040-TG WATER
Depth (ft)
1
2
3
4
5
6
7
8
9
10
11
12
13
0
50
Signal (%RE)
☐ Fix RE Scale
☐ Duplicate Fixed RE
☐ Goodness of Fit
☐ A+B
☐ A+B+C
☐ A+B+C+D
☐ C+D
☐ D+E
☐ auto bkgd subtract
Waveform at ? ft
Signal (mV)
6
4
2
0
0
100
200
300
Time (ns)
675
625
575
Background
Signal (mV)
1
0.5
0
0
100
200
300
NAPLE4
4
2
0
0
200
Component B
Signal (mV)
1
0.5
0
0
100
200
300
CHLOROPHJ1
20
10
0
0
200
OMH1
Signal (mV)
4
2
0
0
100
200
300
Time (ns)
SHELLE2
8
6
4
2
0
0
100
200
300
Time (ns)



☑ Fix RE Scale 20
☑ Duplicate Fixed RE
☐ Goodness of Fit
☐ A+B
☐ A+B+C
☐ A+B+C+D
☐ C+D
☐ D+E
☐ auto bkgd subtract



☑ Fix RE Scale 20

☑ Duplicate Fixed RE

☐ Goodness of Fit

☐ A+B

☐ A+B+C

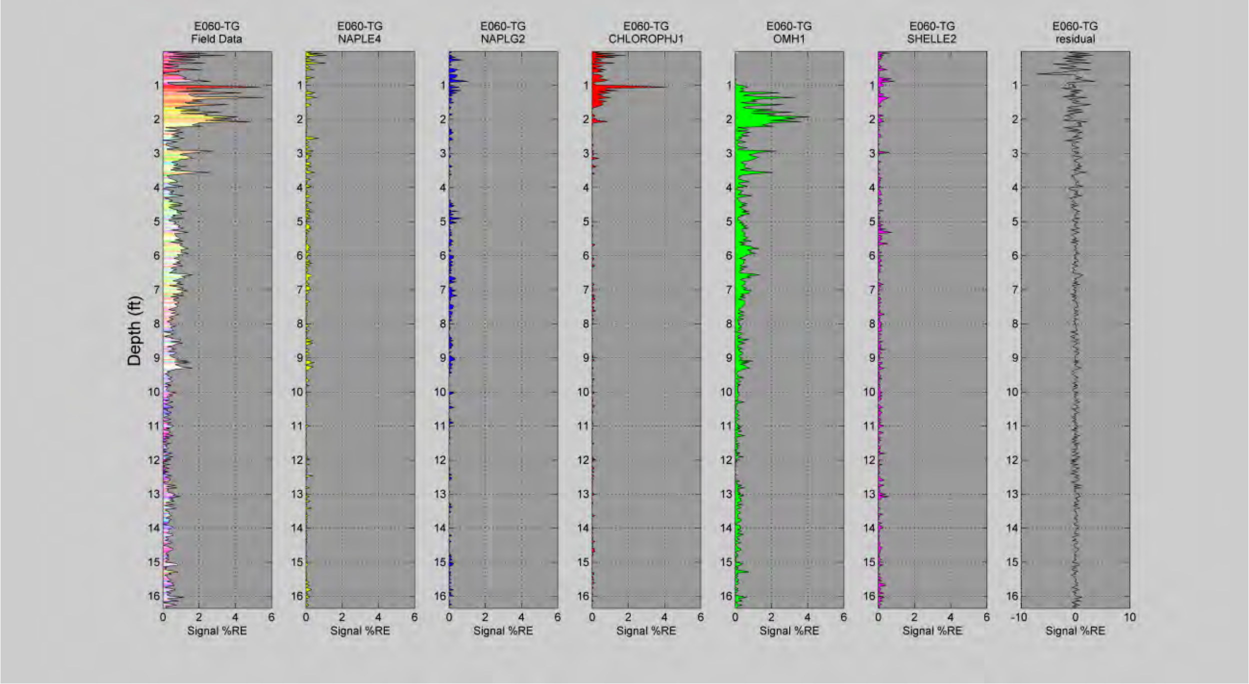
☐ A+B+C+D

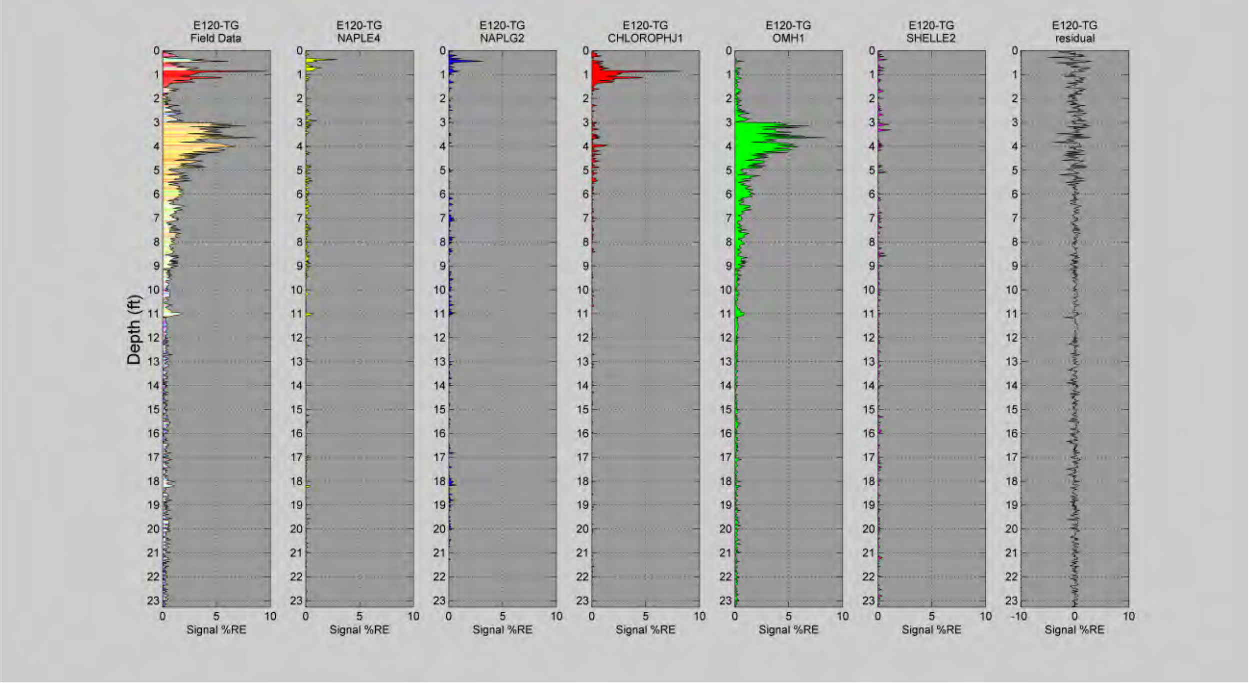
☐ C+D

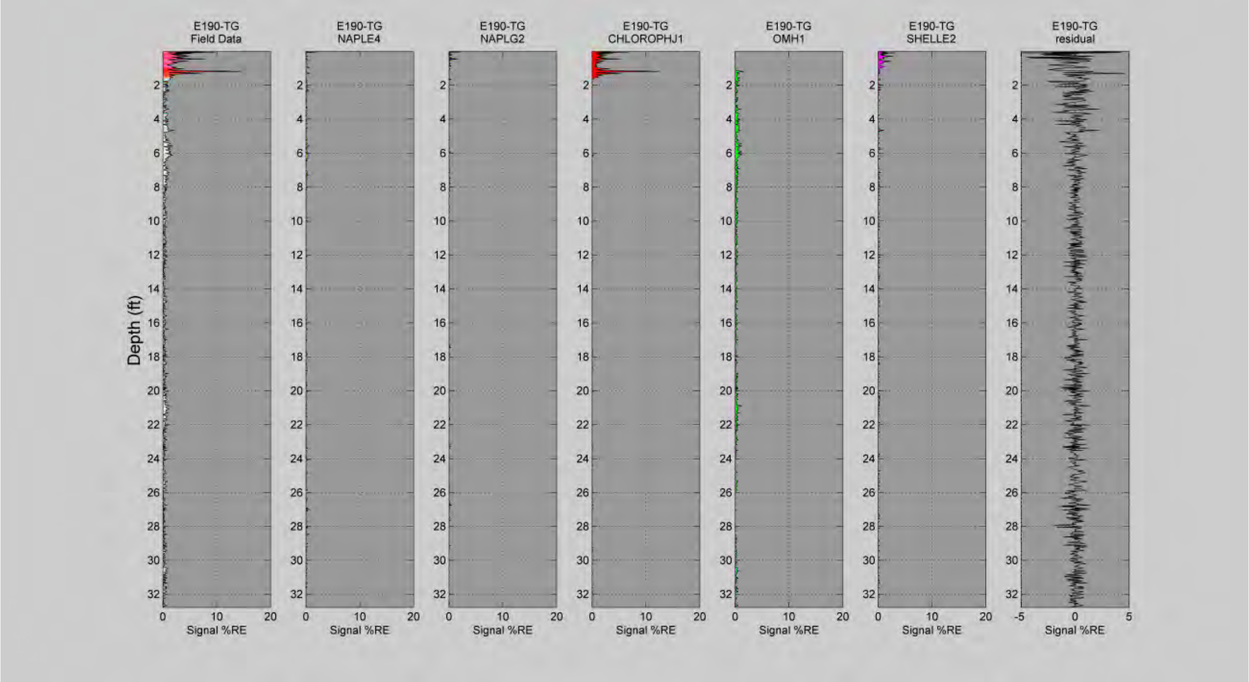
☐ D+E

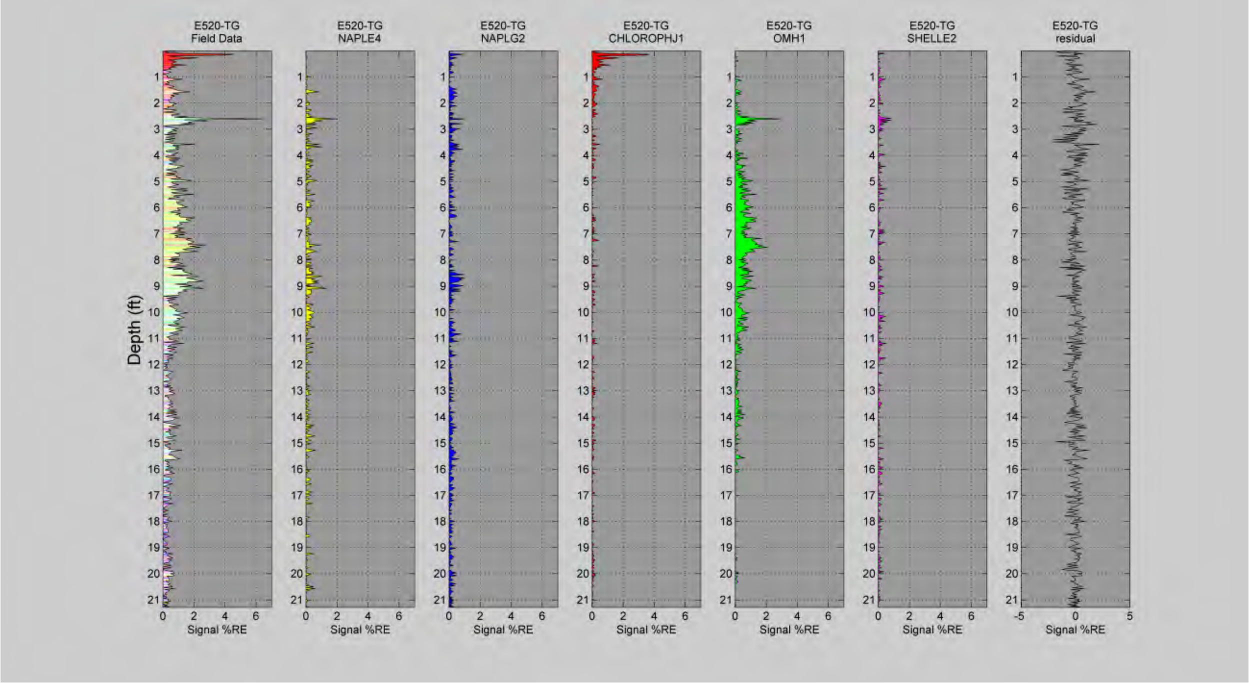
☐ auto bkgd subtract

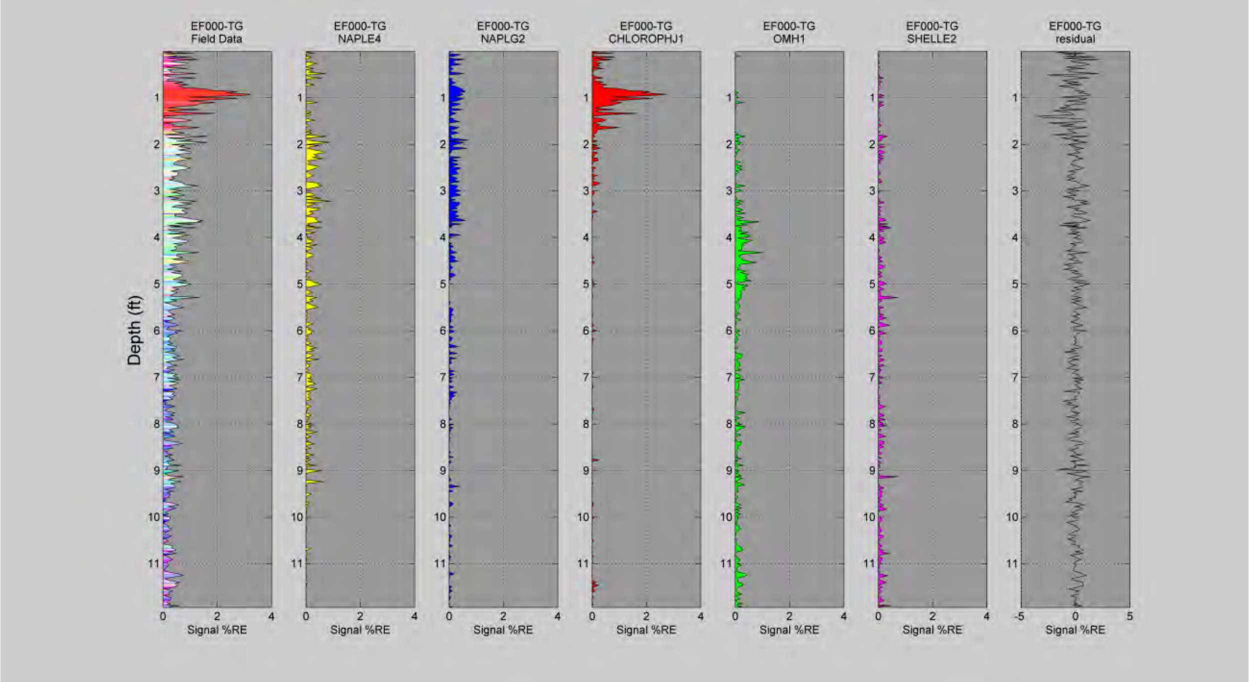
675 ▾ 625 ▾ 575 ▾

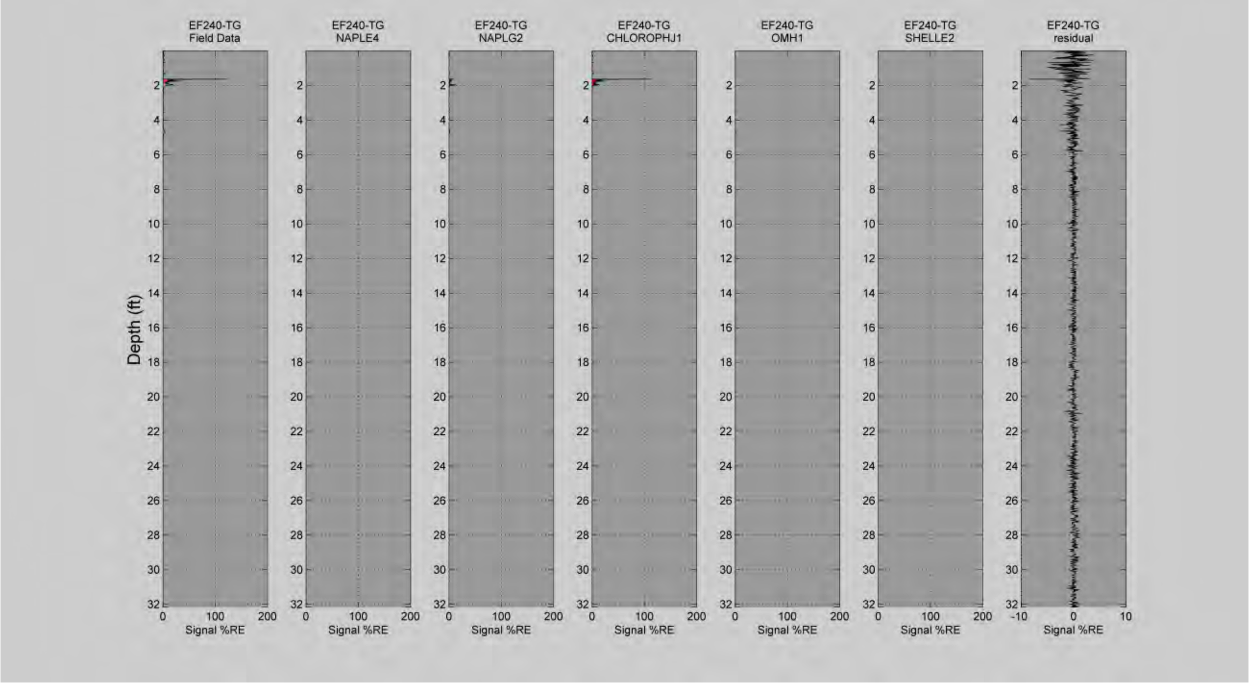

E060-TG
Field Data
E060-TG
NAPLE4
E060-TG
NAPLG2
E060-TG
CHLOROPHJ1
E060-TG
OMH1
E060-TG
SHELLE2
E060-TG
residual
Depth (ft)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
0
2
4
6
-10
0
10
Signal %RE

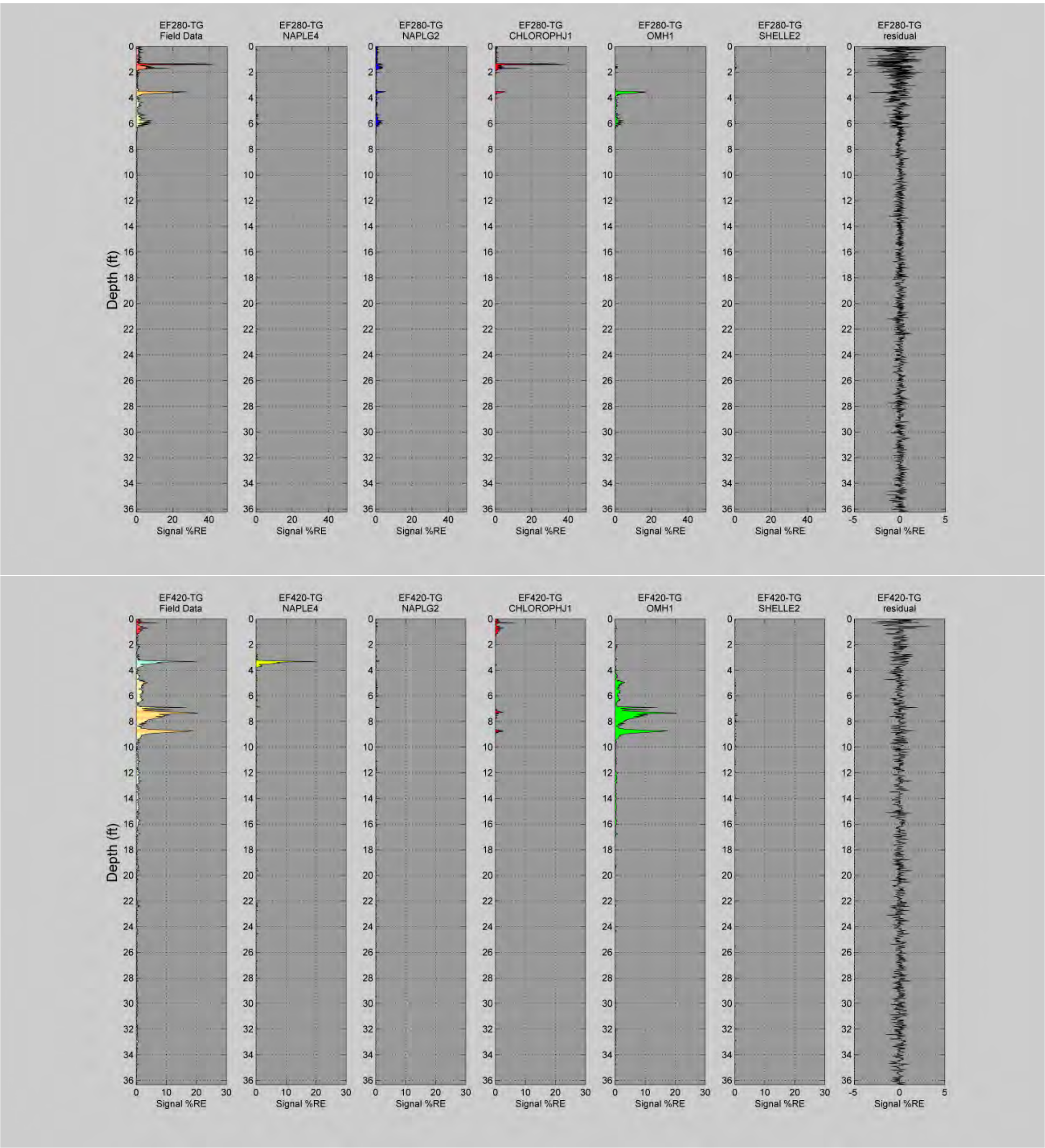

E120-TG
Field Data
E120-TG
NAPLE4
E120-TG
NAPLG2
E120-TG
CHLOROPHJ1
E120-TG
OMH1
E120-TG
SHELLE2
E120-TG
residual
Depth (ft)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
0
5
10
-10
Signal %RE

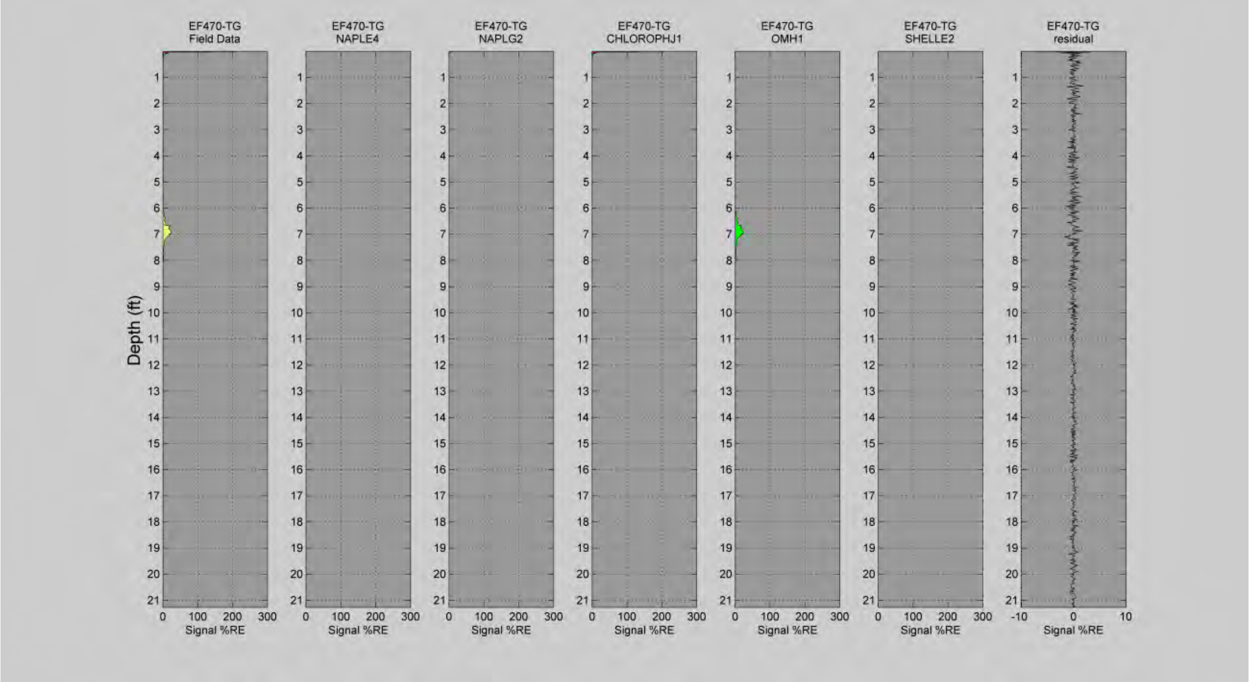

E190-TG
Field Data
E190-TG
NAPLE4
E190-TG
NAPLG2
E190-TG
CHLOROPHJ1
E190-TG
OMH1
E190-TG
SHELLE2
E190-TG
residual
Depth (ft)
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
0
10
20
-5
0
5
Signal %RE

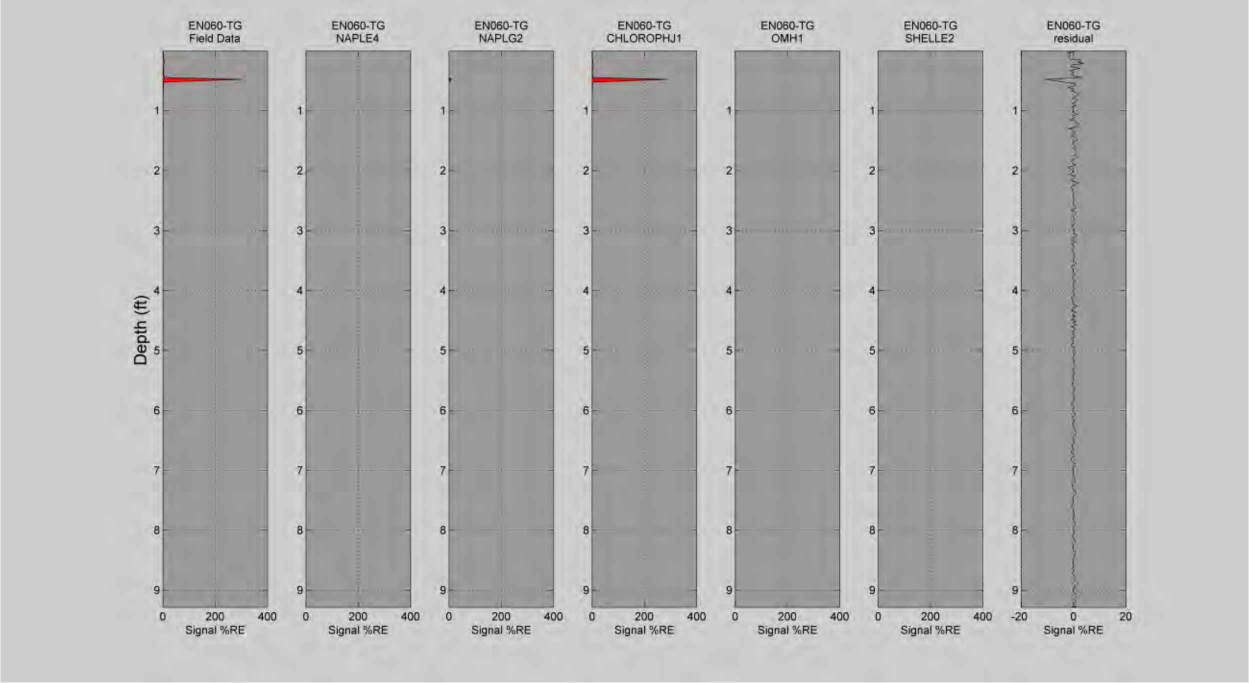

E520-TG
Field Data
E520-TG
NAPLE4
E520-TG
NAPLG2
E520-TG
CHLOROPHJ1
E520-TG
OMH1
E520-TG
SHELLE2
E520-TG
residual
Depth (ft)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
0
2
4
6
-5
0
5
Signal %RE

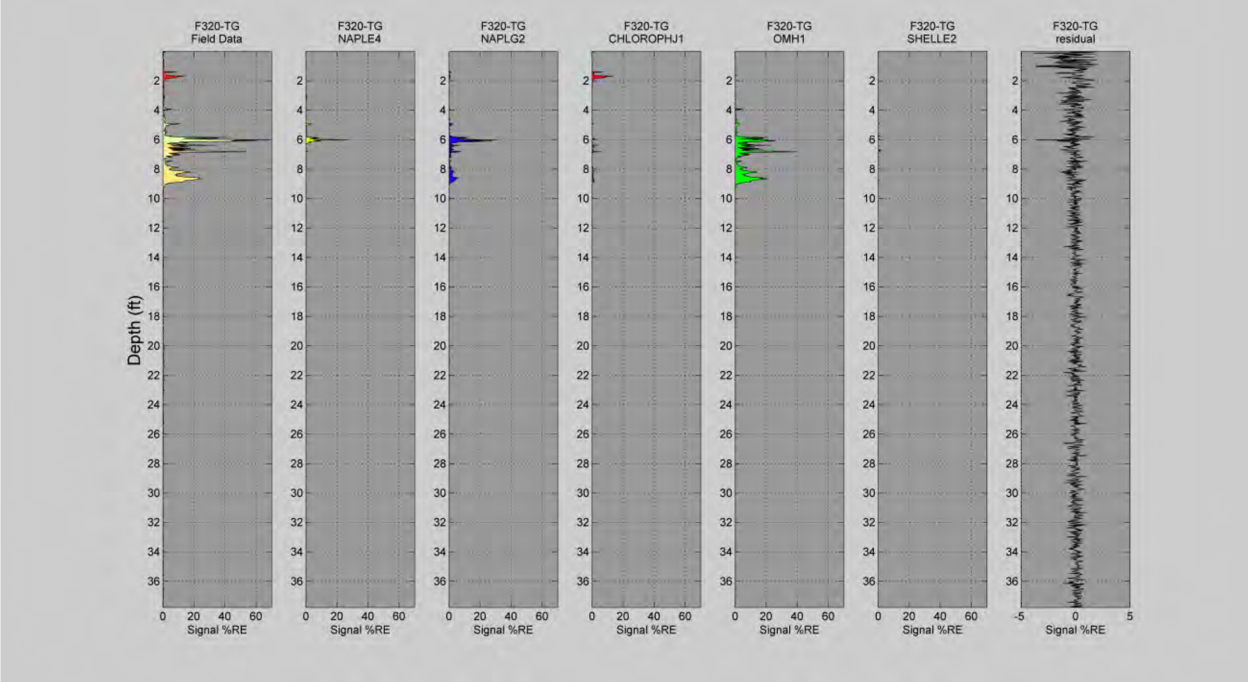

EF000-TG Field Data
EF000-TG NAPLE4
EF000-TG NAPLG2
EF000-TG CHLOROPHJ1
EF000-TG OMH1
EF000-TG SHELLE2
EF000-TG residual
Depth (ft)
1
2
3
4
5
6
7
8
9
10
11
0
2
4
-5
0
5
Signal %RE

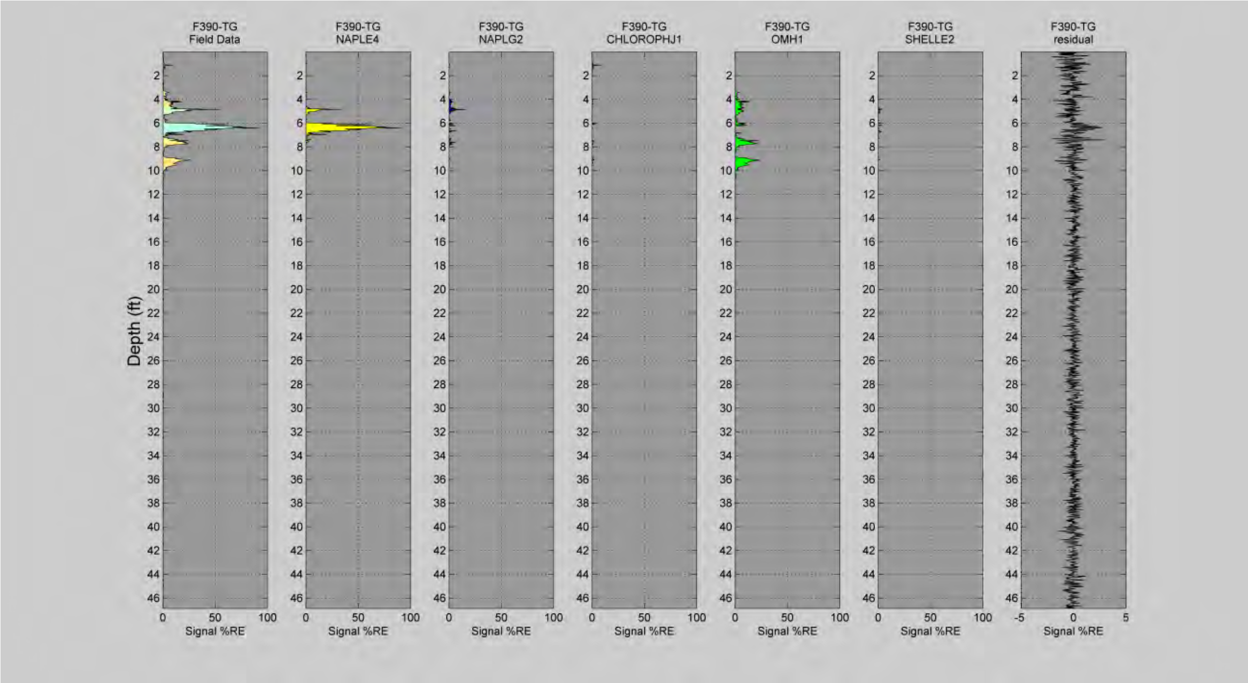

EF240-TG Field Data
EF240-TG NAPLE4
EF240-TG NAPLG2
EF240-TG CHLOROPHJ1
EF240-TG OMH1
EF240-TG SHELLE2
EF240-TG residual
Depth (ft)
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
0
100
200
-10
0
10
Signal %RE

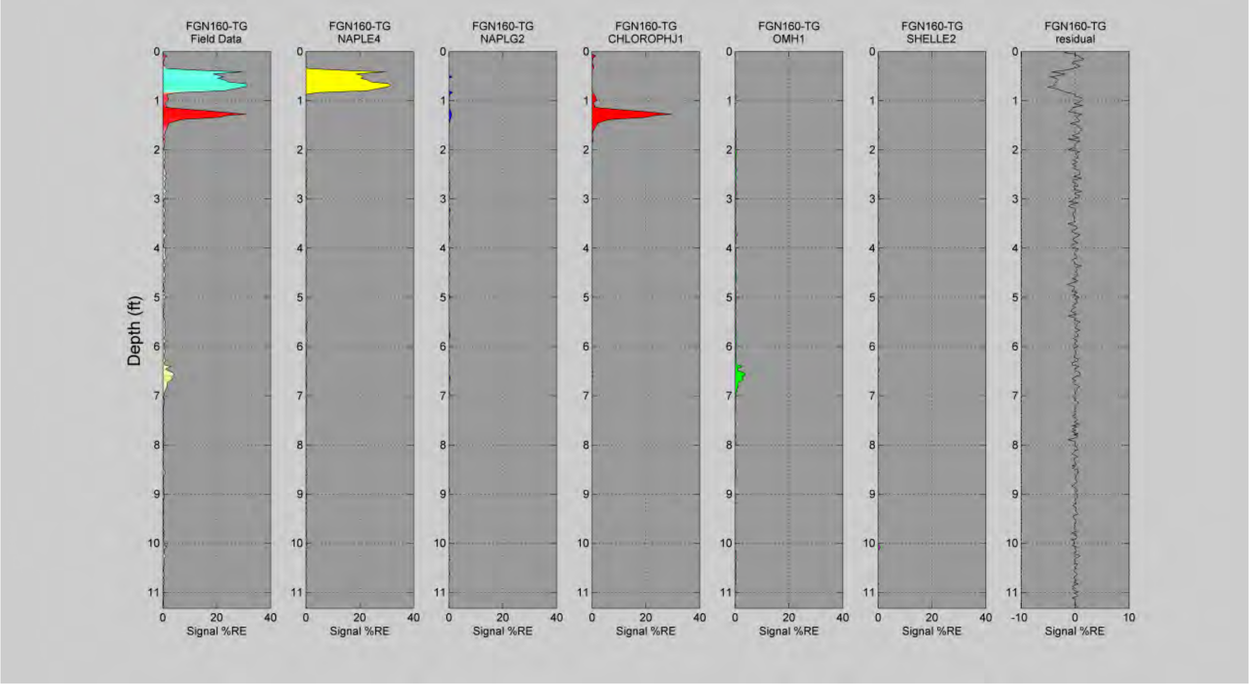

EF280-TG Field Data
EF280-TG NAPLE4
EF280-TG NAPLG2
EF280-TG CHLOROPHJ1
EF280-TG OMH1
EF280-TG SHELLE2
EF280-TG residual
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
0
20
40
-5
5
Signal %RE
EF420-TG Field Data
EF420-TG NAPLE4
EF420-TG NAPLG2
EF420-TG CHLOROPHJ1
EF420-TG OMH1
EF420-TG SHELLE2
EF420-TG residual
10
30

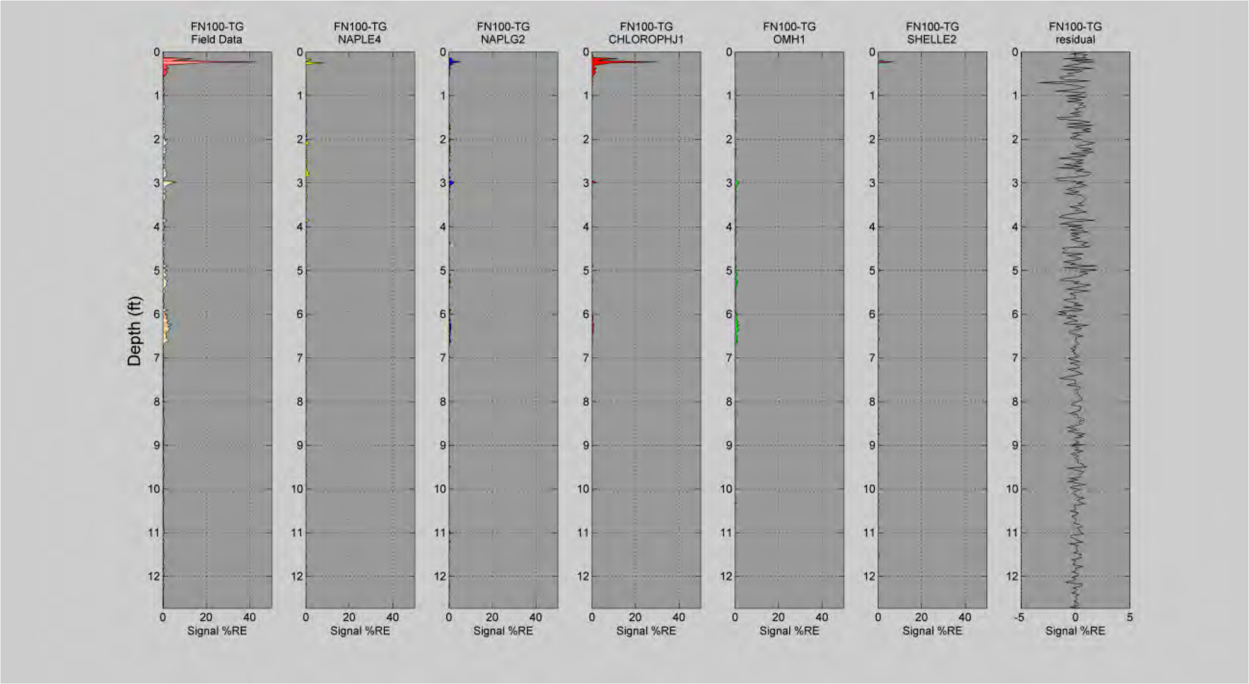

EF470-TG
Field Data
EF470-TG
NAPLE4
EF470-TG
NAPLG2
EF470-TG
CHLOROPHJ1
EF470-TG
OMH1
EF470-TG
SHELLE2
EF470-TG
residual
Depth (ft)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
0
100
200
300
-10
0
10
Signal %RE

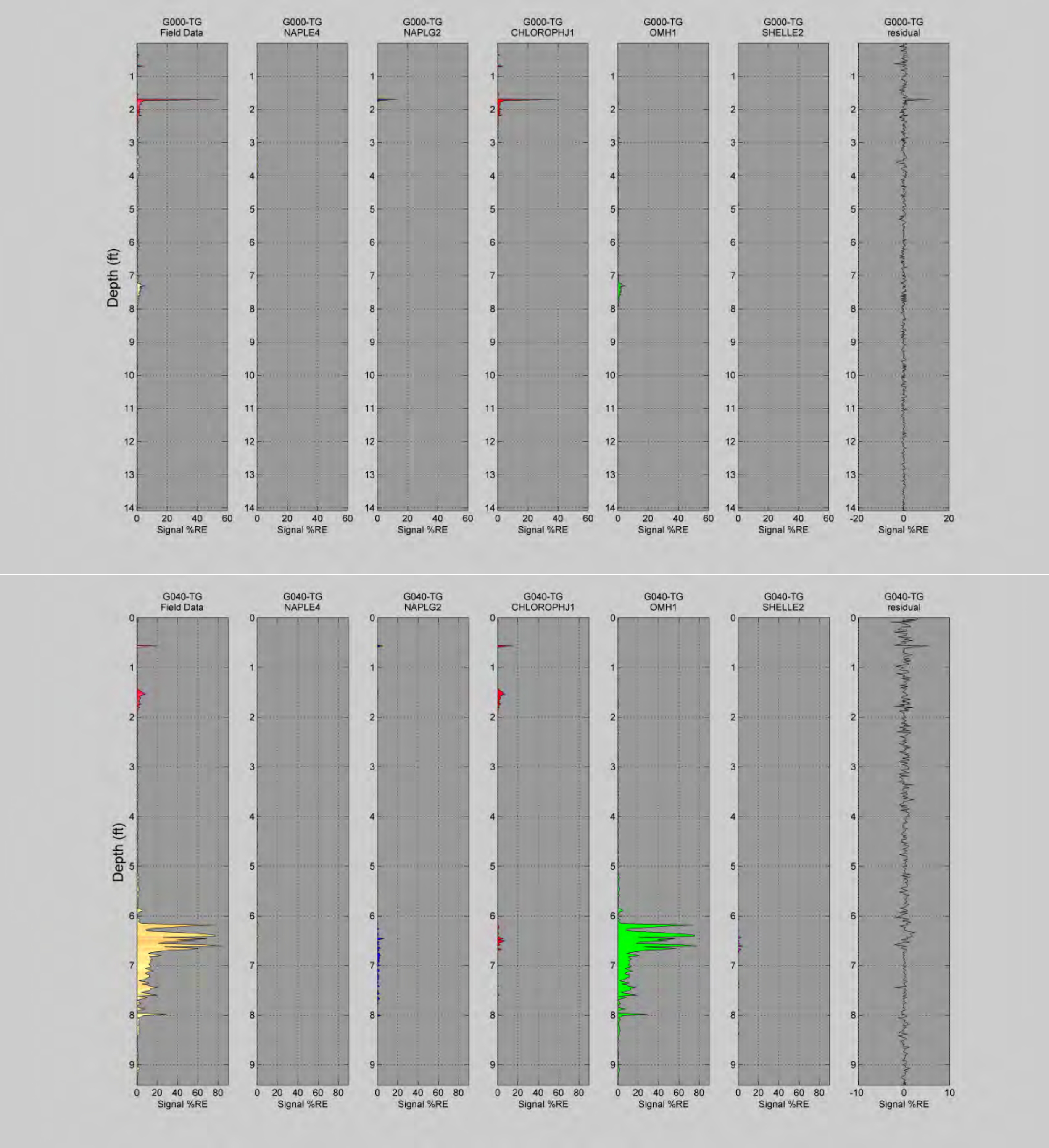

EN060-TG
Field Data
EN060-TG
NAPLE4
EN060-TG
NAPLG2
EN060-TG
CHLOROPHJ1
EN060-TG
OMH1
EN060-TG
SHELLE2
EN060-TG
residual
Depth (ft)
1
2
3
4
5
6
7
8
9
0
200
400
-20
0
20
Signal %RE

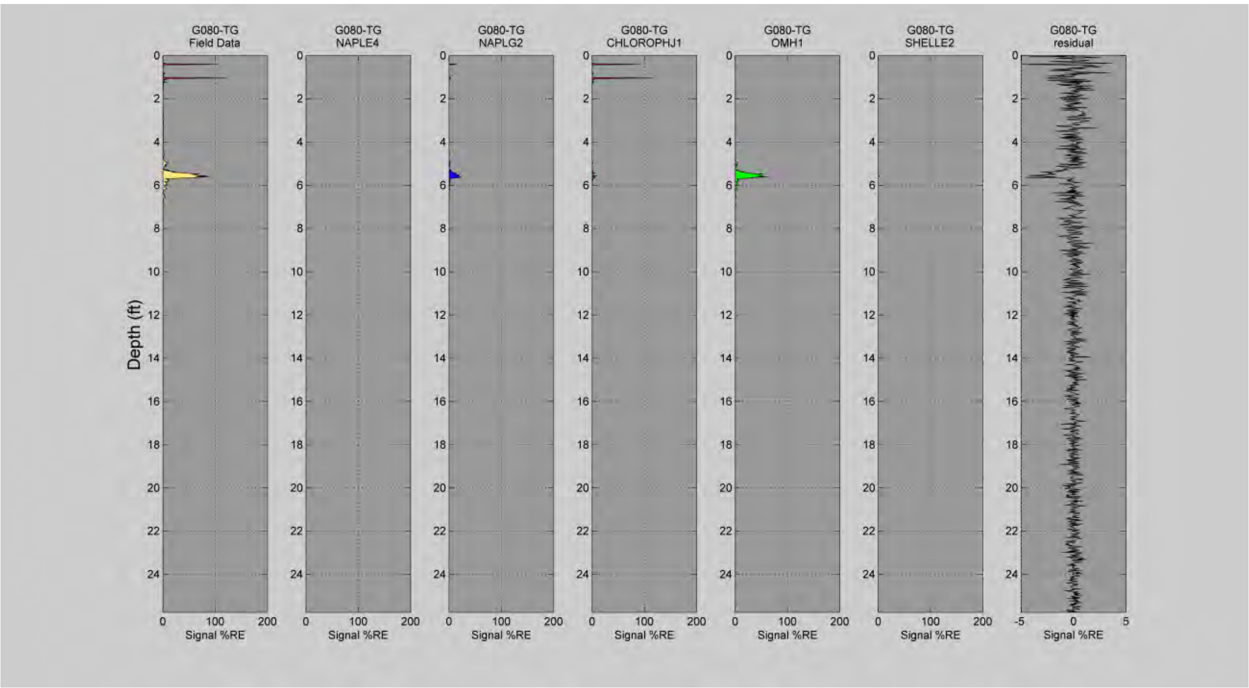

F320-TG
Field Data
F320-TG
NAPLE4
F320-TG
NAPLG2
F320-TG
CHLOROPHJ1
F320-TG
OMH1
F320-TG
SHELLE2
F320-TG
residual
Depth (ft)
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
0
20
40
60
-5
0
5
Signal %RE

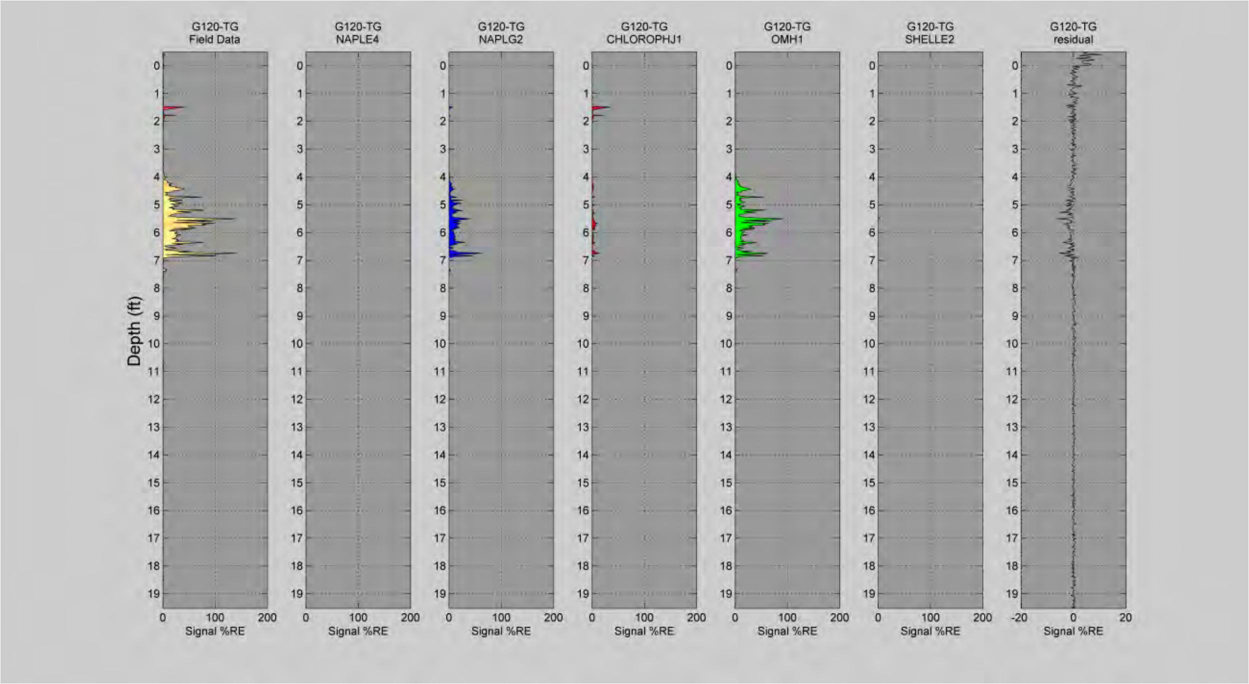

F390-TG
Field Data
F390-TG
NAPLE4
F390-TG
NAPLG2
F390-TG
CHLOROPHJ1
F390-TG
OMH1
F390-TG
SHELLE2
F390-TG
residual
Depth (ft)
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
0
50
100
-5
0
5
Signal %RE

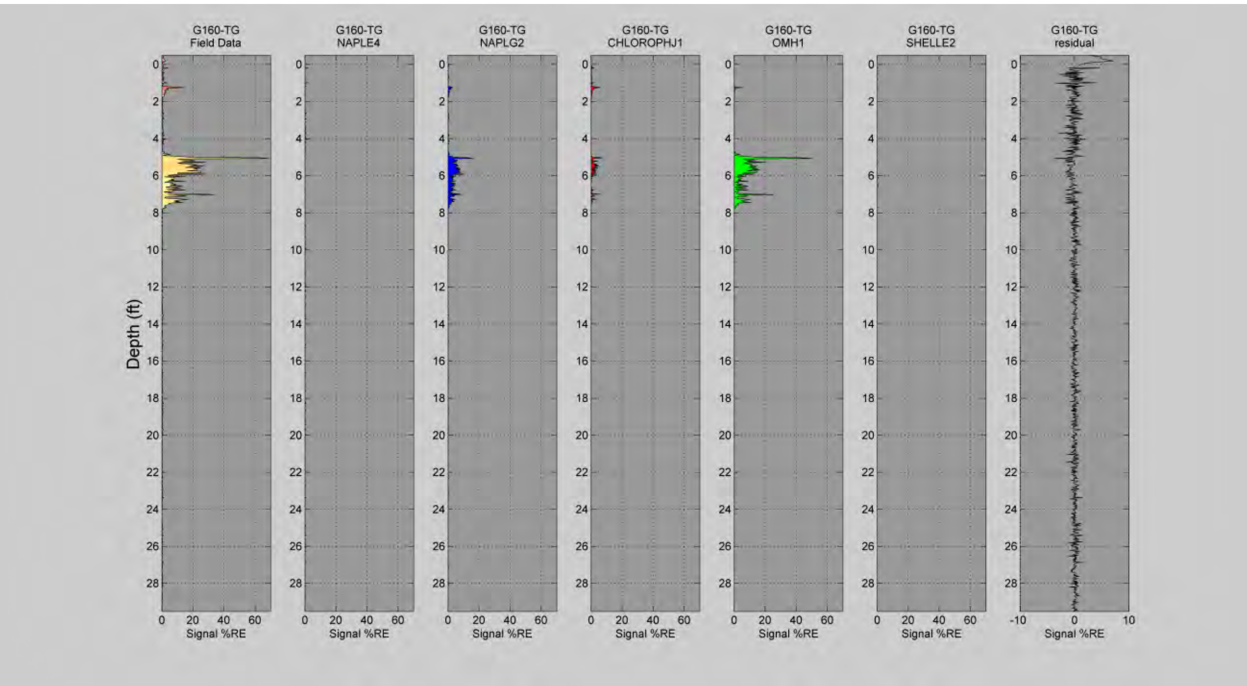

FGN160-TG Field Data
FGN160-TG NAPLE4
FGN160-TG NAPLG2
FGN160-TG CHLOROPHJ1
FGN160-TG OMH1
FGN160-TG SHELLE2
FGN160-TG residual
Depth (ft)
0
1
2
3
4
5
6
7
8
9
10
11
0
20
40
-10
0
10
Signal %RE

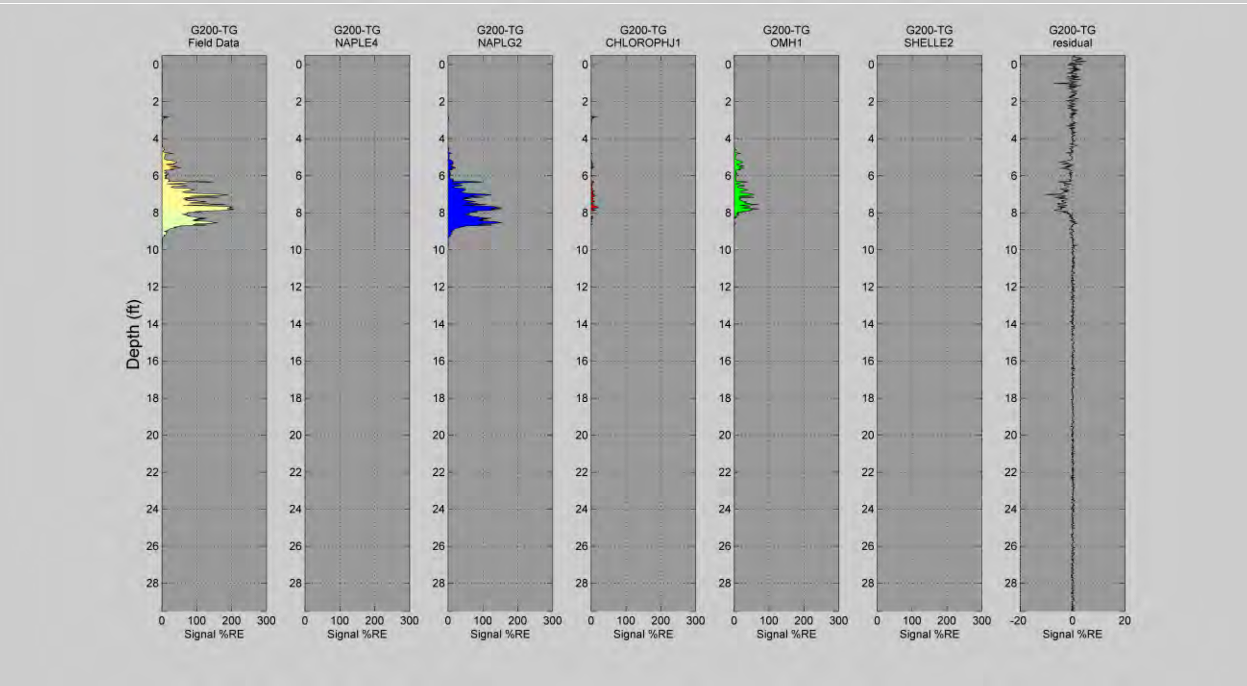

FN100-TG Field Data
FN100-TG NAPLE4
FN100-TG NAPLG2
FN100-TG CHLOROPHJ1
FN100-TG OMH1
FN100-TG SHELLE2
FN100-TG residual
Depth (ft)
0
1
2
3
4
5
6
7
8
9
10
11
12
0
20
40
-5
0
5
Signal %RE

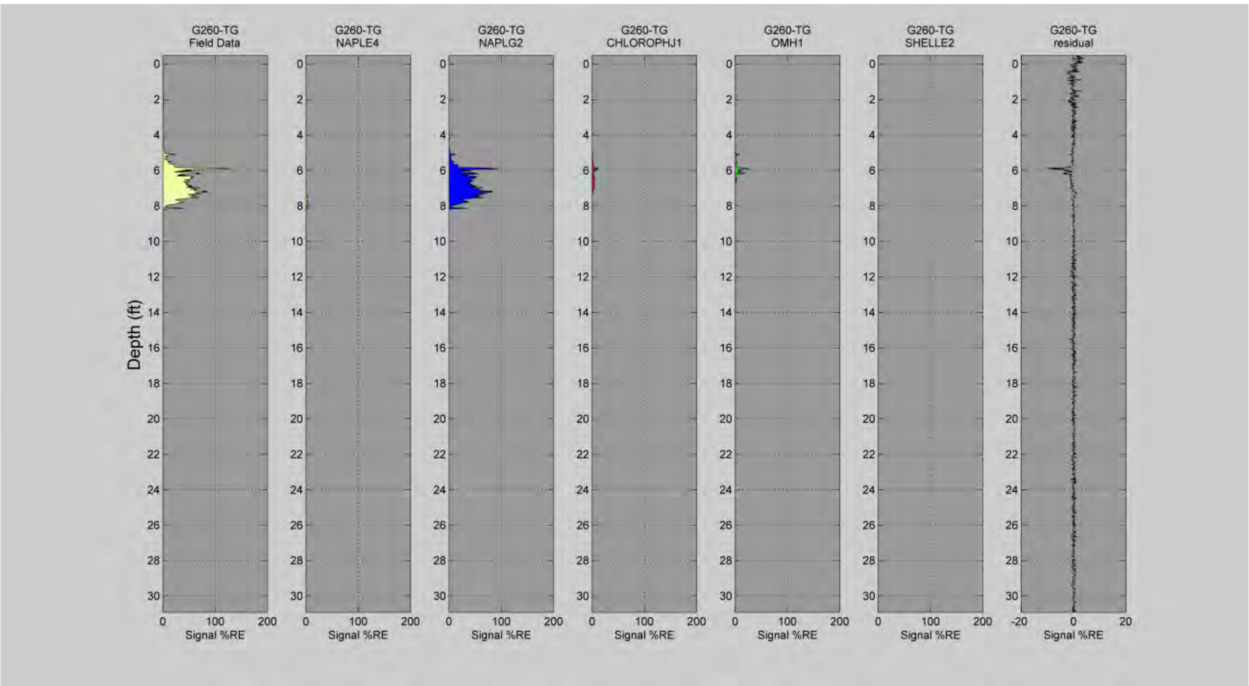

G000-TG
Field Data
G000-TG
NAPLE4
G000-TG
NAPLG2
G000-TG
CHLOROPHJ1
G000-TG
OMH1
G000-TG
SHELLE2
G000-TG
residual
Depth (ft)
Signal %RE
G040-TG
Field Data
G040-TG
NAPLE4
G040-TG
NAPLG2
G040-TG
CHLOROPHJ1
G040-TG
OMH1
G040-TG
SHELLE2
G040-TG
residual
Depth (ft)
Signal %RE

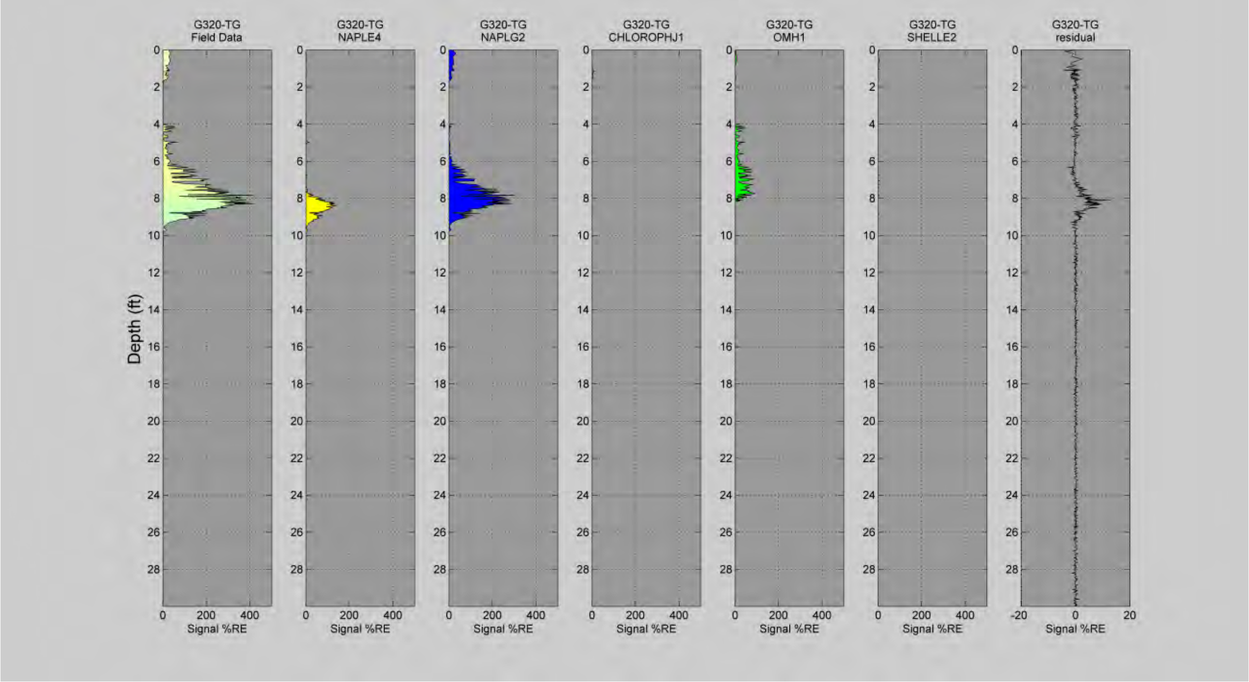

G080-TG
Field Data
G080-TG
NAPLE4
G080-TG
NAPLG2
G080-TG
CHLOROPHJ1
G080-TG
OMH1
G080-TG
SHELLE2
G080-TG
residual
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
0
100
200
Signal %RE
-5
0
5
Signal %RE

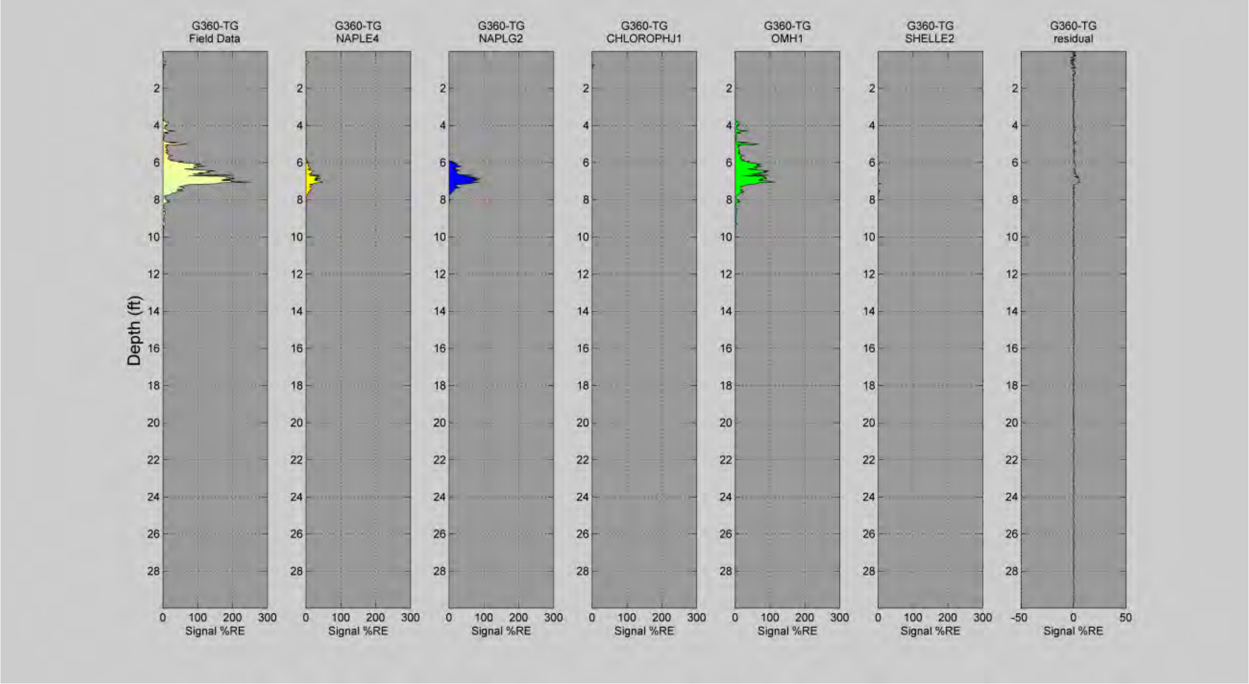

G120-TG
Field Data
G120-TG
NAPLE4
G120-TG
NAPLG2
G120-TG
CHLOROPHJ1
G120-TG
OMH1
G120-TG
SHELLE2
G120-TG
residual
Depth (ft)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
0
100
200
Signal %RE
-20
0
20
Signal %RE

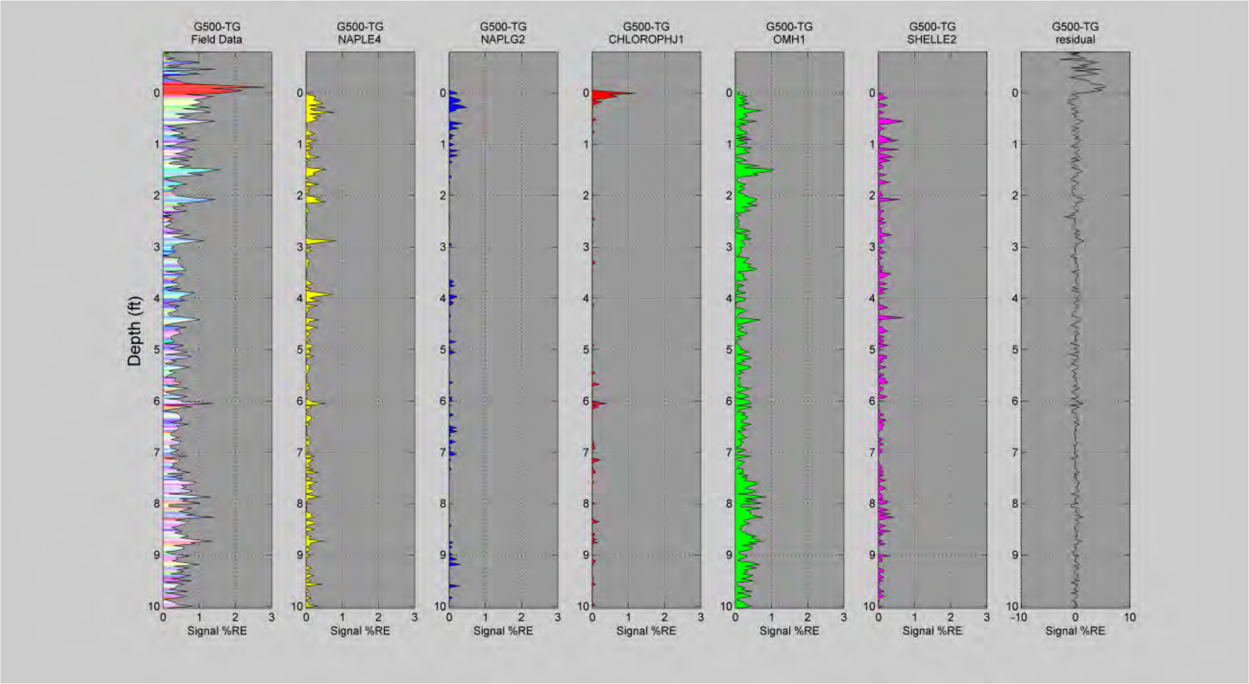

G160-TG
Field Data
G160-TG
NAPLE4
G160-TG
NAPLG2
G160-TG
CHLOROPHJ1
G160-TG
OMH1
G160-TG
SHELLE2
G160-TG
residual
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
0 20 40 60
Signal %RE
-10 0 10
Signal %RE

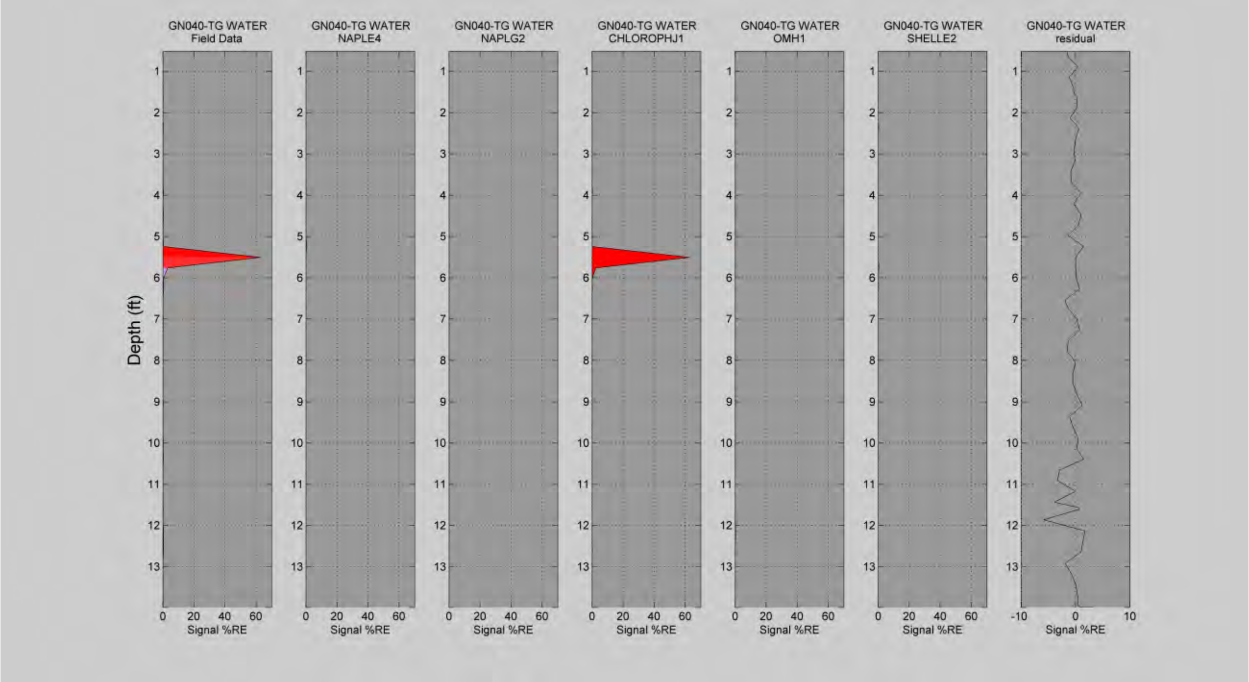

G200-TG
Field Data
G200-TG
NAPLE4
G200-TG
NAPLG2
G200-TG
CHLOROPHJ1
G200-TG
OMH1
G200-TG
SHELLE2
G200-TG
residual
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
0 100 200 300
Signal %RE
-20 0 20
Signal %RE

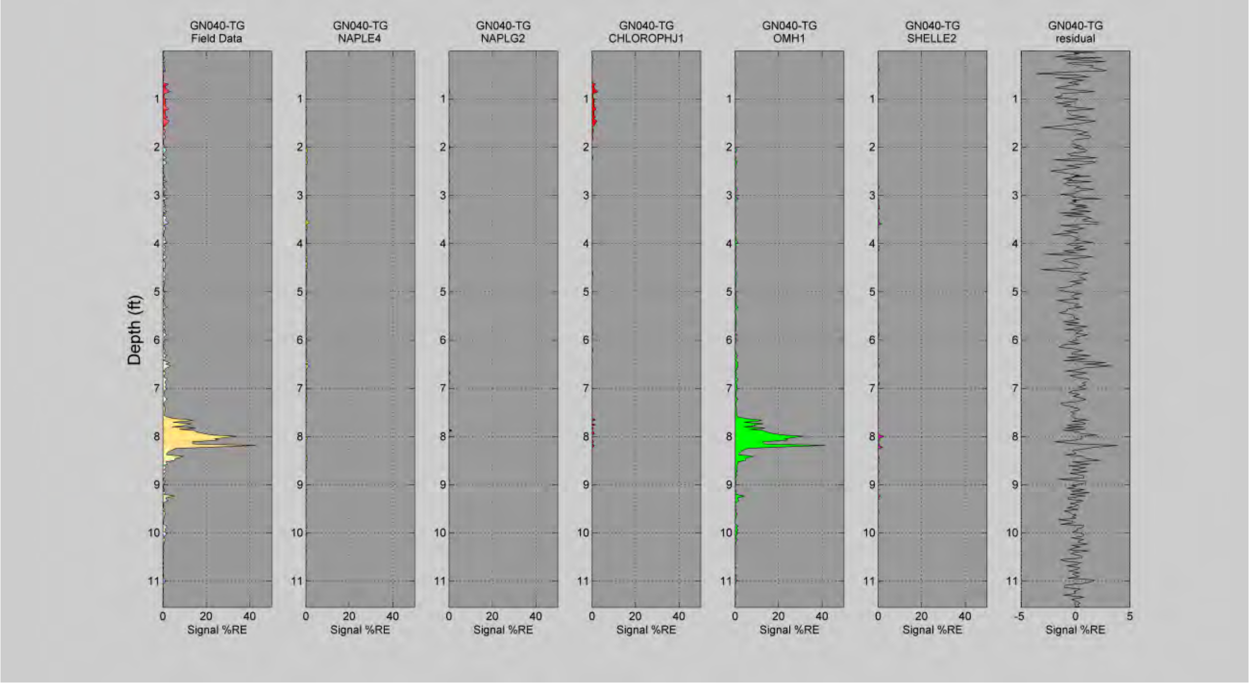

G260-TG
Field Data
G260-TG
NAPLE4
G260-TG
NAPLG2
G260-TG
CHLOROPHJ1
G260-TG
OMH1
G260-TG
SHELLE2
G260-TG
residual
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
0
100
200
-20
0
20
Signal %RE

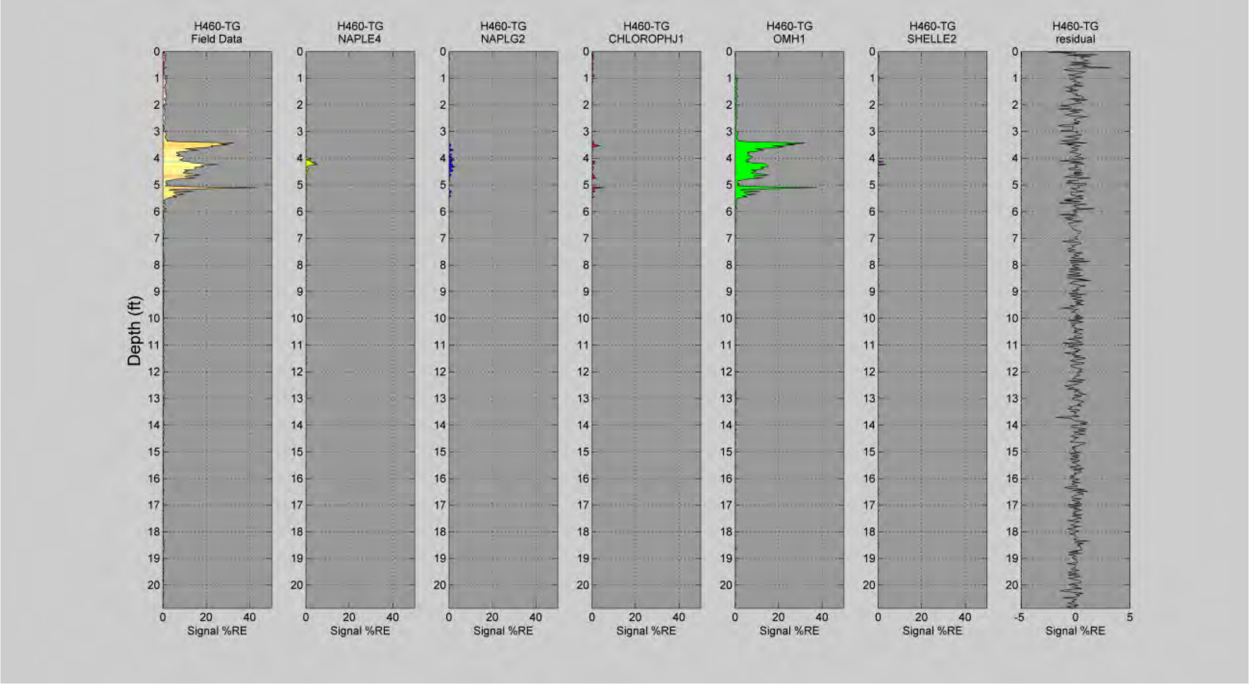

G320-TG
Field Data
G320-TG
NAPLE4
G320-TG
NAPLG2
G320-TG
CHLOROPHJ1
G320-TG
OMH1
G320-TG
SHELLE2
G320-TG
residual
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
0
200
400
-20
0
20
Signal %RE

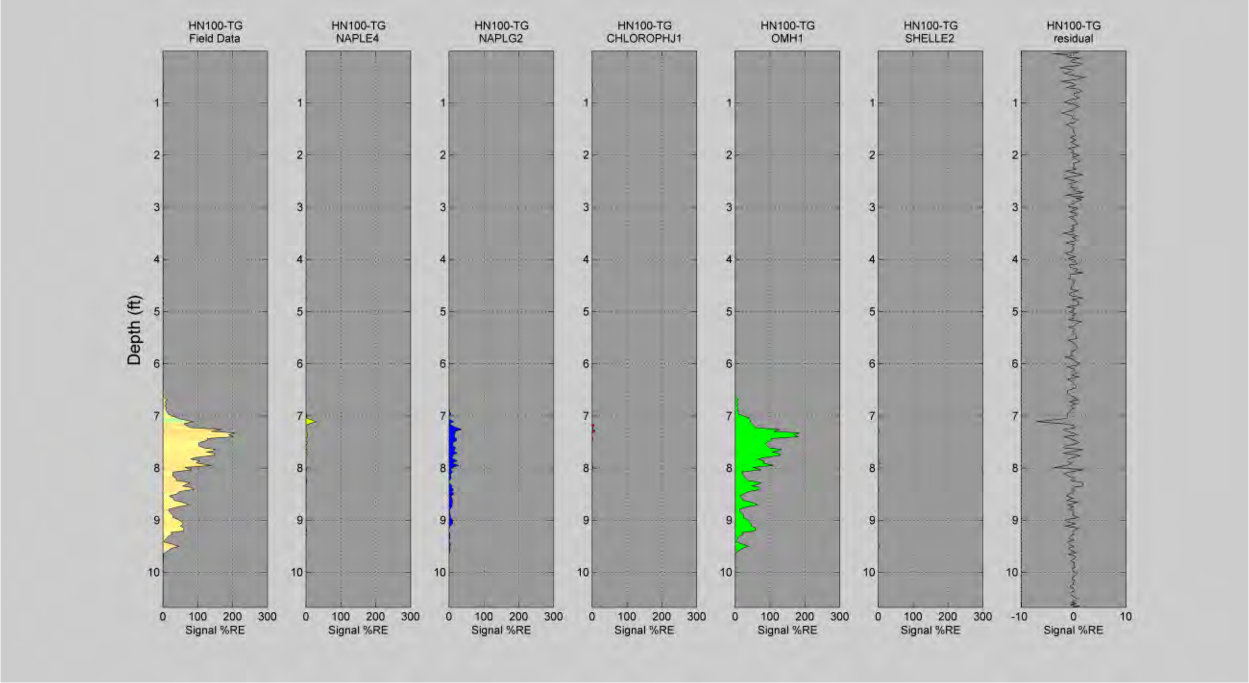

G360-TG
Field Data
G360-TG
NAPLE4
G360-TG
NAPLG2
G360-TG
CHLOROPHJ1
G360-TG
OMH1
G360-TG
SHELLE2
G360-TG
residual
Depth (ft)
2
4
6
8
10
12
14
16
18
20
22
24
26
28
0
100
200
300
-50
0
50
Signal %RE

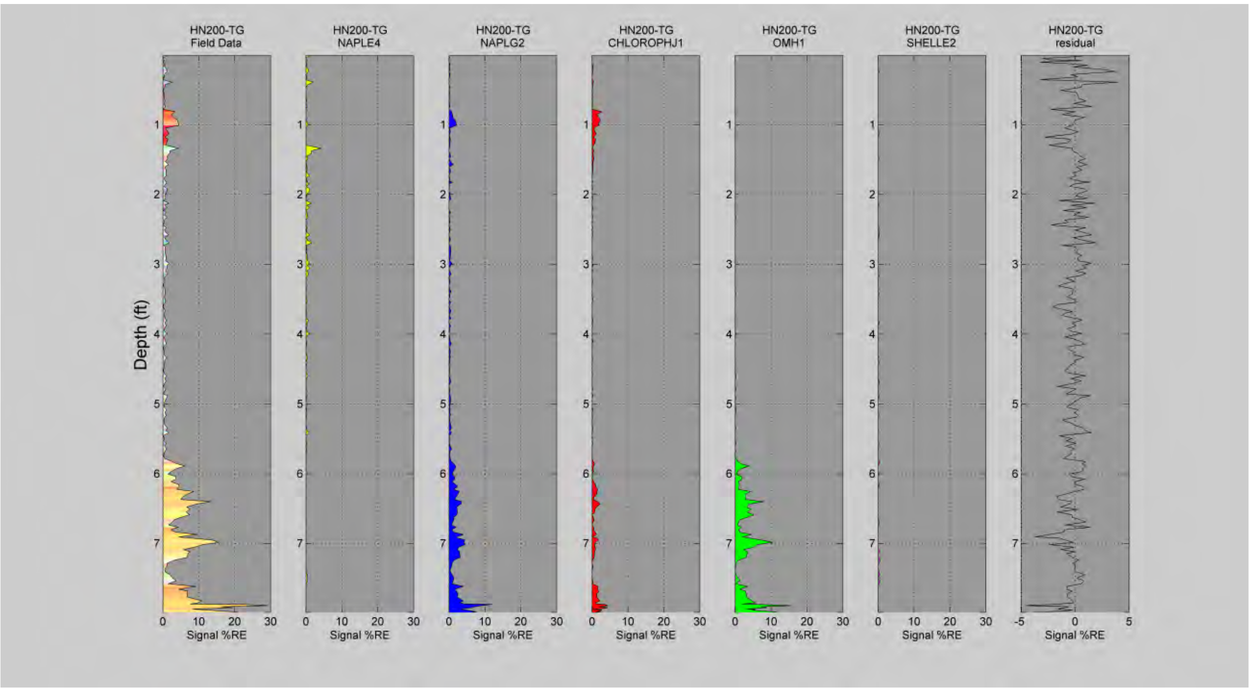

G500-TG
Field Data
G500-TG
NAPLE4
G500-TG
NAPLG2
G500-TG
CHLOROPHJ1
G500-TG
OMH1
G500-TG
SHELLE2
G500-TG
residual
Depth (ft)
0
1
2
3
4
5
6
7
8
9
10
0
1
2
3
-10
0
10
Signal %RE

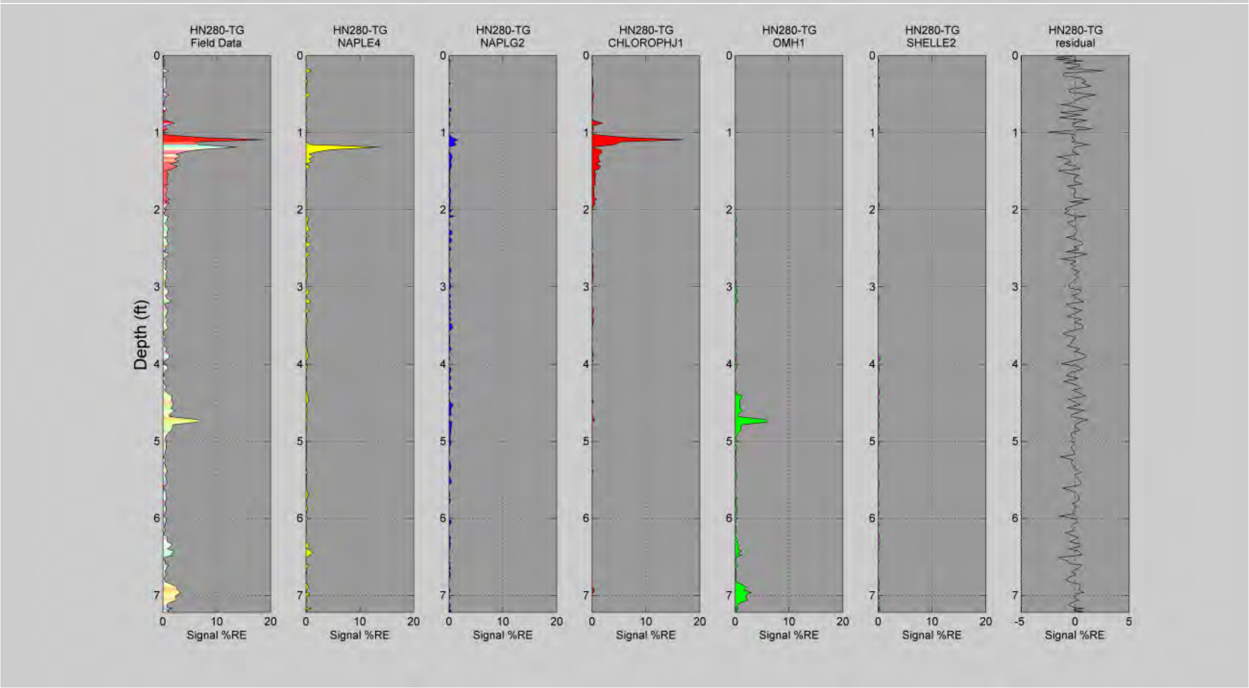

GN040-TG WATER Field Data
GN040-TG WATER NAPLE4
GN040-TG WATER NAPLG2
GN040-TG WATER CHLOROPHJ1
GN040-TG WATER OMH1
GN040-TG WATER SHELLE2
GN040-TG WATER residual
Depth (ft)
1
2
3
4
5
6
7
8
9
10
11
12
13
0
20
40
60
-10
10
Signal %RE

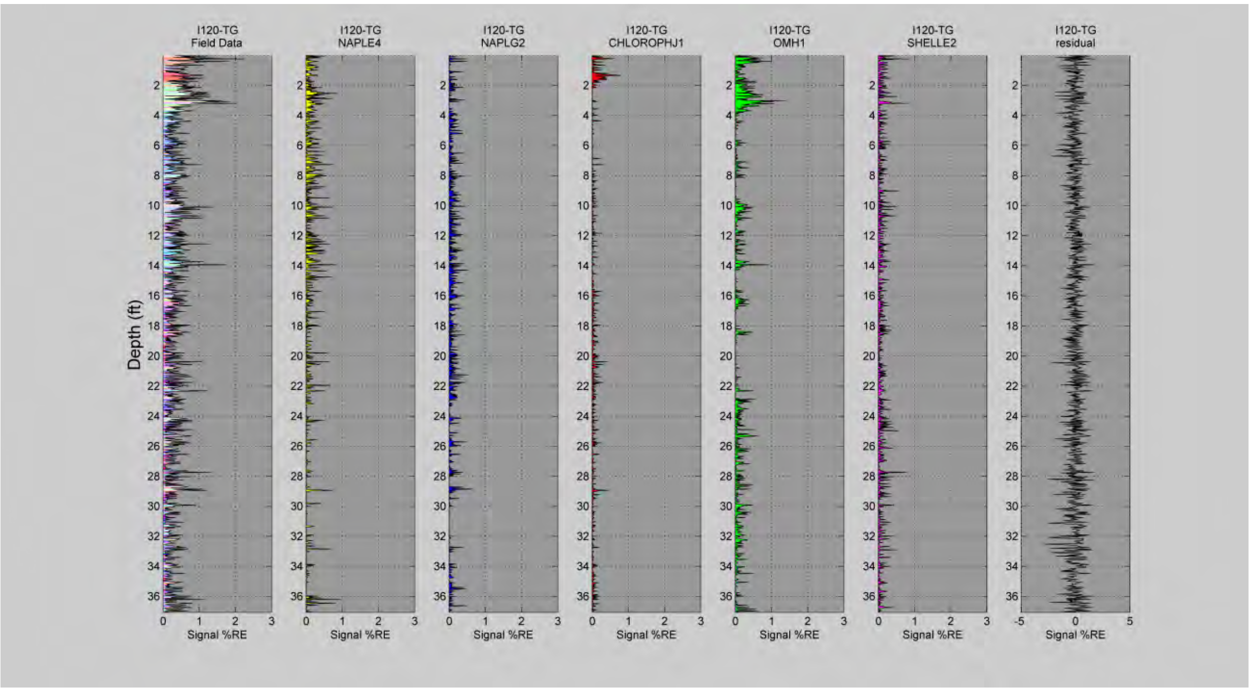

GN040-TG Field Data
GN040-TG NAPLE4
GN040-TG NAPLG2
GN040-TG CHLOROPHJ1
GN040-TG OMH1
GN040-TG SHELLE2
GN040-TG residual
Depth (ft)
1
2
3
4
5
6
7
8
9
10
11
0
20
40
-5
5
Signal %RE

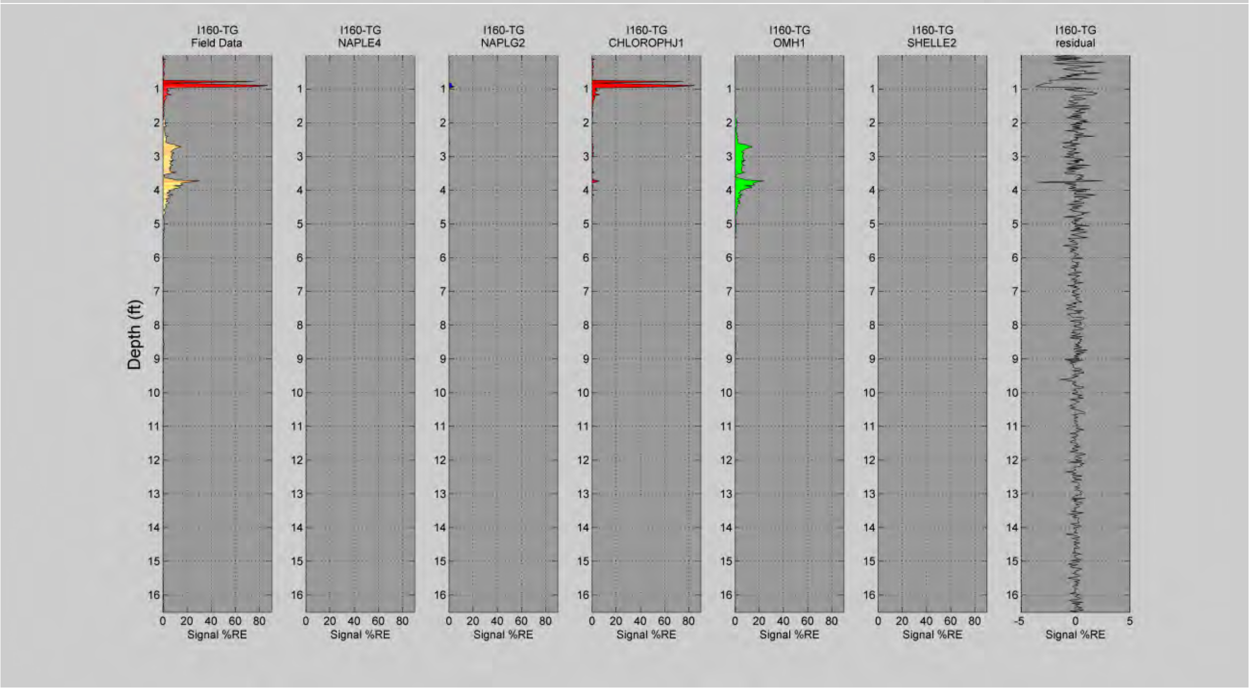

H460-TG Field Data
H460-TG NAPLE4
H460-TG NAPLG2
H460-TG CHLOROPHJ1
H460-TG OMH1
H460-TG SHELLE2
H460-TG residual
Depth (ft)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
0 20 40
-5 0 5
Signal %RE

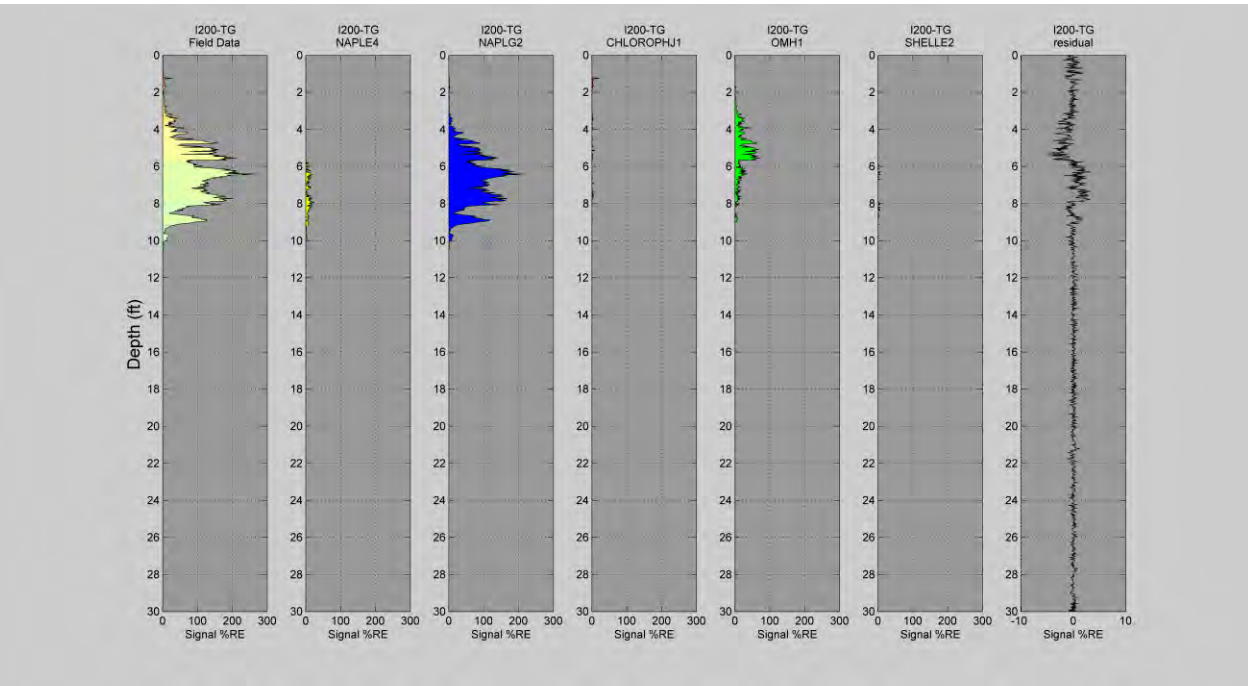

HN100-TG Field Data
HN100-TG NAPLE4
HN100-TG NAPLG2
HN100-TG CHLOROPHJ1
HN100-TG OMH1
HN100-TG SHELLE2
HN100-TG residual
Depth (ft)
1 2 3 4 5 6 7 8 9 10
0 100 200 300
-10 0 10
Signal %RE

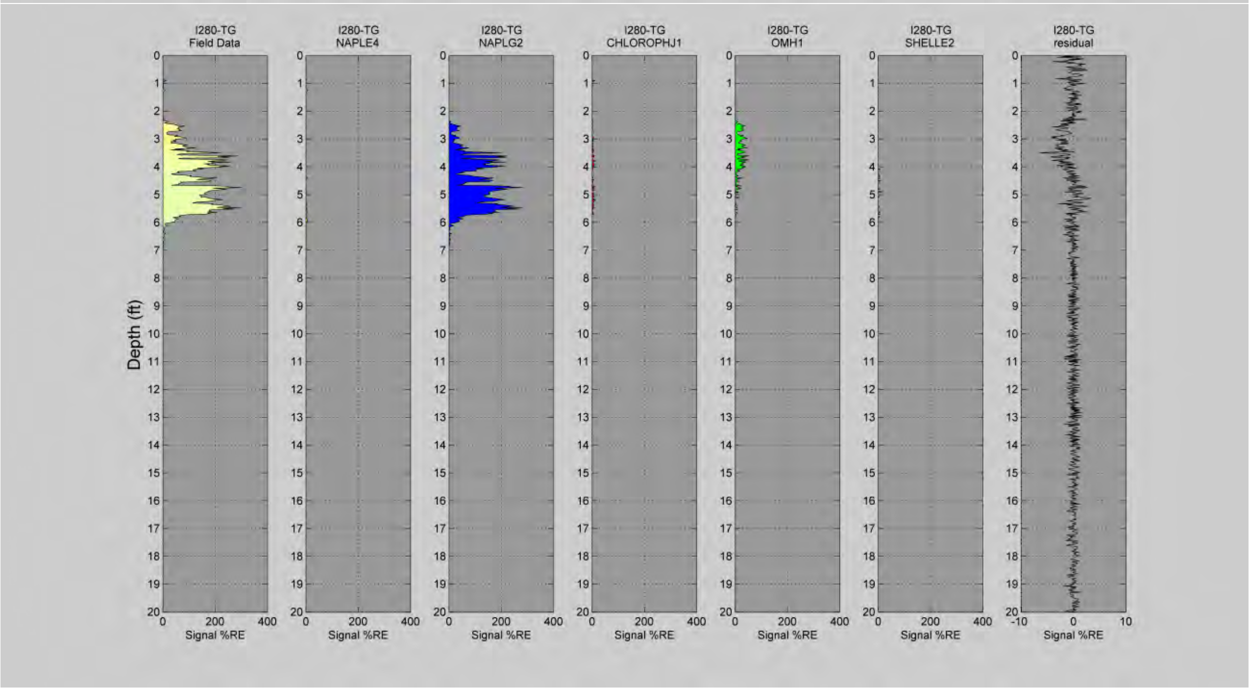

HN200-TG
Field Data
HN200-TG
NAPLE4
HN200-TG
NAPLG2
HN200-TG
CHLOROPHJ1
HN200-TG
OMH1
HN200-TG
SHELLE2
HN200-TG
residual
Depth (ft)
1
2
3
4
5
6
7
0
10
20
30
-5
0
5
Signal %RE

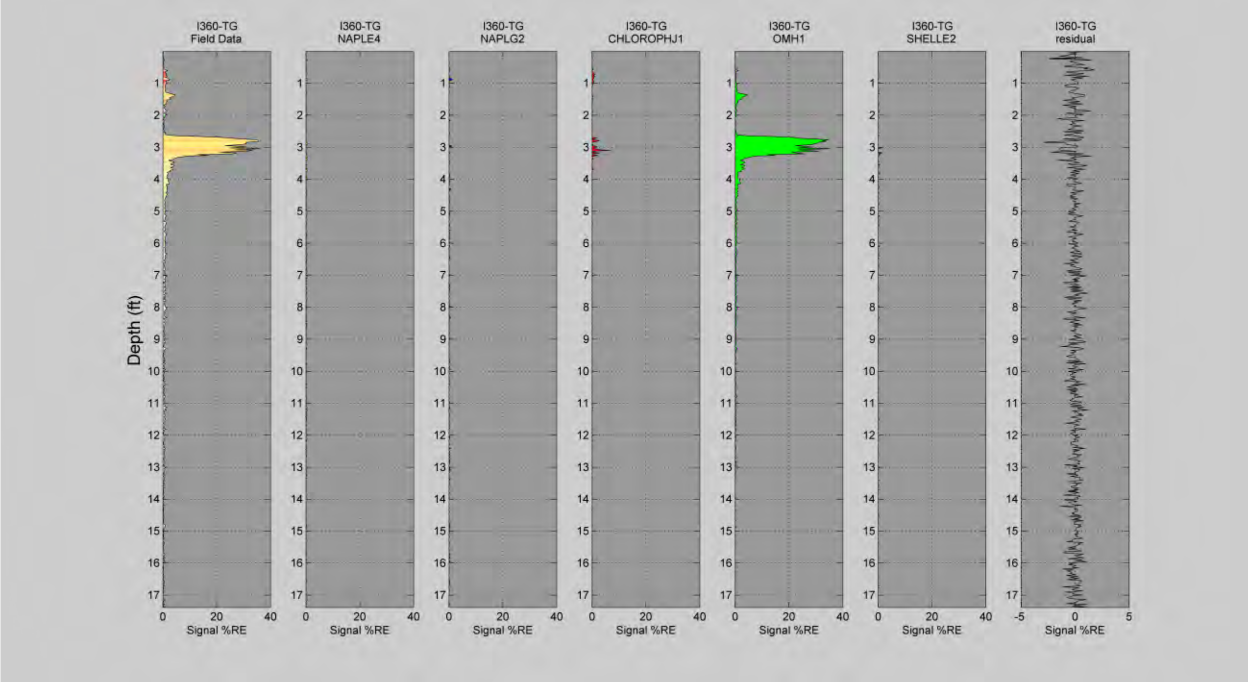

HN280-TG
Field Data
HN280-TG
NAPLE4
HN280-TG
NAPLG2
HN280-TG
CHLOROPHJ1
HN280-TG
OMH1
HN280-TG
SHELLE2
HN280-TG
residual
Depth (ft)
0
1
2
3
4
5
6
7
0
10
20
-5
0
5
Signal %RE

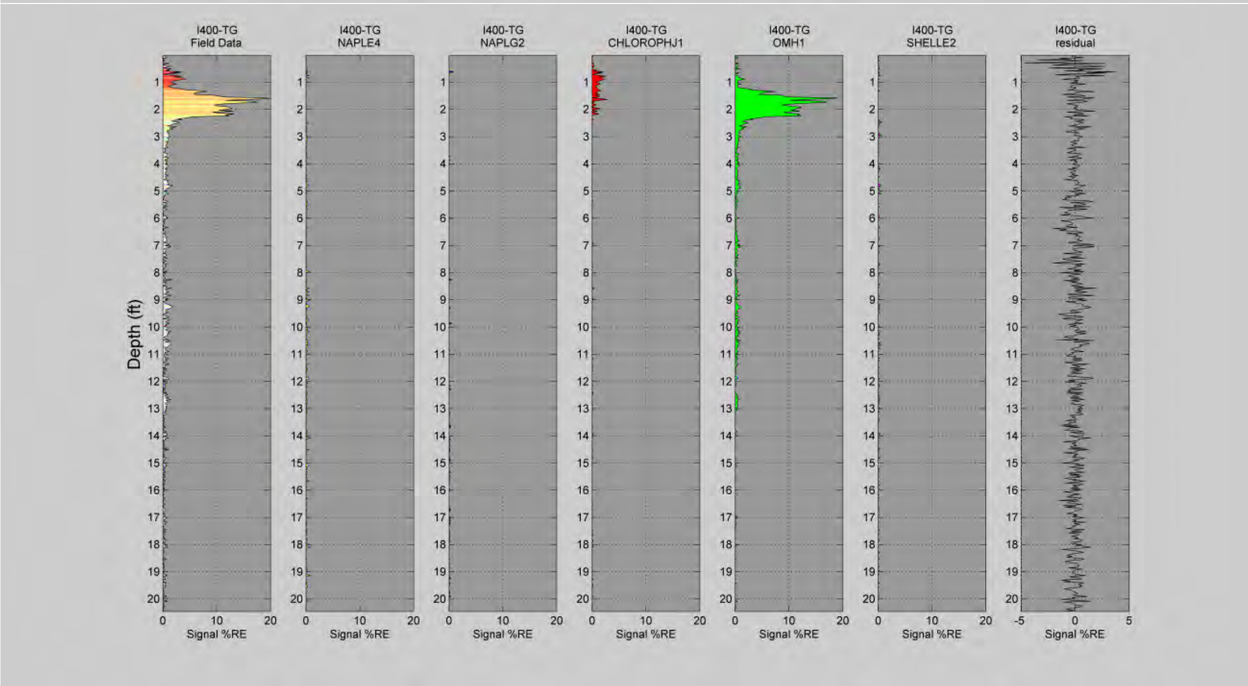

I120-TG
Field Data
I120-TG
NAPLE4
I120-TG
NAPLG2
I120-TG
CHLOROPHJ1
I120-TG
OMH1
I120-TG
SHELLE2
I120-TG
residual
Depth (ft)
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
0
1
2
3
-5
0
5
Signal %RE

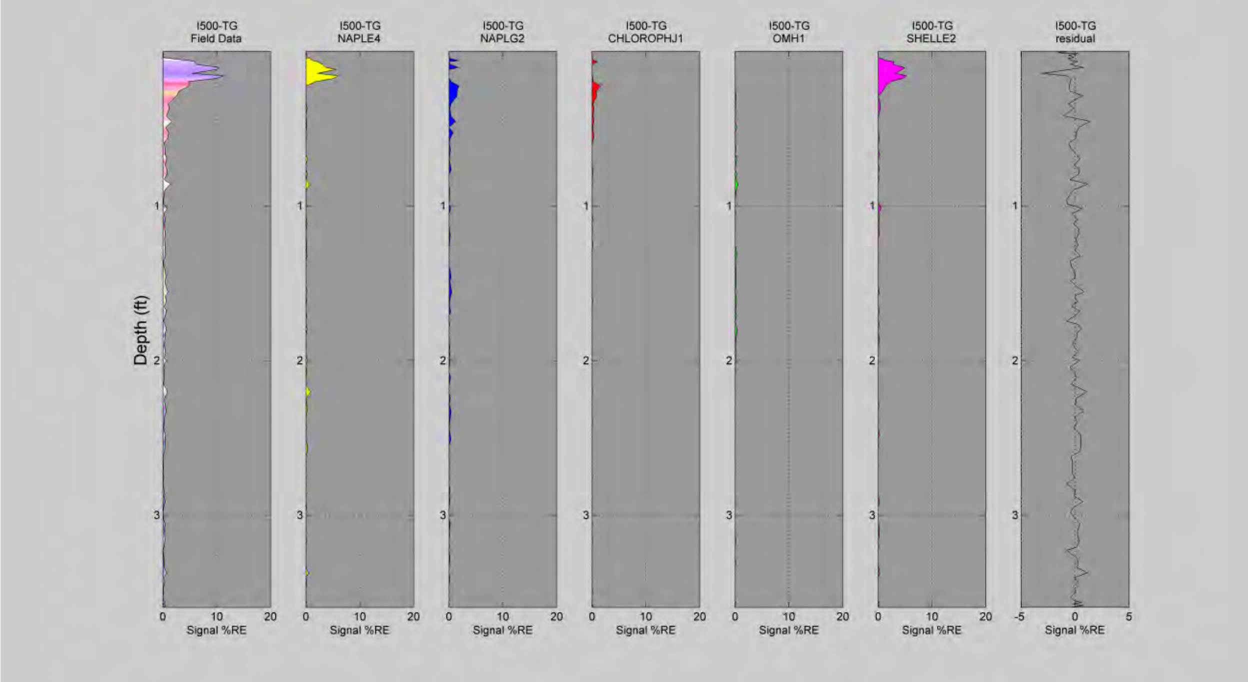

I160-TG
Field Data
I160-TG
NAPLE4
I160-TG
NAPLG2
I160-TG
CHLOROPHJ1
I160-TG
OMH1
I160-TG
SHELLE2
I160-TG
residual
Depth (ft)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
0
20
40
60
80
-5
0
5
Signal %RE

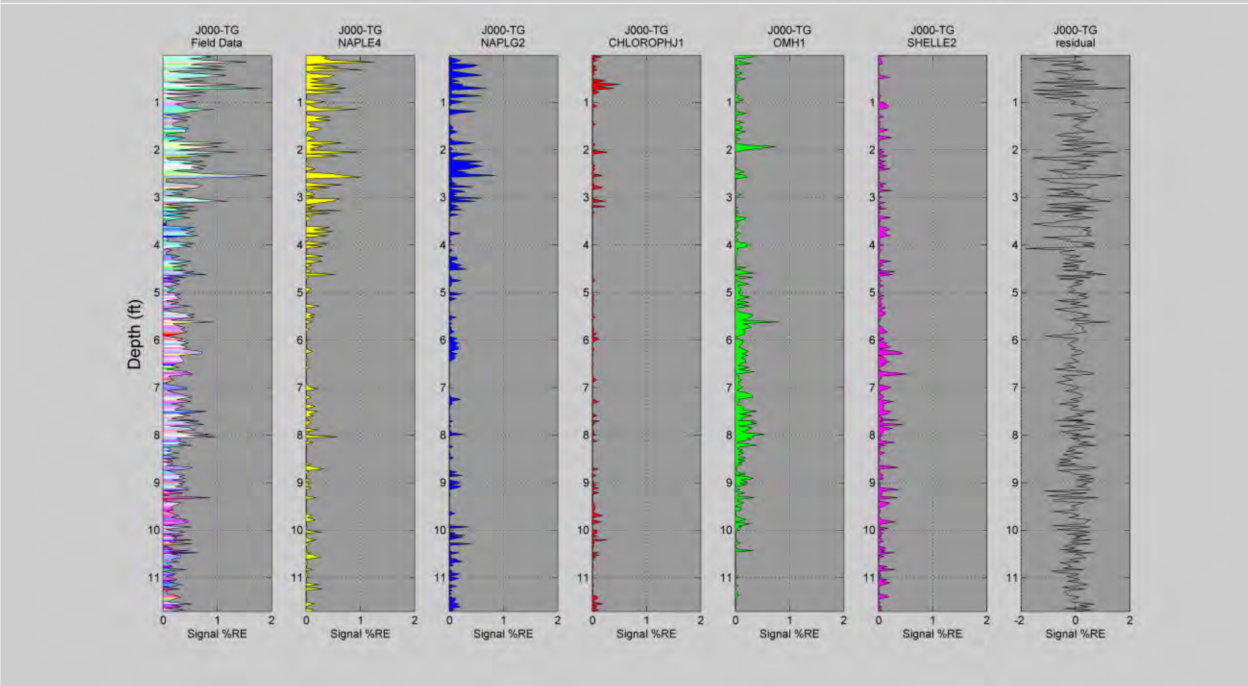

I200-TG
Field Data
I200-TG
NAPLE4
I200-TG
NAPLG2
I200-TG
CHLOROPHJ1
I200-TG
OMH1
I200-TG
SHELLE2
I200-TG
residual
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
0
100
200
300
-10
0
10
Signal %RE

