

Notes: New MEQ DFN May 2024

Aleta Finnila, May 22, 2024

Add Stimulation Intervals to Wells

KB is different for these stimulations

— 2022 values

— 2024 (16B slightly different; no info for 16A)

3

Well Trajectories for 2024 Reference DFN.xlsx • Last Modified: January 15

	A	B	C	D	E	F	G	H	I
1	Well Name	X	Y	Z	TD[m]	TD[ft]	KB [ft]	KB[m]	
2	58-32 with KB	335450.99	4263037.91	1691.33	2307.00	7568.9	21.5	6.55	
3	58-32	335450.99	4263037.91	1684.77	2300.45	7547.4			
4	56-32 with KB	335504.28	4263426.19	1670.92	2787.40	9145.0	30.4	9.27	
5	56-32	335504.28	4263426.19	1661.65	2778.13	9114.6			
6	78B-32 with KB	335865.45	4262983.53	1714.61	2895.60	9500.0	29.5	8.99	
7	78B-32	335865.45	4262983.53	1705.62	2886.46	9470.0			
8	16A(78)-32 with KB	334639.62	4263442.82	1659.17	3348.84	10987.0	30.0	9.14	
9	16A(78)-32	334639.62	4263442.82	1650.02	3339.69	10957.0			
10	16B(78)-32 with KB	334642.08	4263471.07	1660.45	3336.65	10947.0	32.0	9.75	
11	16B(78)-32	334642.08	4263471.07	1650.70	3326.89	10915.0			
12									
13									
14									

spinner data summary.xlsx • Last Modified: Mon at 9:43 AM

Measured Depth (Referenced to KB = 31.5 ft)						
	Gun 1	Gun 2	Gun 3	Gun 4	Gun 5	Frac Plug Top
Frac Plug #1						9,777
Stage 1 (16B)	9,769 - 9,773	9,756 - 9,760	9,745 - 9,749	9,690 - 9,694		
Frac Plug #2						9,600
Stage 2 (16B)	9,508 - 9,512	9,475 - 9,479	9,459 - 9,463	9,447 - 9,451	9,429 - 9,433	
Frac Plug #3						9,415
Stage 3 (16B)	9,389 - 9,393	9,343 - 9,347	9,265 - 9,269			
Frac Plug #4						9,165
Stage 4 (16B)	9,054 - 9,058	9,026 - 9,030	8,995 - 8,999	8,958 - 8,962		
Frac Plug #5						8,915
Stage 5 (16B)	8,879 - 8,883	8,870 - 8,874	8,834 - 8,838	8,774 - 8,778		

Using same KB for 16A and 16B as original log data...

In an email dated May 22, 2024 to Finnila, Rob Podgorney (Idaho National Laboratory) reported that the Nubrex staff member who led the perf shot placement said that 16A and 16B were referenced to the original KB data. So for 16A, whatever the KB was for the original FMI logs, the new data should be referenced to the same KB height above the ground.

Clean and Load MEQ Data

Original Data from GDR

INCLUDES POINTS WITHOUT LOCATIONS AND LOCAL COORDINATES

Data cleaning steps

- Remove excess header info
- Remove points without locations
- Move to global coordinate frame
- Format date/time as elapsed seconds

Task New MEQ DFN May 2024 > Original Data Files > MEQ Catalogs	
	Name
	FORGE16aApril24BackgroundPost Stim A.csv
	FORGE16aApril24BackgroundPost Stim B.csv
	FORGE16aApril24BackgroundPost Stim C.csv
	FORGE16aApril24BackgroundPost Stim D.csv
	FORGE16aApril24BackgroundStage 3R.csv
	FORGE16aApril24BackgroundStage 4.csv
	FORGE16aApril24BackgroundStage 5.csv
	FORGE16aApril24BackgroundStage 6.csv
	FORGE16aApril24BackgroundStage 7.csv
	FORGE16aApril24BackgroundStage 7b.csv
	FORGE16aApril24BackgroundStage 7C.csv
	FORGE16aApril24BackgroundStage 8.csv
	FORGE16aApril24BackgroundStage 8b.csv
	FORGE16aApril24BackgroundStage 9.csv
	FORGE16aApril24BackgroundStage 9and10.csv
	FORGE16aApril24BackgroundStage 9B.csv
	FORGE16aApril24BackgroundStage 9C.csv
	FORGE16aApril24BackgroundStage 10.csv
	FORGE16aApril24BackgroundStage 10B.csv
	FORGE16aApril24BackgroundStage 10C.csv