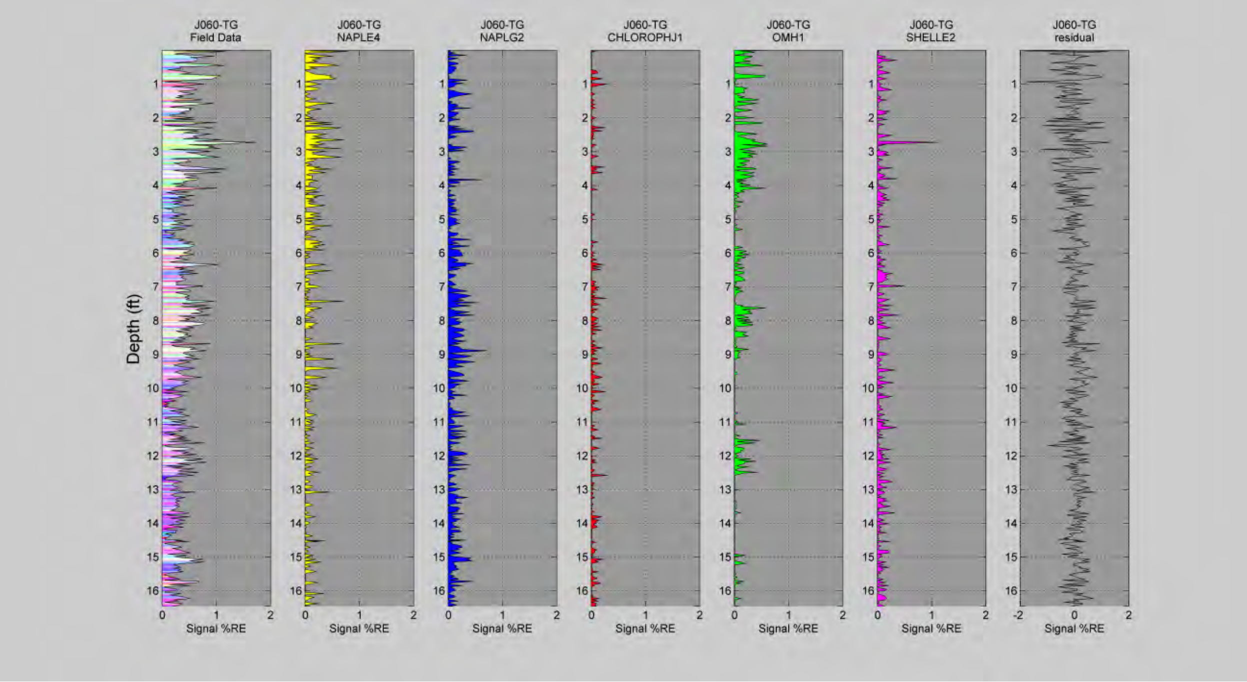

I280-TG
Field Data
I280-TG
NAPLE4
I280-TG
NAPLG2
I280-TG
CHLOROPHJ1
I280-TG
OMH1
I280-TG
SHELLE2
I280-TG
residual
Depth (ft)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
0
200
400
-10
0
10
Signal %RE

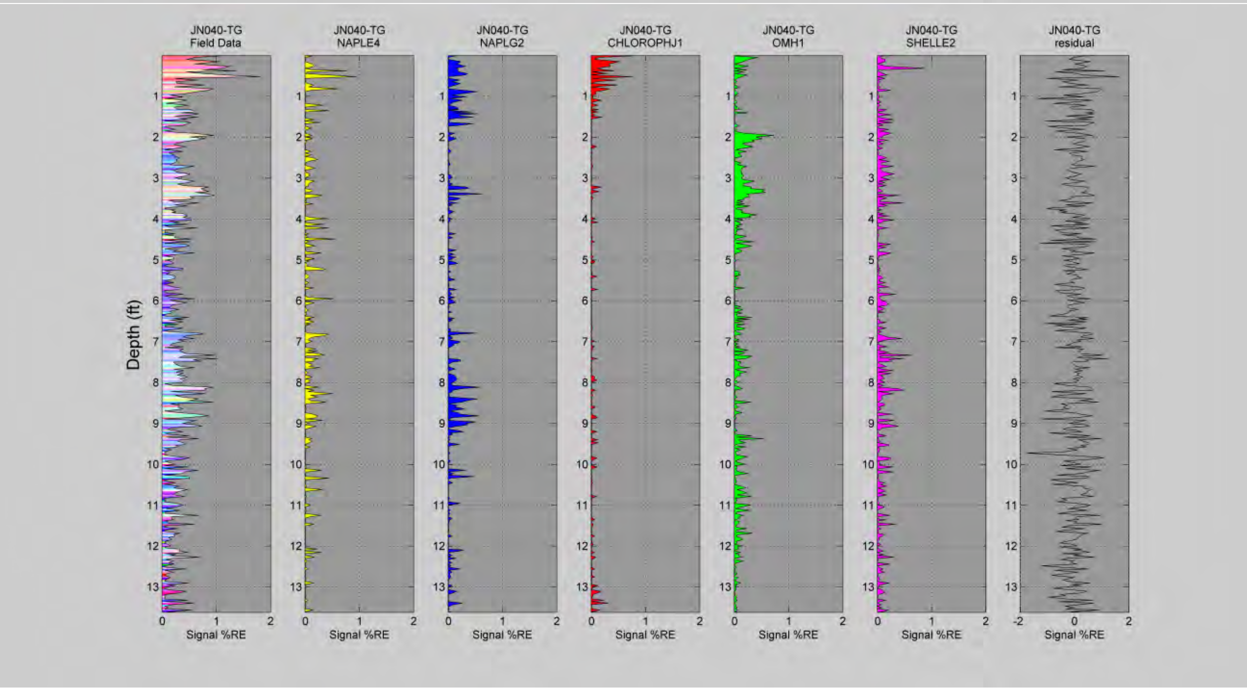

I360-TG
Field Data
I360-TG
NAPLE4
I360-TG
NAPLG2
I360-TG
CHLOROPHJ1
I360-TG
OMH1
I360-TG
SHELLE2
I360-TG
residual
Depth (ft)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
0
20
40
-5
0
5
Signal %RE

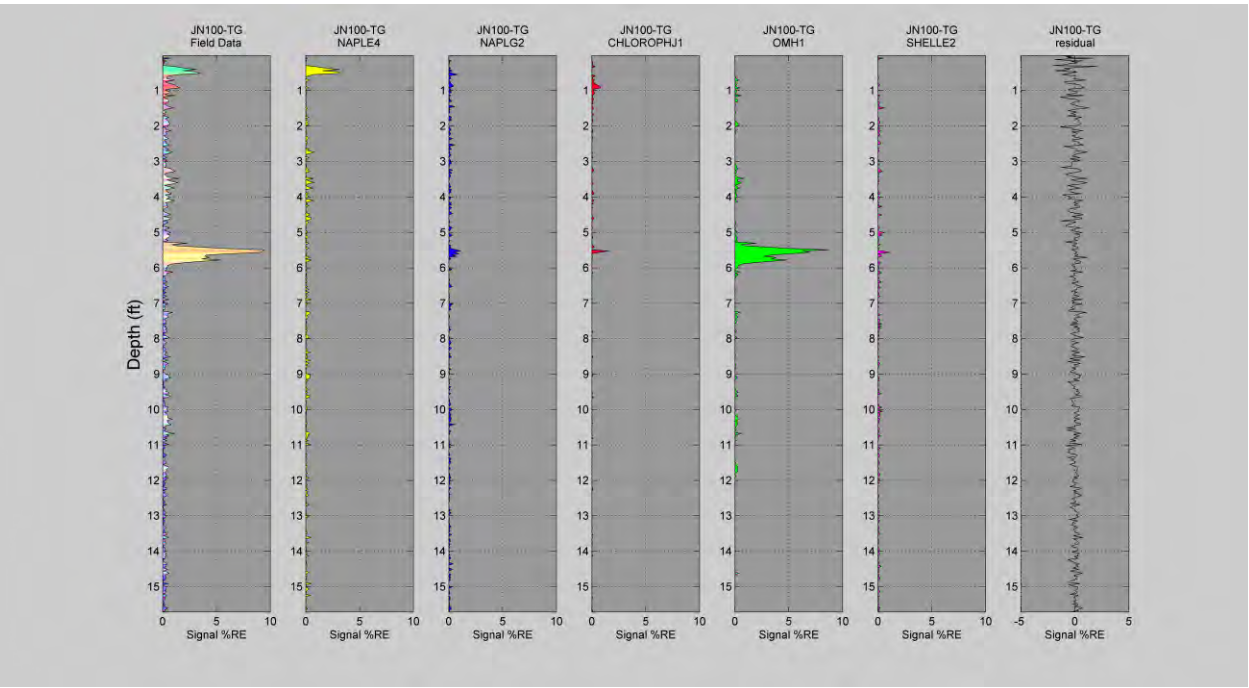

I400-TG
Field Data
I400-TG
NAPLE4
I400-TG
NAPLG2
I400-TG
CHLOROPHJ1
I400-TG
OMH1
I400-TG
SHELLE2
I400-TG
residual
Depth (ft)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
0
10
20
-5
0
5
Signal %RE

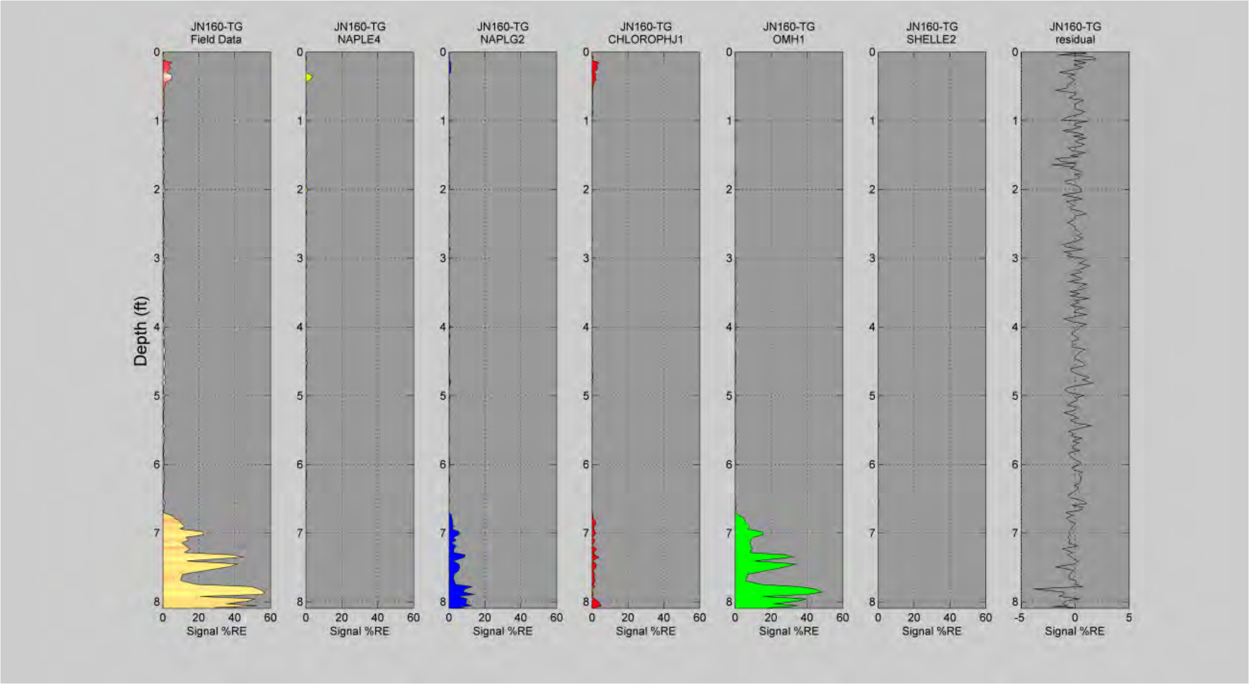

I500-TG
Field Data
I500-TG
NAPLE4
I500-TG
NAPLG2
I500-TG
CHLOROPHJ1
I500-TG
OMH1
I500-TG
SHELLE2
I500-TG
residual
Depth (ft)
1
2
3
0
10
20
-5
0
5
Signal %RE

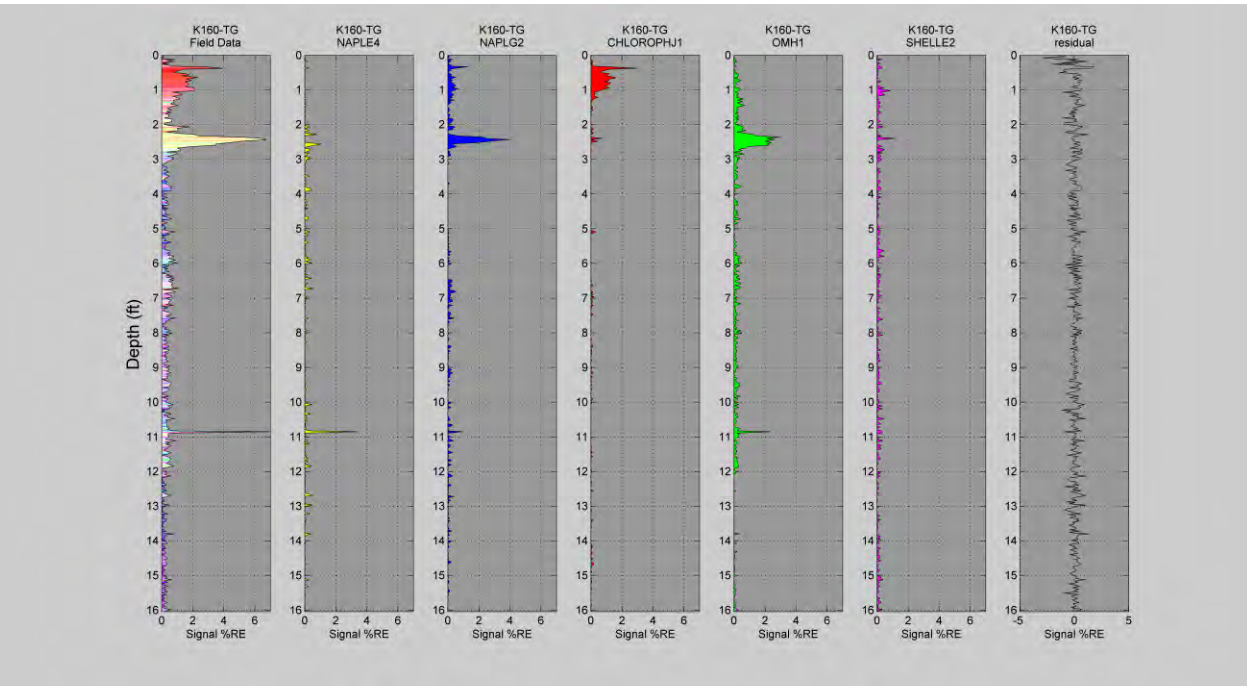

J000-TG
Field Data
J000-TG
NAPLE4
J000-TG
NAPLG2
J000-TG
CHLOROPHJ1
J000-TG
OMH1
J000-TG
SHELLE2
J000-TG
residual
Depth (ft)
1
2
3
4
5
6
7
8
9
10
11
0
1
2
-2
0
2
Signal %RE

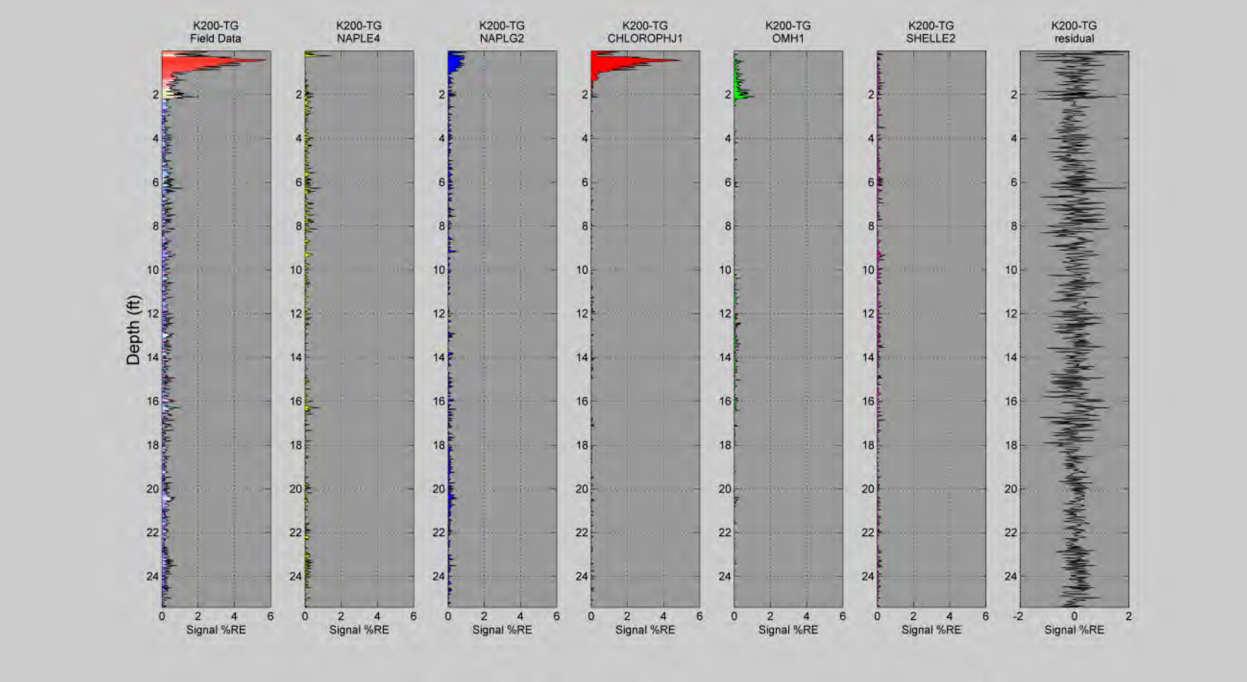

J060-TG
Field Data
J060-TG
NAPLE4
J060-TG
NAPLG2
J060-TG
CHLOROPHJ1
J060-TG
OMH1
J060-TG
SHELLE2
J060-TG
residual
Depth (ft)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
0
1
2
-2
Signal %RE

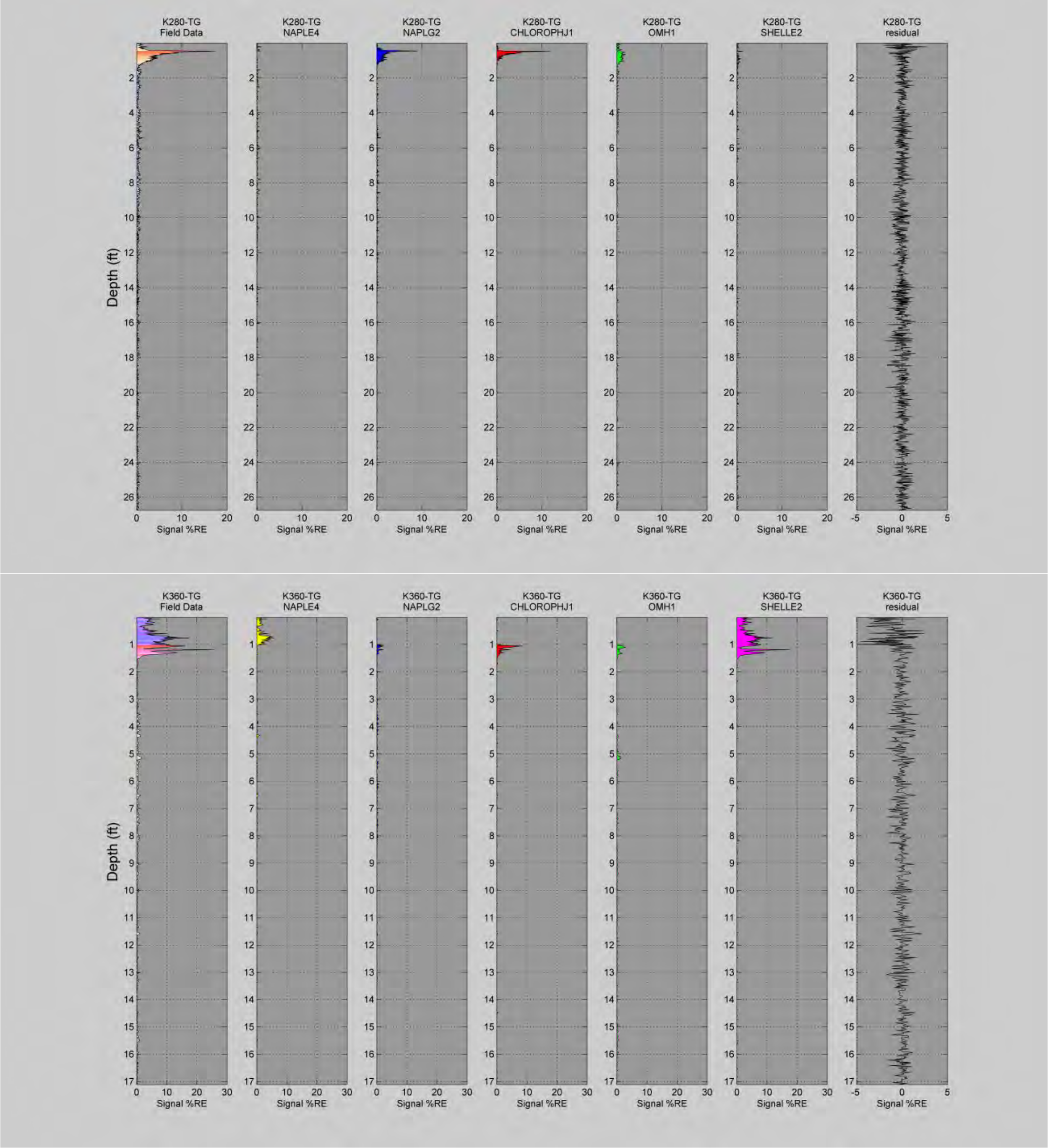

JN040-TG
Field Data
JN040-TG
NAPLE4
JN040-TG
NAPLG2
JN040-TG
CHLOROPHJ1
JN040-TG
OMH1
JN040-TG
SHELLE2
JN040-TG
residual
Depth (ft)
1
2
3
4
5
6
7
8
9
10
11
12
13
0
1
2
-2
Signal %RE

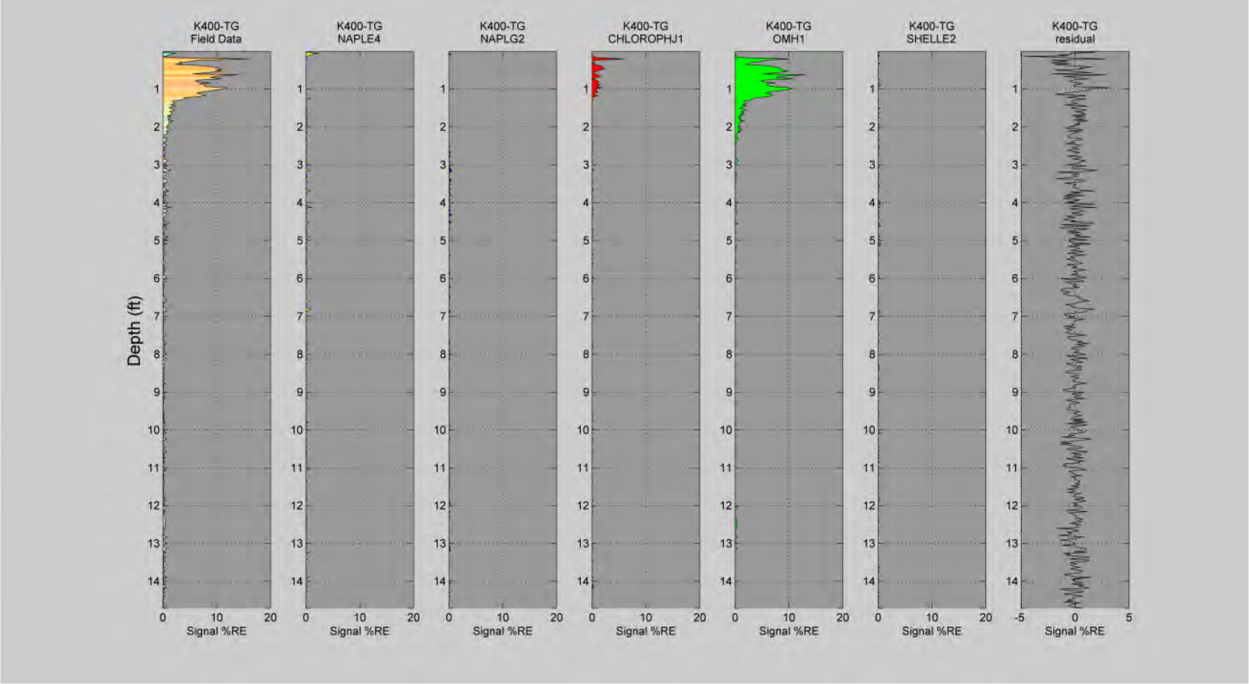

JN100-TG
Field Data
JN100-TG
NAPLE4
JN100-TG
NAPLG2
JN100-TG
CHLOROPHJ1
JN100-TG
OMH1
JN100-TG
SHELLE2
JN100-TG
residual
Depth (ft)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
0
5
10
-5
Signal %RE

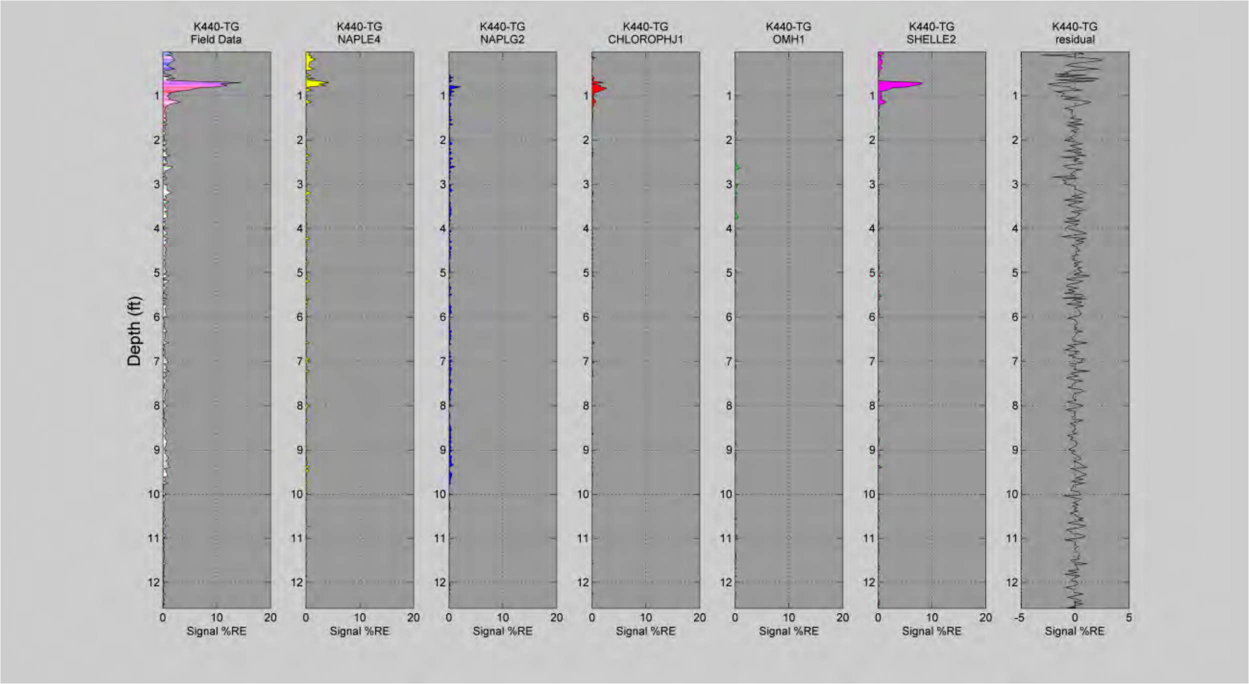

JN160-TG
Field Data
JN160-TG
NAPLE4
JN160-TG
NAPLG2
JN160-TG
CHLOROPHJ1
JN160-TG
OMH1
JN160-TG
SHELLE2
JN160-TG
residual
Depth (ft)
0
1
2
3
4
5
6
7
8
0
20
40
60
-5
5
Signal %RE

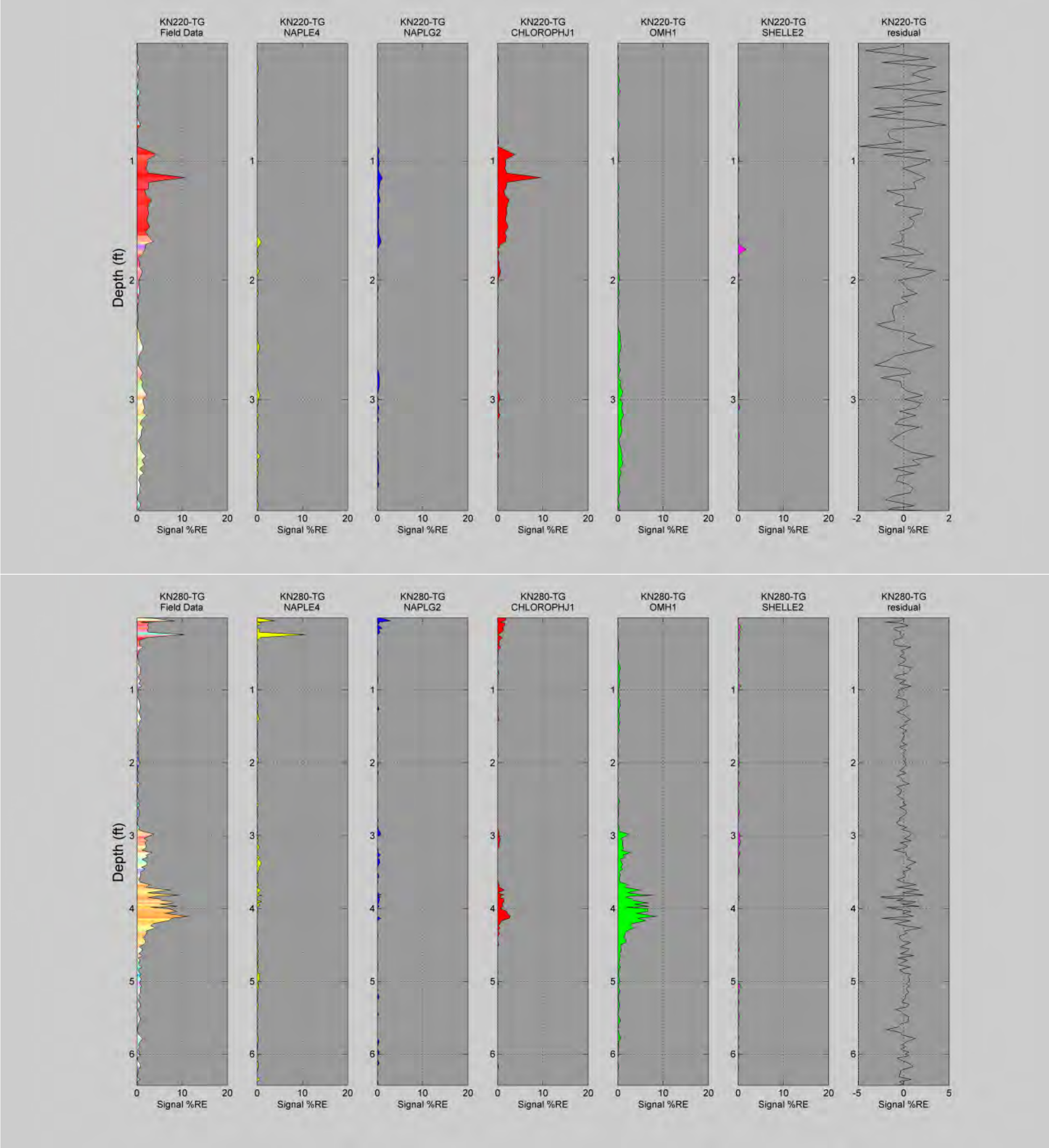

K160-TG Field Data
K160-TG NAPLE4
K160-TG NAPLG2
K160-TG CHLOROPHJ1
K160-TG OMH1
K160-TG SHELLE2
K160-TG residual
Depth (ft)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Signal %RE
0 2 4 6
-5 0 5

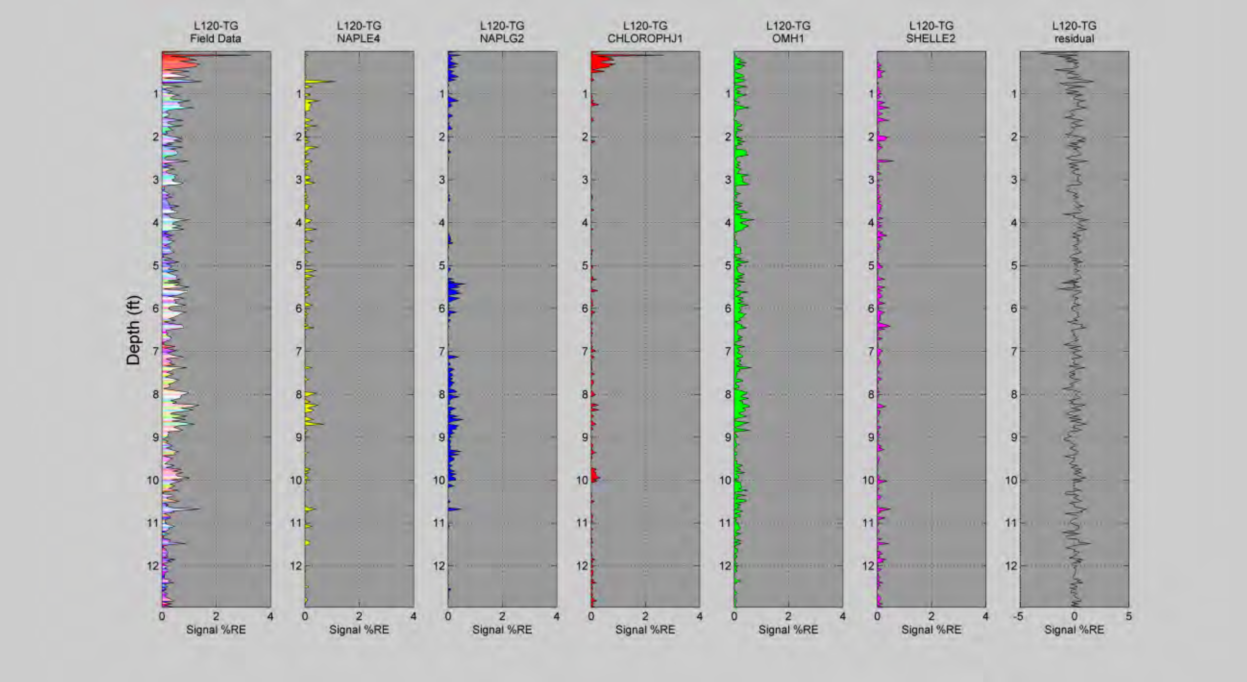

K200-TG Field Data
K200-TG NAPLE4
K200-TG NAPLG2
K200-TG CHLOROPHJ1
K200-TG OMH1
K200-TG SHELLE2
K200-TG residual
Depth (ft)
2
4
6
8
10
12
14
16
18
20
22
24
Signal %RE
0 2 4 6
-2 0 2

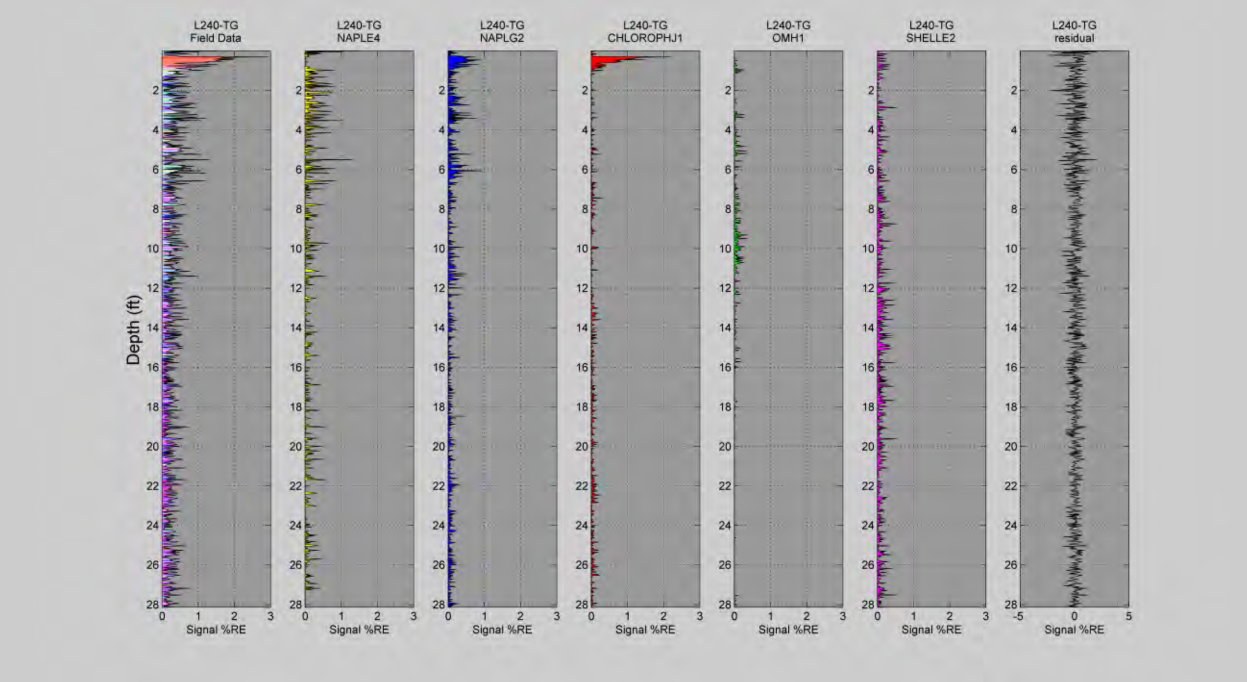

K280-TG
Field Data
K280-TG
NAPLE4
K280-TG
NAPLG2
K280-TG
CHLOROPHJ1
K280-TG
OMH1
K280-TG
SHELLE2
K280-TG
residual
Depth (ft)
2
4
6
8
10
12
14
16
18
20
22
24
26
0
10
20
-5
0
5
Signal %RE
K360-TG
Field Data
K360-TG
NAPLE4
K360-TG
NAPLG2
K360-TG
CHLOROPHJ1
K360-TG
OMH1
K360-TG
SHELLE2
K360-TG
residual
Depth (ft)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
0
10
20
30
-5
0
5
Signal %RE

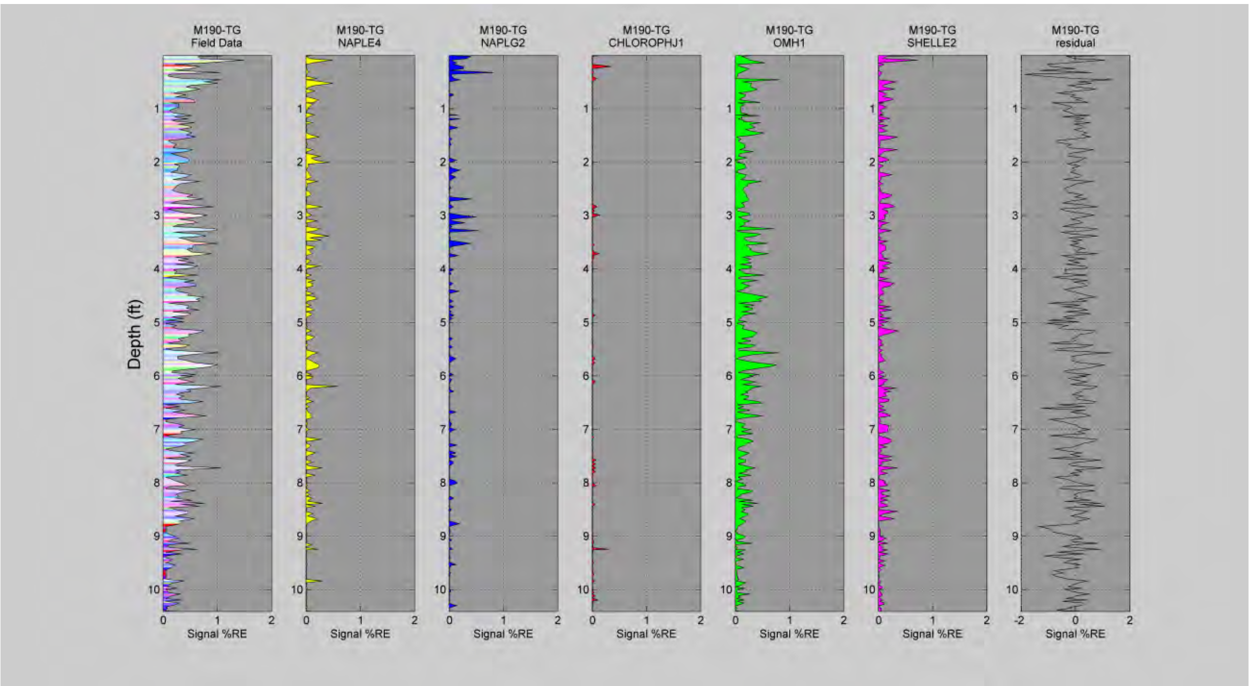

K400-TG
Field Data
K400-TG
NAPLE4
K400-TG
NAPLG2
K400-TG
CHLOROPHJ1
K400-TG
OMH1
K400-TG
SHELLE2
K400-TG
residual
Depth (ft)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
0
10
20
-5
0
5
Signal %RE

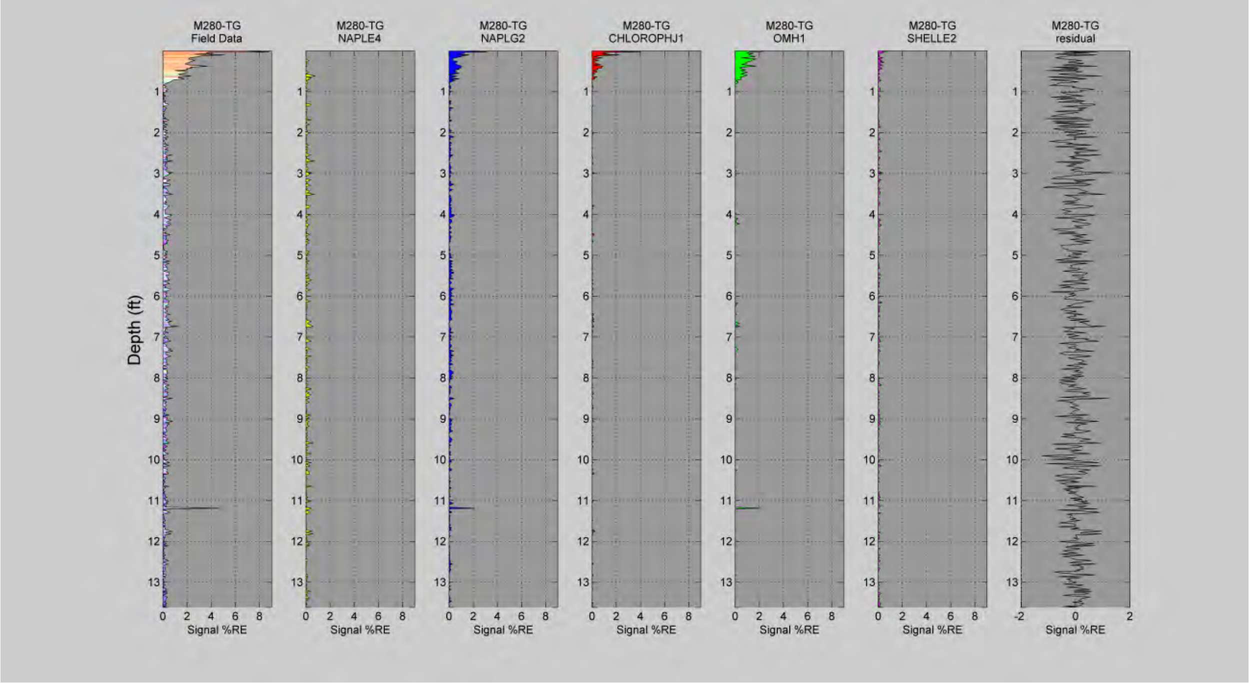

K440-TG
Field Data
K440-TG
NAPLE4
K440-TG
NAPLG2
K440-TG
CHLOROPHJ1
K440-TG
OMH1
K440-TG
SHELLE2
K440-TG
residual
Depth (ft)
1
2
3
4
5
6
7
8
9
10
11
12
0
10
20
-5
0
5
Signal %RE

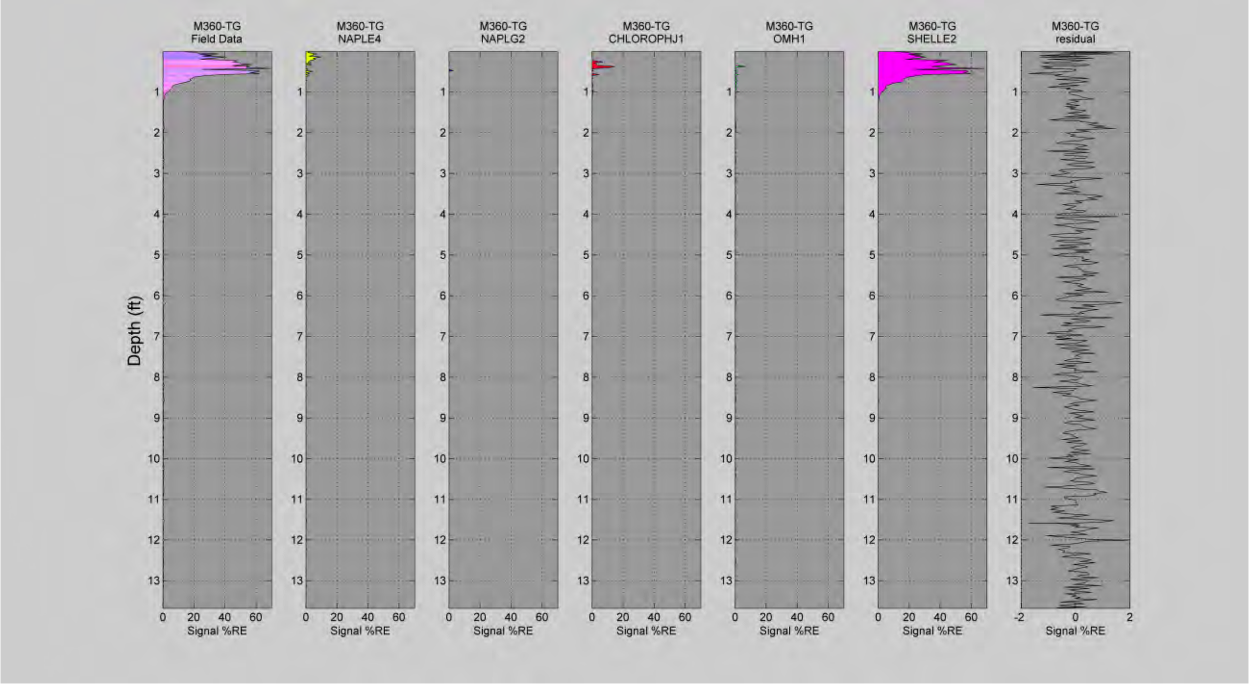

KN220-TG
Field Data
KN220-TG
NAPLE4
KN220-TG
NAPLG2
KN220-TG
CHLOROPHJ1
KN220-TG
OMH1
KN220-TG
SHELLE2
KN220-TG
residual
Depth (ft)
1
2
3
0
10
20
Signal %RE
-2
0
2
KN280-TG
Field Data
KN280-TG
NAPLE4
KN280-TG
NAPLG2
KN280-TG
CHLOROPHJ1
KN280-TG
OMH1
KN280-TG
SHELLE2
KN280-TG
residual
Depth (ft)
1
2
3
4
5
6
0
10
20
Signal %RE
-5
0
5

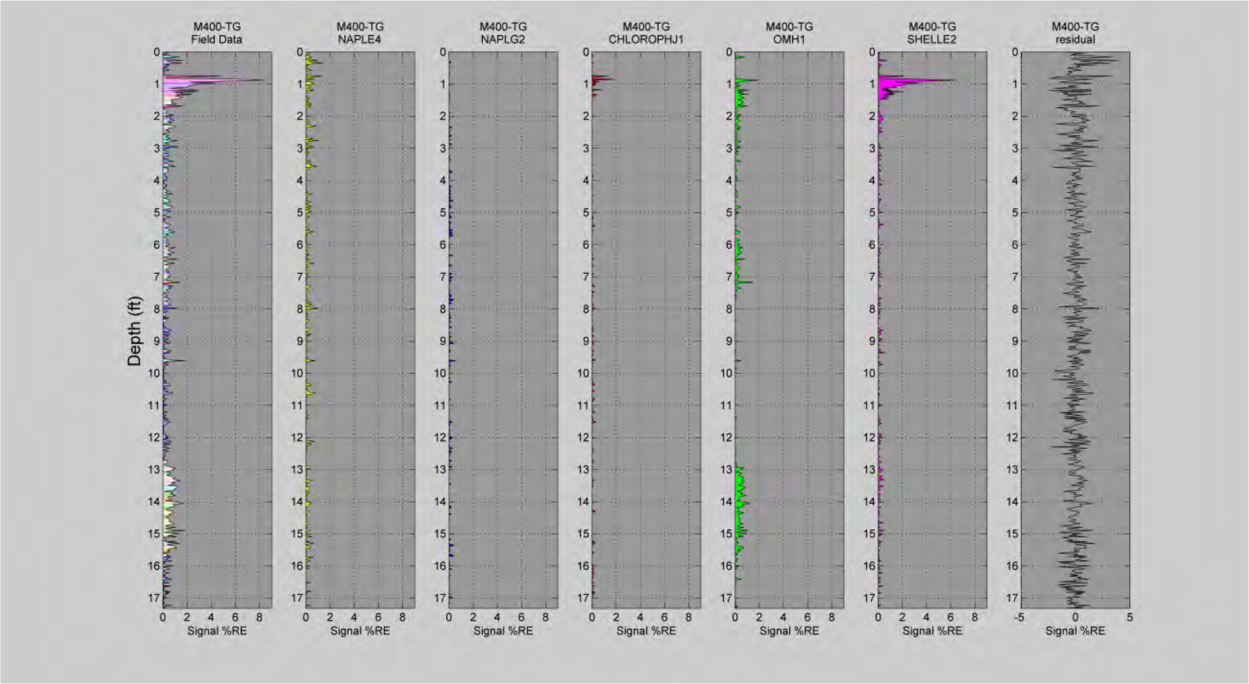

L120-TG
Field Data
L120-TG
NAPLE4
L120-TG
NAPLG2
L120-TG
CHLOROPHJ1
L120-TG
OMH1
L120-TG
SHELLE2
L120-TG
residual
Depth (ft)
1
2
3
4
5
6
7
8
9
10
11
12
0
2
4
-5
0
5
Signal %RE

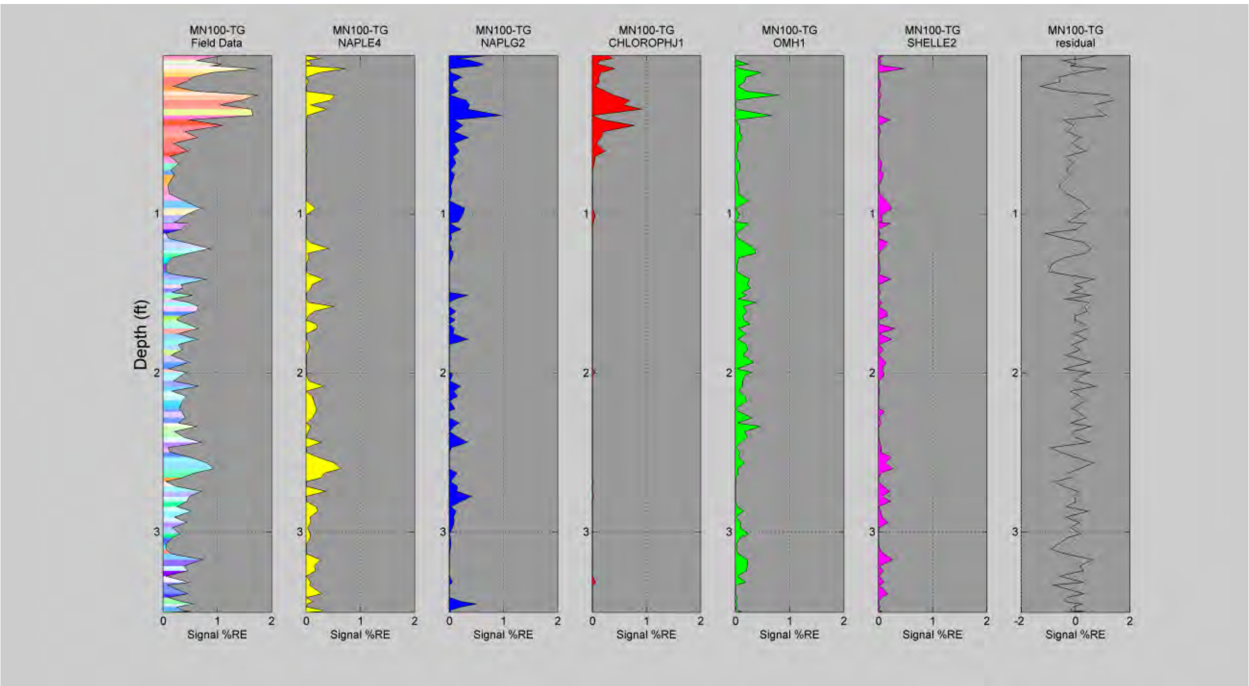

L240-TG
Field Data
L240-TG
NAPLE4
L240-TG
NAPLG2
L240-TG
CHLOROPHJ1
L240-TG
OMH1
L240-TG
SHELLE2
L240-TG
residual
Depth (ft)
2
4
6
8
10
12
14
16
18
20
22
24
26
28
0
1
2
3
-5
0
5
Signal %RE

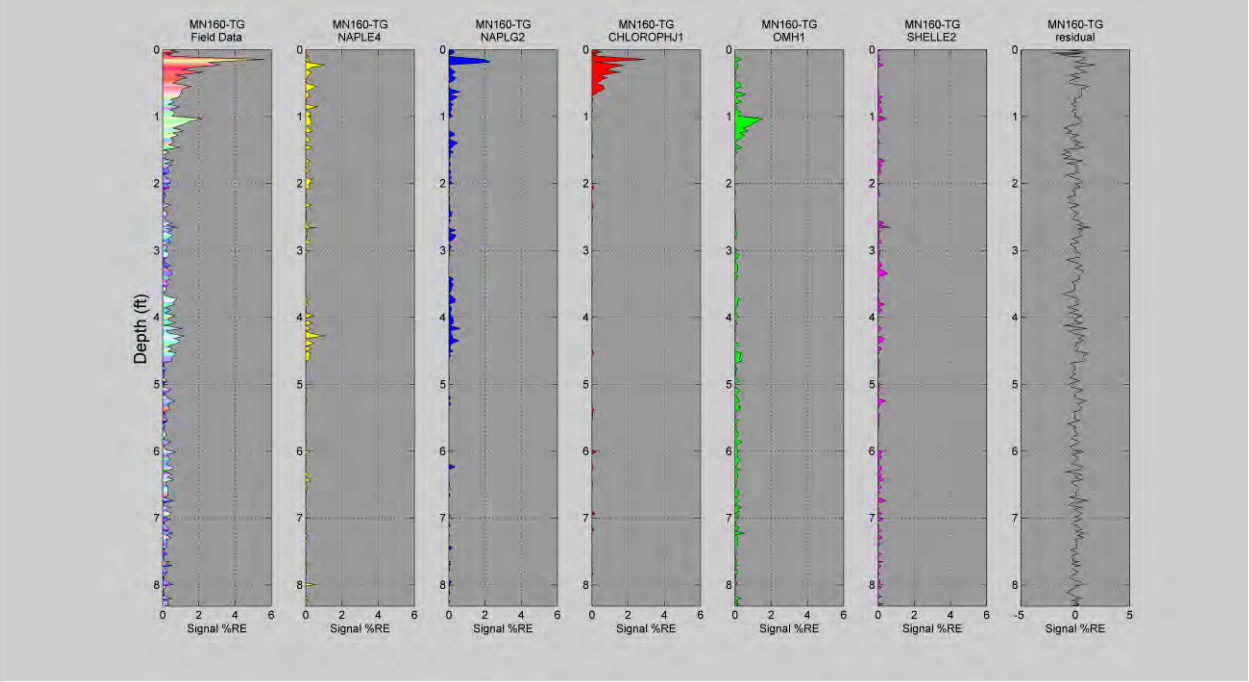

M190-TG
Field Data
M190-TG
NAPLE4
M190-TG
NAPLG2
M190-TG
CHLOROPHJ1
M190-TG
OMH1
M190-TG
SHELLE2
M190-TG
residual
Depth (ft)
1
2
3
4
5
6
7
8
9
10
0
1
2
-2
0
2
Signal %RE

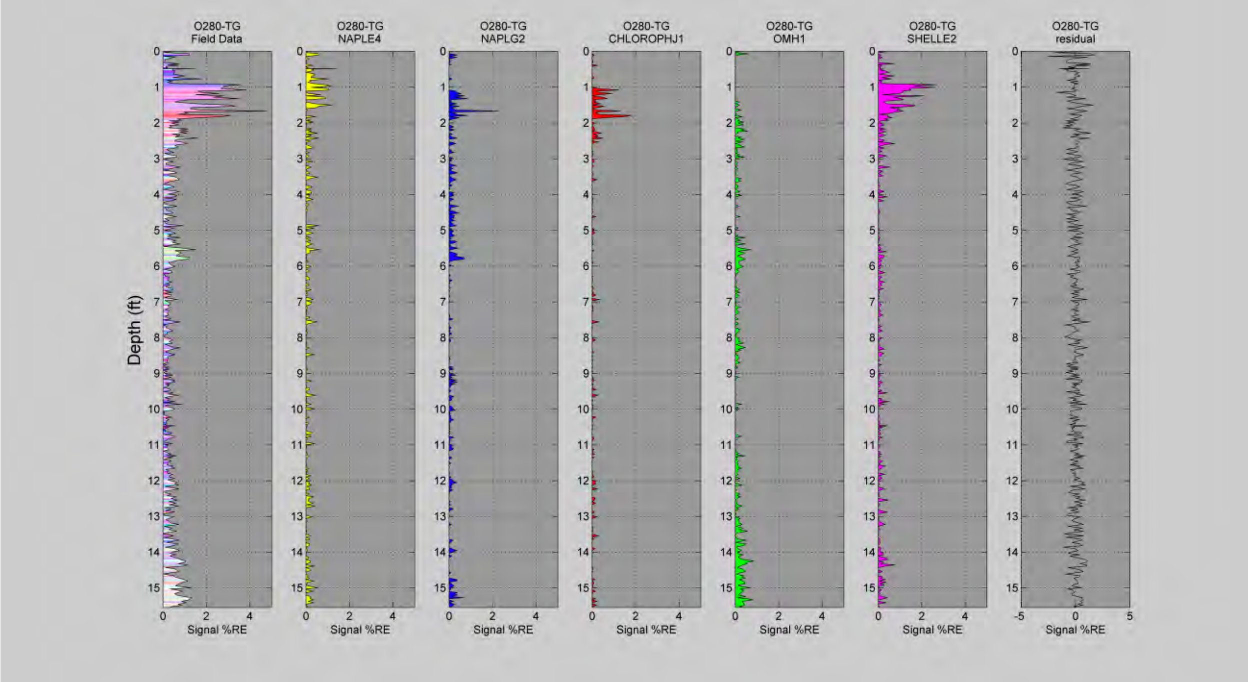

M280-TG
Field Data
M280-TG
NAPLE4
M280-TG
NAPLG2
M280-TG
CHLOROPHJ1
M280-TG
OMH1
M280-TG
SHELLE2
M280-TG
residual
Depth (ft)
1
2
3
4
5
6
7
8
9
10
11
12
13
0
2
4
6
8
-2
0
2
Signal %RE


M360-TG
Field Data
M360-TG
NAPLE4
M360-TG
NAPLG2
M360-TG
CHLOROPHJ1
M360-TG
OMH1
M360-TG
SHELLE2
M360-TG
residual
Depth (ft)
1
2
3
4
5
6
7
8
9
10
11
12
13
0
20
40
60
-2
0
2
Signal %RE


M400-TG
Field Data
M400-TG
NAPLE4
M400-TG
NAPLG2
M400-TG
CHLOROPHJ1
M400-TG
OMH1
M400-TG
SHELLE2
M400-TG
residual
Depth (ft)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
0
2
4
6
8
-5
0
5
Signal %RE


MN100-TG
Field Data
MN100-TG
NAPLE4
MN100-TG
NAPLG2
MN100-TG
CHLOROPHJ1
MN100-TG
OMH1
MN100-TG
SHELLE2
MN100-TG
residual
Depth (ft)
1
2
3
0
1
2
-2
0
2
Signal %RE


MN160-TG
Field Data
MN160-TG
NAPLE4
MN160-TG
NAPLG2
MN160-TG
CHLOROPHJ1
MN160-TG
OMH1
MN160-TG
SHELLE2
MN160-TG
residual
Depth (ft)
0
1
2
3
4
5
6
7
8
0
2
4
6
-5
0
5
Signal %RE


O280-TG
Field Data
O280-TG
NAPLE4
O280-TG
NAPLG2
O280-TG
CHLOROPHJ1
O280-TG
OMH1
O280-TG
SHELLE2
O280-TG
residual
Depth (ft)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
0
2
4
-5
0
5
Signal %RE

Appendix G-2
Sample Callout Terminology

Sample Callout Abbreviations

NP – NAPL Present

discreet NAPL was observed – even tiny weeps count (visually identified in any fashion – even UV)

NS – NAPL Stain

staining of soil was observed but not discrete pools, globules, droplets or weeps

PP – PAHs Present

neither NP nor NS were present, but jar lids placed under UV light or UV black nitrile glove test confirmed enough PAHs to show themselves via solid phase extraction's superior detection capability

FP – False Positive

some sort of false positive was observed – organic, soil particles, wood, roots, etc.

PO – Positive Odor

sample gave an odor that indicates contamination of the variety expected for this project – if outside of ordinary briefly explain

ND Non-Detect

nothing remarkable was found worth noting – otherwise considered clean soil [making this mandatory helps eliminates inadvertently forgetting to examine/note a sample

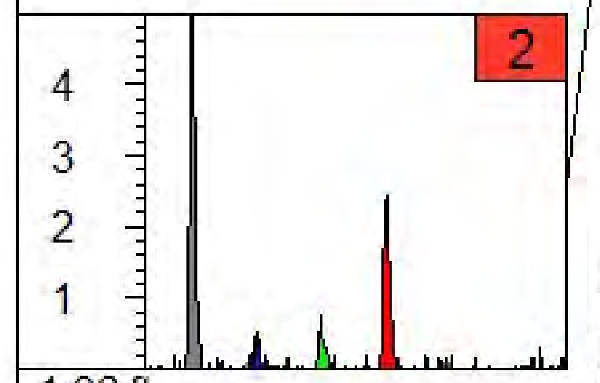
Example: jar from former MGP smelled of gasoline, but the only other evidence of contamination was blue fluorescence in the lid, so notes under the callout are:
PP PO (gasoline?)

Appendix G-3

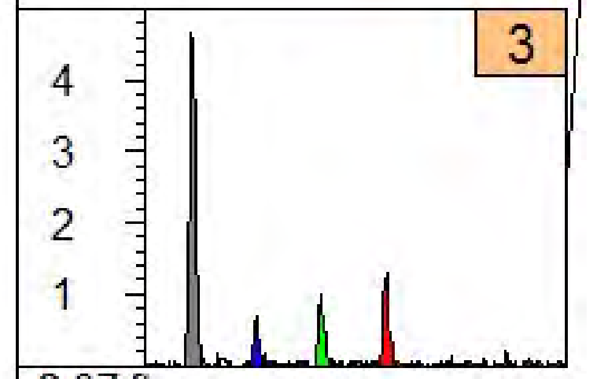
TarGOST Logs including Ex-Situ Samples

Callouts

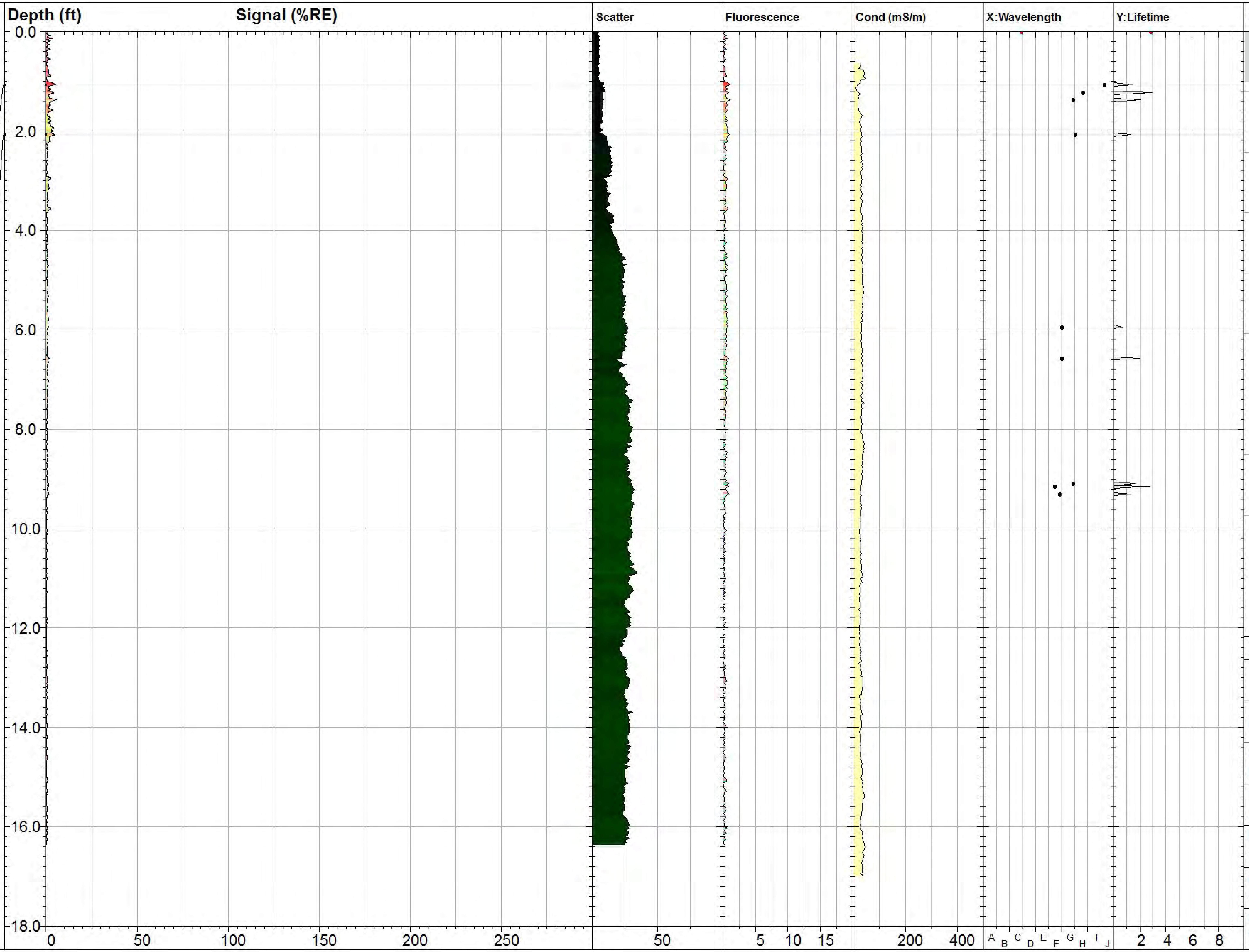
0 to 0.5' was logged within the casing



1.06 ft
5.4 %RE
chlorophyll

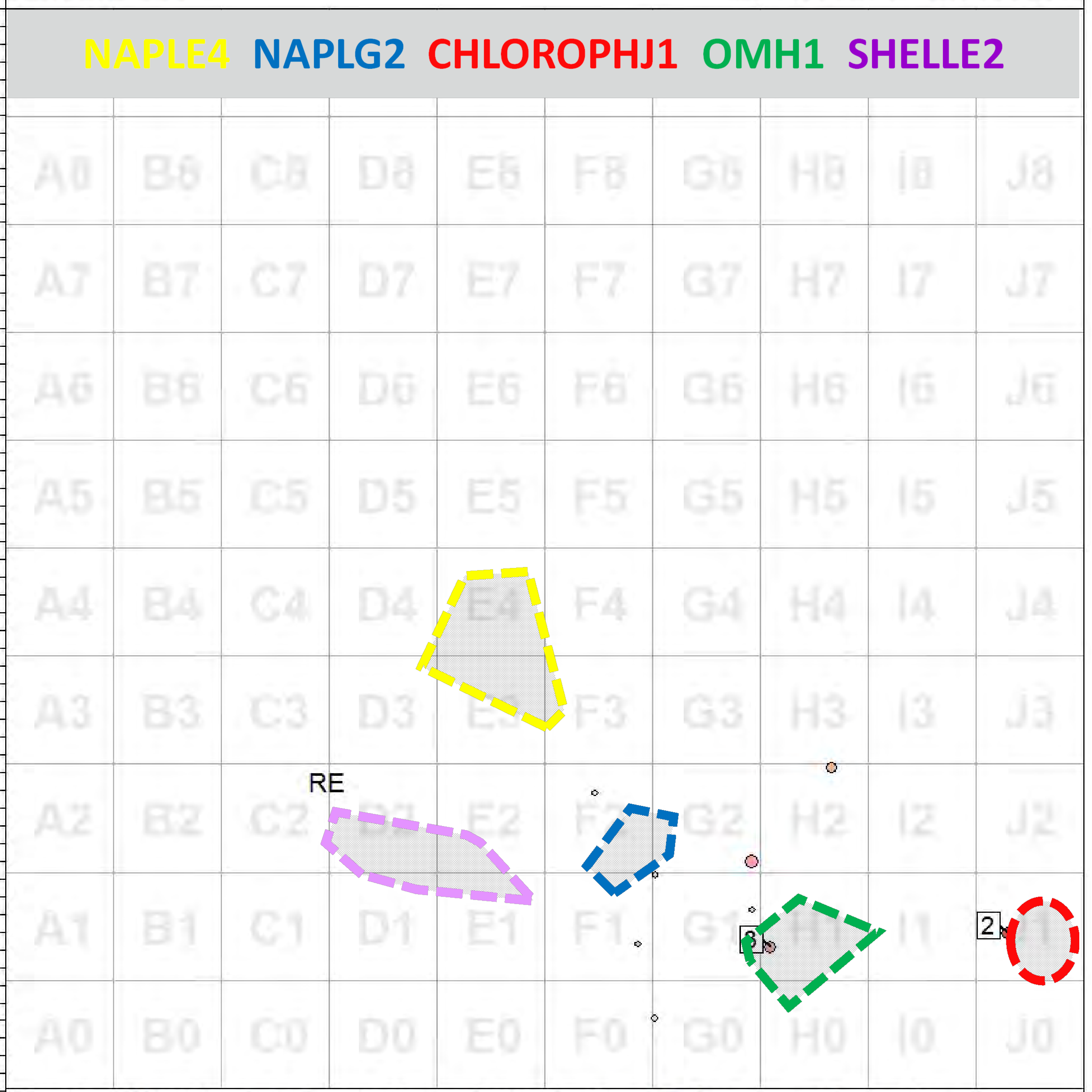


2.07 ft
4.8 %RE



Cluster Plot

Cluster Cutoff: Fluorescence < 0.8



X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

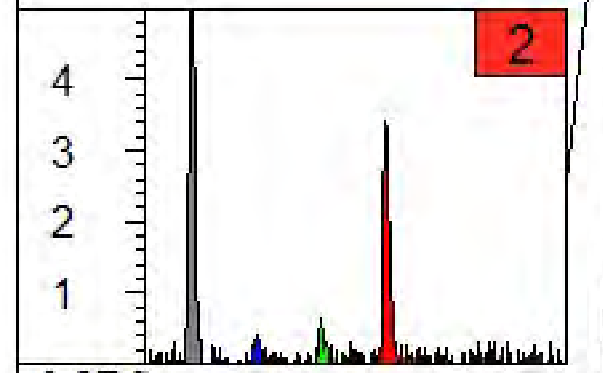
TarGOST® By Dakota

Log: **E060-TG**

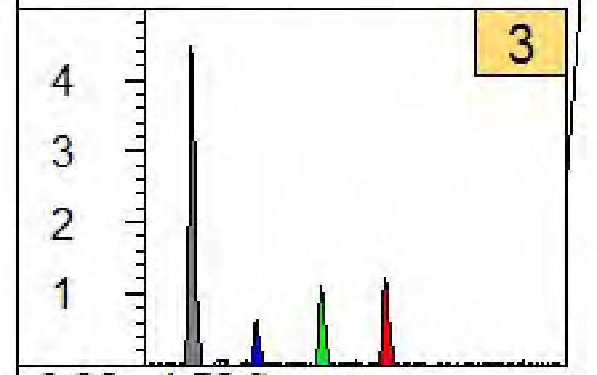
Site: **BNSF Wishram**	Date & Time: **2022-11-10 10:40 PST**
Client: **Jacobs**	Job:
Final Depth: **16.35 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **5.6 %RE @ 1.36 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**

Callouts

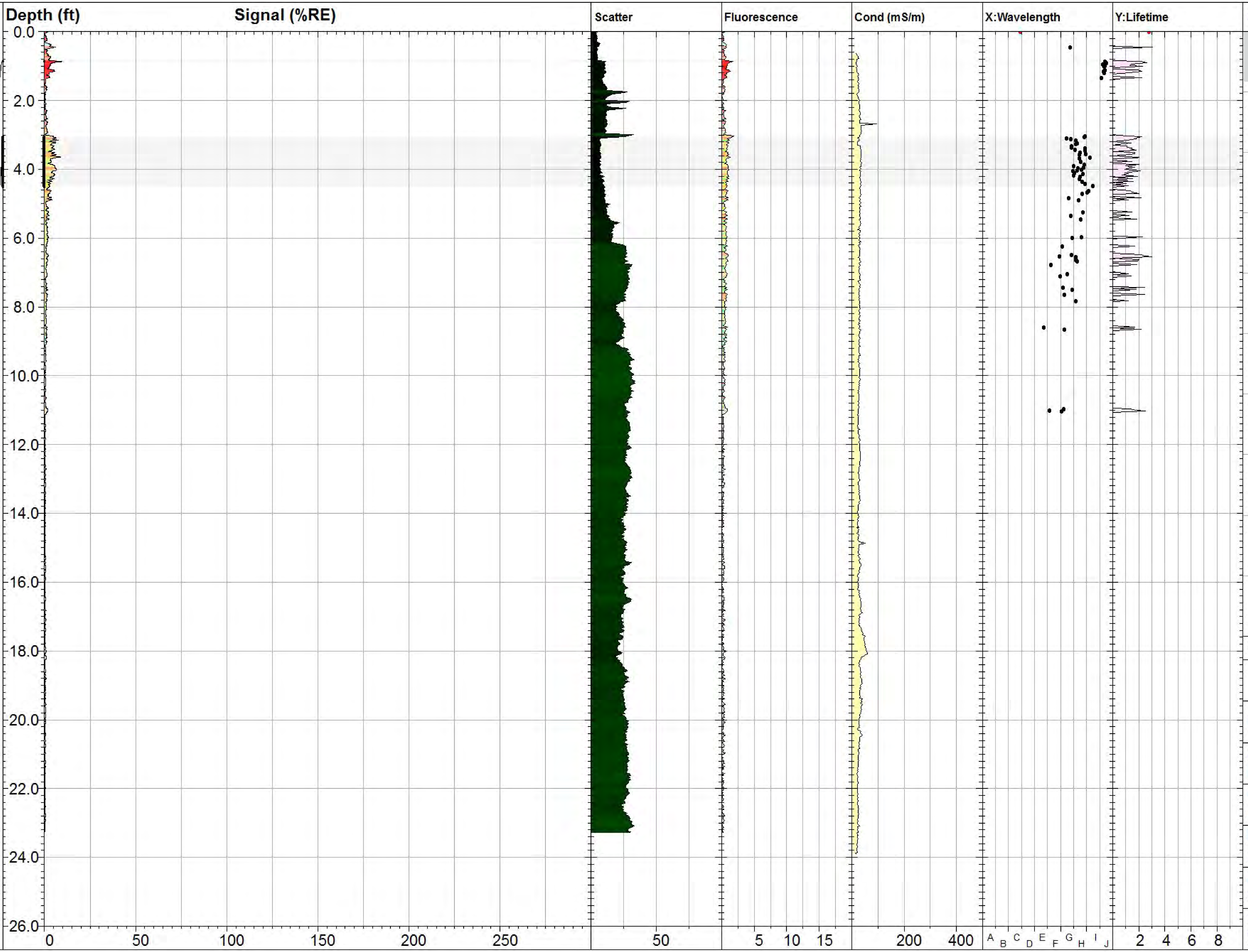
0 to 0.6' was logged within the casing

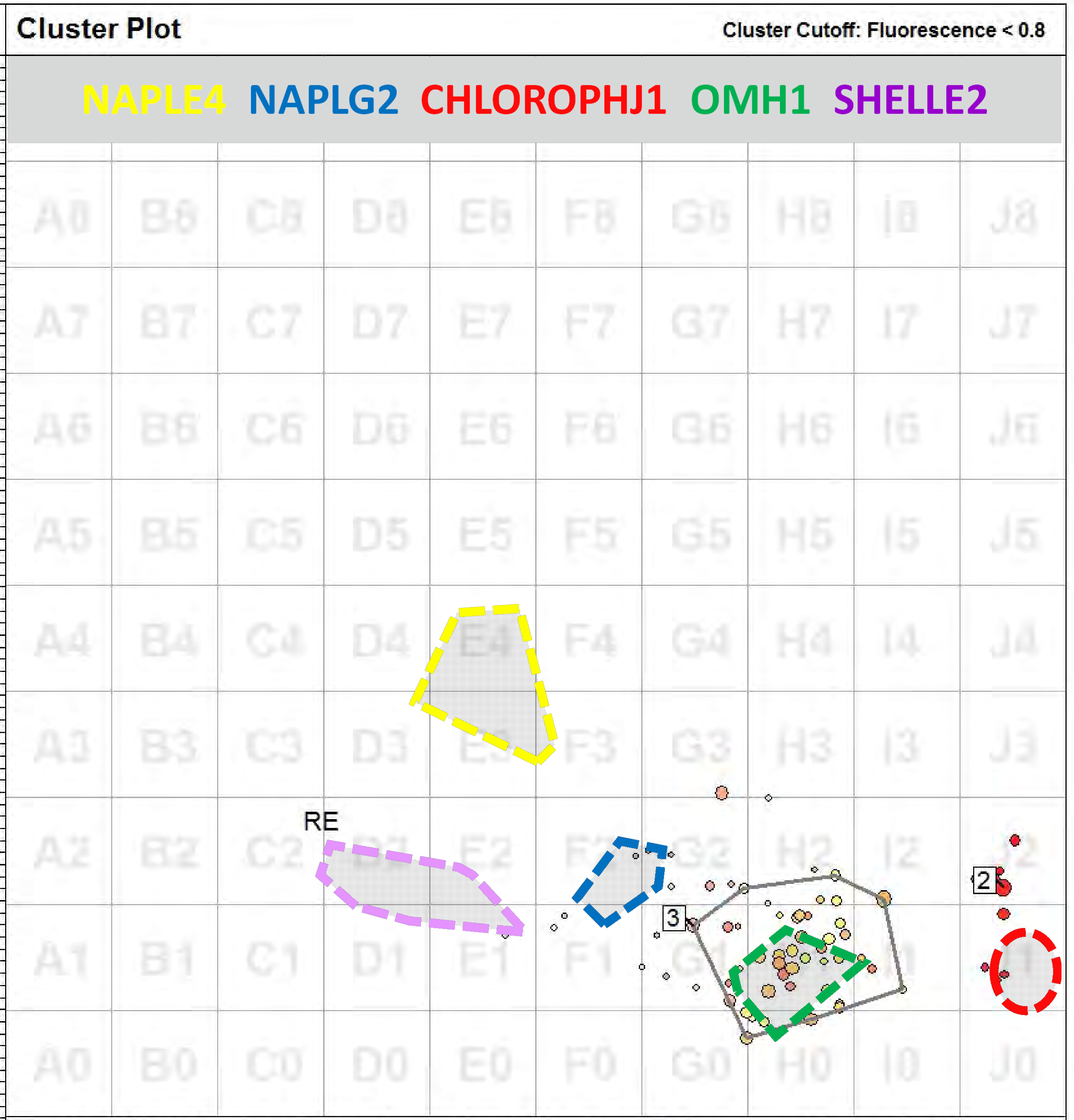


0.87 ft
9.6 %RE
chlorophyll



3.06 - 4.52 ft
4.2 %RE (s 1.6)



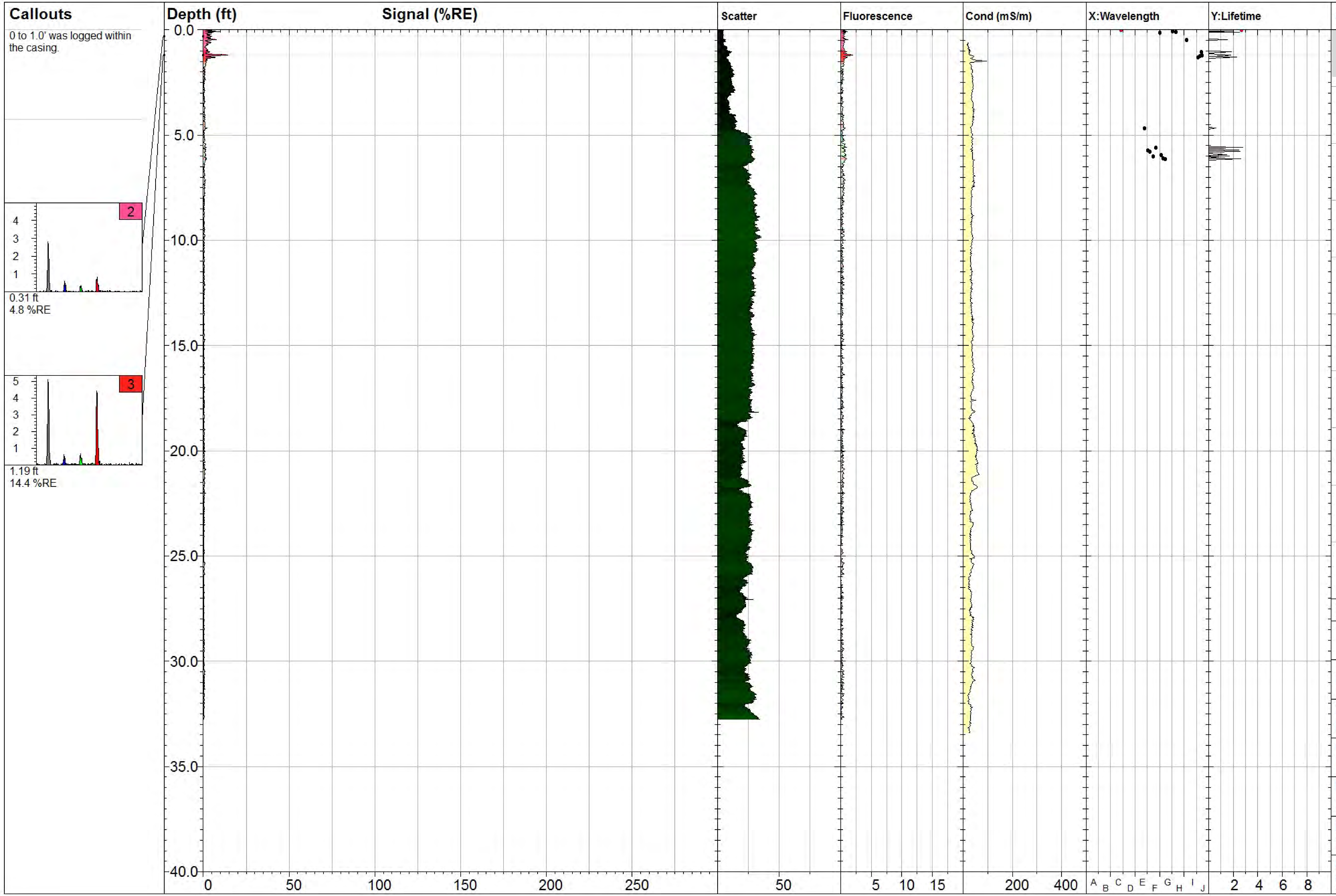


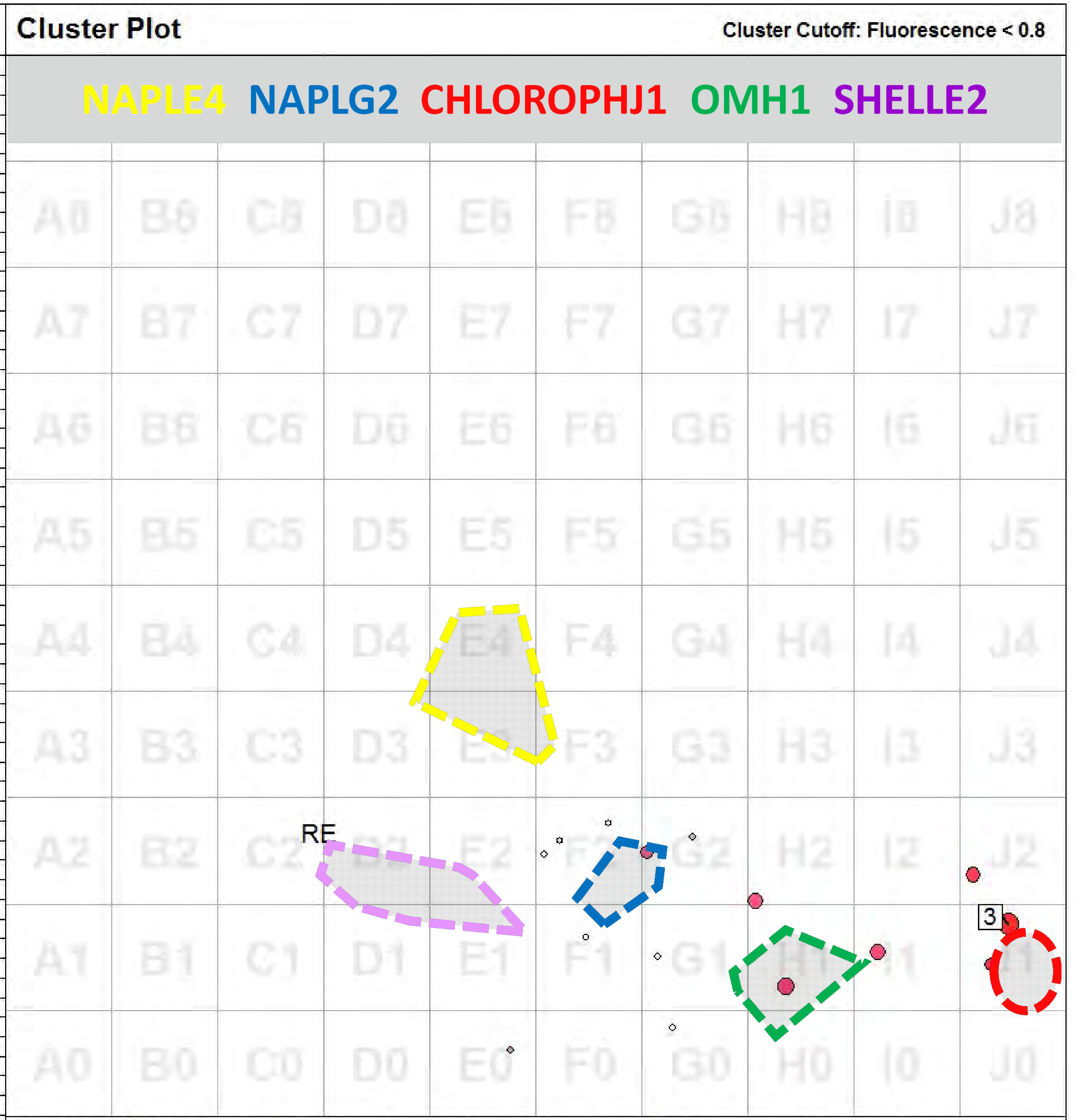
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **E120-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-10 11:18 PST**
Client: **Jacobs**	Job:
Final Depth: **23.27 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **9.6 %RE @ 0.87 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**





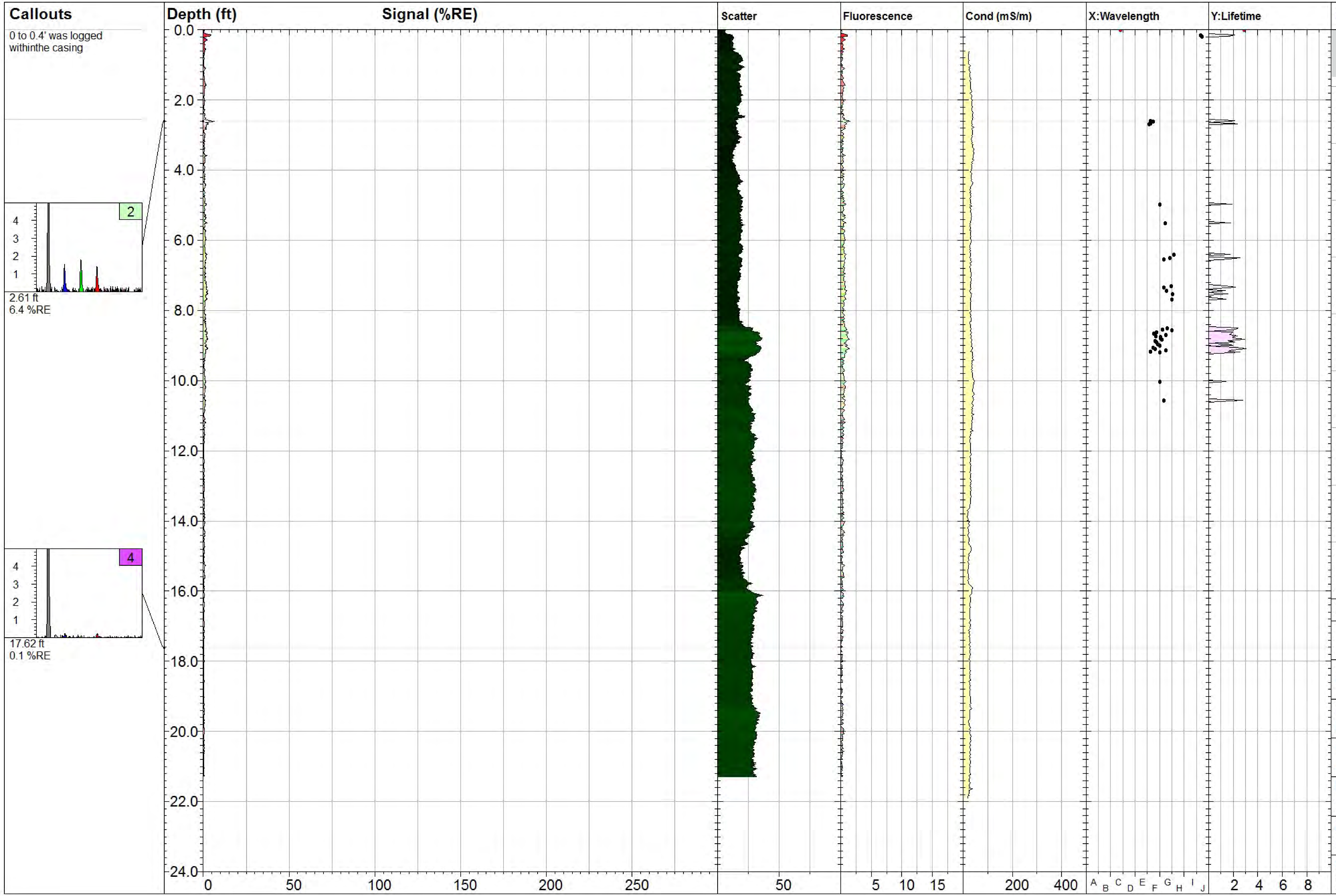
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Data Presentation Format © 2023 Dakota Technologies, Inc. (v2.8.1)

Log: **E190-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-10 12:08 PST**
Client: **Jacobs**	Job:
Final Depth: **32.77 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **14.4 %RE @ 1.19 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**



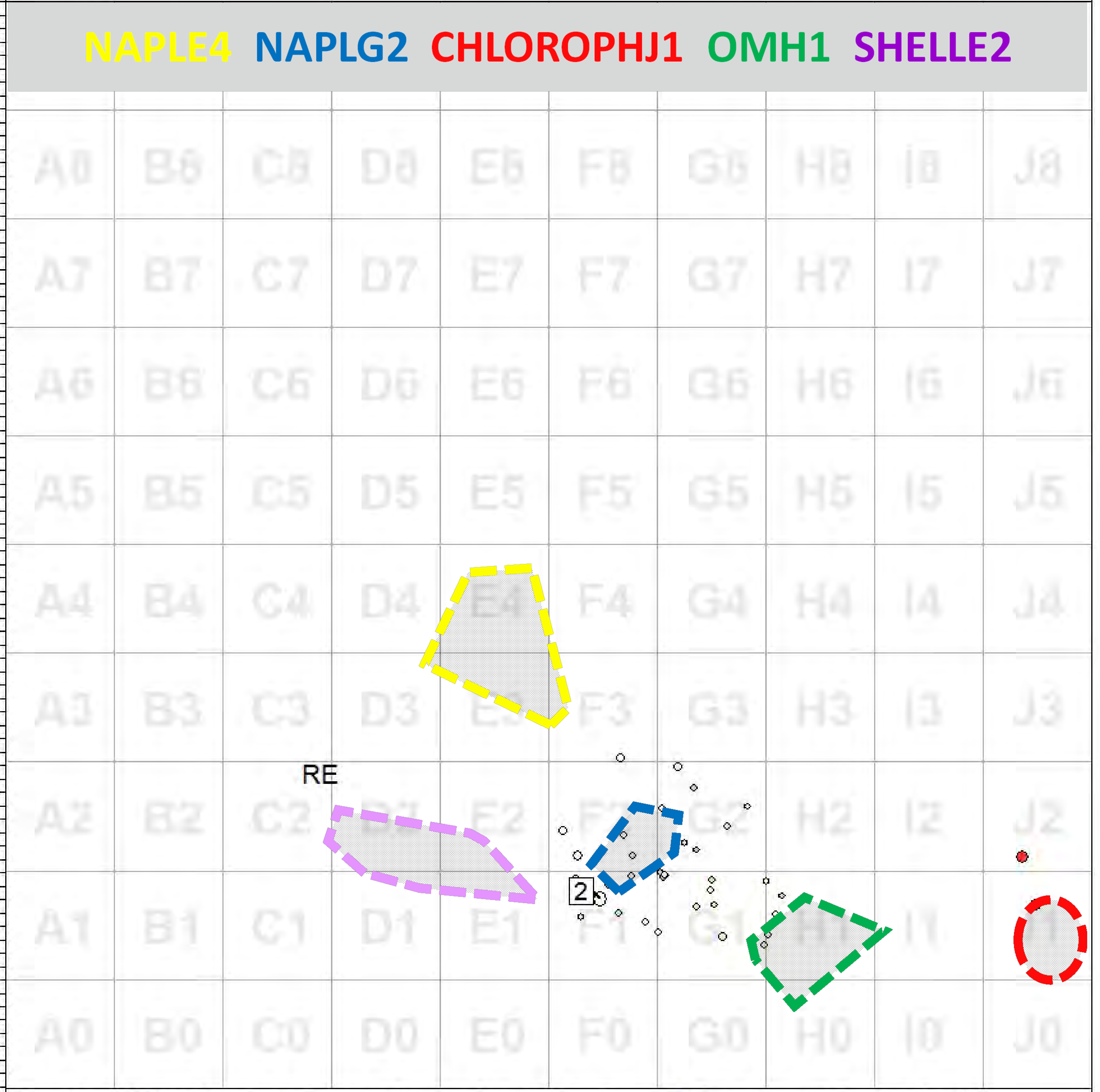
0 to 0.4' was logged withinthe casing

2.61 ft
6.4 %RE

17.62 ft
0.1 %RE

Cluster Plot

Cluster Cutoff: Fluorescence < 0.8

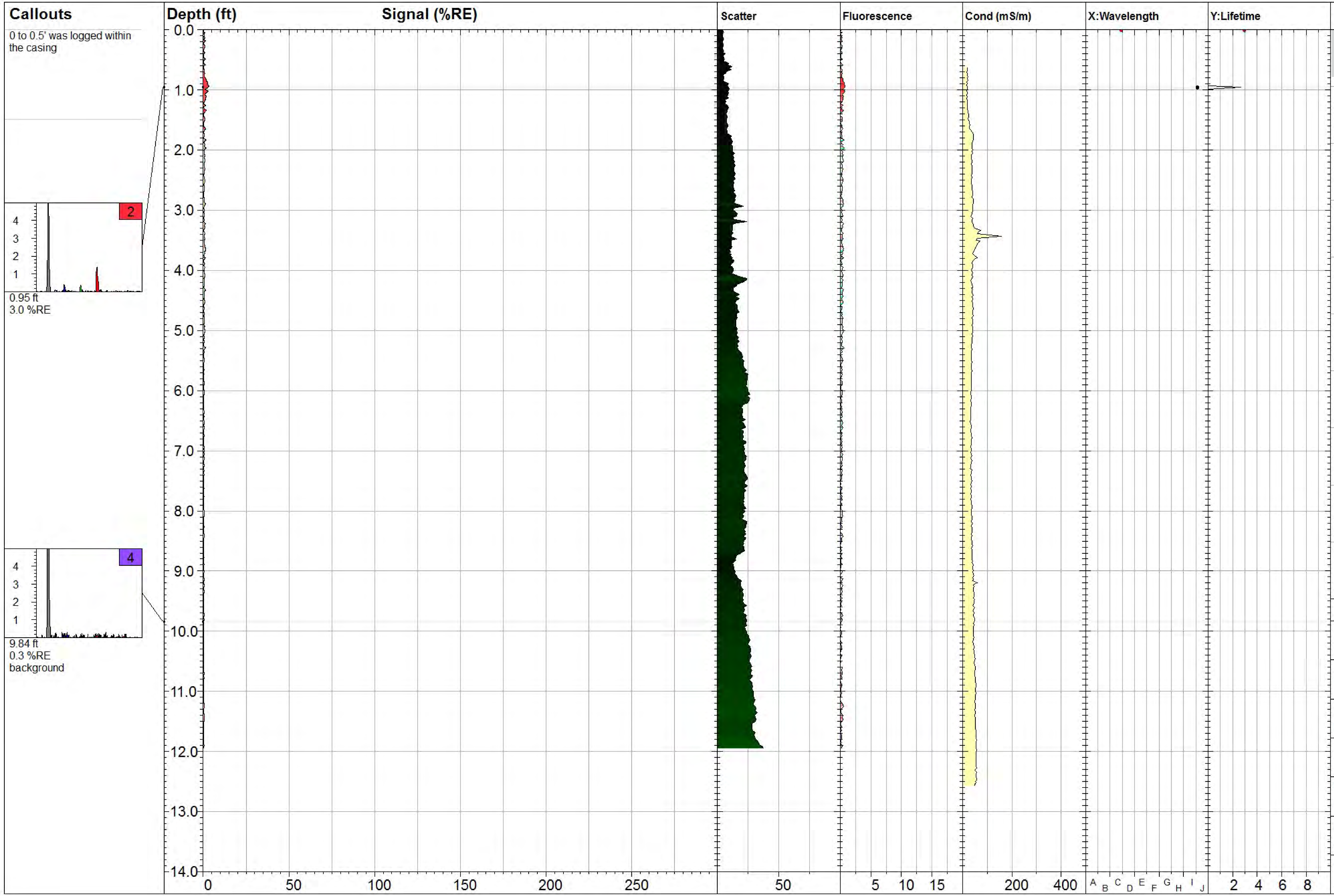


X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **E520-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-10 14:28 PST**
Client: **Jacobs**	Job:
Final Depth: **21.29 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **6.4 %RE @ 2.61 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**

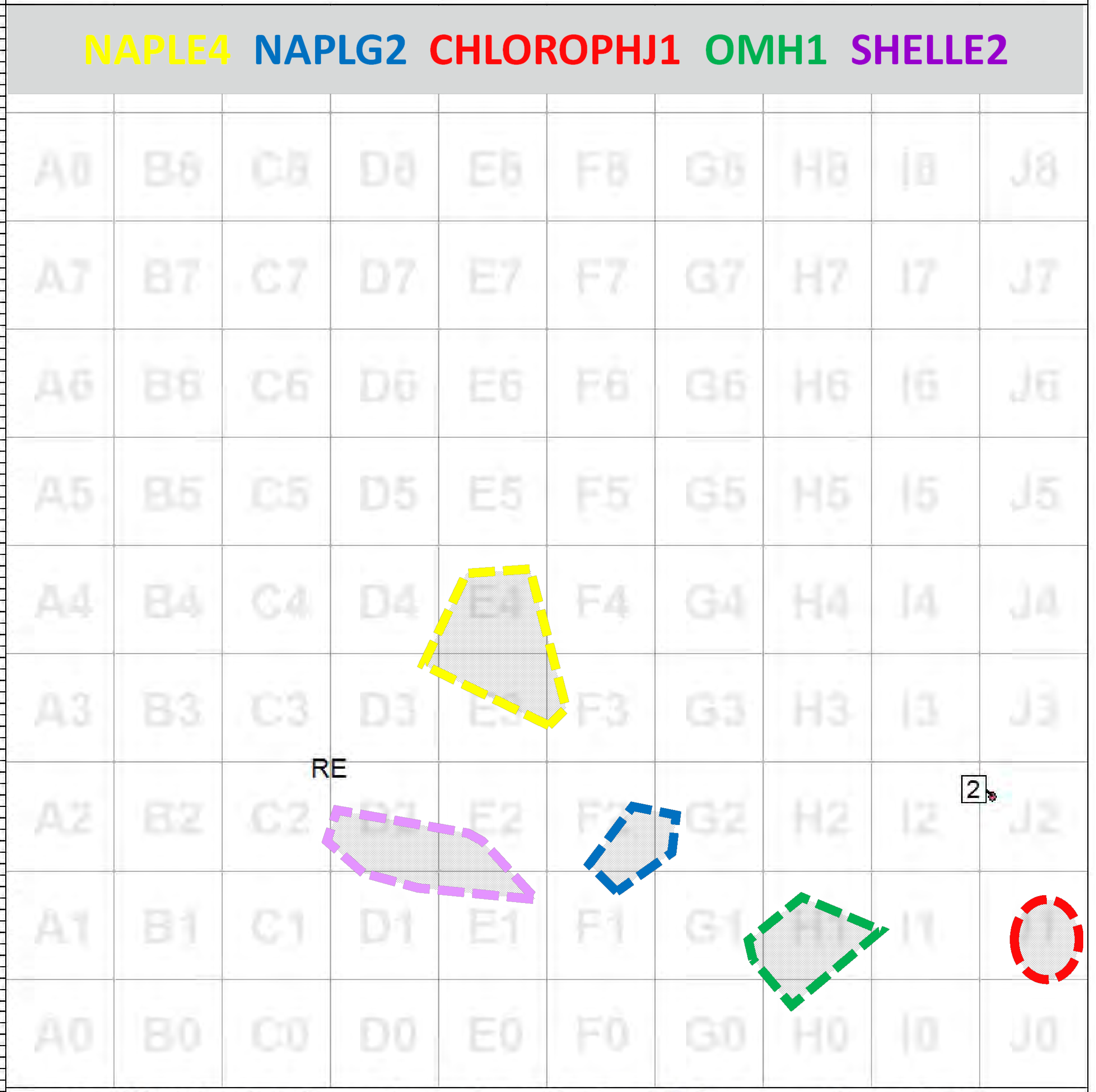


0 to 0.5' was logged within the casing

0.95 ft
3.0 %RE

9.84 ft
0.3 %RE
background

Cluster Plot Cluster Cutoff: Fluorescence < 0.8

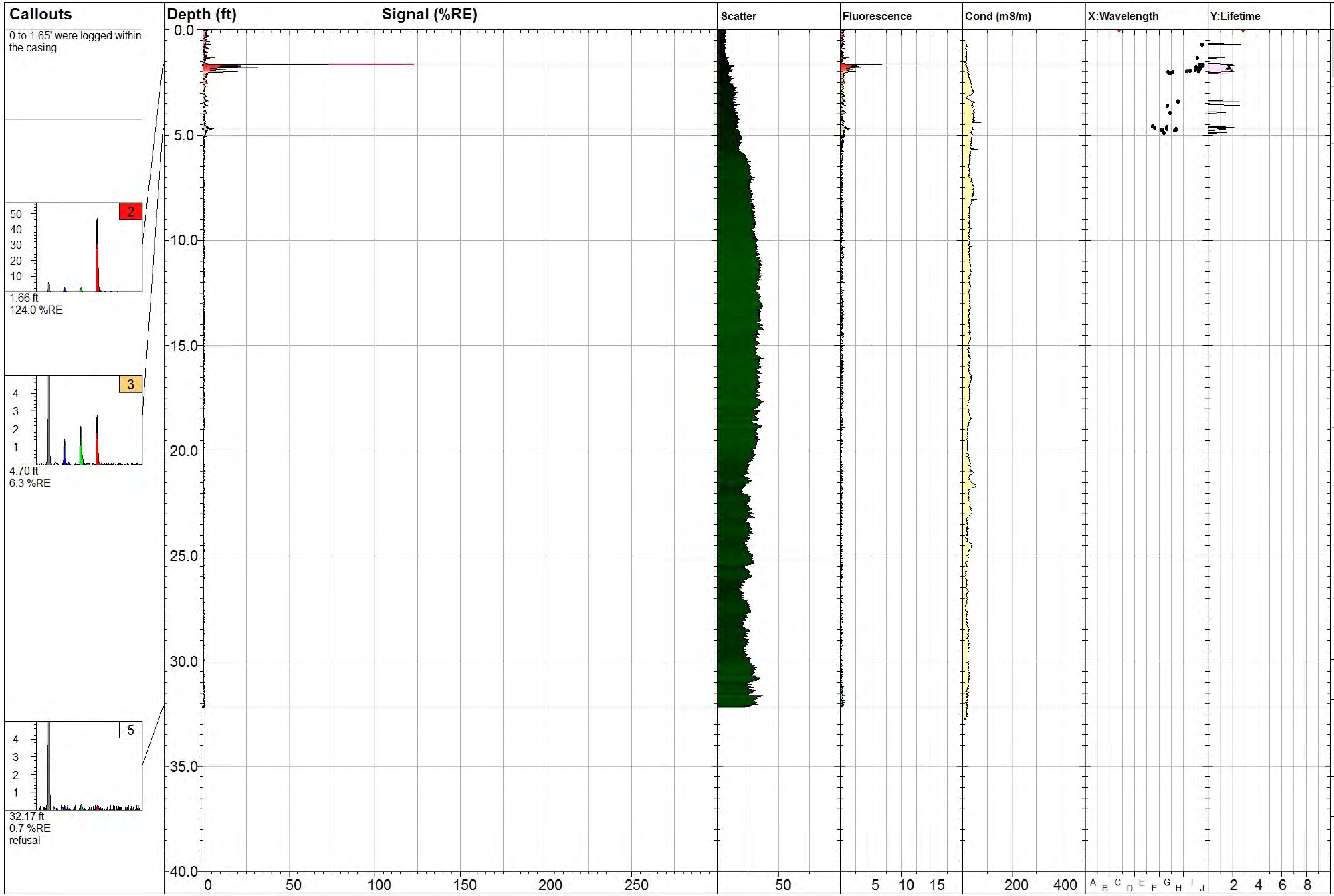


X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **EF000-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-10 10:05 PST**
Client: **Jacobs**	Job:
Final Depth: **11.94 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **3.2 %RE @ 0.93 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**

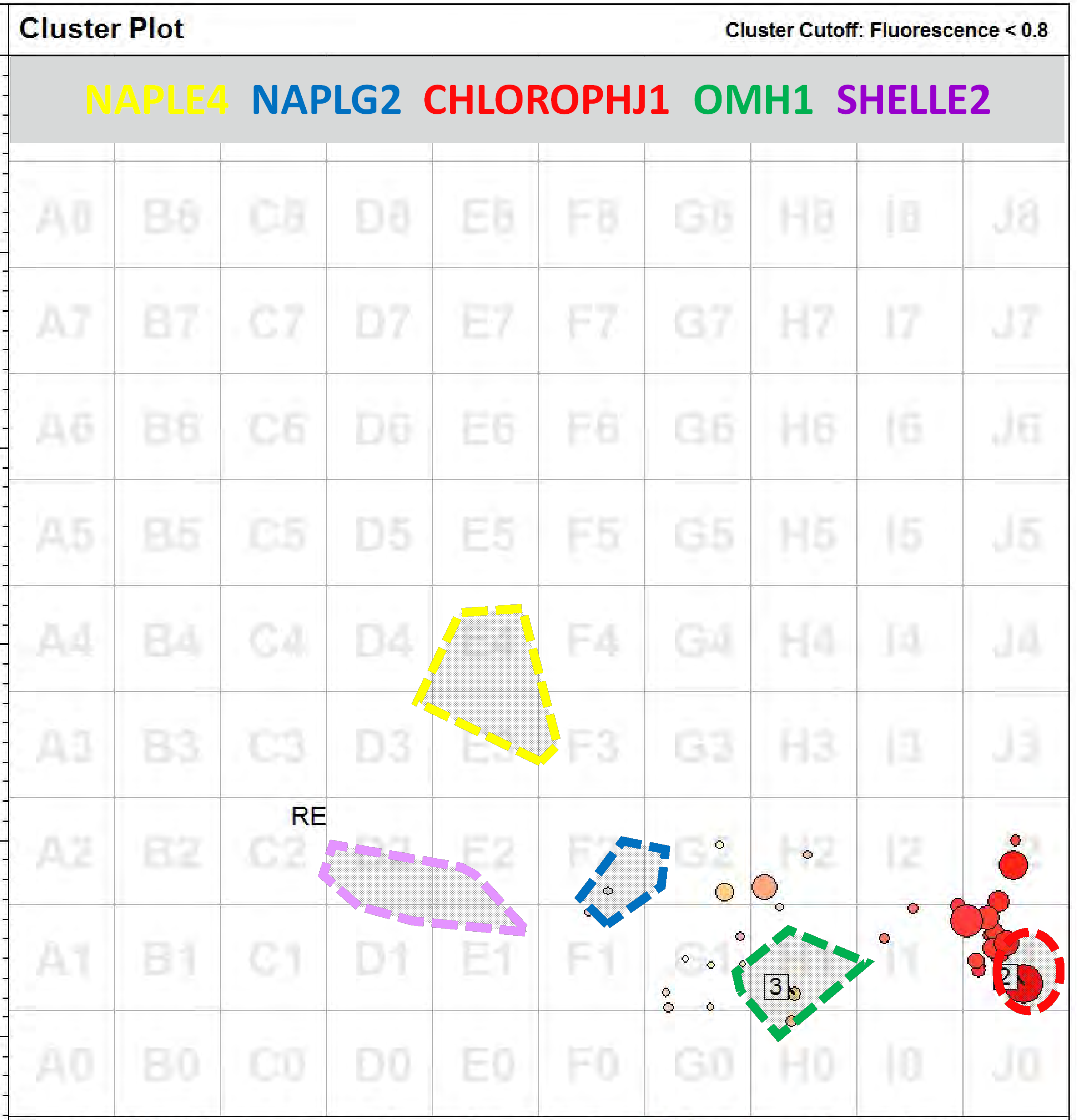


0 to 1.65' were logged within the casing

1.66 ft
124.0 %RE

4.70 ft
6.3 %RE

32.17 ft
0.7 %RE
refusal

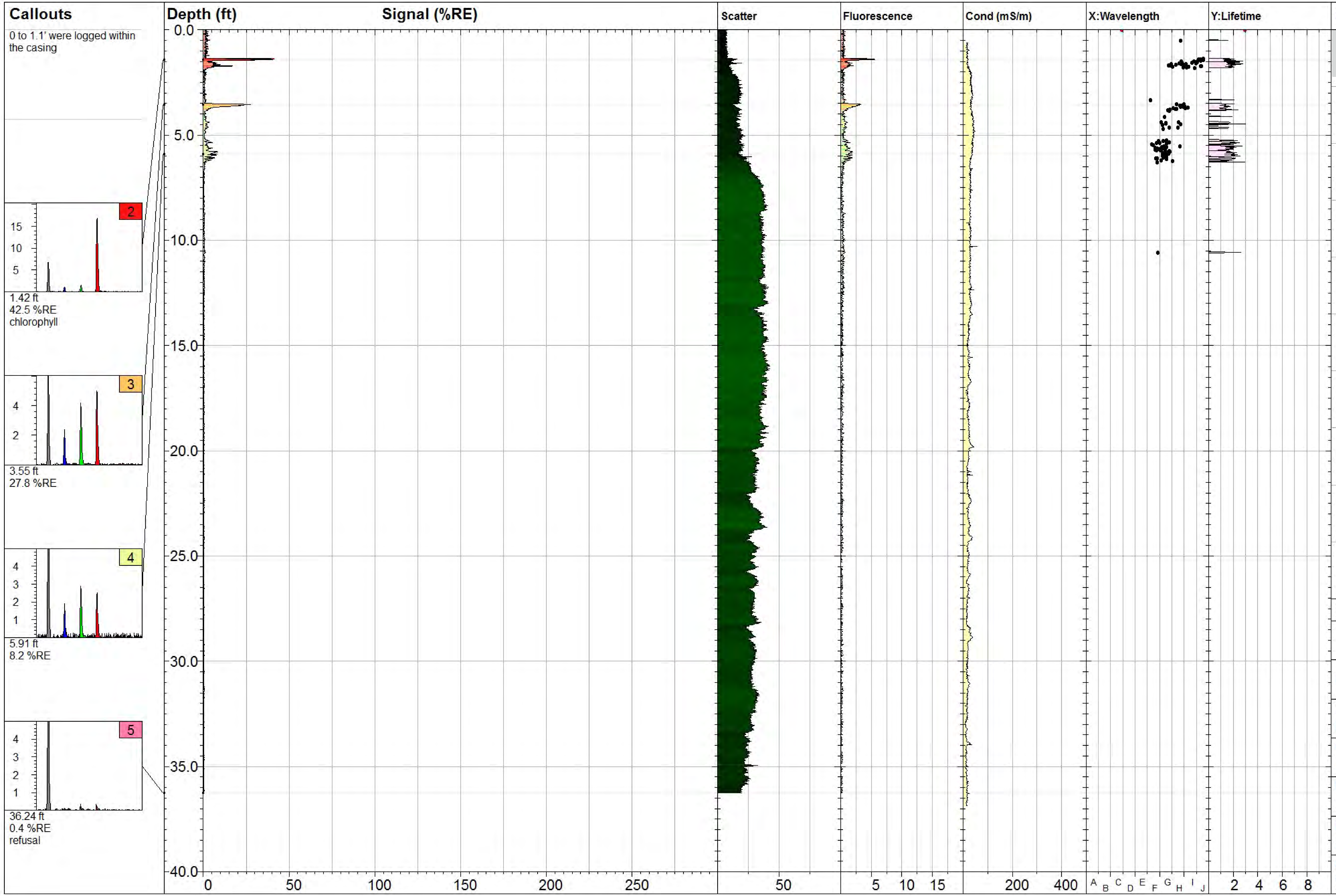


X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **EF240-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-03 09:30 PDT**
Client: **Jacobs**	Job:
Final Depth: **32.17 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **124.0 %RE @ 1.66 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**



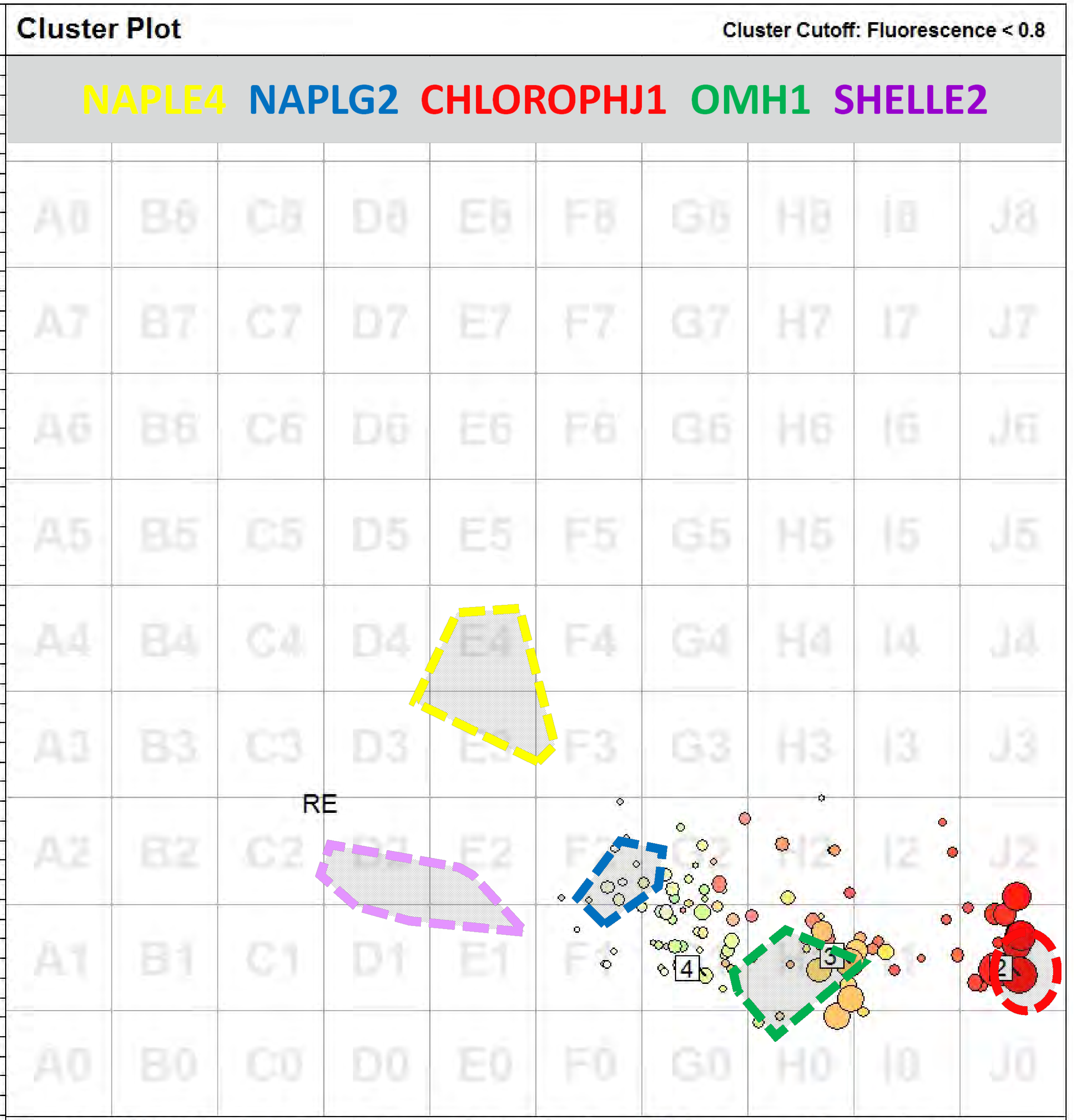
0 to 1.1' were logged within the casing

1.42 ft
42.5 %RE
chlorophyll

3.55 ft
27.8 %RE

5.91 ft
8.2 %RE

36.24 ft
0.4 %RE
refusal

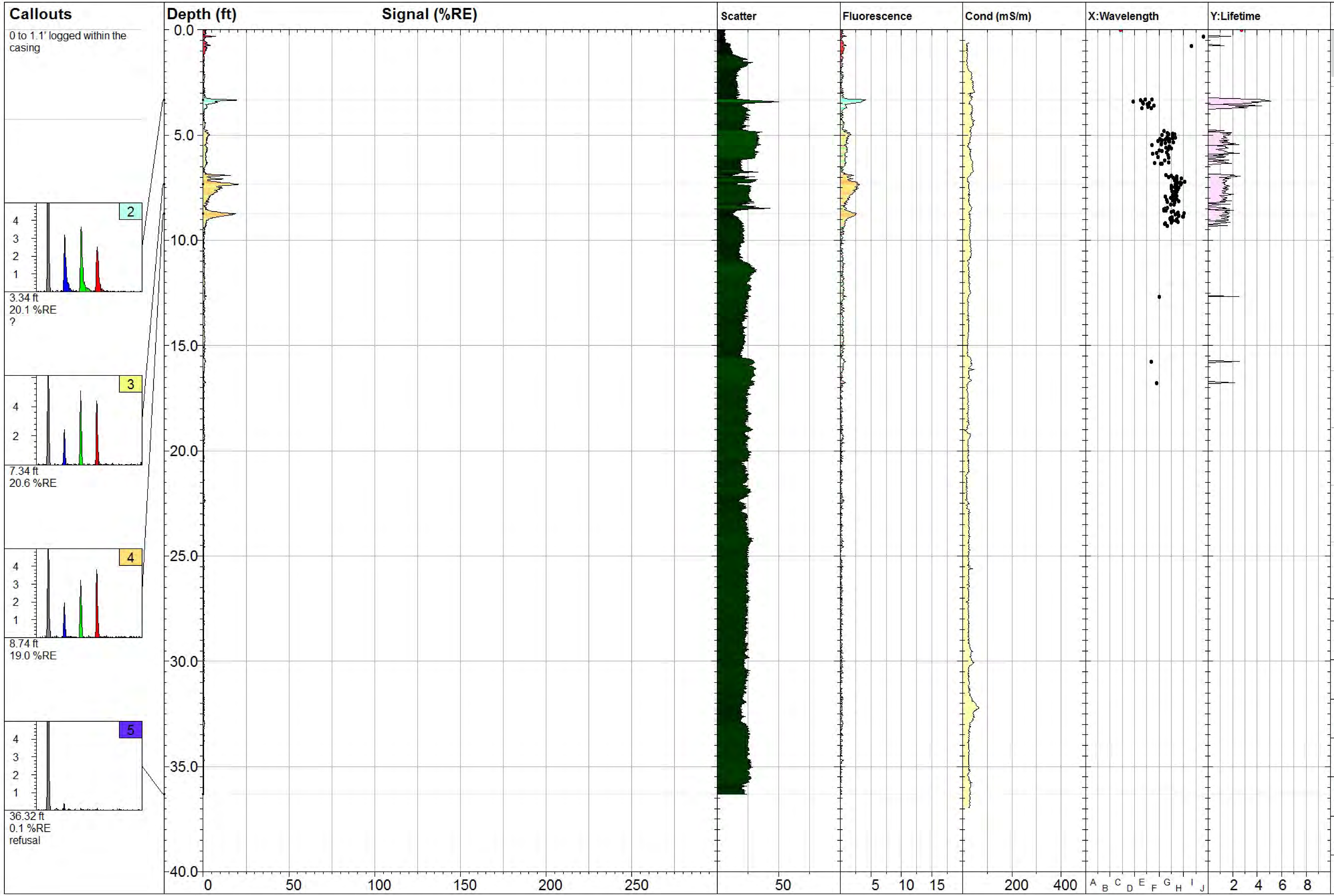


X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **EF280-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-03 10:41 PDT**
Client: **Jacobs**	Job:
Final Depth: **36.24 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **42.5 %RE @ 1.42 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**



0 to 1.1' logged within the casing

3.34 ft
20.1 %RE
?