AutoSave OFF

FORGE16aApril24BackgroundStage 3... Search

Finnila, Aleta

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	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	Source	Trig Date	Trig Time	Origin Date	Origin Time	Profile	Status	Cluster	Y	X	Depth	MomMag	PGV	Stage	P S/N	S S/N	Quality	Error	Location	rms Noise
2	32	3/4/2024	10:35:53.026500	3/4/2024	10:35:53.026501	Primary	1	0	0	0	0	-20	0.23	10	0	0	0	1000000	Unloc msmx	6.69
3	35	3/4/2024	10:36:24.899000	3/4/2024	10:36:24.655392	Primary	1	0	0	0	0	-20	0.26	10	0	0	0	1000000	Unloc msmx	6.64
4	38	3/4/2024	10:36:42.886000	3/4/2024	10:36:42.886002	Primary	1	0	0	0	0	-20	0.43	10	0	0	0	1000000	Unloc msmx	6.69
5	41	3/4/2024	10:37:19.880750	3/4/2024	10:37:19.880751	Primary	1	0	0	0	0	-20	0.21	10	0	0	0	1000000	Unloc msmx	6.66
6	43	3/4/2024	10:37:26.708000	3/4/2024	10:37:26.708000	Primary	2	0	-1150	3300	8430	-0.92	0.35	10	15.4	36.5	1.1	1000000	L2 msmx	6.7
7	45	3/4/2024	10:37:39.448250	3/4/2024	10:37:39.448250	Primary	1	0	0	0	0	-20	0.34	10	0	0	0	1000000	Unloc msmx	6.72
8	47	3/4/2024	10:37:59.106000	3/4/2024	10:37:59.105999	Primary	2	0	-1070	3500	8410	-1.09	0.45	10	13.7	33.2	1.1	1000000	L2 msmx	6.73
9	56	3/4/2024	10:38:40.201750	3/4/2024	10:38:40.201752	Primary	2	0	-940	3530	8500	-0.73	0.56	10	23	48.7	1.1	1000000	L2 msmx	6.62
10	58	3/4/2024	10:38:58.120500	3/4/2024	10:38:58.120499	Primary	1	0	0	0	0	-20	0.48	10	0	0	0	1000000	Unloc msmx	6.72
11	62	3/4/2024	10:39:15.447750	3/4/2024	10:39:15.447750	Primary	2	0	-1250	3200	8430	-0.85	1.13	10	35	124.8	1.1	1000000	L2 msmx	6.77
12	731	3/4/2024	11:29:09.727750	3/4/2024	11:29:09.623594	Primary	1	0	0	0	0	-20	19.64	10	0	0	0	0	Unloc msmx	8.07
13	756	3/4/2024	11:30:43.855000	3/4/2024	11:30:43.611187	Primary	1	0	0	0	0	-20	16.42	10	0	0	0	0	Unloc msmx	7.69
14	766	3/4/2024	11:31:21.351000	3/4/2024	11:31:21.219326	Primary	1	0	0	0	0	-20	23.96	10	0	0	0	1000000	Unloc msmx	9.85
15	768	3/4/2024	11:31:35.426750	3/4/2024	11:31:35.310722	Primary	1	0	0	0	0	-20	45.73	10	0	0	0	0	Unloc msmx	11.96
16	789	3/4/2024	11:33:00.956500	3/4/2024	11:33:00.825466	Primary	1	0	0	0	0	-20	24.74	10	0	0	0	0	Unloc msmx	11.39
17	802	3/4/2024	11:33:40.933750	3/4/2024	11:33:40.735584	Primary	1	0	0	0	0	-20	22.43	10	0	0	0	0	Unloc msmx	10.01
18	806	3/4/2024	11:34:18.352250	3/4/2024	11:34:18.121273	Primary	1	0	0	0	0	-20	21.97	10	0	0	0	0	Unloc msmx	7.6
19	814	3/4/2024	11:34:58.638000	3/4/2024	11:34:58.507175	Primary	1	0	0	0	0	-20	25.18	10	0	0	0	0	Unloc msmx	10.95
20	835	3/4/2024	11:37:03.131000	3/4/2024	11:37:03.106624	Primary	1	0	0	0	0	-20	70.45	10	0	0	0	0	Unloc msmx	12.6
21	846	3/4/2024	11:37:32.336000	3/4/2024	11:37:31.980244	Primary	1	0	0	0	0	-20	14.01	10	0	0	0	0	Unloc msmx	11.79
22	849	3/4/2024	11:37:51.087250	3/4/2024	11:37:50.933231	Primary	2	0	-570	3210	7980	-0.37	34.06	10	14.9	40.8	2	0	Boot msmx	11.63
23	869	3/4/2024	11:39:04.779500	3/4/2024	11:39:04.581985	Primary	1	0	0	0	0	-20	23.35	10	0	0	0	0	Unloc msmx	7.97
24	884	3/4/2024	11:40:19.176250	3/4/2024	11:40:19.069494	Primary	1	0	0	0	0	-20	14.52	10	0	0	0	0	Unloc msmx	7.35
25	900	3/4/2024	11:41:21.157000	3/4/2024	11:41:21.002193	Primary	2	0	-900	3090	8060	-0.74	28.81	10	0.8	19.2	1.7	0	Boot msmx	11.47
26	939	3/4/2024	11:43:41.637000	3/4/2024	11:43:41.419781	Primary	1	0	0	0	0	-20	4.58	10	0	0	0	0	Unloc msmx	6.81

FORGE16aApril24BackgroundStage

date format conventions day/month/year

Cleaning file: FORGE16aApril24BackgroundPost Stim A.csv Number of points in file: 94 Number of points with locations: 91 Start Date and Time: 7/4/2024 14:15:33.476563 End Date and Time: 7/4/2024 20:26:52.349422	Cleaning file: FORGE16aApril24BackgroundStage 10C.csv Number of points in file: 91 Number of points with locations: 90 Start Date and Time: 7/4/2024 08:22:38.446228 End Date and Time: 7/4/2024 14:08:12.327833	Cleaning file: FORGE16aApril24BackgroundStage 7b.csv Number of points in file: 1505 Number of points with locations: 1133 Start Date and Time: 5/4/2024 01:39:50.705540 End Date and Time: 5/4/2024 09:41:20.500137	Cleaning file: FORGE16aApril24BackgroundStage 9B.csv Number of points in file: 926 Number of points with locations: 843 Start Date and Time: 6/4/2024 06:37:09.894145 End Date and Time: 6/4/2024 12:24:26.050301
Cleaning file: FORGE16aApril24BackgroundPost Stim B.csv Number of points in file: 71 Number of points with locations: 69 Start Date and Time: 7/4/2024 20:36:34.370602 End Date and Time: 8/4/2024 03:10:52.786774	Cleaning file: FORGE16aApril24BackgroundStage 3R.csv Number of points in file: 1414 Number of points with locations: 927 Start Date and Time: 3/4/2024 10:37:26.708000 End Date and Time: 3/4/2024 17:56:47.917919	Cleaning file: FORGE16aApril24BackgroundStage 7C.csv Number of points in file: 275 Number of points with locations: 274 Start Date and Time: 5/4/2024 09:41:59.598637 End Date and Time: 5/4/2024 13:42:27.472912	Cleaning file: FORGE16aApril24BackgroundStage 9C.csv Number of points in file: 519 Number of points with locations: 463 Start Date and Time: 6/4/2024 12:24:36.675743 End Date and Time: 6/4/2024 18:00:50.315899
Cleaning file: FORGE16aApril24BackgroundPost Stim C.csv Number of points in file: 33 Number of points with locations: 32 Start Date and Time: 8/4/2024 03:38:20.804478 End Date and Time: 8/4/2024 10:52:05.721511	Cleaning file: FORGE16aApril24BackgroundStage 4.csv Number of points in file: 934 Number of points with locations: 560 Start Date and Time: 3/4/2024 17:58:39.851707 End Date and Time: 3/4/2024 22:34:46.059692	Cleaning file: FORGE16aApril24BackgroundStage 8.csv Number of points in file: 2412 Number of points with locations: 2405 Start Date and Time: 5/4/2024 13:47:43.927181 End Date and Time: 5/4/2024 22:10:24.583498	
Cleaning file: FORGE16aApril24BackgroundPost Stim D.csv Number of points in file: 26 Number of points with locations: 18 Start Date and Time: 8/4/2024 11:16:45.279060 End Date and Time: 8/4/2024 15:25:01.067299	Cleaning file: FORGE16aApril24BackgroundStage 5.csv Number of points in file: 1244 Number of points with locations: 693 Start Date and Time: 3/4/2024 22:37:22.052130 End Date and Time: 4/4/2024 06:29:27.596243	Cleaning file: FORGE16aApril24BackgroundStage 8b.csv Number of points in file: 317 Number of points with locations: 306 Start Date and Time: 5/4/2024 22:10:45.663517 End Date and Time: 6/4/2024 00:00:22.123589	
Cleaning file: FORGE16aApril24BackgroundStage 10.csv Number of points in file: 388 Number of points with locations: 325 Start Date and Time: 6/4/2024 20:48:27.287647 End Date and Time: 7/4/2024 02:28:54.295425	Cleaning file: FORGE16aApril24BackgroundStage 6.csv Number of points in file: 535 Number of points with locations: 321 Start Date and Time: 4/4/2024 06:35:20.236235 End Date and Time: 4/4/2024 13:37:52.267693	Cleaning file: FORGE16aApril24BackgroundStage 9.csv Number of points in file: 1539 Number of points with locations: 1527 Start Date and Time: 6/4/2024 00:01:42.078655 End Date and Time: 6/4/2024 06:35:21.260925	
Cleaning file: FORGE16aApril24BackgroundStage 10B.csv Number of points in file: 127 Number of points with locations: 92 Start Date and Time: 7/4/2024 02:35:12.788411 End Date and Time: 7/4/2024 08:10:56.813770	Cleaning file: FORGE16aApril24BackgroundStage 7.csv Number of points in file: 682 Number of points with locations: 450 Start Date and Time: 4/4/2024 13:38:55.297939 End Date and Time: 5/4/2024 01:24:52.038036	Cleaning file: FORGE16aApril24BackgroundStage 9and10.csv Number of points in file: 126 Number of points with locations: 106 Start Date and Time: 6/4/2024 18:02:11.529058 End Date and Time: 6/4/2024 20:41:53.145214	