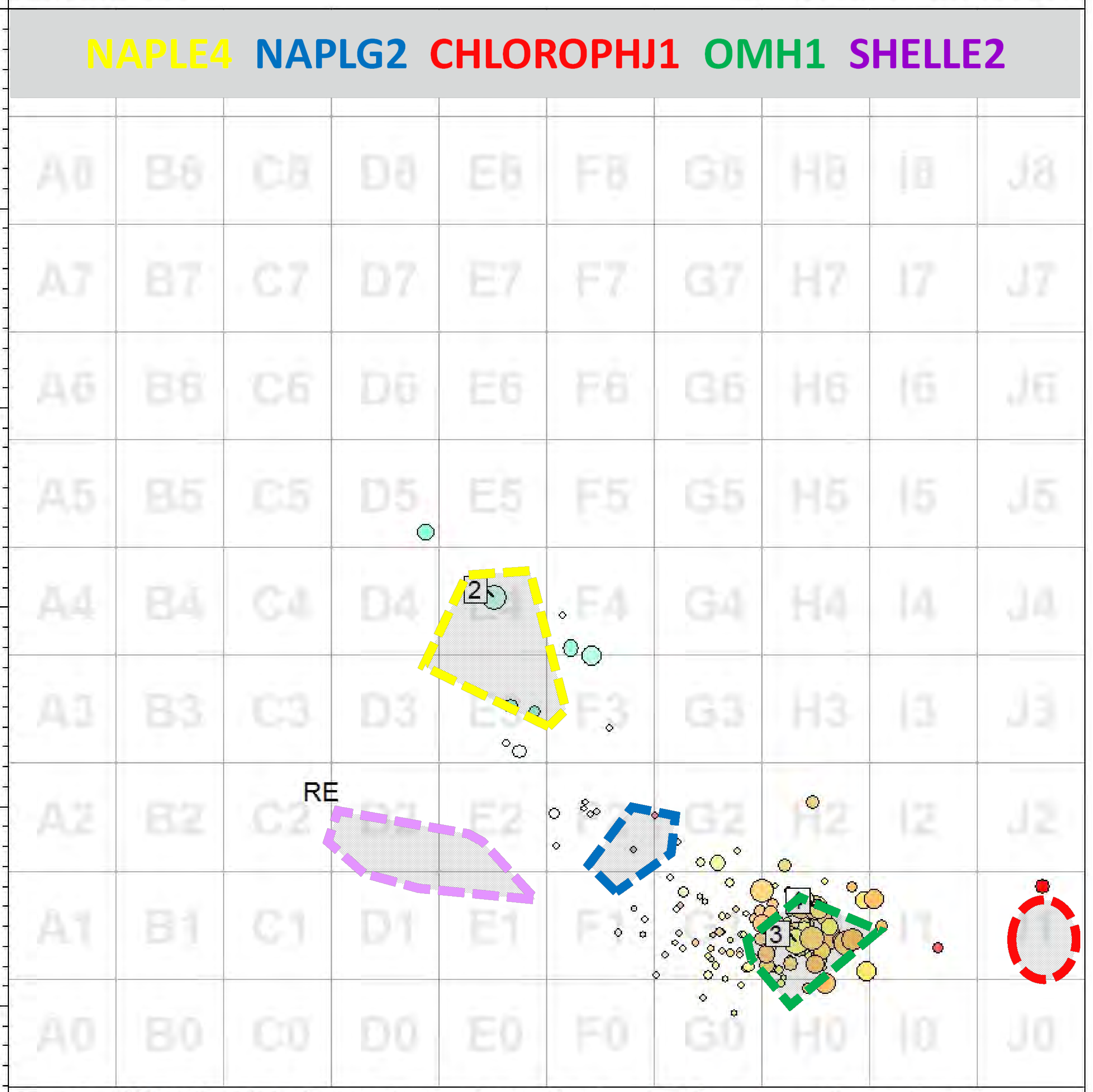
7.34 ft
20.6 %RE

8.74 ft
19.0 %RE

36.32 ft
0.1 %RE
refusal

Cluster Plot

Cluster Cutoff: Fluorescence < 0.8



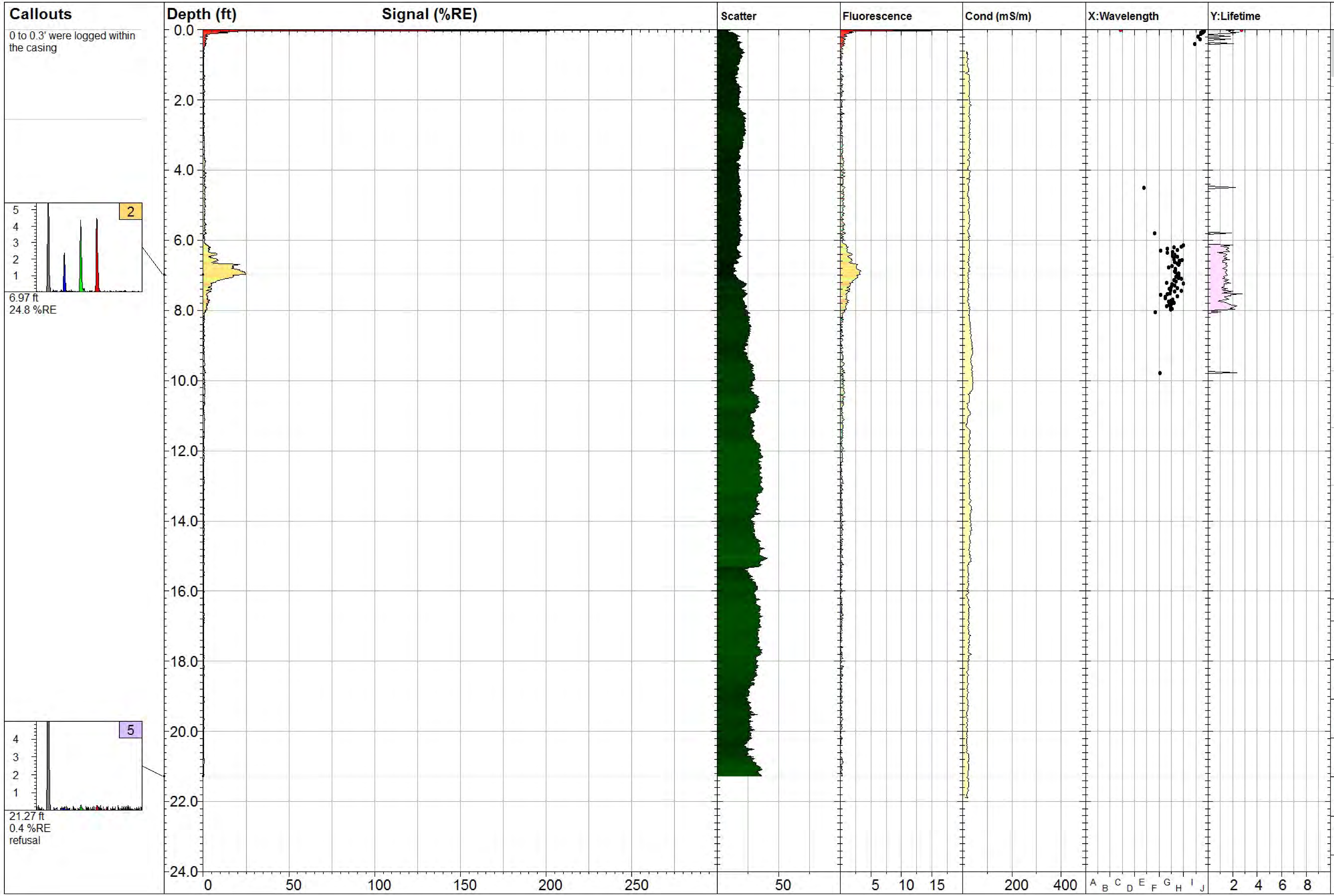
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

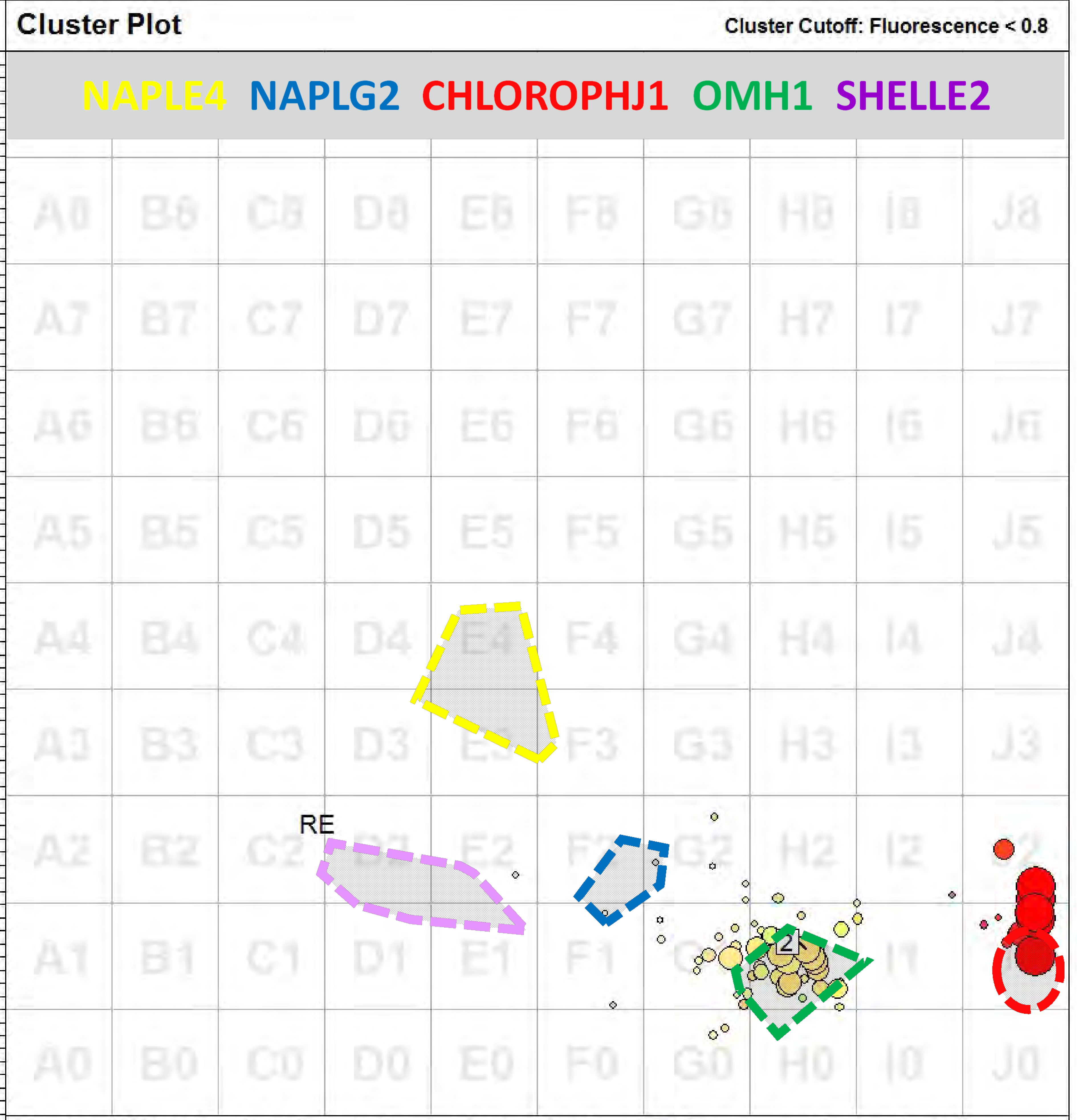
TarGOST® By Dakota

Data Presentation Format © 2023 Dakota Technologies, Inc. (v2.8.1)

Log: **EF420-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-03 14:19 PDT**
Client: **Jacobs**	Job:
Final Depth: **36.32 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **20.6 %RE @ 7.34 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**





X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Data Presentation Format © 2023 Dakota Technologies, Inc. (v2.8.1)

Log: **EF470-TG**

Site:
BNSF Wishram

Date & Time:
2022-11-03 15:17 PDT

Client:
Jacobs

Job:

Final Depth:
21.27 ft

X Coord.(Long/East):
Unavailable

Max Signal:
272.1 %RE @ 0.01 ft

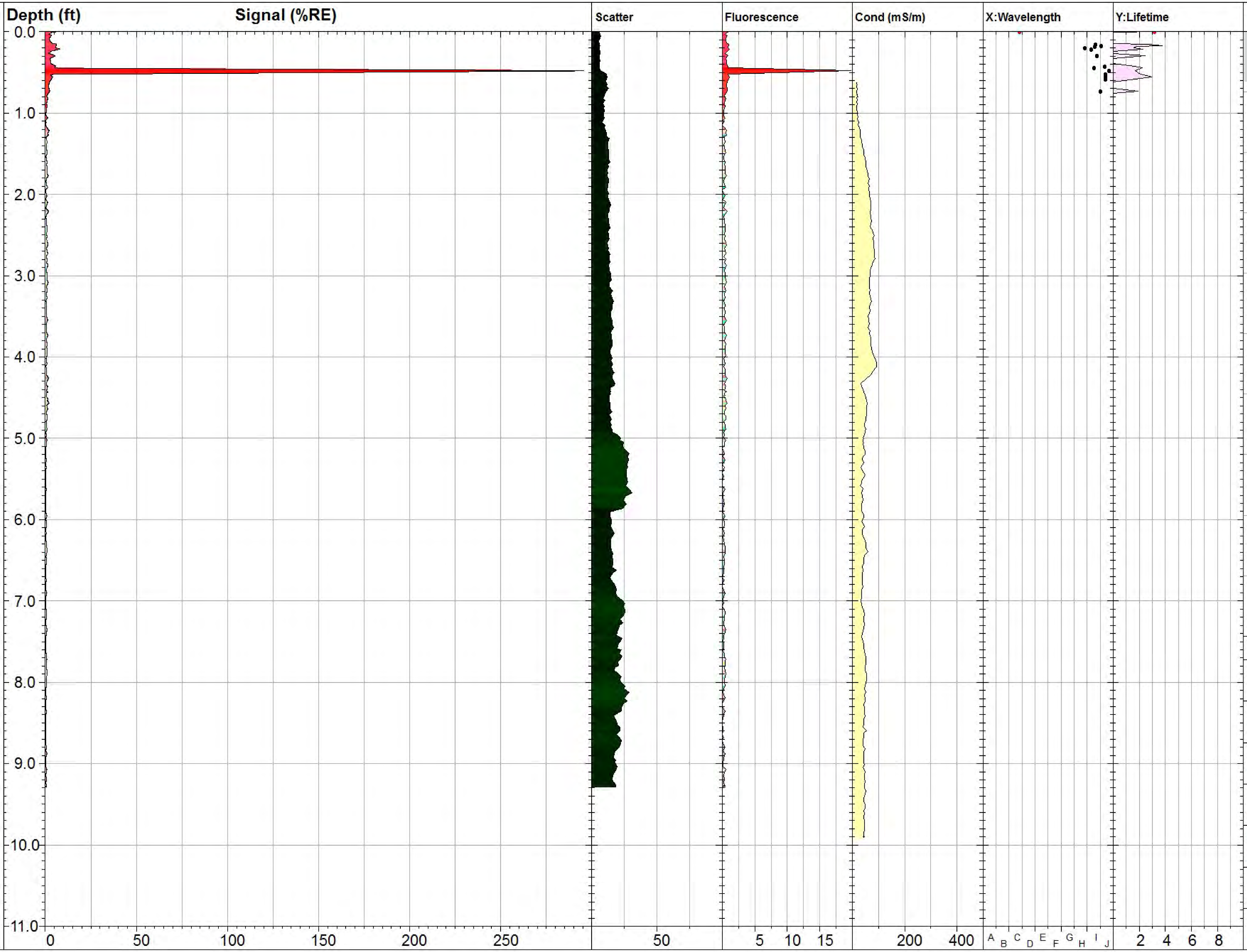
Y Coord.(Lat/North):
Unavailable

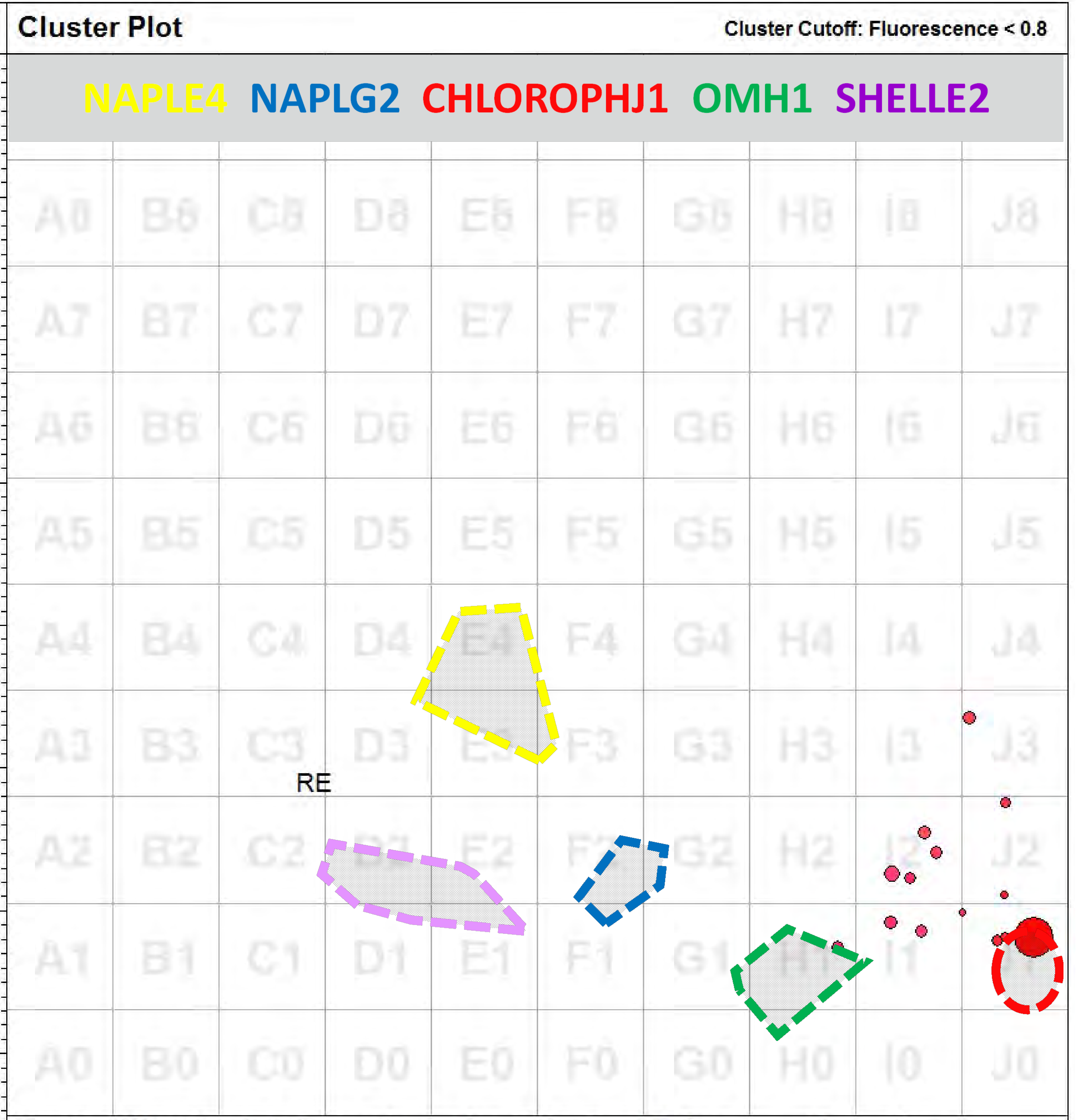
Operator / Unit:
SDA / TG1807

Elevation:
Unavailable

Callouts

0-.25 pushed inside casing



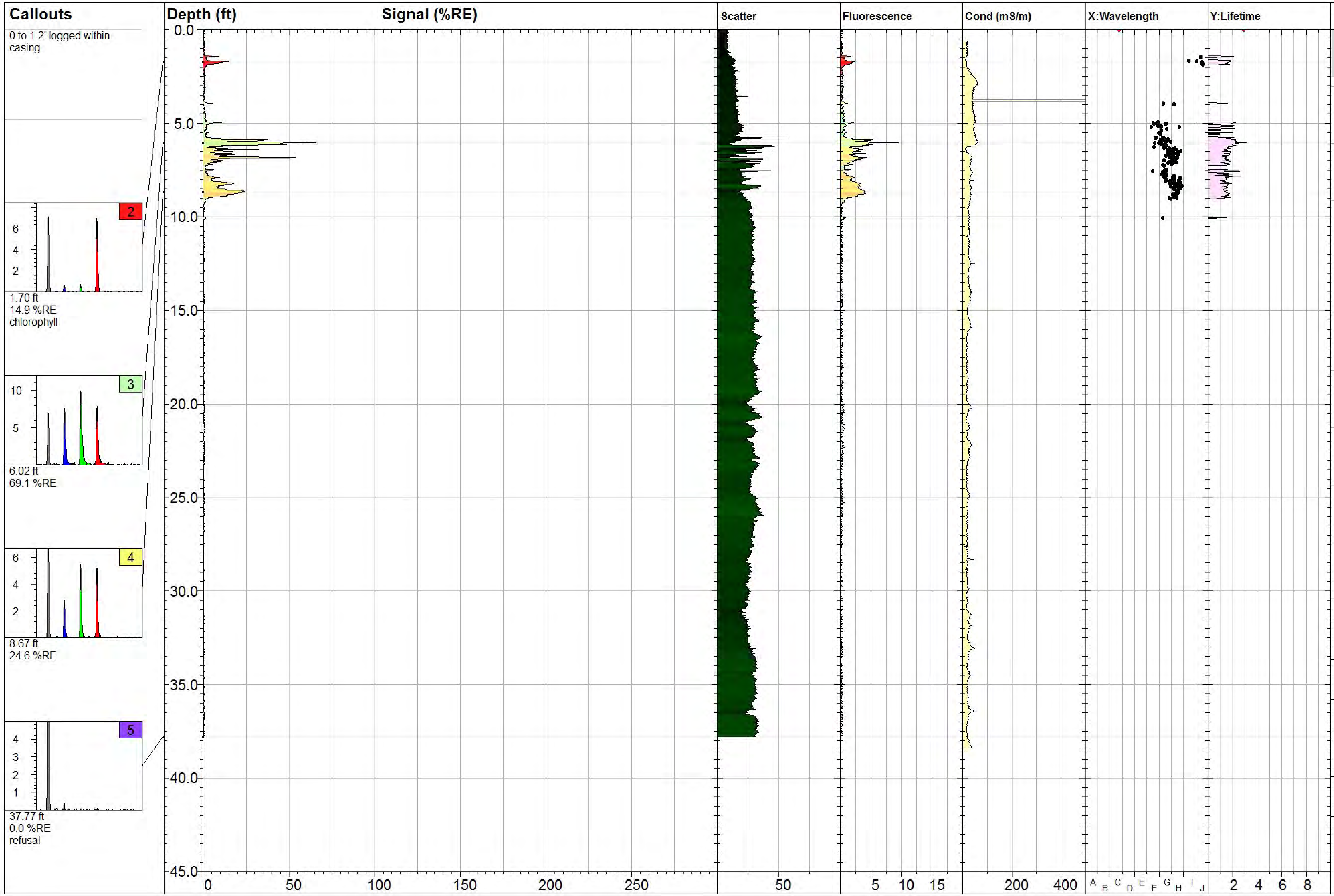


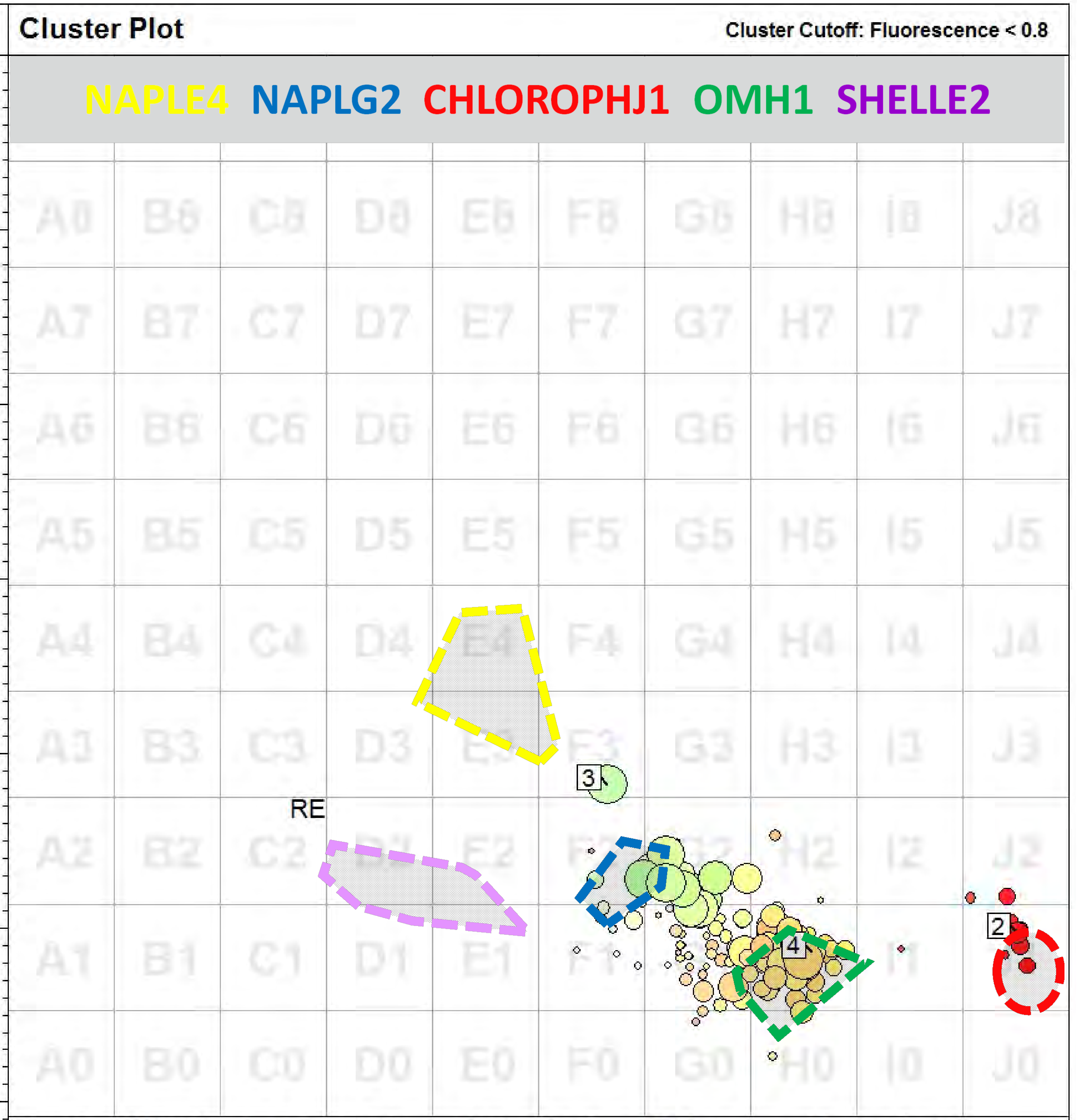
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **EN060-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-15 10:46 PST**
Client: **Jacobs**	Job:
Final Depth: **9.29 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **300.7 %RE @ 0.48 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **T.Rudolph / TG1807**	Elevation: **Unavailable**



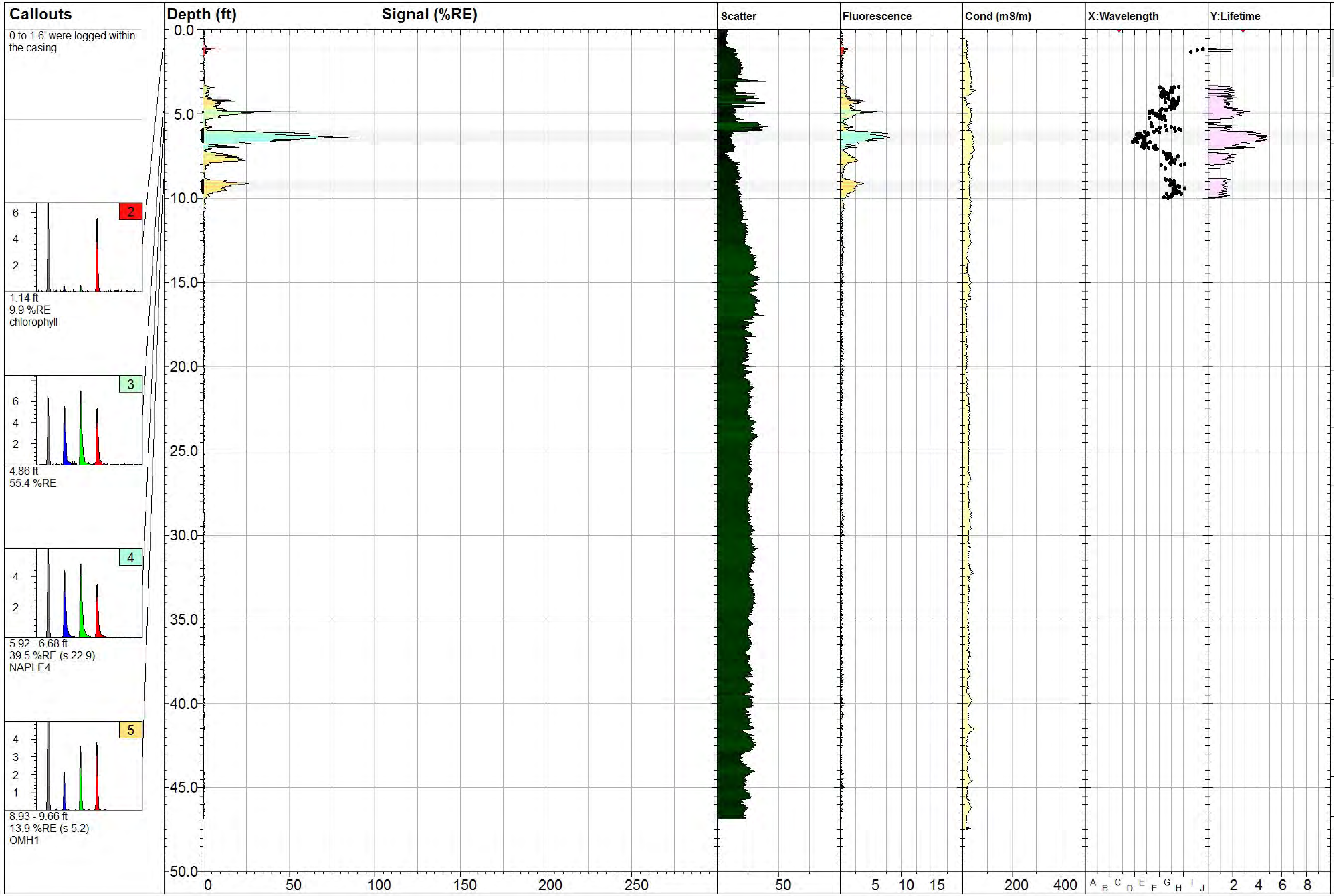


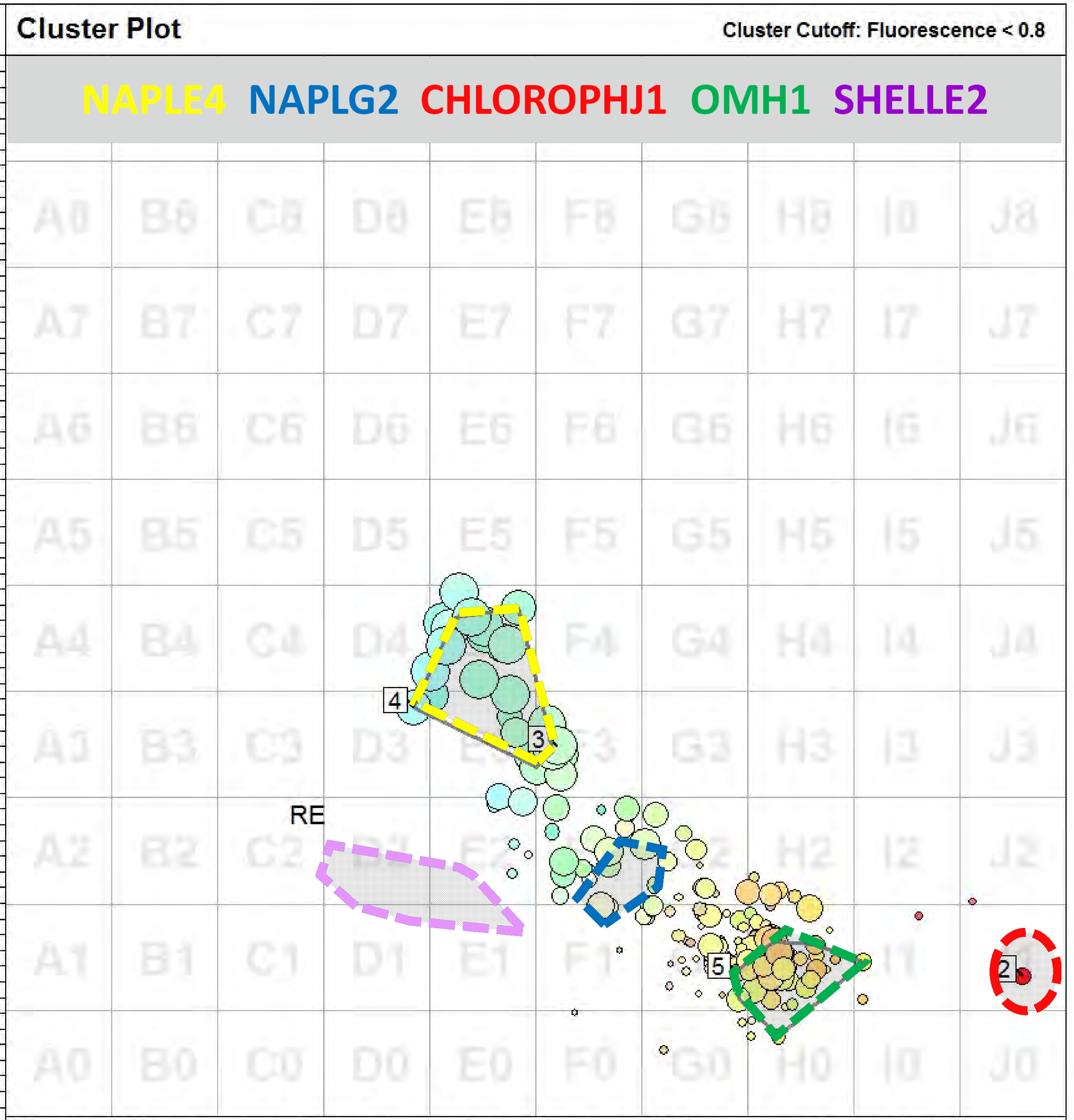
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **F320-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-03 12:00 PDT**
Client: **Jacobs**	Job:
Final Depth: **37.77 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **69.1 %RE @ 6.02 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**





X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

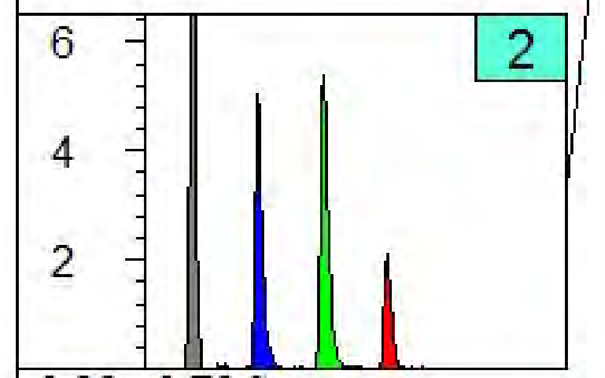
TarGOST® By Dakota

Log: **F390-TG**

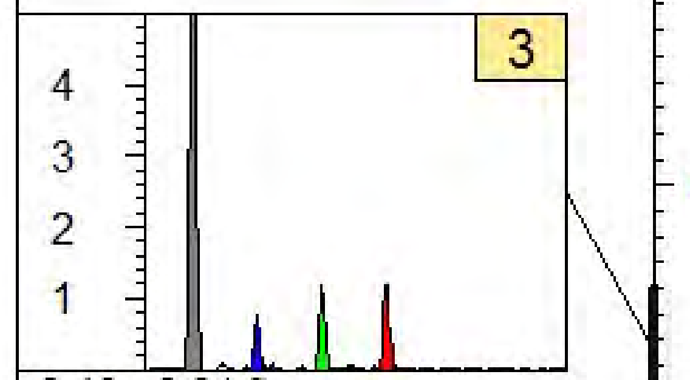
Site: **BNSF Wishram**	Date & Time: **2022-11-03 13:14 PDT**
Client: **Jacobs**	Job:
Final Depth: **46.87 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **91.8 %RE @ 6.42 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**

Callouts

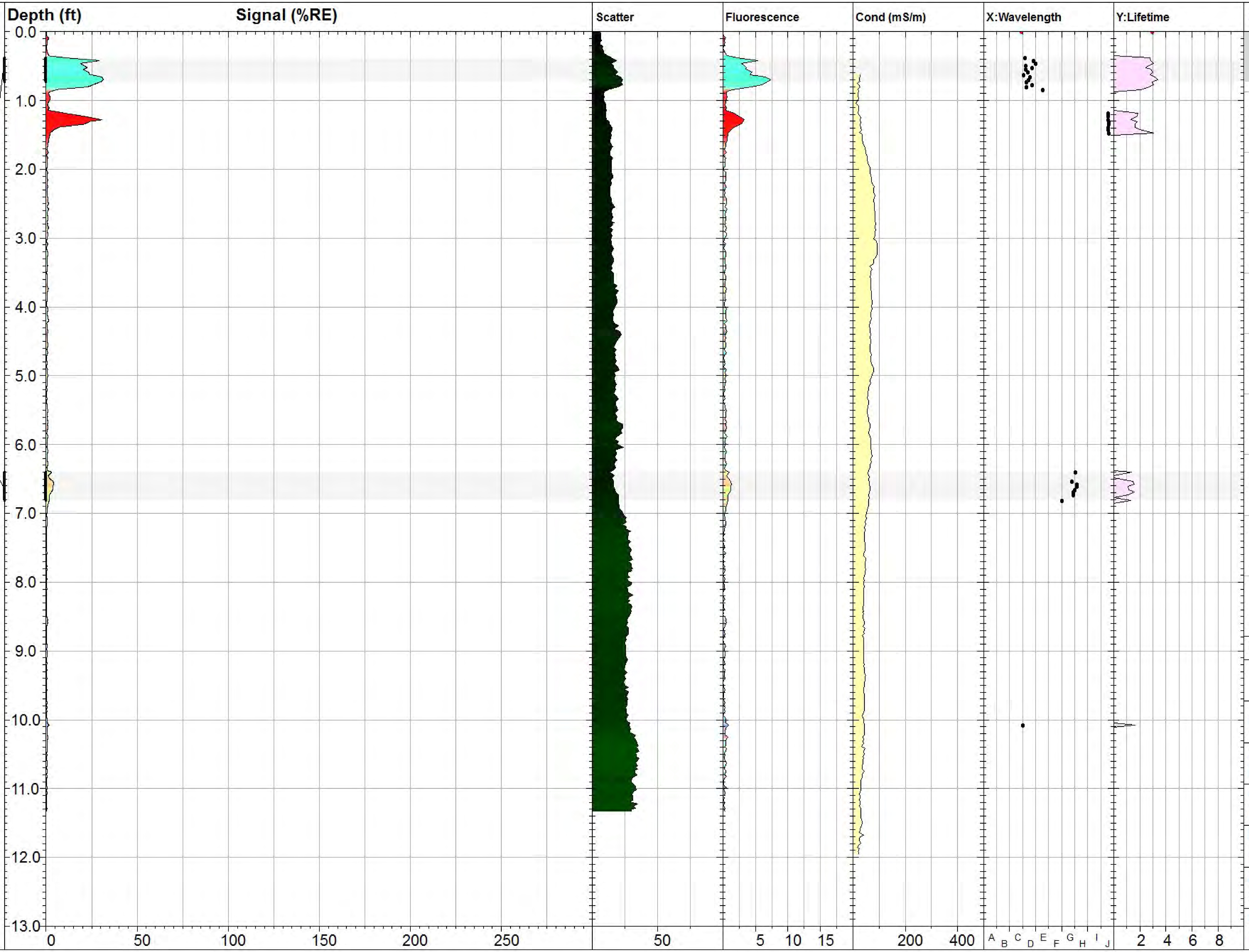
0-.65' pushed inside casing



0.38 - 0.73 ft
25.0 %RE (s 6.1)
??

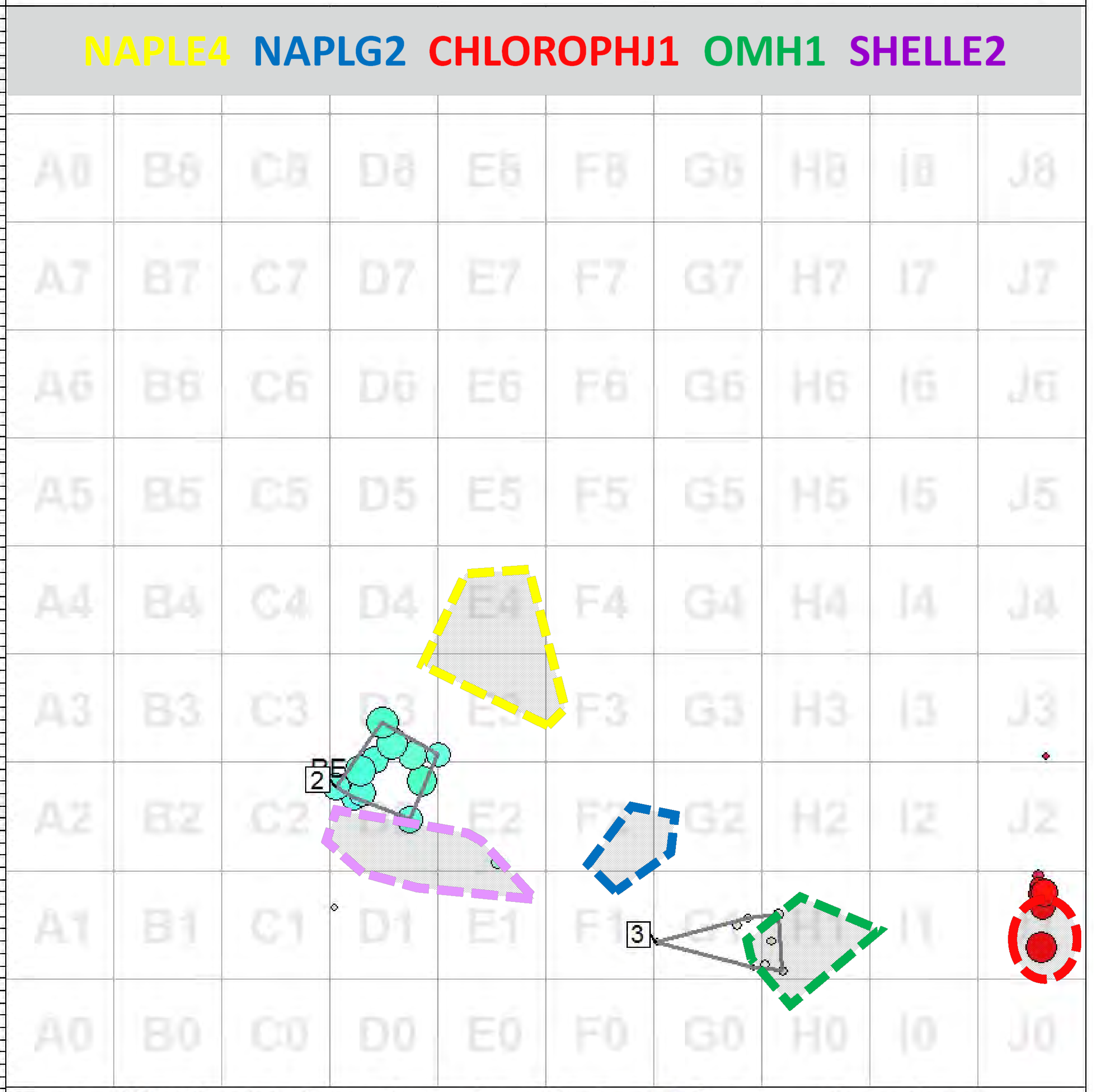


6.40 - 6.81 ft
2.5 %RE (s 1.1)



Cluster Plot

Cluster Cutoff: Fluorescence < 0.8



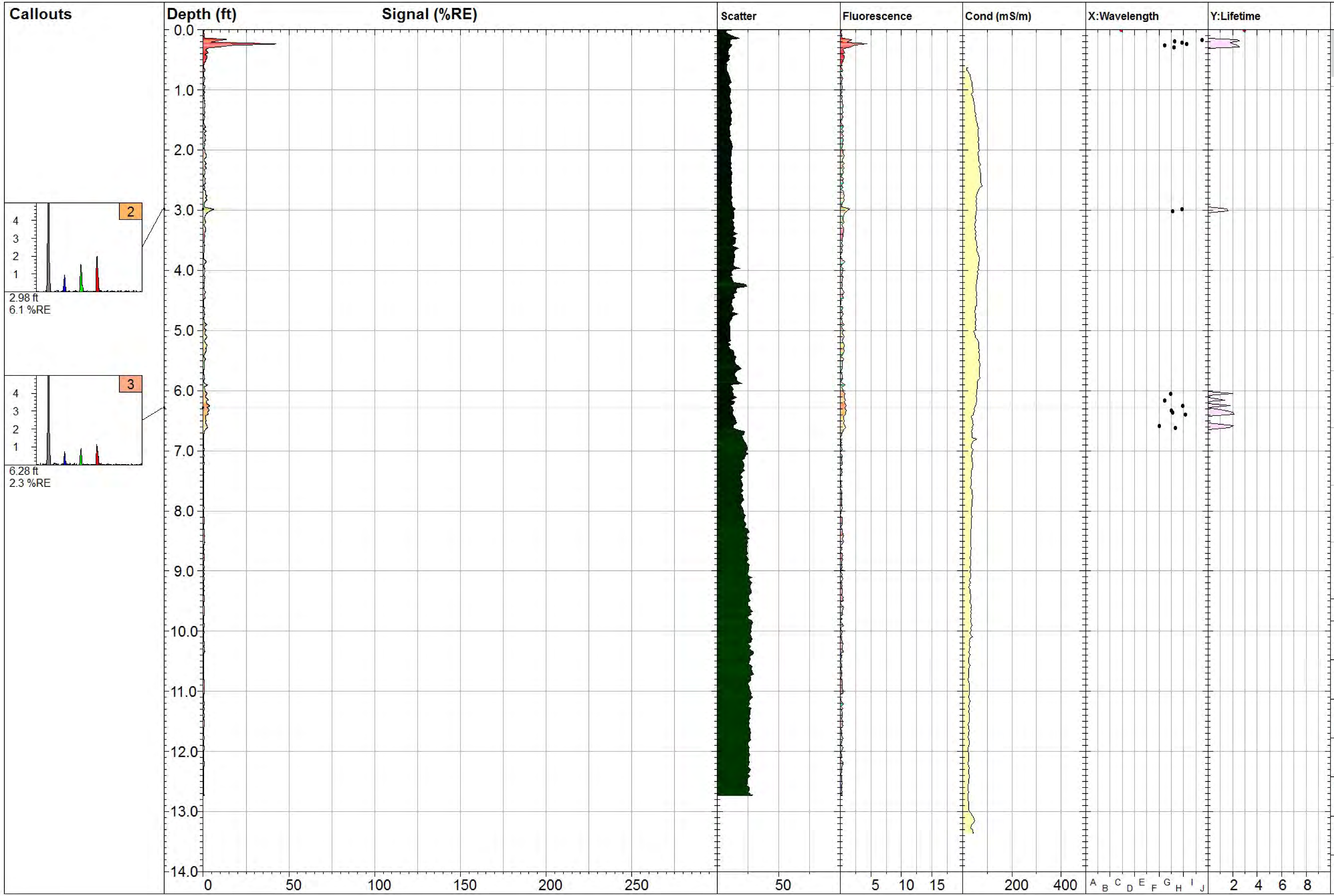
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

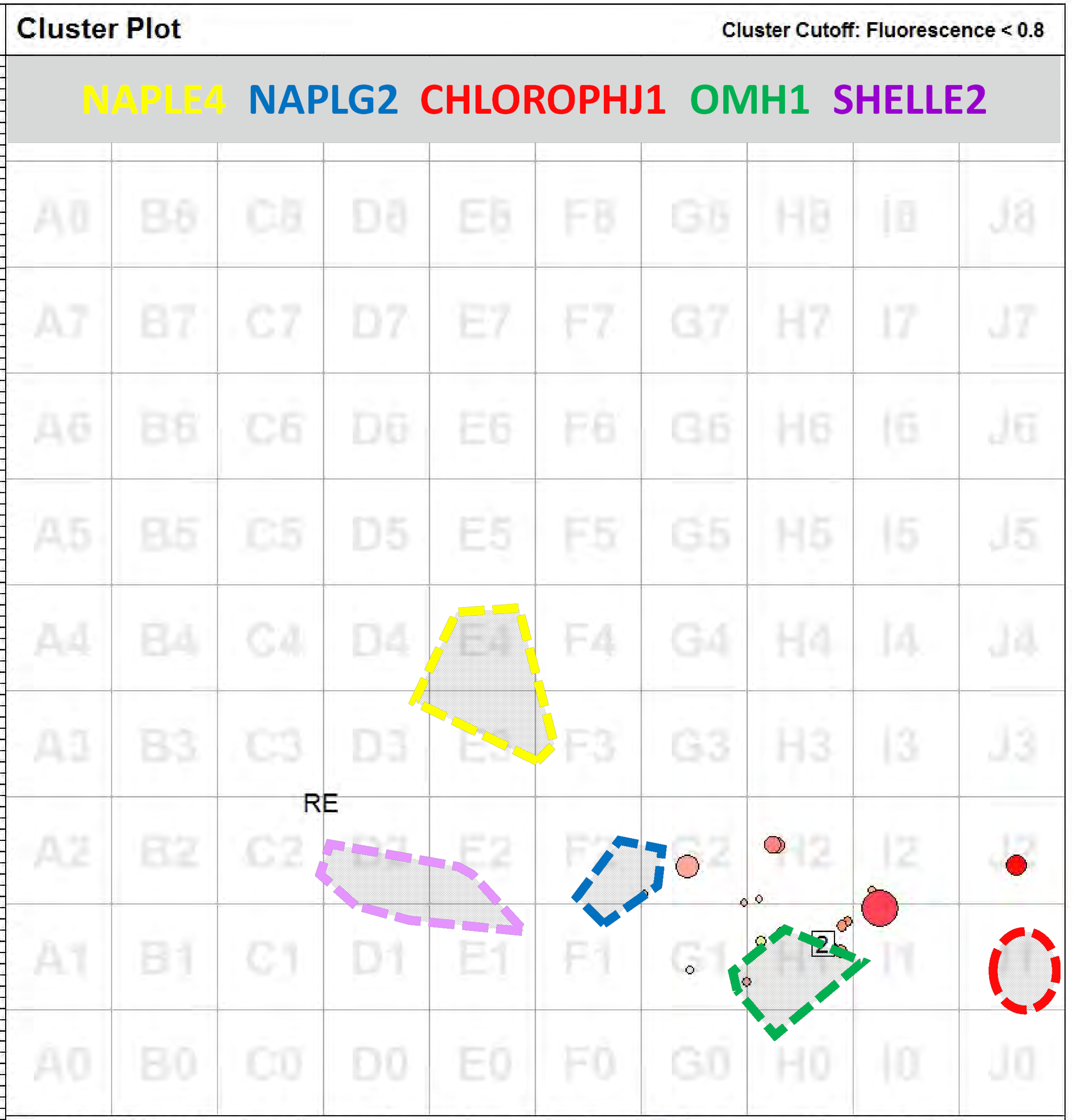
TarGOST® By Dakota

Data Presentation Format © 2023 Dakota Technologies, Inc. (v2.8.1)

Log: **FGN160-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-14 15:03 PST**
Client: **Jacobs**	Job:
Final Depth: **11.32 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **31.6 %RE @ 0.70 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **T.Rudolph / TG1807**	Elevation: **Unavailable**



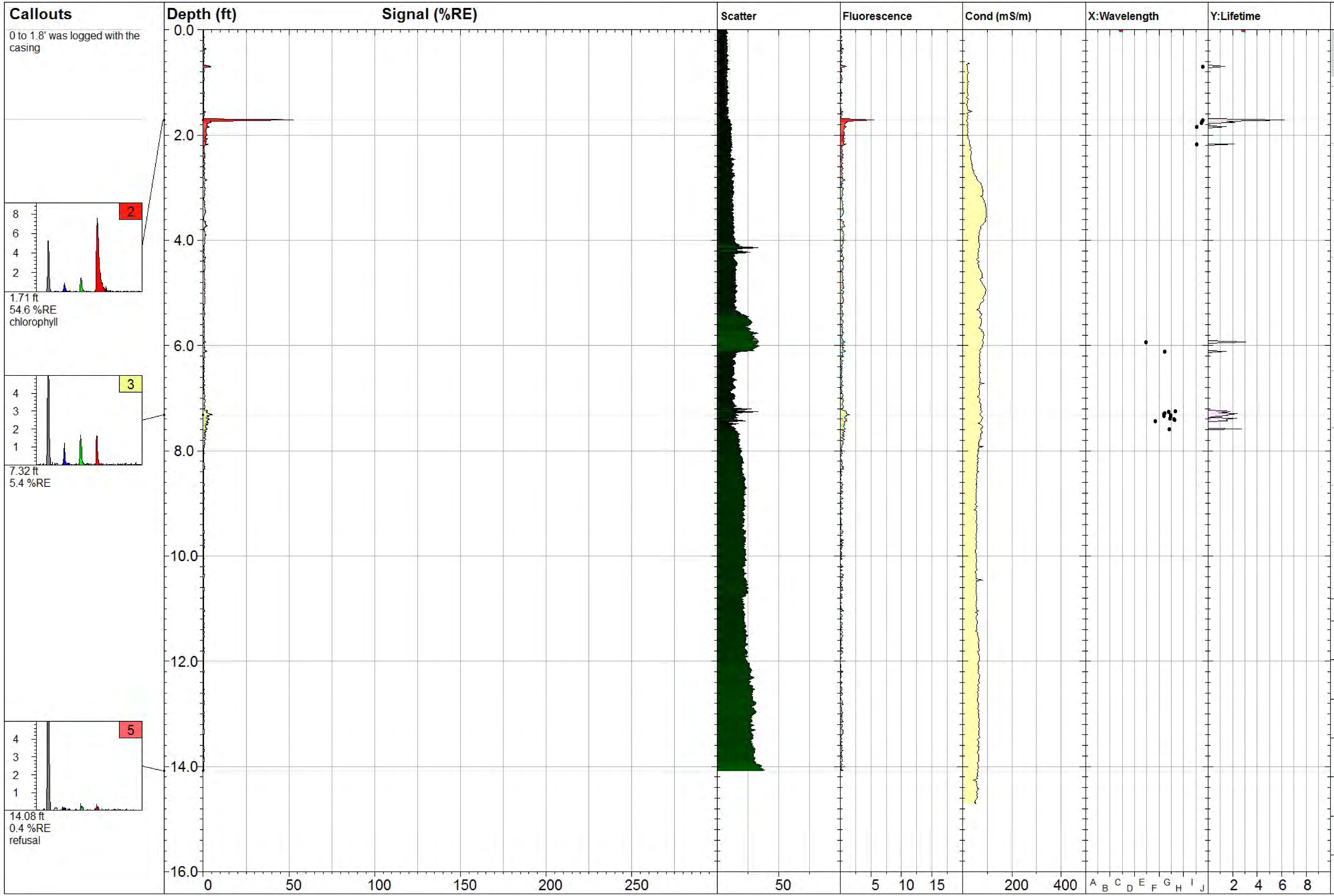


X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **FN100-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-15 10:15 PST**
Client: **Jacobs**	Job:
Final Depth: **12.73 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **42.8 %RE @ 0.23 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **T.Rudolph / TG1807**	Elevation: **Unavailable**

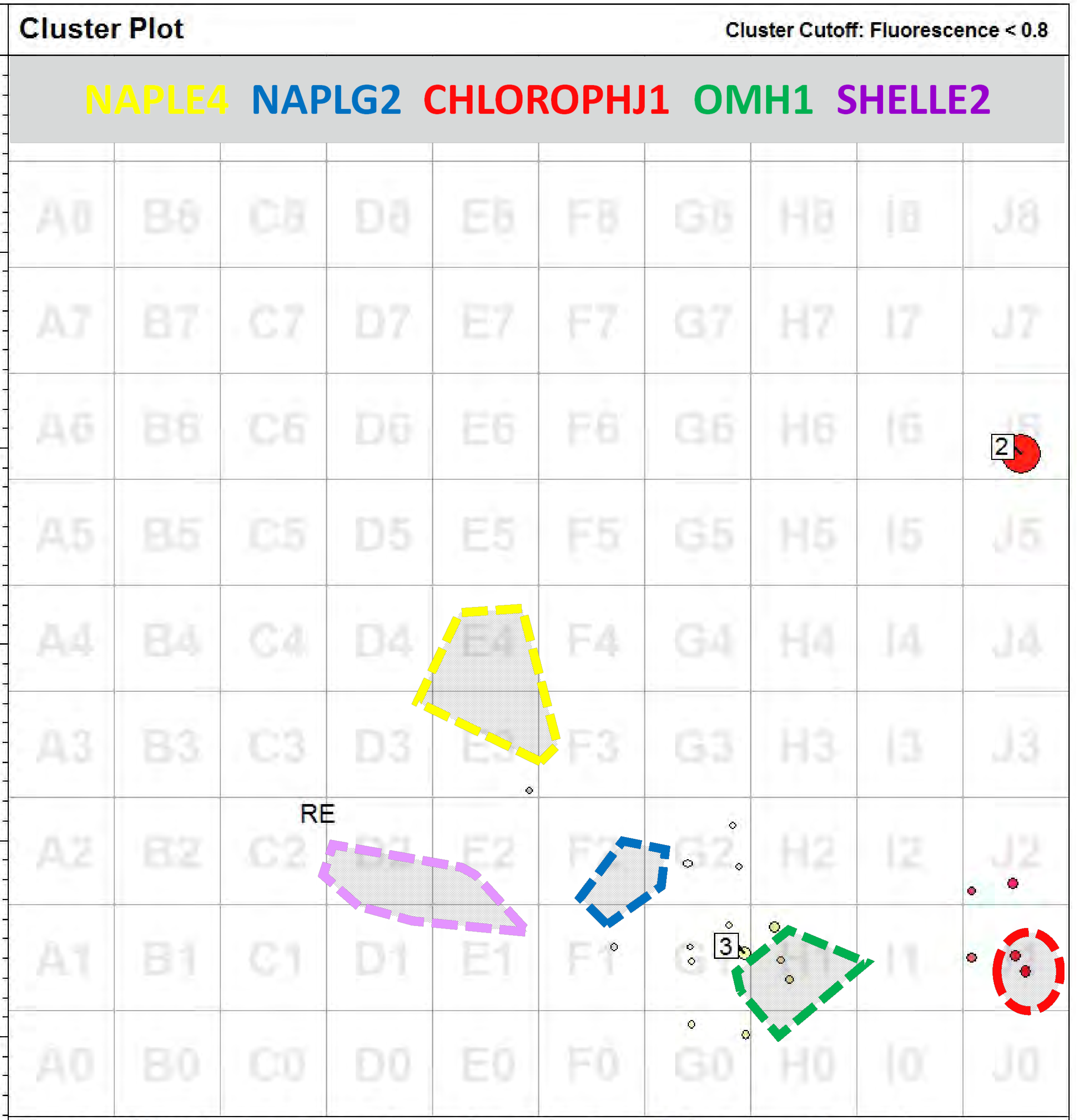


0 to 1.8' was logged with the casing

1.71 ft
54.6 %RE
chlorophyll

7.32 ft
5.4 %RE

14.08 ft
0.4 %RE
refusal



X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

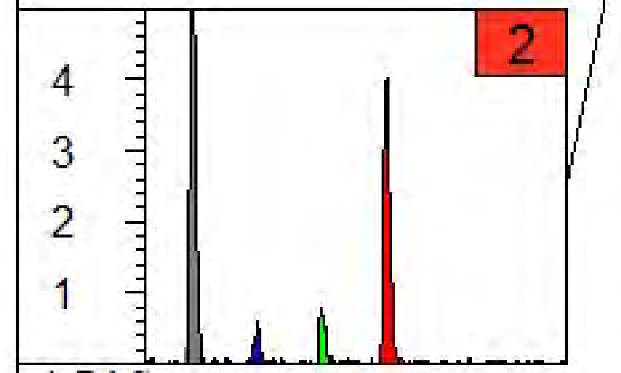
TarGOST® By Dakota

Log: **G000-TG**

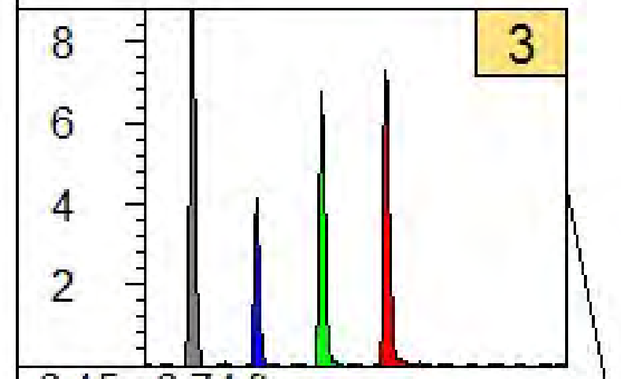
Site: **BNSF Wishram**	Date & Time: **2022-11-02 11:21 PDT**
Client: **Jacobs**	Job:
Final Depth: **14.08 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **54.6 %RE @ 1.71 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**

Callouts

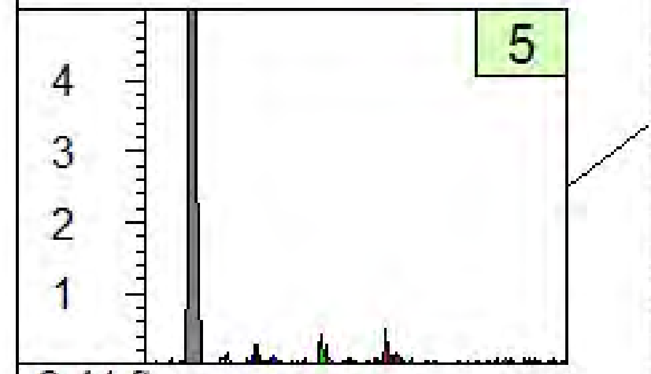
0 to 2.1' logged within the casing



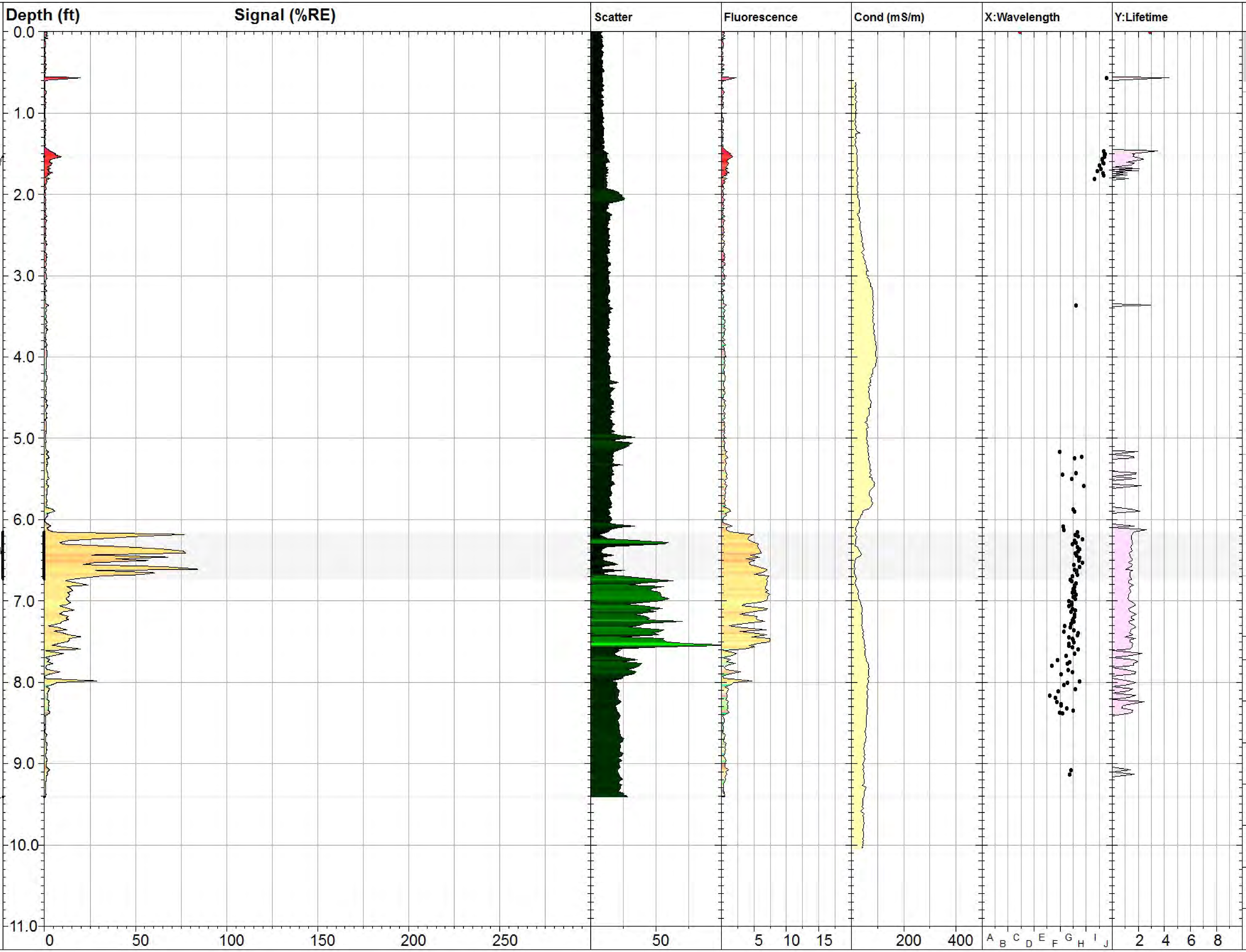
1.54 ft
9.1 %RE
chlorophyll



6.15 - 6.74 ft
28.5 %RE (s 25.1)

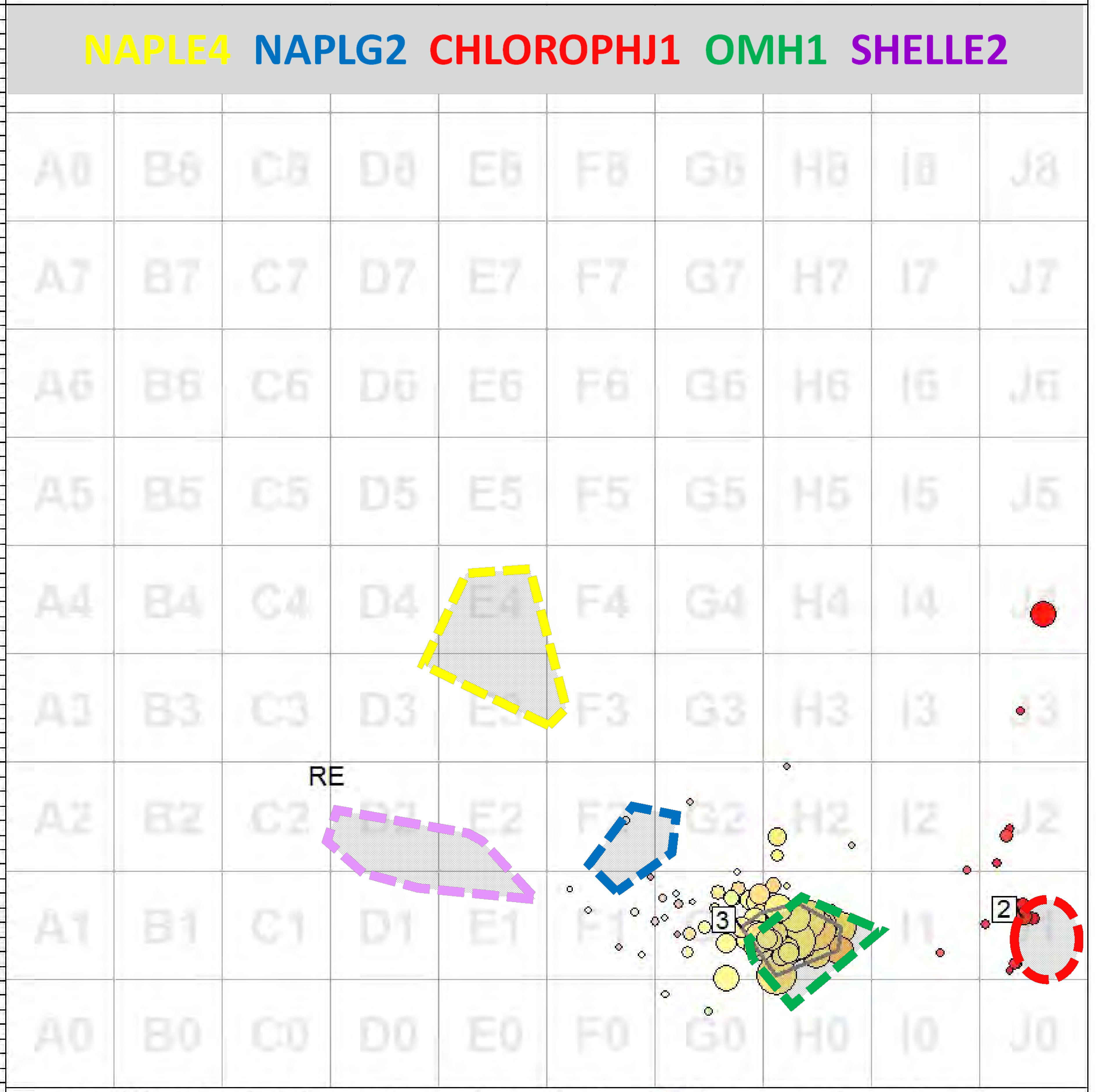


9.41 ft
0.7 %RE
refusal



Cluster Plot

Cluster Cutoff: Fluorescence < 0.8

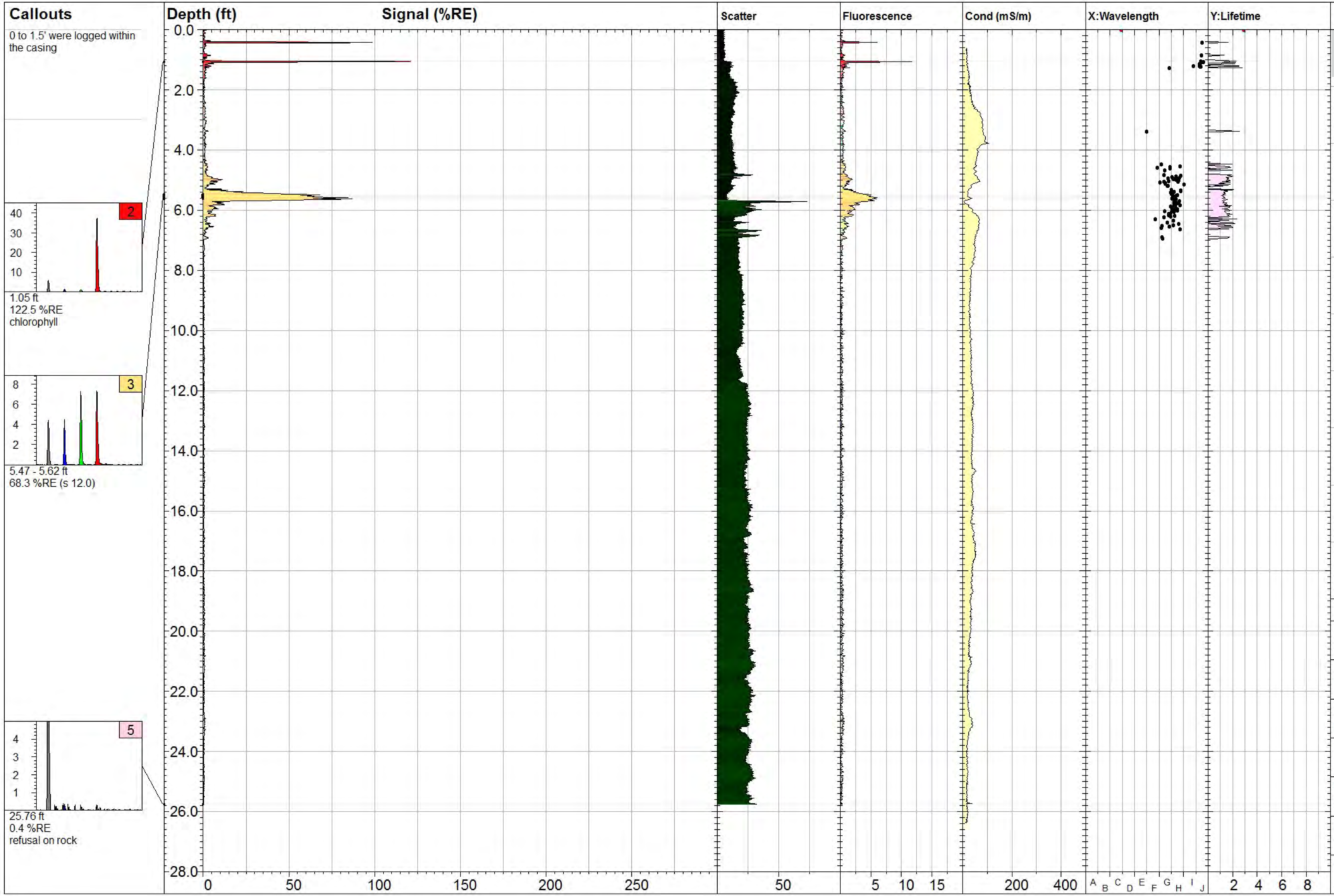


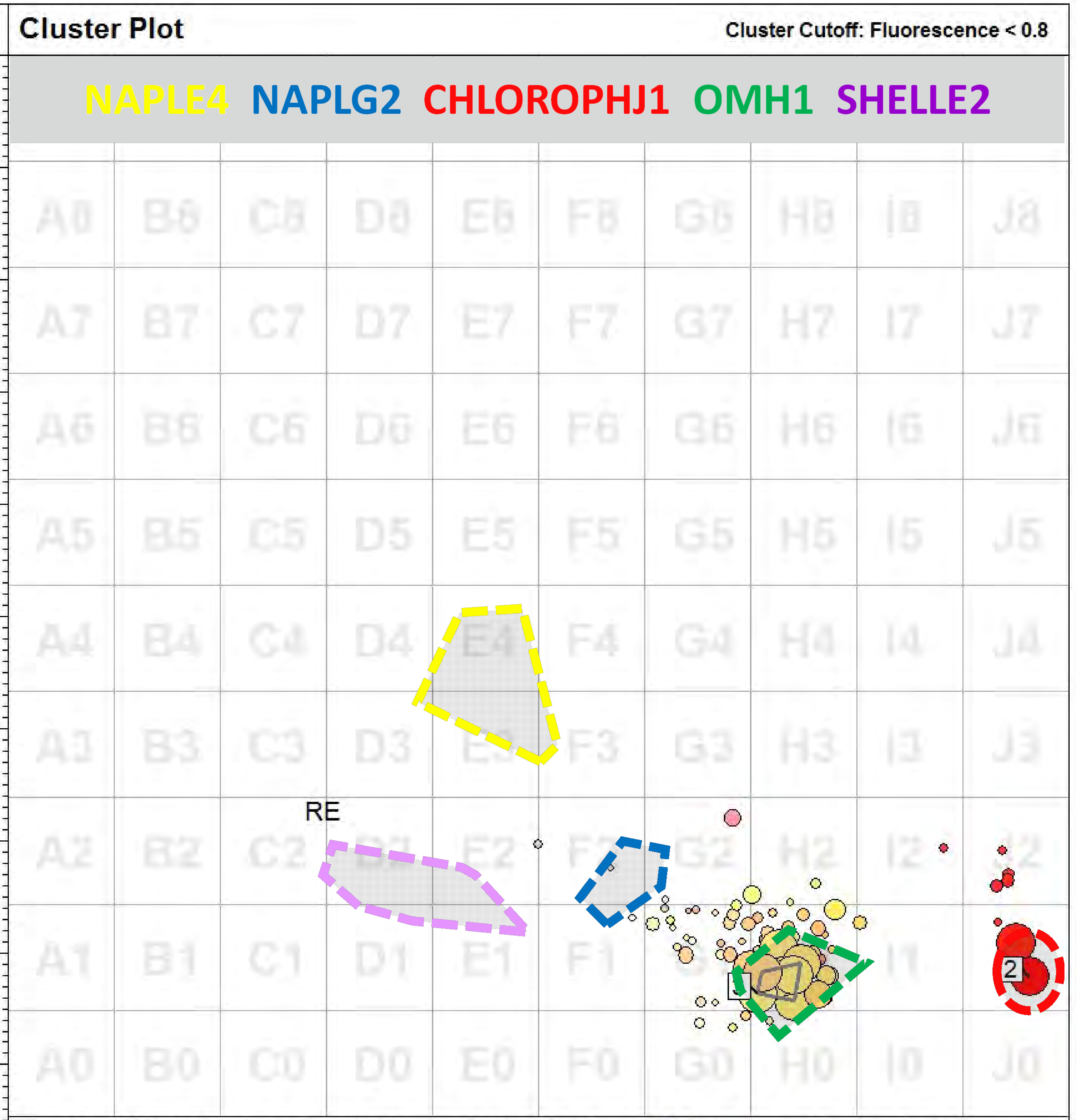
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **G040-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-02 10:24 PDT**
Client: **Jacobs**	Job:
Final Depth: **9.41 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **84.2 %RE @ 6.61 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**



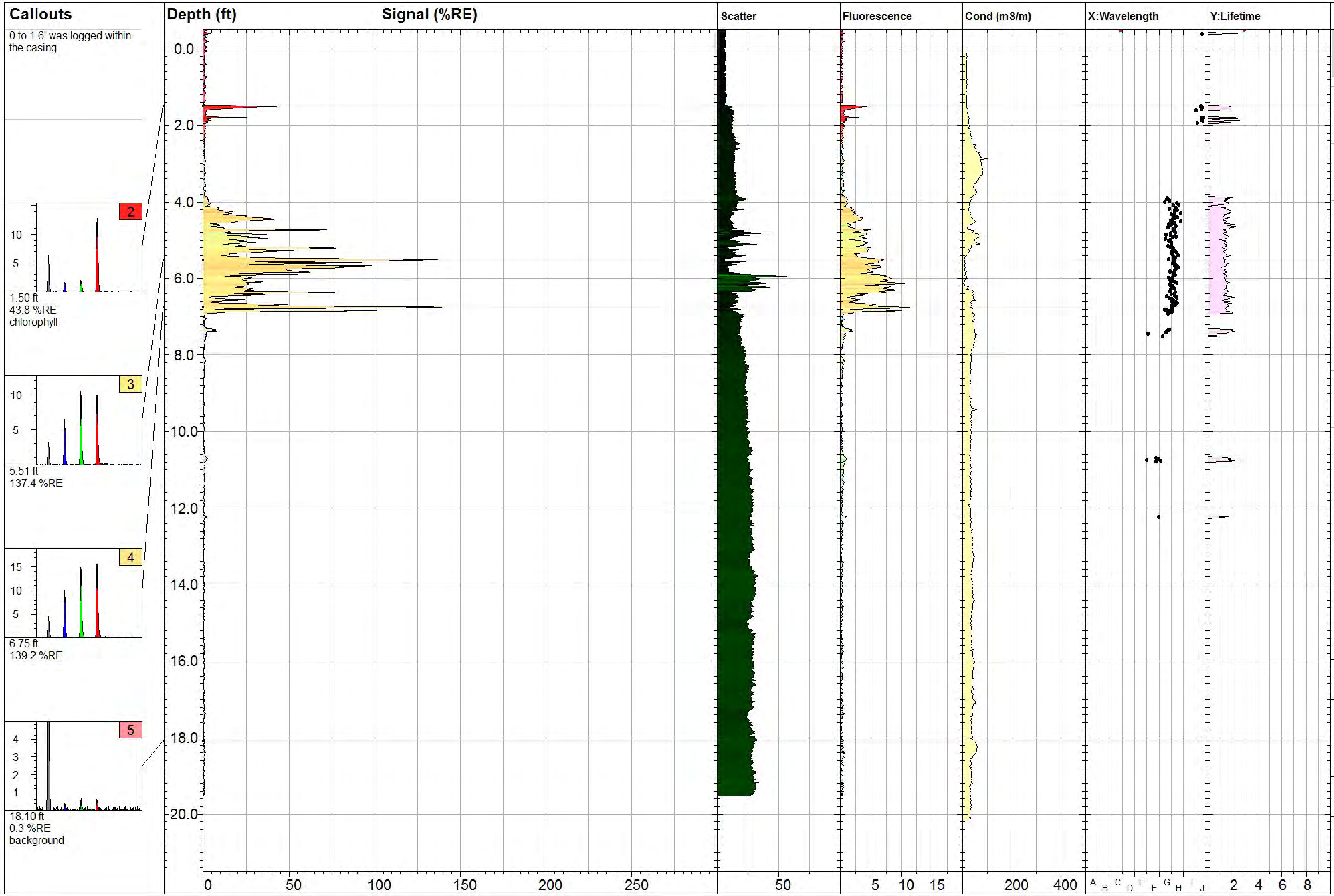


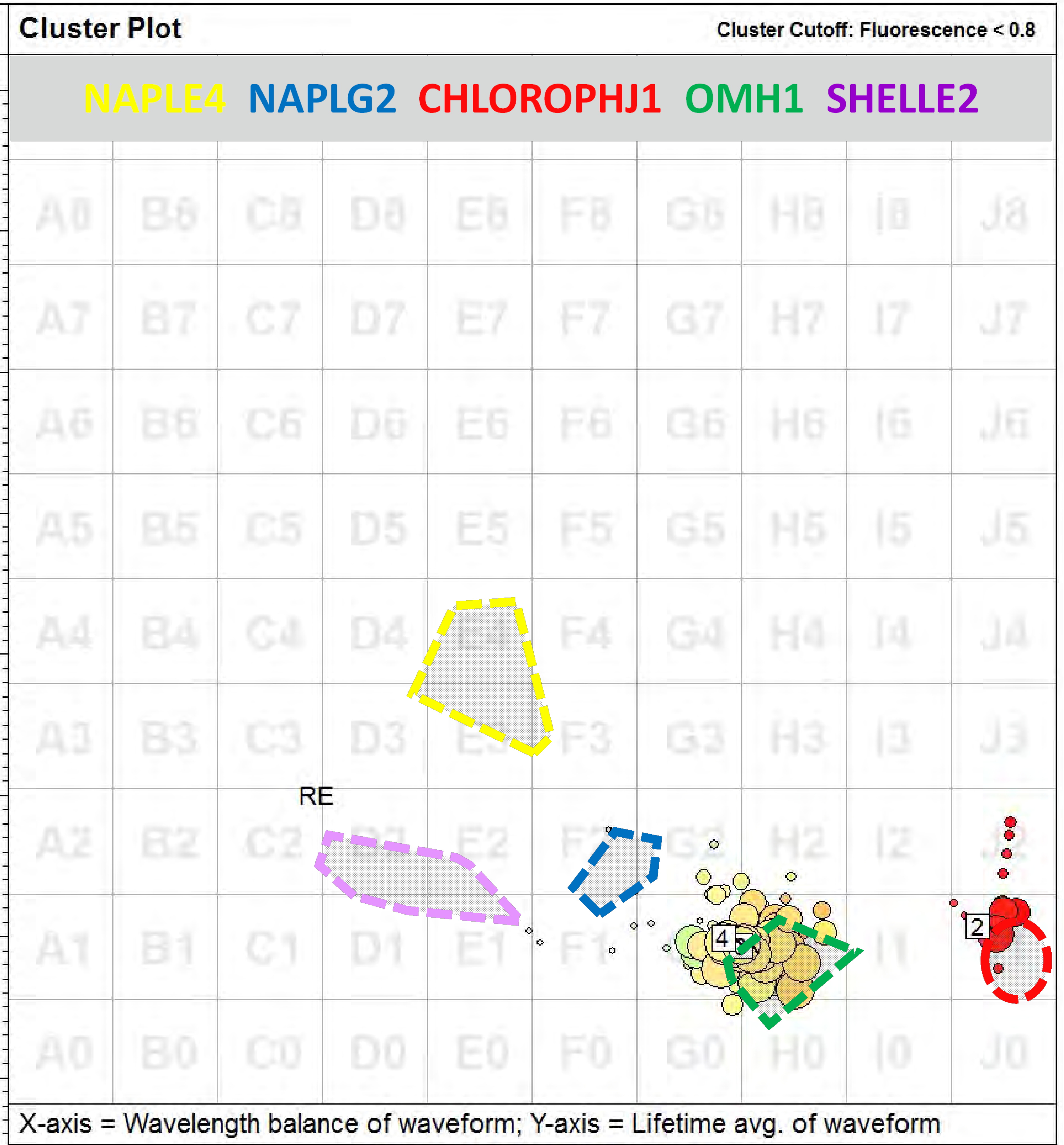
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **G080-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-02 09:21 PDT**
Client: **Jacobs**	Job:
Final Depth: **25.76 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **122.5 %RE @ 1.05 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**

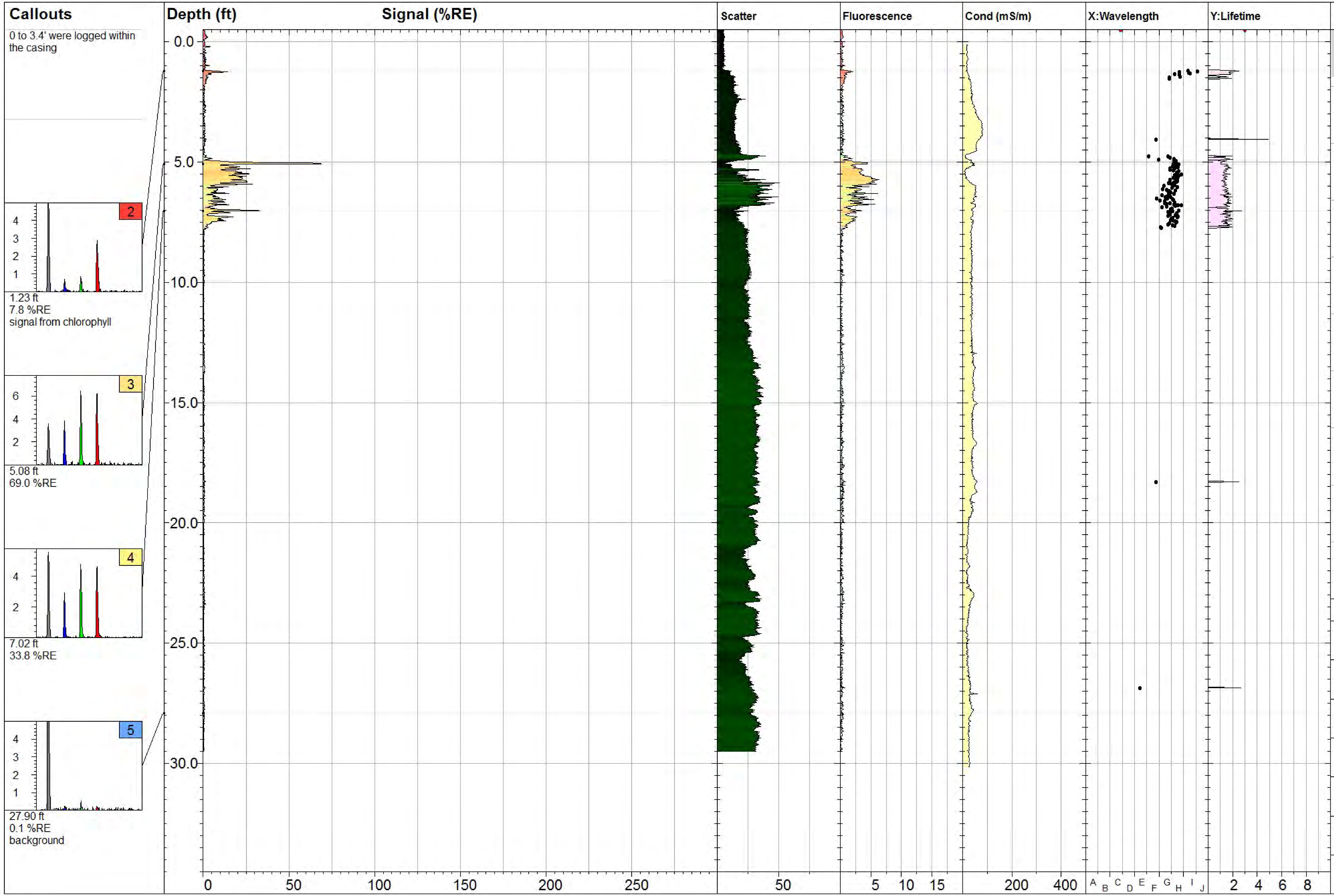




TarGOST® By Dakota

Log: **G120-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-01 15:39 PDT**
Client: **Jacobs**	Job:
Final Depth: **19.52 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **139.2 %RE @ 6.75 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**



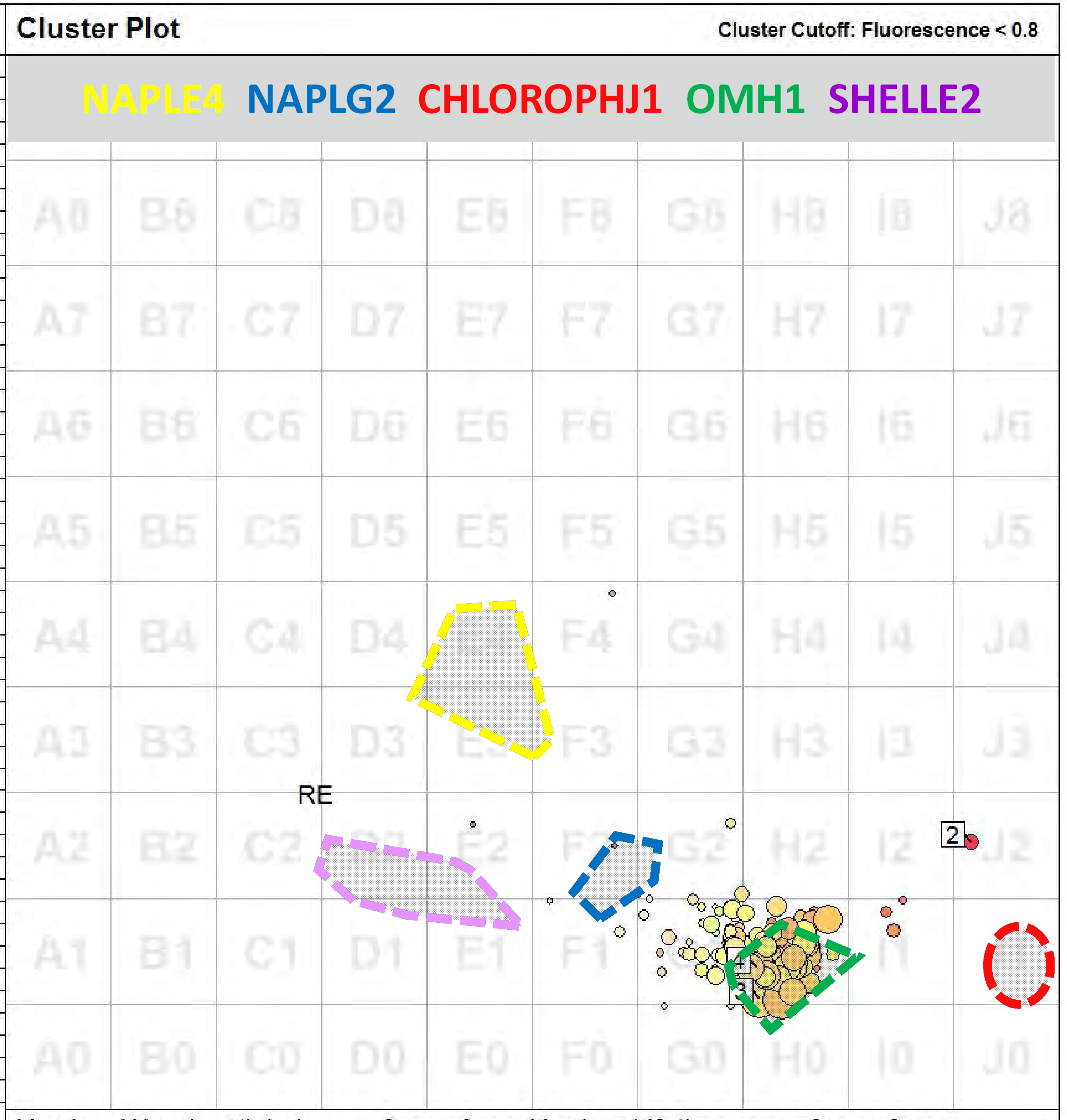
0 to 3.4' were logged within the casing

1.23 ft
7.8 %RE
signal from chlorophyll

5.08 ft
69.0 %RE

7.02 ft
33.8 %RE

27.90 ft
0.1 %RE
background



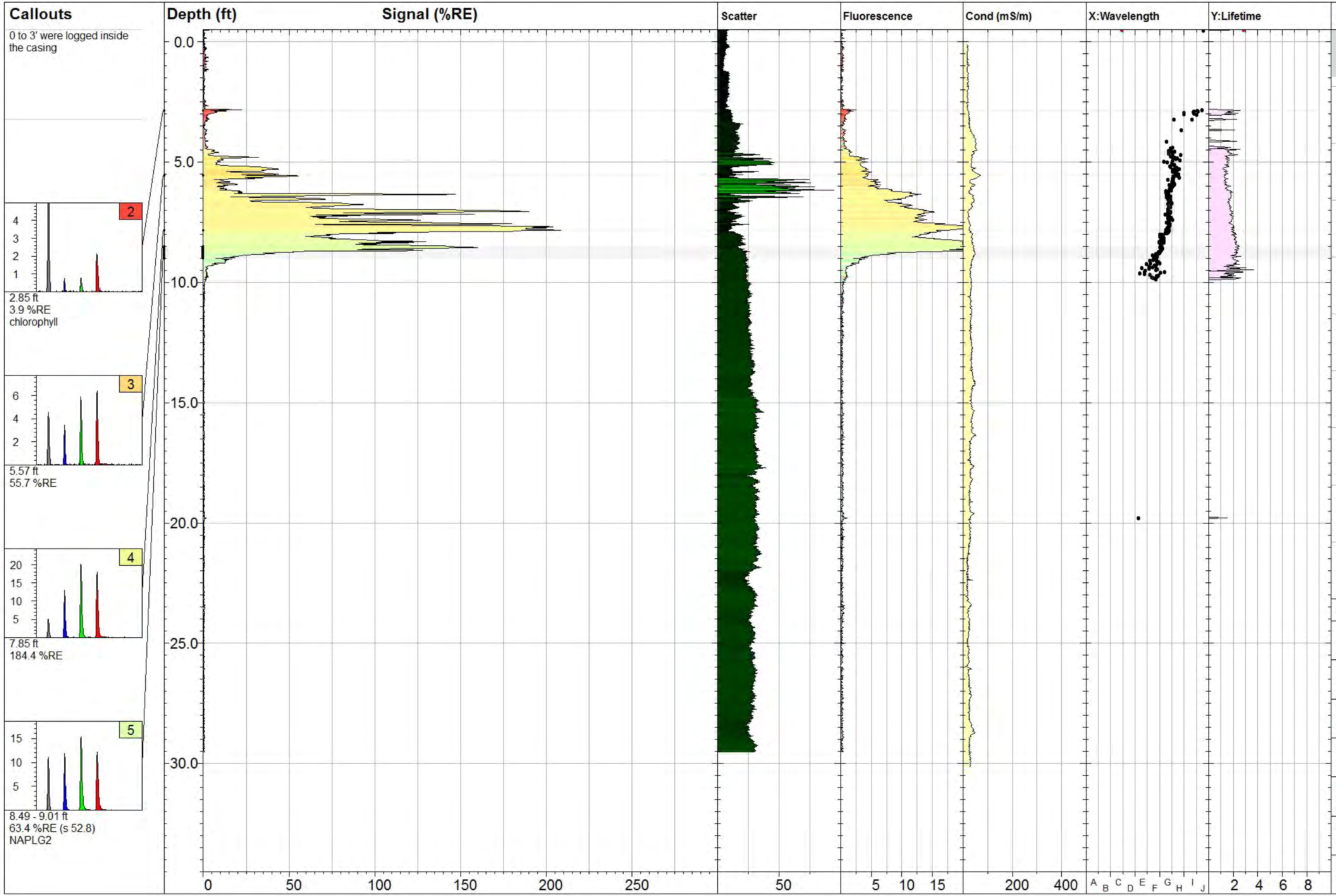
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Data Presentation Format © 2023 Dakota Technologies, Inc. (v2.8.1)