Cleaned data – not Date_Time correct but not showing up automatically in Excel view

AutoSave Off

FORGE16aApril24BackgroundPost Stim A_Cleaned.csv

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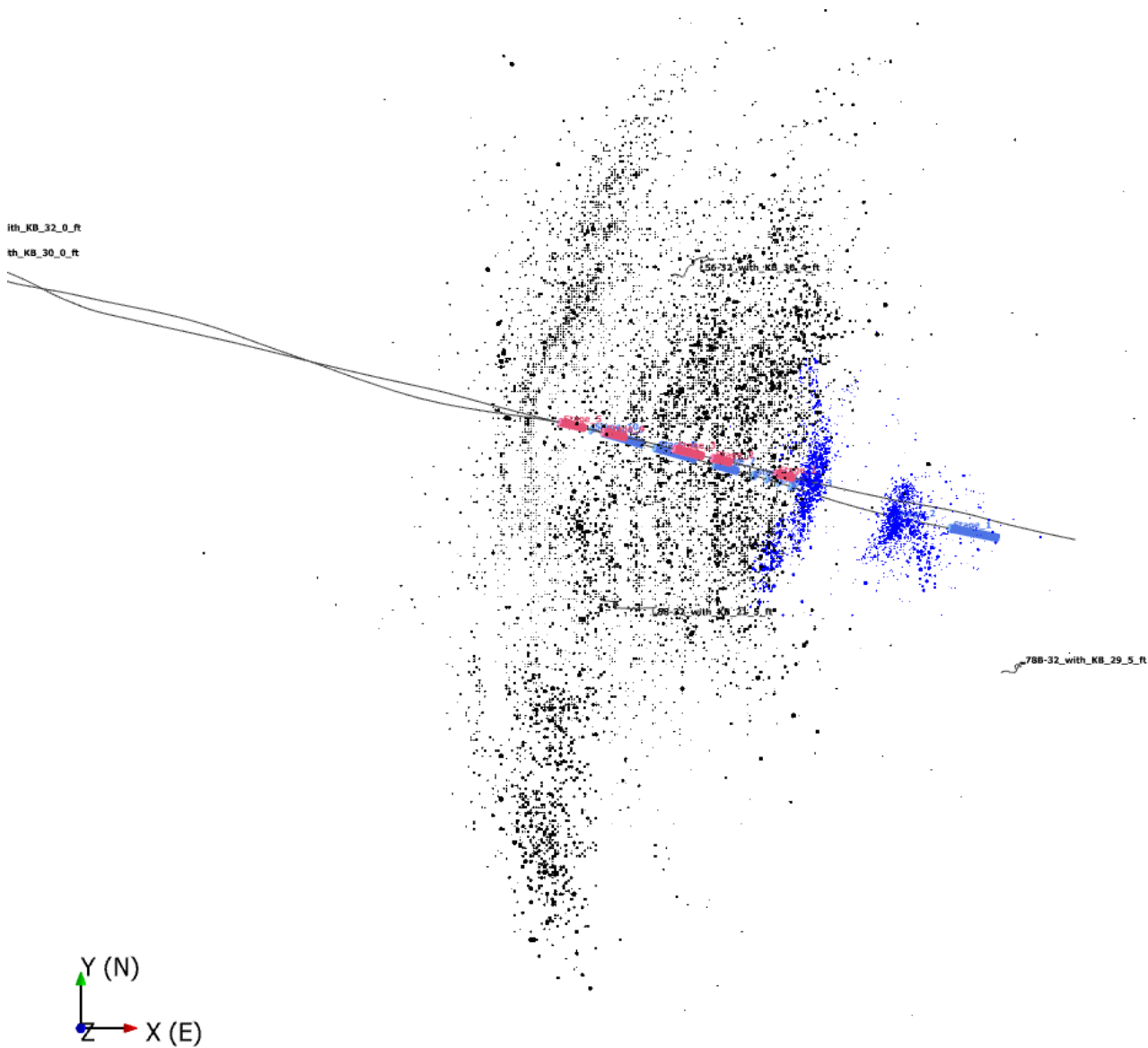
Macros

Macros

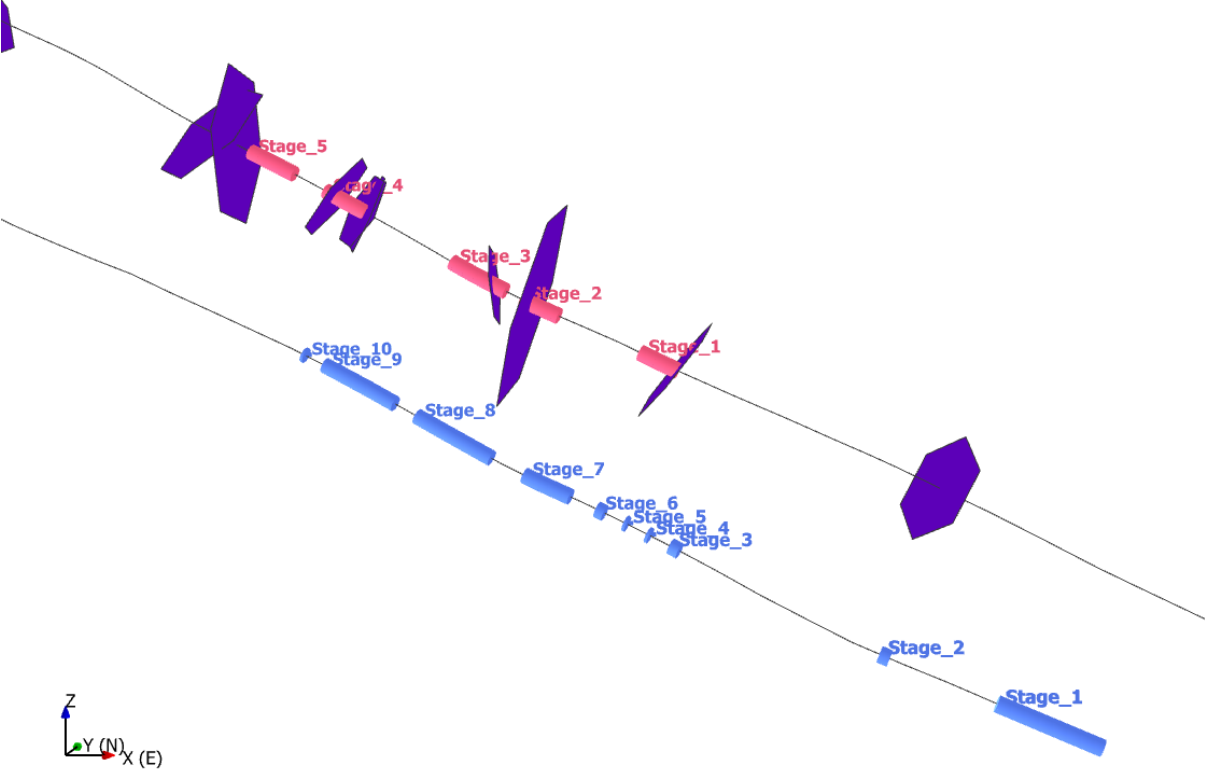
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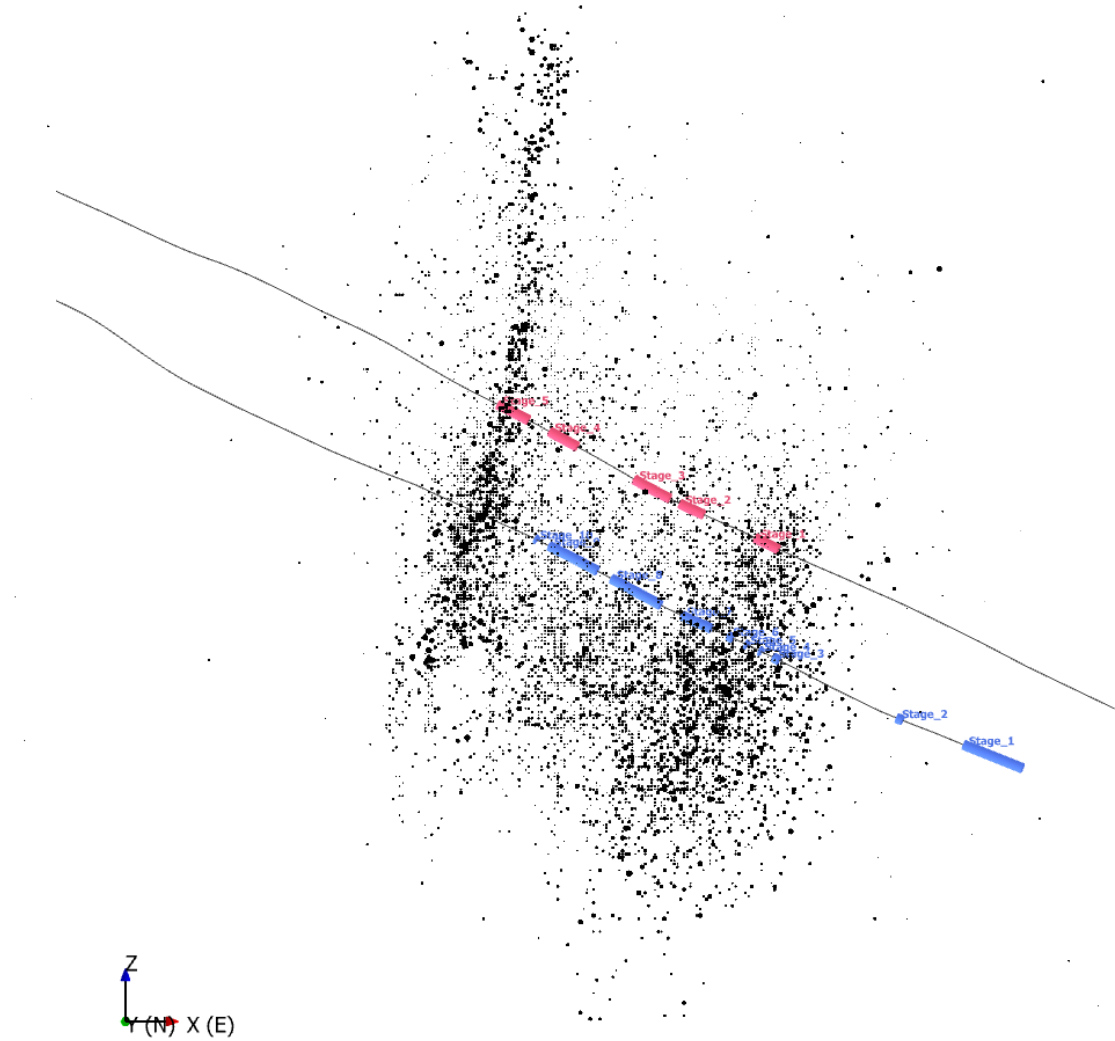
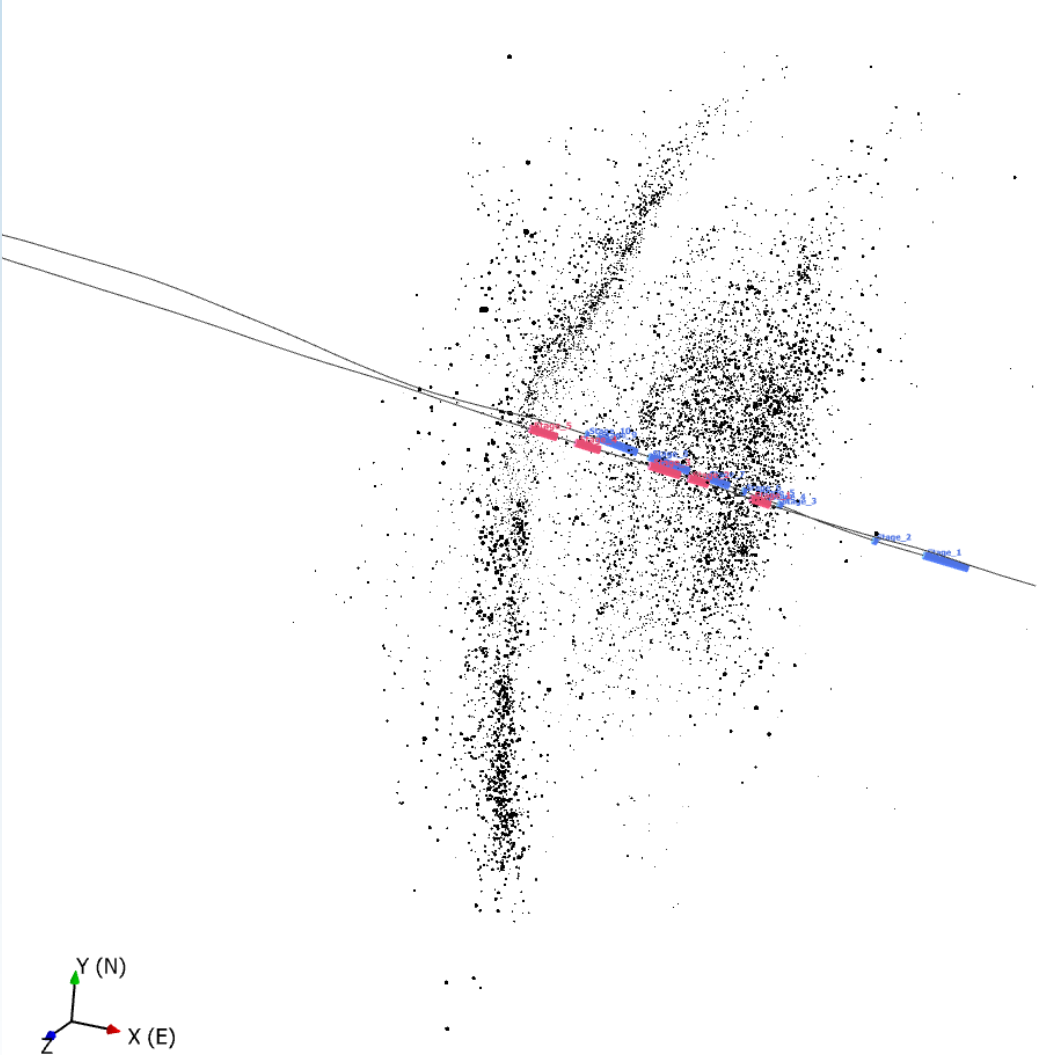
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	
	Source	Trig Date	Trig Time	Origin Date	Origin Time	Profile	Status	Cluster	Y	X	Depth	MomMag	PGV	Stage	P S/N	S S/N	Quality	Error	Location	rms Noise	Global_X_m	Global_Y_m	Global_Z_m	Date_Time	Time_Diff	Elapsed_Seconds	
1	147	7/4/2024	15:33.6	7/4/2024	15:33.5	Primary	2	0	-2250	2270	7910	-0.37	-1000000	26	28.5	45.8	1.8	1000000	L2 msmx	8.24	335331.516	4262757.017	-760.918	15:33.5	0 days 00:00:00	0	
2	164	7/4/2024	16:12.3	7/4/2024	16:12.4	Primary	2	0	-2260	2280	7880	-0.22	-1000000	26	27.4	46	2	1000000	L2 msmx	7.87	335334.564	4262753.969	-751.799	16:12.4	0 days 00:00:38.897776	38	
3	187	7/4/2024	16:56.0	7/4/2024	16:56.0	Primary	2	0	-390	2100	8170	0.65	-1000000	26	58.4	148	5	1000000	L2 msmx	7.84	335279.7	4263323.945	-840.191	16:56.0	0 days 00:01:22.497982	82	
4	257	7/4/2024	19:30.4	7/4/2024	19:30.6	Primary	2	0	-350	2110	8140	0.46	-1000000	26	27.1	52.6	3.6	1000000	L2 msmx	7.83	335282.748	4263336.137	-831.047	19:30.6	0 days 00:03:57.121282	237	