Log: **G160-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-01 14:32 PDT**
Client: **Jacobs**	Job:
Final Depth: **29.51 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **69.0 %RE @ 5.08 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**



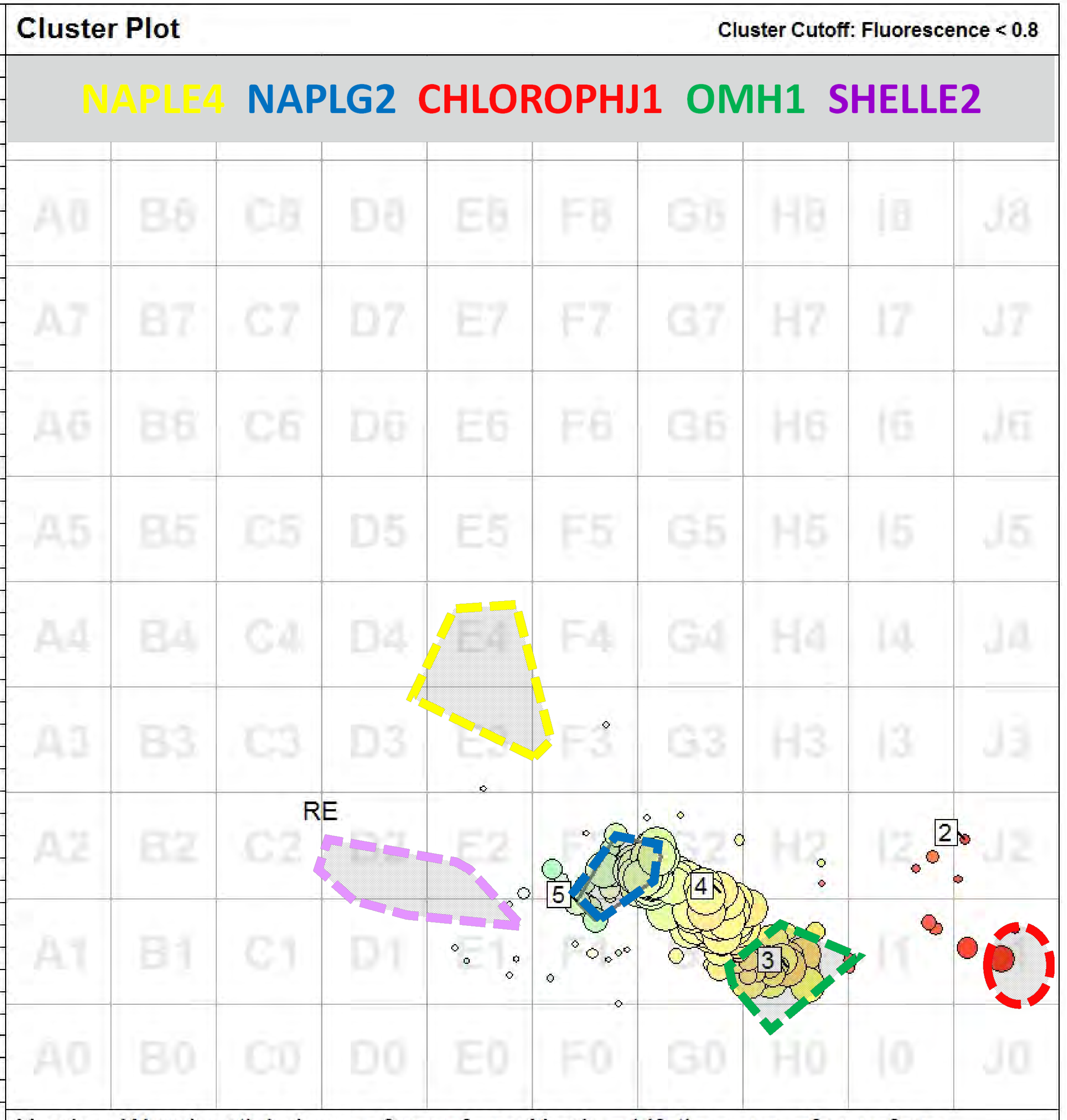
0 to 3' were logged inside the casing

2.85 ft
3.9 %RE
chlorophyll

5.57 ft
55.7 %RE

7.85 ft
184.4 %RE

8.49 - 9.01 ft
63.4 %RE (s 52.8)
NAPLG2

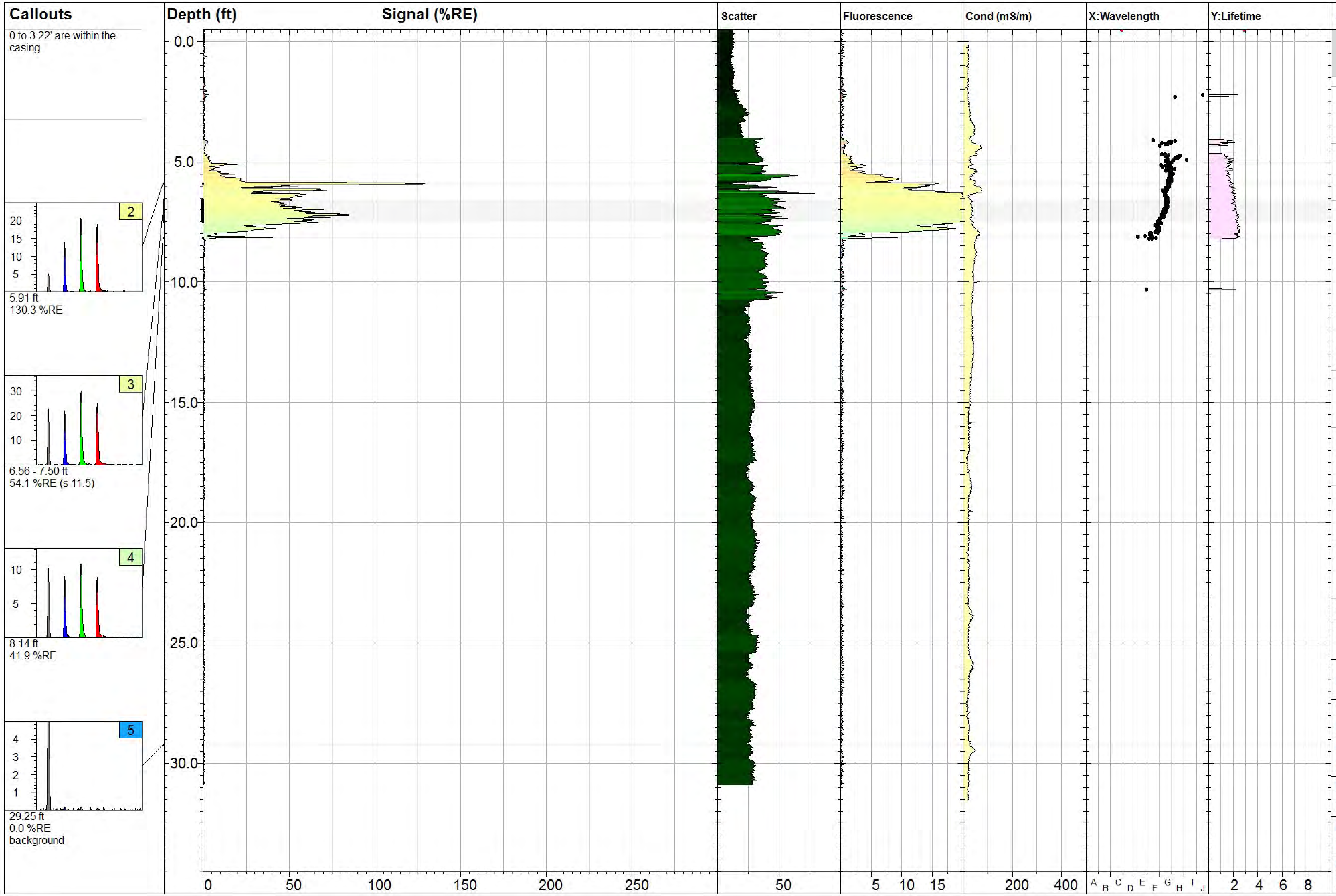


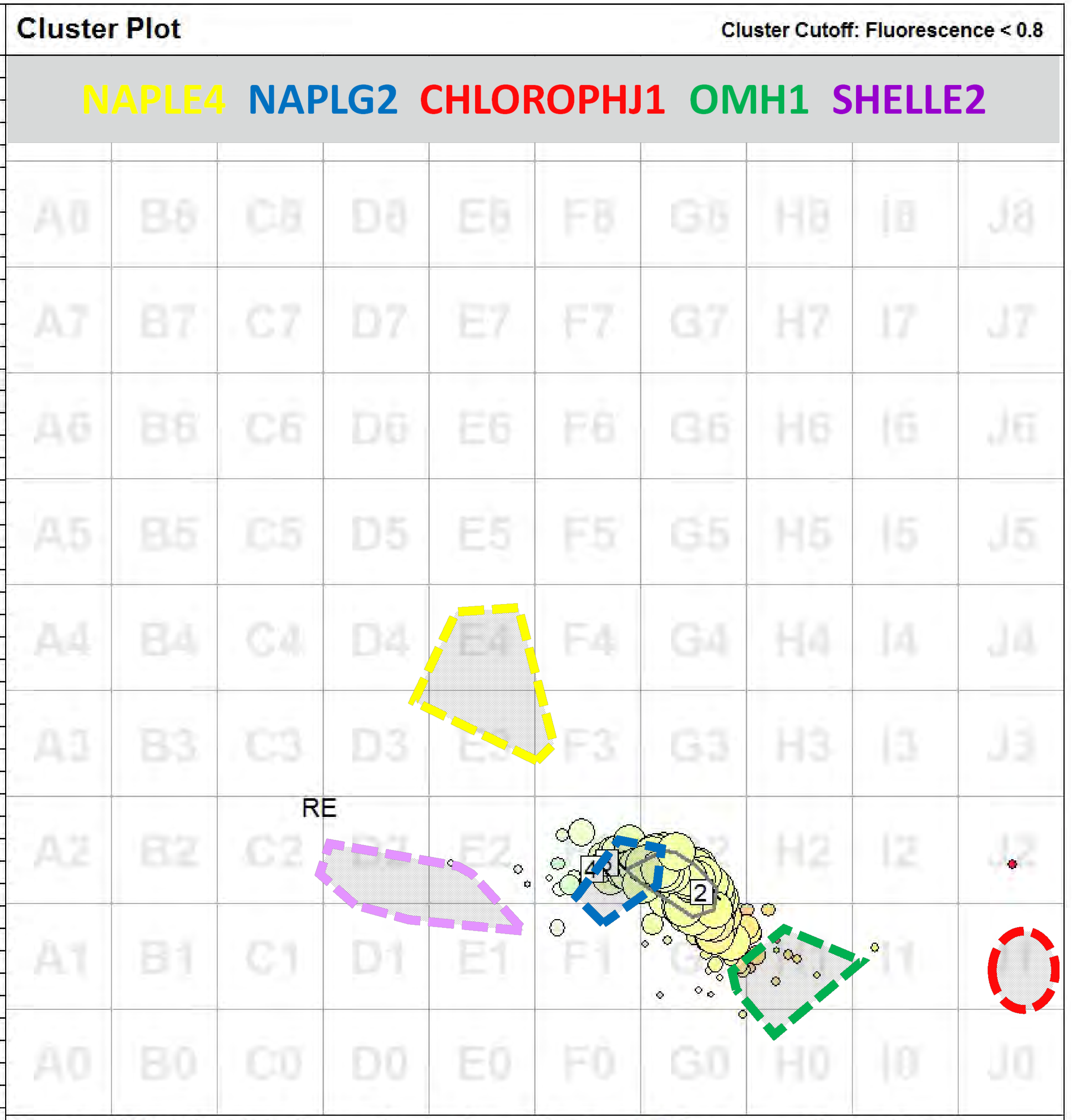
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **G200-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-01 13:18 PDT**
Client: **Jacobs**	Job:
Final Depth: **29.52 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **208.6 %RE @ 7.83 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**



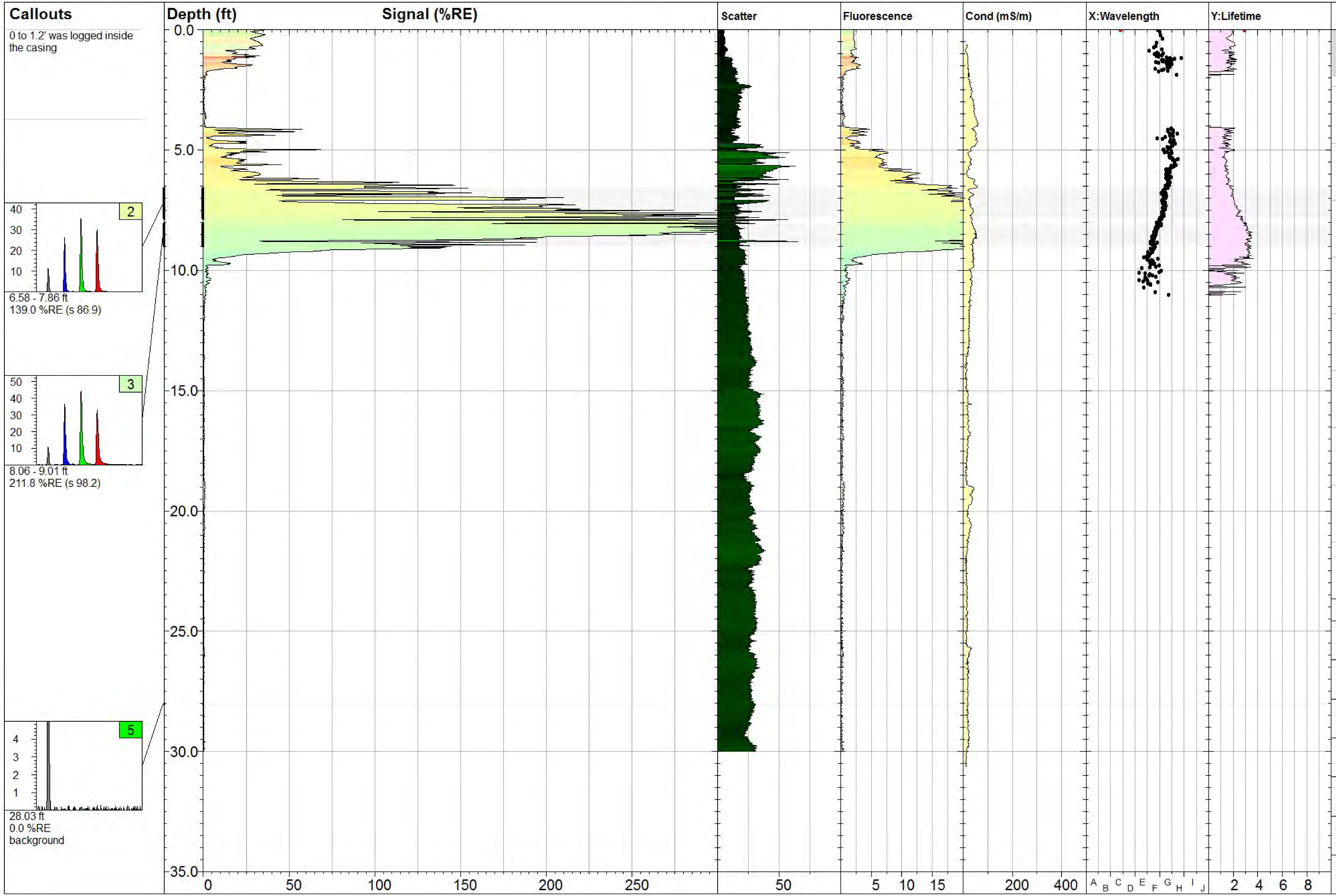


X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **G260-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-01 11:41 PDT**
Client: **Jacobs**	Job:
Final Depth: **30.91 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **130.3 %RE @ 5.91 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**



0 to 1.2' was logged inside the casing

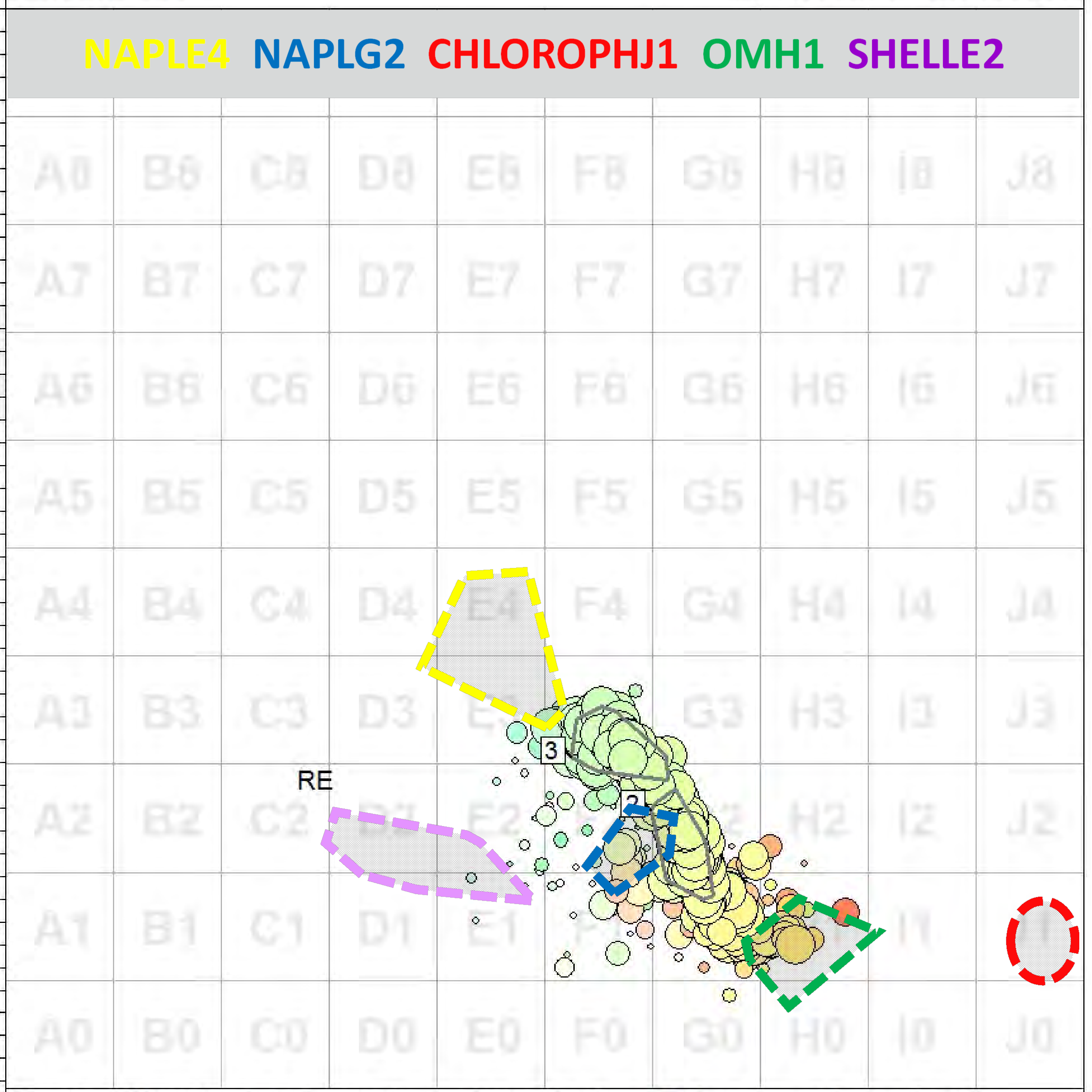
6.58 - 7.86 ft
139.0 %RE (s 86.9)

8.06 - 9.01 ft
211.8 %RE (s 98.2)

28.03 ft
0.0 %RE
background

Cluster Plot

Cluster Cutoff: Fluorescence < 0.8



X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **G320-TG**

Site: **BNSF Wishram**

Date & Time: **2022-11-02 14:02 PDT**

Client: **Jacobs**

Job:

Final Depth: **29.99 ft**

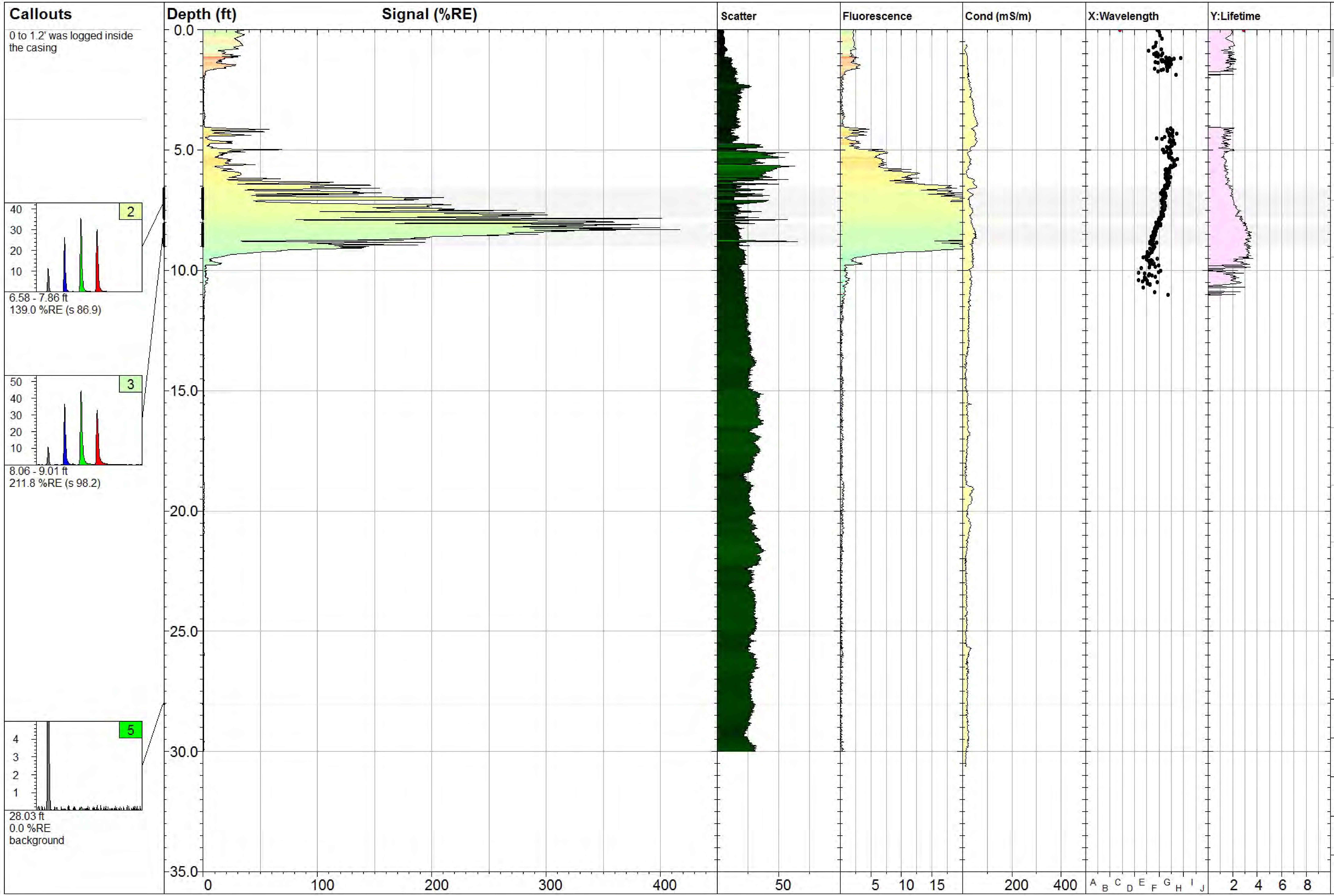
X Coord.(Long/East): **Unavailable**

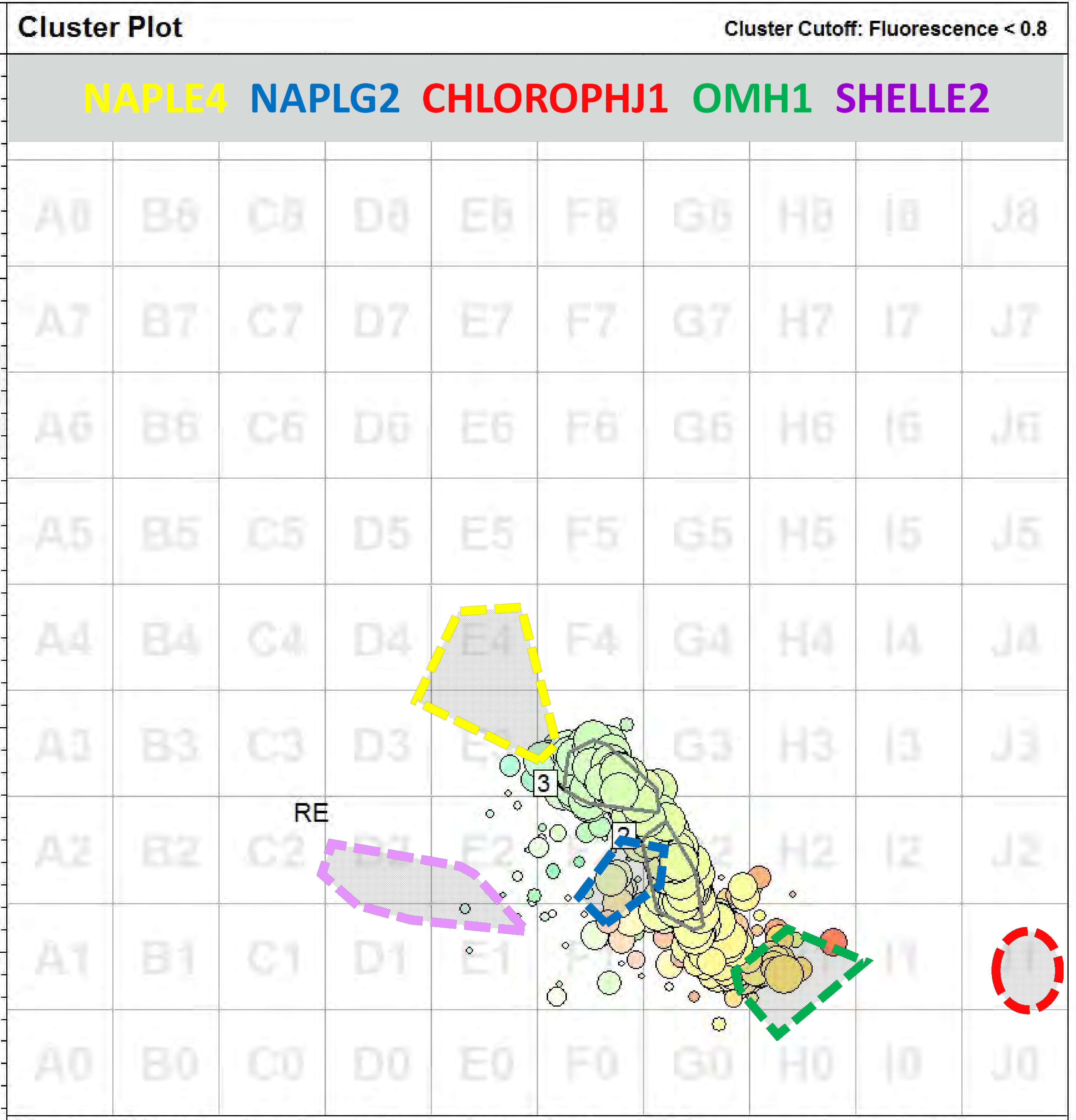
Max Signal: **421.0 %RE @ 8.31 ft**

Y Coord.(Lat/North): **Unavailable**

Operator / Unit: **SDA / TG1807**

Elevation: **Unavailable**



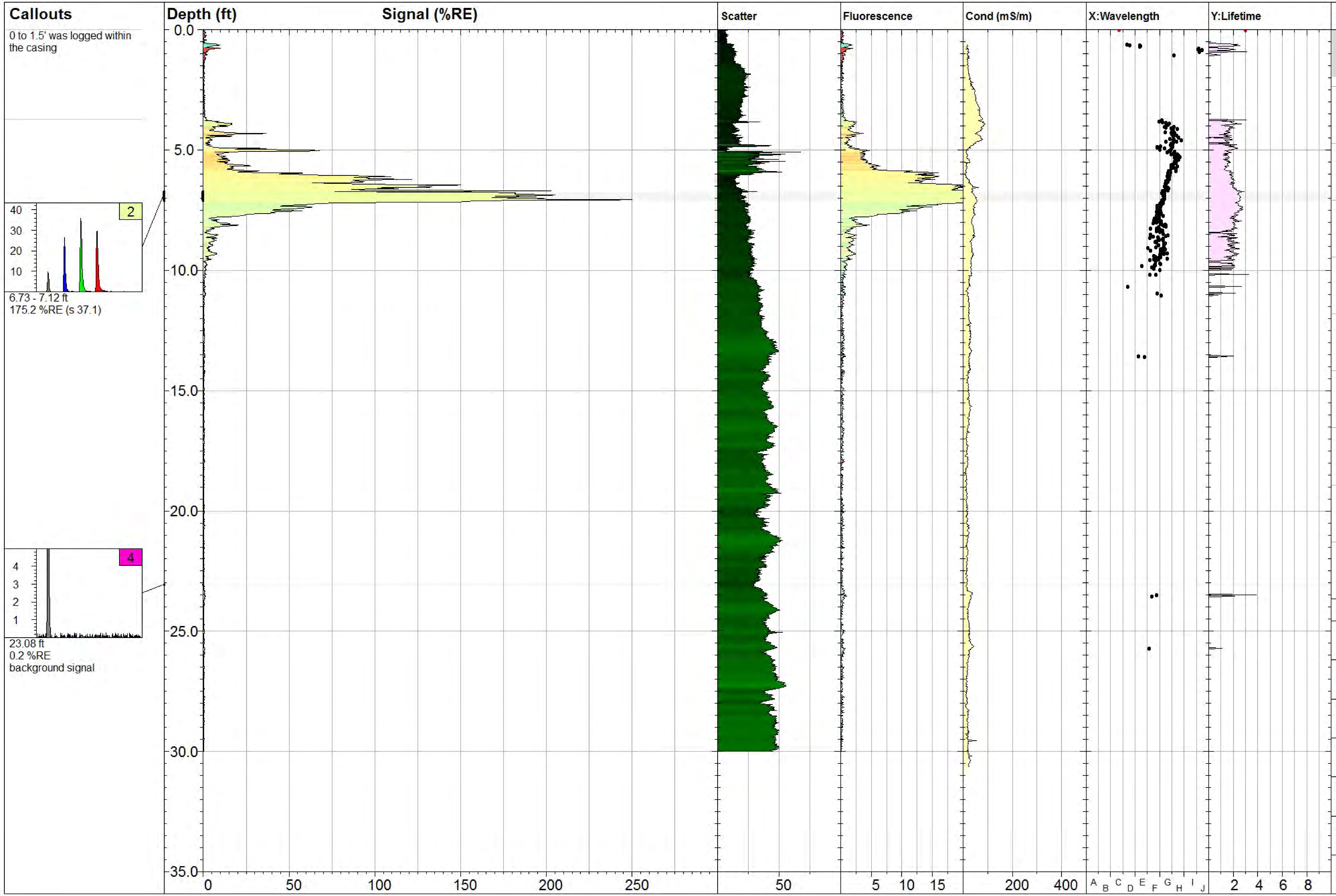


X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **G320-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-02 14:02 PDT**
Client: **Jacobs**	Job:
Final Depth: **29.99 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **421.0 %RE @ 8.31 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**



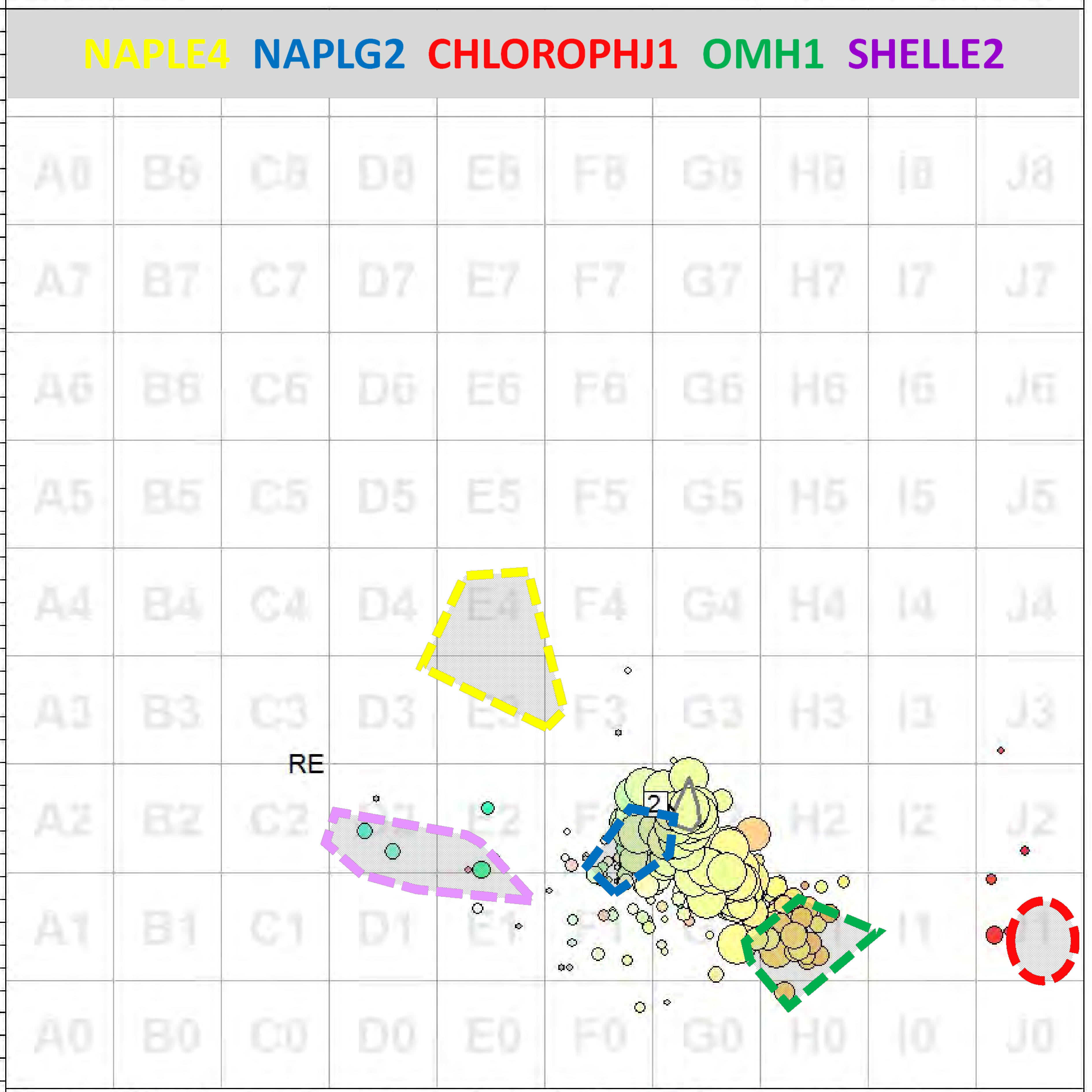
0 to 1.5' was logged within the casing

6.73 - 7.12 ft
175.2 %RE (s 37.1)

23.08 ft
0.2 %RE
background signal

Cluster Plot

Cluster Cutoff: Fluorescence < 0.8



X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Data Presentation Format © 2023 Dakota Technologies, Inc. (v2.8.1)

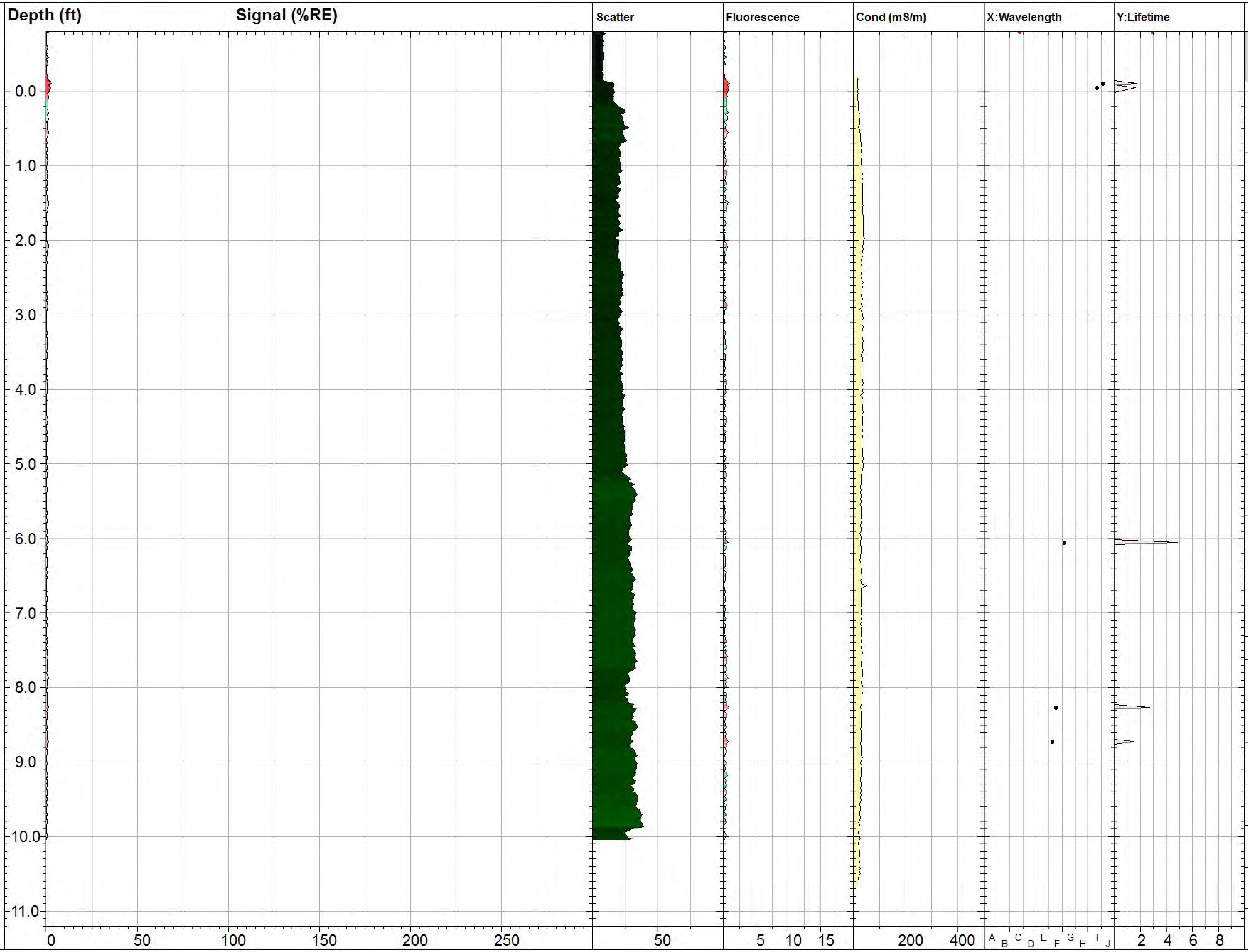
Log: **G360-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-02 13:04 PDT**
Client: **Jacobs**	Job:
Final Depth: **30.00 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **252.6 %RE @ 7.06 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**

Callouts

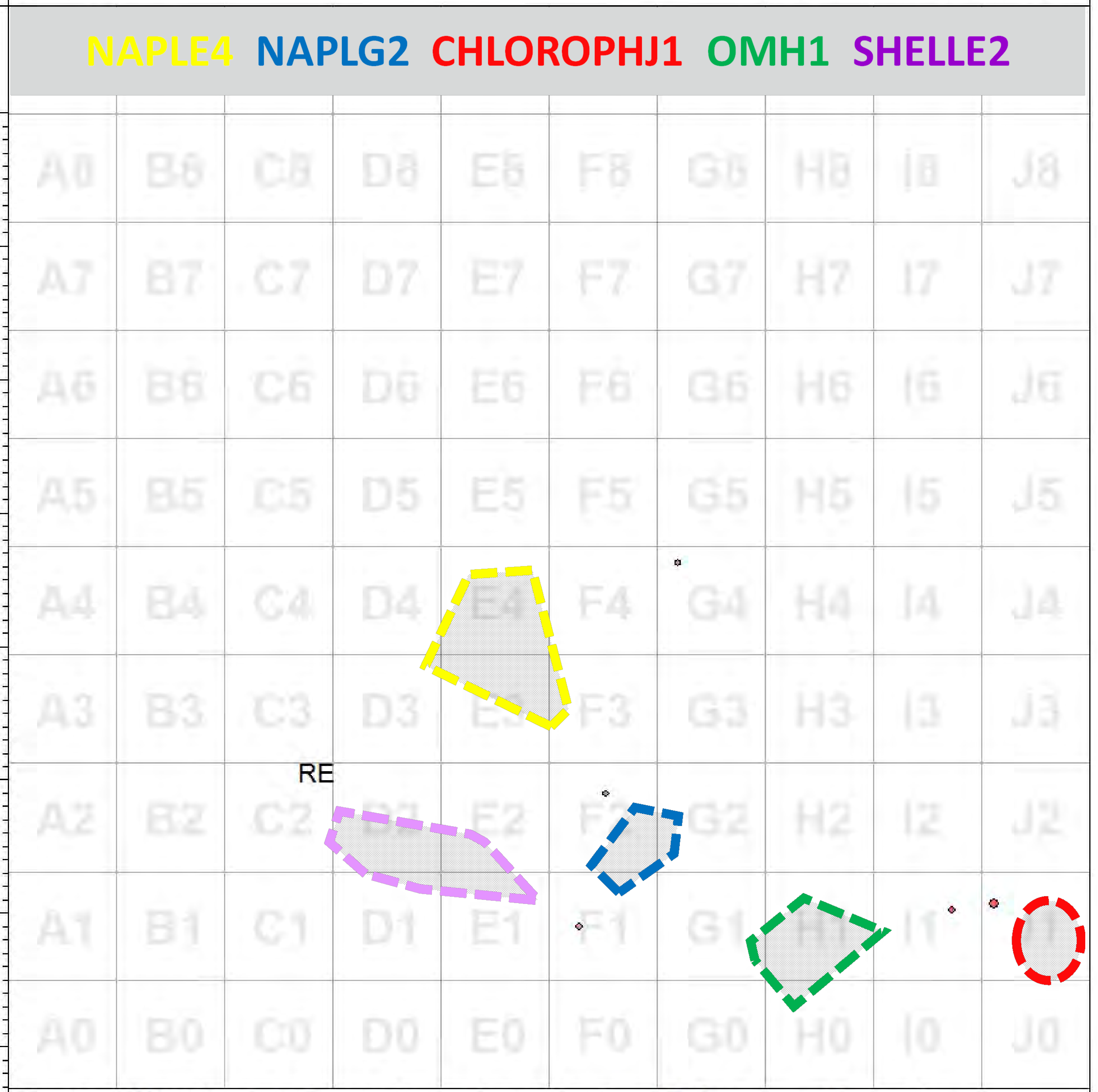
Started log 0.8' before it should have been. Logged 1.6' within casing.

Will see if office can correct log.



Cluster Plot

Cluster Cutoff: Fluorescence < 0.8



X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

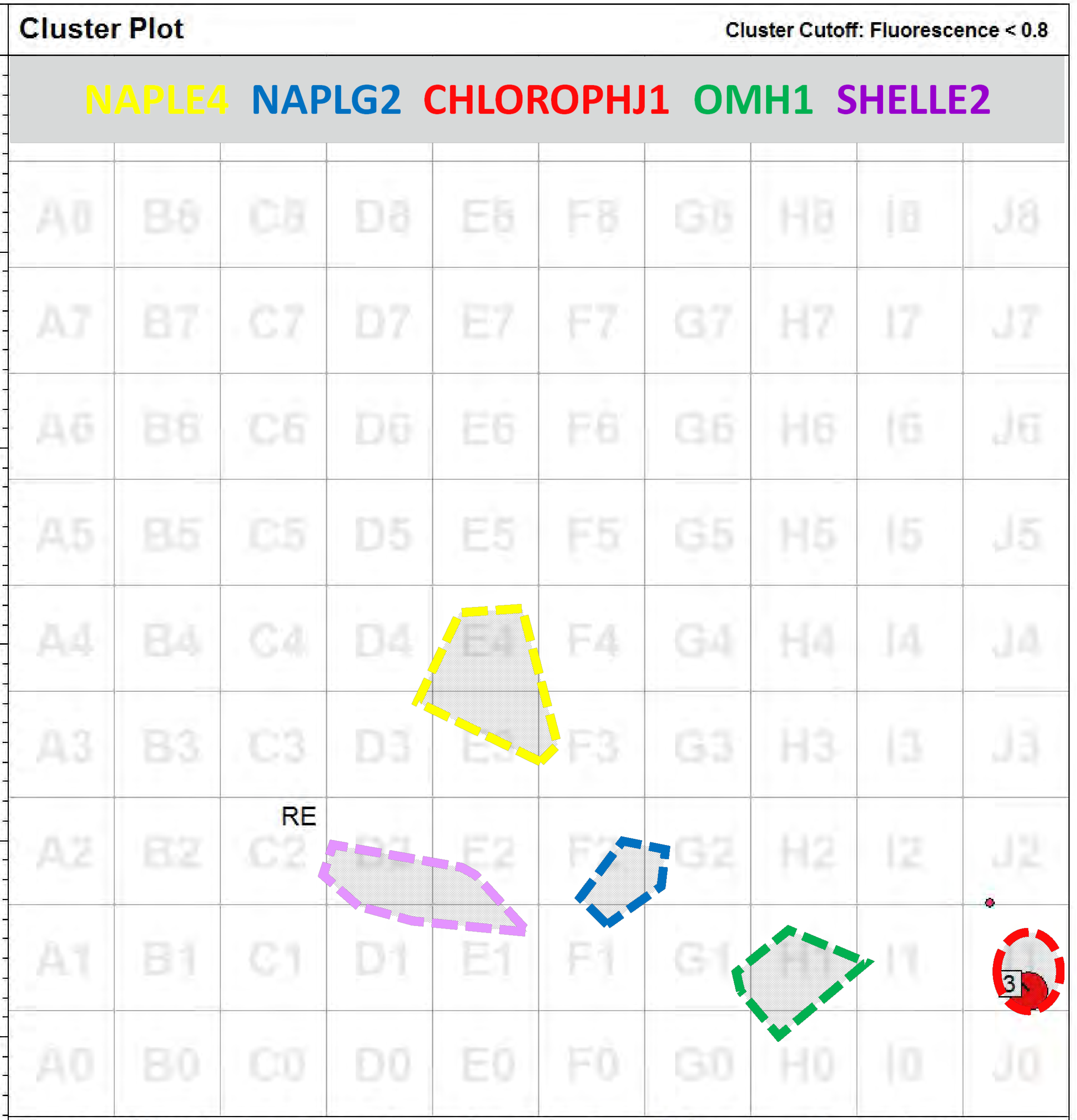
TarGOST® By Dakota

Log: **G500-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-10 13:44 PST**
Client: **Jacobs**	Job:
Final Depth: **10.04 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **2.8 %RE @ -0.11 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**

Logged water column while lowering TG probe to mudline.

5.51 ft
62.6 %RE
CHLOROPHJ1

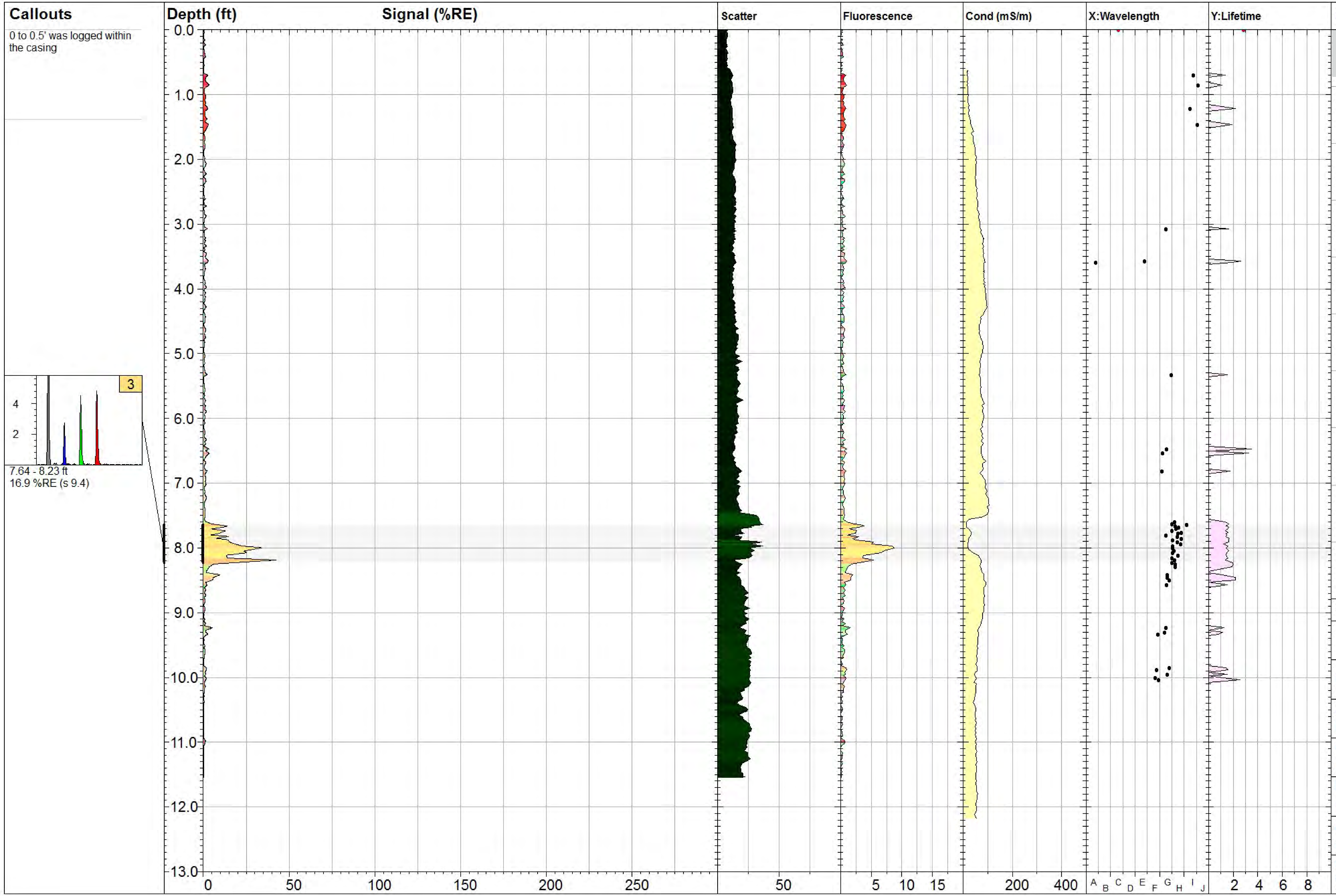


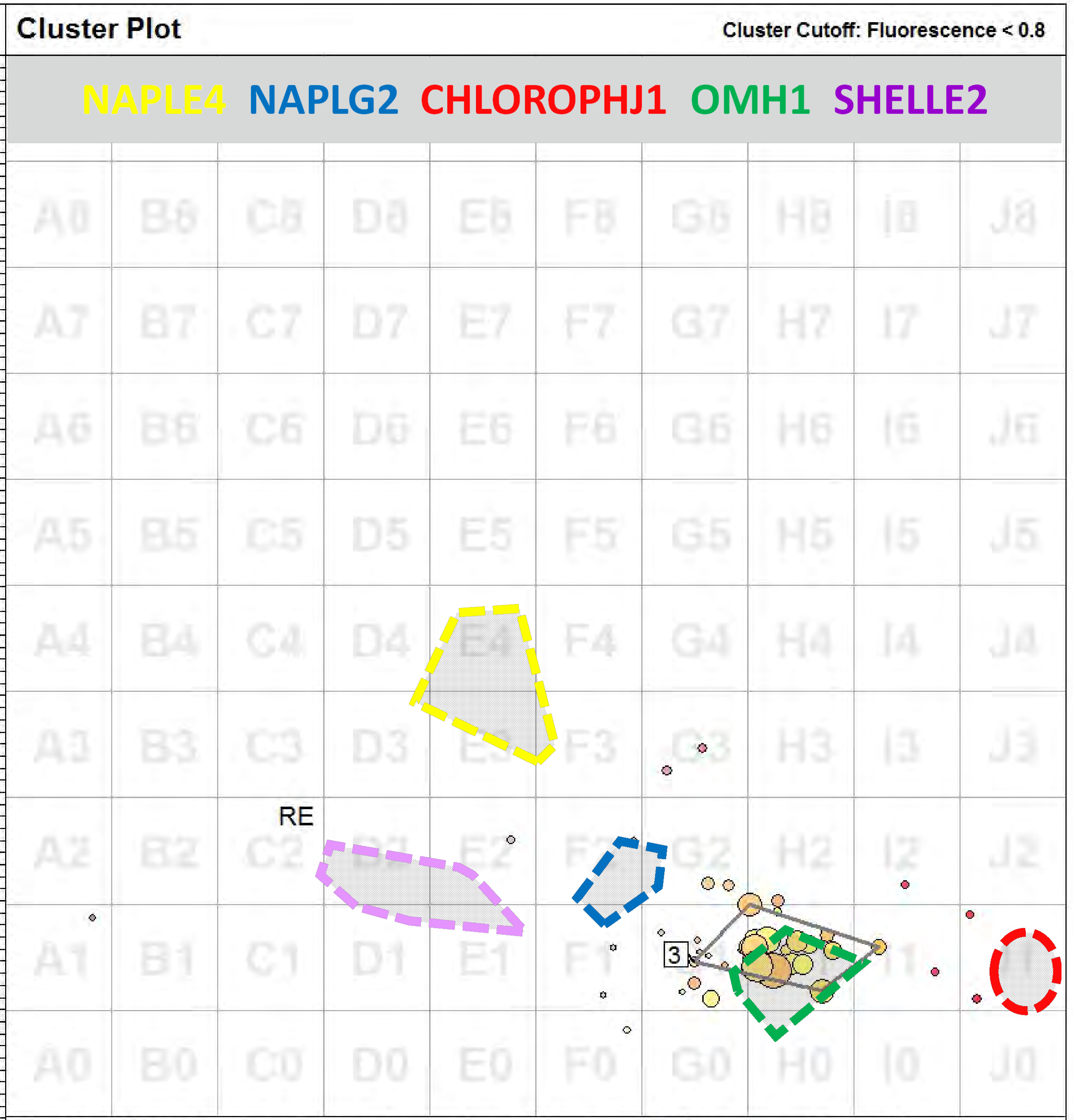
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **GN040-TG water**

Site: **BNSF Wishram**	Date & Time: **2022-11-10 13:02 PST**
Client: **Jacobs**	Job:
Final Depth: **13.98 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **62.6 %RE @ 5.51 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**





X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

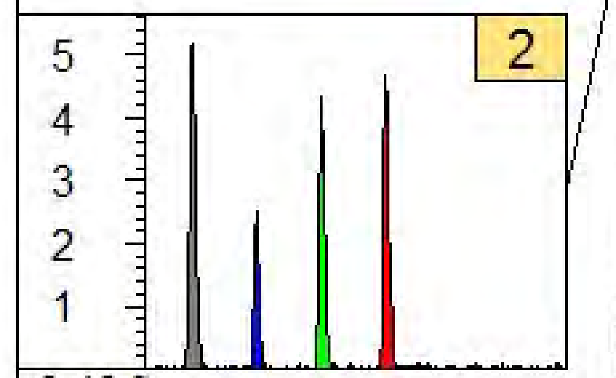
TarGOST® By Dakota

Log: **GN040-TG**

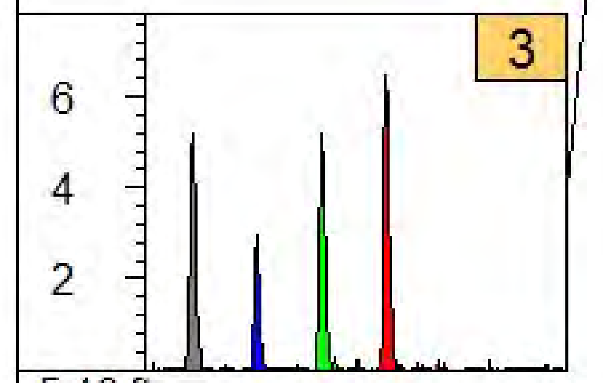
Site: **BNSF Wishram**	Date & Time: **2022-11-10 13:04 PST**
Client: **Jacobs**	Job:
Final Depth: **11.55 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **42.7 %RE @ 8.19 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**

Callouts

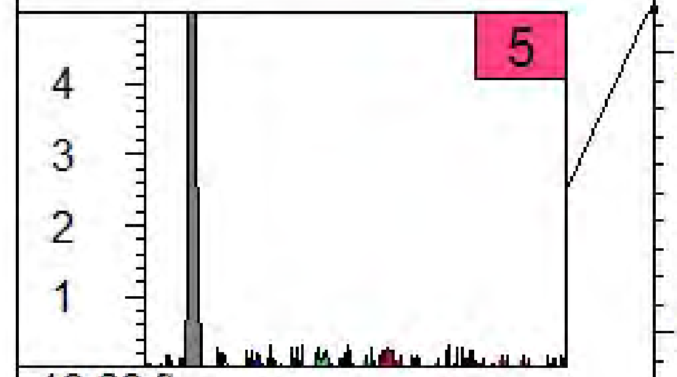
0 to 0.4' was logged within the casing



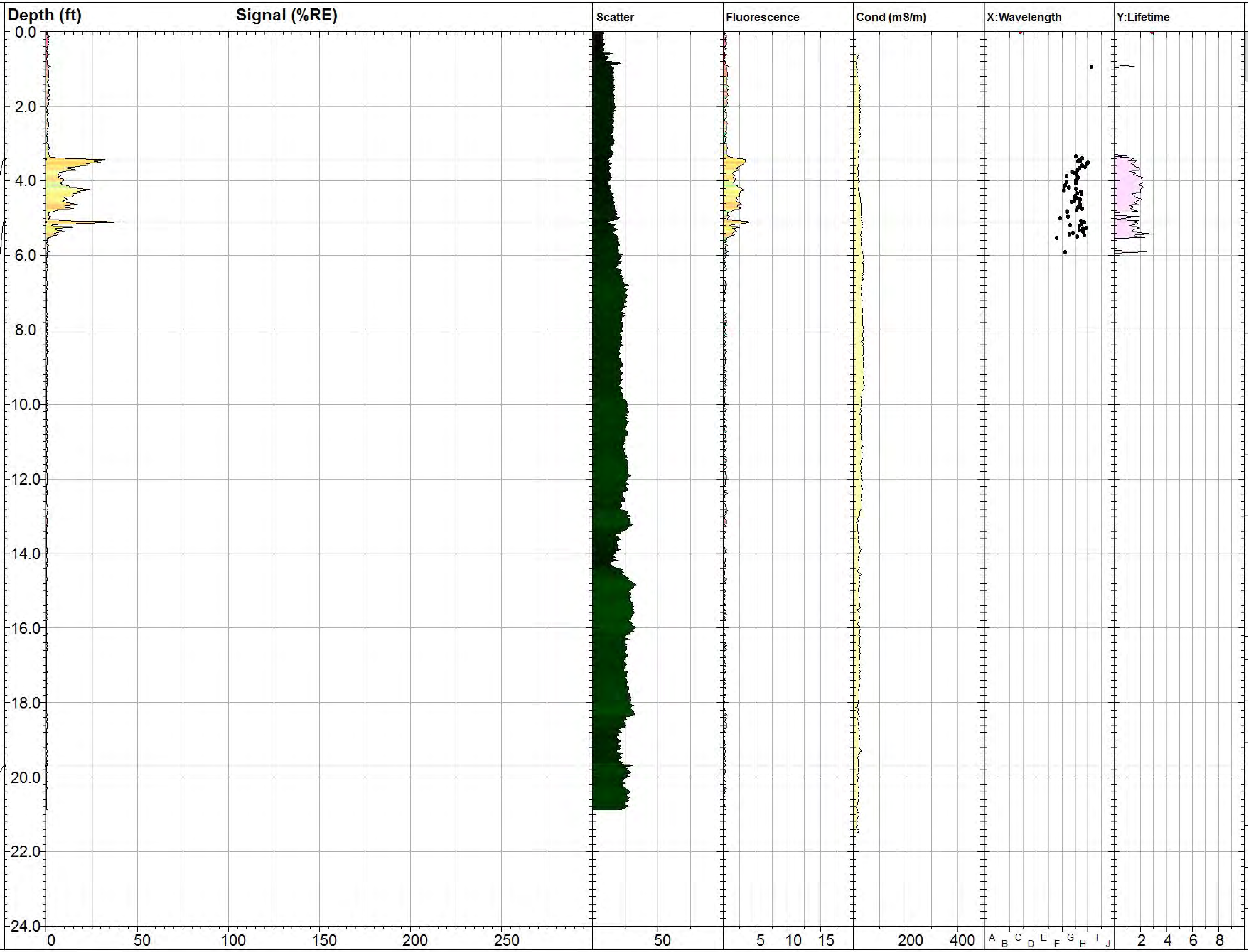
3.43 ft
32.4 %RE



5.10 ft
43.0 %RE

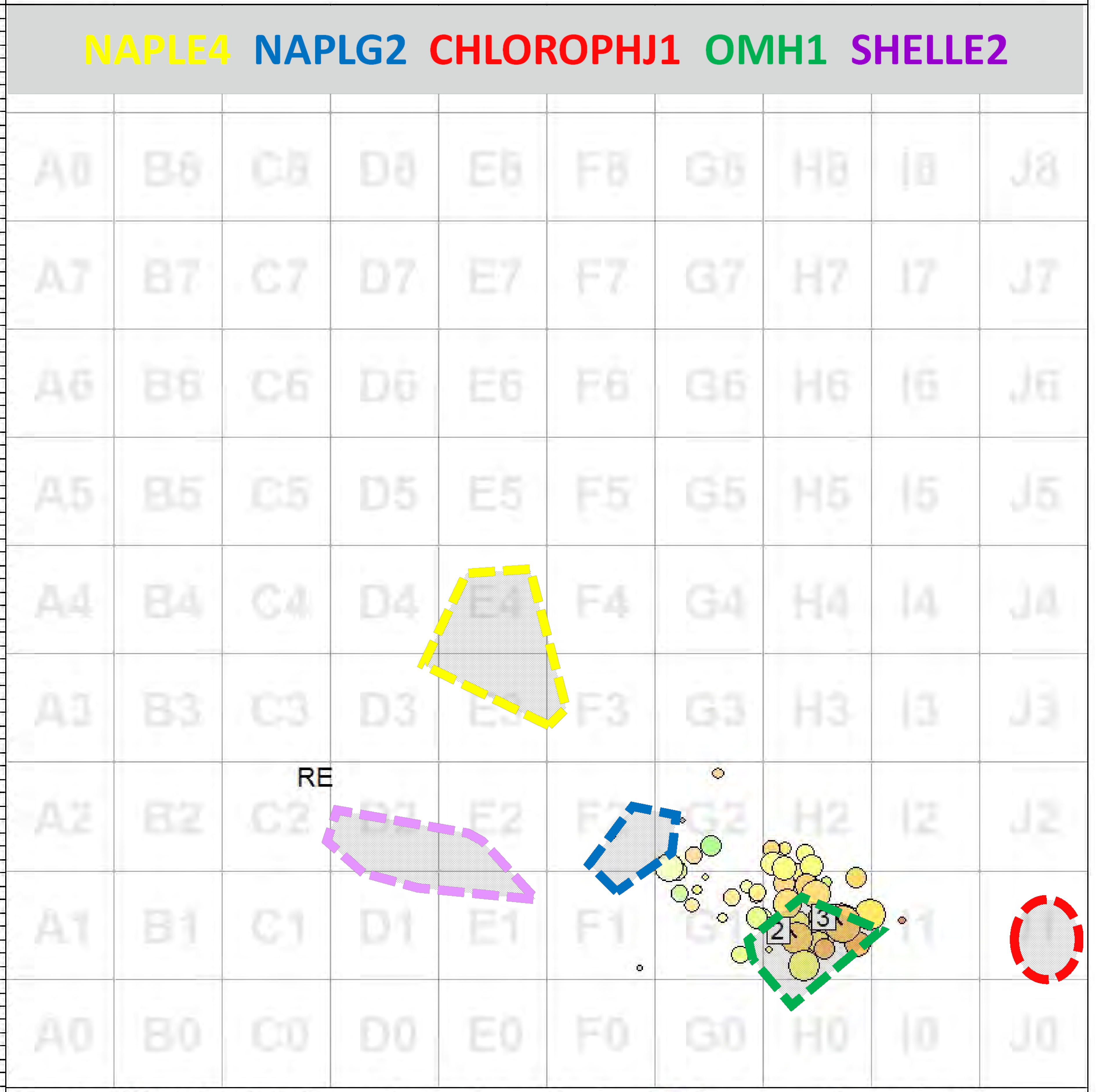


19.69 ft
0.4 %RE



Cluster Plot

Cluster Cutoff: Fluorescence < 0.8

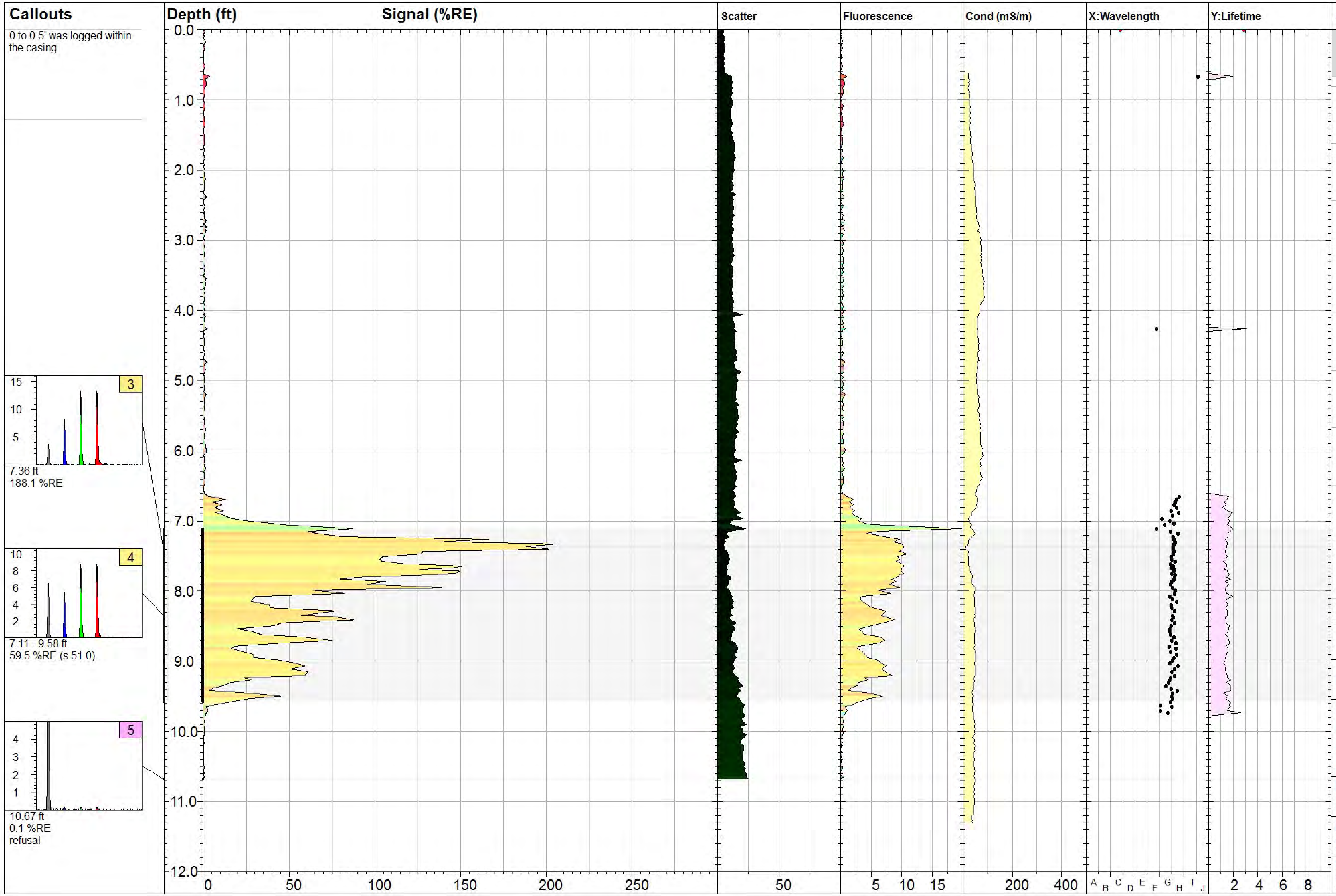


X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **H460-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-10 15:07 PST**
Client: **Jacobs**	Job:
Final Depth: **20.87 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **43.0 %RE @ 5.10 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**

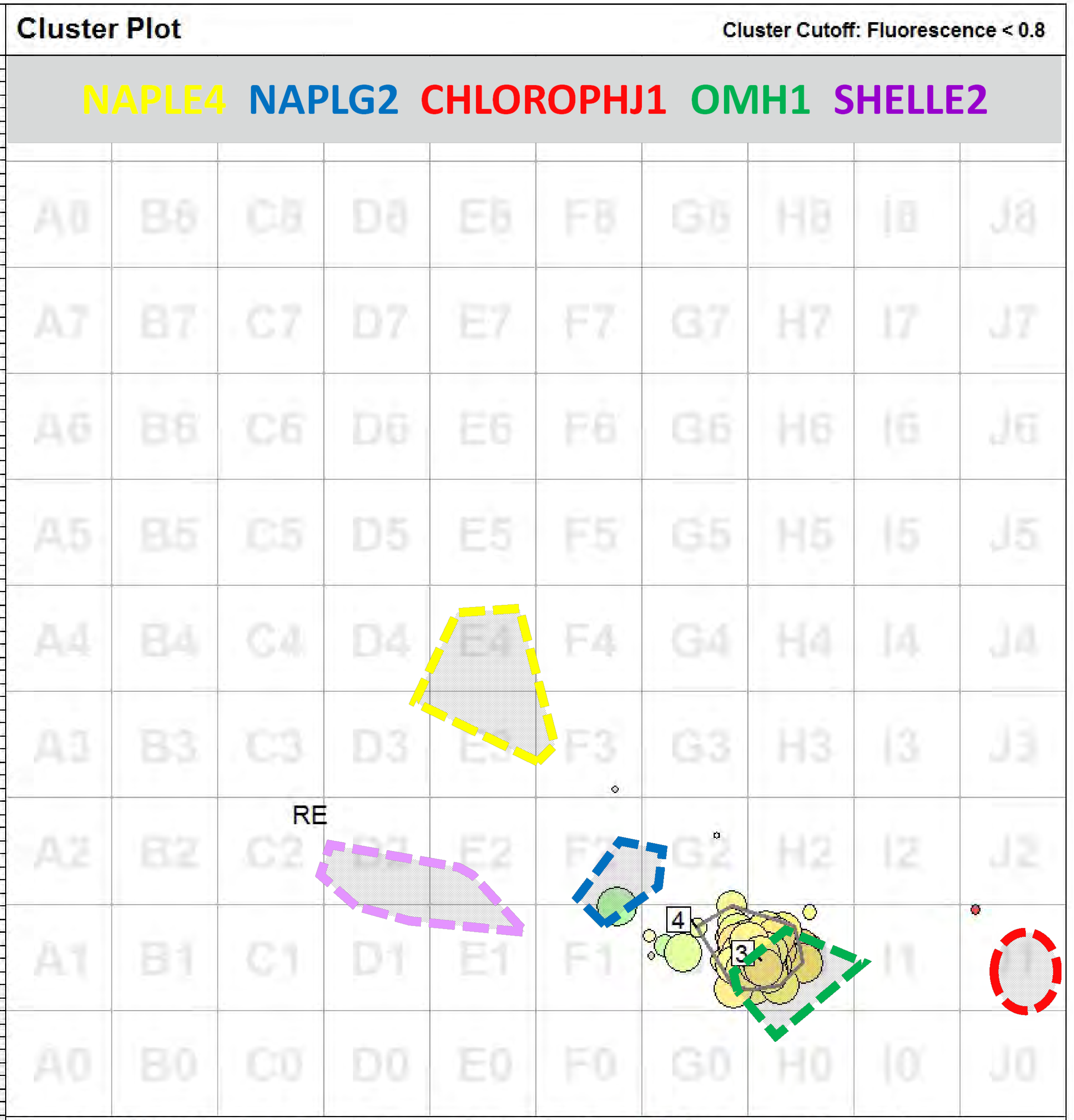


0 to 0.5' was logged within the casing

7.36 ft
188.1 %RE

7.11 - 9.58 ft
59.5 %RE (s 51.0)

10.67 ft
0.1 %RE
refusal



X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

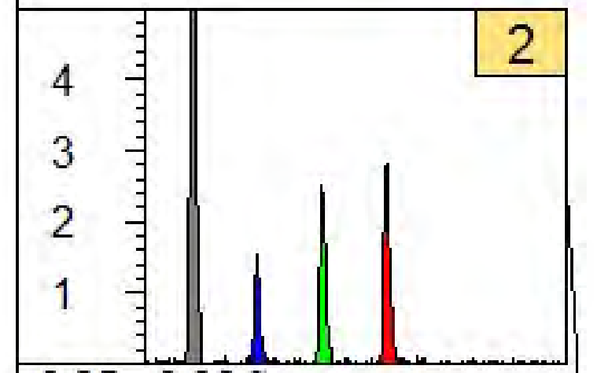
TarGOST® By Dakota

Log: **HN100-TG**

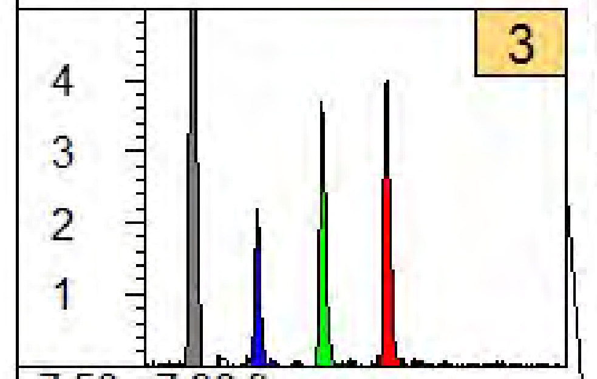
Site: **BNSF Wishram**	Date & Time: **2022-11-11 12:49 PST**
Client: **Jacobs**	Job:
Final Depth: **10.67 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **206.8 %RE @ 7.33 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**

Callouts

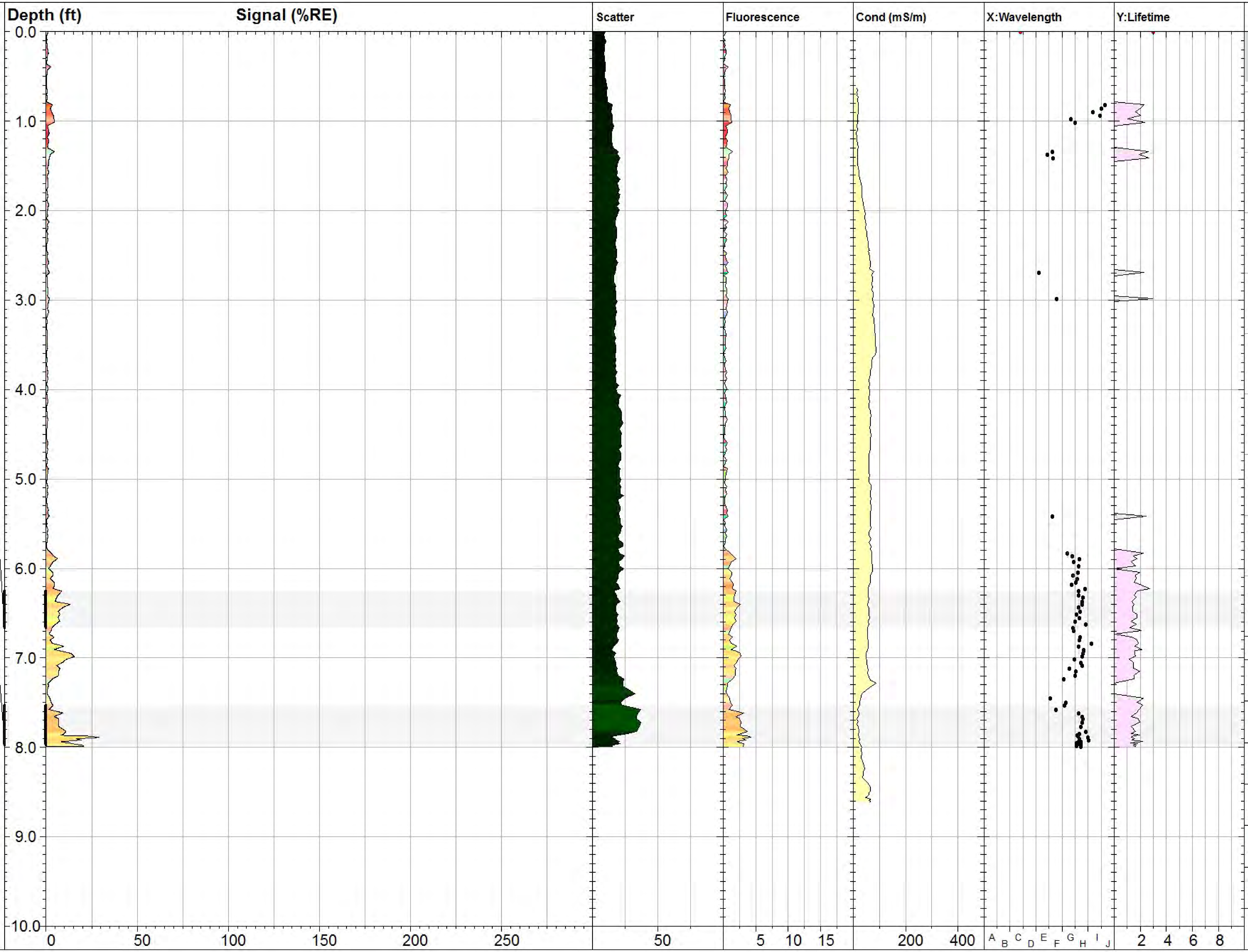
0 to .75 was logged within the casing



6.25 - 6.66 ft
6.9 %RE (s 2.6)

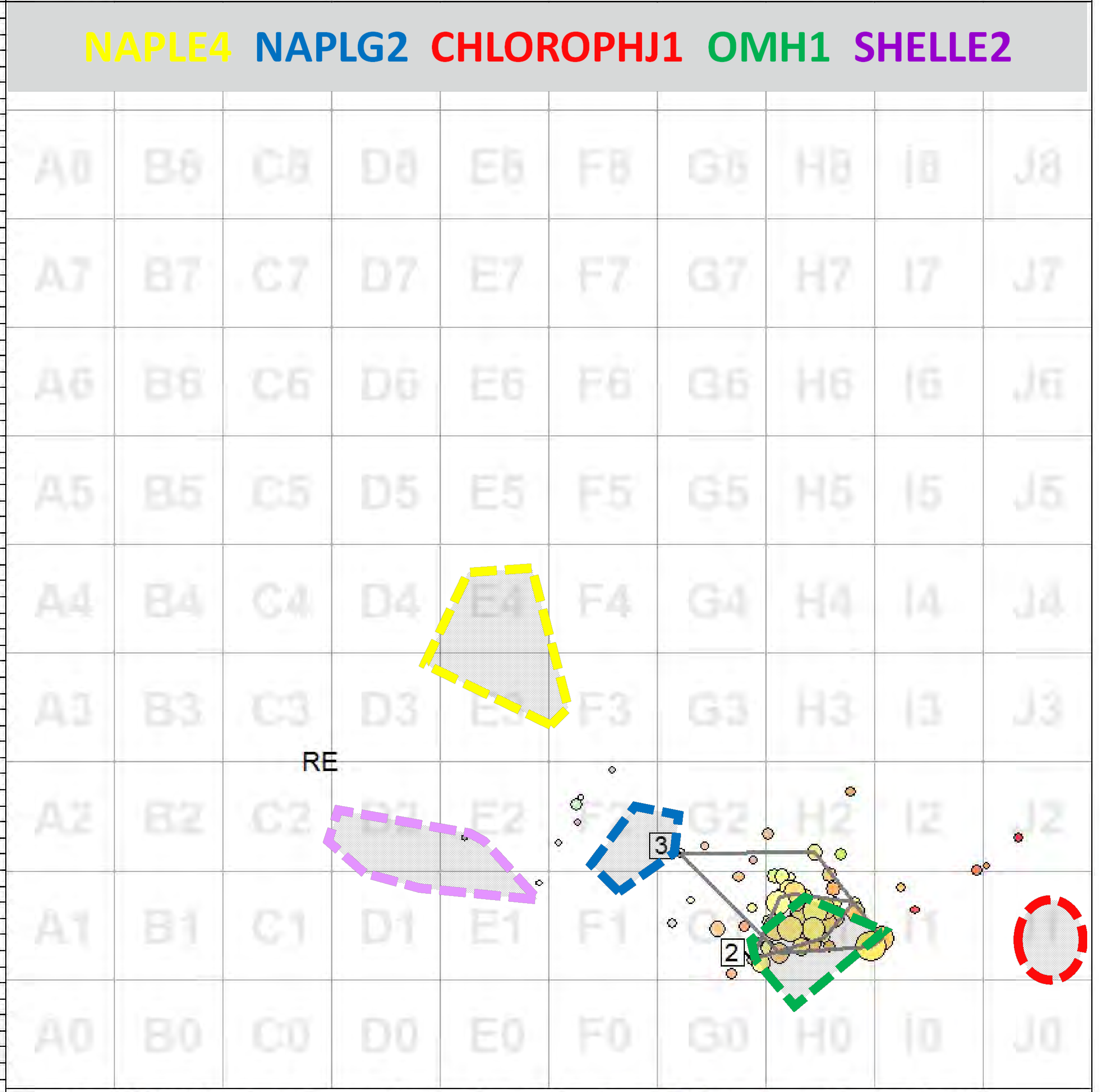


7.53 - 7.98 ft
10.3 %RE (s 7.0)



Cluster Plot

Cluster Cutoff: Fluorescence < 0.8

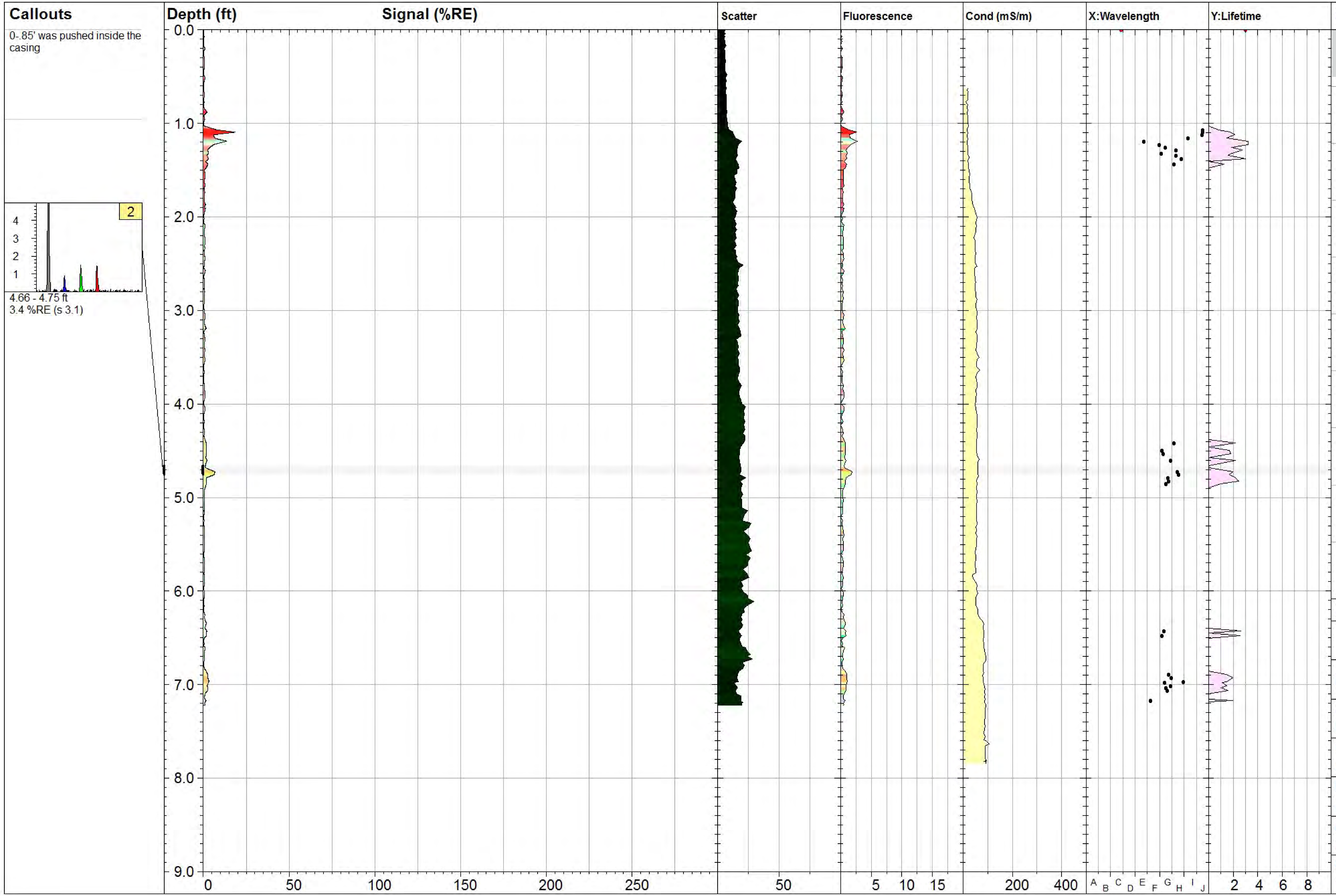


X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

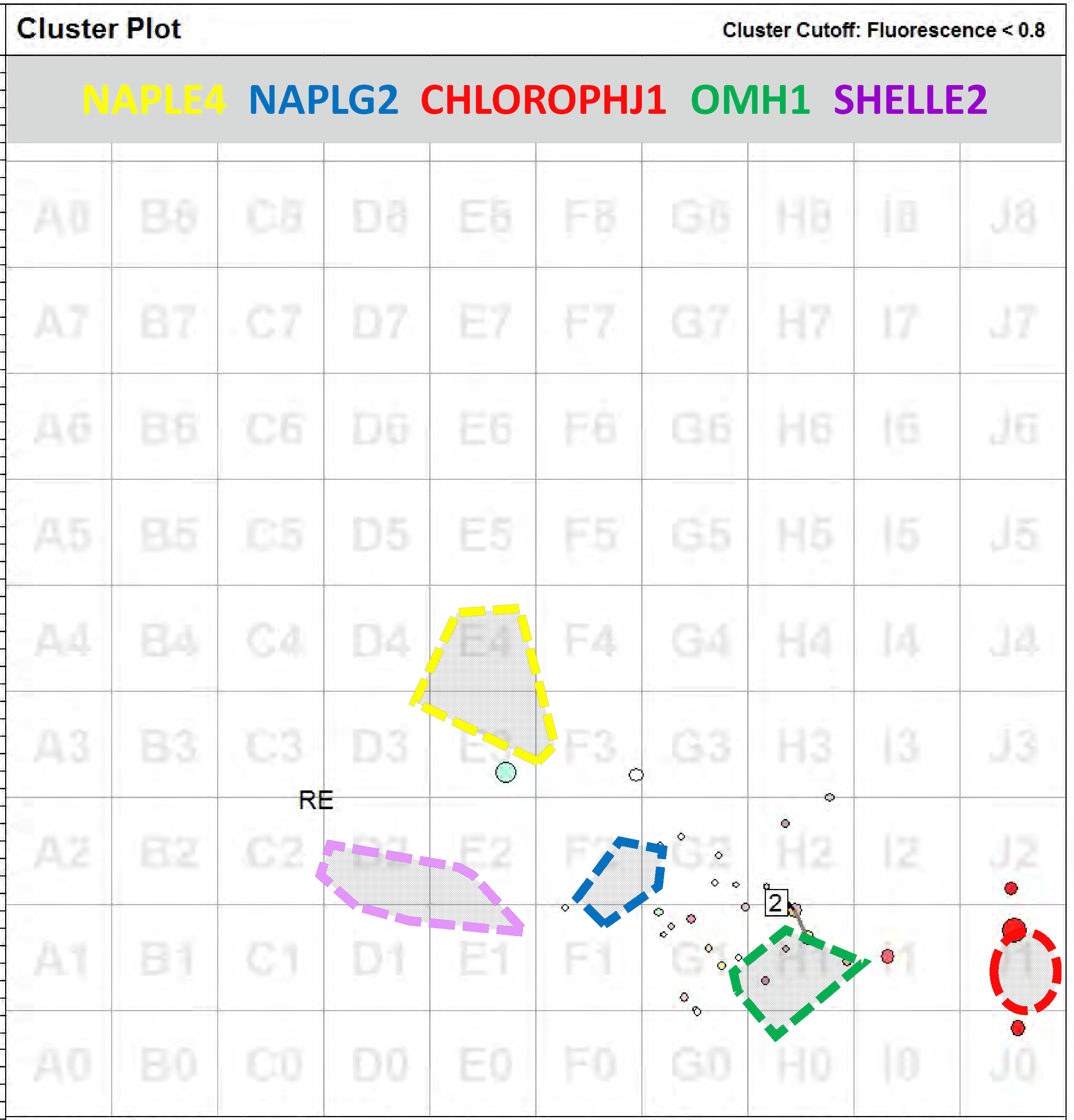
TarGOST® By Dakota

Log: **HN200-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-14 10:17 PST**
Client: **Jacobs**	Job:
Final Depth: **7.99 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **29.3 %RE @ 7.89 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **T.Rudolph / TG1807**	Elevation: **Unavailable**



0-.85' was pushed inside the casing



X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

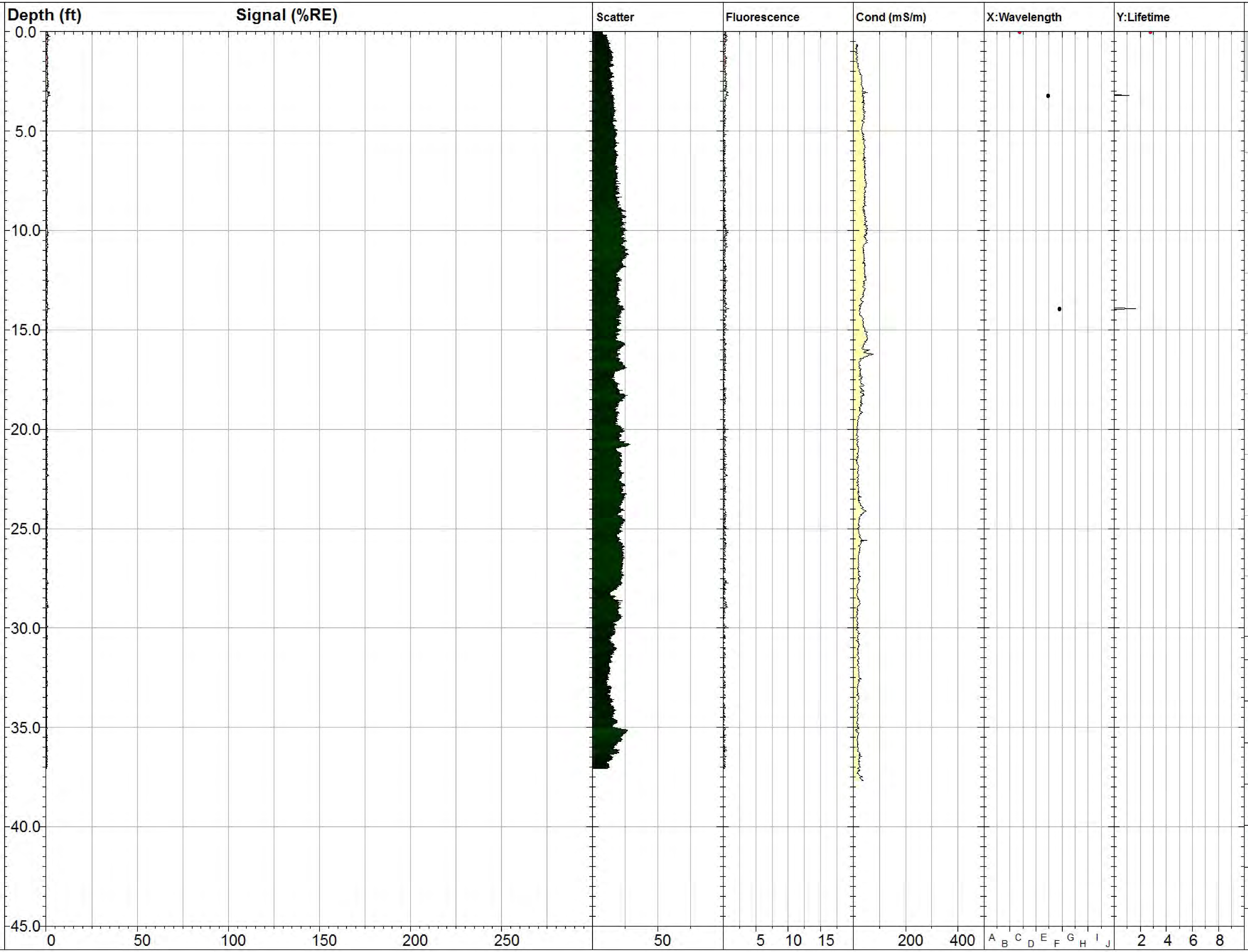
TarGOST® By Dakota

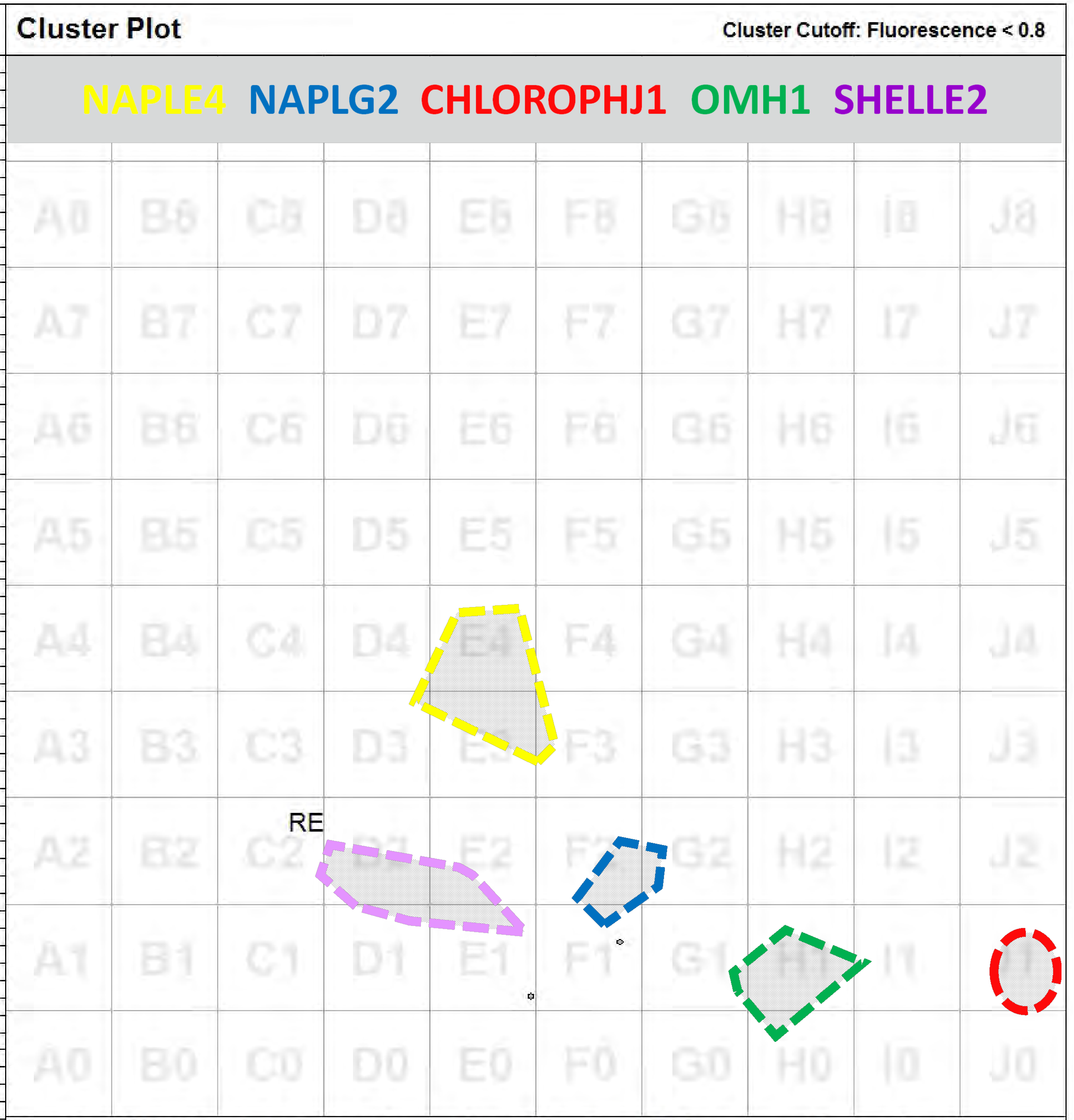
Log: **HN280-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-14 13:30 PST**
Client: **Jacobs**	Job:
Final Depth: **7.22 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **18.6 %RE @ 1.09 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **T.Rudolph / TG1807**	Elevation: **Unavailable**

Callouts

0 to 0.6' was logged within the casing





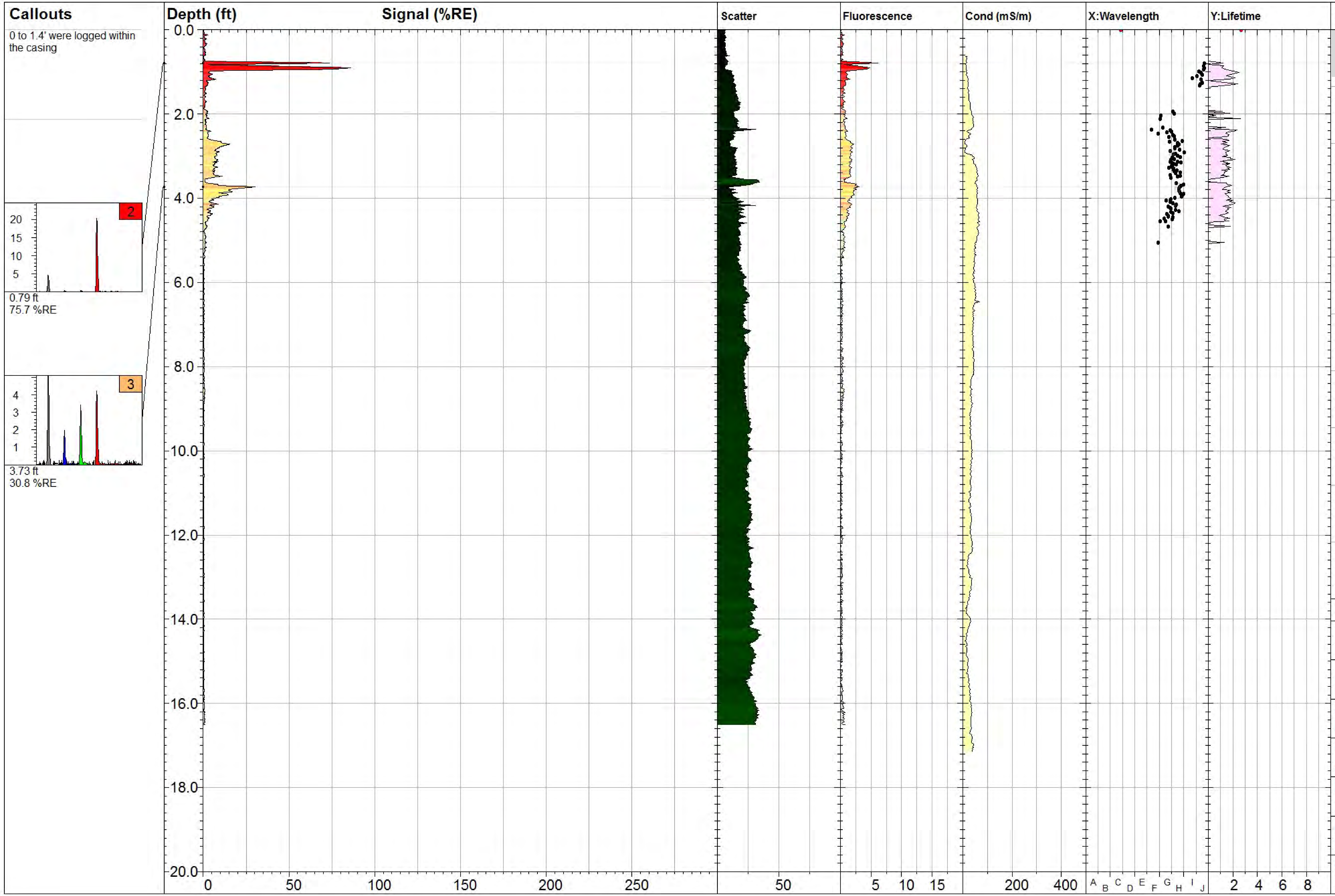
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

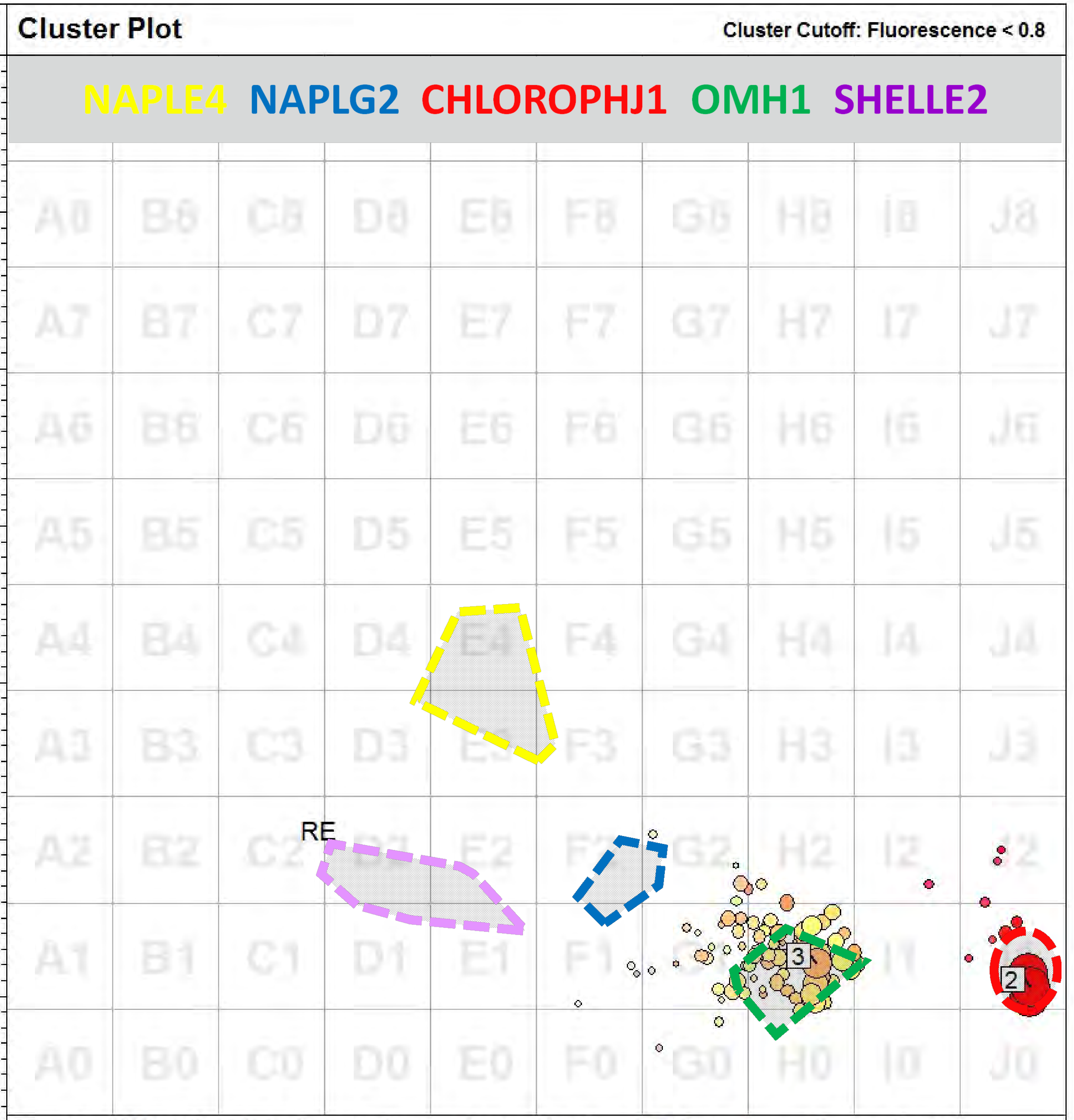
TarGOST® By Dakota

Data Presentation Format © 2023 Dakota Technologies, Inc. (v2.8.1)

Log: **I120-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-06 15:03 PST**
Client: **Jacobs**	Job:
Final Depth: **37.06 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **2.2 %RE @ 0.24 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**





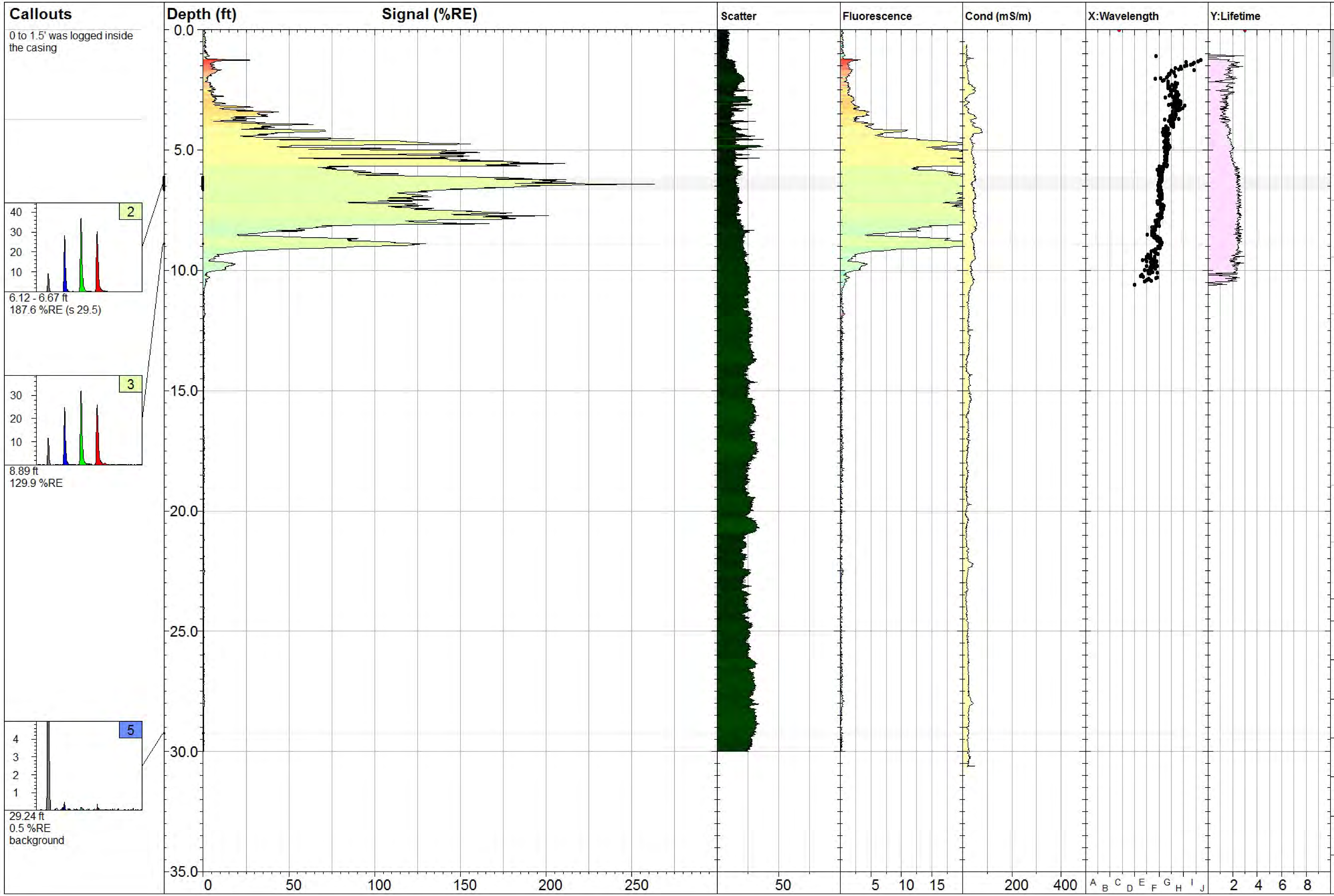
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Data Presentation Format © 2023 Dakota Technologies, Inc. (v2.8.1)