5	429	7/4/2024	25:47.1	7/4/2024	25:47.0	Primary	2	0	-2290	2310	7680	0.1	-1000000	26	41	97	2.4	1000000	L2 msmx	8.01	335343.708	4262744.825	-690.839	25:47.0	0 days 00:10:13.509719	613	
6	547	7/4/2024	30:21.3	7/4/2024	30:21.1	Primary	2	0	-730	2210	7990	-0.31	-1000000	26	15.6	41.6	2.5	1000000	L2 msmx	9.04	335313.228	4263220.313	-785.327	30:21.1	0 days 00:14:47.654102	887	
7	653	7/4/2024	34:17.2	7/4/2024	34:17.0	Primary	2	0	-2070	2230	7840	-0.23	-1000000	26	4	5.5	1.6	1000000	L2 msmx	12.29	335319.324	4262811.881	-739.607	34:17.0	0 days 00:18:43.547817	1123	
8	670	7/4/2024	34:53.4	7/4/2024	34:53.4	Primary	2	0	-730	2460	6250	0	-1000000	26	33.4	40.5	2.2	1000000	L2 msmx	7.96	335389.428	4263220.313	-254.975	34:53.4	0 days 00:19:19.909172	1159	
9	671	7/4/2024	34:55.0	7/4/2024	34:54.9	Primary	2	0	-730	2440	6270	-0.21	-1000000	26	4.5	5.6	1.7	1000000	L2 msmx	10.53	335383.332	4263220.313	-261.071	34:54.9	0 days 00:19:21.423774	1161	