Log: **I160-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-06 14:24 PST**
Client: **Jacobs**	Job:
Final Depth: **16.51 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **86.6 %RE @ 0.90 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**



0 to 1.5' was logged inside the casing

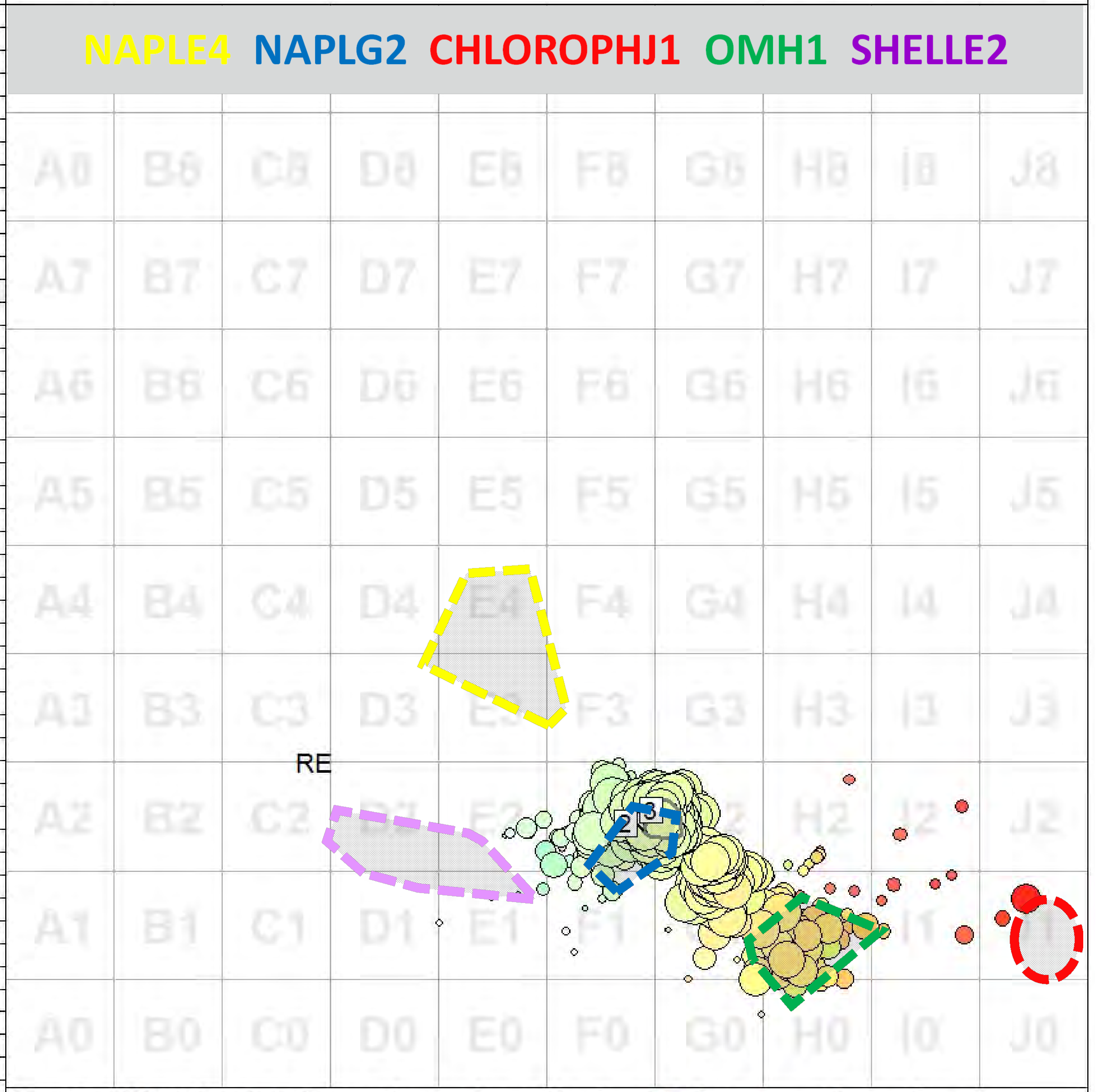
6.12 - 6.67 ft
187.6 %RE (s 29.5)

8.89 ft
129.9 %RE

29.24 ft
0.5 %RE
background

Cluster Plot

Cluster Cutoff: Fluorescence < 0.8



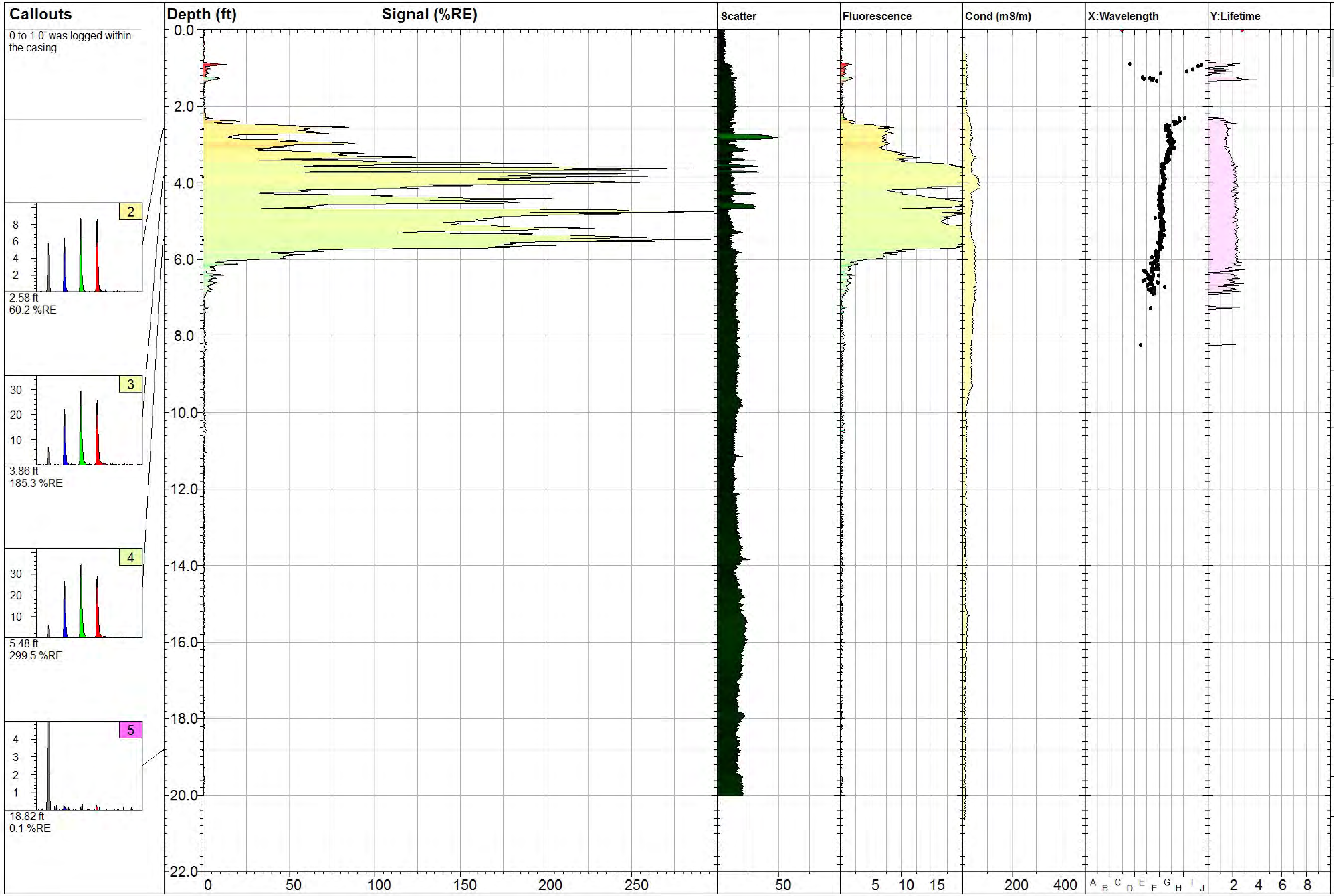
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

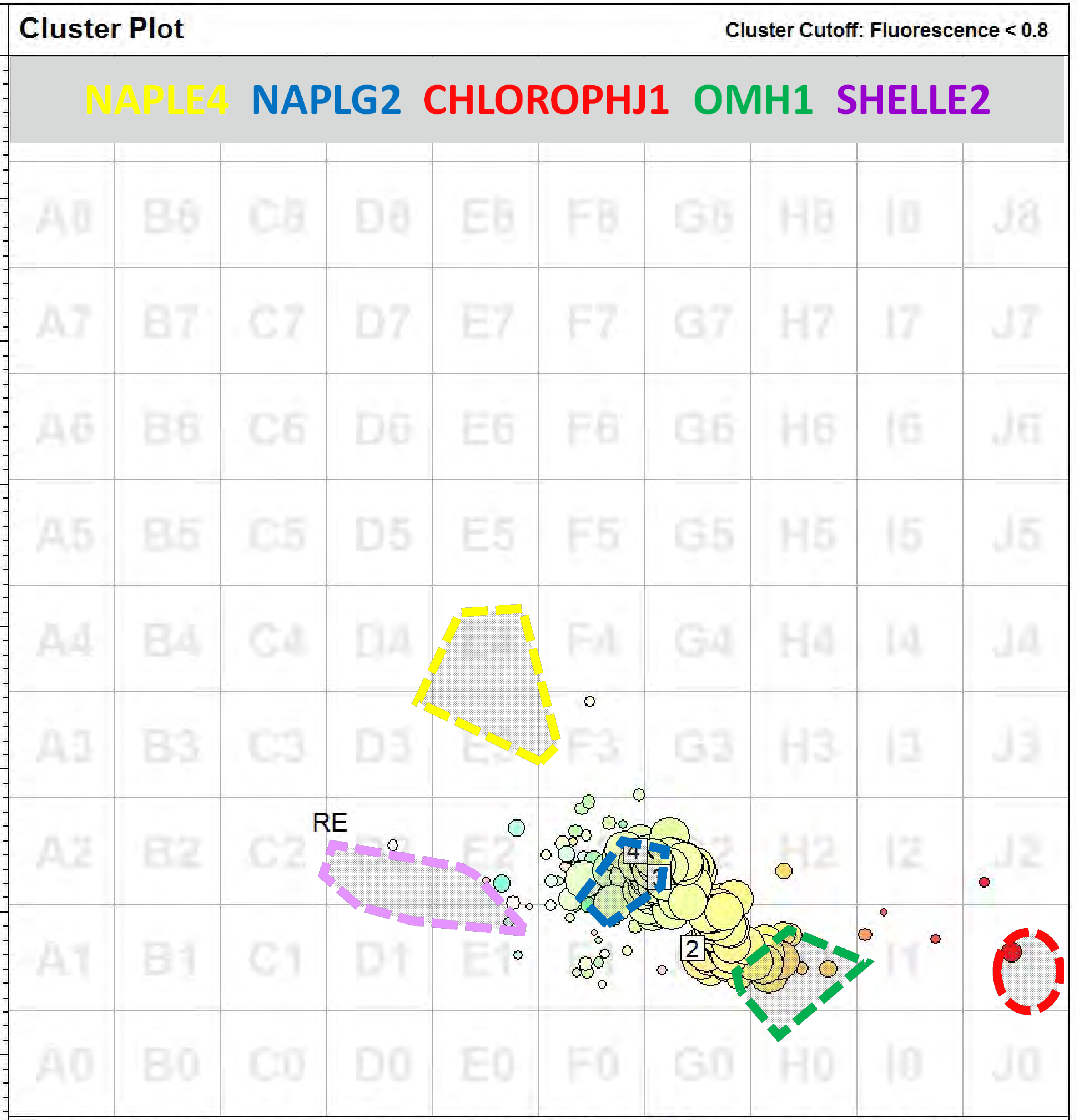
TarGOST® By Dakota

Data Presentation Format © 2023 Dakota Technologies, Inc. (v2.8.1)

Log: **I200-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-02 15:42 PDT**
Client: **Jacobs**	Job:
Final Depth: **30.00 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **267.7 %RE @ 6.41 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**



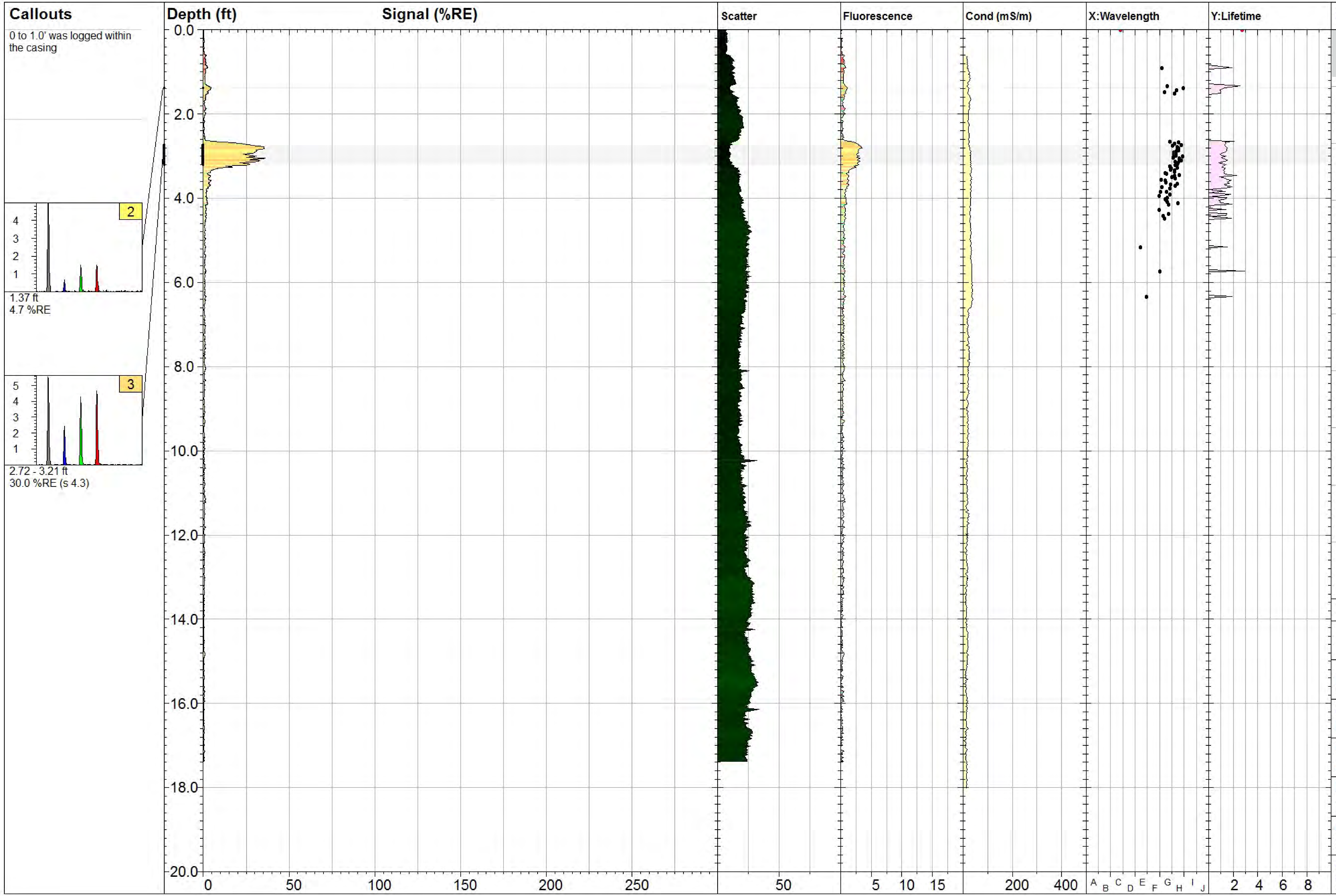


X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **I280-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-06 09:21 PST**
Client: **Jacobs**	Job:
Final Depth: **20.01 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **300.8 %RE @ 4.75 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**



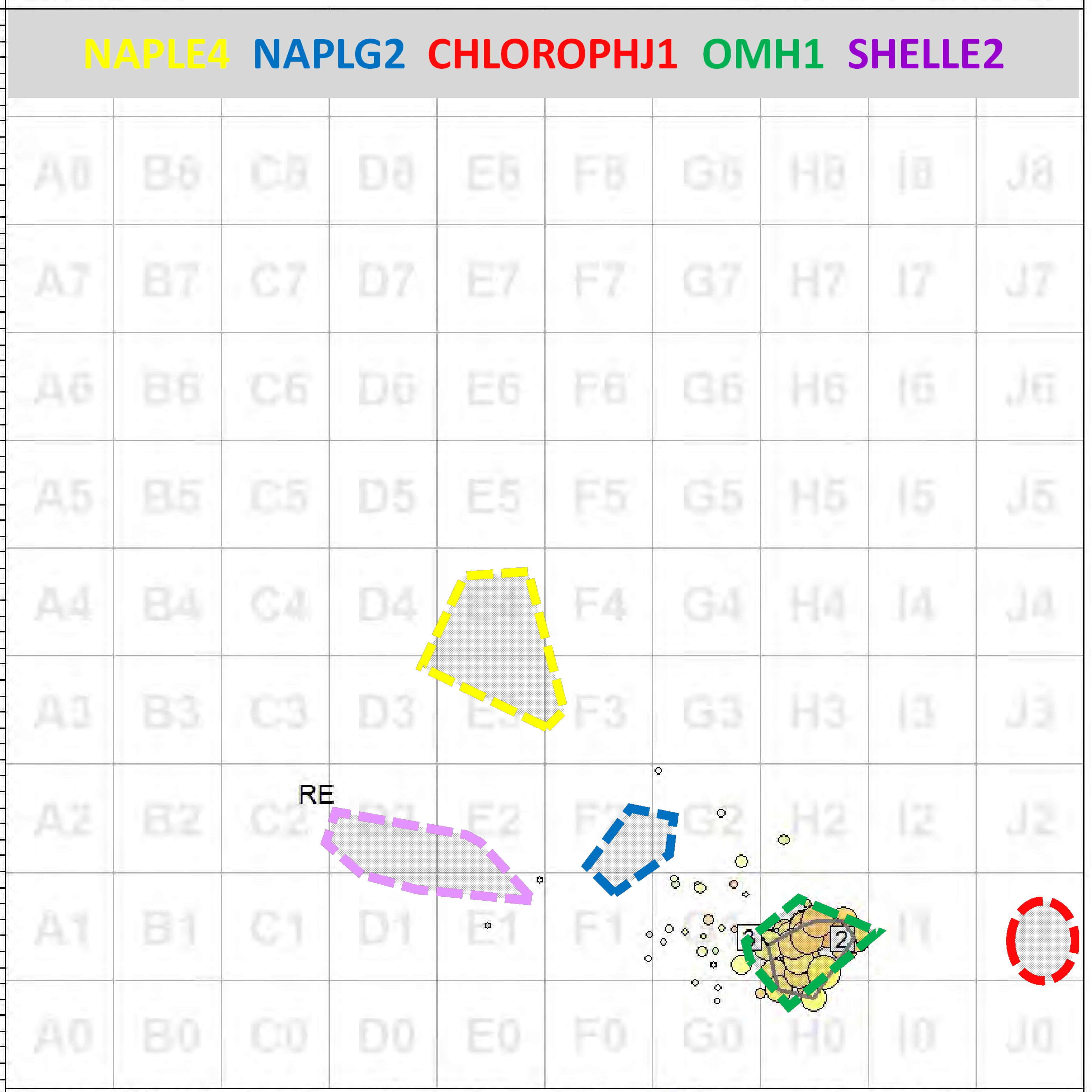
0 to 1.0' was logged within the casing

1.37 ft
4.7 %RE

2.72 - 3.21 ft
30.0 %RE (s 4.3)

Cluster Plot

Cluster Cutoff: Fluorescence < 0.8

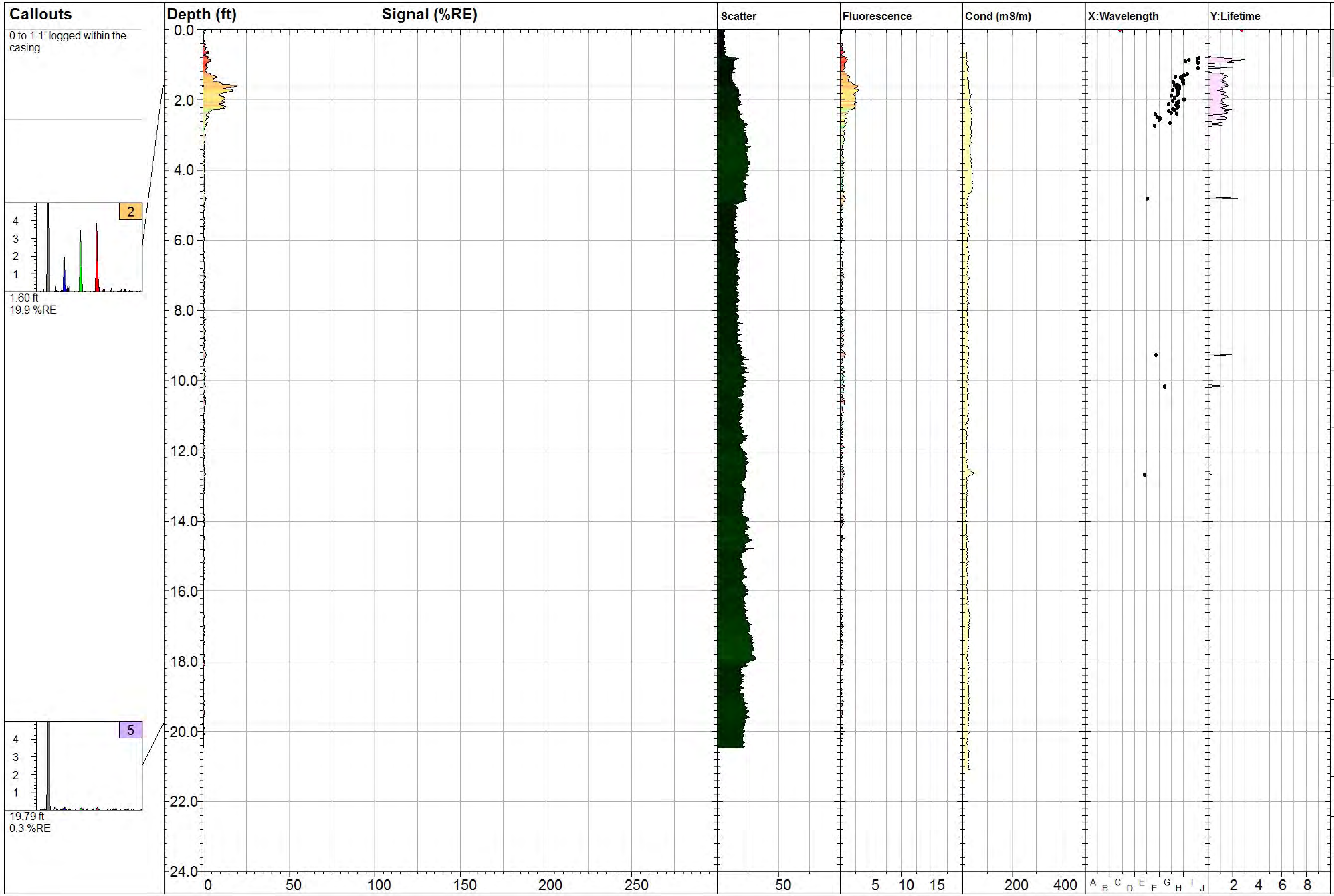


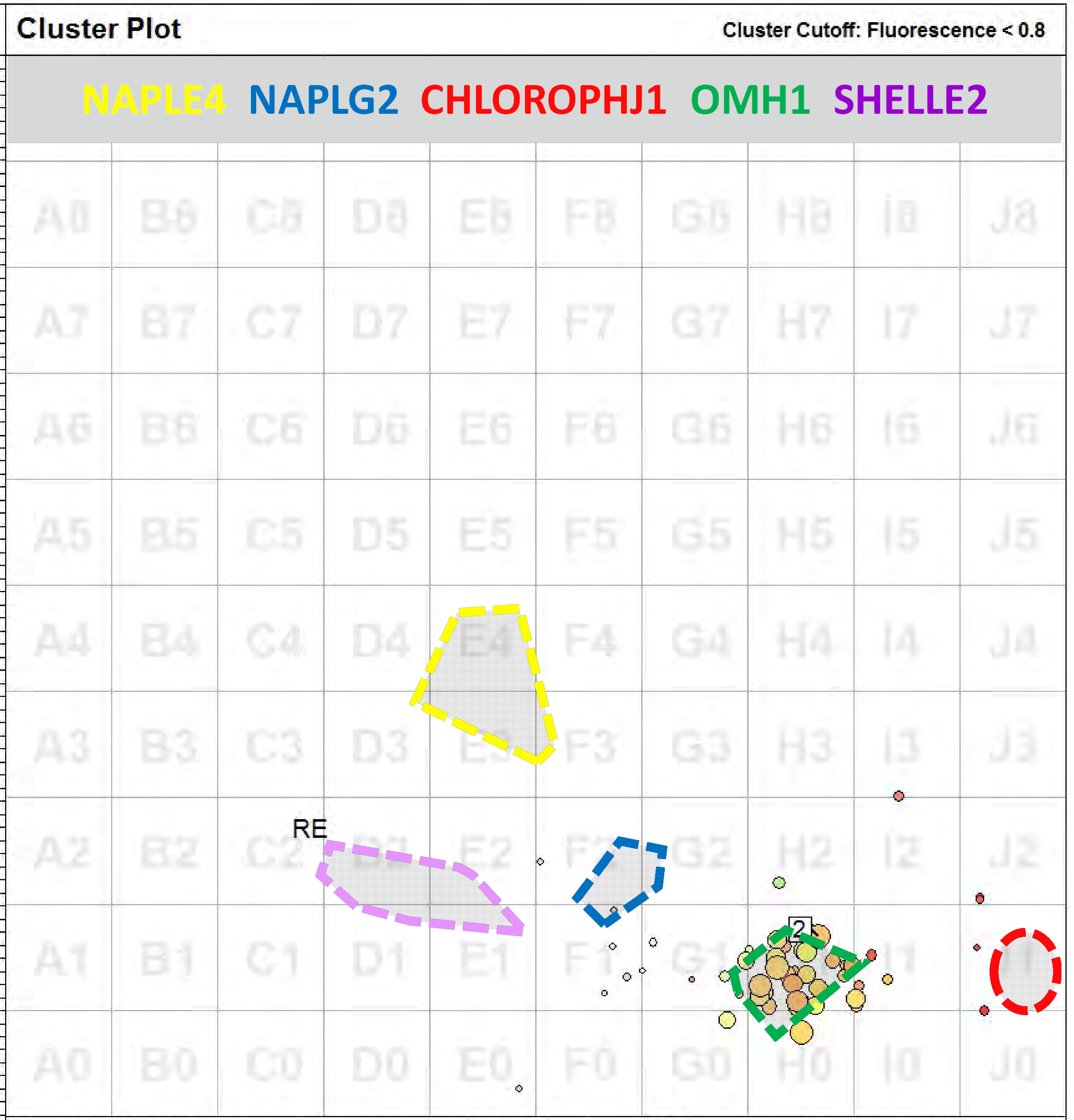
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **I360-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-07 09:45 PST**
Client: **Jacobs**	Job:
Final Depth: **17.39 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **36.1 %RE @ 3.05 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**





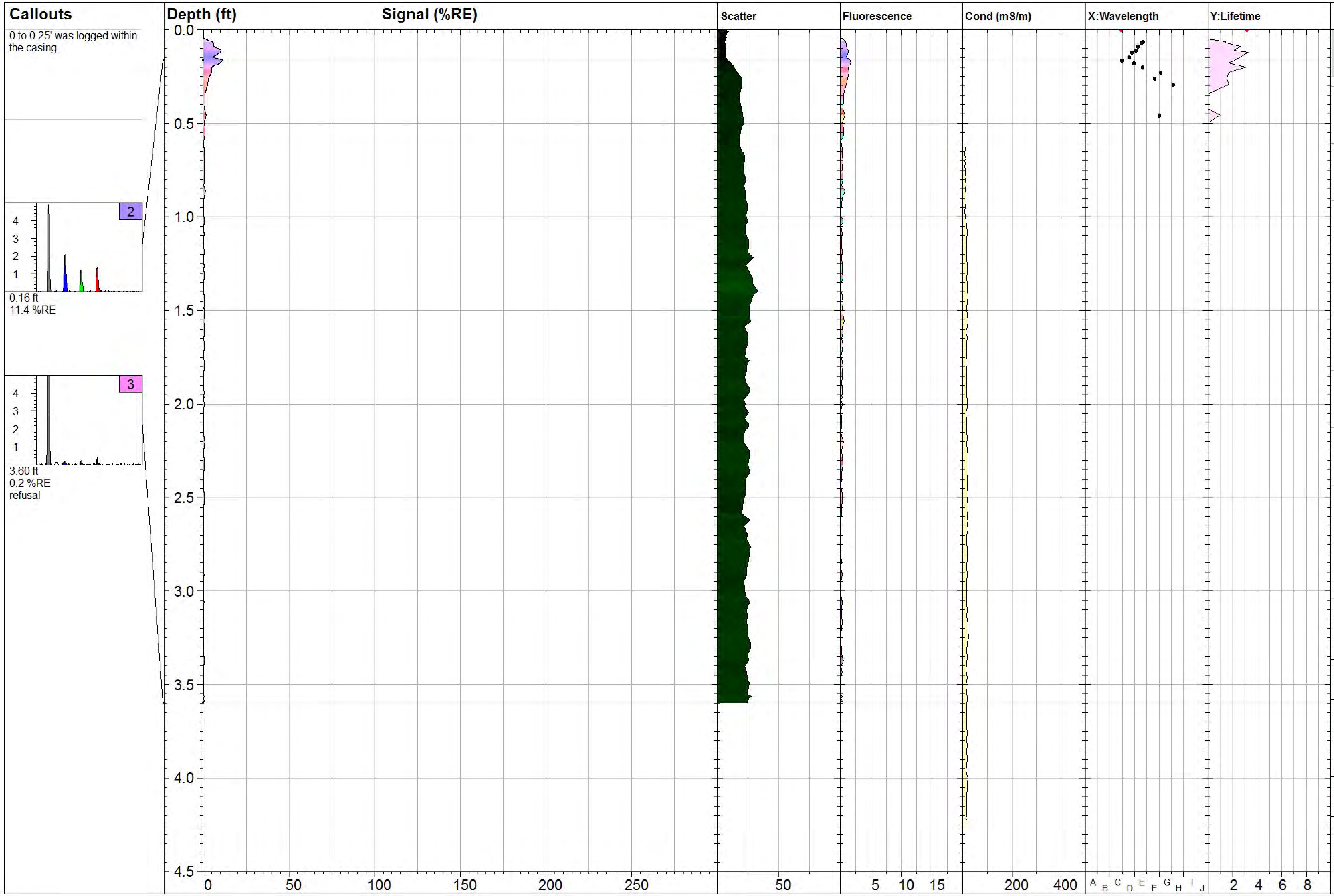
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

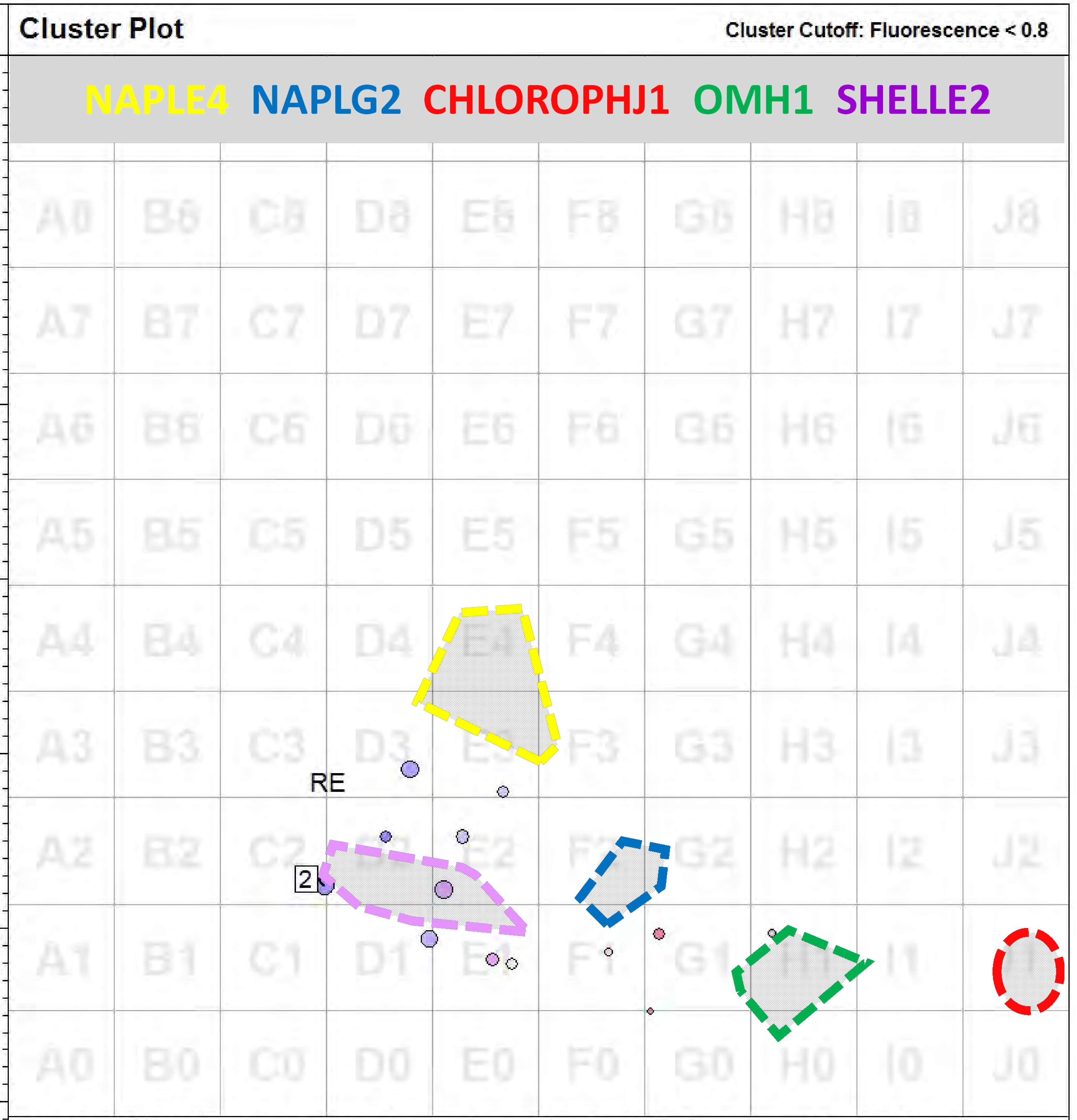
TarGOST® By Dakota

Data Presentation Format © 2023 Dakota Technologies, Inc. (v2.8.1)

Log: **I400-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-07 13:07 PST**
Client: **Jacobs**	Job:
Final Depth: **20.46 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **19.9 %RE @ 1.60 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**





X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

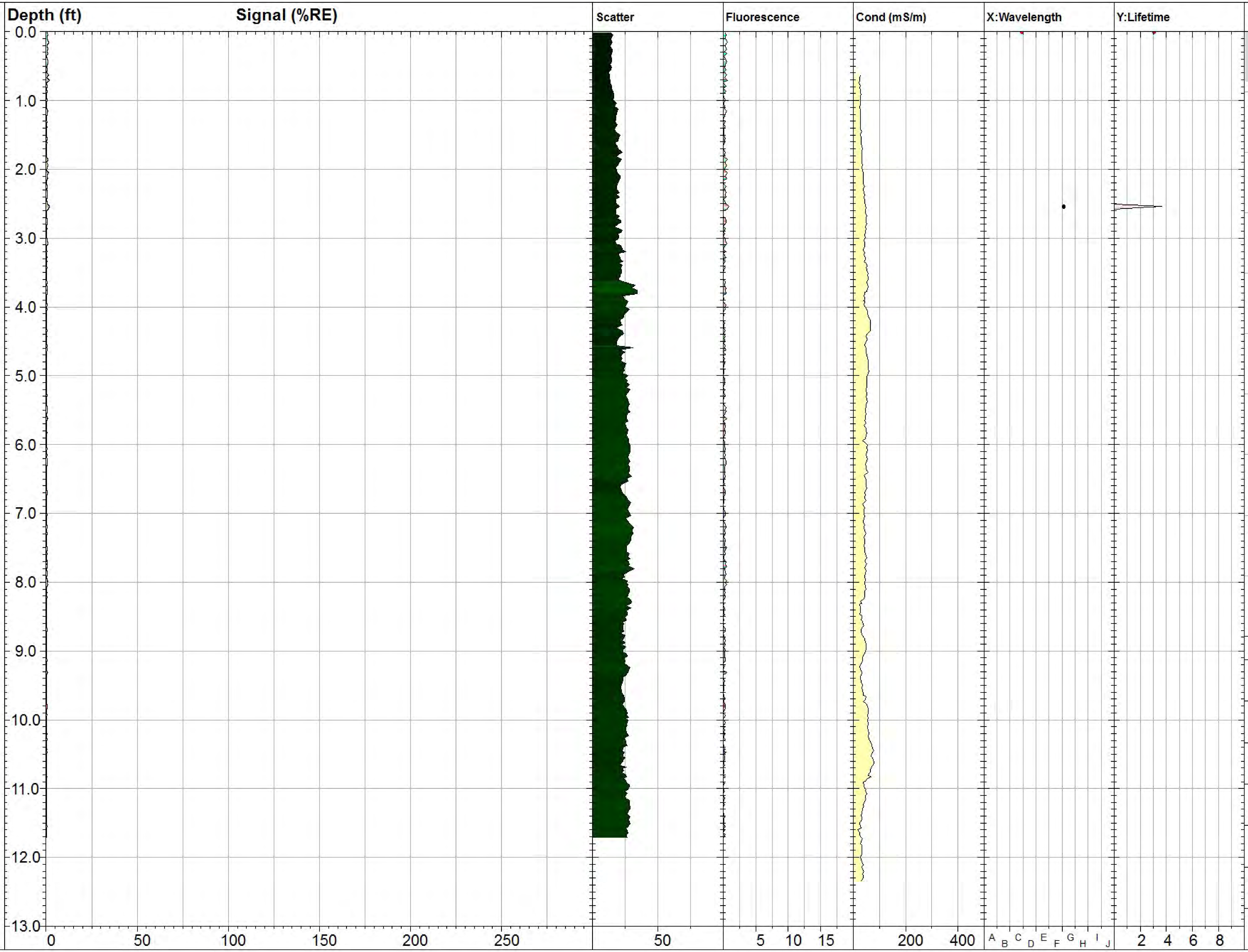
TarGOST® By Dakota

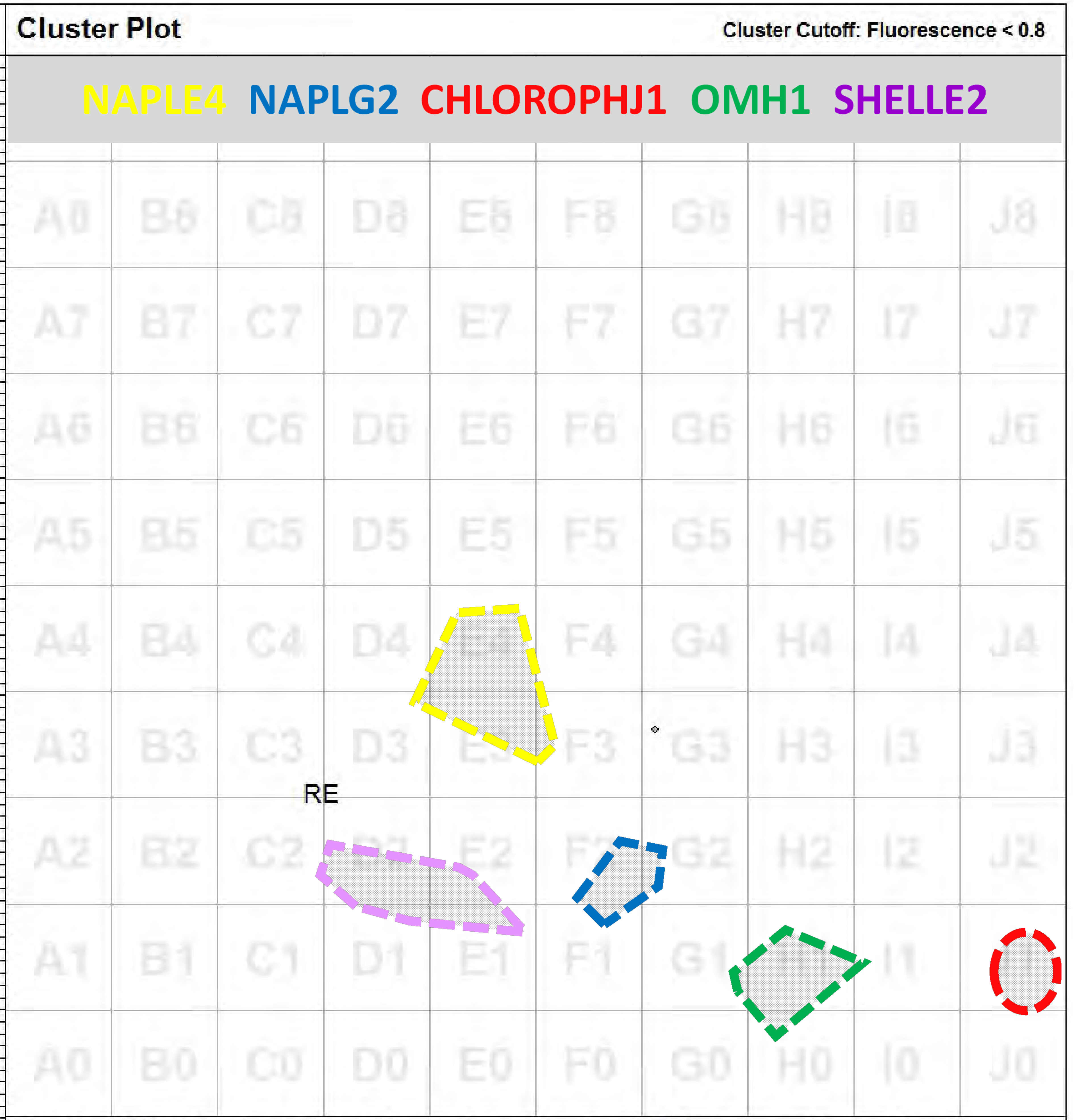
Log: **I500-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-11 08:37 PST**
Client: **Jacobs**	Job:
Final Depth: **3.60 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **11.4 %RE @ 0.16 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**

Callouts

0 to .1' was pushed inside casing





X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

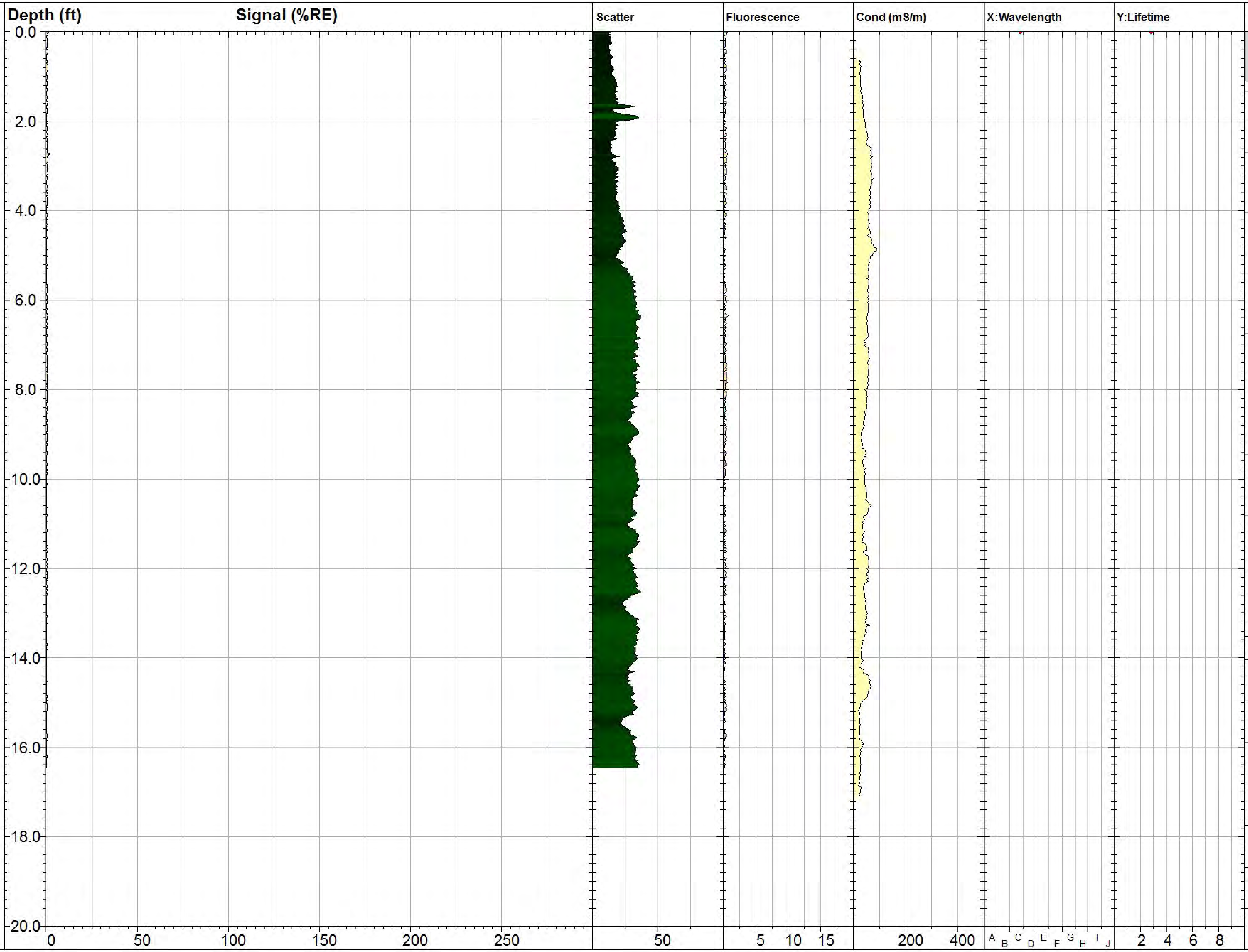
TarGOST® By Dakota

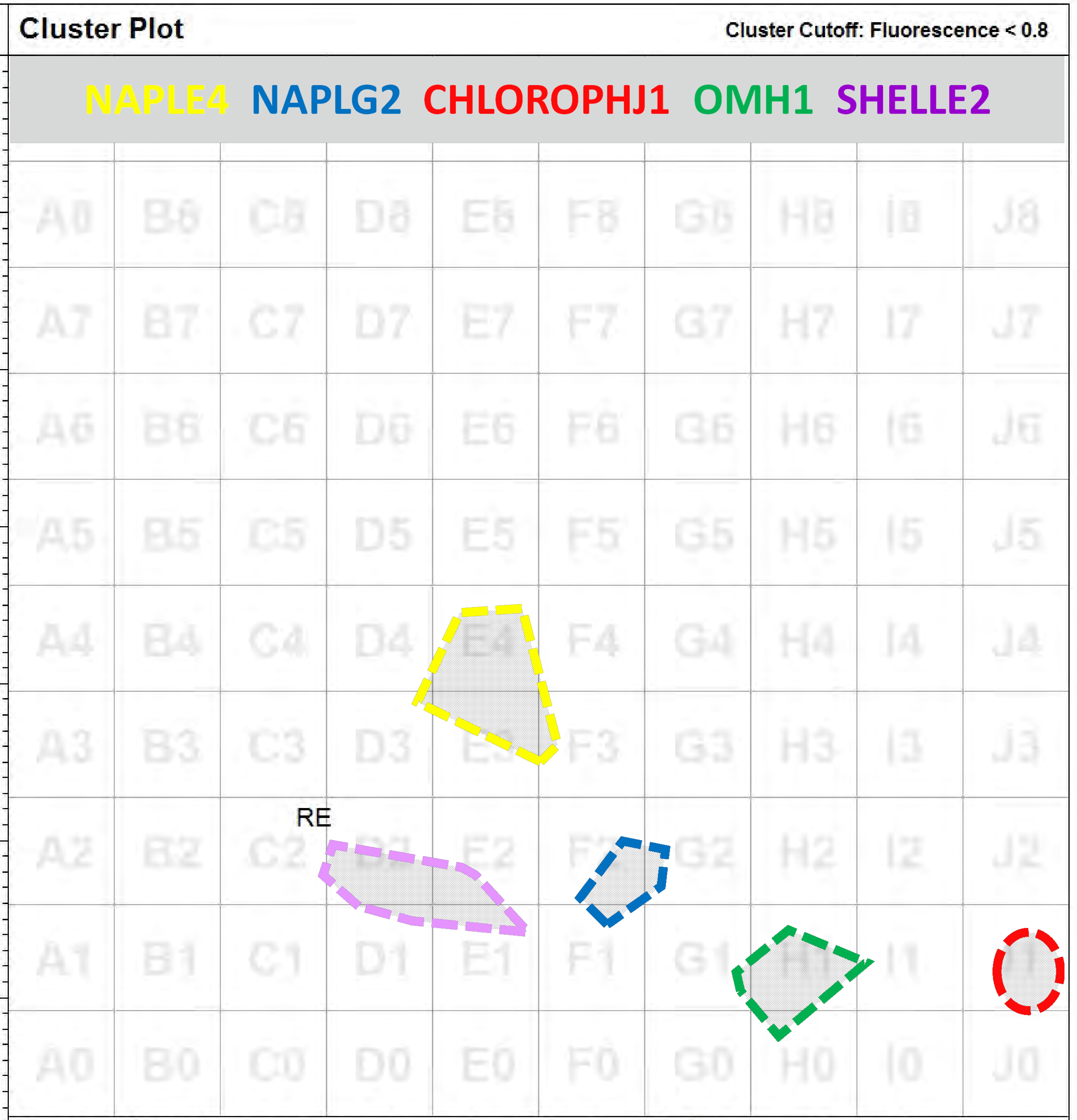
Log: **J000-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-15 13:09 PST**
Client: **Jacobs**	Job:
Final Depth: **11.71 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **1.9 %RE @ 2.54 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **T.Rudolph / TG1807**	Elevation: **Unavailable**

Callouts

0 to 0.4' was logged within the casing





X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

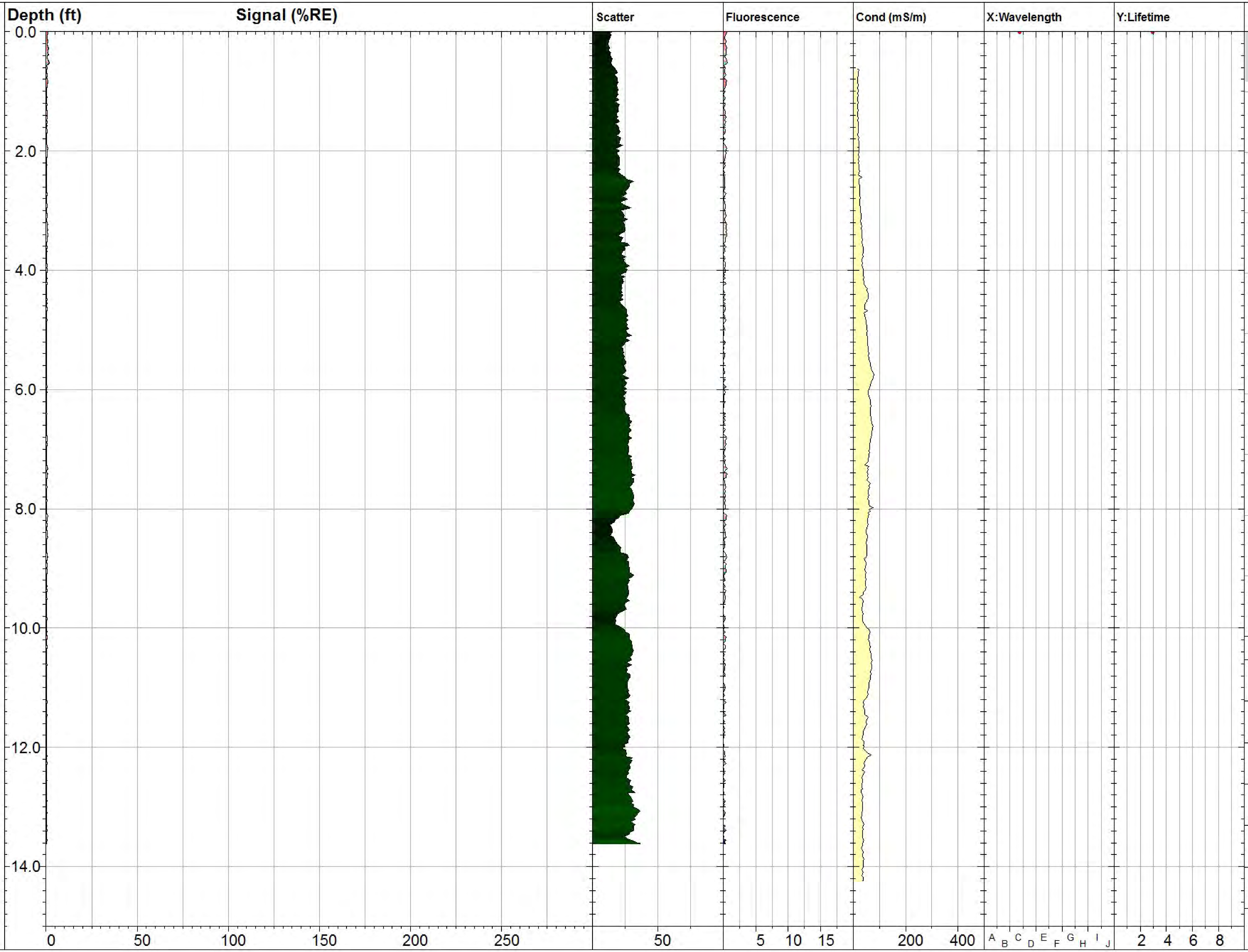
TarGOST® By Dakota

Log: **J060-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-11 11:22 PST**
Client: **Jacobs**	Job:
Final Depth: **16.46 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **1.7 %RE @ 2.73 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**

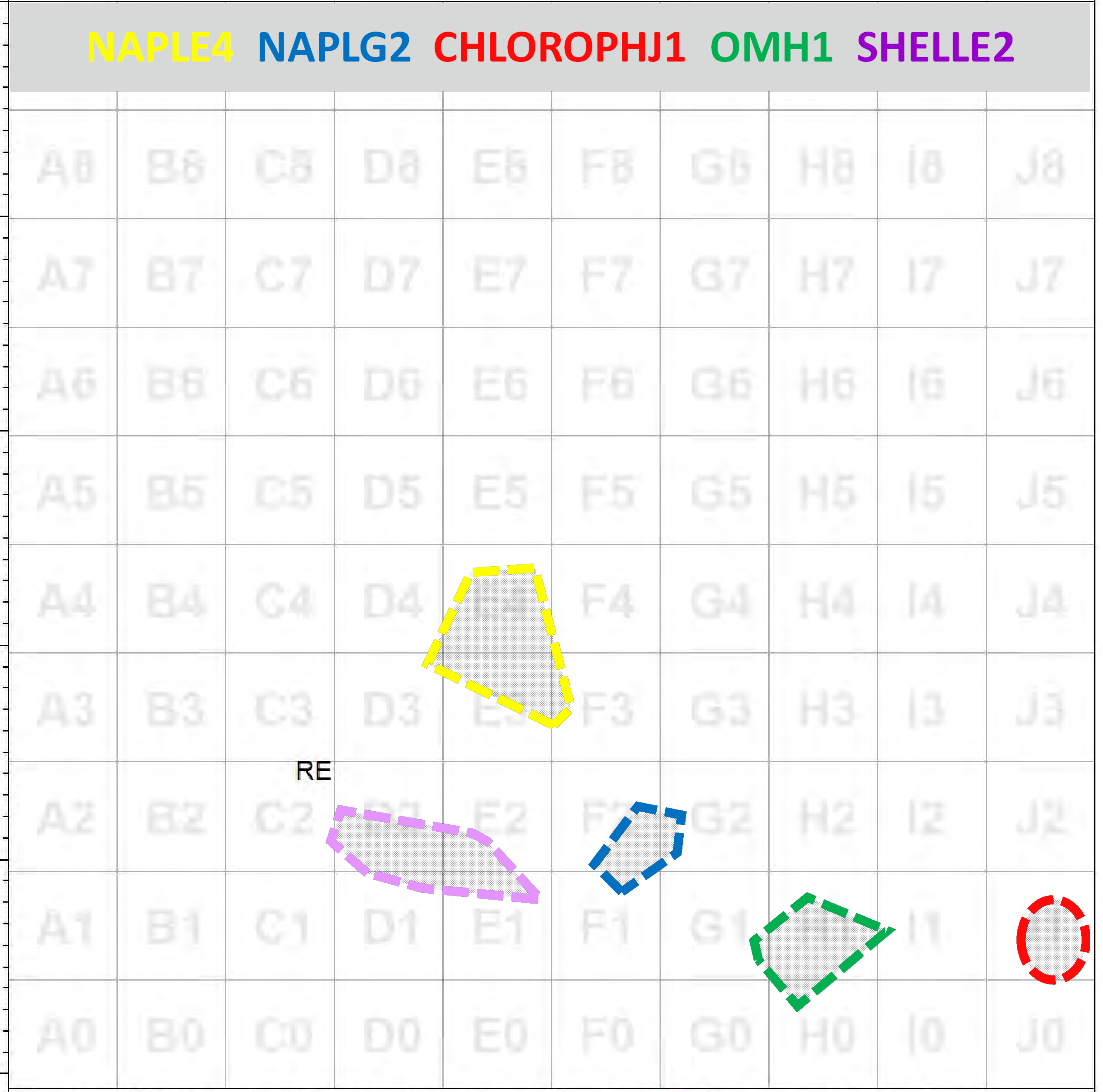
Callouts

0 to 0.25' was logged within the casing



Cluster Plot

Cluster Cutoff: Fluorescence < 0.8



X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

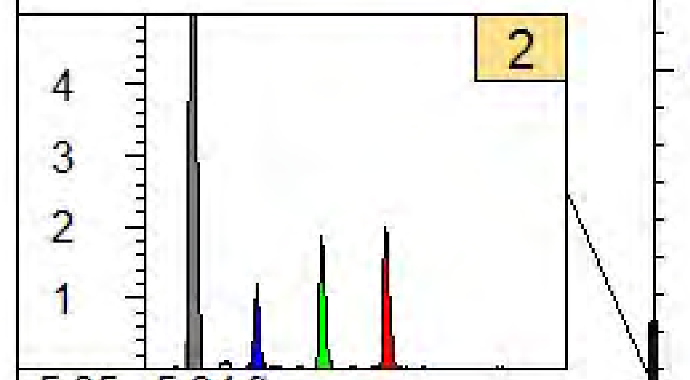
Data Presentation Format © 2023 Dakota Technologies, Inc. (v2.8.1)

Log: **JN040-TG**

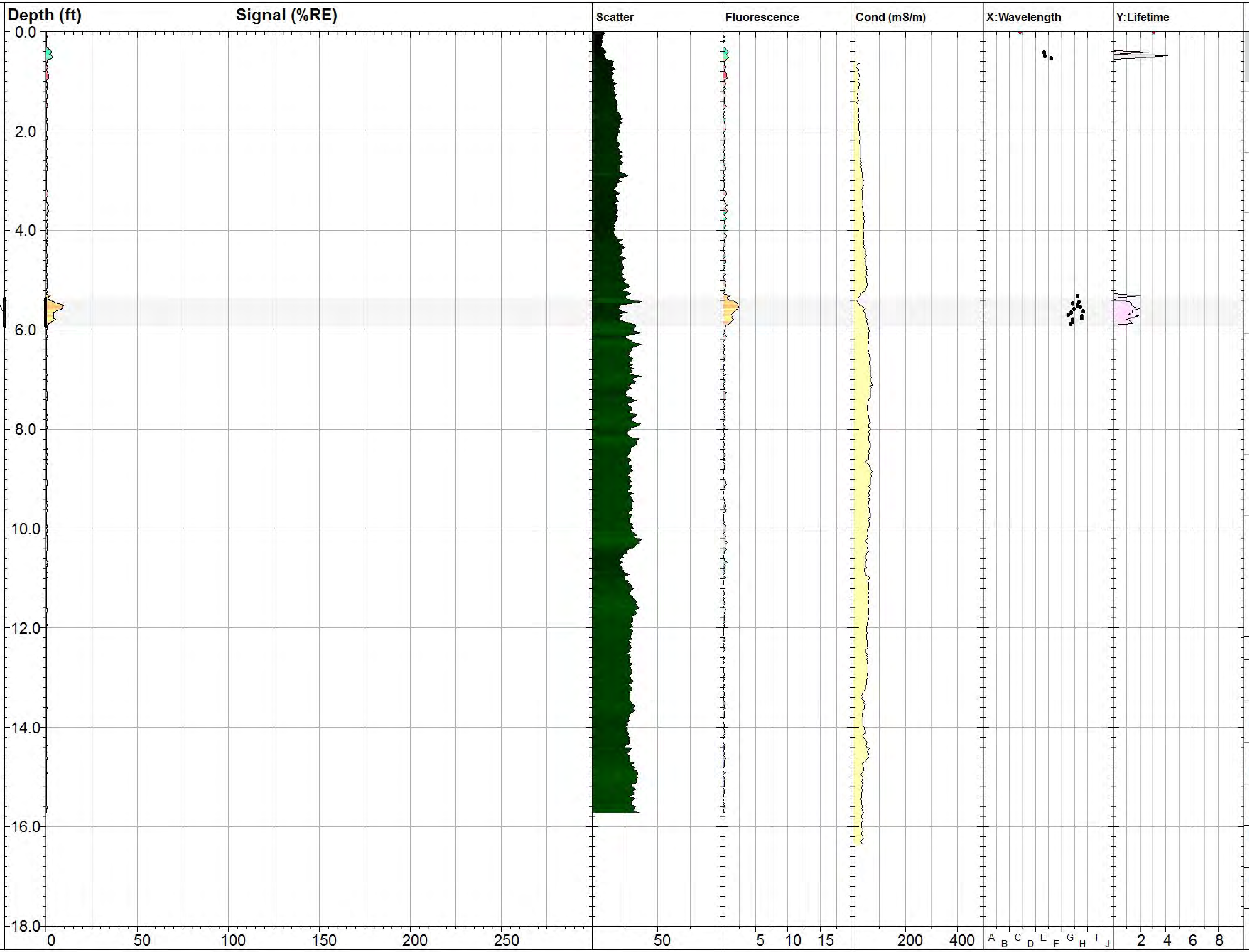
Site: **BNSF Wishram**	Date & Time: **2022-11-11 12:05 PST**
Client: **Jacobs**	Job:
Final Depth: **13.62 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **1.8 %RE @ 0.53 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**

Callouts

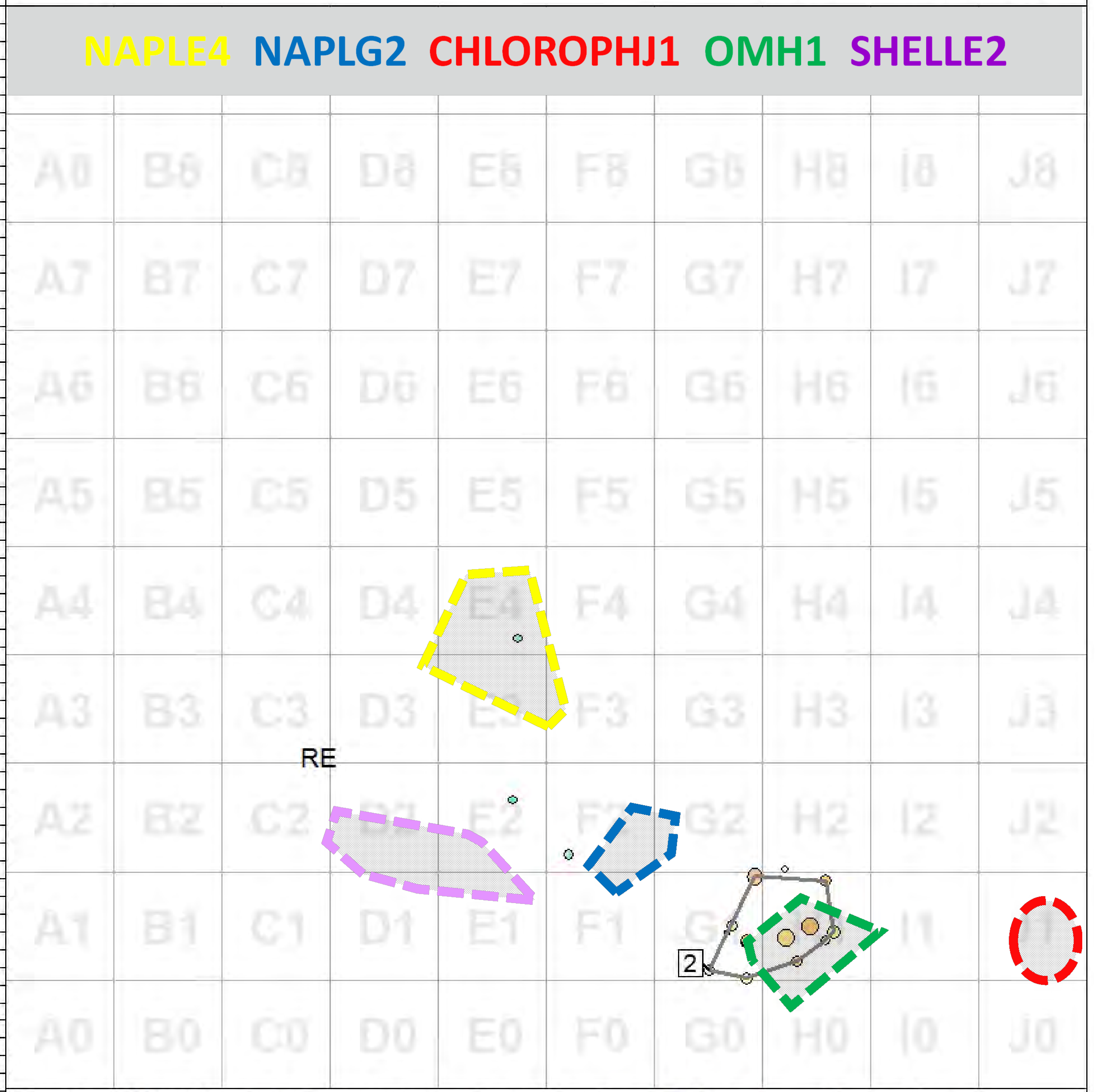
0-1.1' was pushed within the casing



5.35 - 5.94 ft
3.6 %RE (s 2.9)



Cluster Plot Cluster Cutoff: Fluorescence < 0.8

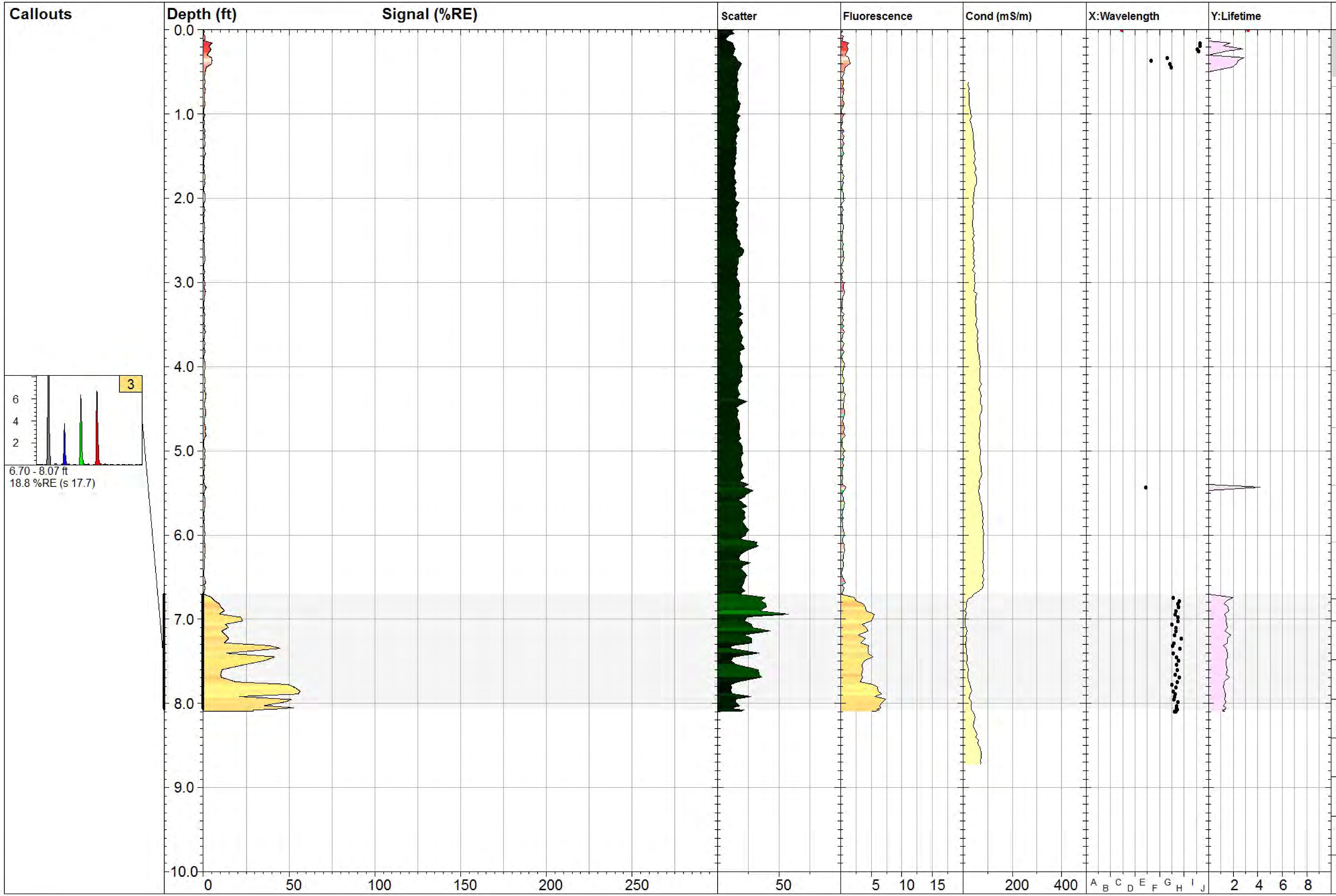


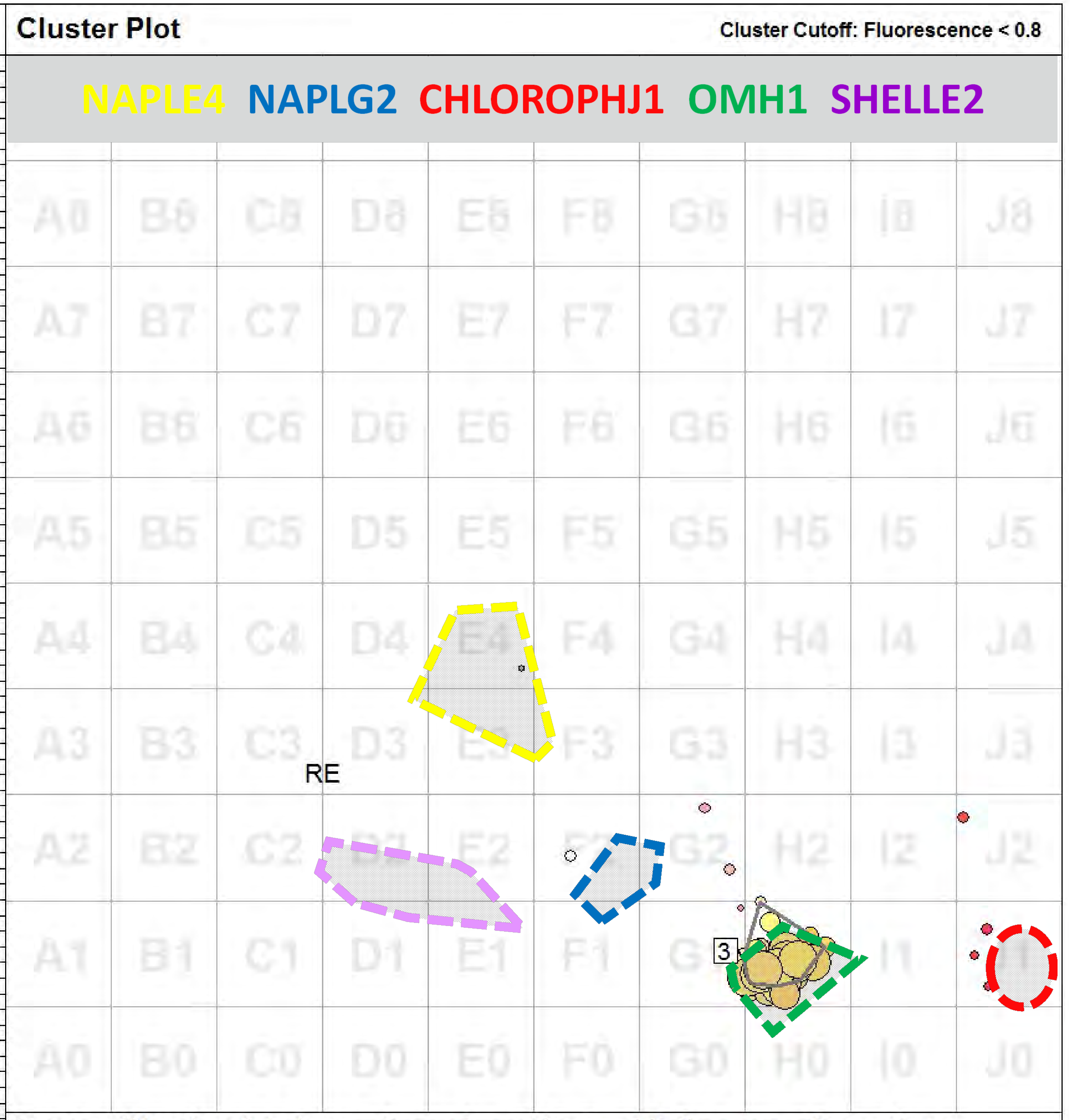
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **JN100-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-14 11:25 PST**
Client: **Jacobs**	Job:
Final Depth: **15.72 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **9.4 %RE @ 5.50 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **T.Rudolph / TG1807**	Elevation: **Unavailable**





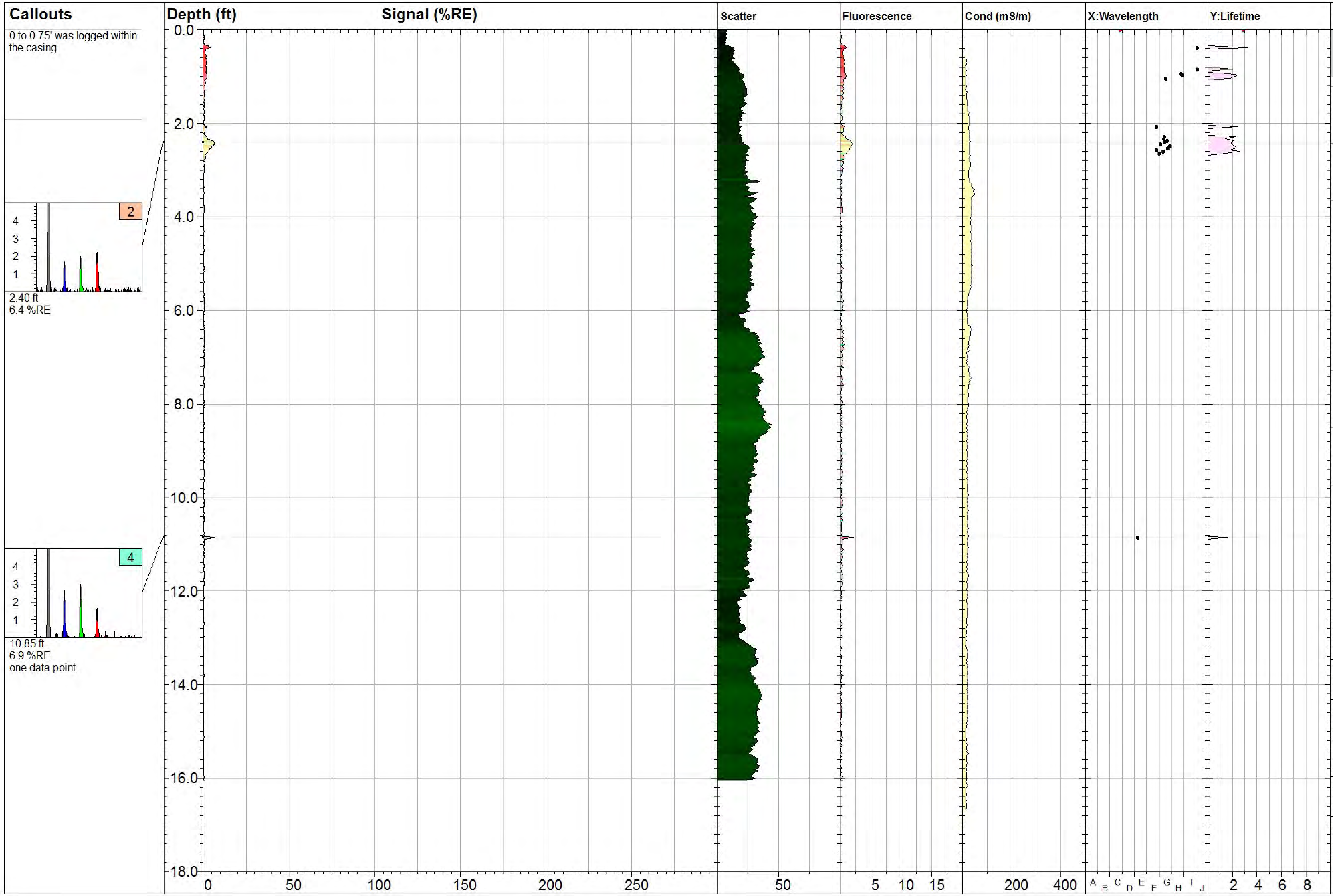
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Data Presentation Format © 2023 Dakota Technologies, Inc. (v2.8.1)

Log: **JN160-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-14 10:51 PST**
Client: **Jacobs**	Job:
Final Depth: **8.09 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **56.6 %RE @ 7.86 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **T.Rudolph / TG1807**	Elevation: **Unavailable**



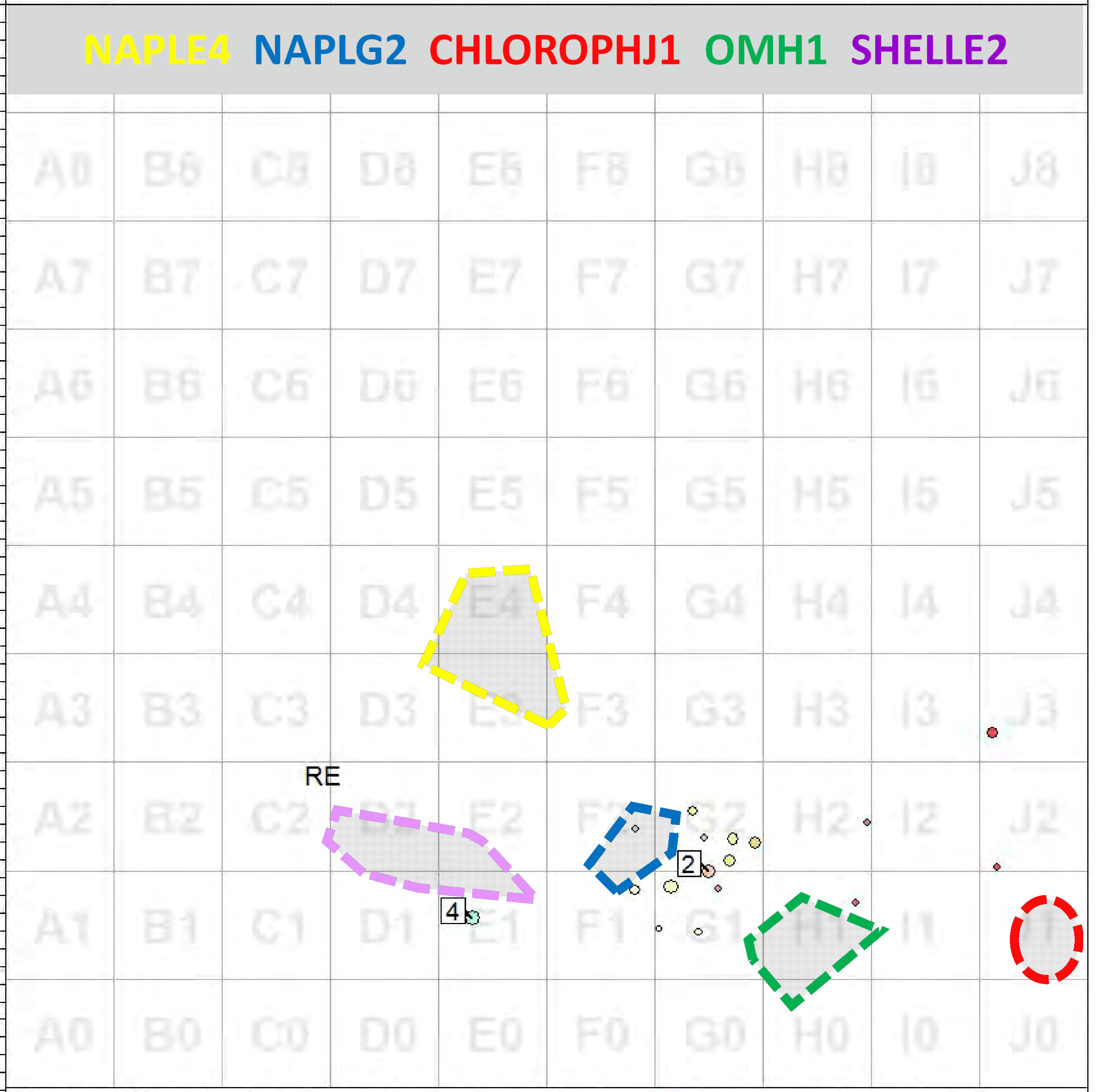
0 to 0.75' was logged within the casing

2.40 ft
6.4 %RE

10.85 ft
6.9 %RE
one data point

Cluster Plot

Cluster Cutoff: Fluorescence < 0.8



X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

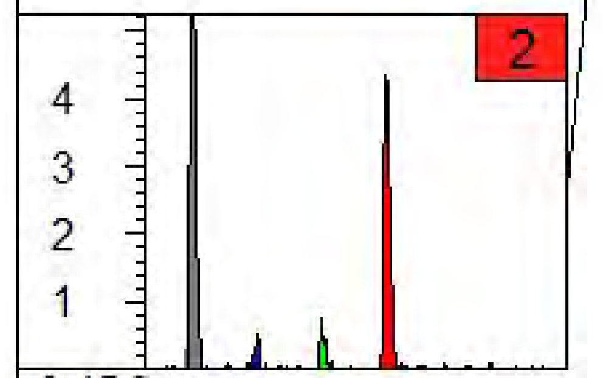
Data Presentation Format © 2023 Dakota Technologies, Inc. (v2.8.1)

Log: **K160-TG**

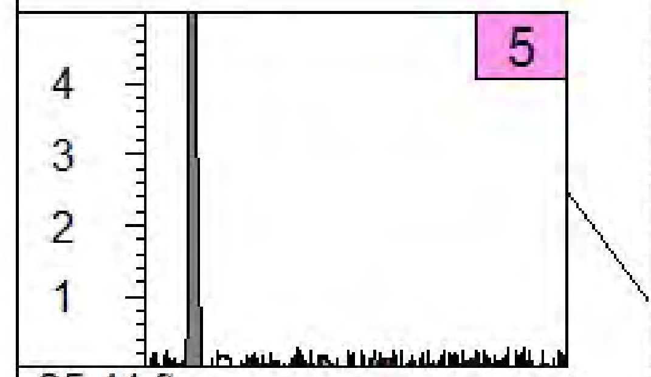
Site: **BNSF Wishram**	Date & Time: **2022-11-11 10:22 PST**
Client: **Jacobs**	Job:
Final Depth: **16.04 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **6.9 %RE @ 10.85 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**

Callouts

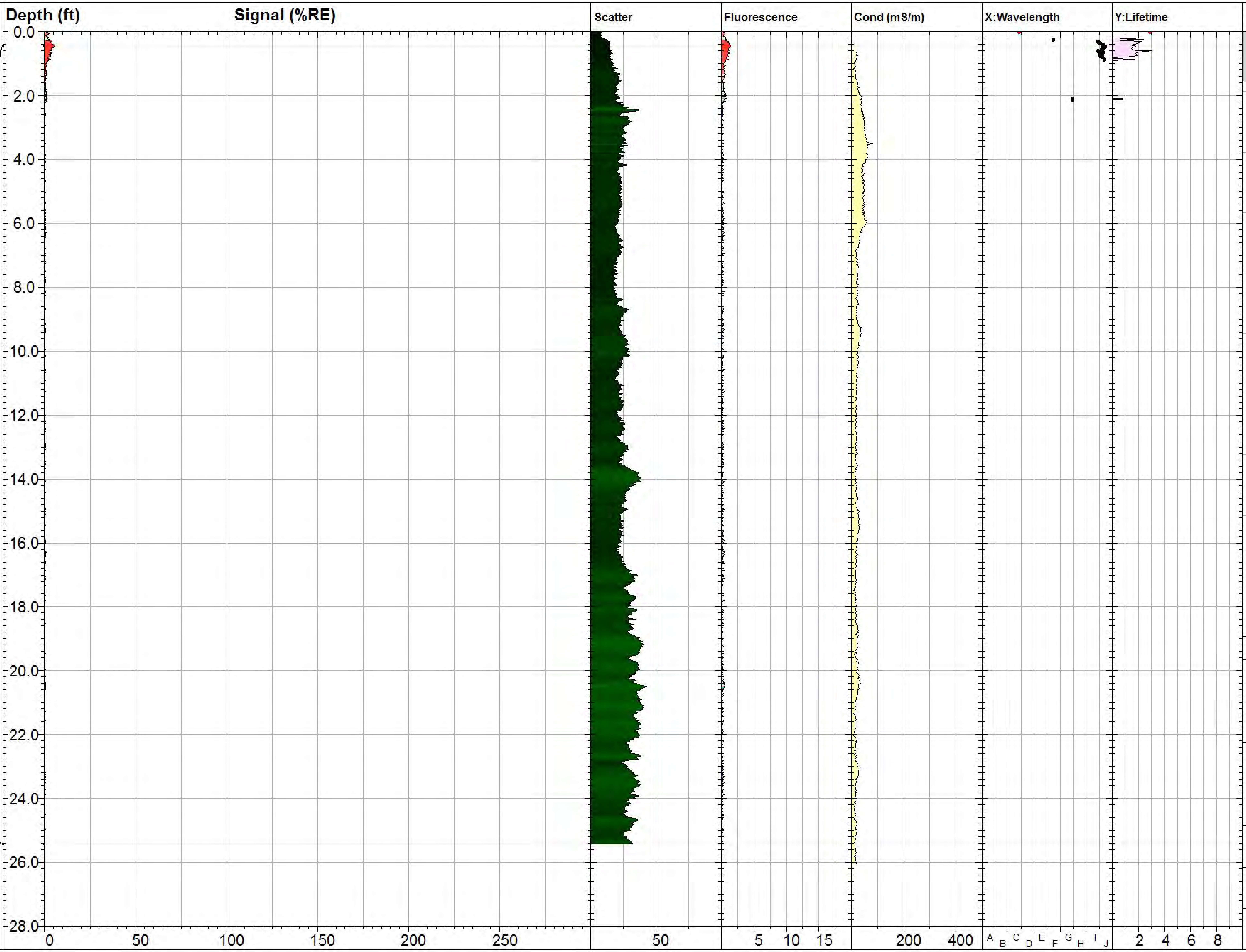
0 to 0.6' was logged within the casing



0.45 ft
5.5 %RE
chlorophyll

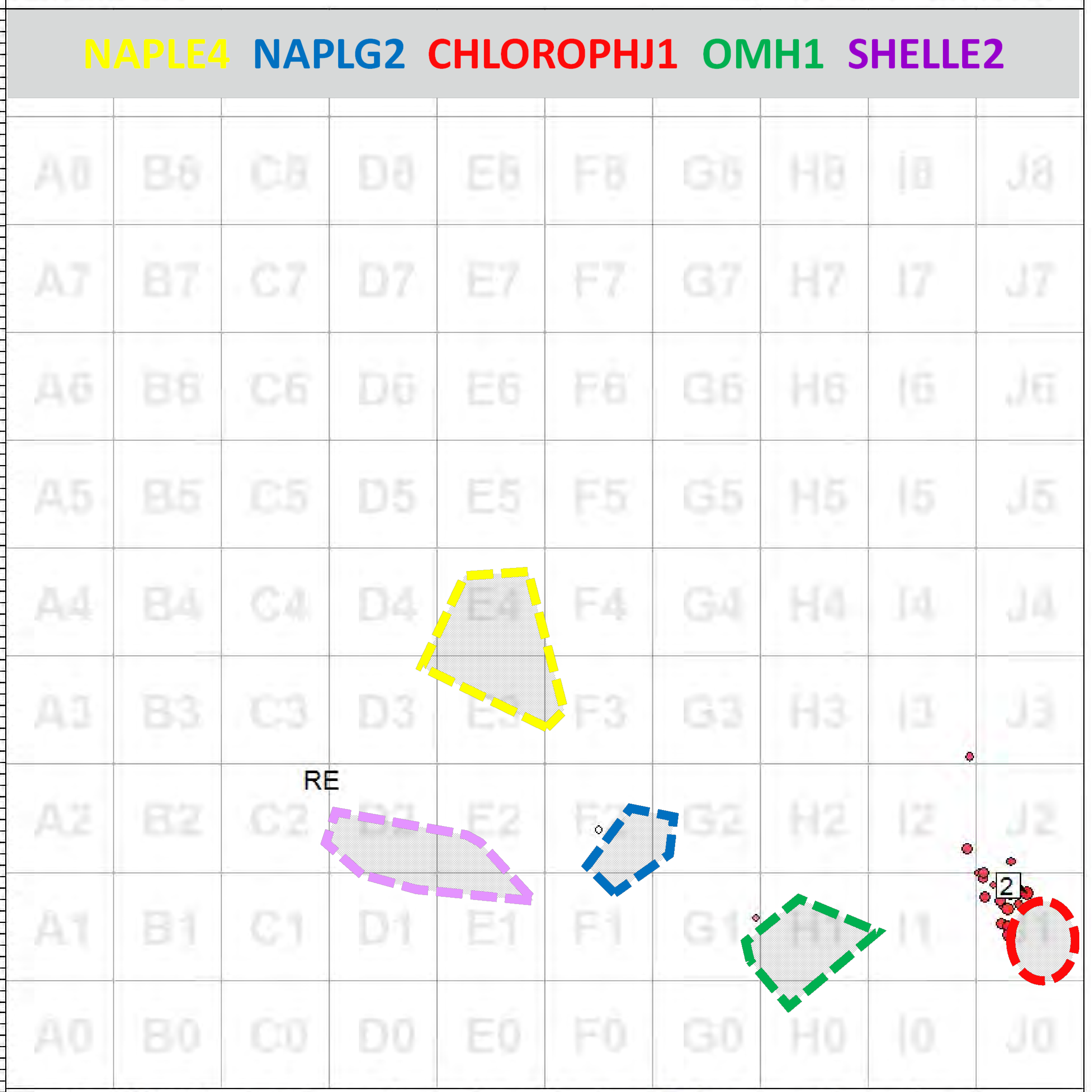


25.41 ft
0.2 %RE
refusal



Cluster Plot

Cluster Cutoff: Fluorescence < 0.8

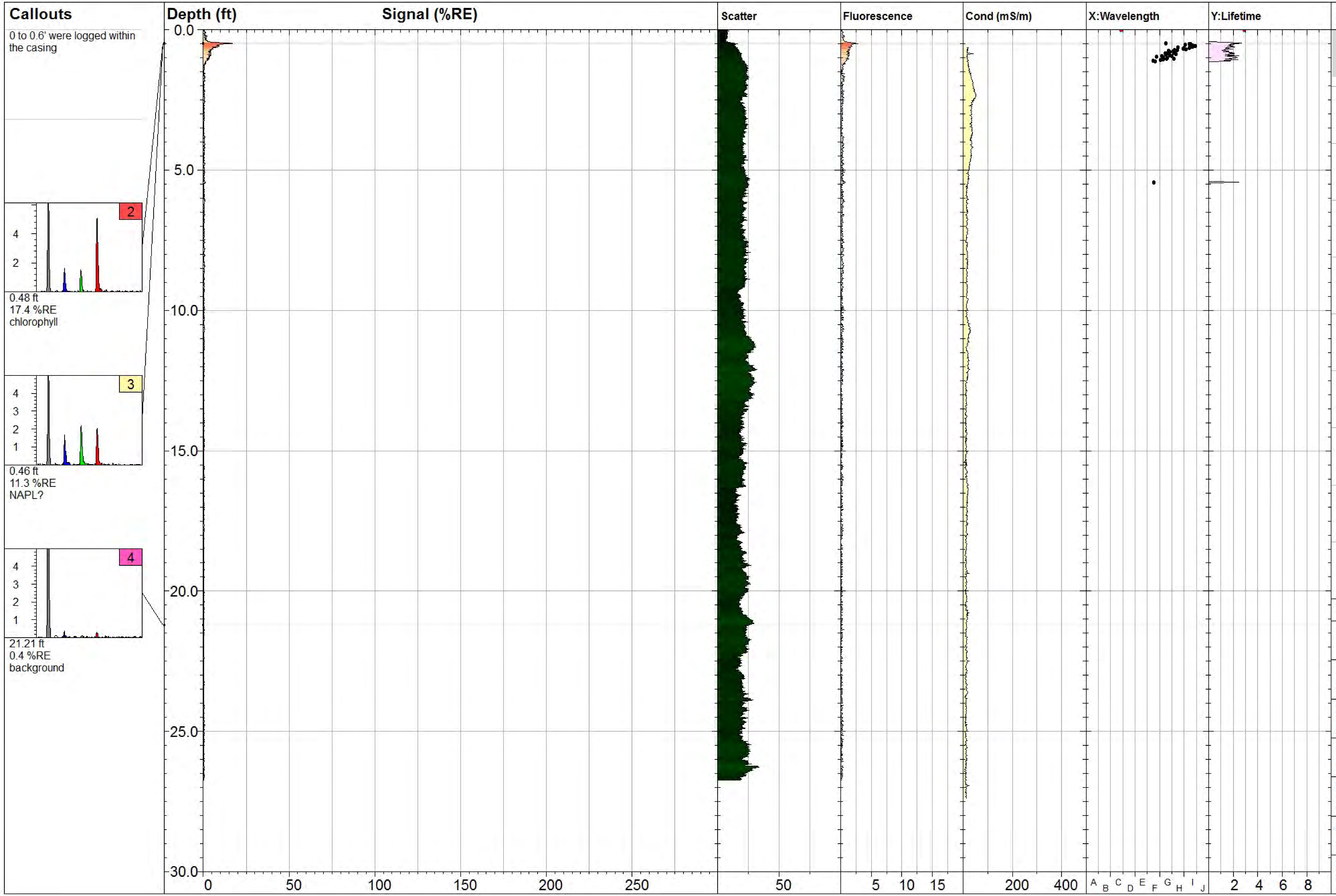


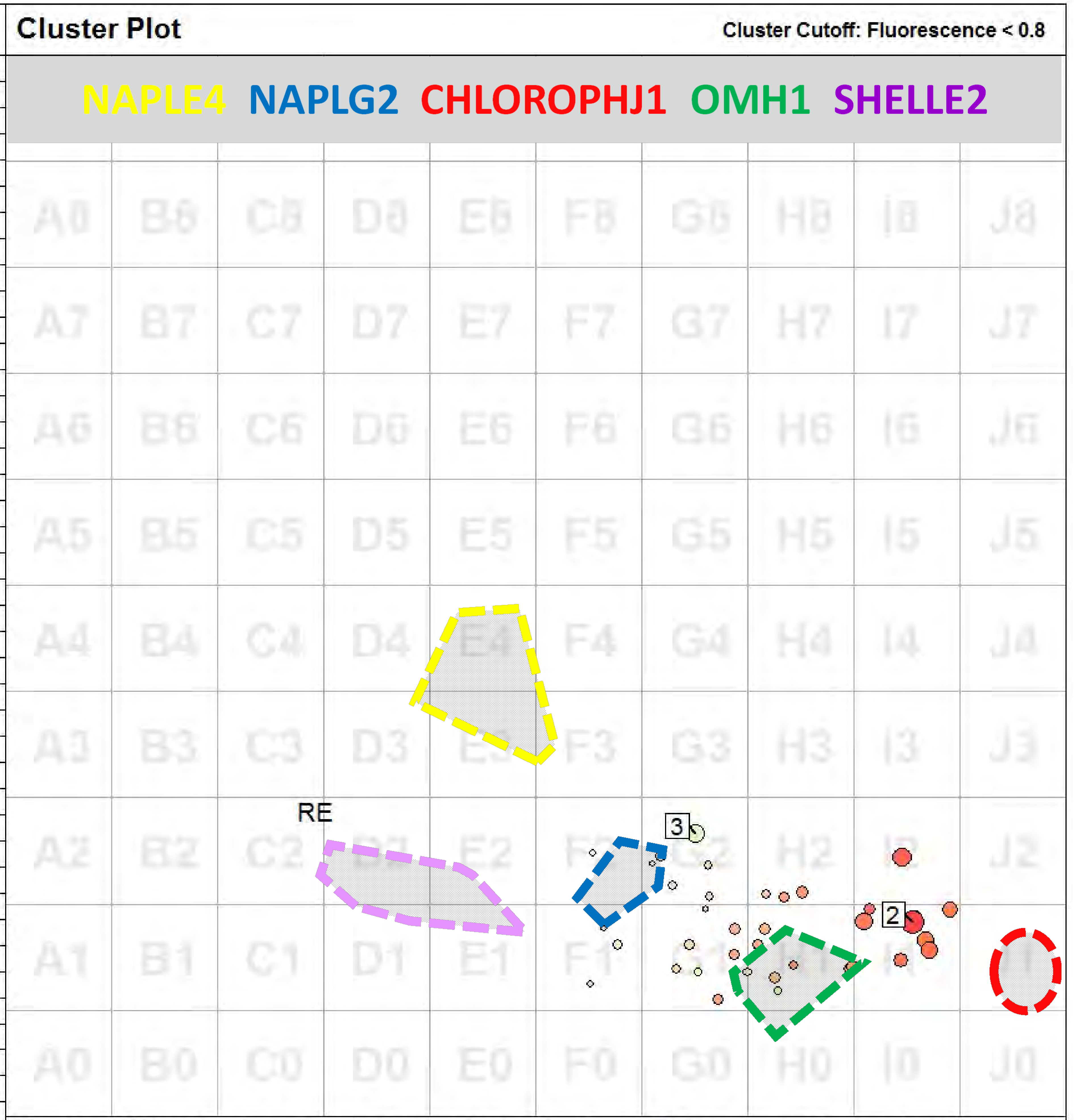
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **K200-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-06 13:21 PST**
Client: **Jacobs**	Job:
Final Depth: **25.41 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **5.7 %RE @ 0.42 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**





X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

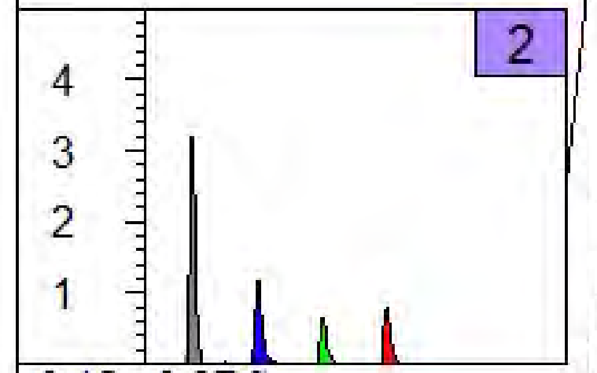
TarGOST® By Dakota

Log: **K280-TG**

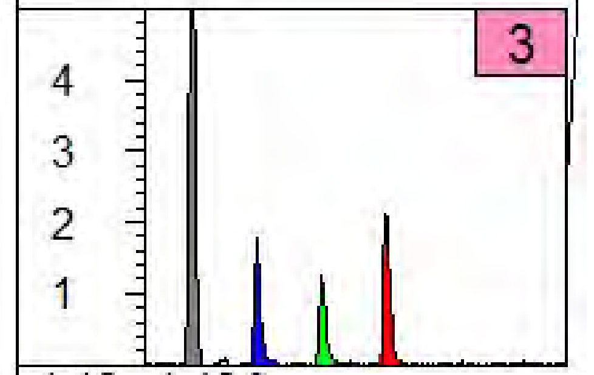
Site: **BNSF Wishram**	Date & Time: **2022-11-06 10:43 PST**
Client: **Jacobs**	Job:
Final Depth: **26.74 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **17.4 %RE @ 0.48 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**

Callouts

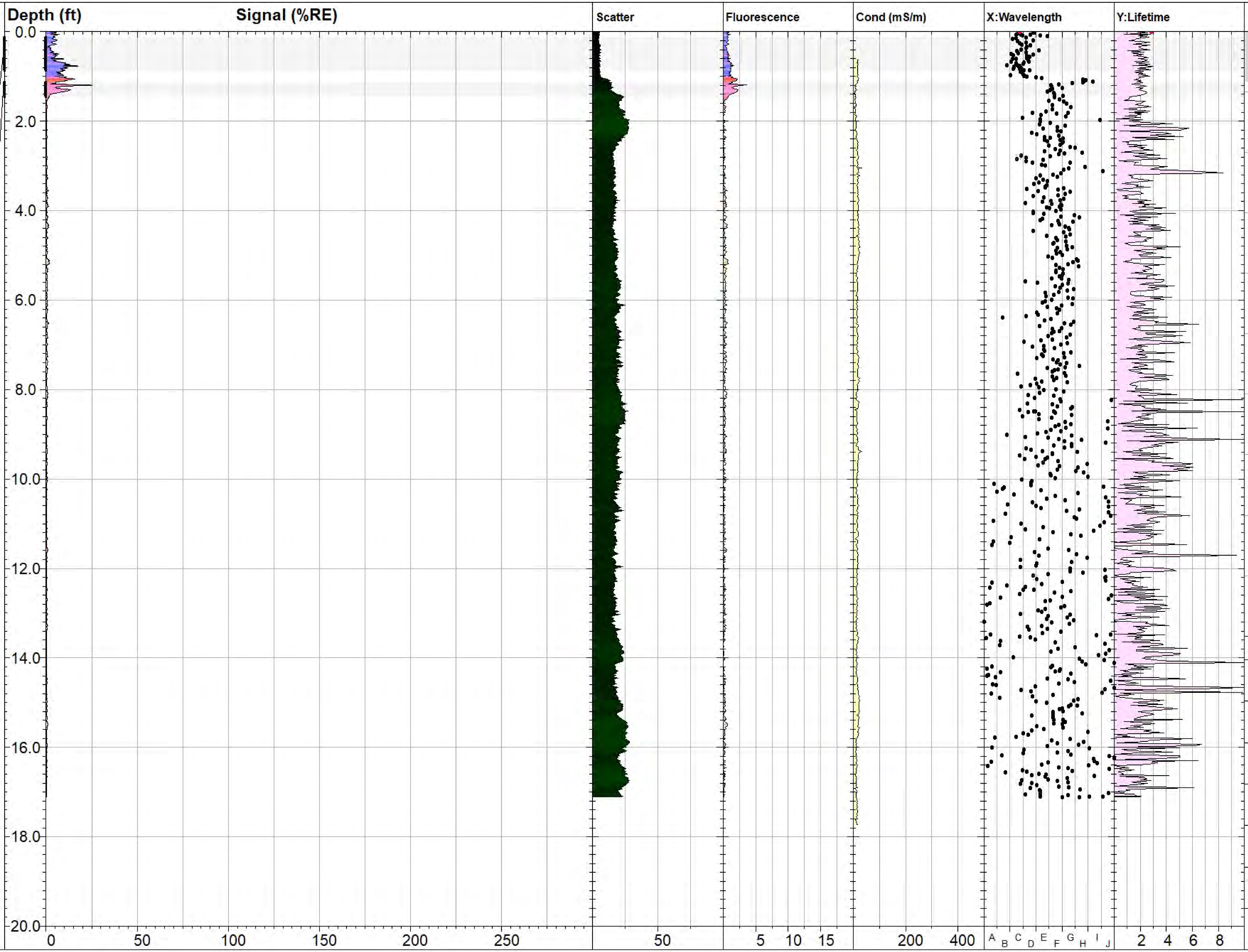
0 to 1.1' was logged within the casing



0.12 - 0.87 ft
5.8 %RE (s 3.8)

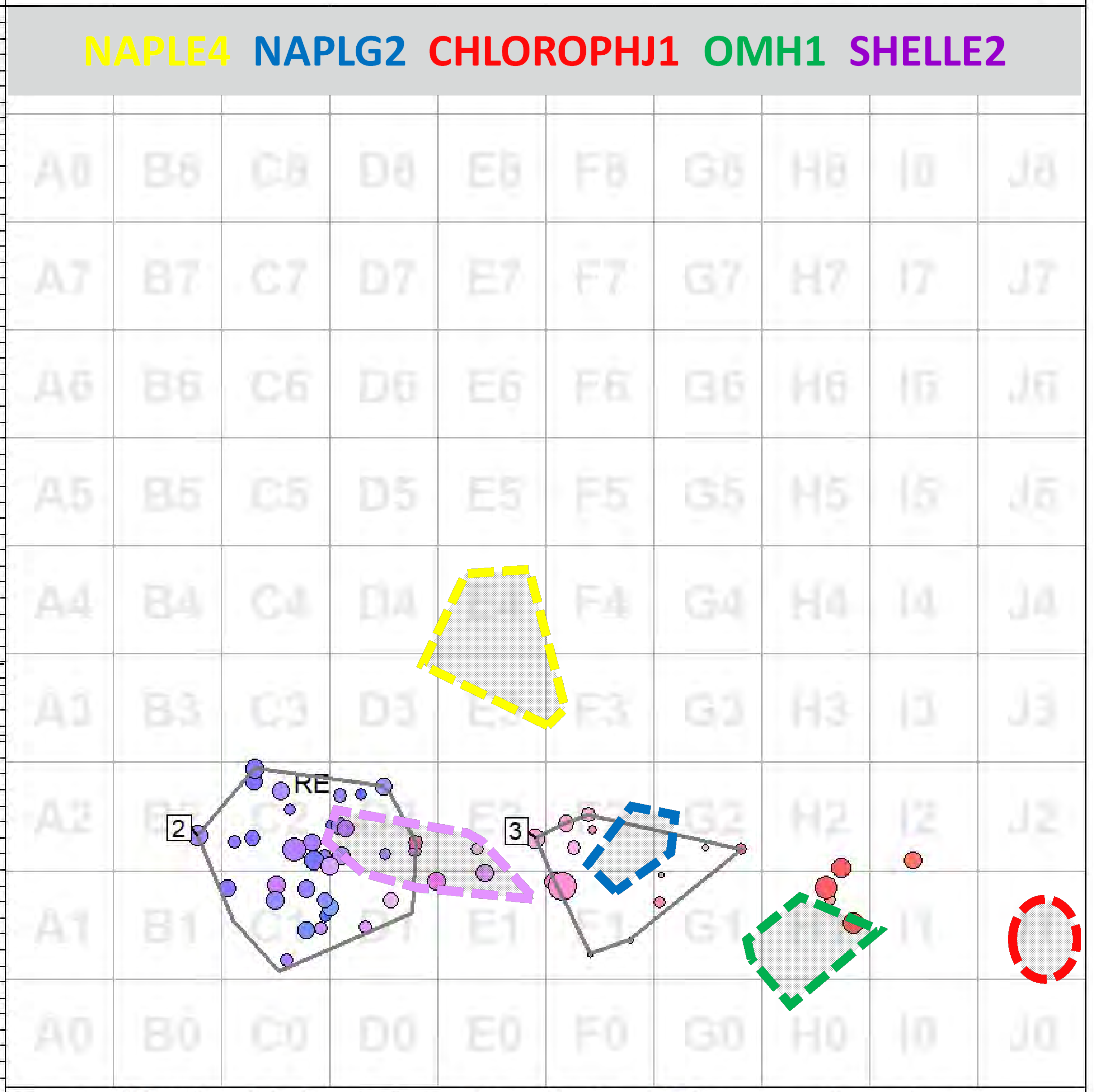


1.12 - 1.46 ft
6.4 %RE (s 6.6)



Cluster Plot

Cluster Cutoff: Fluorescence < 0.8



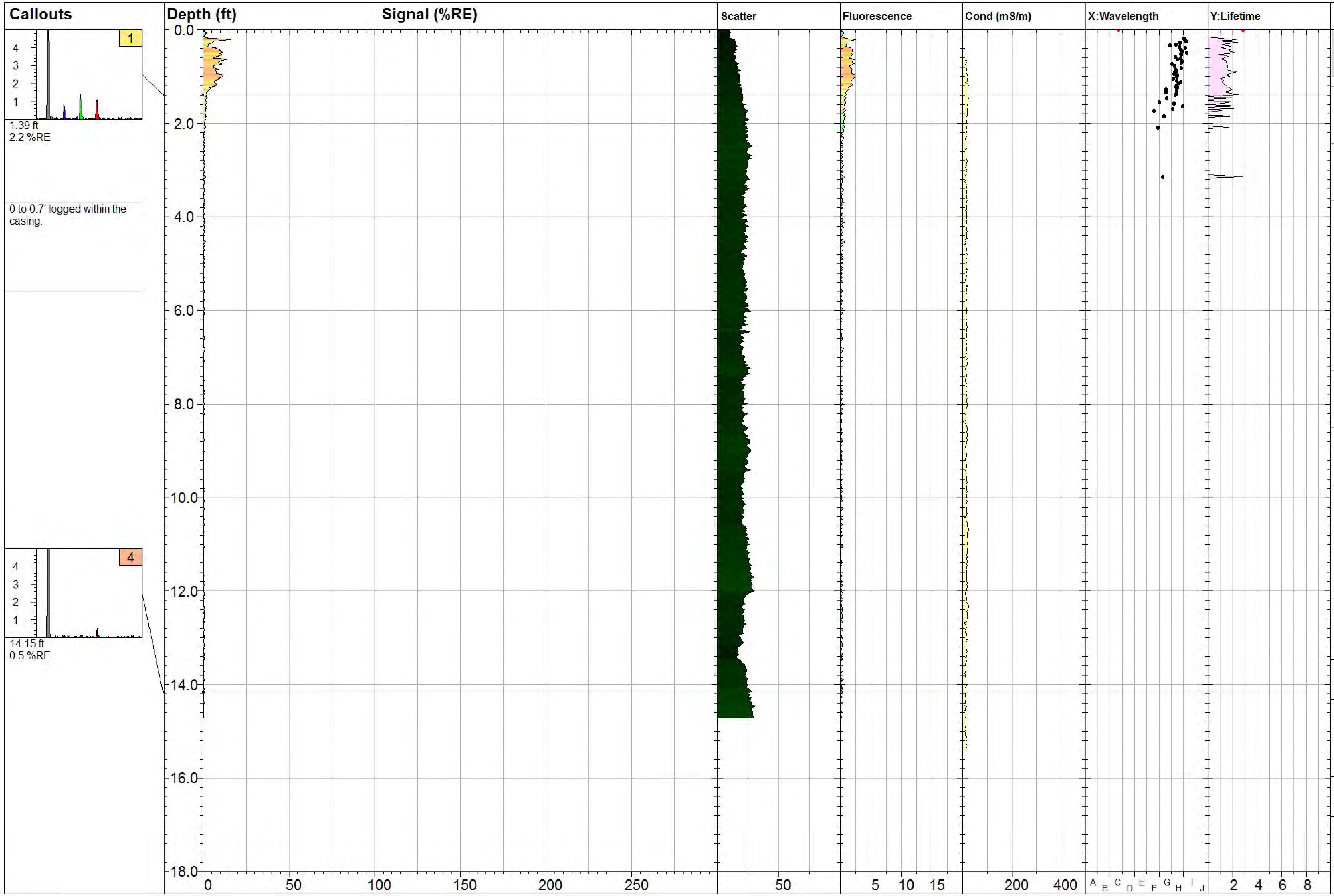
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Data Presentation Format © 2023 Dakota Technologies, Inc. (v2.8.2)

Log: **K360-TG**

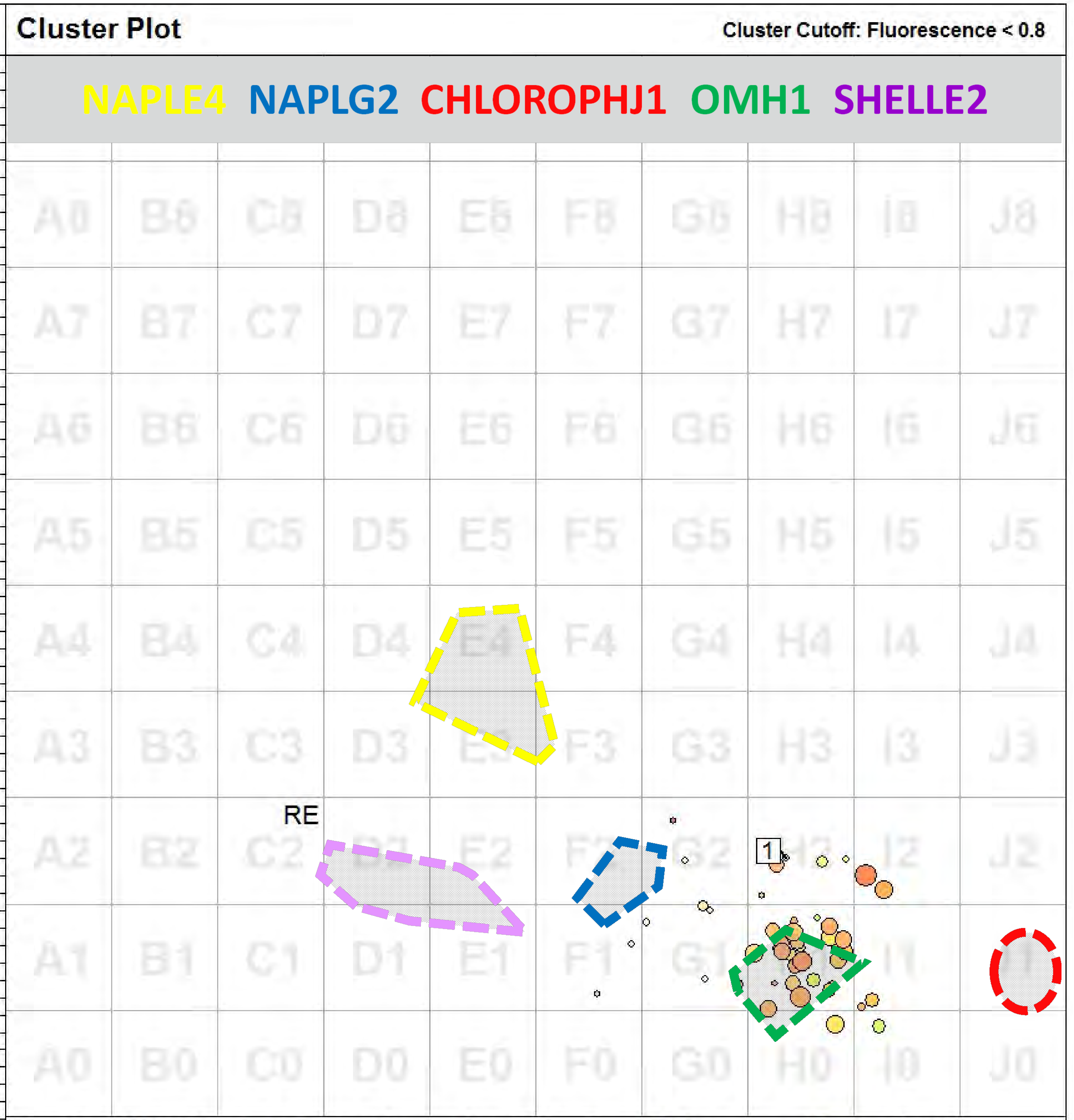
Site: **BNSF Wishram**	Date & Time: **2022-11-07 10:36 PST**
Client: **Jacobs**	Job:
Final Depth: **17.11 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **25.7 %RE @ 1.19 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**



1.39 ft
2.2 %RE

0 to 0.7' logged within the casing.