10	692	7/4/2024	35:40.1	7/4/2024	35:40.0	Primary	2	0	-2070	2170	8010	-0.41	-1000000	26	26.7	15.8	1.5	1000000	L2 msmx	7.81	335301.036	4262811.881	-791.423	35:40.0	0 days 00:20:06.493179	1206	
11	704	7/4/2024	36:04.5	7/4/2024	36:04.3	Primary	2	0	-320	2130	8150	0.01	-1000000	26	10.9	13.6	3.2	1000000	L2 msmx	11.75	335288.844	4263345.281	-834.095	36:04.3	0 days 00:20:30.848923	1230	
12	742	7/4/2024	37:24.9	7/4/2024	37:24.7	Primary	2	0	-2180	2250	7880	-0.36	-1000000	26	17.6	15.6	1.6	1000000	L2 msmx	8	335325.42	4262778.353	-751.799	37:24.7	0 days 00:21:51.262268	1311	
13	774	7/4/2024	38:42.5	7/4/2024	38:42.4	Primary	2	0	-2390	2210	8140	0.44	-1000000	26	62.3	70	2.8	1000000	L2 msmx	8.3	335313.228	4262714.345	-831.047	38:42.4	0 days 00:23:08.897876	1388	
14	806	7/4/2024	39:57.4	7/4/2024	39:57.2	Primary	2	0	-2200	2220	7980	-0.34	-1000000	26	5.3	8.5	1.6	1000000	L2 msmx	8.96	335316.276	4262772.257	-782.279	39:57.2	0 days 00:24:23.753906	1463	
15	807	7/4/2024	39:58.6	7/4/2024	39:58.5	Primary	2	0	-2270	2300	7730	-0.2	-1000000	26	4.4	6.1	1.7	1000000	L2 msmx	10.77	335340.66	4262750.921	-706.079	39:58.5	0 days 00:24:24.976799	1464	