14.15 ft
0.5 %RE

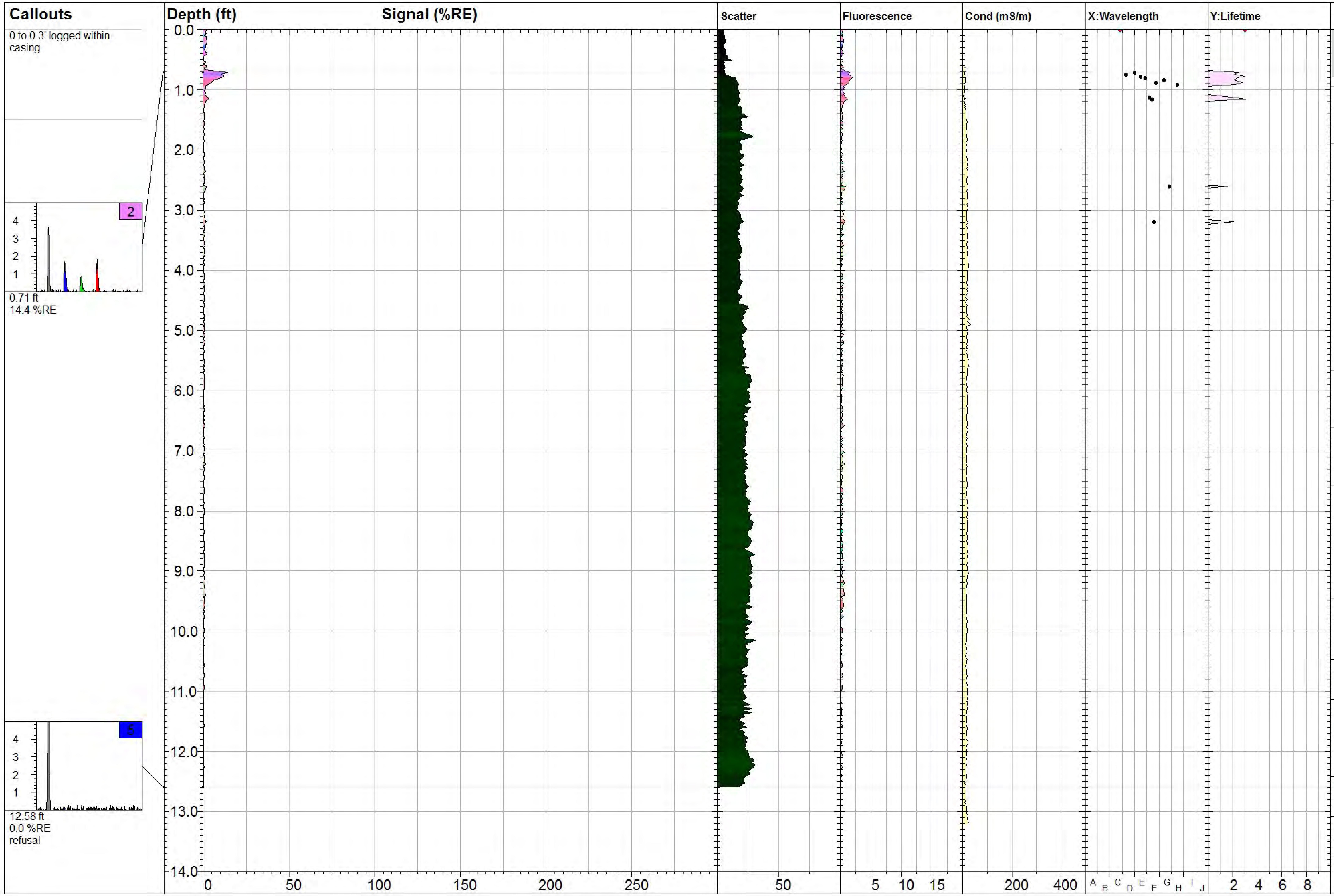


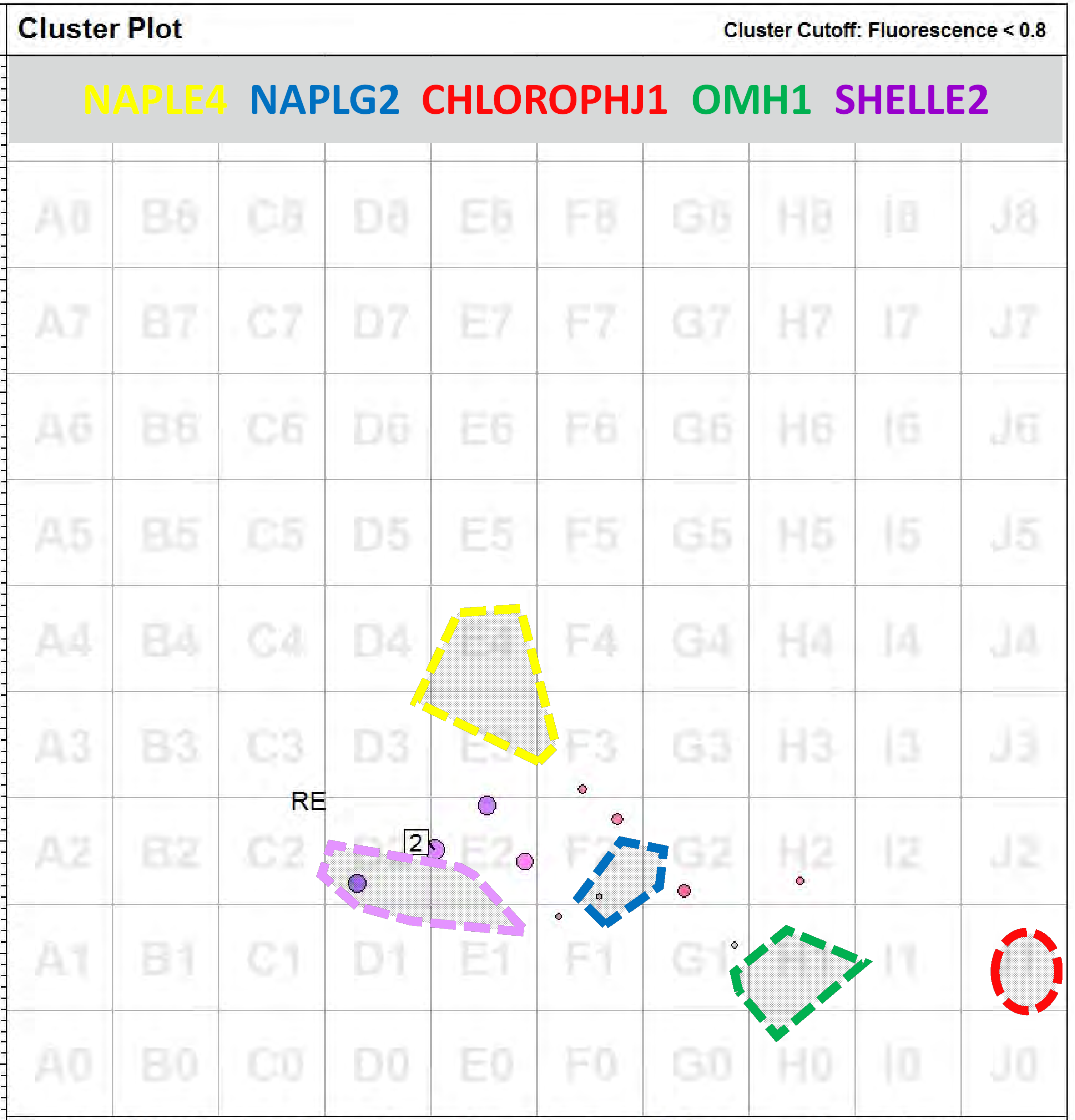
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **K400-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-07 14:12 PST**
Client: **Jacobs**	Job:
Final Depth: **14.71 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **16.0 %RE @ 0.21 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**





X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

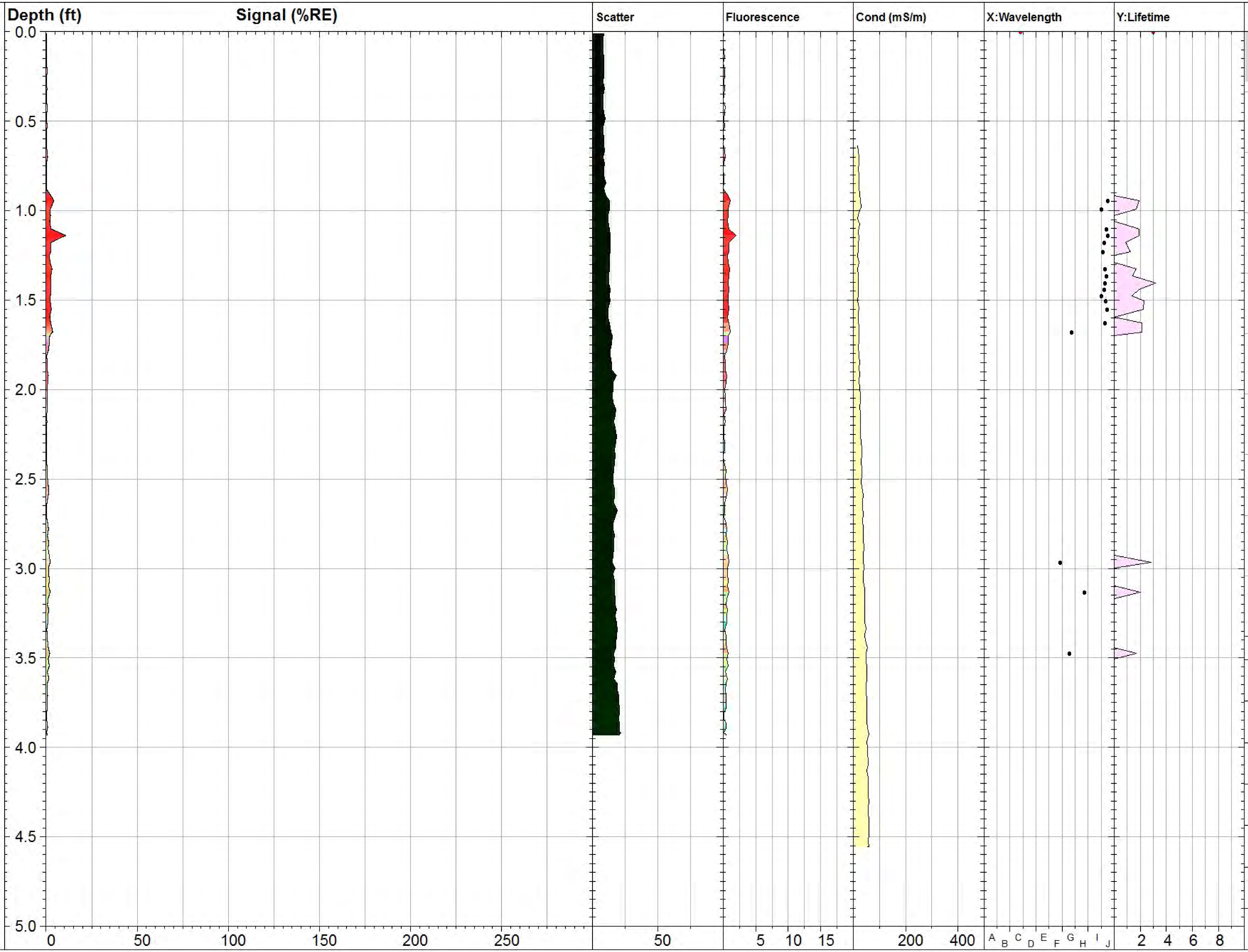
TarGOST® By Dakota

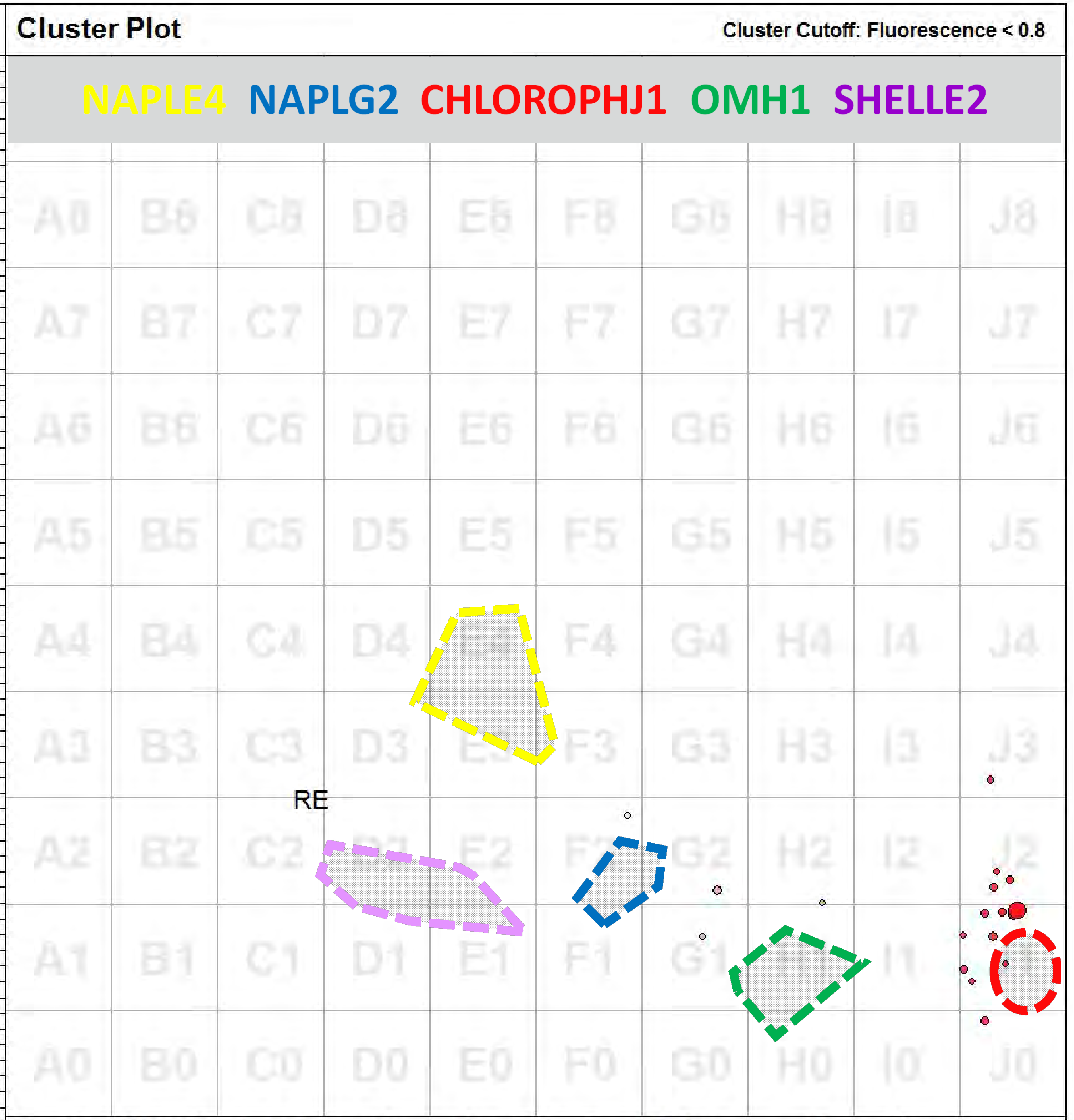
Log: **K440-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-11 09:25 PST**
Client: **Jacobs**	Job:
Final Depth: **12.58 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **14.4 %RE @ 0.71 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**

Callouts

0-.85' pushede within the casing



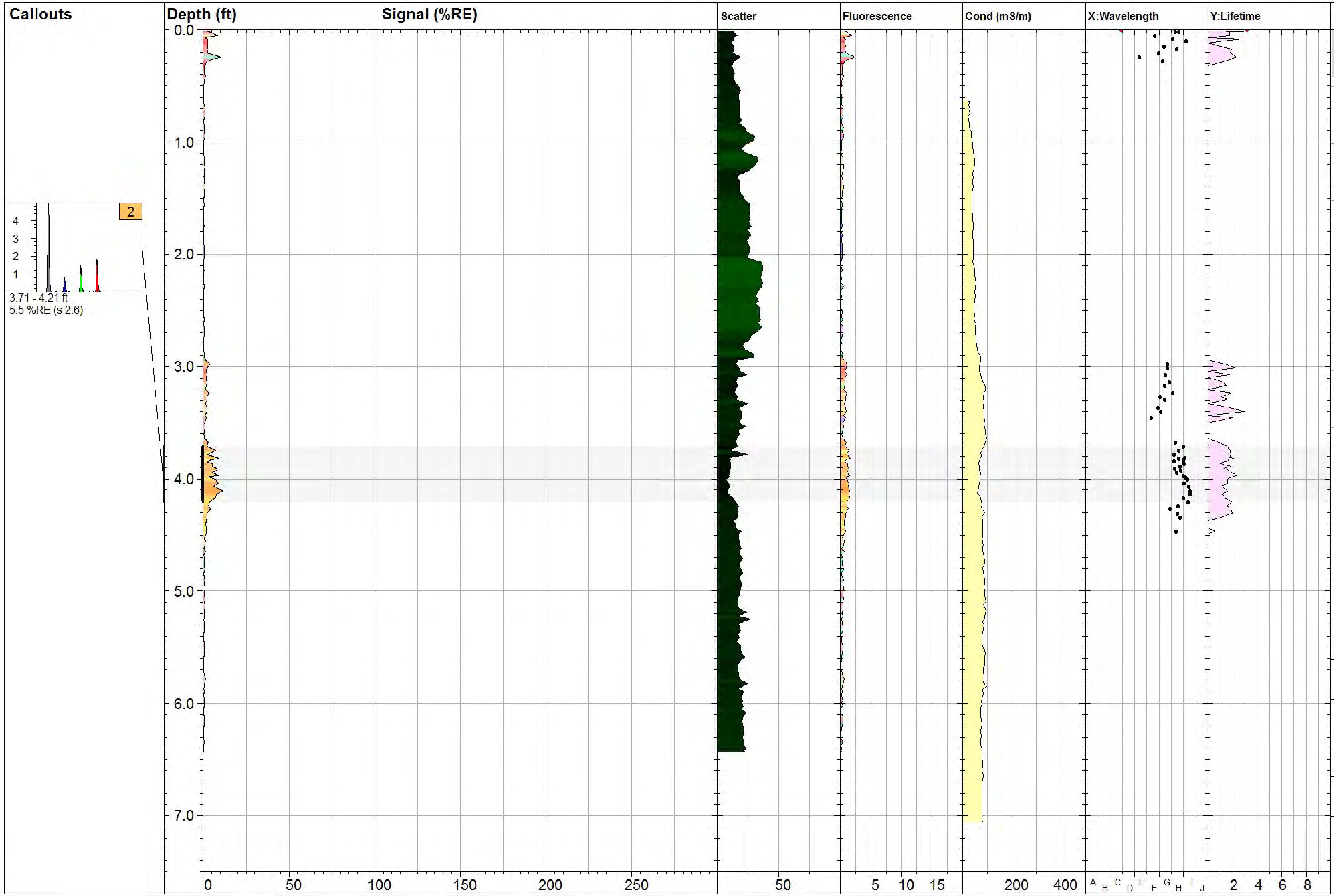


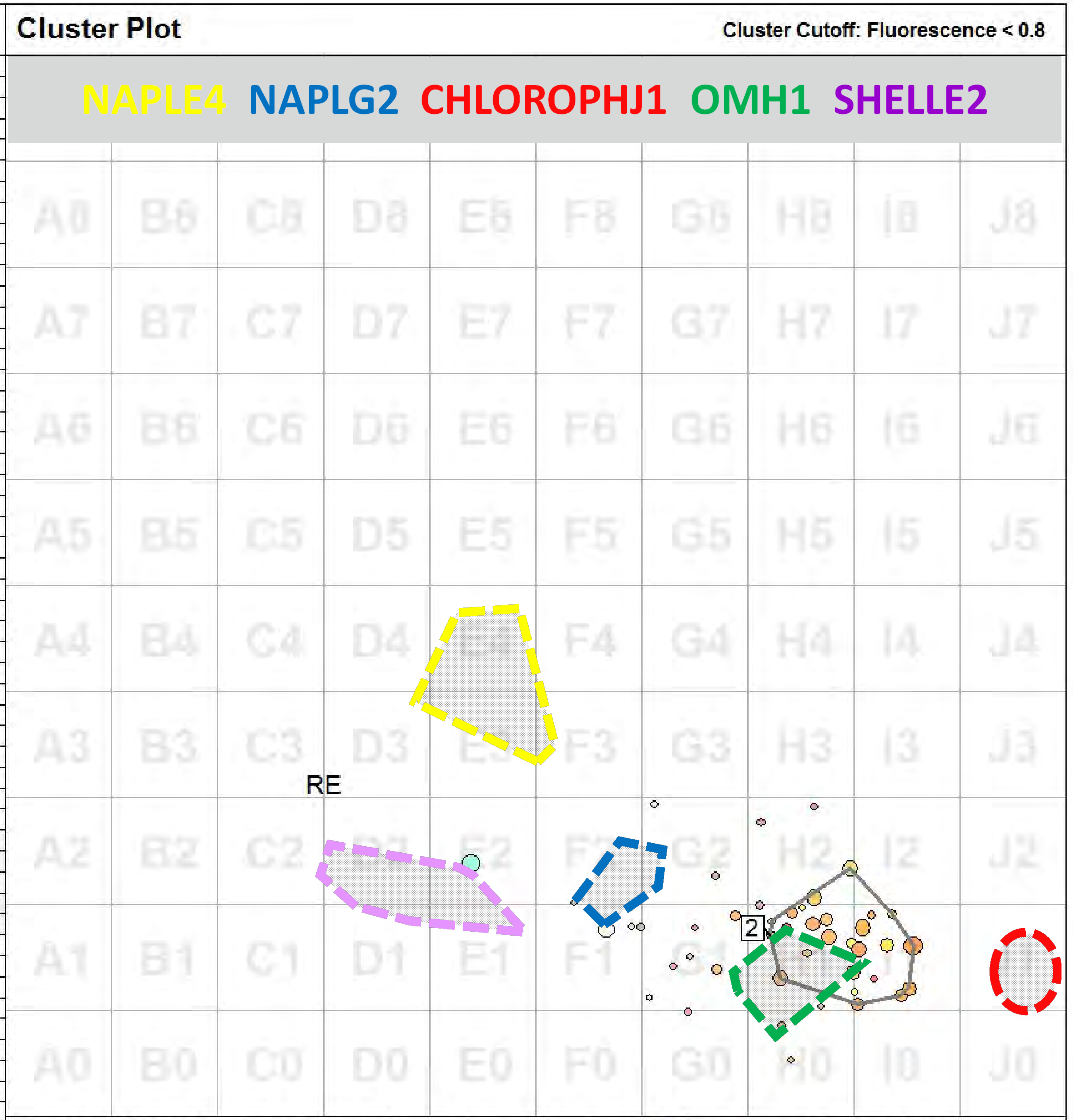
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **KN220-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-14 12:50 PST**
Client: **Jacobs**	Job:
Final Depth: **3.93 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **10.6 %RE @ 1.14 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **T.Rudolph / TG1807**	Elevation: **Unavailable**





X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

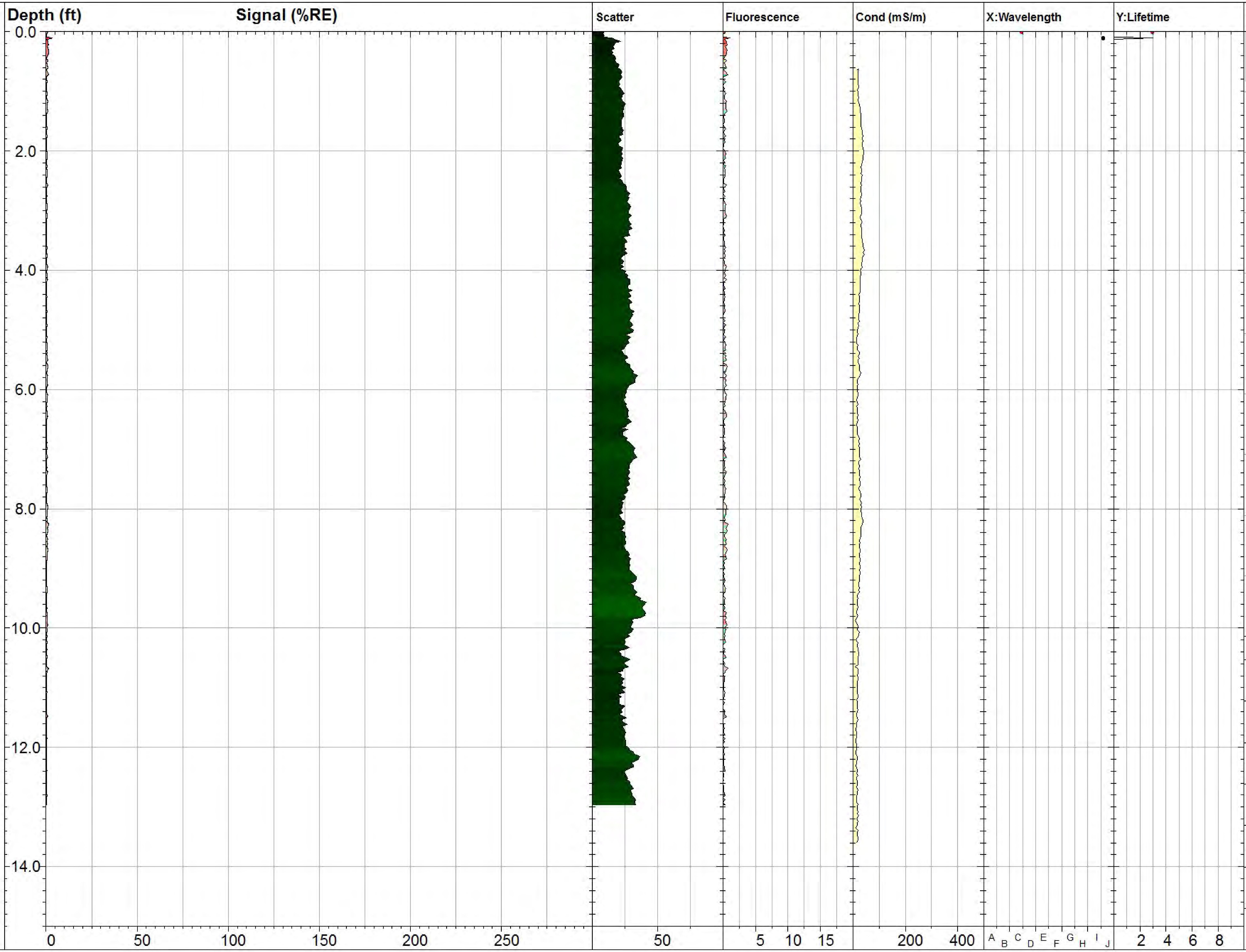
TarGOST® By Dakota

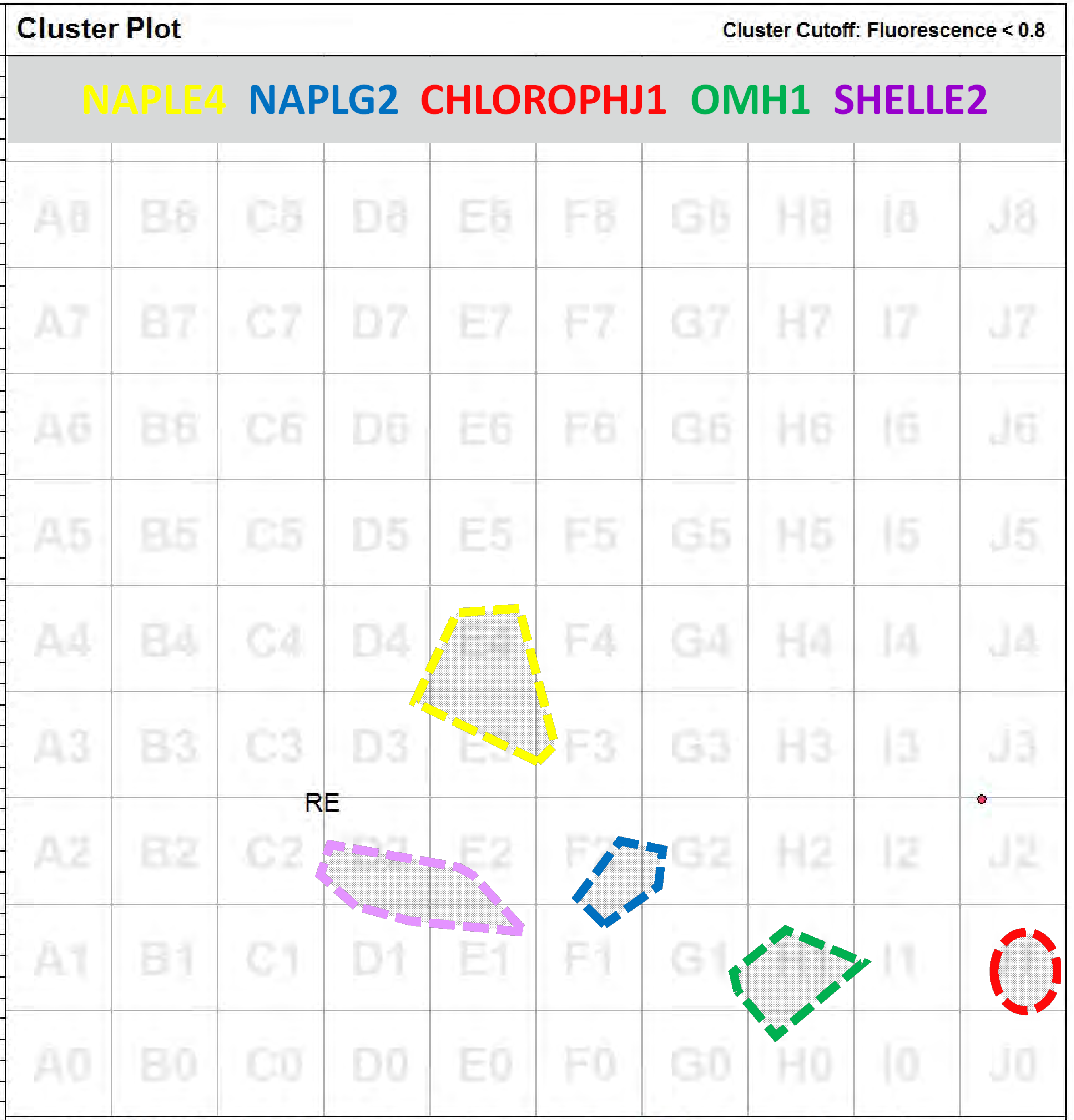
Log: **KN280-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-15 11:25 PST**
Client: **Jacobs**	Job:
Final Depth: **6.43 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **11.3 %RE @ 4.11 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **T.Rudolph / TG1807**	Elevation: **Unavailable**

Callouts

0 t0 .3' pushed inside the casing





X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

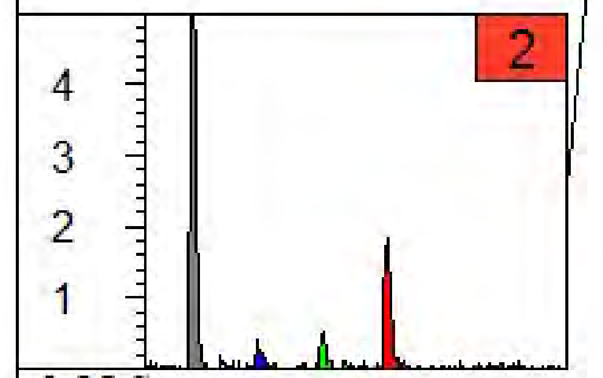
Data Presentation Format © 2023 Dakota Technologies, Inc. (v2.8.1)

Log: **L120-TG**

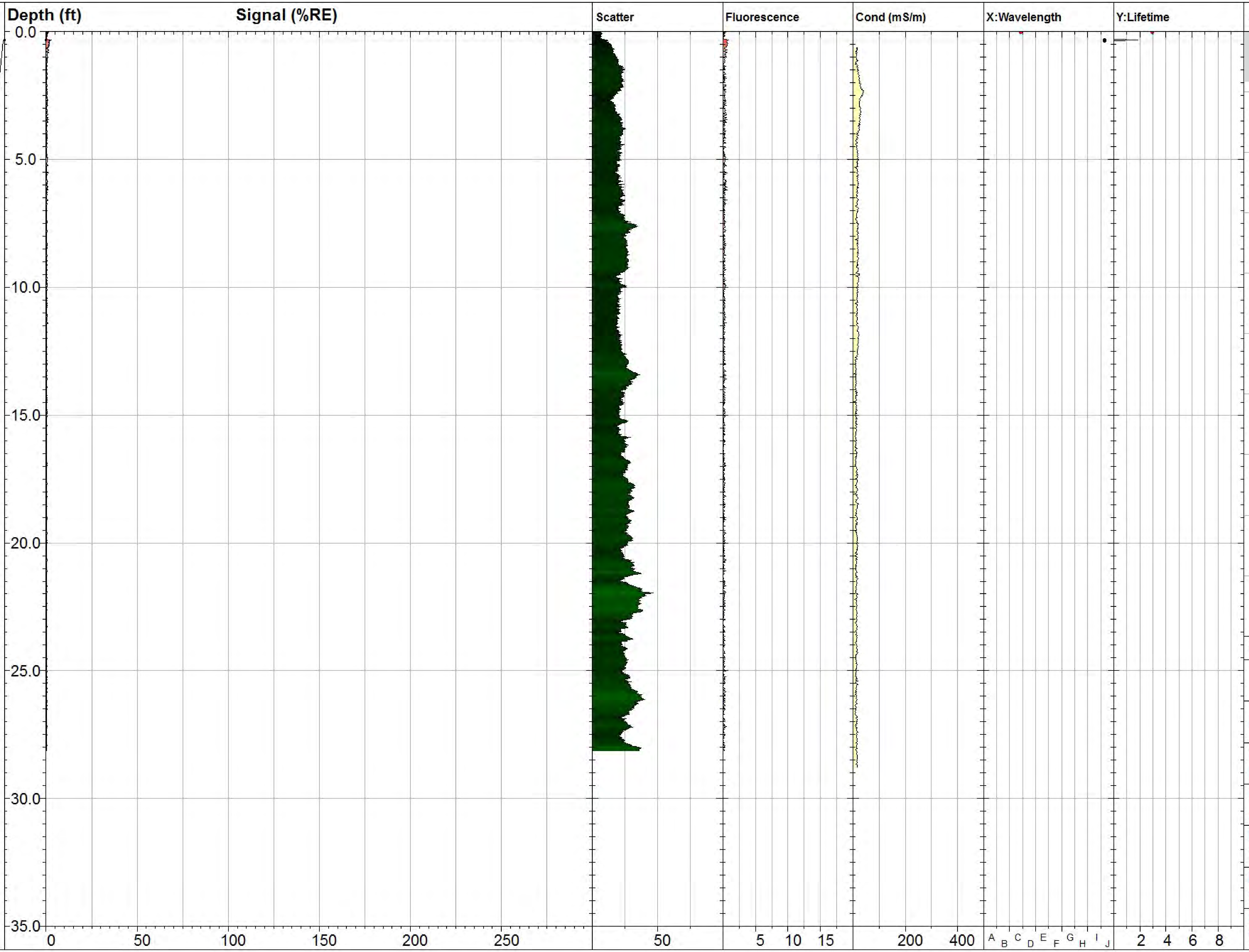
Site: **BNSF Wishram**	Date & Time: **2022-11-15 13:49 PST**
Client: **Jacobs**	Job:
Final Depth: **12.97 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **3.3 %RE @ 0.11 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **T.Rudolph / TG1807**	Elevation: **Unavailable**

Callouts

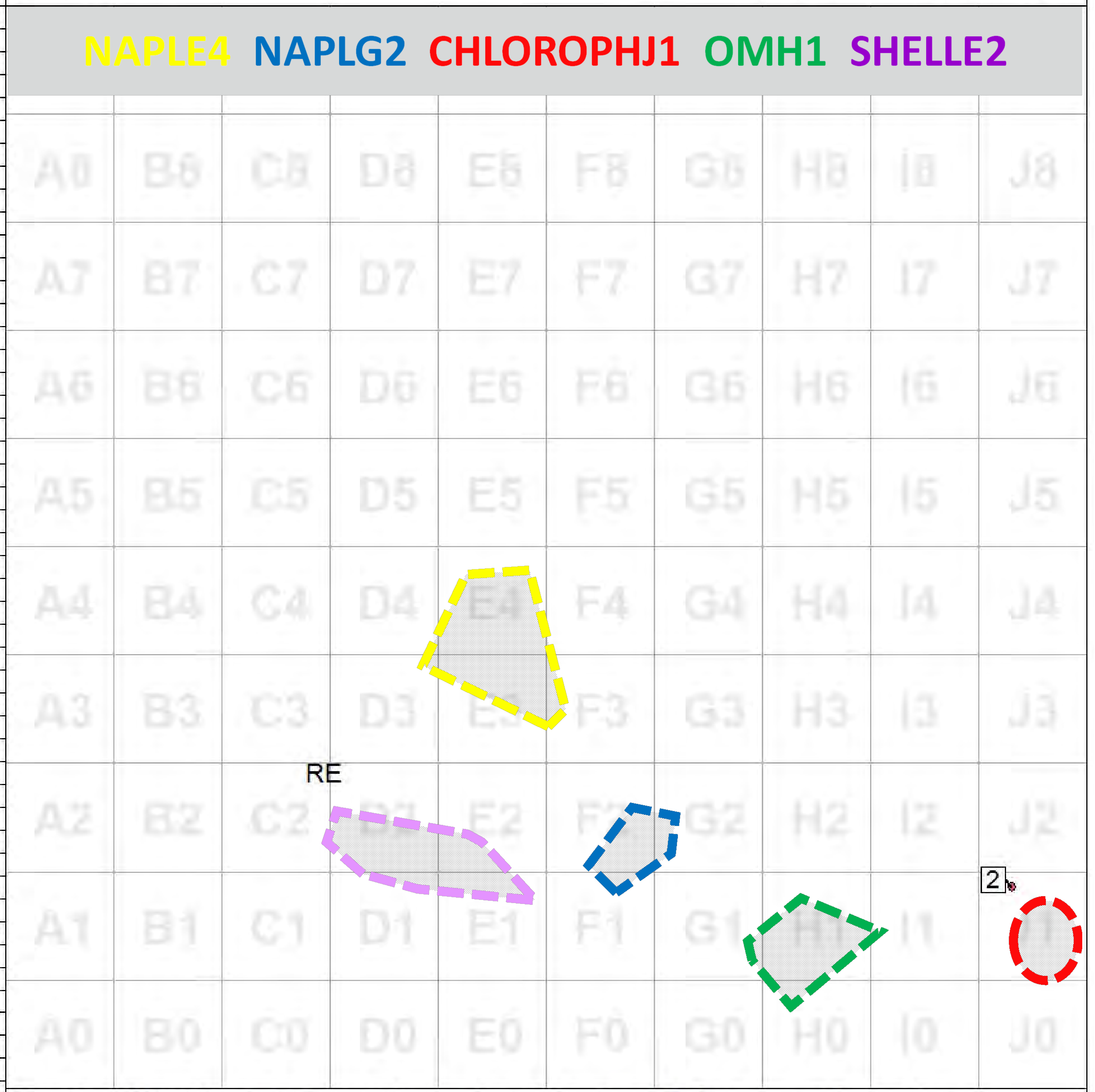
0 to 0.9' was logged within the casing



0.32 ft
2.9 %RE
chlorophyll



Cluster Plot Cluster Cutoff: Fluorescence < 0.8



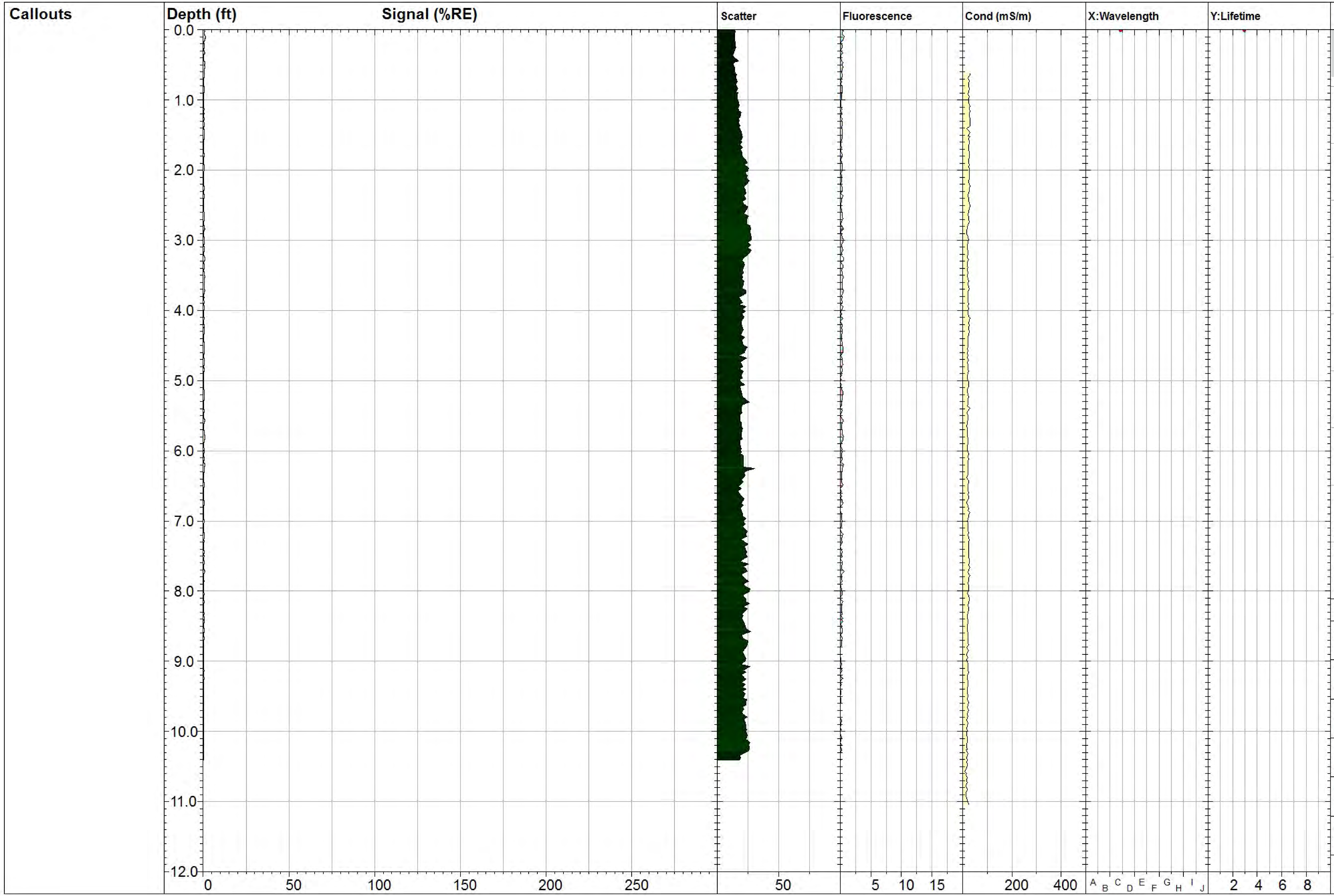
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

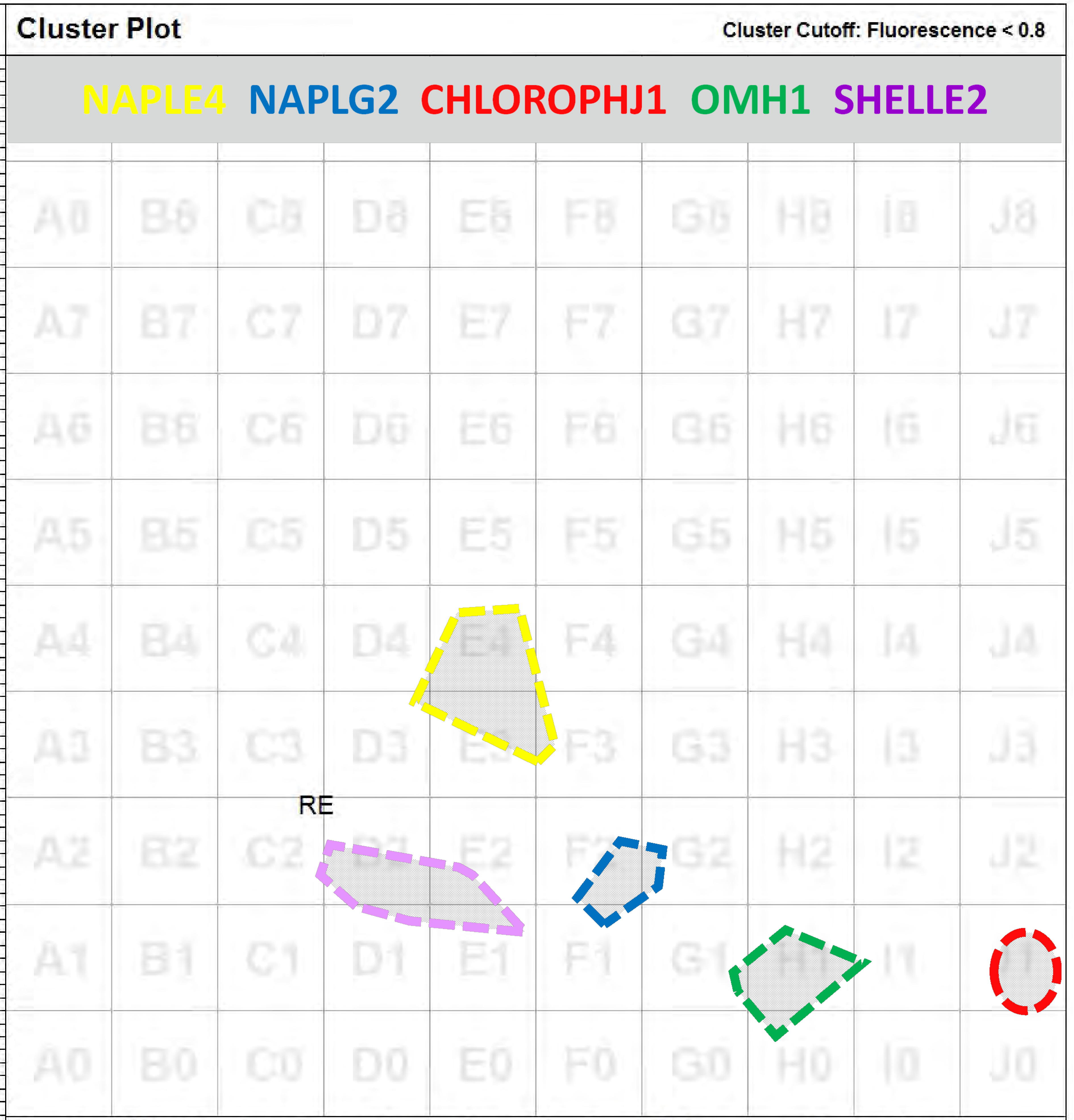
TarGOST® By Dakota

Data Presentation Format © 2023 Dakota Technologies, Inc. (v2.8.1)

Log: **L240-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-07 08:30 PST**
Client: **Jacobs**	Job:
Final Depth: **28.14 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **2.9 %RE @ 0.32 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**





X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

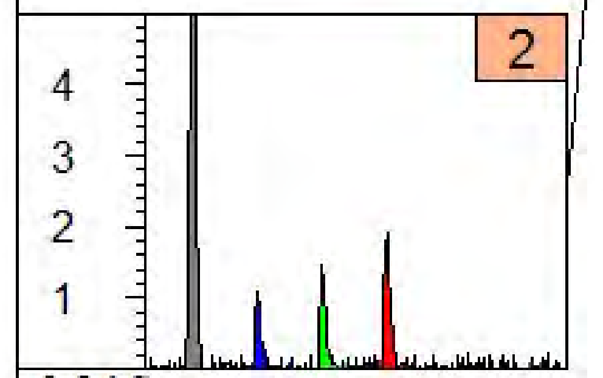
TarGOST® By Dakota

Log: **M190-TG**

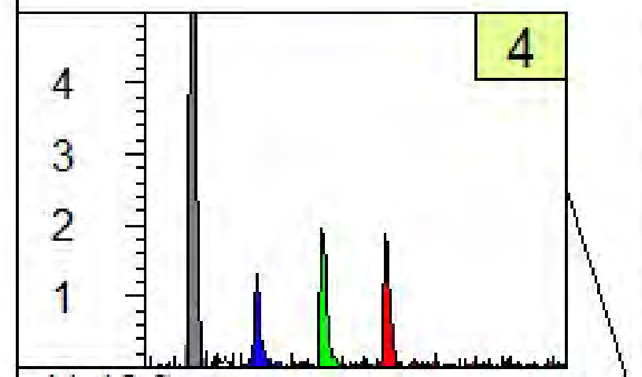
Site: **BNSF Wishram**	Date & Time: **2022-11-11 13:23 PST**
Client: **Jacobs**	Job:
Final Depth: **10.41 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **1.5 %RE @ 0.10 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**

Callouts

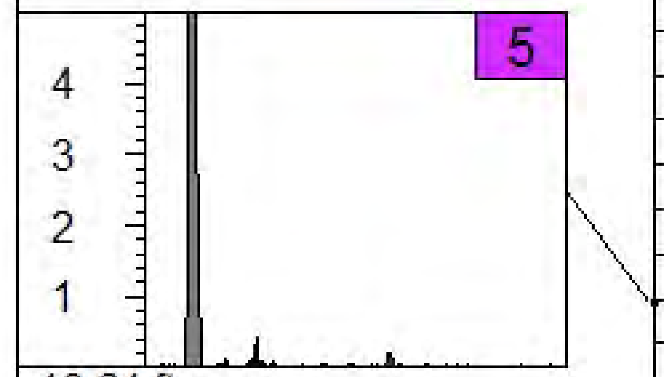
0 to 0.25' was logged within the casing



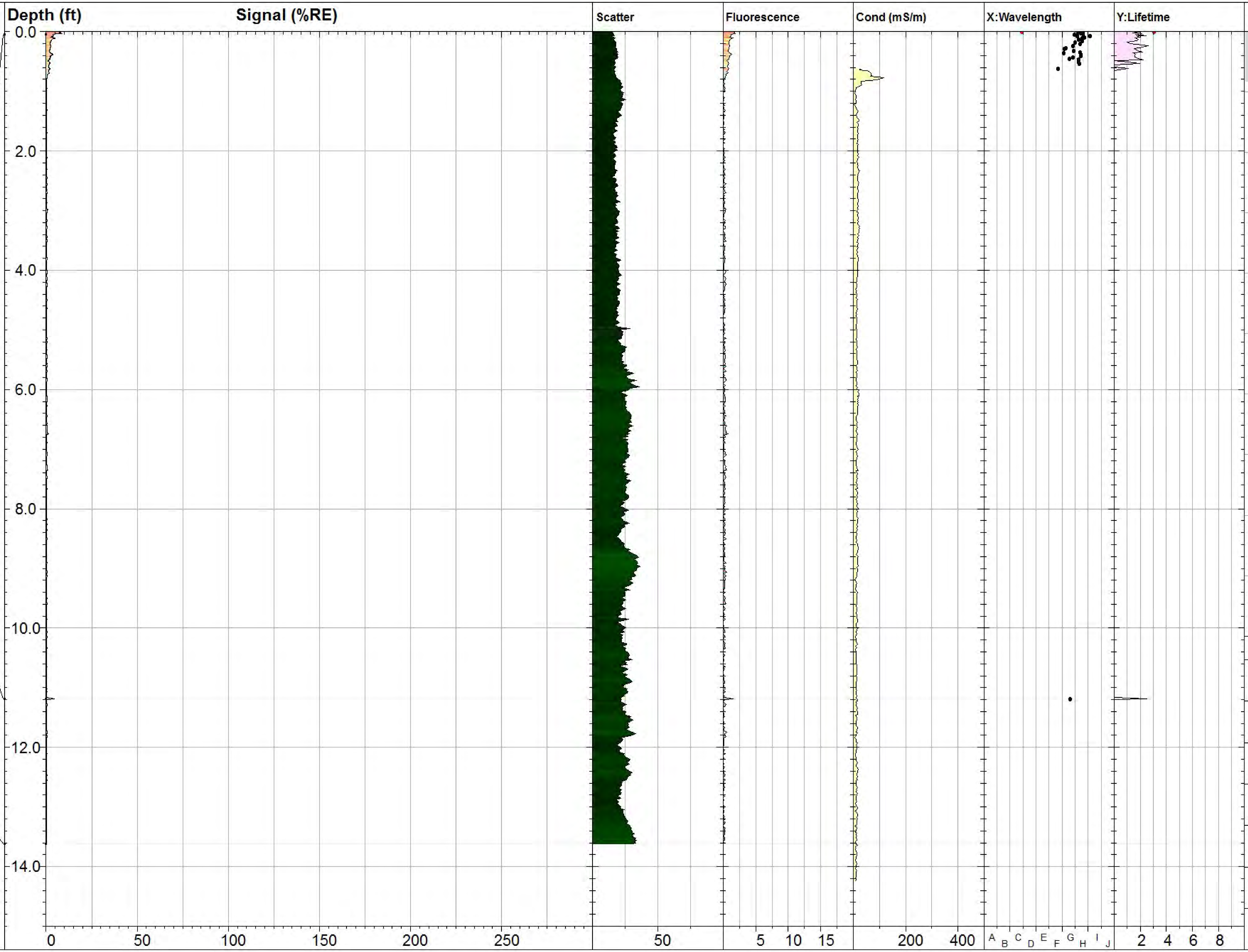
0.04 ft
3.7 %RE



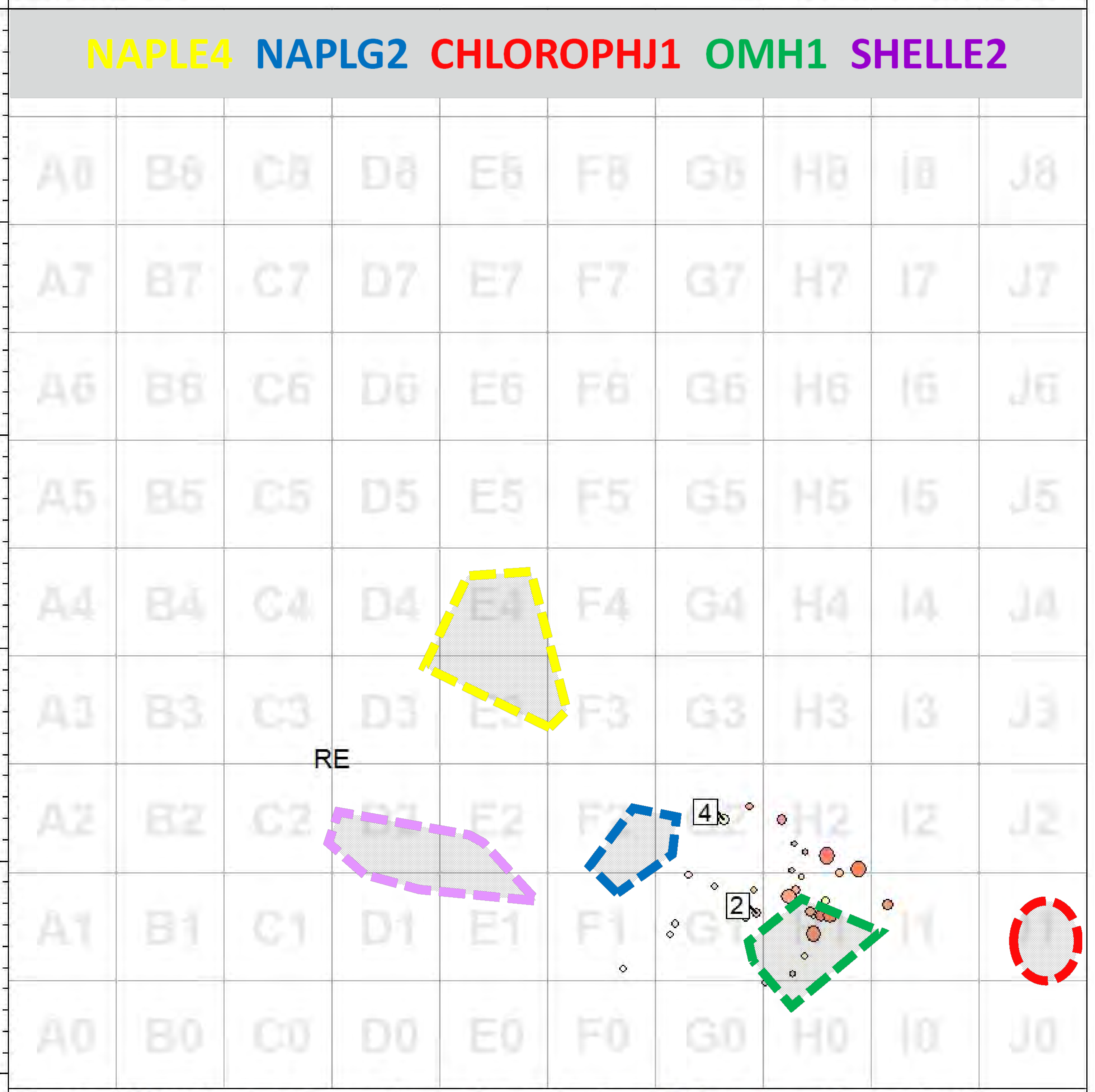
11.19 ft
4.7 %RE
??



13.61 ft
0.0 %RE
refusal



Cluster Plot Cluster Cutoff: Fluorescence < 0.8



X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **M280-TG**

Site: **BNSF Wishram**

Date & Time: **2022-11-06 12:19 PST**

Client: **Jacobs**

Job:

Final Depth: **13.61 ft**

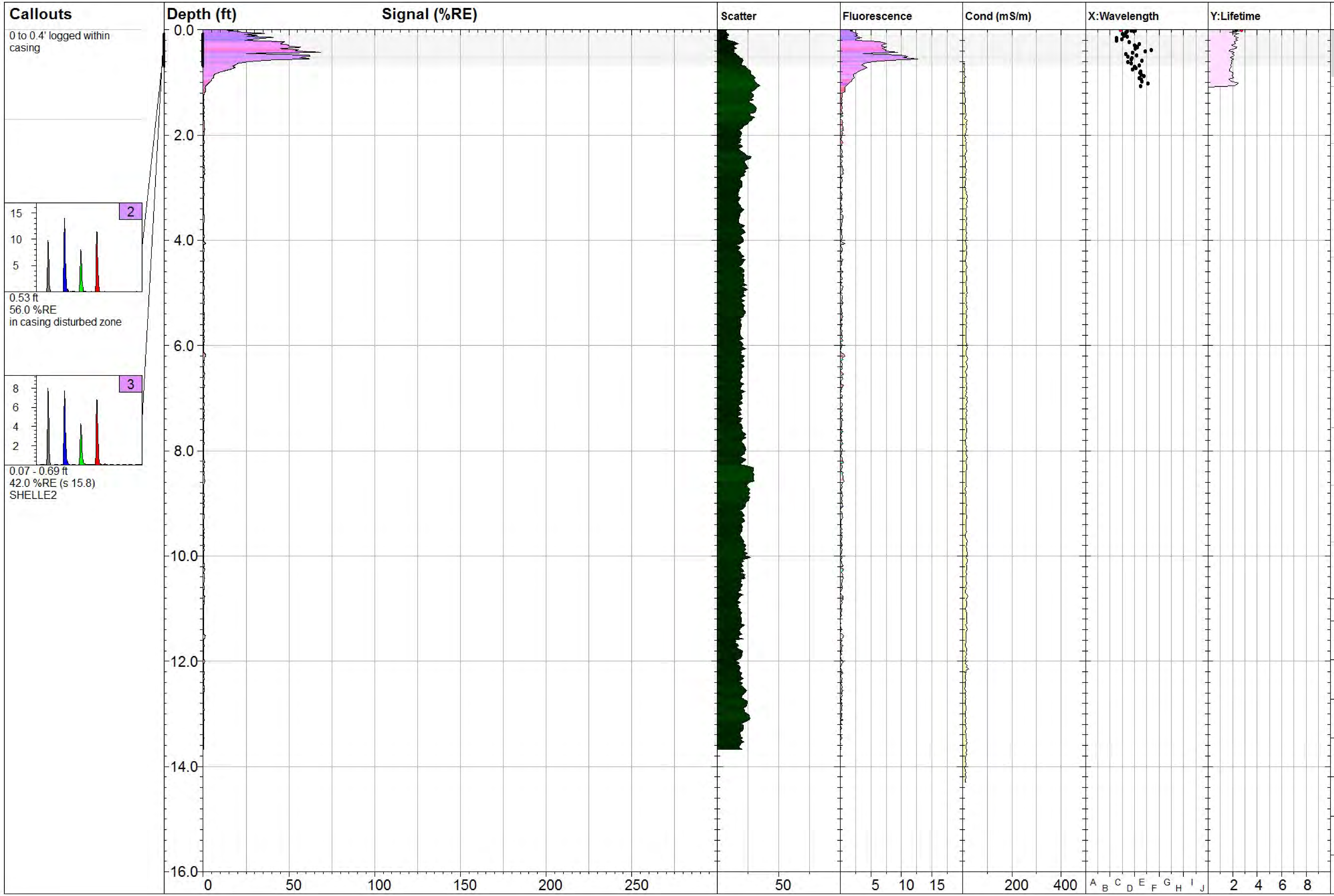
X Coord.(Long/East): **Unavailable**

Max Signal: **8.8 %RE @ 0.03 ft**

Y Coord.(Lat/North): **Unavailable**

Operator / Unit: **SDA / TG1807**

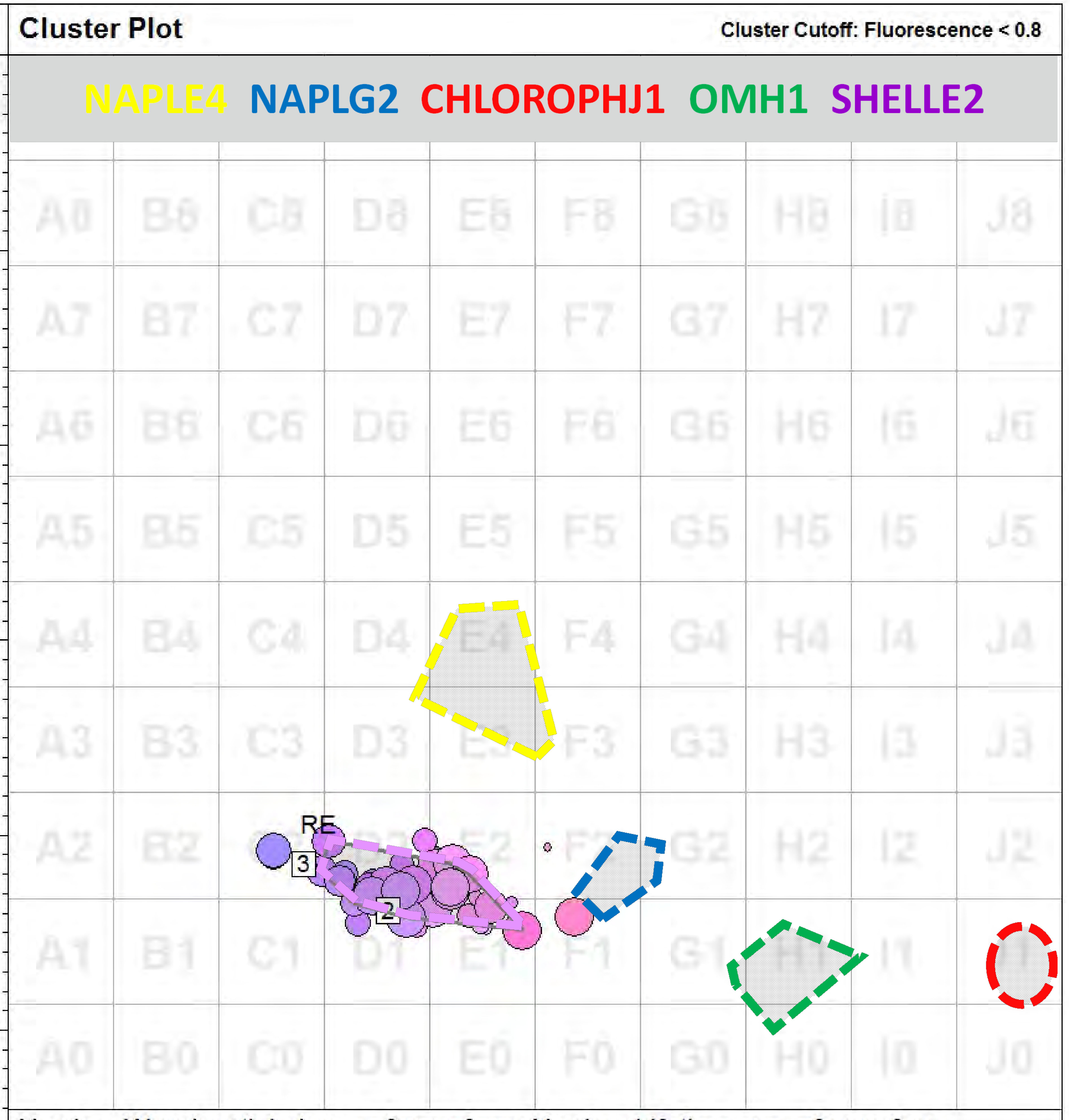
Elevation: **Unavailable**



0 to 0.4' logged within casing

0.53 ft
56.0 %RE
in casing disturbed zone

0.07 - 0.69 ft
42.0 %RE (s 15.8)
SHELLE2

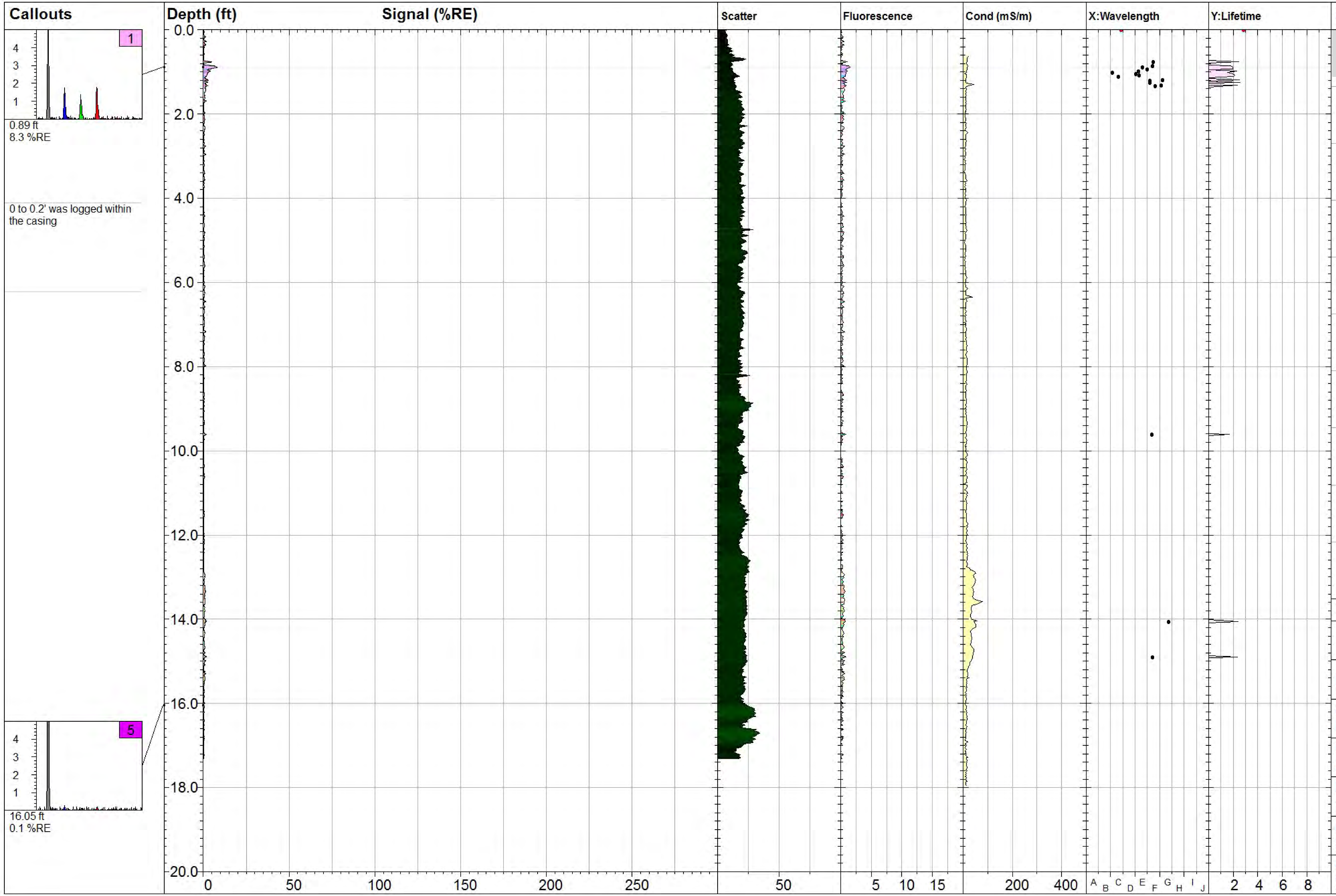


X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

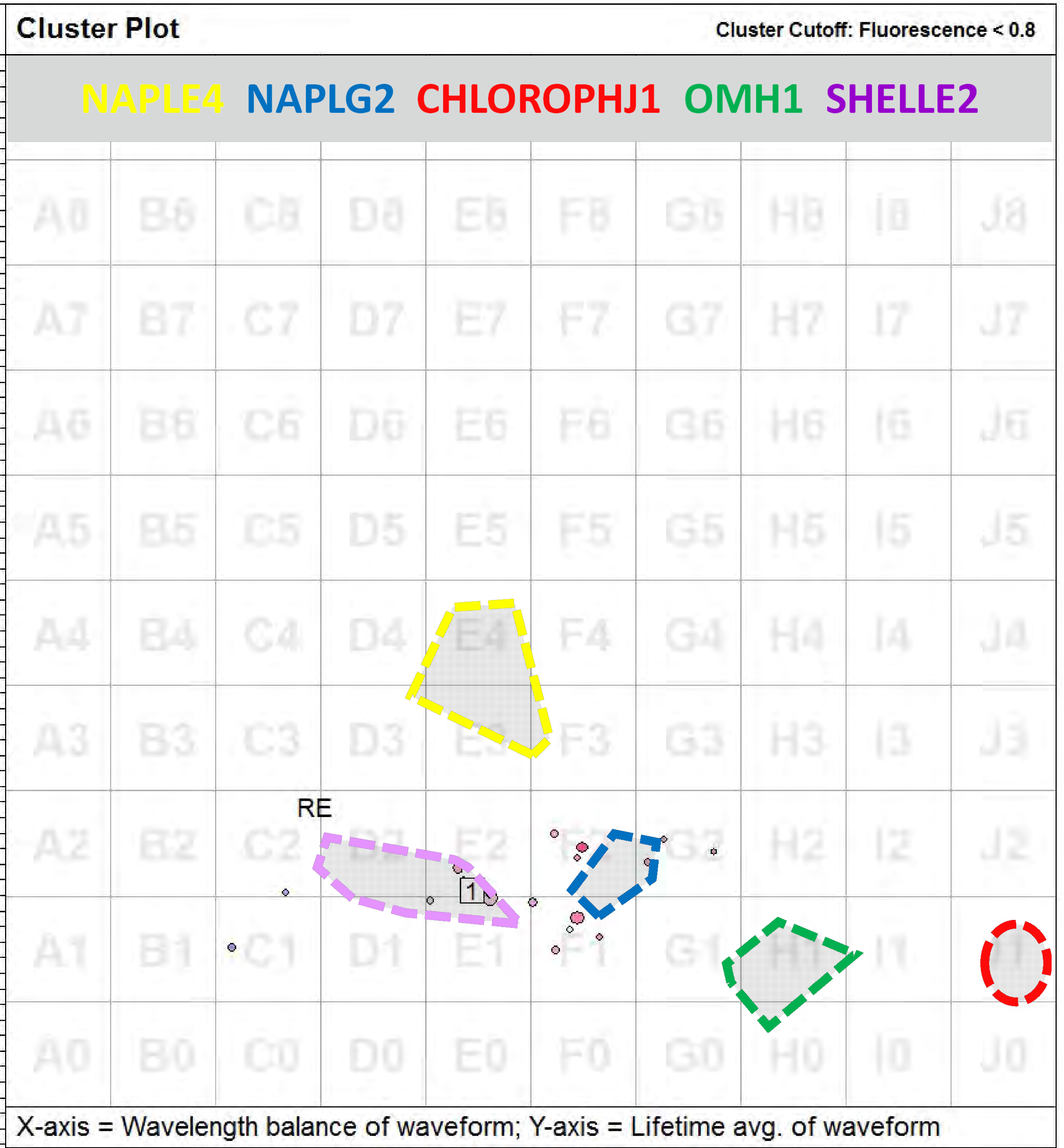
TarGOST® By Dakota

Log: **M360-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-07 11:46 PST**
Client: **Jacobs**	Job:
Final Depth: **13.68 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **69.3 %RE @ 0.43 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**



0 to 0.2' was logged within the casing



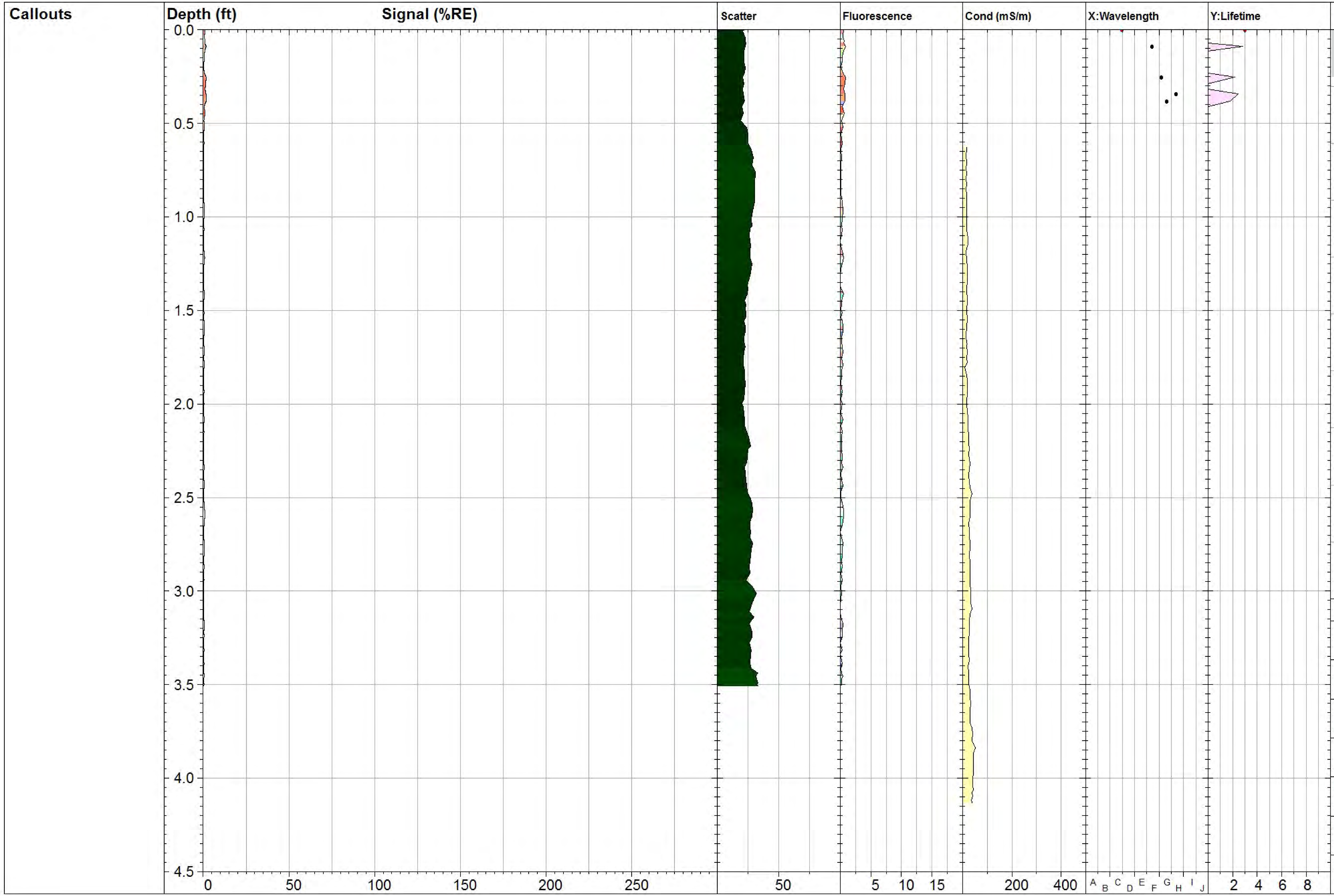
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

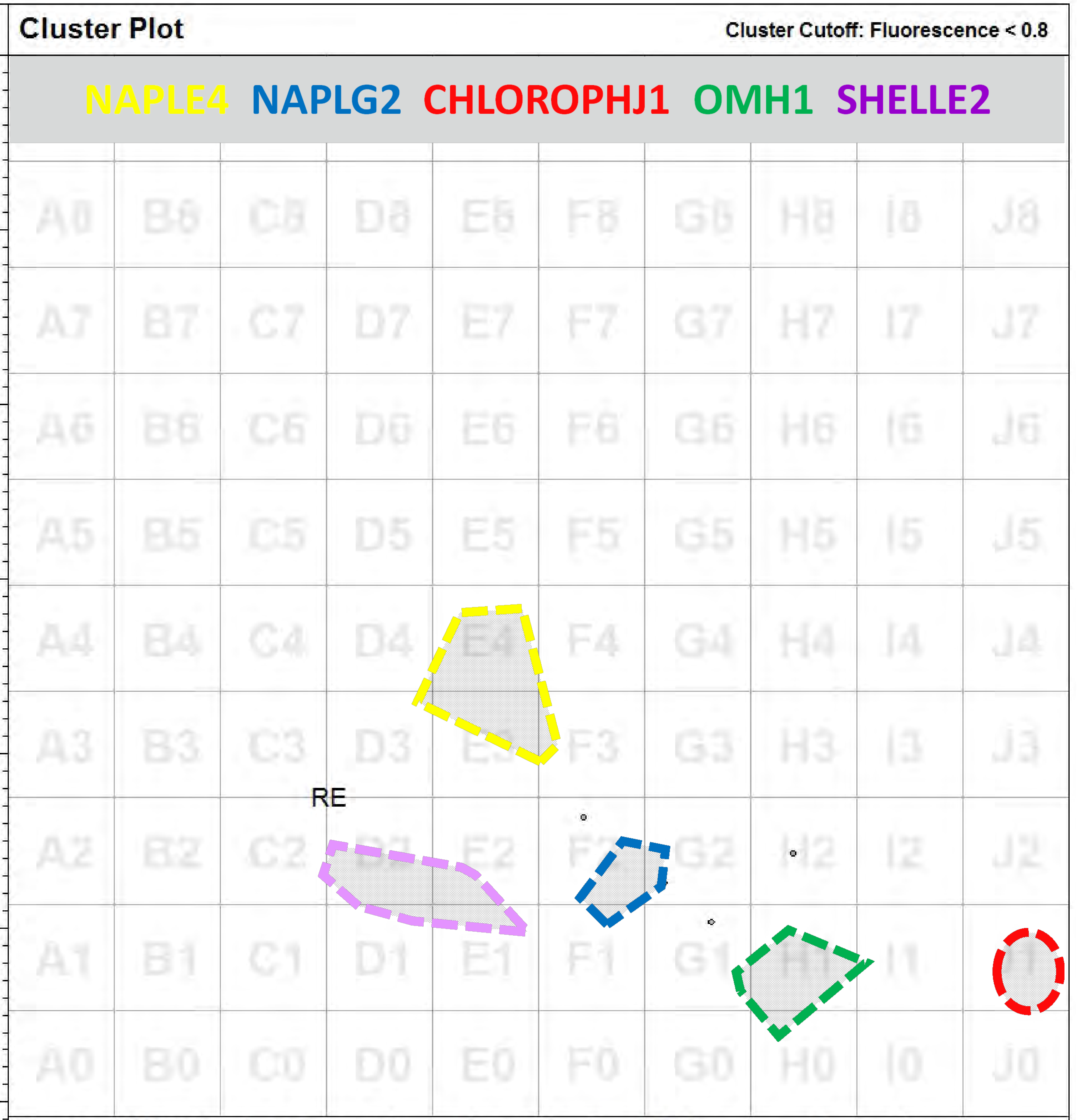
TarGOST® By Dakota

Data Presentation Format © 2023 Dakota Technologies, Inc. (v2.8.1)

Log: **M400-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-07 14:51 PST**
Client: **Jacobs**	Job:
Final Depth: **17.32 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **8.3 %RE @ 0.89 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**





X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

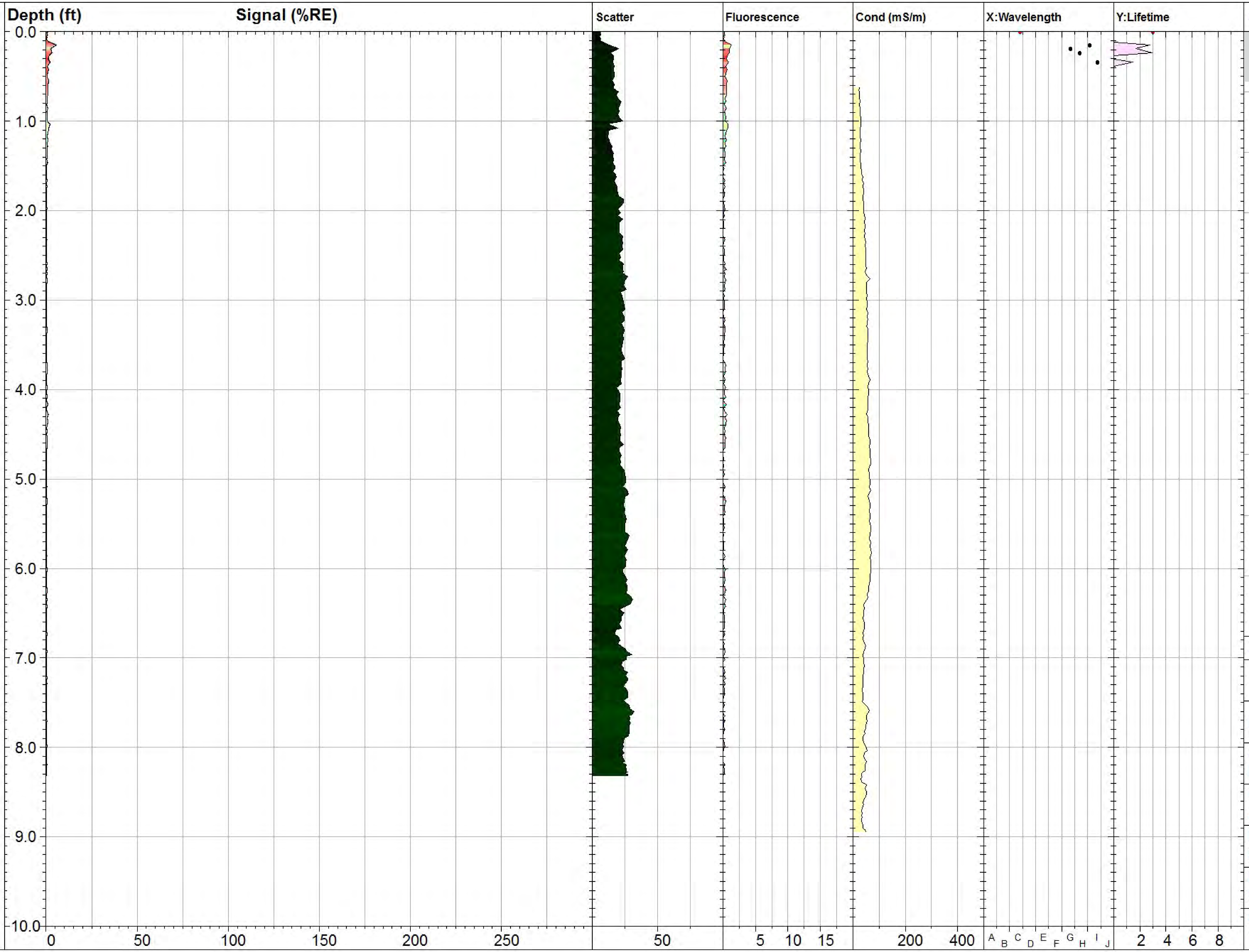
Data Presentation Format © 2023 Dakota Technologies, Inc. (v2.8.1)

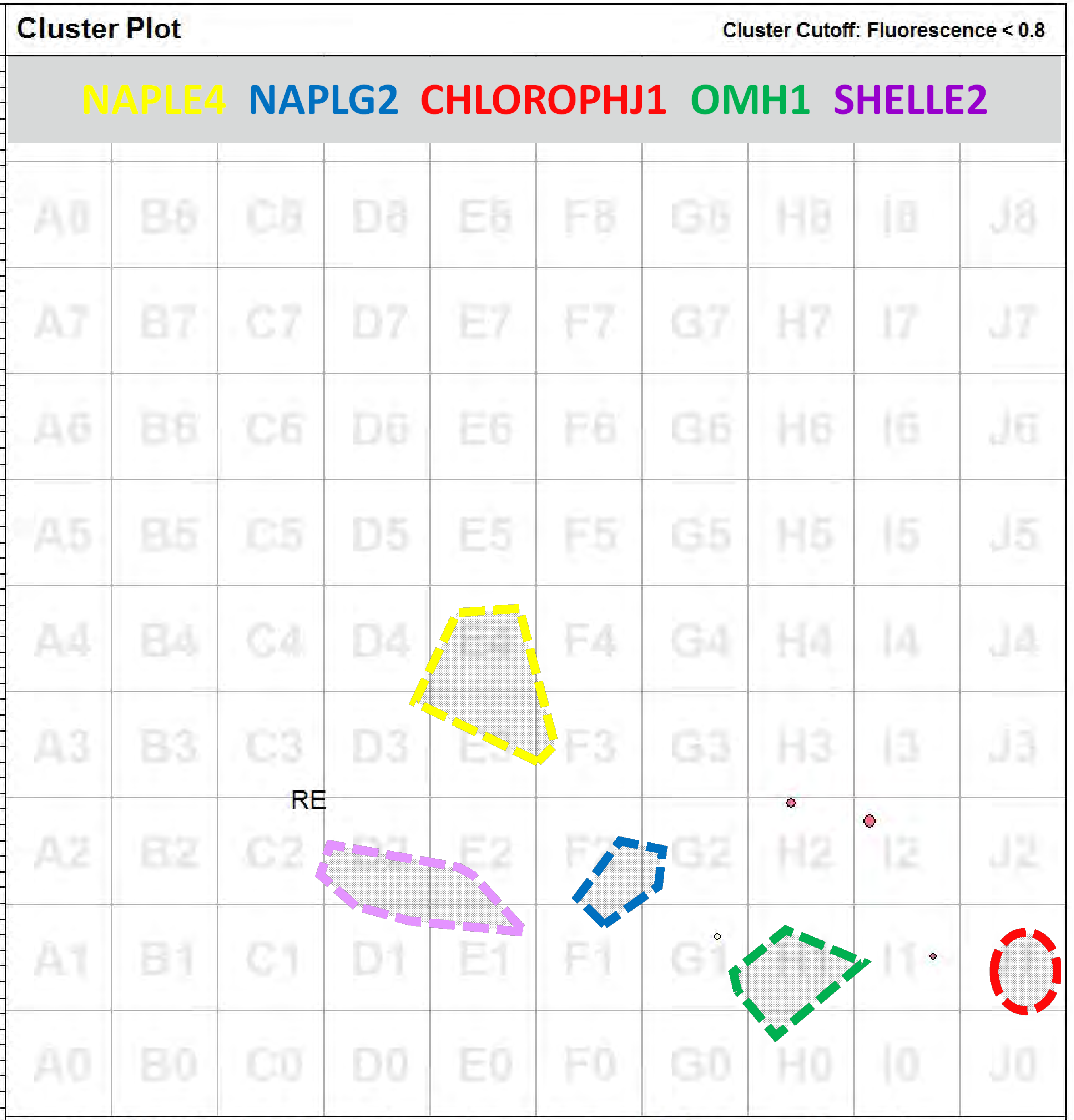
Log: **MN100-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-15 11:59 PST**
Client: **Jacobs**	Job:
Final Depth: **3.51 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **1.7 %RE @ 0.25 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **T.Rudolph / TG1807**	Elevation: **Unavailable**

Callouts

0- 6' waas pushed inside the casing





X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

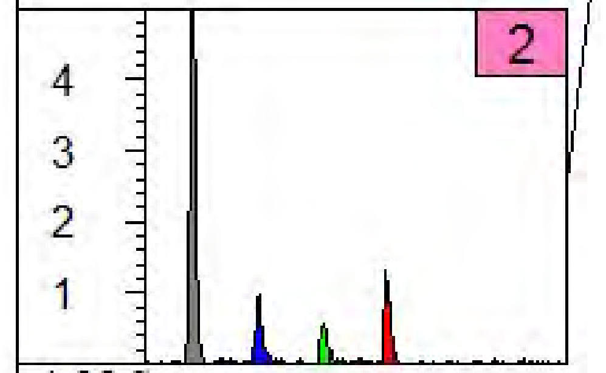
TarGOST® By Dakota

Log: **MN160-TG**

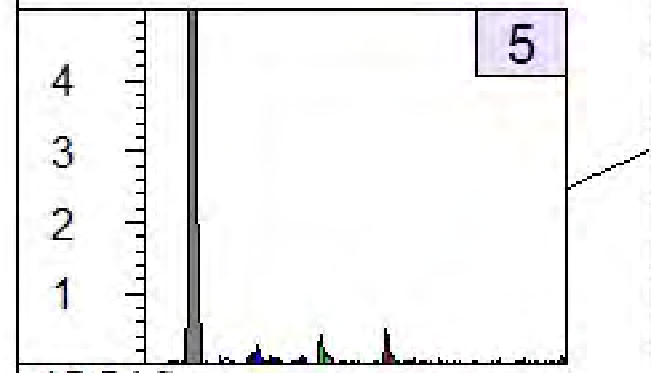
Site: **BNSF Wishram**	Date & Time: **2022-11-14 12:12 PST**
Client: **Jacobs**	Job:
Final Depth: **8.32 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **5.6 %RE @ 0.15 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **T.Rudolph / TG1807**	Elevation: **Unavailable**

Callouts

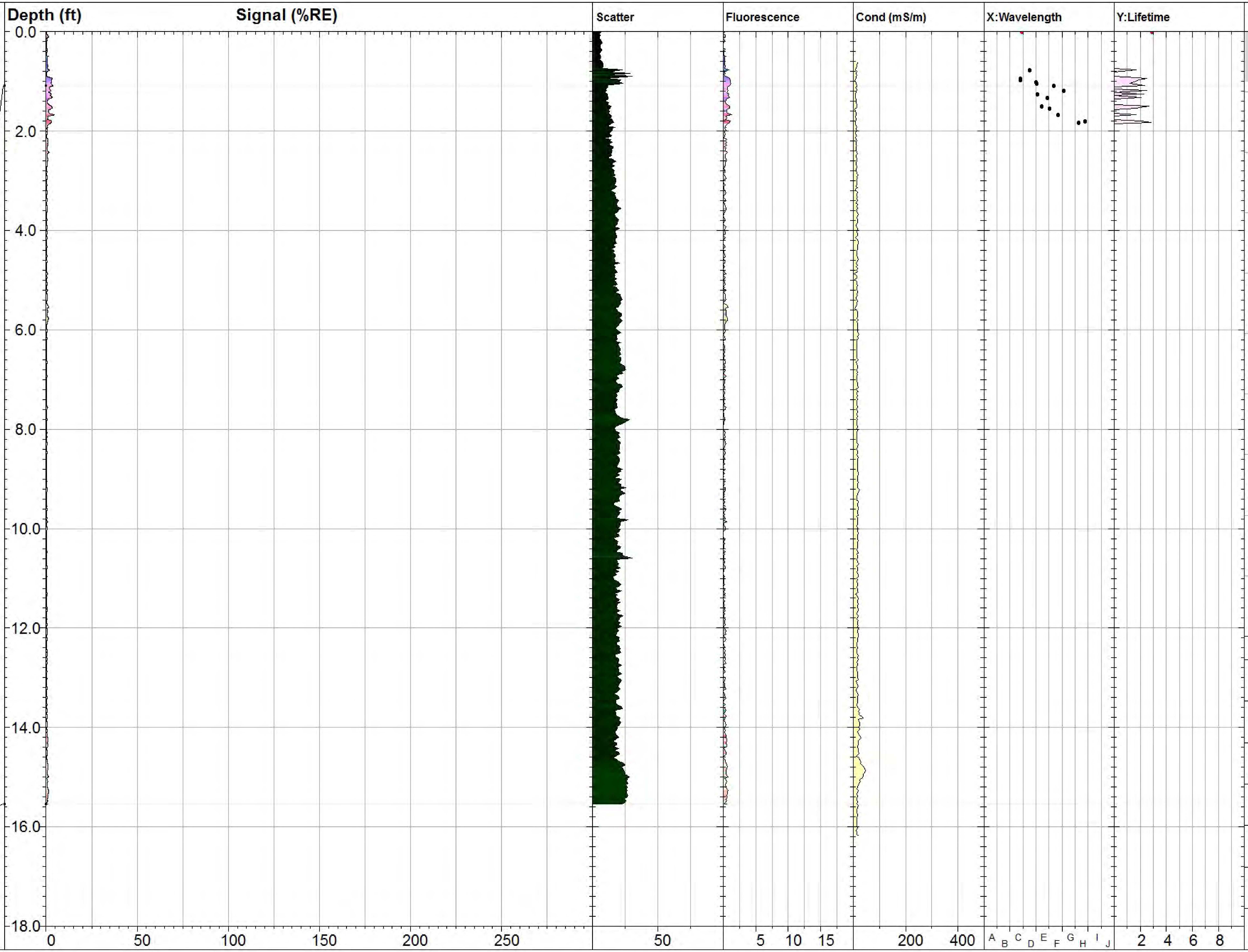
0 to 0.4' was logged within the casing

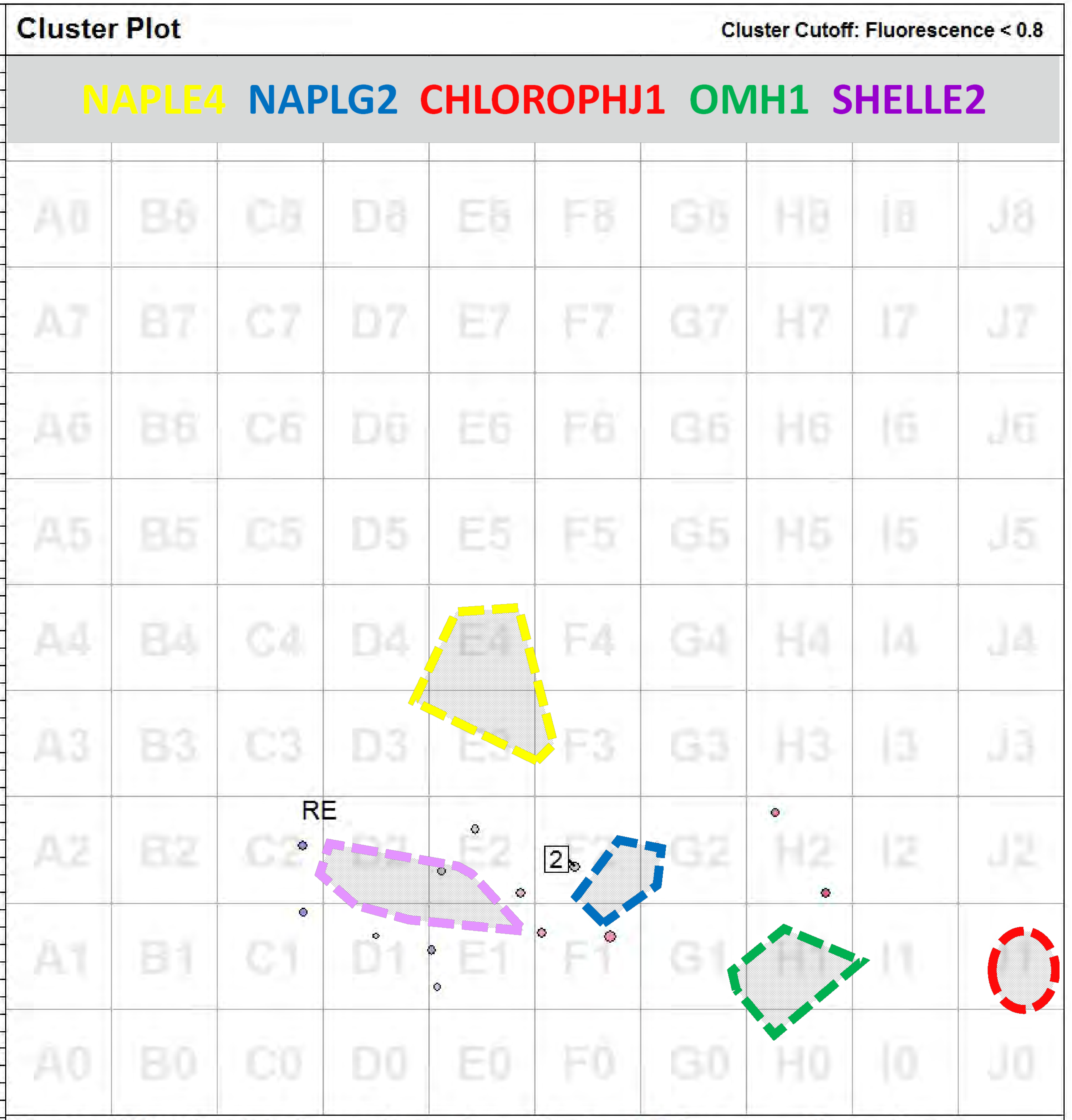


1.09 ft
3.8 %RE



15.54 ft
0.8 %RE
refusal





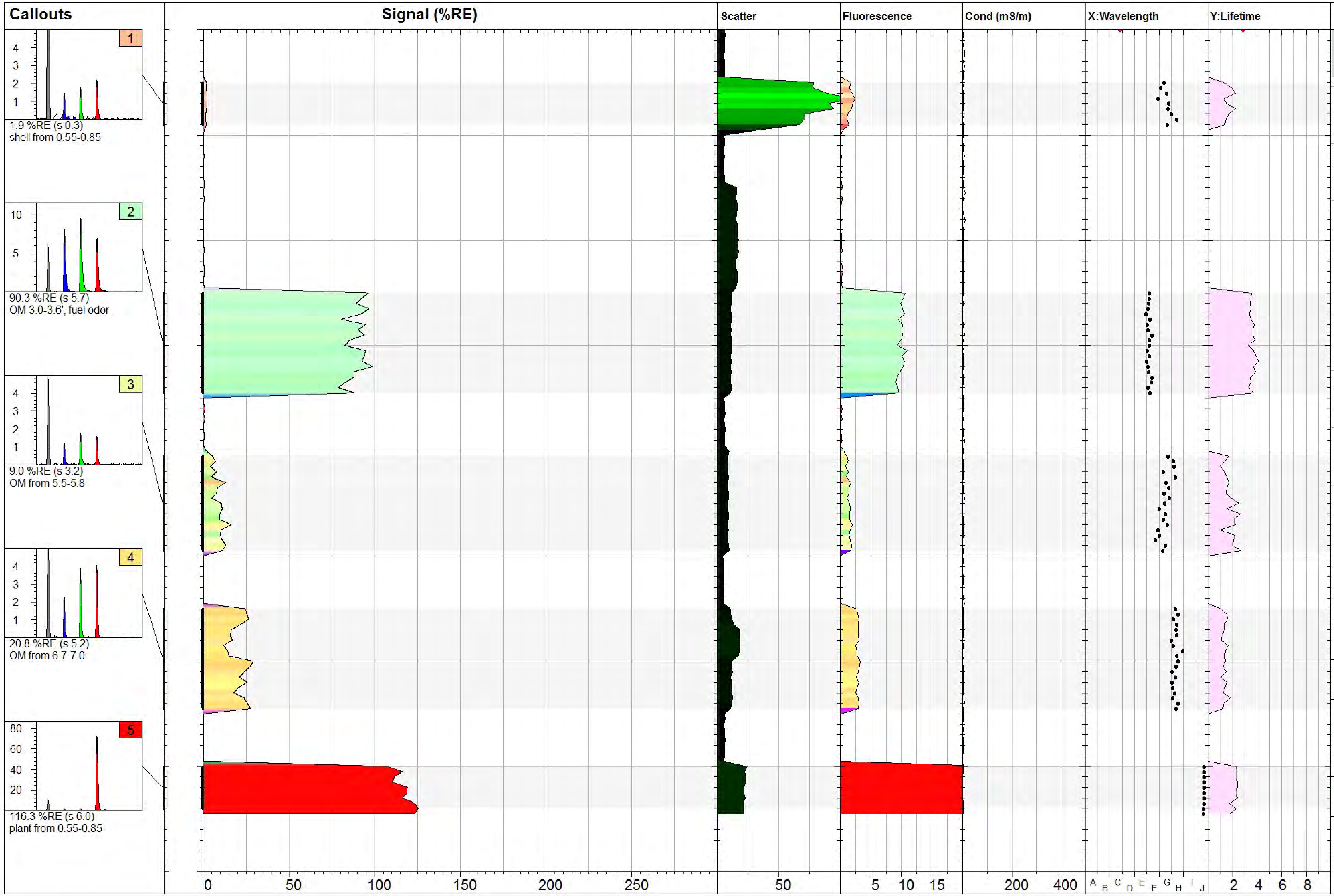
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Data Presentation Format © 2023 Dakota Technologies, Inc. (v2.8.1)

Log: **O280-TG**

Site: **BNSF Wishram**	Date & Time: **2022-11-11 13:58 PST**
Client: **Jacobs**	Job:
Final Depth: **15.54 ft**	X Coord.(Long/East): **Unavailable**
Max Signal: **4.8 %RE @ 1.67 ft**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**



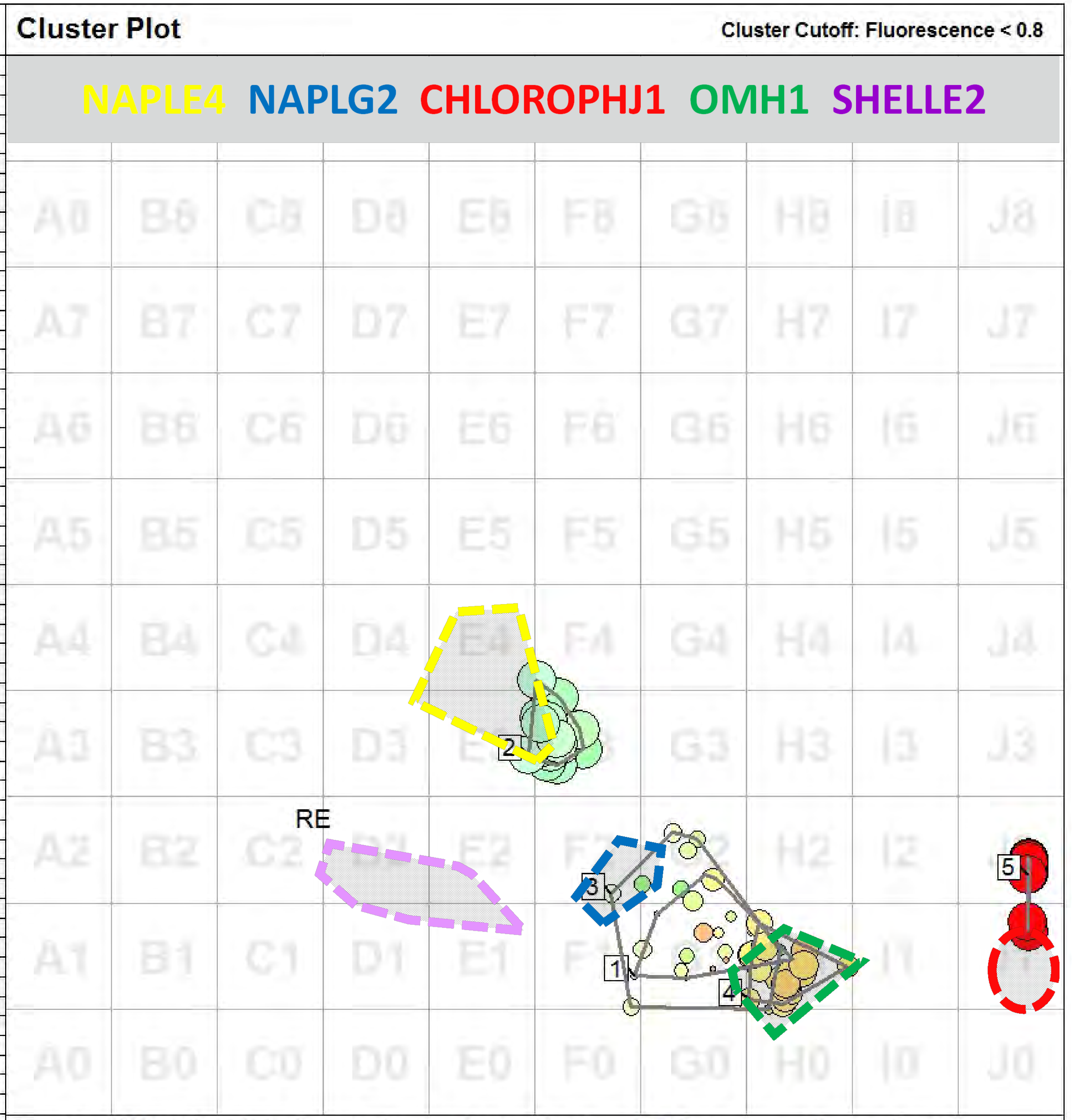
1.9 %RE (s 0.3)
shell from 0.55-0.85

90.3 %RE (s 5.7)
OM 3.0-3.6', fuel odor

9.0 %RE (s 3.2)
OM from 5.5-5.8

20.8 %RE (s 5.2)
OM from 6.7-7.0

116.3 %RE (s 6.0)
plant from 0.55-0.85

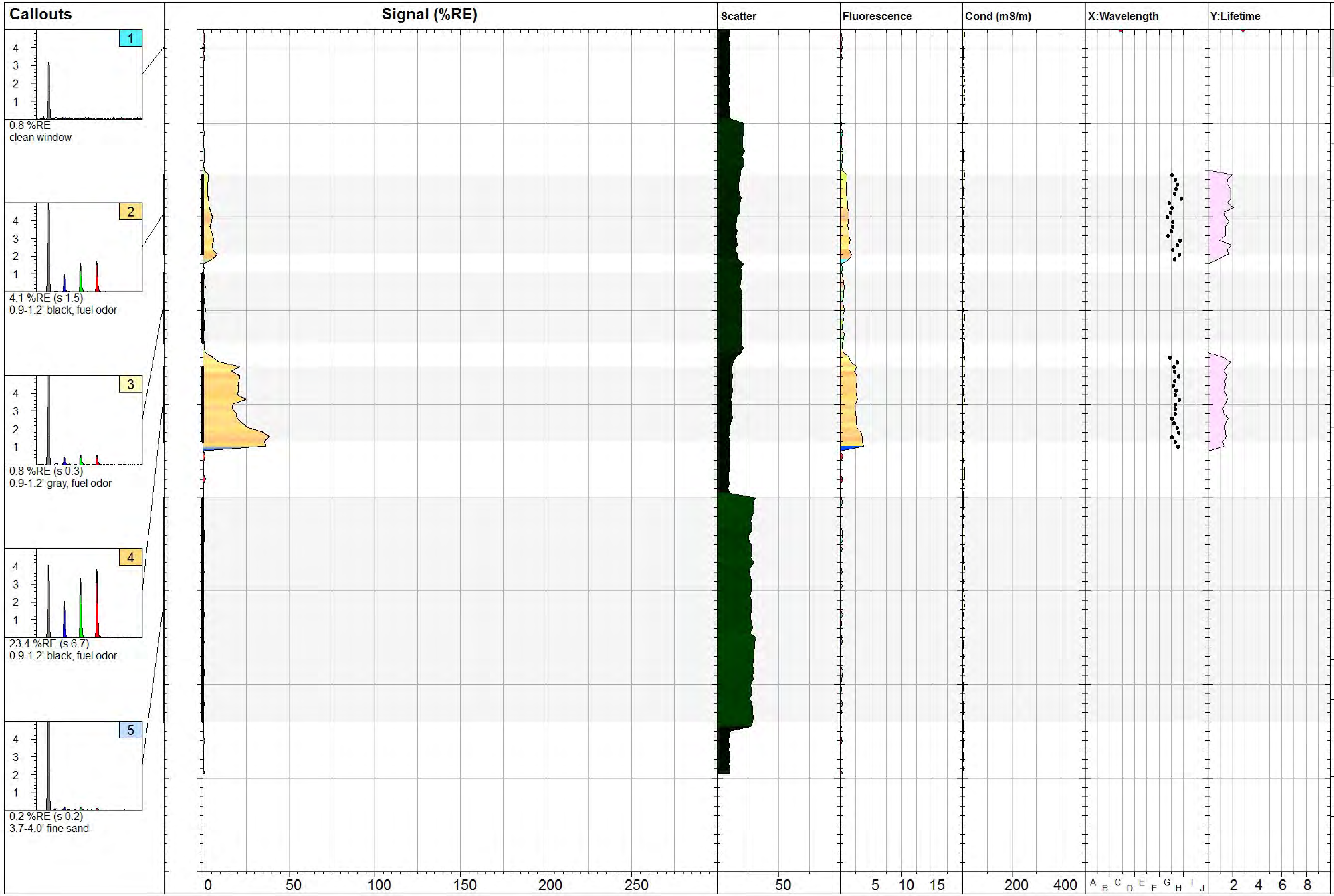


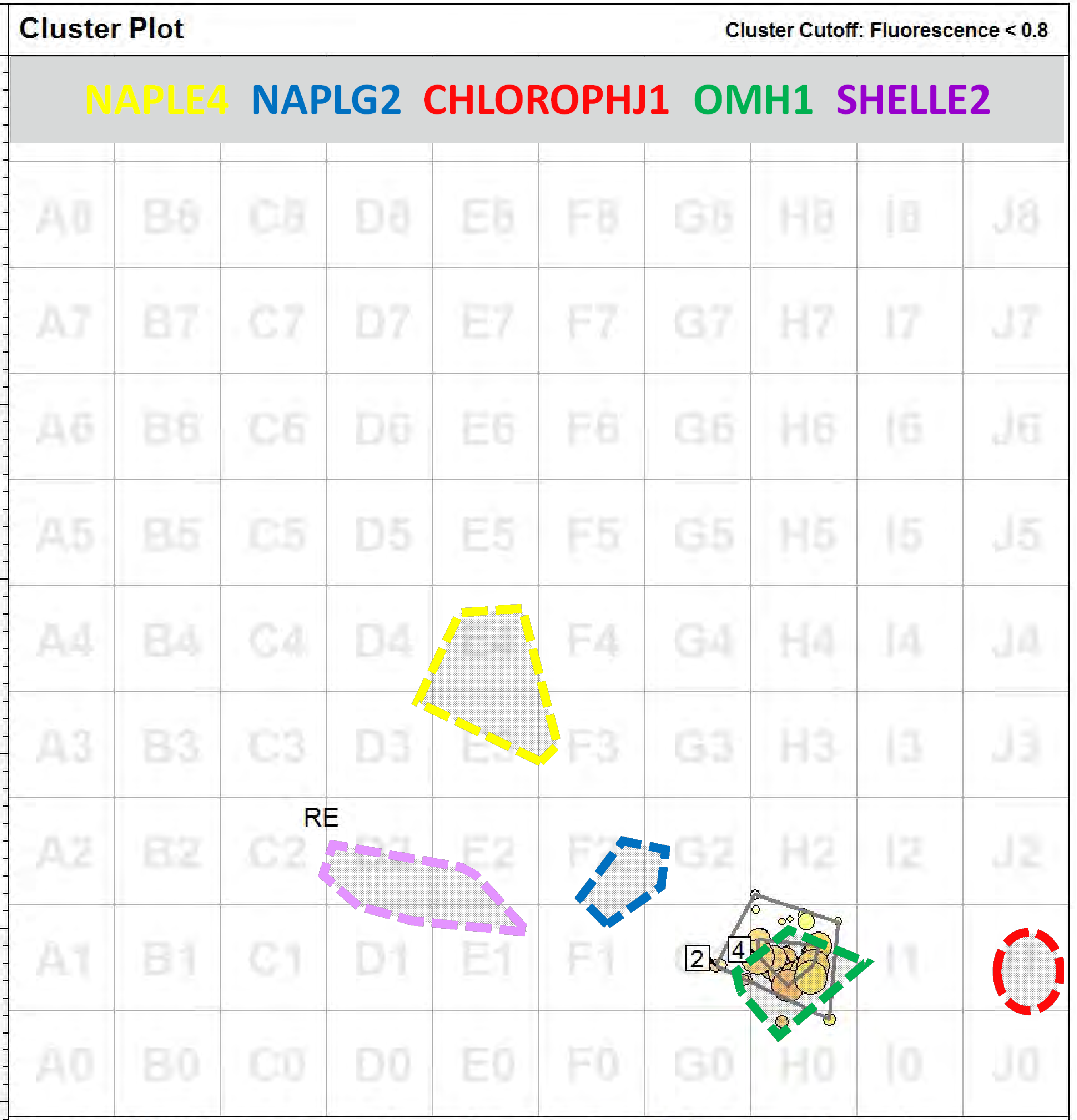
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **F390-TG false pos**

Site: **BNSF Wishram**	Date & Time: **2022-11-07 11:17 PST**
Client: **Jacobs**	Job:
Final Depth:	X Coord.(Long/East): **Unavailable**
Max Signal: **125.3 %RE**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**





X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

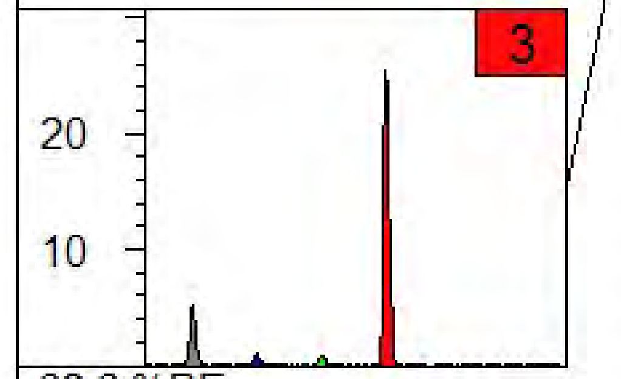
TarGOST® By Dakota

Log: **G000-TG-EX**

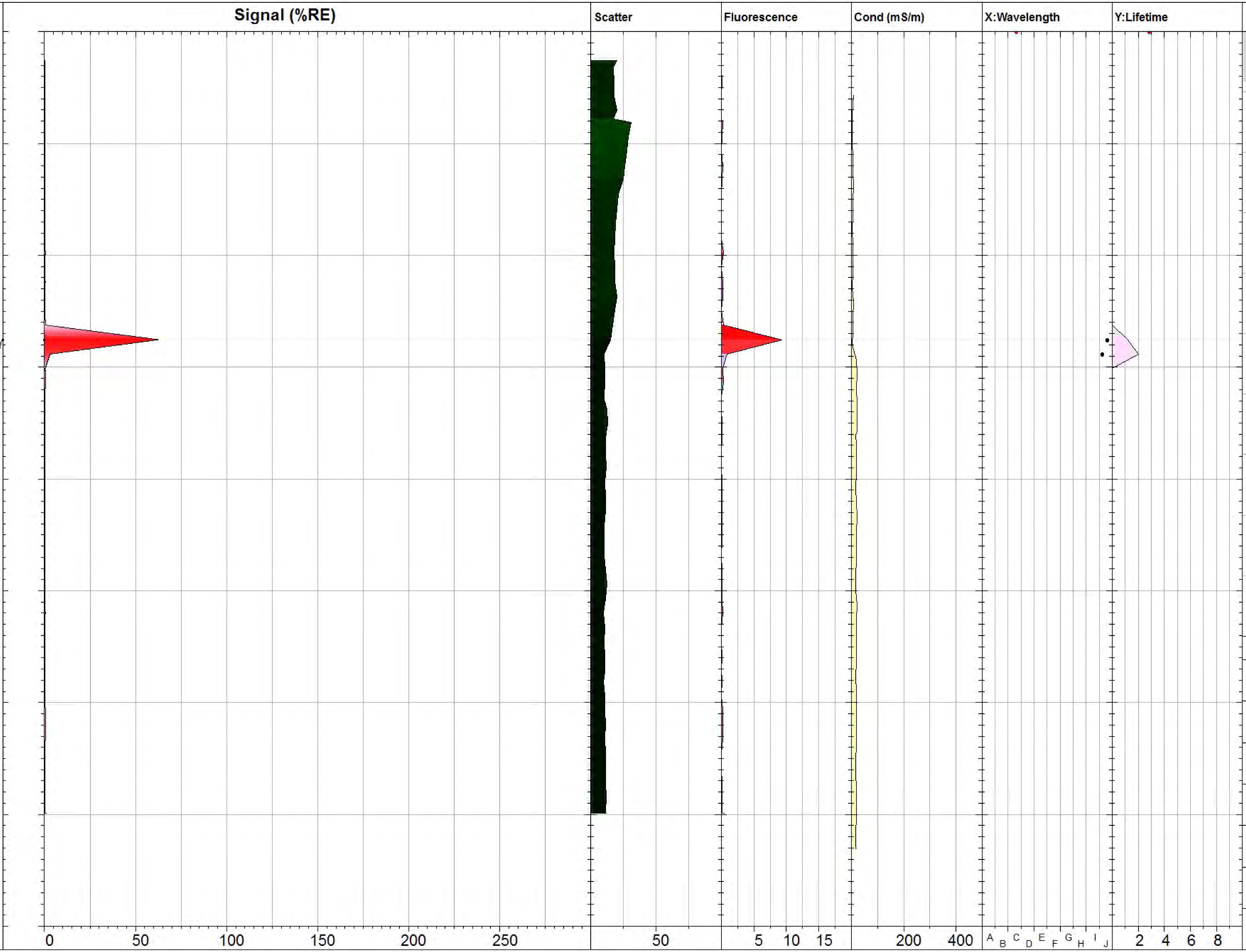
Site: **BNSF Wishram**	Date & Time: **2022-11-08 12:12 PST**
Client: **Jacobs**	Job:
Final Depth:	X Coord.(Long/East): **Unavailable**
Max Signal: **38.5 %RE**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**

Callouts

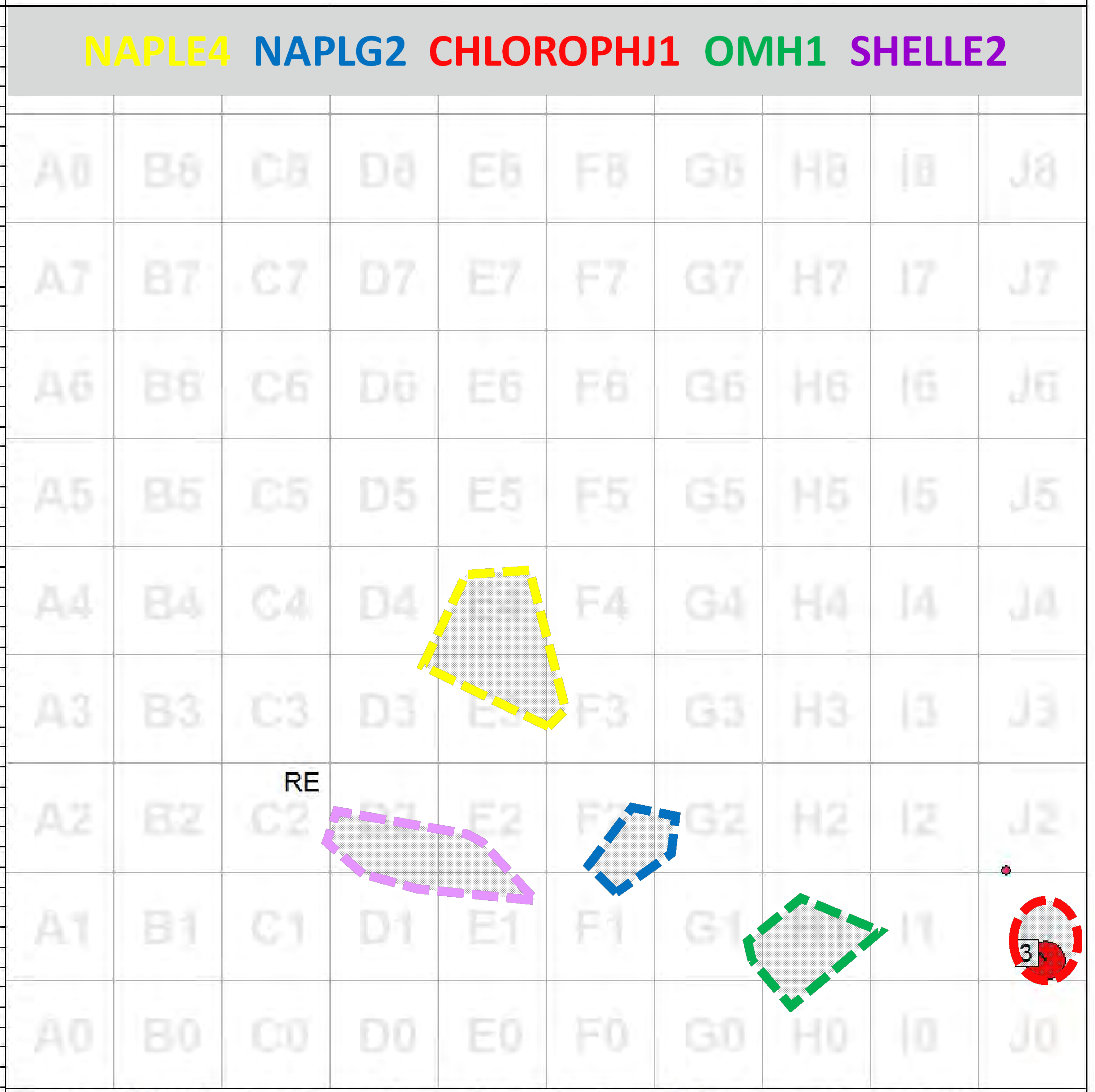
Logged water column while lowering TG probe to mudline.



62.6 %RE chlorophyll



Cluster Plot Cluster Cutoff: Fluorescence < 0.8



X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

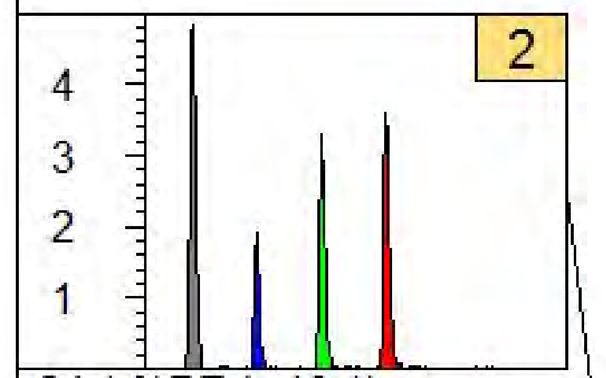
TarGOST® By Dakota

Data Presentation Format © 2023 Dakota Technologies, Inc. (v2.8.1)

Log: **GN040-TG water**

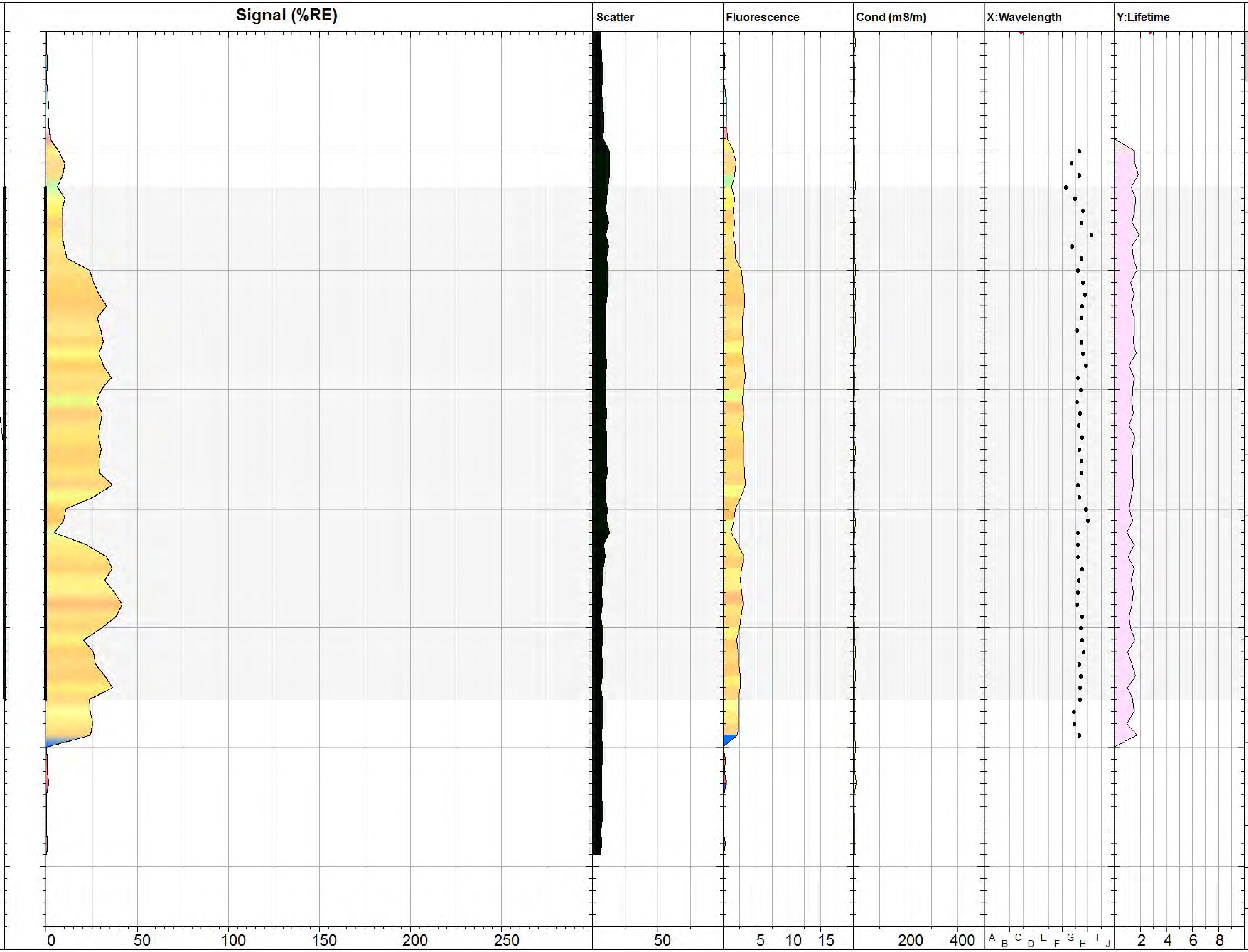
Site: **BNSF Wishram**	Date & Time: **2022-11-10 13:02 PST**
Client: **Jacobs**	Job:
Final Depth:	X Coord.(Long/East): **Unavailable**
Max Signal: **62.6 %RE**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**

Callouts



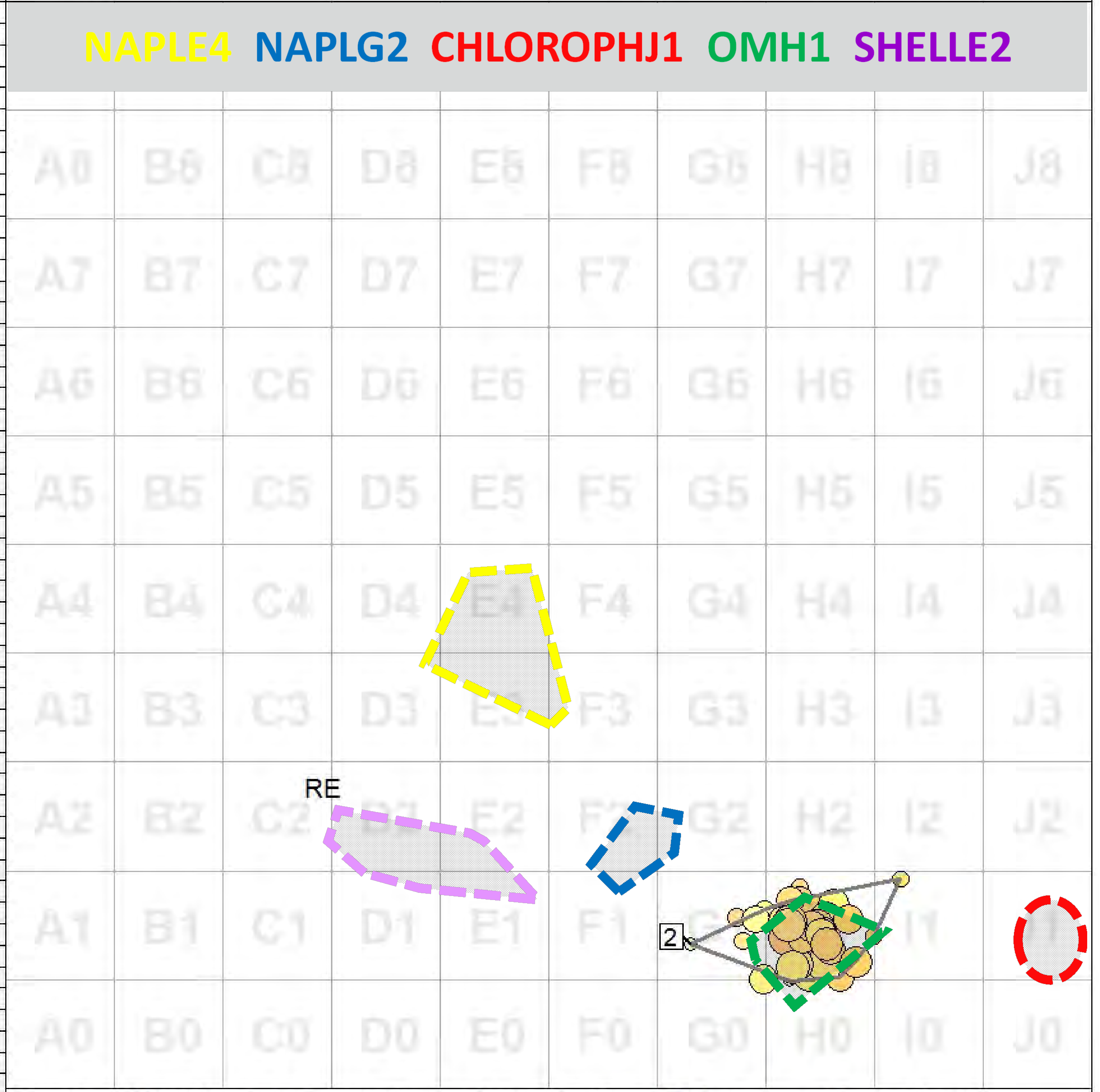
24.1 %RE (s 10.1)
0.7 to 0.8'

Hard fragment of wood and tar like material. Has tar odor.



Cluster Plot

Cluster Cutoff: Fluorescence < 0.8



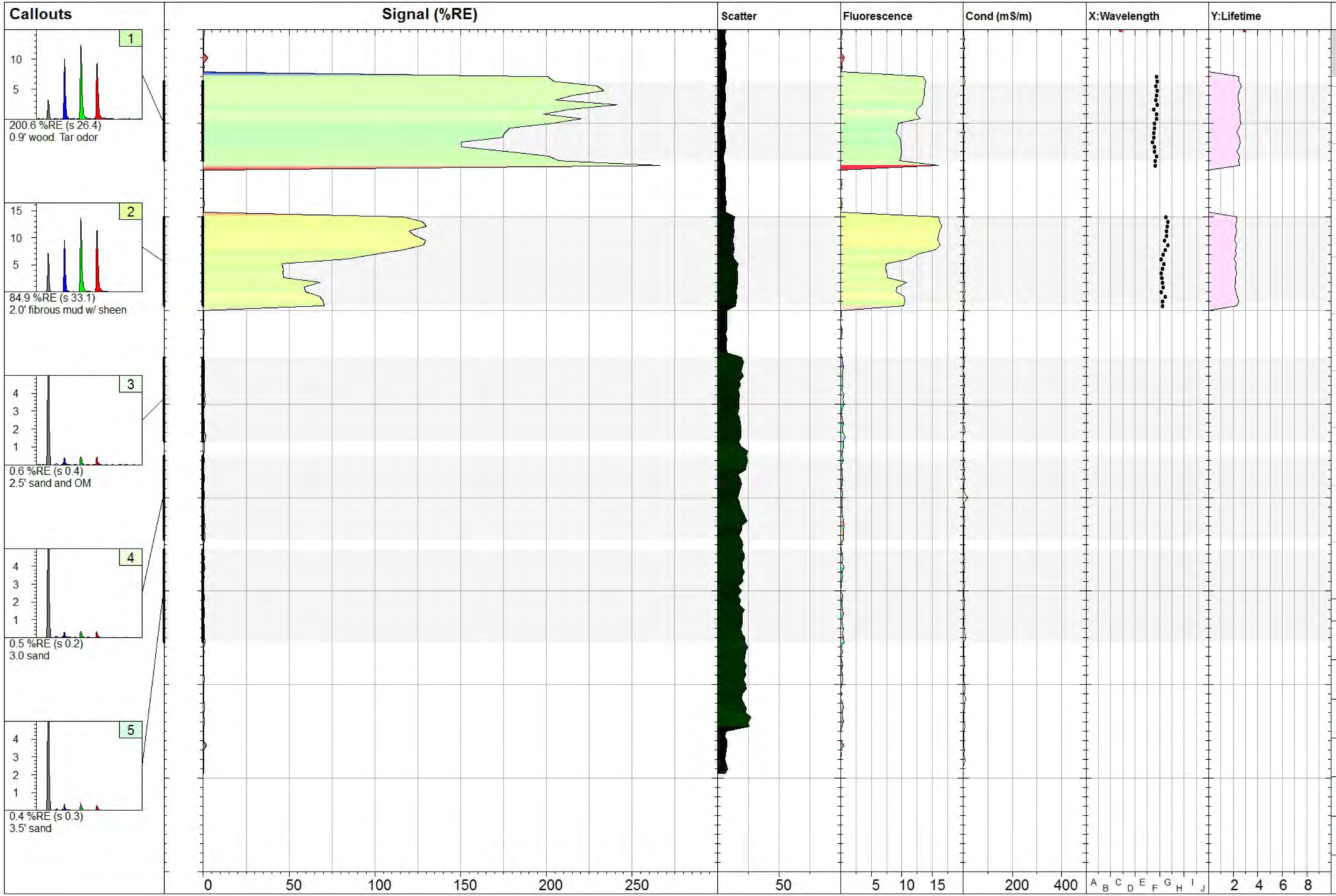
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

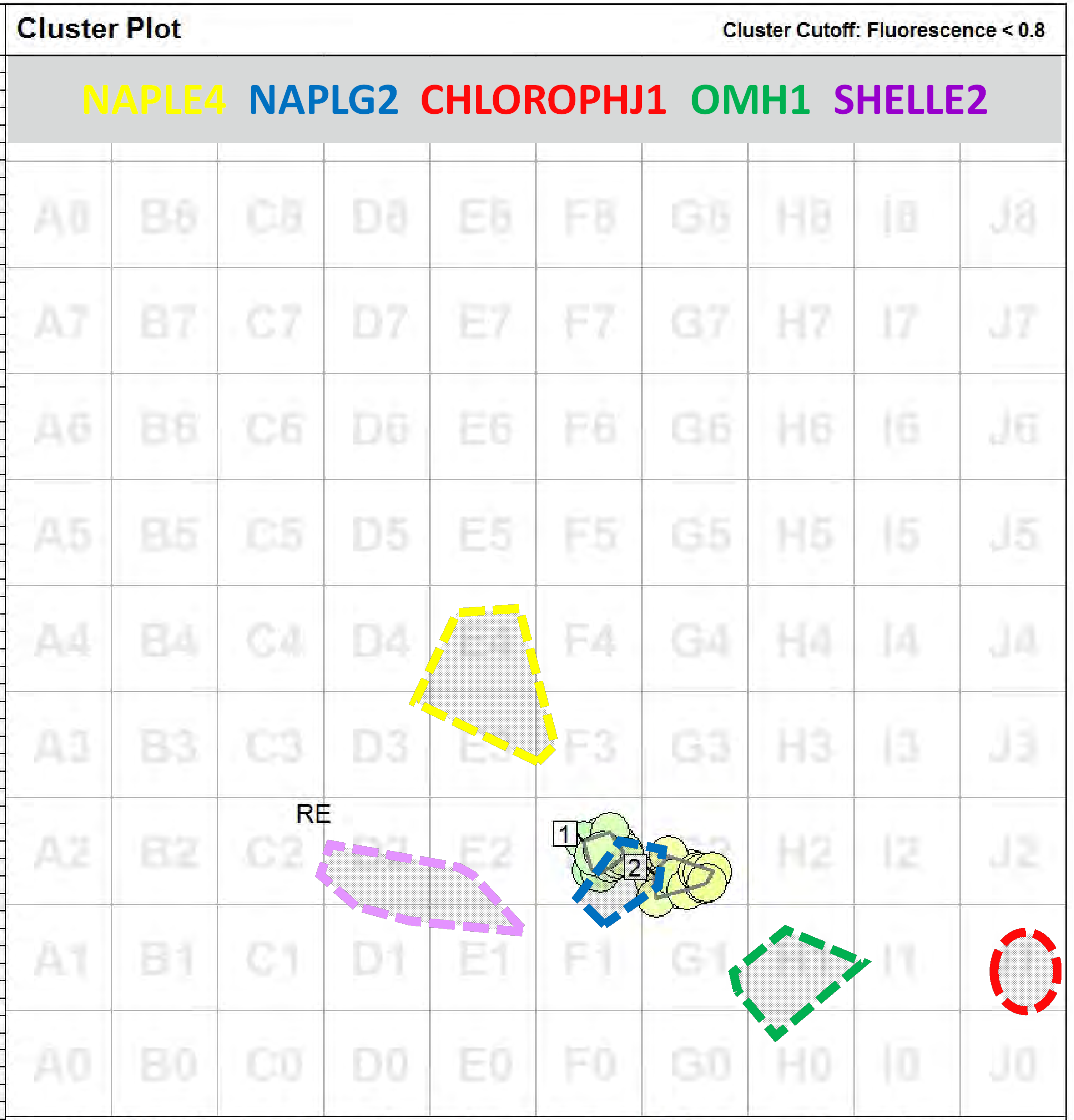
TarGOST® By Dakota

Data Presentation Format © 2023 Dakota Technologies, Inc. (v2.8.1)

Log: **I160-TG-EX**

Site: **BNSF Wishram**	Date & Time: **2022-11-09 10:58 PST**
Client: **Jacobs**	Job:
Final Depth:	X Coord.(Long/East): **Unavailable**
Max Signal: **41.8 %RE**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**



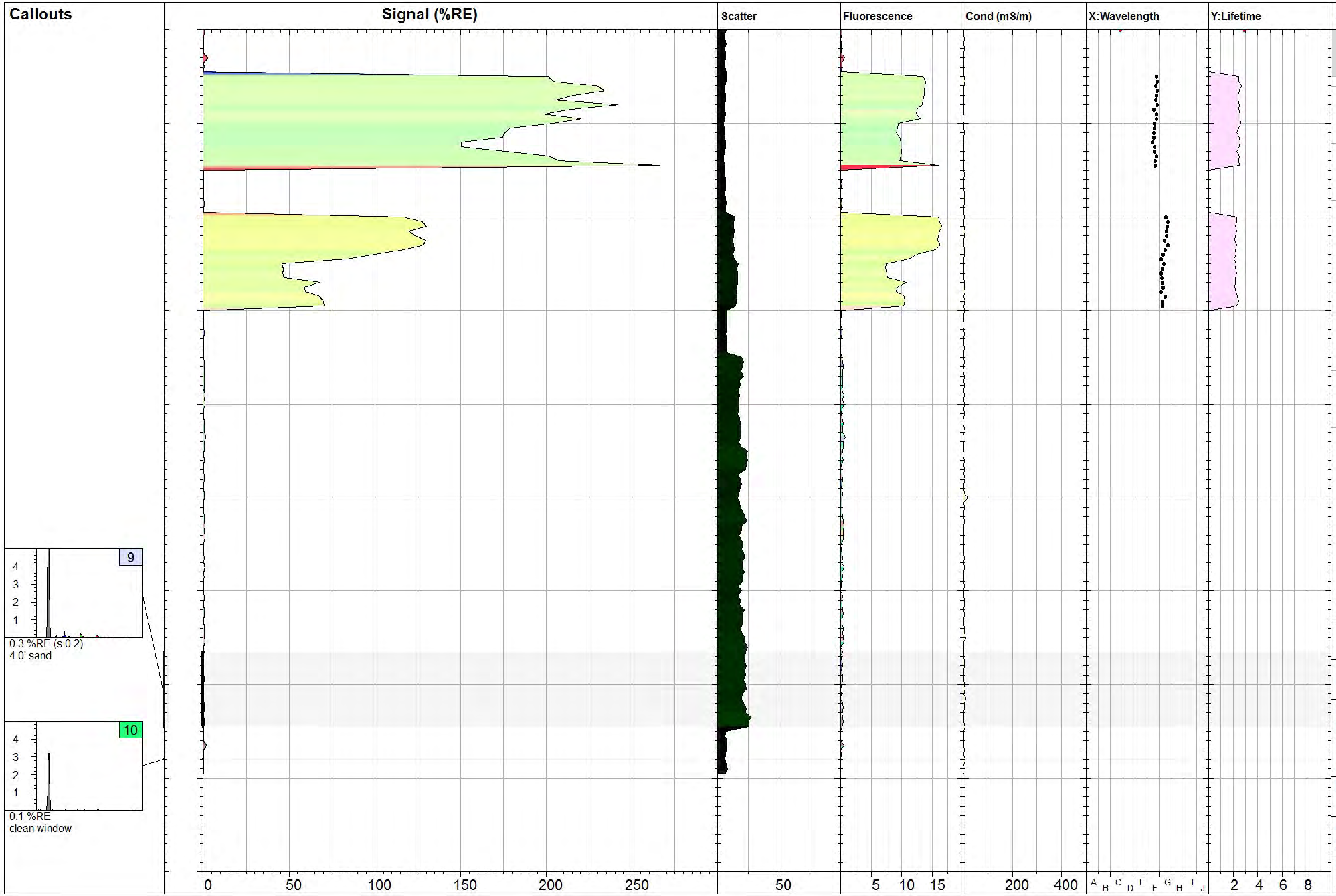


X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **K280-TG-EX**

Site: **BNSF Wishram**	Date & Time: **2022-11-10 14:07 PST**
Client: **Jacobs**	Job:
Final Depth:	X Coord.(Long/East): **Unavailable**
Max Signal: **266.9 %RE**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**

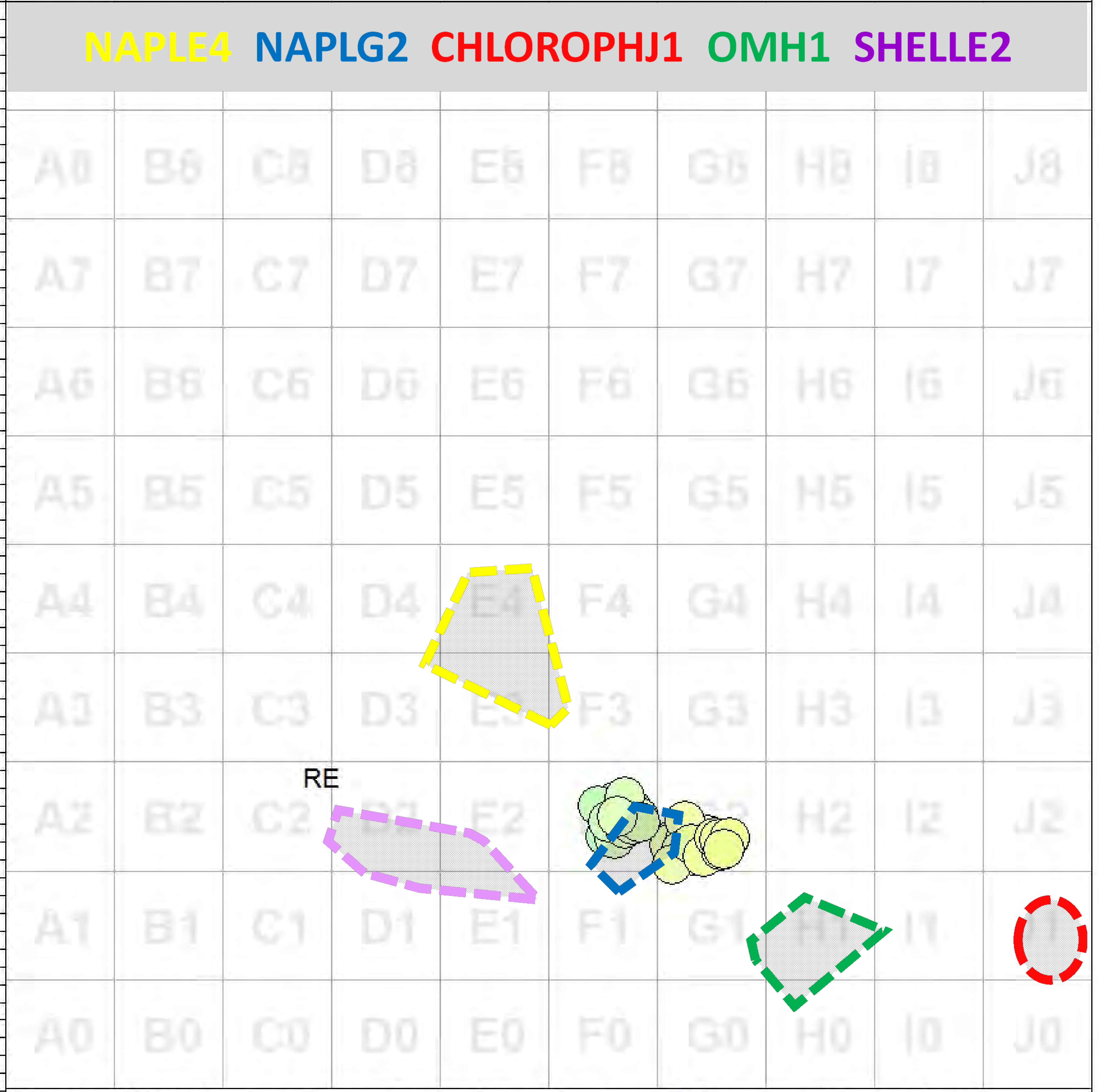


0.3 %RE (s 0.2)
4.0' sand

0.1 %RE
clean window

Cluster Plot

Cluster Cutoff: Fluorescence < 0.8

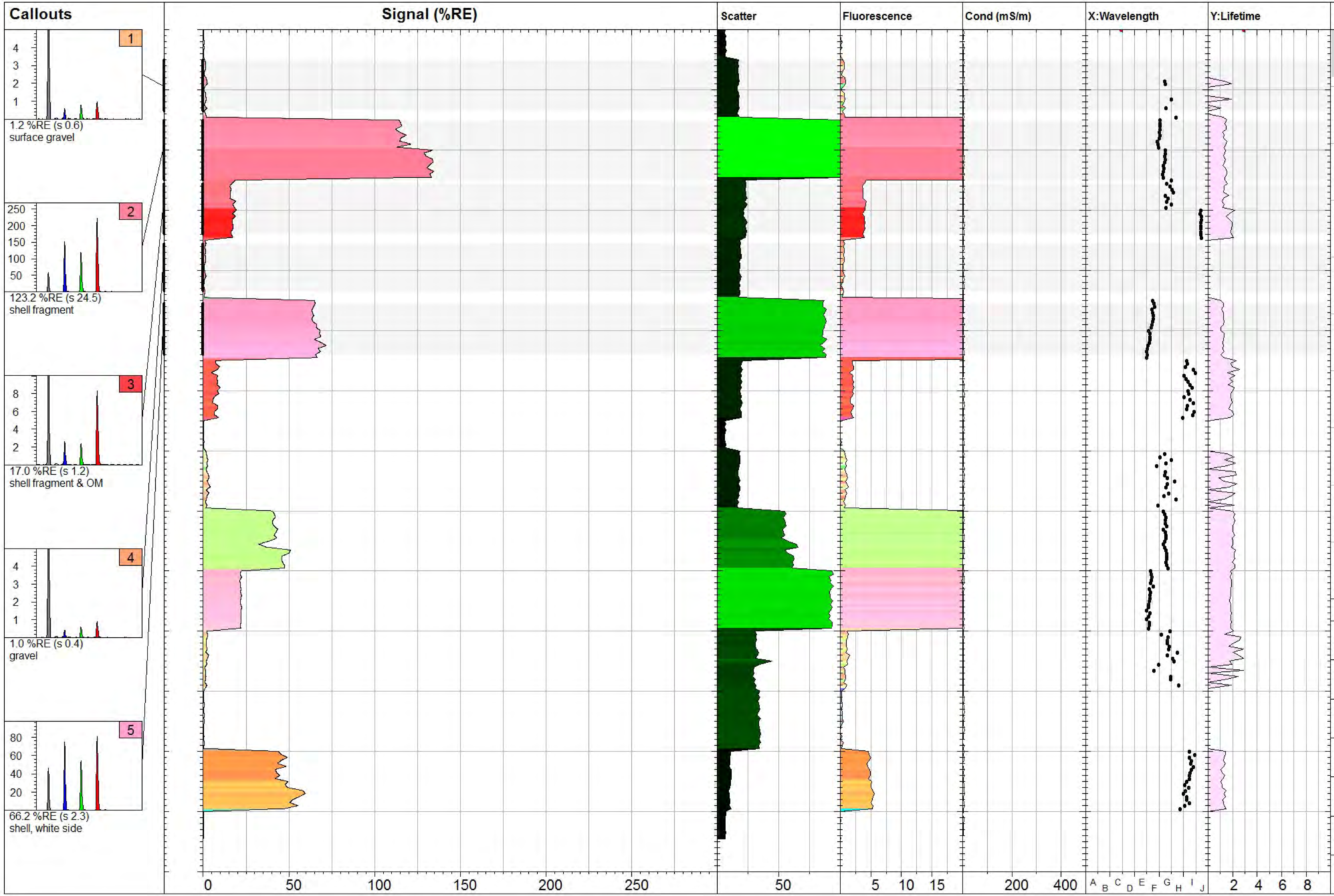


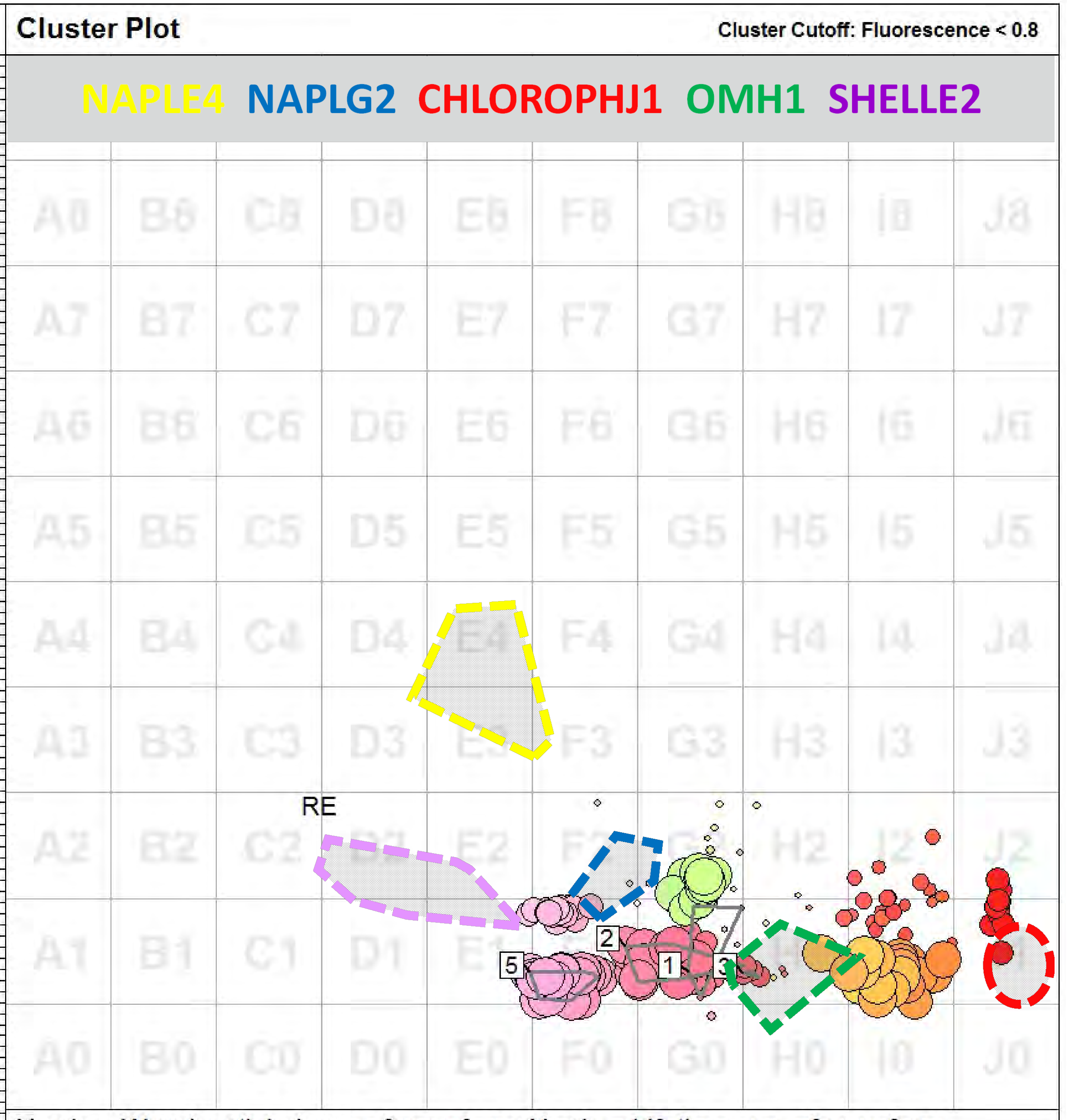
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **K280-TG-EX**

Site: **BNSF Wishram**	Date & Time: **2022-11-10 14:07 PST**
Client: **Jacobs**	Job:
Final Depth:	X Coord.(Long/East): **Unavailable**
Max Signal: **266.9 %RE**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**





X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

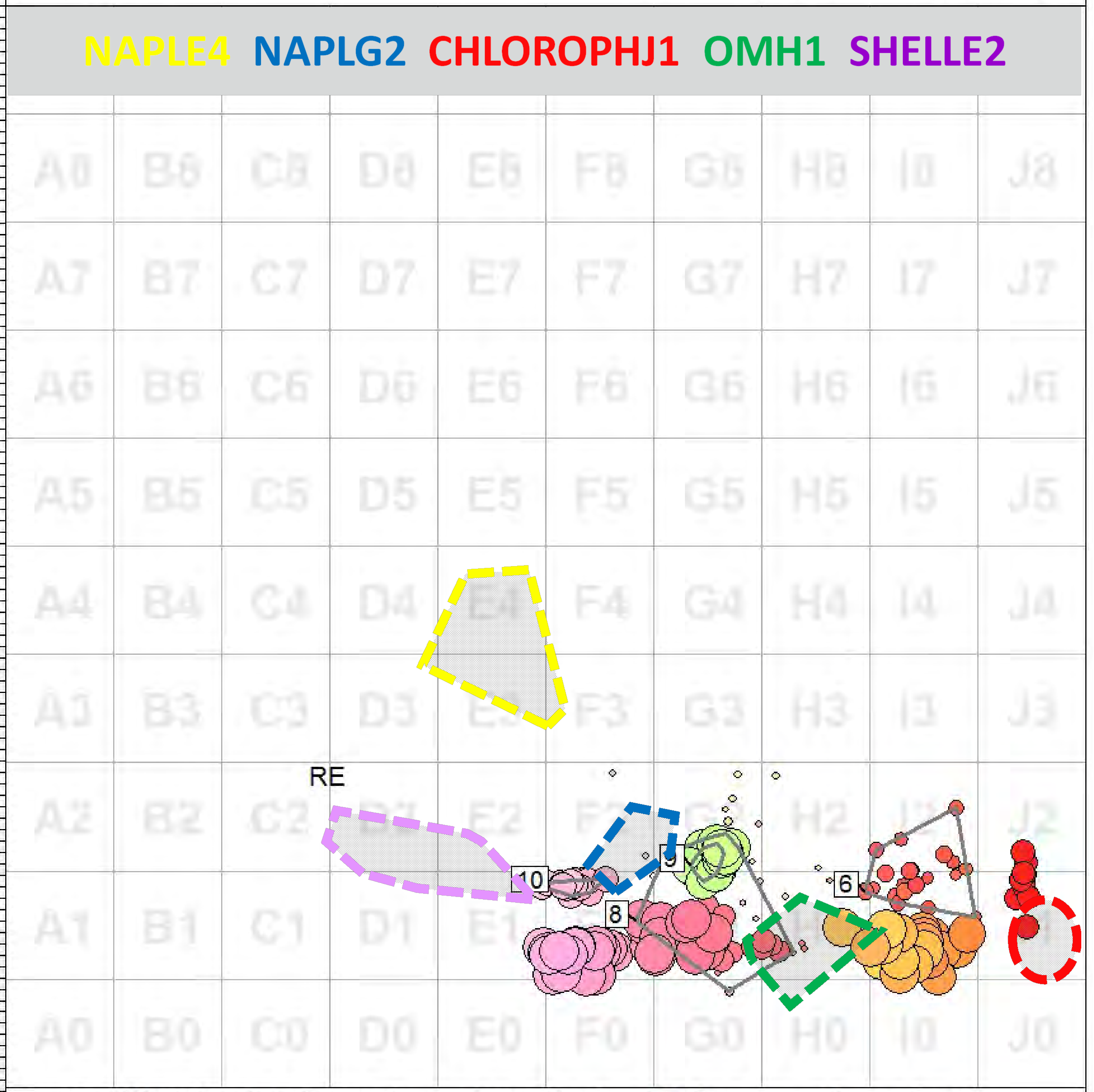
TarGOST® By Dakota

Log: **K360-TG-EX**

Site: **BNSF Wishram**	Date & Time: **2022-11-09 08:52 PST**
Client: **Jacobs**	Job:
Final Depth:	X Coord.(Long/East): **Unavailable**
Max Signal: **134.4 %RE**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**

Cluster Plot

Cluster Cutoff: Fluorescence < 0.8



X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **K360-TG-EX**

Site: **BNSF Wishram**	Date & Time: **2022-11-09 08:52 PST**
Client: **Jacobs**	Job:
Final Depth:	X Coord.(Long/East): **Unavailable**
Max Signal: **134.4 %RE**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**

11
1.8 %RE (s 0.6)
lrg shell frag, dk side

12
0.3 %RE (s 0.2)
quartz rock

13
48.7 %RE (s 5.5)
OM? no odor

14
0.0 %RE
clean window

X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Data Presentation Format © 2023 Dakota Technologies, Inc. (v2.8.1)

Log: **K360-TG-EX**

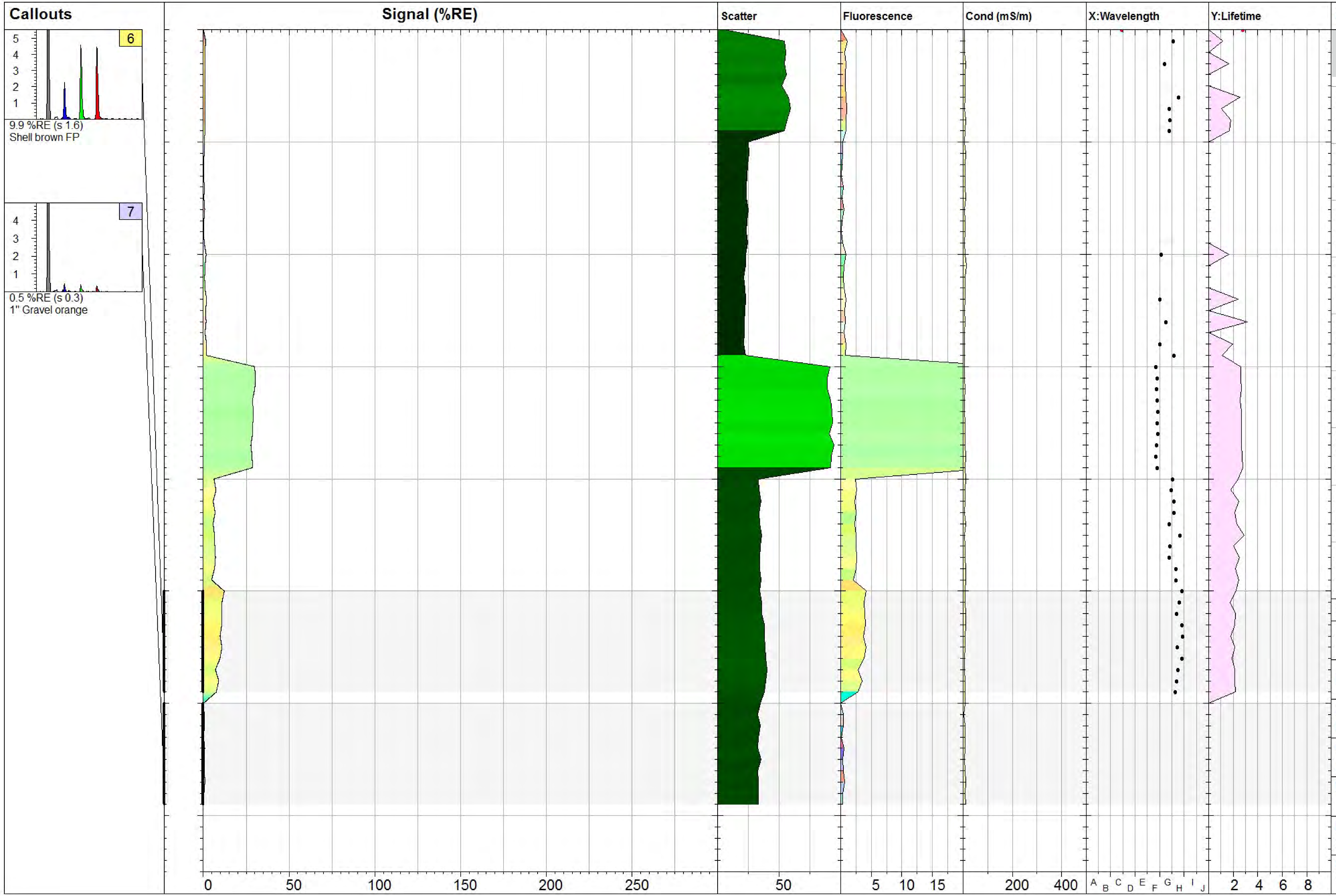
Site: **BNSF Wishram**	Date & Time: **2022-11-09 08:52 PST**
Client: **Jacobs**	Job:
Final Depth:	X Coord.(Long/East): **Unavailable**
Max Signal: **134.4 %RE**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **SDA / TG1807**	Elevation: **Unavailable**

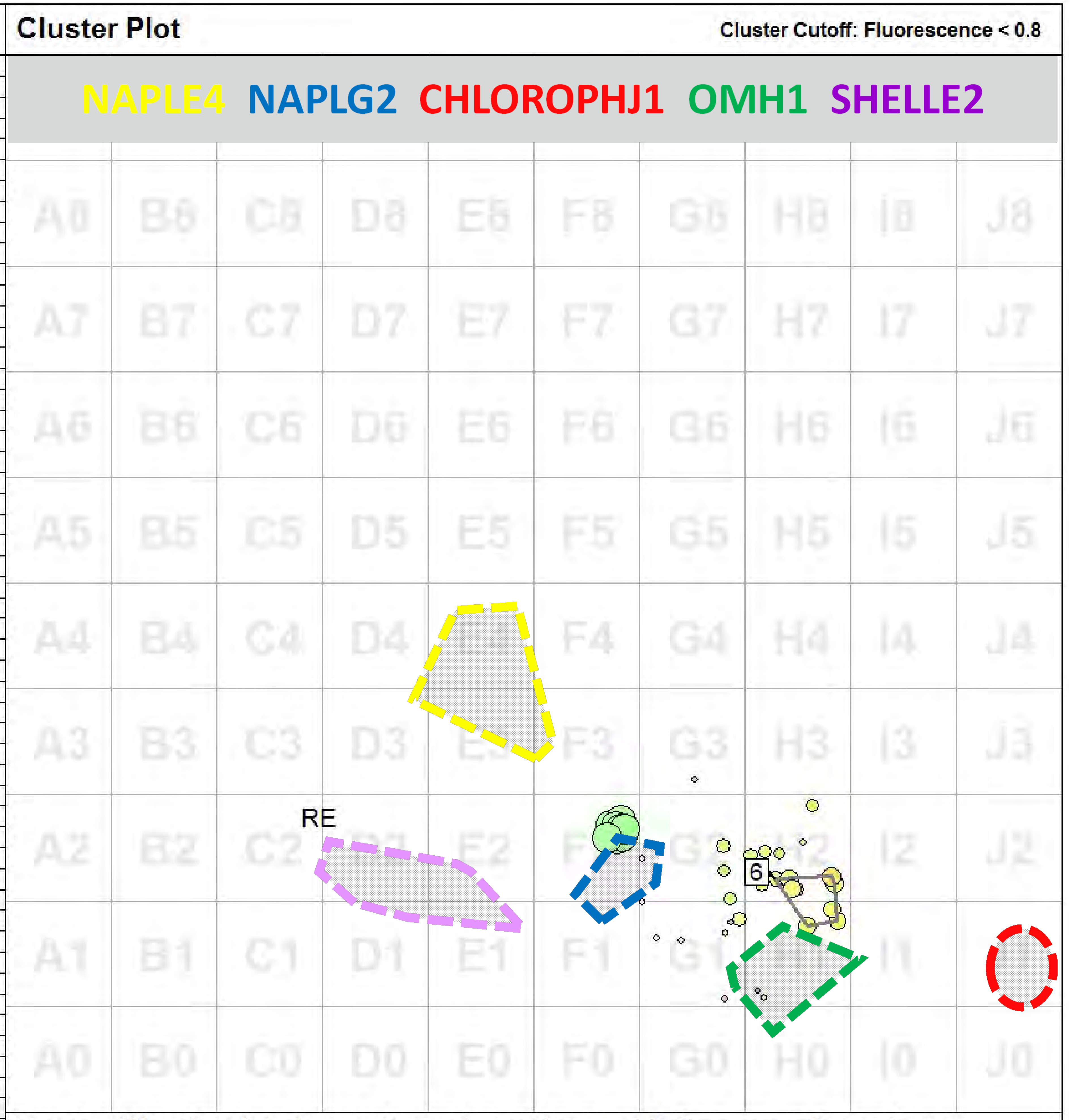
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **Wishram K360 Core**

Site: **BNSF Wishram**	Date & Time: **2022-12-16 12:58 CST**
Client: **Jacobs**	Job:
Final Depth:	X Coord.(Long/East): **Unavailable**
Max Signal: **30.3 %RE**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **T. Rudolph / TG1807**	Elevation: **Unavailable**



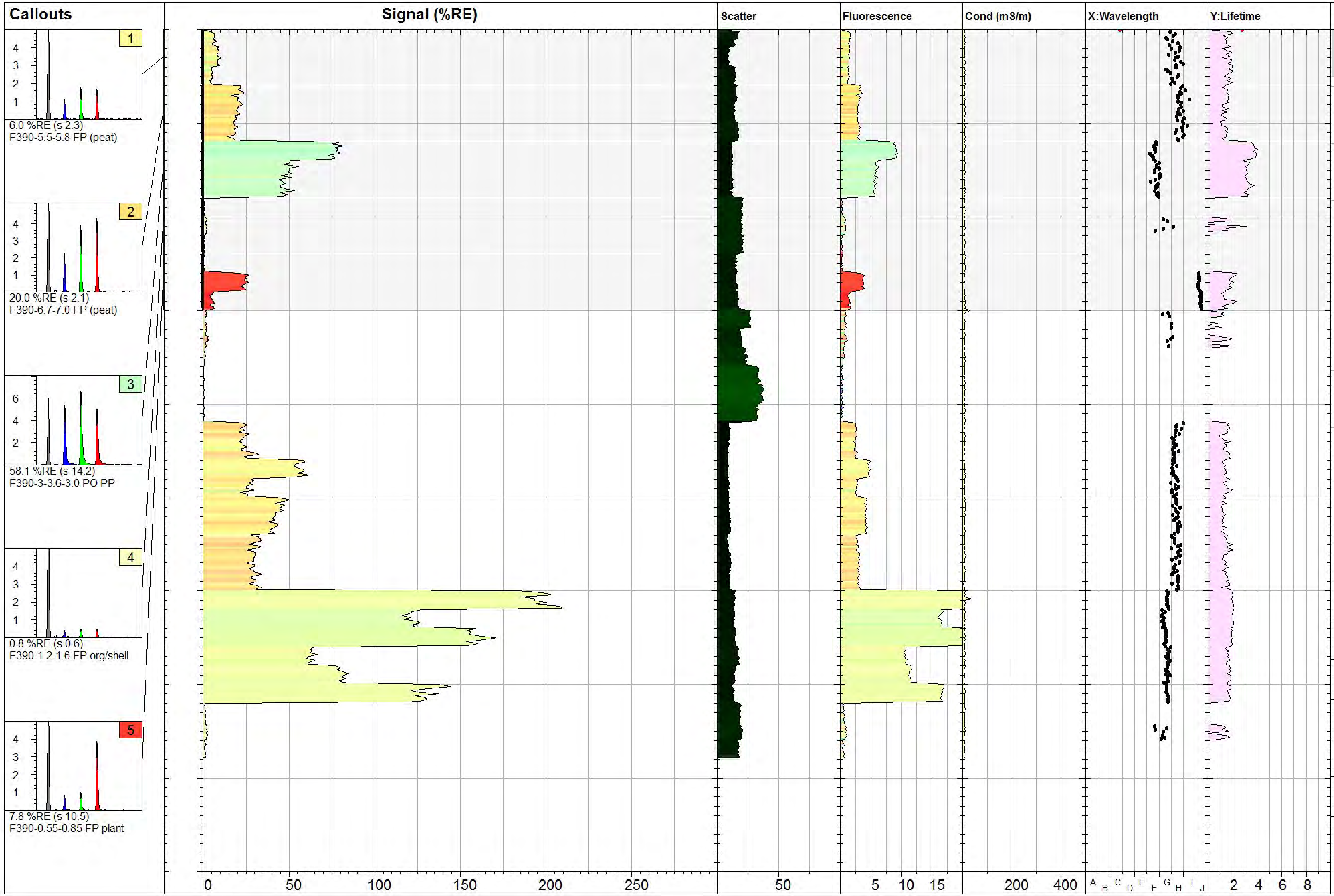


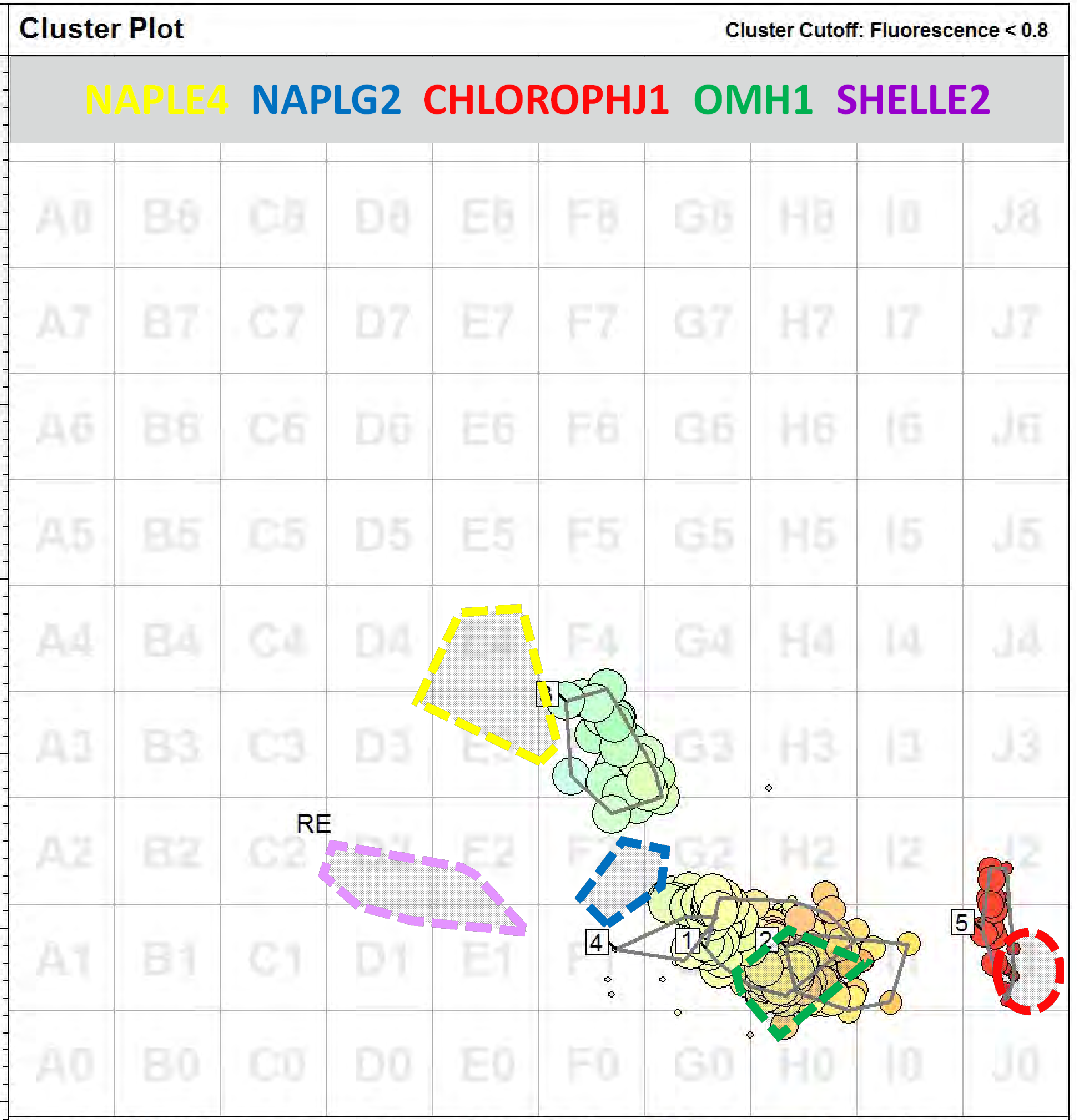
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **Wishram K360 Core**

Site: **BNSF Wishram**	Date & Time: **2022-12-16 12:58 CST**
Client: **Jacobs**	Job:
Final Depth:	X Coord.(Long/East): **Unavailable**
Max Signal: **30.3 %RE**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **T. Rudolph / TG1807**	Elevation: **Unavailable**



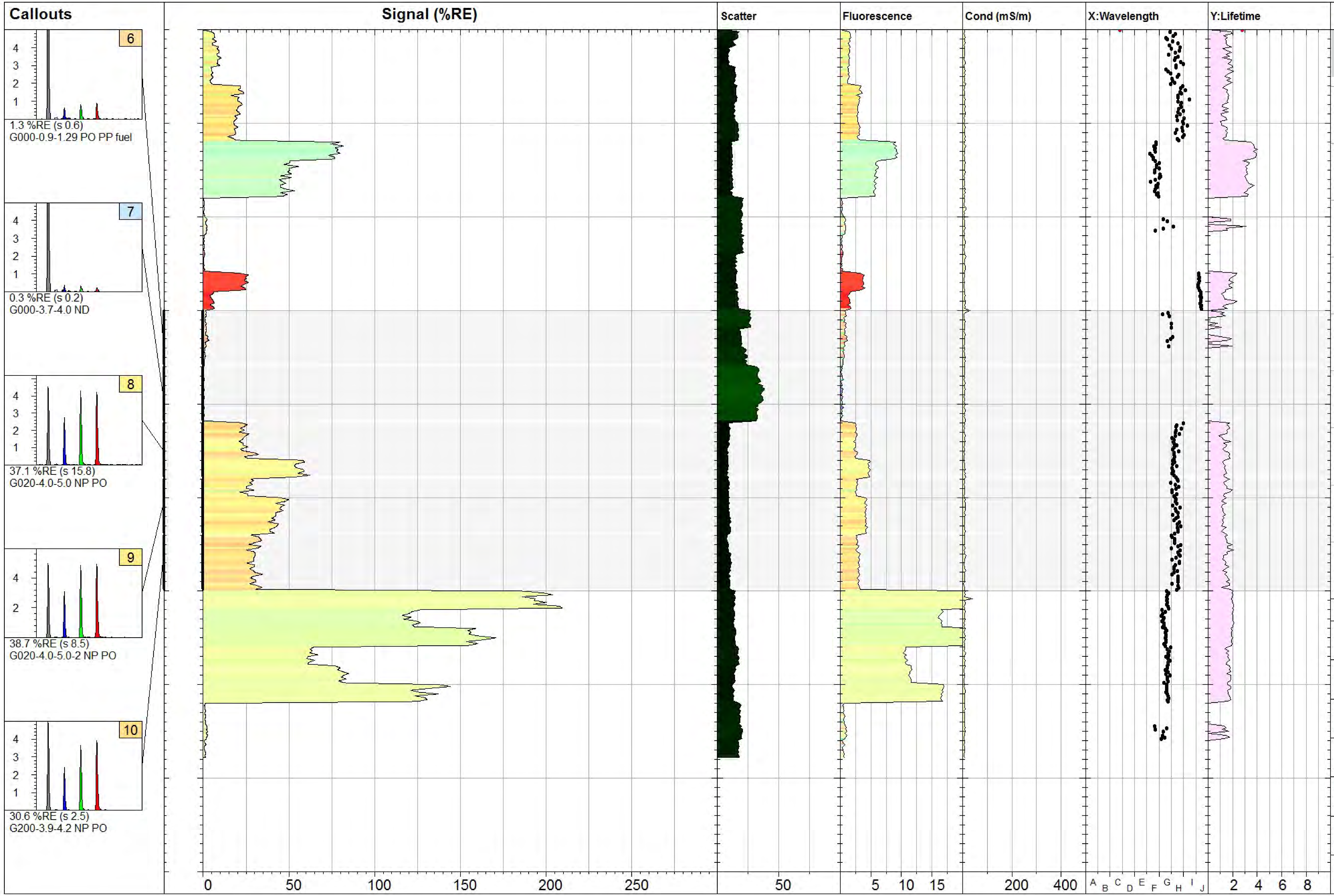


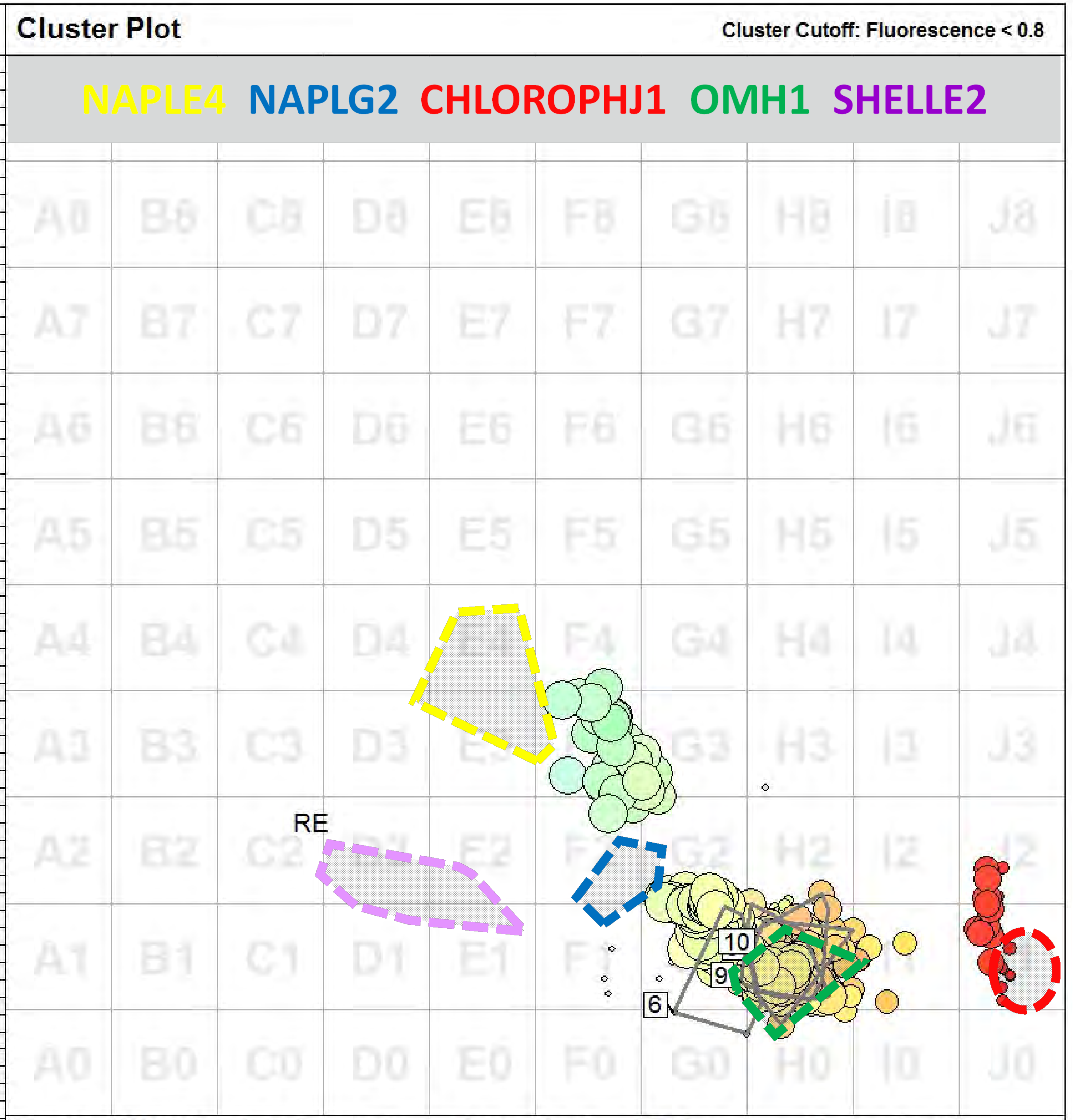
X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **Wishram Samples**

Site: **BNSF Wishram**	Date & Time: **2022-12-16 12:26 CST**
Client: **Jacobs**	Job:
Final Depth:	X Coord.(Long/East): **Unavailable**
Max Signal: **209.3 %RE**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **T. Rudolph / TG1807**	Elevation: **Unavailable**





X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Log: **Wishram Samples**

Site: **BNSF Wishram**	Date & Time: **2022-12-16 12:26 CST**
Client: **Jacobs**	Job:
Final Depth:	X Coord.(Long/East): **Unavailable**
Max Signal: **209.3 %RE**	Y Coord.(Lat/North): **Unavailable**
Operator / Unit: **T. Rudolph / TG1807**	Elevation: **Unavailable**

X-axis = Wavelength balance of waveform; Y-axis = Lifetime avg. of waveform

TarGOST® By Dakota

Data Presentation Format © 2023 Dakota Technologies, Inc. (v2.8.1)

Log: **Wishram Samples**

Site:
BNSF Wishram

Date & Time:
2022-12-16 12:26 CST

Client:
Jacobs

Job:

Final Depth:

X Coord.(Long/East):
Unavailable

Max Signal:
209.3 %RE

Y Coord.(Lat/North):
Unavailable

Operator / Unit:
T. Rudolph / TG1807

Elevation:
Unavailable

Appendix G-4
UV and White Light Photos


G000
G000
10/?
G000
A8
0.9-1.2
11/8/22 1200
DAKOTA
G000
A9
3.7-4.0
11/8/22 1200
DAKOTA
1045
G020
11/4/22
4-5
IMPACTED
DAKOTA
G020
11/4/22
1035
4.0
-5.0
F390
10/7 1030
0.55-0.85
DAKOTA
F390
10/7 1030
1.2-1.6
DAKOTA
F390
10/7 1030
3.0-3.6
DAKOTA
F390
10/7 1030
5.5-5.8
DAKOTA
F390
10/7 1030
6.7-7
DAKOTA


G000 A8
0.8-1.2
11/8/22 1200
DAKOTA
G000 A8
3.7-4.0
11/8/22 1200
DAKOTA
GD20
11/4/22
4-5
DAKOTA
11/4/22
G020
1035
4.0
-5.0
F390
10/7 1030
DAKOTA
F390
10/7 1030
1.2-1.6
DAKOTA
F390
10/7 1030
2.0-2.6
DAKOTA
F390
10/7 1030
5.5-5.8
DAKOTA
F390
10/7 1030
6.7-7
DAKOTA


K280 A2
11/10/22 1430
1.5ft
DAKOTA
K280 A2
11/10/22 1430
2.0ft
DAKOTA
K280
A2
11/10/22 1430
2.5-3.0
DAKOTA


K280 A2
11/10/22 1430
1.5ft
DAKOTA
K280 A2
11/10/22 1430
2.0ft
DAKOTA
K280 A2
11/10/22 1430
2.5-3.0
DAKOTA


G200
11/7 1400
3.9-4.2
DAKOTA


G200
11/7 1400
3.9-4.2
DAKOTA


DAKOTA
K 360
0.0-1.0
11/8/22


DAKOTA
K 360
0.0-1.0
11.8.22

Table G-1
Ex-situ Sample Results

Table G-1. Ex-situ Sample Results

BNSF Wishram Sediment Remedial Investigation Report

Station	Sample ID	Intervals Sampled	Date Sampled	Time Sampled	Description of media	Notes	Dakota notes from UV inspection	Dakota notes from TarGOST inspection
SHIPPED TO DAKOTA								
F390	F390-5.5-5.8	5.5-5.8	11/7/2022	10:30	Organics	Roots and Woody Debris	Orange/ Slight Lid Staining	FP- Peat-like
F390	F390-6.7-7.0	6.7-7	11/7/2022	10:30	Organics	Roots and Woody Debris	Orange/ Slight Lid Staining	FP- Peat-like
F390	F390-3-3.6-3.0	3-3.6	11/7/2022	10:30	Organics w/ Fuel Odor	Roots and Woody Debris	Bright Green/Heavy Staining On Lid	PO- Fuel Oil PP- Staining on Lid
F390	F390-1.2-1.6	1.2-1.6	11/7/2022	10:30	Organics	Roots and Woody Debris	Specks Otherwise Non-detect	FP- Roots, Wood, Shells
F390	F390-0.55-0.85	0.55-0.85	11/7/2022	10:30	Organics	Plant/Chlorophyll	Specks /Organics Otherwise Non-detect	FP- Plant Material Sand and Clay
G000	G000-0.9-1.29	0.9-1.2	11/8/2022	12:00	Organics (phc odor)	Roots;slight petro odor after being jarred, not observed during logging	Specks /Light Stain on Lid	PO- Diesel-like PP- light Staining on Lid
G000	G000-3.7-4.0	3.7-4	11/8/2022	12:00	Unimpacted Sand		Specks Otherwise Non-detect	ND -Clean Sand
G020	G020-4.0-5.0	4-5	11/4/2022	10:35	CH	Separate sample. Notes not clear but believe this was intended to be "clean" belowobserverd saturated interval	Bright Orange/Staining on Lid	NP- Tar PO -tar/Naptha
G020	G020-4.0-5.0-2	4-5	11/4/2022	10:45	Impacted CH	Labeled as impacted	Bright orange/staining on lid	NP- Tar PO -Tar/Naptha
G200	G200-3.9-4.2	3.9-4.2	11/7/2022	14:00	Tar-Laden Woody Debris		Bright /Staining on Lid	NP- Tar PO -Tar/Naptha
K280	K280-2.0	2.0	11/10/2022	14:30	SP-SM	Saturated sediments; no hits on TarGOST	Bright /Staining on Lid	NP-Slight Oil PO -oil-like
K280	K280-1.5	1.5	11/10/2022	14:30	Woody Chunk		Bright /Staining on Lid	NP-NAPL Soaked Wood PO-Naptha FP-Wood
K280	K280-2.5-3.0	2.5-3	11/10/2022	14:30	SP-SM	Saturated sediments; no hits on TarGOST	Orange Liquid?/ Stain on Lid	ND -Clean Sand
K360	K360-0.0-1.0	0-1	11/8/2022	15:35	Cobbles, Gravels, Sands, and Shells	7+ items also profiled on barge - see ex-situ log	Shells Visable	Gravel, Shells

Notes:
NP = NAPL Present
NS = NAPL Stain
PP = PAHs Present
FP = False Positive
PO = Positive Odor
ND = Non-detect
CH = Fat Clay
SP-SM = Poorly graded sand with silt

Appendix H
Data Quality Evaluation Reports

Appendix H. Data Quality Evaluation Reports

This appendix provides the data quality evaluation report information from the sediment sampling events and includes the following:

- Appendix H-1 – Data Quality Evaluation – Step 1
- Appendix H-2 – Data Quality Evaluation – Step 2

Appendix H-1

Data Quality Evaluation - **Step** 1

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1

Data Quality Evaluation

Final

June 2024

Contents

Tables

Introduction

The objective of this data quality evaluation (DQE) report is to assess the data quality of analytical results for sediment samples collected as part of sediment investigation activities in the aquatic lands adjacent to the BNSF Railway Company (BNSF) Wishram Railyard (aka BNSF Track Switching Facility) in Wishram, Washington. This DQE covers results for sample delivery groups (SDGs) received as part of the Step 1 sampling in April 2022. Individual method requirements and guidelines from the BNSF Wishram Railyard, Wishram, Washington, Sediment Remedial Investigation Work Plan (Jacobs 2021a) (Work Plan) were used in this assessment.

This report is intended as a general data quality assessment designed to summarize data issues.

Analytical Data

This DQE report covers 21 normal sediment samples, two sediment field duplicates (FDs), seven sediment matrix spike/matrix spike duplicate (MS/MSD) sets, and two equipment blanks (EBs). A list of samples and collection dates is included in Table 1. Samples were collected between April 19 and April 29, 2022. These sample results were reported as nine sample delivery groups (SDG) listed in Table 2. The analyses were performed by Pace Laboratory in Minneapolis, Minnesota, Pace Laboratory in Mount Juliet, Tennessee, Pace Laboratory in Sheridan, Wyoming and Eurofins Frontier Geosciences in Seattle, Washington. Thirteen methods were used to analyze the environmental samples. One or more of the samples were analyzed for the analytes/methods presented in Table 3.

Field samples were also reviewed to ascertain field compliance and data quality issues. This included a review of FDs, MS/MSDs, and EBs.

Data flags were assigned according to the Work Plan. Multiple flags are routinely applied to specific sample method/matrix/analyte combinations, but there will be only one final flag. A final flag is applied to the data and is the most conservative of the applied validation flags in the order of most conservative to least conservative as follows: R, B, J, UJ, and U.

The data flags are defined as follows:

- J = Analyte was present but reported value may not be accurate or precise.
- B = Analyte was detected in the associated method blank or field blank.
- R = This result has been rejected.
- U = This analyte was analyzed for but not detected at the specified detection limit.
- UJ = The analyte was not detected above the detection limit objective; however, the reported detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Findings

Table 4 shows all final validation flags based on the most conservative of the applied validation flags. The following sections and Tables 5 through 13 summarize the data qualifiers applied for each element of quality control.

Calibration

The recovery of benzoic acid was less than the lower control limit in a continuing calibration verification for Method SW8270E, indicating associated sample results are possibly biased low. One associated detected result in sample BNSF-SG11-042822-0-5 was qualified as estimated and flagged “J;” one associated nondetected result in sample BNSF-E380-042822-0-4 was qualified as estimated and flagged “UJ.”

The samples and analytes affected by CCV exceedances are shown in Table 5.

Holding Times

All holding-time criteria were met with the following exceptions:

Samples BNSF-SG01-041922-0-10, BNSF-SG02-041922-0-10 and FD01-041922-0-10 were analyzed 3 days past the 14-day holding time for Method SW9030B, associated results are possibly biased low. Three associated nondetected results were qualified as estimated and flagged “UJ.”

Sample BNSF-E320-042822-0-4 was inadvertently not sent to the subcontract laboratory for Methods E350.1 and SW9060A upon receipt at the main laboratory. The sample was sent after the holding time was expired. Two associated detected results were qualified as estimated and flagged “J.”

The samples and analytes affected by holding time exceedances are shown in Table 6.

Method Blanks

Method blanks were analyzed at the required frequency and were free of contamination that would affect the sample results with the following exceptions:

Total petroleum hydrocarbons as motor oil was detected less than the reporting limit (RL) in a method blank for Method NWTPH-Dx. Two associated results less than five times the blank concentration were qualified as estimated and flagged “B” in samples BNSF-BG13-042122-0-10 and BNSF-SG23-042122-0-6.

Lead was detected less than the RL in a method blank for Method SW6020B. One associated result less than five times the blank concentration was qualified as estimated and flagged “B” in sample BNSF-BG13-042122-0-10.

Total organic carbon was detected less than the RL in a method blank for Method SW9060A. Two associated results less than five times the blank concentration were qualified as estimated and flagged “B” in samples BNSF-BG16-042722-0-10 and BNSF-SG13-042522-0-1.5.

OCDD was detected less than the RL in a method blank for Method E1613B. One associated result in sample BNSF-SG23-042122-0-6 was detected less than five times the blank concentration and was qualified as estimated and flagged “B”.

Ammonia was detected less than the RL in the method blanks for Method E350.1. Associated results less than five times the blank concentrations were qualified as estimated and flagged “B” in samples BNSF-I120-042922-0-6, BNSF-L320-042922-0-2, BNSF-D160-042822-0-5, BNSF-E380-042822-0-4, BNSF-E460-042922-0-4, BNSF-H360-042922-0-8, BNSF-SG11-042822-0-5 and BNSF-BG20-042922-0-10.

The samples and analytes affected by method blank detections are shown in Table 7.

Equipment Blanks

Two EBs were collected and analyzed and were free of contamination that would affect the sample results.

Field Duplicates

Two FD sets were collected. The precision criteria of 20 percent was met with the exceptions listed as follows.

The relative percent differences (RPD) of total petroleum hydrocarbons as motor oil and total petroleum hydrocarbons as diesel were greater than criteria in FD set BNSF-SG01-041922-0-10/FD01-041922-0-10 for Method NWTPH-Dx. Four associated detected results were qualified as estimated and flagged "J."

The RPDs of OCDD, 1,2,3,4,6,7,8-HpCDD and Total HpCDD were greater than criteria in FD set BNSF-BG17-042722-0-10/ FD02-042722-0-10 for Method E1613B. Six associated detected results were qualified as estimated and flagged "J."

The RPDs of OCDD and Total HpCDD were greater than criteria in FD set BNSF-SG01-041922-0-10 / FD01-041922-0-10 for Method E1613B. Four associated detected results were qualified as estimated and flagged "J."

The samples and analytes affected by FD RPD exceedances are shown in Table 8.

Laboratory Duplicates

Laboratory duplicates were analyzed where required by the method. All precision criteria were met with the following exception:

The RPD of total organic carbon was greater than the criteria of 20 percent in the laboratory duplicate of sample BNSF-L320-042922-0-2 for Method SW9060A. One associated detected result was qualified as estimated and flagged "J."

The samples and analytes affected by laboratory duplicate RPD exceedances are shown in Table 9.

Laboratory Control Samples

Laboratory control sample/ laboratory control sample duplicate (LCS/LCSDs) were analyzed for all methods as required. All acceptance criteria were met.

Matrix Spike Samples and Post-digestion Spikes

The results of matrix spike/matrix spike duplicate (MS/MSD) and post-digestion spike (PDS) analyses provide information about the possible influence of the matrix on either accuracy or precision of the measurements. All acceptance criteria were met with the following exceptions:

The recovery of silver was less than the lower control limit in the PDS of samples BNSF-BG13-042122-0-10 and BNSF-SG13-042522-0-1.5 for Method SW6020B, indicating associated sample results are possibly biased low. One associated nondetected result was qualified as estimated and flagged “UJ;” one associated detected result was qualified as estimated and flagged “J.”

The recovery of copper was greater than the upper control limit in the PDS of sample BNSF-E320-042822-0-4 for Method SW6020B, indicating the associated sample result is possibly biased high. The associated detected result was qualified as estimated and flagged “J.”

The recovery of zinc was greater than the upper control limit in the MS and MSD of sample BNSF-BG13-042122-0-10 for Method SW6020B, indicating the associated sample result is possibly biased high. The associated detected result was qualified as estimated and flagged “J.”

The recovery of lead was greater than the upper control limit in the MS of sample BNSF-SG13-042522-0-1.5 for Method SW6020B, indicating the associated sample result is possibly biased high. Additionally, the RPD of lead was greater than criteria in this same MS/MSD set. The associated detected result was qualified as estimated and flagged “J.”

The recovery of ammonia was less than the lower control limit in the MSs and MSDs of samples BNSF-BG14-042722-0-5.5 and BNSF-E320-042822-0-4 for Method E350.1, indicating the associated sample results are possibly biased low. The associated detected results were qualified as estimated and flagged “J.”

The recovery of ammonia was less than the lower control limit in the MSD of sample BNSF-BG20-042922-0-10 for Method E350.1, indicating the associated sample result is possibly biased low. The associated detected result was qualified as estimated and flagged “J.”

The recovery of PCB-81 was less than the lower control limit in the MS of sample BNSF-BG20-042922-0-10 for Method E1668C, indicating the associated sample result is possibly biased low. The associated nondetected result was qualified as estimated and flagged “UJ.”

The samples and analytes affected by MS/MSD recovery and RPD, or PDS, exceedances are shown in Table 10.

Surrogates

Surrogates were analyzed for all required methods. All acceptance criteria were met with the following exceptions:

Surrogate recoveries were less than the lower control limit in sample BNSF-L320-042922-0-2 for Method E1613B, indicating associated sample results are possibly biased. Two associated nondetected results were qualified as estimated and flagged “UJ.”

Surrogate recoveries were less than the lower control limit in sample BNSF-E460-042922-0-4 for Method E1668C, indicating associated sample results are possibly biased. Two associated nondetected results were qualified as estimated and flagged “UJ.”

The samples and analytes affected by surrogate recovery exceedances are shown in Table 11.

Internal Standards

Internal standards were analyzed for all required methods. All acceptance criteria were met.

Estimated Maximum Possible Concentrations

EMPCs were reported for Method E1613B where ion abundance ratio criteria were not met. One or more of seven analytes in samples BNSF-D160-042822-0-5, BNSF-E320-042822-0-4, BNSF-H360-042922-0-8 and BNSF-L320-042922-0-2 were reported as EMPCs. The results were qualified as estimated and flagged “J.”

EMPCs were reported for Method E16668C where ion abundance ratio criteria were not met. One or more of five analytes in samples BNSF-BG15-042722-0-10, BNSF-E320-042822-0-4, BNSF-H360-042922-0-8, BNSF-SG02-041922-0-10 and BNSF-SG03-042722-0-5.5 were reported as EMPCs. The results were qualified as estimated and flagged “J.”

The samples and analytes where EMPCs are reported are shown in Table 12.

Chain of Custody

Samples were documented in a completed chain-of-custody and received at the laboratory within temperature criteria with the following exceptions:

Nine samples were received at the laboratory over the temperature criterion at 8.9 degrees Celsius and 11 degrees Celsius. Associated results are possibly biased low for Methods E1613B, E1668C, E350.1, SW9060A, SW9030B, SW8270E and NWTPH-Dx. Methods SW6020B and SW7471B do not have a temperature requirement and are not affected by the temperature exceedance. In total, 148 associated detected results were qualified as estimated and flagged “J“ and 473 associated nondetected results were qualified as estimated and flagged “UJ” in samples BNSF-BG20-042922-0-10, BNSF-D160-042822-0-5, BNSF-E320-042822-0-4, BNSF-E380-042822-0-4, BNSF-E460-042922-0-4, BNSF-H360-042922-0-8, BNSF-I120-042922-0-6, BNSF-L320-042922-0-2 and BNSF-SG11-042822-0-5.

The samples and analytes affected by temperature exceedances are shown in Table 13.

Overall Assessment

The final activity in the DQE is an assessment of whether the data meets the data quality objectives (DQOs). The goal of this assessment is to demonstrate that a sufficient number of representative samples were collected and the resulting analytical data can be used to support the decision-making process. The following summary highlights the data evaluation findings for the above defined events:

1) No data were rejected, and the completeness goal of 95 percent was met for all method/analyte combinations.
2) Approximately 26 percent of the data were qualified due to quality control exceedances that included the following: FD and laboratory duplicate RPD exceedances, holding time exceedances, laboratory blank contamination, surrogate recovery exceedances, MS/MSD recovery and RPD exceedances, PDS recovery exceedances, ion ratio exceedances resulting in EMPC, calibration check exceedances, and sample receipt temperature exceedances.
3) Overall, the precision and accuracy of the data, as measured by laboratory and field quality control indicators, suggest that the DQOs were met. Data are usable for project decision-making, considering the biases outlined in this data quality evaluation.

4) Representativeness and comparability of the data was achieved through adherence to the sampling plan. Consistent sample collection procedures, project laboratories and analytical methodologies were used throughout the sampling event. Data were reported in consistent methods and units for the sampling event and with historical data.

5) Sensitivity of the data was maintained with consistent reporting limits, adjusted for percent moisture.

References

Jacobs. 2021. *BNSF Wishram Railyard, Wishram, Washington, Sediment Remedial Investigation Work Plan*. November.

Tables

Table H1-1. Sample Identifications

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

	Sample Type	Date Sampled
EB01-042822-01	EB	4/28/2022
EB02-042822-02	EB	4/28/2022
FD01-041922-0-10	FD	4/19/2022
FD02-042722-0-10	FD	4/27/2022
BNSF-BG13-042122-0-10	N	4/21/2022
BNSF-BG14-042722-0-5.5	N	4/27/2022
BNSF-BG15-042722-0-10	N	4/27/2022
BNSF-BG16-042722-0-10	N	4/27/2022
BNSF-BG17-042722-0-10	N	4/27/2022
BNSF-BG18-042722-0-10	N	4/27/2022
BNSF-BG19-042722-0-10	N	4/27/2022
BNSF-BG20-042922-0-10	N	4/29/2022
BNSF-D160-042822-0-5	N	4/28/2022
BNSF-E320-042822-0-4	N	4/28/2022
BNSF-E380-042822-0-4	N	4/28/2022
BNSF-E460-042922-0-4	N	4/29/2022
BNSF-H360-042922-0-8	N	4/29/2022
BNSF-I120-042922-0-6	N	4/29/2022
BNSF-L320-042922-0-2	N	4/29/2022
BNSF-SG01-041922-0-10	N	4/19/2022
BNSF-SG02-041922-0-10	N	4/19/2022
BNSF-SG03-042722-0-5.5	N	4/27/2022
BNSF-SG11-042822-0-5	N	4/28/2022
BNSF-SG13-042522-0-1.5	N	4/25/2022
BNSF-SG23-042122-0-6	N	4/21/2022
BNSF-BG13-042122-0-10-MS	MS	4/21/2022
BNSF-BG14-042722-0-5.5-MS	MS	4/27/2022
BNSF-BG19-042722-0-10MS	MS	4/27/2022
BNSF-BG20-042922-0-10MS	MS	4/29/2022
BNSF-L320-042922-0-2-MS	MS	4/29/2022
BNSF-SG02-041922-0-10-MS	MS	4/19/2022
BNSF-SG13-042522-0-1.5MS	MS	4/25/2022
BNSF-BG13-042122-0-10-MSD	SD	4/21/2022
BNSF-BG14-042722-0-5.5-SD	SD	4/27/2022
BNSF-BG19-042722-0-10SD	SD	4/27/2022
BNSF-BG20-042922-0-10SD	SD	4/29/2022
BNSF-L320-042922-0-2-SD	SD	4/29/2022
BNSF-SG02-041922-0-10-SD	SD	4/19/2022
BNSF-SG13-042522-0-1.5SD	SD	4/25/2022

Notes:

EB = equipment blank

FD = field duplicate

ID = identification

MS = matrix spike

N = normal sample

SD = matrix spike duplicate

Table H1-2. Sample Delivery Groups

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

	Ammonia and TOC
10605435	580-112980-1
10605661	580-113170-1
10606046	580-113238-1
10606394	580-113239-1
10606395	580-113240-1
10606560	580-113471-1
10606561	NA - in main report
10606563	NA - in main report
10606565	580-113469-1

Notes:

NA = not applicable

PAH = polycyclic aromatic hydrocarbon

PCB = polychlorinated biphenyl Aroclor

TOC = total organic carbon

TPH = total petroleum hydrocarbons

Table H1-3. Analytical Methods by Laboratory

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

	ANALYTIC_METHOD	Laboratory
Grain Size	ASTM D422	Pace - Wyoming
Dioxins and Furans	E1613B	Pace - Minnesota
Polychlorinated Biphenyl Congeners	E1668C	Pace - Minnesota
Total Petroleum Hydrocarbons	NWTPH-Dx	Pace - Minnesota
Total Solids	SM2540G	Pace - Minnesota
Metals	SW6020B	Pace - Minnesota
Mercury in Water	SW7470A	Pace - Minnesota
Mercury in Sediment	SW7471B	Pace - Minnesota
Sulfide in Water	SM4500-S2-D	Pace - Minnesota
Polycyclic Aromatic Hydrocarbons	SW8270E	Pace - Tennessee
Sulfide in Sediment	SW9030B	Pace - Tennessee
Ammonia	E350.1	Eurofins Frontier Geosciences - Seattle
Total Organic Carbon	SW9060A	Eurofins Frontier Geosciences - Seattle

Table H1-4. Overall Flagging Summary Analytical Methods

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-BG13-042122-0-10	NWTPH-Dx	TPH as Motor Oil	36.9	mg/kg	B	LB<RL	10605661
BNSF-BG13-042122-0-10	SW6020B	Lead	0.092	mg/kg	B	LB<RL	10605661
BNSF-BG13-042122-0-10	SW6020B	Silver	0.21	mg/kg	UJ	PDS<LCL	10605661
BNSF-BG13-042122-0-10	SW6020B	Zinc	2	mg/kg	J	MS>UCL|MSD>UCL	10605661
BNSF-SG01-041922-0-10	NWTPH-Dx	Diesel Fuel	25.4	mg/kg	J	FD>RPD	10605435
BNSF-SG01-041922-0-10	NWTPH-Dx	TPH as Motor Oil	106	mg/kg	J	FD>RPD	10605435
BNSF-SG01-041922-0-10	SW9030B	Sulfide	40.6	mg/kg	UJ	HTa>UCL	10605435
BNSF-SG02-041922-0-10	SW9030B	Sulfide	59.5	mg/kg	UJ	HTa>UCL	10605435
BNSF-SG13-042522-0-1.5	SW6020B	Lead	3.6	mg/kg	J	MS>UCL|MSRPD	10606046
BNSF-SG13-042522-0-1.5	SW6020B	Silver	0.26	mg/kg	J	PDS<LCL	10606046
BNSF-SG23-042122-0-6	NWTPH-Dx	TPH as Motor Oil	37.4	mg/kg	B	LB<RL	10605661
FD01-041922-0-10	NWTPH-Dx	Diesel Fuel	56.9	mg/kg	J	FD>RPD	10605435
FD01-041922-0-10	NWTPH-Dx	TPH as Motor Oil	167	mg/kg	J	FD>RPD	10605435
FD01-041922-0-10	SW9030B	Sulfide	40.6	mg/kg	UJ	HTa>UCL	10605435
BNSF-BG17-042722-0-10	E1613B	OCDD	200	ng/kg	J	FD>RPD	10606394
BNSF-BG17-042722-0-10	E1613B	1,2,3,4,6,7,8-HpCDD	12	ng/kg	J	FD>RPD	10606394
BNSF-BG17-042722-0-10	E1613B	Total HpCDD	24	ng/kg	J	FD>RPD	10606394
BNSF-SG01-041922-0-10	E1613B	OCDD	11	ng/kg	J	FD>RPD	10605435
BNSF-SG01-041922-0-10	E1613B	Total HpCDD	3.2	ng/kg	J	FD>RPD	10605435
BNSF-SG23-042122-0-6	E1613B	OCDD	5.2	ng/kg	B	LB<RL	10605661
FD01-041922-0-10	E1613B	OCDD	22	ng/kg	J	FD>RPD	10605435
FD01-041922-0-10	E1613B	Total HpCDD	6.4	ng/kg	J	FD>RPD	10605435
FD02-042722-0-10	E1613B	OCDD	12	ng/kg	J	FD>RPD	10606395
FD02-042722-0-10	E1613B	1,2,3,4,6,7,8-HpCDD	1.5	ng/kg	J	FD>RPD	10606395
FD02-042722-0-10	E1613B	Total HpCDD	4.1	ng/kg	J	FD>RPD	10606395
BNSF-BG14-042722-0-5.5	E350.1	Ammonia as N	32	mg/kg	J	MS<LCL|MSD<LCL	580-113239-1
BNSF-BG16-042722-0-10	SW9060A	Total Organic Carbon	530	mg/kg	B	LB<RL	580-113239-1
BNSF-I120-042922-0-6	E350.1	Ammonia as N	20	mg/kg	B	LB<RL|TEMP	5801134711
BNSF-I120-042922-0-6	SW9060A	Total Organic Carbon	5000	mg/kg	J	TEMP	5801134711
BNSF-L320-042922-0-2	E350.1	Ammonia as N	10	mg/kg	B	LB<RL|TEMP	5801134711
BNSF-L320-042922-0-2	SW9060A	Total Organic Carbon	30000	mg/kg	J	LabDupRPD|TEMP	5801134711
BNSF-SG13-042522-0-1.5	SW9060A	Total Organic Carbon	670	mg/kg	B	LB<RL	580-113238-1
BNSF-D160-042822-0-5	E1613B	2,3,7,8-TCDD	0.2	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	1,2,3,7,8,9-HxCDD	0.42	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	Total TCDF	0.7	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	Total PeCDF	0.83	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	OCDD	36	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	Total HxCDD	2.1	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	1,2,3,4,6,7,8-HpCDD	7.5	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	Total PeCDD	0.22	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	Total HpCDD	15	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	Total HpCDF	1	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	OCDF	1.5	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	1,2,3,4,7,8-HxCDD	0.46	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	1,2,3,7,8-PeCDD	0.22	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	Total TCDD	0.2	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	2,3,7,8-TCDF	0.39	ng/kg	J	EMPC|TEMP	10606565
BNSF-D160-042822-0-5	E1613B	1,2,3,4,7,8,9-HpCDF	0.46	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	Total HxCDF	0.62	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	2,3,4,7,8-PeCDF	0.23	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	1,2,3,7,8-PeCDF	0.23	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	1,2,3,6,7,8-HxCDF	0.4	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	1,2,3,6,7,8-HxCDD	0.69	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	2,3,4,6,7,8-HxCDF	0.43	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	1,2,3,4,6,7,8-HpCDF	1	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	1,2,3,4,7,8-HxCDF	0.43	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	1,2,3,7,8,9-HxCDF	0.5	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	NWTPH-Dx	Diesel Fuel	52.1	mg/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	NWTPH-Dx	TPH as Motor Oil	215	mg/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Phenol	0.19	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Bis (2-ethylhexyl) phthalate	0.597	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Di-n-octyl phthalate	0.318	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Anthracene	0.0839	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Pyrene	0.0917	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Dibenzofuran	0.154	mg/kg	UJ	TEMP	10606565

Table H1-4. Overall Flagging Summary Analytical Methods

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-D160-042822-0-5	SW8270E	Benzo[g,h,i]perylene	0.0861	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Indeno[1,2,3-cd]pyrene	0.133	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Benzo[b]fluoranthene	0.0878	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Fluoranthene	0.085	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Benzo[k]fluoranthene	0.0837	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Acenaphthylene	0.0663	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Chrysene	0.0936	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Benzo[a]pyrene	0.0876	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Dibenzo[a,h]anthracene	0.131	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Benzo[a]anthracene	0.083	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Benzoic Acid	1.67	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	3 & 4-Methylphenol (m,p-Cresols)	0.147	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Acenaphthene	0.0762	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Di-N-Butylphthalate	0.161	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Phenanthrene	0.0935	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Fluorene	0.0767	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Carbazole	0.146	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Pentachlorophenol	0.127	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	1-Methylnaphthalene	0.0603	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Naphthalene	0.118	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	2-Methylnaphthalene	0.0611	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW9030B	Sulfide	220	mg/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	2,3,7,8-TCDD	2.2	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	1,2,3,7,8,9-HxCDD	1.6	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	Total TCDF	0.23	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	Total PeCDF	1.6	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	OCDD	130	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	Total HxCDD	28	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	1,2,3,4,6,7,8-HpCDD	24	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	Total PeCDD	0.74	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	Total HpCDD	50	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	Total HpCDF	22	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	OCDF	7.1	ng/kg	J	EMPC|TEMP	10606565
BNSF-E320-042822-0-4	E1613B	1,2,3,4,7,8-HxCDD	0.7	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	1,2,3,7,8-PeCDD	0.74	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	Total TCDD	2.2	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	2,3,7,8-TCDF	0.23	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	1,2,3,4,7,8,9-HpCDF	0.41	ng/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	Total HxCDF	7.9	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	2,3,4,7,8-PeCDF	0.21	ng/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	1,2,3,7,8-PeCDF	4.6	ng/kg	J	EMPC|TEMP	10606565
BNSF-E320-042822-0-4	E1613B	1,2,3,6,7,8-HxCDF	0.36	ng/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	1,2,3,6,7,8-HxCDD	3.7	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	2,3,4,6,7,8-HxCDF	0.42	ng/kg	J	EMPC|TEMP	10606565
BNSF-E320-042822-0-4	E1613B	1,2,3,4,6,7,8-HpCDF	11	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	1,2,3,4,7,8-HxCDF	0.39	ng/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	1,2,3,7,8,9-HxCDF	0.45	ng/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	NWTPH-Dx	Diesel Fuel	223	mg/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	NWTPH-Dx	TPH as Motor Oil	630	mg/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	SW6020B	Copper	12	mg/kg	J	PDS>UCL	10606565
BNSF-E320-042822-0-4	SW8270E	Phenol	0.186	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Bis (2-ethylhexyl) phthalate	0.585	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Di-n-octyl phthalate	0.312	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Anthracene	0.0822	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Pyrene	0.184	mg/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Dibenzofuran	0.151	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Benzo[g,h,i]perylene	0.0844	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Indeno[1,2,3-cd]pyrene	0.13	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Benzo[b]fluoranthene	0.086	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Fluoranthene	0.0833	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Benzo[k]fluoranthene	0.082	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Acenaphthylene	0.065	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Chrysene	0.0917	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Benzo[a]pyrene	0.103	mg/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Dibenzo[a,h]anthracene	0.128	mg/kg	UJ	TEMP	10606565

Table H1-4. Overall Flagging Summary Analytical Methods

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-E320-042822-0-4	SW8270E	Benzo[a]anthracene	0.0813	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Benzoic Acid	1.63	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	3 & 4-Methylphenol (m,p-Cresols)	0.144	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Acenaphthene	0.0747	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Di-N-Butylphthalate	0.158	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Phenanthrene	0.0916	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Fluorene	0.0751	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Carbazole	0.143	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Pentachlorophenol	0.124	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	1-Methylnaphthalene	0.059	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Naphthalene	0.116	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	2-Methylnaphthalene	0.0599	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW9030B	Sulfide	318	mg/kg	J	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	2,3,7,8-TCDD	0.19	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	1,2,3,7,8,9-HxCDD	0.4	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	Total TCDF	0.21	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	Total PeCDF	0.21	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	OCDD	13	ng/kg	J	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	Total HxCDD	0.81	ng/kg	J	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	1,2,3,4,6,7,8-HpCDD	2.4	ng/kg	J	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	Total PeCDD	0.2	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	Total HpCDD	5.5	ng/kg	J	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	Total HpCDF	0.44	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	OCDF	1.4	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	1,2,3,4,7,8-HxCDD	0.42	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	1,2,3,7,8-PeCDD	0.2	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	Total TCDD	0.19	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	2,3,7,8-TCDF	0.21	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	1,2,3,4,7,8,9-HpCDF	0.44	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	Total HxCDF	0.38	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	2,3,4,7,8-PeCDF	0.22	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	1,2,3,7,8-PeCDF	0.21	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	1,2,3,6,7,8-HxCDF	0.38	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	1,2,3,6,7,8-HxCDD	0.46	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	2,3,4,6,7,8-HxCDF	0.41	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	1,2,3,4,6,7,8-HpCDF	0.64	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	1,2,3,4,7,8-HxCDF	0.41	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	1,2,3,7,8,9-HxCDF	0.48	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	NWTPH-Dx	Diesel Fuel	9.7	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	NWTPH-Dx	TPH as Motor Oil	25.1	mg/kg	J	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Phenol	0.0178	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Bis (2-ethylhexyl) phthalate	0.056	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Di-n-octyl phthalate	0.0298	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Anthracene	0.00786	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Pyrene	0.00859	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Dibenzofuran	0.0145	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Benzo[g,h,i]perylene	0.00808	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Indeno[1,2,3-cd]pyrene	0.0125	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Benzo[b]fluoranthene	0.00824	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Fluoranthene	0.00797	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Benzo[k]fluoranthene	0.00785	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Acenaphthylene	0.00622	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Chrysene	0.00878	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Benzo[a]pyrene	0.00821	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Dibenzo[a,h]anthracene	0.0122	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Benzo[a]anthracene	0.00779	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Benzoic Acid	0.157	mg/kg	UJ	CCV<LCL|TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	3 & 4-Methylphenol (m,p-Cresols)	0.0138	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Acenaphthene	0.00715	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Di-N-Butylphthalate	0.0151	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Phenanthrene	0.00877	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Fluorene	0.00719	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Carbazole	0.0137	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Pentachlorophenol	0.0119	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	1-Methylnaphthalene	0.00565	mg/kg	UJ	TEMP	10606565

Table H1-4. Overall Flagging Summary Analytical Methods

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-E380-042822-0-4	SW8270E	Naphthalene	0.0111	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	2-Methylnaphthalene	0.00894	mg/kg	J	TEMP	10606565
BNSF-E380-042822-0-4	SW9030B	Sulfide	39.8	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	2,3,7,8-TCDD	0.21	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	1,2,3,7,8,9-HxCDD	0.43	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	Total TCDF	0.58	ng/kg	J	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	Total PeCDF	0.28	ng/kg	J	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	OCDD	10	ng/kg	J	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	Total HxCDD	0.43	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	1,2,3,4,6,7,8-HpCDD	1.9	ng/kg	J	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	Total PeCDD	0.22	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	Total HpCDD	3.8	ng/kg	J	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	Total HpCDF	0.5	ng/kg	J	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	OCDF	1.6	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	1,2,3,4,7,8-HxCDD	0.46	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	1,2,3,7,8-PeCDD	0.22	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	Total TCDD	0.21	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	2,3,7,8-TCDF	0.25	ng/kg	J	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	1,2,3,4,7,8,9-HpCDF	0.48	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	Total HxCDF	0.42	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	2,3,4,7,8-PeCDF	0.24	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	1,2,3,7,8-PeCDF	0.23	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	1,2,3,6,7,8-HxCDF	0.42	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	1,2,3,6,7,8-HxCDD	0.5	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	2,3,4,6,7,8-HxCDF	0.45	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	1,2,3,4,6,7,8-HpCDF	0.7	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	1,2,3,4,7,8-HxCDF	0.45	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	1,2,3,7,8,9-HxCDF	0.52	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	NWTPH-Dx	Diesel Fuel	38.8	mg/kg	J	TEMP	10606565
BNSF-E460-042922-0-4	NWTPH-Dx	TPH as Motor Oil	112	mg/kg	J	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Phenol	0.188	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Bis (2-ethylhexyl) phthalate	0.593	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Di-n-octyl phthalate	0.316	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Anthracene	0.0834	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Pyrene	0.0973	mg/kg	J	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Dibenzofuran	0.153	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Benzo[g,h,i]perylene	0.0856	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Indeno[1,2,3-cd]pyrene	0.132	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Benzo[b]fluoranthene	0.0873	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Fluoranthene	0.0845	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Benzo[k]fluoranthene	0.0832	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Acenaphthylene	0.0659	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Chrysene	0.0931	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Benzo[a]pyrene	0.087	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Dibenzo[a,h]anthracene	0.13	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Benzo[a]anthracene	0.0825	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Benzoic Acid	1.66	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	3 & 4-Methylphenol (m,p-Cresols)	0.146	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Acenaphthene	0.0758	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Di-N-Butylphthalate	0.16	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Phenanthrene	0.0929	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Fluorene	0.0762	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Carbazole	0.145	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Pentachlorophenol	0.126	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	1-Methylnaphthalene	0.0599	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Naphthalene	0.118	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	2-Methylnaphthalene	0.0607	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW9030B	Sulfide	101	mg/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	2,3,7,8-TCDD	0.18	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	1,2,3,7,8,9-HxCDD	0.37	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	Total TCDF	0.21	ng/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	Total PeCDF	0.28	ng/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	OCDD	6.7	ng/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	Total HxCDD	0.37	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	1,2,3,4,6,7,8-HpCDD	0.94	ng/kg	J	EMPC|TEMP	10606565

Table H1-4. Overall Flagging Summary Analytical Methods

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-H360-042922-0-8	E1613B	Total PeCDD	0.19	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	Total HpCDD	1.1	ng/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	Total HpCDF	0.61	ng/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	OCDF	1.3	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	1,2,3,4,7,8-HxCDD	0.39	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	1,2,3,7,8-PeCDD	0.19	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	Total TCDD	0.18	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	2,3,7,8-TCDF	0.21	ng/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	1,2,3,4,7,8,9-HpCDF	0.41	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	Total HxCDF	0.36	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	2,3,4,7,8-PeCDF	0.21	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	1,2,3,7,8-PeCDF	0.2	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	1,2,3,6,7,8-HxCDF	0.36	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	1,2,3,6,7,8-HxCDD	0.43	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	2,3,4,6,7,8-HxCDF	0.39	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	1,2,3,4,6,7,8-HpCDF	0.61	ng/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	1,2,3,4,7,8-HxCDF	0.39	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	1,2,3,7,8,9-HxCDF	0.45	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	NWTPH-Dx	Diesel Fuel	31	mg/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	NWTPH-Dx	TPH as Motor Oil	107	mg/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Phenol	0.0173	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Bis (2-ethylhexyl) phthalate	0.0543	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Di-n-octyl phthalate	0.029	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Anthracene	0.00764	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Pyrene	0.00835	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Dibenzofuran	0.014	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Benzo[g,h,i]perylene	0.00784	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Indeno[1,2,3-cd]pyrene	0.0121	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Benzo[b]fluoranthene	0.008	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Fluoranthene	0.00774	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Benzo[k]fluoranthene	0.00762	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Acenaphthylene	0.00604	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Chrysene	0.00853	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Benzo[a]pyrene	0.00797	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Dibenzo[a,h]anthracene	0.0119	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Benzo[a]anthracene	0.00756	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Benzoic Acid	0.158	mg/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	3 & 4-Methylphenol (m,p-Cresols)	0.0134	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Acenaphthene	0.00694	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Di-N-Butylphthalate	0.0147	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Phenanthrene	0.00851	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Fluorene	0.00698	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Carbazole	0.0133	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Pentachlorophenol	0.0115	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	1-Methylnaphthalene	0.00549	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Naphthalene	0.0108	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	2-Methylnaphthalene	0.00556	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW9030B	Sulfide	38.6	mg/kg	UJ	TEMP	10606565
BNSF-I120-042922-0-6	E1613B	2,3,7,8-TCDD	0.19	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	1,2,3,7,8,9-HxCDD	0.39	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	Total TCDF	0.21	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	Total PeCDF	0.21	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	OCDD	14	ng/kg	J	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	Total HxCDD	0.39	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	1,2,3,4,6,7,8-HpCDD	1.9	ng/kg	J	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	Total PeCDD	0.2	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	Total HpCDD	4.4	ng/kg	J	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	Total HpCDF	0.7	ng/kg	J	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	OCDF	1.4	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	1,2,3,4,7,8-HxCDD	0.42	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	1,2,3,7,8-PeCDD	0.2	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	Total TCDD	0.19	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	2,3,7,8-TCDF	0.21	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	1,2,3,4,7,8,9-HpCDF	0.44	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	Total HxCDF	0.38	ng/kg	UJ	TEMP	10606560

Table H1-4. Overall Flagging Summary Analytical Methods

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-I120-042922-0-6	E1613B	2,3,4,7,8-PeCDF	0.22	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	1,2,3,7,8-PeCDF	0.21	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	1,2,3,6,7,8-HxCDF	0.38	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	1,2,3,6,7,8-HxCDD	0.46	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	2,3,4,6,7,8-HxCDF	0.41	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	1,2,3,4,6,7,8-HpCDF	0.64	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	1,2,3,4,7,8-HxCDF	0.41	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	1,2,3,7,8,9-HxCDF	0.47	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	NWTPH-Dx	Diesel Fuel	32.2	mg/kg	J	TEMP	10606560
BNSF-I120-042922-0-6	NWTPH-Dx	TPH as Motor Oil	70	mg/kg	J	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Phenol	0.0179	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Bis (2-ethylhexyl) phthalate	0.0565	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Di-n-octyl phthalate	0.0301	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Anthracene	0.00793	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Pyrene	0.00867	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Dibenzofuran	0.0146	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Benzo[g,h,i]perylene	0.00815	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Indeno[1,2,3-cd]pyrene	0.0126	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Benzo[b]fluoranthene	0.00831	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Fluoranthene	0.00804	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Benzo[k]fluoranthene	0.00792	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Acenaphthylene	0.00627	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Chrysene	0.00886	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Benzo[a]pyrene	0.00828	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Dibenzo[a,h]anthracene	0.0123	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Benzo[a]anthracene	0.00785	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Benzoic Acid	0.158	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	3 & 4-Methylphenol (m,p-Cresols)	0.0139	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Acenaphthene	0.00721	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Di-N-Butylphthalate	0.0153	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Phenanthrene	0.00884	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Fluorene	0.00725	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Carbazole	0.0138	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Pentachlorophenol	0.012	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	1-Methylnaphthalene	0.0057	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Naphthalene	0.0112	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	2-Methylnaphthalene	0.00706	mg/kg	J	TEMP	10606560
BNSF-I120-042922-0-6	SW9030B	Sulfide	51.7	mg/kg	J	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	2,3,7,8-TCDD	0.18	ng/kg	UJ	Sur<LCL|TEMP	10606560
BNSF-L320-042922-0-2	E1613B	1,2,3,7,8,9-HxCDD	0.38	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	Total TCDF	0.2	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	Total PeCDF	0.2	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	OCDD	8.8	ng/kg	J	EMPC|TEMP	10606560
BNSF-L320-042922-0-2	E1613B	Total HxCDD	8.2	ng/kg	J	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	1,2,3,4,6,7,8-HpCDD	2.3	ng/kg	J	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	Total PeCDD	3.2	ng/kg	J	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	Total HpCDD	2.3	ng/kg	J	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	Total HpCDF	0.41	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	OCDF	1.4	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	1,2,3,4,7,8-HxCDD	0.39	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	1,2,3,7,8-PeCDD	0.19	ng/kg	UJ	Sur<LCL|TEMP	10606560
BNSF-L320-042922-0-2	E1613B	Total TCDD	0.18	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	2,3,7,8-TCDF	0.2	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	1,2,3,4,7,8,9-HpCDF	0.41	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	Total HxCDF	2.2	ng/kg	J	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	2,3,4,7,8-PeCDF	0.21	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	1,2,3,7,8-PeCDF	0.2	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	1,2,3,6,7,8-HxCDF	0.36	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	1,2,3,6,7,8-HxCDD	0.44	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	2,3,4,6,7,8-HxCDF	0.39	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	1,2,3,4,6,7,8-HpCDF	1.5	ng/kg	J	EMPC|TEMP	10606560
BNSF-L320-042922-0-2	E1613B	1,2,3,4,7,8-HxCDF	0.39	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	1,2,3,7,8,9-HxCDF	0.45	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	NWTPH-Dx	Diesel Fuel	136	mg/kg	J	TEMP	10606560
BNSF-L320-042922-0-2	NWTPH-Dx	TPH as Motor Oil	503	mg/kg	J	TEMP	10606560

Table H1-4. Overall Flagging Summary Analytical Methods

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-L320-042922-0-2	SW8270E	Phenol	0.0334	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Bis (2-ethylhexyl) phthalate	0.105	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Di-n-octyl phthalate	0.0561	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Anthracene	0.0148	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Pyrene	0.0162	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Dibenzofuran	0.0272	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Benzo[g,h,i]perylene	0.0152	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Indeno[1,2,3-cd]pyrene	0.0234	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Benzo[b]fluoranthene	0.0155	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Fluoranthene	0.015	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Benzo[k]fluoranthene	0.0147	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Acenaphthylene	0.0117	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Chrysene	0.0165	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Benzo[a]pyrene	0.0155	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Dibenzo[a,h]anthracene	0.0231	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Benzo[a]anthracene	0.0146	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Benzoic Acid	0.294	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	3 & 4-Methylphenol (m,p-Cresols)	0.0259	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Acenaphthene	0.0135	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Di-N-Butylphthalate	0.0284	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Phenanthrene	0.0165	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Fluorene	0.0135	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Carbazole	0.0257	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Pentachlorophenol	0.0223	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	1-Methylnaphthalene	0.0106	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Naphthalene	0.0208	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	2-Methylnaphthalene	0.0108	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW9030B	Sulfide	37.4	mg/kg	UJ	TEMP	10606560
BNSF-SG11-042822-0-5	E1613B	2,3,7,8-TCDD	0.2	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	1,2,3,7,8,9-HxCDD	0.41	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	Total TCDF	0.22	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	Total PeCDF	0.22	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	OCDD	4.6	ng/kg	J	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	Total HxCDD	0.41	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	1,2,3,4,6,7,8-HpCDD	0.75	ng/kg	J	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	Total PeCDD	0.21	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	Total HpCDD	1.6	ng/kg	J	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	Total HpCDF	0.45	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	OCDF	1.5	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	1,2,3,4,7,8-HxCDD	0.43	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	1,2,3,7,8-PeCDD	0.21	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	Total TCDD	0.2	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	2,3,7,8-TCDF	0.22	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	1,2,3,4,7,8,9-HpCDF	0.45	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	Total HxCDF	0.39	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	2,3,4,7,8-PeCDF	0.23	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	1,2,3,7,8-PeCDF	0.22	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	1,2,3,6,7,8-HxCDF	0.39	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	1,2,3,6,7,8-HxCDD	0.47	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	2,3,4,6,7,8-HxCDF	0.42	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	1,2,3,4,6,7,8-HpCDF	0.66	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	1,2,3,4,7,8-HxCDF	0.42	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	1,2,3,7,8,9-HxCDF	0.49	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	NWTPH-Dx	Diesel Fuel	9.9	mg/kg	J	TEMP	10606565
BNSF-SG11-042822-0-5	NWTPH-Dx	TPH as Motor Oil	35.4	mg/kg	J	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Phenol	0.0174	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Bis (2-ethylhexyl) phthalate	0.0548	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Di-n-octyl phthalate	0.0292	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Anthracene	0.0077	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Pyrene	0.0142	mg/kg	J	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Dibenzofuran	0.0142	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Benzo[g,h,i]perylene	0.00791	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Indeno[1,2,3-cd]pyrene	0.0122	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Benzo[b]fluoranthene	0.00806	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Fluoranthene	0.0078	mg/kg	UJ	TEMP	10606565

Table H1-4. Overall Flagging Summary Analytical Methods

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-SG11-042822-0-5	SW8270E	Benzo[k]fluoranthene	0.00769	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Acenaphthylene	0.00609	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Chrysene	0.0101	mg/kg	J	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Benzo[a]pyrene	0.00804	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Dibenzo[a,h]anthracene	0.012	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Benzo[a]anthracene	0.00762	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Benzoic Acid	0.238	mg/kg	J	CCV<LCL|TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	3 & 4-Methylphenol (m,p-Cresols)	0.0135	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Acenaphthene	0.007	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Di-N-Butylphthalate	0.0148	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Phenanthrene	0.00858	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Fluorene	0.00704	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Carbazole	0.0134	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Pentachlorophenol	0.0116	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	1-Methylnaphthalene	0.00623	mg/kg	J	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Naphthalene	0.0109	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	2-Methylnaphthalene	0.00945	mg/kg	J	TEMP	10606565
BNSF-SG11-042822-0-5	SW9030B	Sulfide	39	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E350.1	Ammonia as N	20	mg/kg	B	LB<RL|TEMP	580-113469-1
BNSF-D160-042822-0-5	SW9060A	Total Organic Carbon	8000	mg/kg	J	TEMP	580-113469-1
BNSF-E320-042822-0-4	E350.1	Ammonia as N	17	mg/kg	J	MS<LCL|MSD<LCL|HTa>UCL|TEMP	580-113469-1
BNSF-E320-042822-0-4	SW9060A	Total Organic Carbon	15000	mg/kg	J	HTa>UCL|TEMP	580-113469-1
BNSF-E380-042822-0-4	E350.1	Ammonia as N	20	mg/kg	B	LB<RL|TEMP	580-113469-1
BNSF-E380-042822-0-4	SW9060A	Total Organic Carbon	3000	mg/kg	J	TEMP	580-113469-1
BNSF-E460-042922-0-4	E350.1	Ammonia as N	30	mg/kg	B	LB<RL|TEMP	580-113469-1
BNSF-E460-042922-0-4	SW9060A	Total Organic Carbon	7000	mg/kg	J	TEMP	580-113469-1
BNSF-H360-042922-0-8	E350.1	Ammonia as N	20	mg/kg	B	LB<RL|TEMP	580-113469-1
BNSF-H360-042922-0-8	SW9060A	Total Organic Carbon	20000	mg/kg	J	TEMP	580-113469-1
BNSF-SG11-042822-0-5	E350.1	Ammonia as N	20	mg/kg	B	LB<RL|TEMP	580-113469-1
BNSF-SG11-042822-0-5	SW9060A	Total Organic Carbon	4000	mg/kg	J	TEMP	580-113469-1
BNSF-BG15-042722-0-10	E1668C	PCB-156	2.13	ng/kg	J	EMPC	10606394
BNSF-D160-042822-0-5	E1668C	PCB-118	28.9	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1668C	PCB-77	2.54	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1668C	PCB-105	9.22	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1668C	PCB-169	0.326	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1668C	PCB-156	2.58	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1668C	PCB-189	0.772	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1668C	PCB-167	1.3	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1668C	PCB-126	0.339	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1668C	PCB-123	0.609	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1668C	PCB-157	0.854	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1668C	PCB-81	0.482	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1668C	PCB-114	0.887	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1668C	PCB-118	26.6	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1668C	PCB-77	3.56	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1668C	PCB-105	12.5	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1668C	PCB-169	0.317	ng/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	E1668C	PCB-156	3.54	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1668C	PCB-189	0.752	ng/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	E1668C	PCB-167	1.7	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1668C	PCB-126	0.33	ng/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	E1668C	PCB-123	0.97	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1668C	PCB-157	0.832	ng/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	E1668C	PCB-81	0.469	ng/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	E1668C	PCB-114	0.802	ng/kg	J	EMPC|TEMP	10606565
BNSF-E380-042822-0-4	E1668C	PCB-118	4.95	ng/kg	J	TEMP	10606565
BNSF-E380-042822-0-4	E1668C	PCB-77	1.81	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1668C	PCB-105	2.44	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1668C	PCB-169	0.27	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1668C	PCB-156	1.66	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1668C	PCB-189	0.641	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1668C	PCB-167	1.08	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1668C	PCB-126	0.281	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1668C	PCB-123	0.506	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1668C	PCB-157	0.709	ng/kg	UJ	TEMP	10606565

Table H1-4. Overall Flagging Summary Analytical Methods

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-E380-042822-0-4	E1668C	PCB-81	0.4	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1668C	PCB-114	0.543	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1668C	PCB-118	11.6	ng/kg	J	TEMP	10606565
BNSF-E460-042922-0-4	E1668C	PCB-77	3.28	ng/kg	J	TEMP	10606565
BNSF-E460-042922-0-4	E1668C	PCB-105	5.83	ng/kg	J	TEMP	10606565
BNSF-E460-042922-0-4	E1668C	PCB-169	0.384	ng/kg	UJ	Sur<LCL|TEMP	10606565
BNSF-E460-042922-0-4	E1668C	PCB-156	2.36	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1668C	PCB-189	0.909	ng/kg	UJ	Sur<LCL|TEMP	10606565
BNSF-E460-042922-0-4	E1668C	PCB-167	1.53	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1668C	PCB-126	0.399	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1668C	PCB-123	0.718	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1668C	PCB-157	1.01	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1668C	PCB-81	0.568	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1668C	PCB-114	0.771	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1668C	PCB-118	40.1	ng/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1668C	PCB-77	3.71	ng/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1668C	PCB-105	14	ng/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1668C	PCB-169	0.353	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1668C	PCB-156	4.77	ng/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1668C	PCB-189	0.836	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1668C	PCB-167	2.26	ng/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1668C	PCB-126	0.367	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1668C	PCB-123	1.38	ng/kg	J	EMPC|TEMP	10606565
BNSF-H360-042922-0-8	E1668C	PCB-157	1.33	ng/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1668C	PCB-81	0.522	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1668C	PCB-114	1.77	ng/kg	J	TEMP	10606565
BNSF-I120-042922-0-6	E1668C	PCB-118	12.2	ng/kg	J	TEMP	10606560
BNSF-I120-042922-0-6	E1668C	PCB-77	2.48	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1668C	PCB-105	5.77	ng/kg	J	TEMP	10606560
BNSF-I120-042922-0-6	E1668C	PCB-169	0.371	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1668C	PCB-156	2.28	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1668C	PCB-189	0.88	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1668C	PCB-167	1.48	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1668C	PCB-126	0.386	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1668C	PCB-123	0.695	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1668C	PCB-157	0.974	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1668C	PCB-81	0.549	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1668C	PCB-114	0.746	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1668C	PCB-118	8.39	ng/kg	J	TEMP	10606560
BNSF-L320-042922-0-2	E1668C	PCB-77	2.4	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1668C	PCB-105	3.24	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1668C	PCB-169	0.359	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1668C	PCB-156	2.2	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1668C	PCB-189	0.85	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1668C	PCB-167	1.43	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1668C	PCB-126	0.373	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1668C	PCB-123	0.792	ng/kg	J	TEMP	10606560
BNSF-L320-042922-0-2	E1668C	PCB-157	0.942	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1668C	PCB-81	0.531	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1668C	PCB-114	0.721	ng/kg	UJ	TEMP	10606560
BNSF-SG02-041922-0-10	E1668C	PCB-126	0.387	ng/kg	J	EMPC	10605435
BNSF-SG03-042722-0-5.5	E1668C	PCB-105	2.85	ng/kg	J	EMPC	10606395
BNSF-SG11-042822-0-5	E1668C	PCB-118	8.87	ng/kg	J	TEMP	10606565
BNSF-SG11-042822-0-5	E1668C	PCB-77	2.23	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1668C	PCB-105	3.51	ng/kg	J	TEMP	10606565
BNSF-SG11-042822-0-5	E1668C	PCB-169	0.334	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1668C	PCB-156	2.05	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1668C	PCB-189	0.791	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1668C	PCB-167	1.33	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1668C	PCB-126	0.347	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1668C	PCB-123	0.625	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1668C	PCB-157	0.876	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1668C	PCB-81	0.494	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1668C	PCB-114	0.671	ng/kg	UJ	TEMP	10606565
BNSF-BG20-042922-0-10	E1613B	2,3,7,8-TCDD	0.24	ng/kg	UJ	TEMP	10606560

Table H1-4. Overall Flagging Summary Analytical Methods

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-BG20-042922-0-10	E1613B	1,2,3,7,8,9-HxCDD	0.51	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	Total TCDF	0.27	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	Total PeCDF	0.27	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	OCDD	2.5	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	Total HxCDD	0.51	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	1,2,3,4,6,7,8-HpCDD	0.65	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	Total PeCDD	0.26	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	Total HpCDD	0.65	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	Total HpCDF	0.56	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	OCDF	1.8	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	1,2,3,4,7,8-HxCDD	0.54	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	1,2,3,7,8-PeCDD	0.26	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	Total TCDD	0.24	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	2,3,7,8-TCDF	0.27	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	1,2,3,4,7,8,9-HpCDF	0.56	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	Total HxCDF	0.49	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	2,3,4,7,8-PeCDF	0.28	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	1,2,3,7,8-PeCDF	0.27	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	1,2,3,6,7,8-HxCDF	0.49	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	1,2,3,6,7,8-HxCDD	0.59	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	2,3,4,6,7,8-HxCDF	0.53	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	1,2,3,4,6,7,8-HpCDF	0.82	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	1,2,3,4,7,8-HxCDF	0.53	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	1,2,3,7,8,9-HxCDF	0.61	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	NWTPH-Dx	Diesel Fuel	10.2	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	NWTPH-Dx	TPH as Motor Oil	31.6	mg/kg	J	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Phenol	0.0381	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Bis (2-ethylhexyl) phthalate	0.12	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Di-n-octyl phthalate	0.064	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Anthracene	0.0169	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Pyrene	0.0185	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Dibenzofuran	0.031	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Benzo[g,h,i]perylene	0.0173	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Indeno[1,2,3-cd]pyrene	0.0267	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Benzo[b]fluoranthene	0.0176	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Fluoranthene	0.0171	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Benzo[k]fluoranthene	0.0168	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Acenaphthylene	0.0133	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Chrysene	0.0188	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Benzo[a]pyrene	0.0176	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Dibenzo[a,h]anthracene	0.0263	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Benzo[a]anthracene	0.0166	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Benzoic Acid	0.335	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	3 & 4-Methylphenol (m,p-Cresols)	0.0296	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Acenaphthene	0.0154	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Di-N-Butylphthalate	0.0324	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Phenanthrene	0.0188	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Fluorene	0.0154	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Carbazole	0.0293	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Pentachlorophenol	0.0254	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	1-Methylnaphthalene	0.0121	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Naphthalene	0.0237	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	2-Methylnaphthalene	0.0123	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW9030B	Sulfide	179	mg/kg	J	TEMP	10606560
BNSF-BG20-042922-0-10	E350.1	Ammonia as N	30	mg/kg	B	LB<RL|MSD<LCL|TEMP	5801134711
BNSF-BG20-042922-0-10	SW9060A	Total Organic Carbon	7000	mg/kg	J	TEMP	5801134711
BNSF-BG20-042922-0-10	E1668C	PCB-118	8.56	ng/kg	J	TEMP	10606560
BNSF-BG20-042922-0-10	E1668C	PCB-77	2.88	ng/kg	J	TEMP	10606560
BNSF-BG20-042922-0-10	E1668C	PCB-105	4.5	ng/kg	J	TEMP	10606560
BNSF-BG20-042922-0-10	E1668C	PCB-169	0.312	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1668C	PCB-156	1.92	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1668C	PCB-189	0.739	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1668C	PCB-167	1.24	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1668C	PCB-126	0.325	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1668C	PCB-123	0.584	ng/kg	UJ	TEMP	10606560

Table H1-4. Overall Flagging Summary Analytical Methods

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-BG20-042922-0-10	E1668C	PCB-157	0.819	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1668C	PCB-81	0.462	ng/kg	UJ	TEMP|MS<LCL	10606560
BNSF-BG20-042922-0-10	E1668C	PCB-114	0.627	ng/kg	UJ	TEMP	10606560

Notes:

B = Analyte was detected in the associated method blank or field blank.
CCV<LCL = Continuing calibration verification recovery less than lower control limit
EMPC = Estimated maximum possible concentration
FD>RPD = Field duplicate relative percent difference greater than acceptance criterion
HpCDD = 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin
HpCDF = 1,2,3,4,6,7,8-Heptachlorodibenzofuran
HTa>UCL = Analytical holding time exceeded
HxCDD = 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin
HxCDF = 1,2,3,4,7,8-Hexachlorodibenzofuran
ID = identification
J = Analyte was present, but reported value may not be accurate or precise.
LabDupRPD = Laboratory duplicate relative percent difference greater than acceptance criterion
LB<RL = Analyte detected less than five times associated laboratory blank concentration
mg/kg = milligram(s) per kilogram
MS<LCL = Matrix spike recovery less than the lower control limit
MS>UCL = Matrix spike recovery greater than the upper control limit
MSD<LCL = Matrix spike duplicate recovery less than the lower control limit
MSD>UCL = Matrix spike duplicate recovery greater than the upper control limit
MSRPD = Matrix spike/matrix spike duplicate relative percent difference greater than acceptance criterion
N = nitrogen
ng/kg = nanogram(s) per kilogram
OCDD = octachlorodibenzodioxin
OCDF = octachlorodibenzofuran
PCB = polychlorinated biphenyl Aroclor
PDS<LCL = Post digestion spike recovery less than the lower control limit
PDS>UCL = Post digestion spike recovery greater than the upper control limit
PeCDD = 1,2,3,7,8-Pentachlorodibenzo-p-dioxin
PeCDF = 2,3,4,7,8-Pentachlorodibenzofuran
Sur<LCL = Surrogate recovery less than the lower control limit
TCDD = 2,3,7,8-Tetrachlorodibenzo-p-dioxin
TCDF = 2,3,7,8-Tetrachlorodibenzofuran
TEMP = Sample received at a temperature greater than 6 degrees Celsius
TPH = total petroleum hydrocarbons
UJ = The analyte was not detected above the detection limit objective; however, the reported detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Table H1-5. Calibration Validation Findings

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-E380-042822-0-4	SW8270E	Benzoic Acid	0.157	mg/kg	UJ	CCV<LCL	10606565
BNSF-SG11-042822-0-5	SW8270E	Benzoic Acid	0.238	mg/kg	J	CCV<LCL	10606565

Notes:

CCV<LCL = Continuing calibration verification recovery less than lower control limit

ID = identification

J = Analyte was present, but reported value may not be accurate or precise.

mg/kg = milligram(s) per kilogram

SDG = sample delivery group

UJ = The analyte was not detected above the detection limit objective; however, the reported detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Table H1-6. Holding Time Exceedances

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-SG01-041922-0-10	SW9030B	Sulfide	40.6	mg/kg	UJ	HTa>UCL	10605435
BNSF-SG02-041922-0-10	SW9030B	Sulfide	59.5	mg/kg	UJ	HTa>UCL	10605435
FD01-041922-0-10	SW9030B	Sulfide	40.6	mg/kg	UJ	HTa>UCL	10605435
BNSF-E320-042822-0-4	E350.1	Ammonia as N	17	mg/kg	J	HTa>UCL	580-113469-1
BNSF-E320-042822-0-4	SW9060A	Total Organic Carbon	15,000	mg/kg	J	HTa>UCL	580-113469-1

Notes:

HTa>UCL = Analytical holding time exceeded

ID = identification

J = Analyte was present, but reported value may not be accurate or precise.

mg/kg = milligram(s) per kilogram

N = nitrogen

SDG = sample delivery group

UJ = The analyte was not detected above the detection limit objective; however, the reported detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Table H1-7. Method Blank Validation Findings

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-BG13-042122-0-10	NWTPH-Dx	TPH as Motor Oil	36.9	mg/kg	B	LB<RL	10605661
BNSF-BG13-042122-0-10	SW6020B	Lead	0.092	mg/kg	B	LB<RL	10605661
BNSF-SG23-042122-0-6	NWTPH-Dx	TPH as Motor Oil	37.4	mg/kg	B	LB<RL	10605661
BNSF-SG23-042122-0-6	E1613B	OCDD	5.2	ng/kg	B	LB<RL	10605661
BNSF-BG16-042722-0-10	SW9060A	Total Organic Carbon	530	mg/kg	B	LB<RL	580-113239-1
BNSF-I120-042922-0-6	E350.1	Ammonia as N	20	mg/kg	B	LB<RL	580-113471-1
BNSF-L320-042922-0-2	E350.1	Ammonia as N	10	mg/kg	B	LB<RL	580-113471-1
BNSF-SG13-042522-0-1.5	SW9060A	Total Organic Carbon	670	mg/kg	B	LB<RL	580-113238-1
BNSF-D160-042822-0-5	E350.1	Ammonia as N	20	mg/kg	B	LB<RL	580-113469-1
BNSF-E380-042822-0-4	E350.1	Ammonia as N	20	mg/kg	B	LB<RL	580-113469-1
BNSF-E460-042922-0-4	E350.1	Ammonia as N	30	mg/kg	B	LB<RL	580-113469-1
BNSF-H360-042922-0-8	E350.1	Ammonia as N	20	mg/kg	B	LB<RL	580-113469-1
BNSF-SG11-042822-0-5	E350.1	Ammonia as N	20	mg/kg	B	LB<RL	580-113469-1
BNSF-BG20-042922-0-10	E350.1	Ammonia as N	30	mg/kg	B	LB<RL	580-113471-1

Notes:

B = Analyte was detected in the associated method blank or field blank.

ID = identification

LB<RL = Analyte detected less than five times associated laboratory blank concentration

mg/kg = milligram(s) per kilogram

N = nitrogen

ng/kg = nanogram(s) per kilogram

OCDD = octachlorodibenzodioxin

SDG = sample delivery group

TPH = total petroleum hydrocarbons

Table H1-8. Field Duplicate Validation Findings

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG	RPD
BNSF-SG01-041922-0-10	NWTPH-Dx	Diesel Fuel	25.4	mg/kg	J	FD>RPD	10605435	77
BNSF-SG01-041922-0-10	NWTPH-Dx	TPH as Motor Oil	106	mg/kg	J	FD>RPD	10605435	45
FD01-041922-0-10	NWTPH-Dx	Diesel Fuel	56.9	mg/kg	J	FD>RPD	10605435	77
FD01-041922-0-10	NWTPH-Dx	TPH as Motor Oil	167	mg/kg	J	FD>RPD	10605435	45
BNSF-BG17-042722-0-10	E1613B	OCDD	200	ng/kg	J	FD>RPD	10606394	177
BNSF-BG17-042722-0-10	E1613B	1,2,3,4,6,7,8-HpCDD	12	ng/kg	J	FD>RPD	10606394	156
BNSF-BG17-042722-0-10	E1613B	Total HpCDD	24	ng/kg	J	FD>RPD	10606394	142
BNSF-SG01-041922-0-10	E1613B	OCDD	11	ng/kg	J	FD>RPD	10605435	67
BNSF-SG01-041922-0-10	E1613B	Total HpCDD	3.2	ng/kg	J	FD>RPD	10605435	67
FD01-041922-0-10	E1613B	OCDD	22	ng/kg	J	FD>RPD	10605435	67
FD01-041922-0-10	E1613B	Total HpCDD	6.4	ng/kg	J	FD>RPD	10605435	67
FD02-042722-0-10	E1613B	OCDD	12	ng/kg	J	FD>RPD	10606395	177
FD02-042722-0-10	E1613B	1,2,3,4,6,7,8-HpCDD	1.5	ng/kg	J	FD>RPD	10606395	156
FD02-042722-0-10	E1613B	Total HpCDD	4.1	ng/kg	J	FD>RPD	10606395	142

Notes:

FD>RPD = Field duplicate relative percent difference greater than acceptance criterion

HpCDD = 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin

ID = identification

J = Analyte was present but reported value may not be accurate or precise

mg/kg = milligram per kilogram

ng/kg = nanogram per kilogram

OCDD = octachlorodibenzodioxin

RPD = relative percent difference

SDG = sample delivery group

TPH = total petroleum hydrocarbons

Table H1-9. Laboratory Duplicate Validation Findings

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG	RPD
BNSF-L320-042922-0-2	SW9060A	Total Organic Carbon	30,000	mg/kg	J	LabDupRPD	580-113471-1	22

Notes:

ID = identification

J = Analyte was present, but reported value may not be accurate or precise.

LabDupRPD = Laboratory duplicate relative percent difference greater than acceptance criterion

mg/kg = milligram(s) per kilogram

RPD = relative percent difference

SDG = sample delivery group

Table H1-10. Matrix Validation Findings

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-BG13-042122-0-10	SW6020B	Silver	0.21	mg/kg	UJ	PDS<LCL	10605661
BNSF-BG13-042122-0-10	SW6020B	Zinc	2	mg/kg	J	MS>UCL|MSD>UCL	10605661
BNSF-SG13-042522-0-1.5	SW6020B	Lead	3.6	mg/kg	J	MS>UCL|MSRPD	10606046
BNSF-SG13-042522-0-1.5	SW6020B	Silver	0.26	mg/kg	J	PDS<LCL	10606046
BNSF-BG14-042722-0-5.5	E350.1	Ammonia as N	32	mg/kg	J	MS<LCL|MSD<LCL	580-113239-1
BNSF-E320-042822-0-4	SW6020B	Copper	12	mg/kg	J	PDS>UCL	10606565
BNSF-E320-042822-0-4	E350.1	Ammonia as N	17	mg/kg	J	MS<LCL|MSD<LCL	580-113469-1
BNSF-BG20-042922-0-10	E350.1	Ammonia as N	30	mg/kg	J	MSD<LCL	580-113471-1
BNSF-BG20-042922-0-10	E1668C	PCB-81	0.462	ng/kg	UJ	MS<LCL	10606560

Notes:

ID = identification

J = Analyte was present, but reported value may not be accurate or precise.

mg/kg = milligram(s) per kilogram

MS<LCL = Matrix spike recovery less than the lower control limit

MS>UCL = Matrix spike recovery greater than the upper control limit

MSD<LCL = Matrix spike duplicate recovery less than the lower control limit

MSD>UCL = Matrix spike duplicate recovery greater than the upper control limit

MSRPD = Matrix spike/matrix spike duplicate relative percent difference greater than acceptance criterion

N = nitrogen

ng/kg = nanogram(s) per kilogram

PCB = polychlorinated biphenyl Aroclor

PDS<LCL = Post digestion spike recovery less than the lower control limit

PDS>UCL = Post digestion spike recovery greater than the upper control limit

SDG = sample delivery group

UJ = The analyte was not detected above the detection limit objective; however, the reported detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Table H1-11. Surrogate Validation Findings

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-L320-042922-0-2	E1613B	2,3,7,8-TCDD	0.18	ng/kg	UJ	Sur<LCL	10606560
BNSF-L320-042922-0-2	E1613B	1,2,3,7,8-PeCDD	0.19	ng/kg	UJ	Sur<LCL	10606560
BNSF-E460-042922-0-4	E1668C	PCB-169	0.384	ng/kg	UJ	Sur<LCL	10606565
BNSF-E460-042922-0-4	E1668C	PCB-189	0.909	ng/kg	UJ	Sur<LCL	10606565

Notes:
ID = identification
ng/kg = nanogram(s) per kilogram
PCB = polychlorinated biphenyl Aroclor
PeCDD = 1,2,3,7,8-Pentachlorodibenzo-p-dioxin
SDG = sample delivery group
Sur<LCL = Surrogate recovery less than the lower control limit
TCDD = 2,3,7,8-Tetrachlorodibenzo-p-dioxin
UJ = The analyte was not detected above the detection limit objective; however, the reported detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Table H1-12. Estimated Maximum Possible Concentrations

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Phase 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-D160-042822-0-5	E1613B	2,3,7,8-TCDF	0.39	ng/kg	J	EMPC	10606565
BNSF-E320-042822-0-4	E1613B	OCDF	7.1	ng/kg	J	EMPC	10606565
BNSF-E320-042822-0-4	E1613B	1,2,3,7,8-PeCDF	4.6	ng/kg	J	EMPC	10606565
BNSF-E320-042822-0-4	E1613B	2,3,4,6,7,8-HxCDF	0.42	ng/kg	J	EMPC	10606565
BNSF-H360-042922-0-8	E1613B	1,2,3,4,6,7,8-HpCDD	0.94	ng/kg	J	EMPC	10606565
BNSF-L320-042922-0-2	E1613B	OCDD	8.8	ng/kg	J	EMPC	10606560
BNSF-L320-042922-0-2	E1613B	1,2,3,4,6,7,8-HpCDF	1.5	ng/kg	J	EMPC	10606560
BNSF-BG15-042722-0-10	E1668C	PCB-156	2.13	ng/kg	J	EMPC	10606394
BNSF-E320-042822-0-4	E1668C	PCB-114	0.802	ng/kg	J	EMPC	10606565
BNSF-H360-042922-0-8	E1668C	PCB-123	1.38	ng/kg	J	EMPC	10606565
BNSF-SG02-041922-0-10	E1668C	PCB-126	0.387	ng/kg	J	EMPC	10605435
BNSF-SG03-042722-0-5.5	E1668C	PCB-105	2.85	ng/kg	J	EMPC	10606395

Notes:

EMPC = Estimated maximum possible concentration

HpCDD = 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin

HpCDF = 1,2,3,4,6,7,8-Heptachlorodibenzofuran

HxCDF = 1,2,3,4,7,8-Hexachlorodibenzofuran

ID = Identifier

J = Analyte was present but reported value may not be accurate or precise

ng/kg = nanogram(s) per kilogram

OCDD = octachlorodibenzodioxin

OCDF = octachlorodibenzofuran

PCB = polychlorinated biphenyl Aroclor

PeCDF = 2,3,4,7,8-Pentachlorodibenzofuran

TCDF = 2,3,7,8-Tetrachlorodibenzofuran

Table H1-13. Samples Received Over Temperature

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-I120-042922-0-6	E350.1	Ammonia as N	20	mg/kg	J	TEMP	580-113471-1
BNSF-I120-042922-0-6	SW9060A	Total Organic Carbon	5,000	mg/kg	J	TEMP	580-113471-1
BNSF-L320-042922-0-2	E350.1	Ammonia as N	10	mg/kg	J	TEMP	580-113471-1
BNSF-L320-042922-0-2	SW9060A	Total Organic Carbon	30,000	mg/kg	J	TEMP	580-113471-1
BNSF-D160-042822-0-5	E1613B	2,3,7,8-TCDD	0.2	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	1,2,3,7,8,9-HxCDD	0.42	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	Total TCDF	0.7	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	Total PeCDF	0.83	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	OCDD	36	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	Total HxCDD	2.1	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	1,2,3,4,6,7,8-HpCDD	7.5	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	Total PeCDD	0.22	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	Total HpCDD	15	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	Total HpCDF	1	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	OCDF	1.5	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	1,2,3,4,7,8-HxCDD	0.46	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	1,2,3,7,8-PeCDD	0.22	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	Total TCDD	0.2	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	2,3,7,8-TCDF	0.39	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	1,2,3,4,7,8,9-HpCDF	0.46	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	Total HxCDF	0.62	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	2,3,4,7,8-PeCDF	0.23	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	1,2,3,7,8-PeCDF	0.23	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	1,2,3,6,7,8-HxCDF	0.4	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	1,2,3,6,7,8-HxCDD	0.69	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	2,3,4,6,7,8-HxCDF	0.43	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	1,2,3,4,6,7,8-HpCDF	1	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	1,2,3,4,7,8-HxCDF	0.43	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1613B	1,2,3,7,8,9-HxCDF	0.5	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	NWTPH-Dx	Diesel Fuel	52.1	mg/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	NWTPH-Dx	TPH as Motor Oil	215	mg/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Phenol	0.19	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Bis (2-ethylhexyl) phthalate	0.597	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Di-n-octyl phthalate	0.318	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Anthracene	0.0839	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Pyrene	0.0917	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Dibenzofuran	0.154	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Benzo[g,h,i]perylene	0.0861	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Indeno[1,2,3-cd]pyrene	0.133	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Benzo[b]fluoranthene	0.0878	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Fluoranthene	0.085	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Benzo[k]fluoranthene	0.0837	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Acenaphthylene	0.0663	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Chrysene	0.0936	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Benzo[a]pyrene	0.0876	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Dibenzo[a,h]anthracene	0.131	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Benzo[a]anthracene	0.083	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Benzoic Acid	1.67	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	3 & 4-Methylphenol (m,p-Cresols)	0.147	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Acenaphthene	0.0762	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Di-N-Butylphthalate	0.161	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Phenanthrene	0.0935	mg/kg	UJ	TEMP	10606565

Table H1-13. Samples Received Over Temperature

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-D160-042822-0-5	SW8270E	Fluorene	0.0767	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Carbazole	0.146	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Pentachlorophenol	0.127	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	1-Methylnaphthalene	0.0603	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	Naphthalene	0.118	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW8270E	2-Methylnaphthalene	0.0611	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	SW9030B	Sulfide	220	mg/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	2,3,7,8-TCDD	2.2	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	1,2,3,7,8,9-HxCDD	1.6	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	Total TCDF	0.23	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	Total PeCDF	1.6	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	OCDD	130	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	Total HxCDD	28	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	1,2,3,4,6,7,8-HpCDD	24	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	Total PeCDD	0.74	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	Total HpCDD	50	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	Total HpCDF	22	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	OCDF	7.1	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	1,2,3,4,7,8-HxCDD	0.7	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	1,2,3,7,8-PeCDD	0.74	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	Total TCDD	2.2	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	2,3,7,8-TCDF	0.23	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	1,2,3,4,7,8,9-HpCDF	0.41	ng/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	Total HxCDF	7.9	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	2,3,4,7,8-PeCDF	0.21	ng/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	1,2,3,7,8-PeCDF	4.6	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	1,2,3,6,7,8-HxCDF	0.36	ng/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	1,2,3,6,7,8-HxCDD	3.7	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	2,3,4,6,7,8-HxCDF	0.42	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	1,2,3,4,6,7,8-HpCDF	11	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	1,2,3,4,7,8-HxCDF	0.39	ng/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	E1613B	1,2,3,7,8,9-HxCDF	0.45	ng/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	NWTPH-Dx	Diesel Fuel	223	mg/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	NWTPH-Dx	TPH as Motor Oil	630	mg/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Phenol	0.186	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Bis (2-ethylhexyl) phthalate	0.585	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Di-n-octyl phthalate	0.312	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Anthracene	0.0822	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Pyrene	0.184	mg/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Dibenzofuran	0.151	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Benzo[g,h,i]perylene	0.0844	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Indeno[1,2,3-cd]pyrene	0.13	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Benzo[b]fluoranthene	0.086	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Fluoranthene	0.0833	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Benzo[k]fluoranthene	0.082	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Acenaphthylene	0.065	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Chrysene	0.0917	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Benzo[a]pyrene	0.103	mg/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Dibenzo[a,h]anthracene	0.128	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Benzo[a]anthracene	0.0813	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Benzoic Acid	1.63	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	3 & 4-Methylphenol (m,p-Cresols)	0.144	mg/kg	UJ	TEMP	10606565

Table H1-13. Samples Received Over Temperature

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-E320-042822-0-4	SW8270E	Acenaphthene	0.0747	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Di-N-Butylphthalate	0.158	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Phenanthrene	0.0916	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Fluorene	0.0751	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Carbazole	0.143	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Pentachlorophenol	0.124	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	1-Methylnaphthalene	0.059	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	Naphthalene	0.116	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW8270E	2-Methylnaphthalene	0.0599	mg/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	SW9030B	Sulfide	318	mg/kg	J	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	2,3,7,8-TCDD	0.19	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	1,2,3,7,8,9-HxCDD	0.4	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	Total TCDF	0.21	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	Total PeCDF	0.21	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	OCDD	13	ng/kg	J	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	Total HxCDD	0.81	ng/kg	J	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	1,2,3,4,6,7,8-HpCDD	2.4	ng/kg	J	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	Total PeCDD	0.2	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	Total HpCDD	5.5	ng/kg	J	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	Total HpCDF	0.44	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	OCDF	1.4	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	1,2,3,4,7,8-HxCDD	0.42	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	1,2,3,7,8-PeCDD	0.2	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	Total TCDD	0.19	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	2,3,7,8-TCDF	0.21	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	1,2,3,4,7,8,9-HpCDF	0.44	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	Total HxCDF	0.38	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	2,3,4,7,8-PeCDF	0.22	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	1,2,3,7,8-PeCDF	0.21	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	1,2,3,6,7,8-HxCDF	0.38	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	1,2,3,6,7,8-HxCDD	0.46	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	2,3,4,6,7,8-HxCDF	0.41	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	1,2,3,4,6,7,8-HpCDF	0.64	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	1,2,3,4,7,8-HxCDF	0.41	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1613B	1,2,3,7,8,9-HxCDF	0.48	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	NWTPH-Dx	Diesel Fuel	9.7	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	NWTPH-Dx	TPH as Motor Oil	25.1	mg/kg	J	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Phenol	0.0178	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Bis (2-ethylhexyl) phthalate	0.056	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Di-n-octyl phthalate	0.0298	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Anthracene	0.00786	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Pyrene	0.00859	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Dibenzofuran	0.0145	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Benzo[g,h,i]perylene	0.00808	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Indeno[1,2,3-cd]pyrene	0.0125	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Benzo[b]fluoranthene	0.00824	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Fluoranthene	0.00797	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Benzo[k]fluoranthene	0.00785	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Acenaphthylene	0.00622	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Chrysene	0.00878	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Benzo[a]pyrene	0.00821	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Dibenzo[a,h]anthracene	0.0122	mg/kg	UJ	TEMP	10606565

Table H1-13. Samples Received Over Temperature

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-E380-042822-0-4	SW8270E	Benzo[a]anthracene	0.00779	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Benzoic Acid	0.157	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	3 & 4-Methylphenol (m,p-Cresols)	0.0138	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Acenaphthene	0.00715	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Di-N-Butylphthalate	0.0151	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Phenanthrene	0.00877	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Fluorene	0.00719	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Carbazole	0.0137	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Pentachlorophenol	0.0119	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	1-Methylnaphthalene	0.00565	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	Naphthalene	0.0111	mg/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	SW8270E	2-Methylnaphthalene	0.00894	mg/kg	J	TEMP	10606565
BNSF-E380-042822-0-4	SW9030B	Sulfide	39.8	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	2,3,7,8-TCDD	0.21	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	1,2,3,7,8,9-HxCDD	0.43	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	Total TCDF	0.58	ng/kg	J	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	Total PeCDF	0.28	ng/kg	J	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	OCDD	10	ng/kg	J	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	Total HxCDD	0.43	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	1,2,3,4,6,7,8-HpCDD	1.9	ng/kg	J	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	Total PeCDD	0.22	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	Total HpCDD	3.8	ng/kg	J	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	Total HpCDF	0.5	ng/kg	J	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	OCDF	1.6	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	1,2,3,4,7,8-HxCDD	0.46	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	1,2,3,7,8-PeCDD	0.22	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	Total TCDD	0.21	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	2,3,7,8-TCDF	0.25	ng/kg	J	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	1,2,3,4,7,8,9-HpCDF	0.48	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	Total HxCDF	0.42	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	2,3,4,7,8-PeCDF	0.24	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	1,2,3,7,8-PeCDF	0.23	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	1,2,3,6,7,8-HxCDF	0.42	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	1,2,3,6,7,8-HxCDD	0.5	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	2,3,4,6,7,8-HxCDF	0.45	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	1,2,3,4,6,7,8-HpCDF	0.7	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	1,2,3,4,7,8-HxCDF	0.45	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1613B	1,2,3,7,8,9-HxCDF	0.52	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	NWTPH-Dx	Diesel Fuel	38.8	mg/kg	J	TEMP	10606565
BNSF-E460-042922-0-4	NWTPH-Dx	TPH as Motor Oil	112	mg/kg	J	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Phenol	0.188	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Bis (2-ethylhexyl) phthalate	0.593	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Di-n-octyl phthalate	0.316	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Anthracene	0.0834	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Pyrene	0.0973	mg/kg	J	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Dibenzofuran	0.153	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Benzo[g,h,i]perylene	0.0856	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Indeno[1,2,3-cd]pyrene	0.132	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Benzo[b]fluoranthene	0.0873	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Fluoranthene	0.0845	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Benzo[k]fluoranthene	0.0832	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Acenaphthylene	0.0659	mg/kg	UJ	TEMP	10606565

Table H1-13. Samples Received Over Temperature

BNSF Wishram Railyard, Wishram, Washington
Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-E460-042922-0-4	SW8270E	Chrysene	0.0931	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Benzo[a]pyrene	0.087	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Dibenzo[a,h]anthracene	0.13	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Benzo[a]anthracene	0.0825	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Benzoic Acid	1.66	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	3 & 4-Methylphenol (m,p-Cresols)	0.146	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Acenaphthene	0.0758	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Di-N-Butylphthalate	0.16	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Phenanthrene	0.0929	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Fluorene	0.0762	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Carbazole	0.145	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Pentachlorophenol	0.126	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	1-Methylnaphthalene	0.0599	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	Naphthalene	0.118	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW8270E	2-Methylnaphthalene	0.0607	mg/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	SW9030B	Sulfide	101	mg/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	2,3,7,8-TCDD	0.18	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	1,2,3,7,8,9-HxCDD	0.37	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	Total TCDF	0.21	ng/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	Total PeCDF	0.28	ng/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	OCDD	6.7	ng/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	Total HxCDD	0.37	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	1,2,3,4,6,7,8-HpCDD	0.94	ng/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	Total PeCDD	0.19	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	Total HpCDD	1.1	ng/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	Total HpCDF	0.61	ng/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	OCDF	1.3	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	1,2,3,4,7,8-HxCDD	0.39	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	1,2,3,7,8-PeCDD	0.19	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	Total TCDD	0.18	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	2,3,7,8-TCDF	0.21	ng/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	1,2,3,4,7,8,9-HpCDF	0.41	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	Total HxCDF	0.36	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	2,3,4,7,8-PeCDF	0.21	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	1,2,3,7,8-PeCDF	0.2	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	1,2,3,6,7,8-HxCDF	0.36	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	1,2,3,6,7,8-HxCDD	0.43	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	2,3,4,6,7,8-HxCDF	0.39	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	1,2,3,4,6,7,8-HpCDF	0.61	ng/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	1,2,3,4,7,8-HxCDF	0.39	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1613B	1,2,3,7,8,9-HxCDF	0.45	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	NWTPH-Dx	Diesel Fuel	31	mg/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	NWTPH-Dx	TPH as Motor Oil	107	mg/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Phenol	0.0173	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Bis (2-ethylhexyl) phthalate	0.0543	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Di-n-octyl phthalate	0.029	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Anthracene	0.00764	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Pyrene	0.00835	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Dibenzofuran	0.014	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Benzo[g,h,i]perylene	0.00784	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Indeno[1,2,3-cd]pyrene	0.0121	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Benzo[b]fluoranthene	0.008	mg/kg	UJ	TEMP	10606565

Table H1-13. Samples Received Over Temperature

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-H360-042922-0-8	SW8270E	Fluoranthene	0.00774	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Benzo[k]fluoranthene	0.00762	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Acenaphthylene	0.00604	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Chrysene	0.00853	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Benzo[a]pyrene	0.00797	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Dibenzo[a,h]anthracene	0.0119	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Benzo[a]anthracene	0.00756	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Benzoic Acid	0.158	mg/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	3 & 4-Methylphenol (m,p-Cresols)	0.0134	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Acenaphthene	0.00694	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Di-N-Butylphthalate	0.0147	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Phenanthrene	0.00851	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Fluorene	0.00698	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Carbazole	0.0133	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Pentachlorophenol	0.0115	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	1-Methylnaphthalene	0.00549	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	Naphthalene	0.0108	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW8270E	2-Methylnaphthalene	0.00556	mg/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	SW9030B	Sulfide	38.6	mg/kg	UJ	TEMP	10606565
BNSF-I120-042922-0-6	E1613B	2,3,7,8-TCDD	0.19	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	1,2,3,7,8,9-HxCDD	0.39	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	Total TCDF	0.21	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	Total PeCDF	0.21	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	OCDD	14	ng/kg	J	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	Total HxCDD	0.39	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	1,2,3,4,6,7,8-HpCDD	1.9	ng/kg	J	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	Total PeCDD	0.2	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	Total HpCDD	4.4	ng/kg	J	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	Total HpCDF	0.7	ng/kg	J	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	OCDF	1.4	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	1,2,3,4,7,8-HxCDD	0.42	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	1,2,3,7,8-PeCDD	0.2	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	Total TCDD	0.19	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	2,3,7,8-TCDF	0.21	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	1,2,3,4,7,8,9-HpCDF	0.44	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	Total HxCDF	0.38	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	2,3,4,7,8-PeCDF	0.22	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	1,2,3,7,8-PeCDF	0.21	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	1,2,3,6,7,8-HxCDF	0.38	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	1,2,3,6,7,8-HxCDD	0.46	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	2,3,4,6,7,8-HxCDF	0.41	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	1,2,3,4,6,7,8-HpCDF	0.64	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	1,2,3,4,7,8-HxCDF	0.41	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1613B	1,2,3,7,8,9-HxCDF	0.47	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	NWTPH-Dx	Diesel Fuel	32.2	mg/kg	J	TEMP	10606560
BNSF-I120-042922-0-6	NWTPH-Dx	TPH as Motor Oil	70	mg/kg	J	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Phenol	0.0179	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Bis (2-ethylhexyl) phthalate	0.0565	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Di-n-octyl phthalate	0.0301	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Anthracene	0.00793	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Pyrene	0.00867	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Dibenzofuran	0.0146	mg/kg	UJ	TEMP	10606560

Table H1-13. Samples Received Over Temperature

BNSF Wishram Railyard, Wishram, Washington
Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-I120-042922-0-6	SW8270E	Benzo[g,h,i]perylene	0.00815	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Indeno[1,2,3-cd]pyrene	0.0126	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Benzo[b]fluoranthene	0.00831	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Fluoranthene	0.00804	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Benzo[k]fluoranthene	0.00792	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Acenaphthylene	0.00627	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Chrysene	0.00886	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Benzo[a]pyrene	0.00828	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Dibenzo[a,h]anthracene	0.0123	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Benzo[a]anthracene	0.00785	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Benzoic Acid	0.158	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	3 & 4-Methylphenol (m,p-Cresols)	0.0139	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Acenaphthene	0.00721	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Di-N-Butylphthalate	0.0153	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Phenanthrene	0.00884	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Fluorene	0.00725	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Carbazole	0.0138	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Pentachlorophenol	0.012	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	1-Methylnaphthalene	0.0057	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	Naphthalene	0.0112	mg/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	SW8270E	2-Methylnaphthalene	0.00706	mg/kg	J	TEMP	10606560
BNSF-I120-042922-0-6	SW9030B	Sulfide	51.7	mg/kg	J	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	2,3,7,8-TCDD	0.18	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	1,2,3,7,8,9-HxCDD	0.38	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	Total TCDF	0.2	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	Total PeCDF	0.2	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	OCDD	8.8	ng/kg	J	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	Total HxCDD	8.2	ng/kg	J	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	1,2,3,4,6,7,8-HpCDD	2.3	ng/kg	J	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	Total PeCDD	3.2	ng/kg	J	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	Total HpCDD	2.3	ng/kg	J	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	Total HpCDF	0.41	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	OCDF	1.4	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	1,2,3,4,7,8-HxCDD	0.39	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	1,2,3,7,8-PeCDD	0.19	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	Total TCDD	0.18	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	2,3,7,8-TCDF	0.2	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	1,2,3,4,7,8,9-HpCDF	0.41	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	Total HxCDF	2.2	ng/kg	J	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	2,3,4,7,8-PeCDF	0.21	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	1,2,3,7,8-PeCDF	0.2	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	1,2,3,6,7,8-HxCDF	0.36	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	1,2,3,6,7,8-HxCDD	0.44	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	2,3,4,6,7,8-HxCDF	0.39	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	1,2,3,4,6,7,8-HpCDF	1.5	ng/kg	J	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	1,2,3,4,7,8-HxCDF	0.39	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1613B	1,2,3,7,8,9-HxCDF	0.45	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	NWTPH-Dx	Diesel Fuel	136	mg/kg	J	TEMP	10606560
BNSF-L320-042922-0-2	NWTPH-Dx	TPH as Motor Oil	503	mg/kg	J	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Phenol	0.0334	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Bis (2-ethylhexyl) phthalate	0.105	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Di-n-octyl phthalate	0.0561	mg/kg	UJ	TEMP	10606560

Table H1-13. Samples Received Over Temperature

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-L320-042922-0-2	SW8270E	Anthracene	0.0148	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Pyrene	0.0162	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Dibenzofuran	0.0272	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Benzo[g,h,i]perylene	0.0152	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Indeno[1,2,3-cd]pyrene	0.0234	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Benzo[b]fluoranthene	0.0155	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Fluoranthene	0.015	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Benzo[k]fluoranthene	0.0147	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Acenaphthylene	0.0117	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Chrysene	0.0165	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Benzo[a]pyrene	0.0155	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Dibenzo[a,h]anthracene	0.0231	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Benzo[a]anthracene	0.0146	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Benzoic Acid	0.294	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	3 & 4-Methylphenol (m,p-Cresols)	0.0259	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Acenaphthene	0.0135	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Di-N-Butylphthalate	0.0284	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Phenanthrene	0.0165	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Fluorene	0.0135	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Carbazole	0.0257	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Pentachlorophenol	0.0223	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	1-Methylnaphthalene	0.0106	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	Naphthalene	0.0208	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW8270E	2-Methylnaphthalene	0.0108	mg/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	SW9030B	Sulfide	37.4	mg/kg	UJ	TEMP	10606560
BNSF-SG11-042822-0-5	E1613B	2,3,7,8-TCDD	0.2	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	1,2,3,7,8,9-HxCDD	0.41	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	Total TCDF	0.22	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	Total PeCDF	0.22	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	OCDD	4.6	ng/kg	J	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	Total HxCDD	0.41	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	1,2,3,4,6,7,8-HpCDD	0.75	ng/kg	J	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	Total PeCDD	0.21	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	Total HpCDD	1.6	ng/kg	J	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	Total HpCDF	0.45	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	OCDF	1.5	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	1,2,3,4,7,8-HxCDD	0.43	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	1,2,3,7,8-PeCDD	0.21	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	Total TCDD	0.2	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	2,3,7,8-TCDF	0.22	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	1,2,3,4,7,8,9-HpCDF	0.45	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	Total HxCDF	0.39	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	2,3,4,7,8-PeCDF	0.23	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	1,2,3,7,8-PeCDF	0.22	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	1,2,3,6,7,8-HxCDF	0.39	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	1,2,3,6,7,8-HxCDD	0.47	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	2,3,4,6,7,8-HxCDF	0.42	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	1,2,3,4,6,7,8-HpCDF	0.66	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	1,2,3,4,7,8-HxCDF	0.42	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1613B	1,2,3,7,8,9-HxCDF	0.49	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	NWTPH-Dx	Diesel Fuel	9.9	mg/kg	J	TEMP	10606565
BNSF-SG11-042822-0-5	NWTPH-Dx	TPH as Motor Oil	35.4	mg/kg	J	TEMP	10606565

Table H1-13. Samples Received Over Temperature

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-SG11-042822-0-5	SW8270E	Phenol	0.0174	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Bis (2-ethylhexyl) phthalate	0.0548	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Di-n-octyl phthalate	0.0292	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Anthracene	0.0077	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Pyrene	0.0142	mg/kg	J	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Dibenzofuran	0.0142	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Benzo[g,h,i]perylene	0.00791	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Indeno[1,2,3-cd]pyrene	0.0122	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Benzo[b]fluoranthene	0.00806	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Fluoranthene	0.0078	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Benzo[k]fluoranthene	0.00769	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Acenaphthylene	0.00609	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Chrysene	0.0101	mg/kg	J	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Benzo[a]pyrene	0.00804	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Dibenzo[a,h]anthracene	0.012	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Benzo[a]anthracene	0.00762	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Benzoic Acid	0.238	mg/kg	J	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	3 & 4-Methylphenol (m,p-Cresols)	0.0135	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Acenaphthene	0.007	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Di-N-Butylphthalate	0.0148	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Phenanthrene	0.00858	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Fluorene	0.00704	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Carbazole	0.0134	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Pentachlorophenol	0.0116	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	1-Methylnaphthalene	0.00623	mg/kg	J	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	Naphthalene	0.0109	mg/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	SW8270E	2-Methylnaphthalene	0.00945	mg/kg	J	TEMP	10606565
BNSF-SG11-042822-0-5	SW9030B	Sulfide	39	mg/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E350.1	Ammonia as N	20	mg/kg	J	TEMP	580-113469-1
BNSF-D160-042822-0-5	SW9060A	Total Organic Carbon	8000	mg/kg	J	TEMP	580-113469-1
BNSF-E320-042822-0-4	E350.1	Ammonia as N	17	mg/kg	J	TEMP	580-113469-1
BNSF-E320-042822-0-4	SW9060A	Total Organic Carbon	15000	mg/kg	J	TEMP	580-113469-1
BNSF-E380-042822-0-4	E350.1	Ammonia as N	20	mg/kg	J	TEMP	580-113469-1
BNSF-E380-042822-0-4	SW9060A	Total Organic Carbon	3000	mg/kg	J	TEMP	580-113469-1
BNSF-E460-042922-0-4	E350.1	Ammonia as N	30	mg/kg	J	TEMP	580-113469-1
BNSF-E460-042922-0-4	SW9060A	Total Organic Carbon	7000	mg/kg	J	TEMP	580-113469-1
BNSF-H360-042922-0-8	E350.1	Ammonia as N	20	mg/kg	J	TEMP	580-113469-1
BNSF-H360-042922-0-8	SW9060A	Total Organic Carbon	20000	mg/kg	J	TEMP	580-113469-1
BNSF-SG11-042822-0-5	E350.1	Ammonia as N	20	mg/kg	J	TEMP	580-113469-1
BNSF-SG11-042822-0-5	SW9060A	Total Organic Carbon	4000	mg/kg	J	TEMP	580-113469-1
BNSF-D160-042822-0-5	E1668C	PCB-118	28.9	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1668C	PCB-77	2.54	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1668C	PCB-105	9.22	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1668C	PCB-169	0.326	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1668C	PCB-156	2.58	ng/kg	J	TEMP	10606565
BNSF-D160-042822-0-5	E1668C	PCB-189	0.772	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1668C	PCB-167	1.3	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1668C	PCB-126	0.339	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1668C	PCB-123	0.609	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1668C	PCB-157	0.854	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1668C	PCB-81	0.482	ng/kg	UJ	TEMP	10606565
BNSF-D160-042822-0-5	E1668C	PCB-114	0.887	ng/kg	J	TEMP	10606565

Table H1-13. Samples Received Over Temperature

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-E320-042822-0-4	E1668C	PCB-118	26.6	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1668C	PCB-77	3.56	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1668C	PCB-105	12.5	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1668C	PCB-169	0.317	ng/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	E1668C	PCB-156	3.54	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1668C	PCB-189	0.752	ng/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	E1668C	PCB-167	1.7	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1668C	PCB-126	0.33	ng/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	E1668C	PCB-123	0.97	ng/kg	J	TEMP	10606565
BNSF-E320-042822-0-4	E1668C	PCB-157	0.832	ng/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	E1668C	PCB-81	0.469	ng/kg	UJ	TEMP	10606565
BNSF-E320-042822-0-4	E1668C	PCB-114	0.802	ng/kg	J	TEMP	10606565
BNSF-E380-042822-0-4	E1668C	PCB-118	4.95	ng/kg	J	TEMP	10606565
BNSF-E380-042822-0-4	E1668C	PCB-77	1.81	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1668C	PCB-105	2.44	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1668C	PCB-169	0.27	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1668C	PCB-156	1.66	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1668C	PCB-189	0.641	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1668C	PCB-167	1.08	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1668C	PCB-126	0.281	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1668C	PCB-123	0.506	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1668C	PCB-157	0.709	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1668C	PCB-81	0.4	ng/kg	UJ	TEMP	10606565
BNSF-E380-042822-0-4	E1668C	PCB-114	0.543	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1668C	PCB-118	11.6	ng/kg	J	TEMP	10606565
BNSF-E460-042922-0-4	E1668C	PCB-77	3.28	ng/kg	J	TEMP	10606565
BNSF-E460-042922-0-4	E1668C	PCB-105	5.83	ng/kg	J	TEMP	10606565
BNSF-E460-042922-0-4	E1668C	PCB-169	0.384	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1668C	PCB-156	2.36	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1668C	PCB-189	0.909	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1668C	PCB-167	1.53	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1668C	PCB-126	0.399	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1668C	PCB-123	0.718	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1668C	PCB-157	1.01	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1668C	PCB-81	0.568	ng/kg	UJ	TEMP	10606565
BNSF-E460-042922-0-4	E1668C	PCB-114	0.771	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1668C	PCB-118	40.1	ng/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1668C	PCB-77	3.71	ng/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1668C	PCB-105	14	ng/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1668C	PCB-169	0.353	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1668C	PCB-156	4.77	ng/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1668C	PCB-189	0.836	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1668C	PCB-167	2.26	ng/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1668C	PCB-126	0.367	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1668C	PCB-123	1.38	ng/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1668C	PCB-157	1.33	ng/kg	J	TEMP	10606565
BNSF-H360-042922-0-8	E1668C	PCB-81	0.522	ng/kg	UJ	TEMP	10606565
BNSF-H360-042922-0-8	E1668C	PCB-114	1.77	ng/kg	J	TEMP	10606565
BNSF-I120-042922-0-6	E1668C	PCB-118	12.2	ng/kg	J	TEMP	10606560
BNSF-I120-042922-0-6	E1668C	PCB-77	2.48	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1668C	PCB-105	5.77	ng/kg	J	TEMP	10606560
BNSF-I120-042922-0-6	E1668C	PCB-169	0.371	ng/kg	UJ	TEMP	10606560

Table H1-13. Samples Received Over Temperature

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-I120-042922-0-6	E1668C	PCB-156	2.28	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1668C	PCB-189	0.88	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1668C	PCB-167	1.48	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1668C	PCB-126	0.386	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1668C	PCB-123	0.695	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1668C	PCB-157	0.974	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1668C	PCB-81	0.549	ng/kg	UJ	TEMP	10606560
BNSF-I120-042922-0-6	E1668C	PCB-114	0.746	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1668C	PCB-118	8.39	ng/kg	J	TEMP	10606560
BNSF-L320-042922-0-2	E1668C	PCB-77	2.4	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1668C	PCB-105	3.24	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1668C	PCB-169	0.359	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1668C	PCB-156	2.2	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1668C	PCB-189	0.85	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1668C	PCB-167	1.43	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1668C	PCB-126	0.373	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1668C	PCB-123	0.792	ng/kg	J	TEMP	10606560
BNSF-L320-042922-0-2	E1668C	PCB-157	0.942	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1668C	PCB-81	0.531	ng/kg	UJ	TEMP	10606560
BNSF-L320-042922-0-2	E1668C	PCB-114	0.721	ng/kg	UJ	TEMP	10606560
BNSF-SG11-042822-0-5	E1668C	PCB-118	8.87	ng/kg	J	TEMP	10606565
BNSF-SG11-042822-0-5	E1668C	PCB-77	2.23	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1668C	PCB-105	3.51	ng/kg	J	TEMP	10606565
BNSF-SG11-042822-0-5	E1668C	PCB-169	0.334	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1668C	PCB-156	2.05	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1668C	PCB-189	0.791	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1668C	PCB-167	1.33	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1668C	PCB-126	0.347	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1668C	PCB-123	0.625	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1668C	PCB-157	0.876	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1668C	PCB-81	0.494	ng/kg	UJ	TEMP	10606565
BNSF-SG11-042822-0-5	E1668C	PCB-114	0.671	ng/kg	UJ	TEMP	10606565
BNSF-BG20-042922-0-10	E1613B	2,3,7,8-TCDD	0.24	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	1,2,3,7,8,9-HxCDD	0.51	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	Total TCDF	0.27	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	Total PeCDF	0.27	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	OCDD	2.5	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	Total HxCDD	0.51	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	1,2,3,4,6,7,8-HpCDD	0.65	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	Total PeCDD	0.26	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	Total HpCDD	0.65	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	Total HpCDF	0.56	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	OCDF	1.8	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	1,2,3,4,7,8-HxCDD	0.54	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	1,2,3,7,8-PeCDD	0.26	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	Total TCDD	0.24	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	2,3,7,8-TCDF	0.27	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	1,2,3,4,7,8,9-HpCDF	0.56	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	Total HxCDF	0.49	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	2,3,4,7,8-PeCDF	0.28	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	1,2,3,7,8-PeCDF	0.27	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	1,2,3,6,7,8-HxCDF	0.49	ng/kg	UJ	TEMP	10606560

Table H1-13. Samples Received Over Temperature

BNSF Wishram Railyard, Wishram, Washington
Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-BG20-042922-0-10	E1613B	1,2,3,6,7,8-HxCDD	0.59	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	2,3,4,6,7,8-HxCDF	0.53	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	1,2,3,4,6,7,8-HpCDF	0.82	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	1,2,3,4,7,8-HxCDF	0.53	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1613B	1,2,3,7,8,9-HxCDF	0.61	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	NWTPH-Dx	Diesel Fuel	10.2	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	NWTPH-Dx	TPH as Motor Oil	31.6	mg/kg	J	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Phenol	0.0381	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Bis (2-ethylhexyl) phthalate	0.12	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Di-n-octyl phthalate	0.064	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Anthracene	0.0169	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Pyrene	0.0185	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Dibenzofuran	0.031	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Benzo[g,h,i]perylene	0.0173	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Indeno[1,2,3-cd]pyrene	0.0267	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Benzo[b]fluoranthene	0.0176	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Fluoranthene	0.0171	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Benzo[k]fluoranthene	0.0168	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Acenaphthylene	0.0133	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Chrysene	0.0188	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Benzo[a]pyrene	0.0176	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Dibenzo[a,h]anthracene	0.0263	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Benzo[a]anthracene	0.0166	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Benzoic Acid	0.335	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	3 & 4-Methylphenol (m,p-Cresols)	0.0296	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Acenaphthene	0.0154	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Di-N-Butylphthalate	0.0324	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Phenanthrene	0.0188	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Fluorene	0.0154	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Carbazole	0.0293	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Pentachlorophenol	0.0254	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	1-Methylnaphthalene	0.0121	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	Naphthalene	0.0237	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW8270E	2-Methylnaphthalene	0.0123	mg/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	SW9030B	Sulfide	179	mg/kg	J	TEMP	10606560
BNSF-BG20-042922-0-10	E1668C	PCB-118	8.56	ng/kg	J	TEMP	10606560
BNSF-BG20-042922-0-10	E1668C	PCB-77	2.88	ng/kg	J	TEMP	10606560
BNSF-BG20-042922-0-10	E1668C	PCB-105	4.5	ng/kg	J	TEMP	10606560
BNSF-BG20-042922-0-10	E1668C	PCB-169	0.312	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1668C	PCB-156	1.92	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1668C	PCB-189	0.739	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1668C	PCB-167	1.24	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1668C	PCB-126	0.325	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1668C	PCB-123	0.584	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1668C	PCB-157	0.819	ng/kg	UJ	TEMP	10606560

Table H1-13. Samples Received Over Temperature

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 1, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-BG20-042922-0-10	E1668C	PCB-81	0.462	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E1668C	PCB-114	0.627	ng/kg	UJ	TEMP	10606560
BNSF-BG20-042922-0-10	E350.1	Ammonia as N	30	mg/kg	J	TEMP	580-113471-1
BNSF-BG20-042922-0-10	SW9060A	Total Organic Carbon	7000	mg/kg	J	TEMP	580-113471-1

Notes:

B = Analyte was detected in the associated method blank or field blank.

HpCDD = 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin

HpCDF = 1,2,3,4,6,7,8-Heptachlorodibenzofuran

HxCDD = 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin

HxCDF = 1,2,3,4,7,8-Hexachlorodibenzofuran

ID = identification

J = Analyte was present, but reported value may not be accurate or precise.

mg/kg = milligram(s) per kilogram

N = nitrogen

ng/kg = nanogram(s) per kilogram

OCDD = octachlorodibenzodioxin

OCDF = octachlorodibenzofuran

PCB = polychlorinated biphenyl Aroclor

PeCDD = 1,2,3,7,8-Pentachlorodibenzo-p-dioxin

PeCDF = 2,3,4,7,8-Pentachlorodibenzofuran

TCDD = 2,3,7,8-Tetrachlorodibenzo-p-dioxin

TCDF = 2,3,7,8-Tetrachlorodibenzofuran

TEMP = Sample received at a temperature greater than 6 degrees Celsius

TPH = total petroleum hydrocarbons

UJ = The analyte was not detected above the detection limit objective; however, the reported detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Appendix H-2

Data Quality Evaluation – **Step** 2

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Phase 2

Data Quality Evaluation

Final

June 2024

Contents

Tables

Introduction

The objective of this data quality evaluation (DQE) report is to assess the data quality of analytical results for sediment samples collected as part of sediment investigation activities in the aquatic lands adjacent to the BNSF Railway Company (BNSF) Wishram Railyard (aka BNSF Track Switching Facility) in Wishram, Washington. This DQE covers results for sample delivery groups (SDGs) received as part of the Step 2 sampling in November 2022. Individual method requirements and guidelines from the BNSF Wishram Railyard, Wishram, Washington, Sediment Remedial Investigation Work Plan (Jacobs 2021a) (Work Plan) were used in this assessment.

This report is intended as a general data quality assessment designed to summarize data issues.

Analytical Data

This DQE report covers 14 normal sediment samples, 1 sediment field duplicate (FD), 5 sediment matrix spike (MS)/matrix spike duplicate (MSD) sets, and 1 equipment blank (EB). A list of samples and collection dates is included in Table 1. Samples were collected between November 3 and November 14, 2022. These sample results were reported as six sample delivery groups (SDGs) listed in Table 2. The analyses were performed by Pace Laboratory in Minneapolis, Minnesota; Pace Laboratory in Mount Juliet, Tennessee; Pace Laboratory in Sheridan, Wyoming; and Eurofins Frontier Geosciences in Seattle, Washington. Five methods were used to analyze the environmental samples. One or more of the samples were analyzed for the analytes and methods presented in Table 3.

Field samples were also reviewed to ascertain field compliance and data quality issues. This included a review of an FD, an EB, and MS/MSDs.

Data flags were assigned according to the Work Plan. Multiple flags are routinely applied to specific sample method/matrix/analyte combinations, but there will be only one final flag. A final flag is applied to the data and is the most conservative of the applied validation flags in the order of most conservative to least conservative as follows: R, B, J, UJ, and U.

The data flags are defined as follows:

- J = Analyte was present but reported value may not be accurate or precise.
- B = Analyte was detected in the associated method blank or field blank.
- R = This result has been rejected.
- U = This analyte was analyzed for but not detected at the specified detection limit.
- UJ = The analyte was not detected above the detection limit objective; however, the reported detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Findings

Table 4 shows all final validation flags based on the most conservative of the applied validation flags. The following sections and Tables 5 through 9 summarize the data qualifiers applied for each element of quality control where exceedances were observed.

Calibration

The recovery of indeno[1,2,3-cd]pyrene was less than the lower control limit in an initial calibration verification (ICV) for Method SW8270E, indicating that associated sample results are possibly biased low. Five associated nondetected results in samples BNSF-HN300-SC-1.0-2.0-111322, BNSF-I500-SC-0.0-0.8-111322, BNSF-J060-SC-0.5-1.5-111422, BNSF-J060-SC-8.5-9.5-111422, and BNSF-O280-SC-0.0-0.7-111322 were qualified as estimated and flagged “UJ.”

The samples and analytes affected by ICV exceedances are shown in Table 5.

Holding Times

All holding-time criteria were met with the following exceptions:

Samples BNSF-EF240-SC-1.0-2.0-111022, BNSF-EF240-SC-1.0-2.0-111022-1, BNSF-EF240-SC-3.0-4.0-111022, BNSF-K200-SC-0.0-0.4-110922, BNSF-J060-SC-8.5-9.5-111422, BNSF-F390-SC-6.2-7.2-110722, and BNSF-G020-SC-0.0-1.0-110422 were analyzed 5 to 14 days past the 28-day holding time for Method SW9060A; as such, associated results are possibly biased low. Seven associated detected results were qualified as estimated and flagged “J.”

The samples and analytes affected by holding time exceedances are shown in Table 6.

Method Blanks

Method blanks were analyzed at the required frequency and were free of contamination that would affect the sample results.

Equipment Blanks

One EB was collected and analyzed and was free of contamination that would affect the sample results.

Field Duplicates

One FD set was collected. The precision criteria of 20 percent was met with the exception listed as follows:

The relative percent differences (RPDs) of total petroleum hydrocarbons as motor oil and total petroleum hydrocarbons as diesel were greater than criteria in FD set BNSF-EF240-SC-1.0-2.0-111022 / BNSF-EF240-SC-1.0-2.0-111022-1 for Method NWTPH-Dx. Three associated detected results were qualified as estimated and flagged “J,” and one associated nondetected result was qualified as estimated and flagged “UJ.”

The samples and analytes affected by FD RPD exceedances are shown in Table 7.

Laboratory Duplicates

Laboratory duplicates were analyzed where required by the method. All precision criteria were met.

Laboratory Control Samples

Laboratory control samples and laboratory control sample duplicates were analyzed for all methods as required. All acceptance criteria were met.

Matrix Spike Samples and Post-digestion Spikes

The results of MS/MSD analyses provide information about the possible influence of the matrix on either accuracy or precision of the measurements. All acceptance criteria were met.

The recovery of total petroleum hydrocarbons as diesel was less than the lower control limit in the MS and MSD of sample BNSF-I500-SC-0.0-0.8-111322 for Method NWTPH-Dx, indicating that the associated sample result is possibly biased low. The associated detected result was qualified as estimated and flagged “J.”

The recoveries of total petroleum hydrocarbons as diesel and total petroleum hydrocarbons as motor oil were greater than the upper control limit in the MS and MSD of sample BNSF-G020-SC-0.0-1.0-110422 for Method NWTPH-Dx, indicating that the associated sample results are possibly biased high. Additionally, the RPDs for total petroleum hydrocarbons as diesel and total petroleum hydrocarbons as motor oil were greater than criteria in this same MS/MSD set. The associated detected results were qualified as estimated and flagged “J.”

The samples and analytes affected by MS/MSD recovery and RPD, or PDS, exceedances are shown in Table 8.

Surrogates

Surrogates were analyzed for all required methods. All acceptance criteria were met.

Internal Standards

Internal standards were analyzed for all required methods. All acceptance criteria were met.

Chain of Custody

Samples were documented in a completed chain-of-custody and received at the laboratory within temperature criteria with the following exceptions:

Two samples were received at the laboratory over the temperature criterion at 6.5 degrees Celsius. Associated results are possibly biased low for Methods SW9060A, SW8270E, and NWTPH-Dx. In total, 13 associated detected results were qualified as estimated and flagged “J,“ and 47 associated nondetected results were qualified as estimated and flagged “UJ” in samples BNSF-G000-SC-1.5-2.5-110322 and BNSF-G000-SC-4.0-5.0-110322.

The samples and analytes affected by temperature exceedances are shown in Table 9.

Archive Samples

Originally, sample BNSF-G200-SC-4.0-5.0-110722 collected on November 8, 2022, was submitted to the laboratory with a request to place in frozen archive. The sample was released from archive on January 11, 2023, at which time it was discovered the sample was placed in refrigerated archive instead of being frozen. Methods SW8270E and SW9060A were more than two times past the holding time; as such, they were not analyzed. Method NWTPH-Dx was extracted upon receipt at the laboratory, and the refrigerated extract was within holding time, and Method ASTM D422 does not have a holding time; as such, these two methods were approved for analysis and are the only methods reported for sample BNSF-G200-SC-4.0-5.0-110722.

Overall Assessment

The final activity in the DQE is an assessment of whether the data meets the data quality objectives (DQOs). The goal of this assessment is to demonstrate that a sufficient number of representative samples were collected and the resulting analytical data can be used to support the decision-making process. The following summary highlights the data evaluation findings for the previously defined events:

1) No data were rejected, and the completeness goal of 95 percent was met for all method/analyte combinations.
2) Approximately 19 percent of the data were qualified due to quality control exceedances that included the following: FD RPD exceedances, holding time exceedances, MS/MSD recovery and RPD exceedances, calibration check exceedances, and sample receipt temperature exceedances.
3) Overall, the precision and accuracy of the data, as measured by laboratory and field quality control indicators, suggest that the DQOs were met. Data are usable for project decision-making, considering the biases outlined in this data quality evaluation.
4) Representativeness and comparability of the data was achieved through adherence to the sampling plan. Consistent sample collection procedures, project laboratories, and analytical methodologies were used throughout the sampling event. Data were reported in consistent methods and units for the sampling event and with historical data.
5) Sensitivity of the data was maintained with consistent reporting limits, adjusted for percent moisture.

References

Jacobs Engineering Group Inc. (Jacobs). 2021. *BNSF Wishram Railyard, Wishram, Washington, Sediment Remedial Investigation Work Plan*. November.

Tables

Table H2-1. Sample Identifications

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 2, Data Quality Evaluation Report

Sample ID	Sample Type	Date Sampled
BNSF-EB01-111422	EB	11/14/2022
BNSF-EF240-SC-1.0-2.0-111022	N	11/10/2022
BNSF-EF240-SC-1.0-2.0-111022-1	FD	11/10/2022
BNSF-EF240-SC-3.0-4.0-111022	N	11/10/2022
BNSF-EF470-SC-11.0-12.0-110922	N	11/9/2022
BNSF-F390-SC-6.2-7.2-110722	N	11/7/2022
BNSF-G000-SC-1.5-2.5-110322	N	11/3/2022
BNSF-G000-SC-4.0-5.0-110322	N	11/3/2022
BNSF-G020-SC-0.0-1.0-110422	N	11/4/2022
BNSF-G200-SC-4.0-5.0-110722	N	11/8/2022
BNSF-HN300-SC-1.0-2.0-111322[1]	N	11/13/2022
BNSF-I500-SC-0.0-0.8-111322	N	11/13/2022
BNSF-J060-SC-0.5-1.5-111422	N	11/14/2022
BNSF-J060-SC-8.5-9.5-111422	N	11/14/2022
BNSF-K200-SC-0.0-0.4-110922	N	11/9/2022
BNSF-O280-SC-0.0-0.7-111322	N	11/13/2022
BNSF-G000-SC-1.5-2.5-110322MS	MS	11/3/2022
BNSF-G000-SC-1.5-2.5-110322SD	MSD	11/3/2022
BNSF-G020-SC-0.0-1.0-110422MS	MS	11/4/2022
BNSF-G020-SC-0.0-1.0-110422SD	MSD	11/4/2022
BNSF-K200-SC-0.0-0.4-110922MS	MS	11/9/2022
BNSF-K200-SC-0.0-0.4-110922SD	MSD	11/9/2022
BNSF-J060-SC-8.5-9.5-111422MS	MS	11/14/2022
BNSF-J060-SC-8.5-9.5-111422SD	MSD	11/14/2022
BNSF-I500-SC-0.0-0.8-111322MS	MS	11/13/2022
BNSF-I500-SC-0.0-0.8-111322SD	MSD	11/13/2022

[1] Changed station name from HN300 to KN400 post sample collection based on actualy X,Y (no target X,Y available at the time of collection. Station was estimated)

Notes:

EB = equipment blank

FD = field duplicate

MS = matrix spike

MSD = matrix spike duplicate

N = normal sample

Table H2-2. Sample Delivery Groups

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 2, Data Quality Evaluation Report

PAH, TPH, Grain Size	TOC
10632545	580-119826-1
10632887	580-119923-1
10632888	NA
10633565	580-120040-1
10633981	580-120212-1
10633992	NA

Notes:

PAH = polynuclear aromatic hydrocarbons

TOC = total organic carbon

TPH = total petroleum hydrcarbons

Table H2-3. Analytical Methods by Laboratory

BNSF Wishram Railyard, Wishram, Washington
Sediment Remedial Investigation Step 2, Data Quality Evaluation Report

Parameter	ANALYTIC_METHOD	Laboratory
Grain Size	ASTM D422	Pace - Wyoming
Total Petroleum Hydrocarbons	NWTPH-Dx	Pace - Minnesota
Total Solids	SM2540G	Pace - Minnesota
Polynuclear Aromatic Hydrocarbons	SW8270E	Pace - Tennessee
Total Organic Carbon	SW9060A	Eurofins Frontier Geosciences - Seattle

Table H2-4. Overall Flagging SUmmaryAnalytical Methods

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 2, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-EF240-SC-1.0-2.0-111022	NWTPH-Dx	Diesel Fuel	9.7	mg/kg	UJ	FD>RPD	10633565
BNSF-EF240-SC-1.0-2.0-111022	NWTPH-Dx	TPH as Motor Oil	17.8	mg/kg	J	FD>RPD	10633565
BNSF-EF240-SC-1.0-2.0-111022	SW9060A	Total Organic Carbon	13000	mg/kg	J	HTa>UCL	580-120040-1
BNSF-EF240-SC-1.0-2.0-111022-1	NWTPH-Dx	Diesel Fuel	151	mg/kg	J	FD>RPD	10633565
BNSF-EF240-SC-1.0-2.0-111022-1	NWTPH-Dx	TPH as Motor Oil	241	mg/kg	J	FD>RPD	10633565
BNSF-EF240-SC-1.0-2.0-111022-1	SW9060A	Total Organic Carbon	13000	mg/kg	J	HTa>UCL	580-120040-1
BNSF-EF240-SC-3.0-4.0-111022	SW9060A	Total Organic Carbon	22000	mg/kg	J	HTa>UCL	580-120040-1
BNSF-F390-SC-6.2-7.2-110722	SW9060A	Total Organic Carbon	32000	mg/kg	J	HTa>UCL	580-119923-1
BNSF-G000-SC-1.5-2.5-110322	NWTPH-Dx	Diesel Fuel	9.6	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	NWTPH-Dx	TPH as Motor Oil	24.4	mg/kg	J	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	1-Methylnaphthalene	0.00581	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	2-Methylnaphthalene	0.00589	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	3 & 4-Methylphenol (m,p-Cresols)	0.0142	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Acenaphthene	0.00735	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Acenaphthylene	0.0064	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Anthracene	0.00809	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Benzo(a)anthracene	0.008	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Benzo(a)pyrene	0.00844	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Benzo(b)fluoranthene	0.00847	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Benzo(g,h,i)perylene	0.0083	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Benzo(k)fluoranthene	0.00807	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Benzoic Acid	0.161	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Bis (2-ethylhexyl) phthalate	0.0575	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Carbazole	0.014	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Chrysene	0.00903	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Dibenzo(a,h)anthracene	0.0126	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Dibenzofuran	0.0149	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Di-N-Butylphthalate	0.0155	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Di-n-octyl phthalate	0.0307	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Fluoranthene	0.0082	mg/kg	UJ	Temp	10632545

Table H2-4. Overall Flagging SUmmaryAnalytical Methods

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 2, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Fluorene	0.00739	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Indeno(1,2,3-cd)pyrene	0.0128	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Naphthalene	0.0114	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Pentachlorophenol	0.0122	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Phenanthrene	0.00901	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Phenol	0.0183	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Pyrene	0.00884	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW9060A	Total Organic Carbon	12000	mg/kg	J	Temp	580-119826-1
BNSF-G000-SC-4.0-5.0-110322	NWTPH-Dx	Diesel Fuel	29.5	mg/kg	J	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	NWTPH-Dx	TPH as Motor Oil	55.7	mg/kg	J	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	1-Methylnaphthalene	0.00608	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	2-Methylnaphthalene	0.00616	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	3 & 4-Methylphenol (m,p-Cresols)	0.0148	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Acenaphthene	0.00769	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Acenaphthylene	0.00669	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Anthracene	0.012	mg/kg	J	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Benzo(a)anthracene	0.0225	mg/kg	J	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Benzo(a)pyrene	0.0165	mg/kg	J	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Benzo(b)fluoranthene	0.0114	mg/kg	J	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Benzo(g,h,i)perylene	0.00868	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Benzo(k)fluoranthene	0.00844	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Benzoic Acid	0.168	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Bis (2-ethylhexyl) phthalate	0.0602	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Carbazole	0.0147	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Chrysene	0.0404	mg/kg	J	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Dibenzo(a,h)anthracene	0.0132	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Dibenzofuran	0.0155	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Di-N-Butylphthalate	0.0163	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Di-n-octyl phthalate	0.0321	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Fluoranthene	0.0168	mg/kg	J	Temp	10632545

Table H2-4. Overall Flagging SUmmaryAnalytical Methods

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 2, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Fluorene	0.00773	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Indeno(1,2,3-cd)pyrene	0.0134	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Naphthalene	0.0119	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Pentachlorophenol	0.0128	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Phenanthrene	0.0302	mg/kg	J	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Phenol	0.0191	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Pyrene	0.0486	mg/kg	J	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW9060A	Total Organic Carbon	13000	mg/kg	J	Temp	580-119826-1
BNSF-G020-SC-0.0-1.0-110422	NWTPH-Dx	Diesel Fuel	154	mg/kg	J	MS>UCL, MSD>UCL, MSRPD	10632887
BNSF-G020-SC-0.0-1.0-110422	NWTPH-Dx	TPH as Motor Oil	392	mg/kg	J	MS>UCL, MSD>UCL, MSRPD	10632887
BNSF-G020-SC-0.0-1.0-110422	SW9060A	Total Organic Carbon	10000	mg/kg	J	HTa>UCL	580-119923-1
BNSF-HN300-SC-1.0-2.0-111322[1]	SW8270E	Indeno(1,2,3-cd)pyrene	0.0124	mg/kg	UJ	ICV<LCL	10633981
BNSF-I500-SC-0.0-0.8-111322	NWTPH-Dx	Diesel Fuel	199	mg/kg	J	MS<LCL, MSD<LCL	10633981
BNSF-I500-SC-0.0-0.8-111322	SW8270E	Indeno(1,2,3-cd)pyrene	0.0117	mg/kg	UJ	ICV<LCL	10633981
BNSF-J060-SC-0.5-1.5-111422	SW8270E	Indeno(1,2,3-cd)pyrene	0.013	mg/kg	UJ	ICV<LCL	10633981
BNSF-J060-SC-8.5-9.5-111422	SW8270E	Indeno(1,2,3-cd)pyrene	0.012	mg/kg	UJ	ICV<LCL	10633981
BNSF-J060-SC-8.5-9.5-111422	SW9060A	Total Organic Carbon	370	mg/kg	J	HTa>UCL	580-120212-1
BNSF-K200-SC-0.0-0.4-110922	SW9060A	Total Organic Carbon	2300	mg/kg	J	HTa>UCL	580-120040-1
BNSF-O280-SC-0.0-0.7-111322	SW8270E	Indeno(1,2,3-cd)pyrene	0.0124	mg/kg	UJ	ICV<LCL	10633981

[1] Changed station name from HN300 to KN400 post sample collection based on actualy X,Y (no target X,Y available at the time of collection. Station was estimated)

Notes:

FD>RPD = Field duplicate relative percent difference greater than acceptance criterion

HTa>UCL = Analytical holding time exceeded

ICV<LCL = Initial calibration verification recovery less than lower control limit

ID = Identifier

J = Analyte was present but reported value may not be accurate or precise

mg/kg = milligram per kilogram

MS<LCL = Matrix spike recovery less than the lower control limit

MS>UCL = Matrix spike recovery greater than the upper control limit

MSD<LCL = Matrix spike duplicate recovery less than the lower control limit

Table H2-4. Overall Flagging SUmmaryAnalytical Methods

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 2, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG

MSD>UCL = Matrix spike duplicate recovery greater than the upper control limit

MSRPD = Matrix spike/matrix spike duplicate relative percent difference greater than acceptance criterion

TEMP = Sample received at a temperature greater than 6 degrees Celsius

UJ = The analyte was not detected above the detection limit objective; however, the reported detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Table H2-5. Calibration Validation Findings

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 2, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-HN300-SC-1.0-2.0-111322[1]	SW8270E	Indeno(1,2,3-cd)pyrene	0.0124	mg/kg	UJ	ICV<LCL	10633981
BNSF-I500-SC-0.0-0.8-111322	SW8270E	Indeno(1,2,3-cd)pyrene	0.0117	mg/kg	UJ	ICV<LCL	10633981
BNSF-J060-SC-0.5-1.5-111422	SW8270E	Indeno(1,2,3-cd)pyrene	0.013	mg/kg	UJ	ICV<LCL	10633981
BNSF-J060-SC-8.5-9.5-111422	SW8270E	Indeno(1,2,3-cd)pyrene	0.012	mg/kg	UJ	ICV<LCL	10633981
BNSF-O280-SC-0.0-0.7-111322	SW8270E	Indeno(1,2,3-cd)pyrene	0.0124	mg/kg	UJ	ICV<LCL	10633981

[1] Changed station name from HN300 to KN400 post sample collection based on actualy X,Y (no target X,Y available at the time of collection. Station was estimated)

Notes:

ICV<LCL = Initial calibration verification recovery less than lower control limit

ID = Identifier

mg/kg = milligram per kilogram

UJ = The analyte was not detected above the detection limit objective; however, the reported detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Table H2-6. Holding Time Exceedances

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 2, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-EF240-SC-1.0-2.0-111022	SW9060A	Total Organic Carbon	13000	mg/kg	J	HTa>UCL	580-120040-1
BNSF-EF240-SC-1.0-2.0-111022-1	SW9060A	Total Organic Carbon	13000	mg/kg	J	HTa>UCL	580-120040-1
BNSF-EF240-SC-3.0-4.0-111022	SW9060A	Total Organic Carbon	22000	mg/kg	J	HTa>UCL	580-120040-1
BNSF-K200-SC-0.0-0.4-110922	SW9060A	Total Organic Carbon	2300	mg/kg	J	HTa>UCL	580-120040-1
BNSF-J060-SC-8.5-9.5-111422	SW9060A	Total Organic Carbon	370	mg/kg	J	HTa>UCL	580-120040-1
BNSF-F390-SC-6.2-7.2-110722	SW9060A	Total Organic Carbon	32000	mg/kg	J	HTa>UCL	580-119923-1
BNSF-G020-SC-0.0-1.0-110422	SW9060A	Total Organic Carbon	10000	mg/kg	J	HTa>UCL	580-119923-1

Notes:

HTa>UCL = Analytical holding time exceeded

ID = Identifier

J = Analyte was present but reported value may not be accurate or precise

mg/kg = milligram per kilogram

Table H2-7. Field Duplicate Validation Findings

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 2, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG	RPD
BNSF-EF240-SC-1.0-2.0-111022	NWTPH-Dx	Diesel Fuel	9.7	mg/kg	UJ	FD>RPD	10633565	175
BNSF-EF240-SC-1.0-2.0-111022	NWTPH-Dx	TPH as Motor Oil	17.8	mg/kg	J	FD>RPD	10633565	172
BNSF-EF240-SC-1.0-2.0-111022-1	NWTPH-Dx	Diesel Fuel	151	mg/kg	J	FD>RPD	10633565	175
BNSF-EF240-SC-1.0-2.0-111022-1	NWTPH-Dx	TPH as Motor Oil	241	mg/kg	J	FD>RPD	10633565	172

Notes:

FD>RPD = Field duplicate relative percent difference greater than acceptance criterion

ID = Identifier

J = Analyte was present but reported value may not be accurate or precise

mg/kg = milligram per kilogram

ng/kg = nanogram per kilogram

UJ = The analyte was not detected above the detection limit objective; however, the reported detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Table H2-8. Matrix Validation Findings

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 2, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-I500-SC-0.0-0.8-111322	NWTPH-Dx	Diesel Fuel	199	mg/kg	J	MS<LCL, MSD<LCL	10633981
BNSF-G020-SC-0.0-1.0-110422	NWTPH-Dx	Diesel Fuel	154	mg/kg	J	MS>UCL, MSD>UCL, MSRPD	10632887
BNSF-G020-SC-0.0-1.0-110422	NWTPH-Dx	TPH as Motor Oil	392	mg/kg	J	MS>UCL, MSD>UCL, MSRPD	10632887

Notes:

ID = Identifier

J = Analyte was present but reported value may not be accurate or precise

mg/kg = milligram per kilogram

MS<LCL = Matrix spike recovery less than the lower control limit

MS>UCL = Matrix spike recovery greater than the upper control limit

MSD<LCL = Matrix spike duplicate recovery less than the lower control limit

MSD>UCL = Matrix spike duplicate recovery greater than the upper control limit

MSRPD = Matrix spike/matrix spike duplicate relative percent difference greater than acceptance criterion

Table H2-9. Samples Received Over Temperature

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 2, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-G000-SC-1.5-2.5-110322	NWTPH-Dx	Diesel Fuel	9.6	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	NWTPH-Dx	TPH as Motor Oil	24.4	mg/kg	J	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	1-Methylnaphthalene	0.00581	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	2-Methylnaphthalene	0.00589	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	3 & 4-Methylphenol (m,p-Cresols)	0.0142	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Acenaphthene	0.00735	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Acenaphthylene	0.0064	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Anthracene	0.00809	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Benzo(a)anthracene	0.008	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Benzo(a)pyrene	0.00844	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Benzo(b)fluoranthene	0.00847	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Benzo(g,h,i)perylene	0.0083	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Benzo(k)fluoranthene	0.00807	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Benzoic Acid	0.161	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Bis (2-ethylhexyl) phthalate	0.0575	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Carbazole	0.014	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Chrysene	0.00903	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Dibenzo(a,h)anthracene	0.0126	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Dibenzofuran	0.0149	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Di-N-Butylphthalate	0.0155	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Di-n-octyl phthalate	0.0307	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Fluoranthene	0.0082	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Fluorene	0.00739	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Indeno(1,2,3-cd)pyrene	0.0128	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Naphthalene	0.0114	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Pentachlorophenol	0.0122	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Phenanthrene	0.00901	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Phenol	0.0183	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW8270E	Pyrene	0.00884	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-1.5-2.5-110322	SW9060A	Total Organic Carbon	12000	mg/kg	J	Temp	580-119826-1

Table H2-9. Samples Received Over Temperature

BNSF Wishram Railyard, Wishram, Washington

Sediment Remedial Investigation Step 2, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-G000-SC-4.0-5.0-110322	NWTPH-Dx	Diesel Fuel	29.5	mg/kg	J	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	NWTPH-Dx	TPH as Motor Oil	55.7	mg/kg	J	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	1-Methylnaphthalene	0.00608	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	2-Methylnaphthalene	0.00616	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	3 & 4-Methylphenol (m,p-Cresols)	0.0148	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Acenaphthene	0.00769	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Acenaphthylene	0.00669	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Anthracene	0.012	mg/kg	J	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Benzo(a)anthracene	0.0225	mg/kg	J	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Benzo(a)pyrene	0.0165	mg/kg	J	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Benzo(b)fluoranthene	0.0114	mg/kg	J	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Benzo(g,h,i)perylene	0.00868	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Benzo(k)fluoranthene	0.00844	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Benzoic Acid	0.168	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Bis (2-ethylhexyl) phthalate	0.0602	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Carbazole	0.0147	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Chrysene	0.0404	mg/kg	J	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Dibenzo(a,h)anthracene	0.0132	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Dibenzofuran	0.0155	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Di-N-Butylphthalate	0.0163	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Di-n-octyl phthalate	0.0321	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Fluoranthene	0.0168	mg/kg	J	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Fluorene	0.00773	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Indeno(1,2,3-cd)pyrene	0.0134	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Naphthalene	0.0119	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Pentachlorophenol	0.0128	mg/kg	UJ	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Phenanthrene	0.0302	mg/kg	J	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Phenol	0.0191	mg/kg	UJ	Temp	10632545

Table H2-9. Samples Received Over Temperature

BNSF Wishram Railyard, Wishram, Washington
Sediment Remedial Investigation Step 2, Data Quality Evaluation Report

SampleID	Method	Analyte	Result	Units	Validation Flag	Reason	SDG
BNSF-G000-SC-4.0-5.0-110322	SW8270E	Pyrene	0.0486	mg/kg	J	Temp	10632545
BNSF-G000-SC-4.0-5.0-110322	SW9060A	Total Organic Carbon	13000	mg/kg	J	Temp	580-119826-1

Notes:

ID = Identifier

J = Analyte was present but reported value may not be accurate or precise

mg/kg = milligram per kilogram

TEMP = Sample received at a temperature greater than 6 degrees Celsius

UJ = The analyte was not detected above the detection limit objective; however, the reported detection limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.