16	1018	7/4/2024	46:52.7	7/4/2024	46:52.6	Primary	2	0	-2710	2430	6760	0.46	-1000000	26	80.9	66.3	1.5	1000000	L2 msmx	8.27	335380.284	4262616.809	-410.423	46:52.6	0 days 00:31:19.114673	1879	
17	1095	7/4/2024	50:02.6	7/4/2024	50:02.5	Primary	2	0	-2490	2170	8090	-0.28	-1000000	26	15.5	30.8	1.6	1000000	L2 msmx	8.13	335301.036	4262683.865	-815.807	50:02.5	0 days 00:34:29.058093	2069	
18	1096	7/4/2024	50:06.5	7/4/2024	50:06.3	Primary	2	0	-2160	2210	8110	0.09	-1000000	26	17.8	49.7	2.5	1000000	L2 msmx	8.4	335313.228	4262784.449	-821.903	50:06.3	0 days 00:34:32.872009	2072	
19	1286	7/4/2024	56:29.8	7/4/2024	56:29.6	Primary	2	0	-2150	2220	7920	-0.06	-1000000	26	22.3	33	2.4	1000000	L2 msmx	8.16	335316.276	4262787.497	-763.991	56:29.6	0 days 00:40:56.129659	2456	
20	1313	7/4/2024	57:18.2	7/4/2024	57:18.0	Primary	2	0	-2190	2220	7900	-0.31	-1000000	26	18.1	28.9	1.5	1000000	L2 msmx	7.93	335316.276	4262775.305	-757.895	57:18.0	0 days 00:41:44.521928	2504	
21	1390	7/4/2024	00:00.2	7/4/2024	00:00.3	Primary	2	0	-2160	2240	7870	-0.21	-1000000	26	5.4	8.8	2.3	1000000	L2 msmx	9.05	335322.372	4262784.449	-748.751	00:00.3	0 days 00:44:26.870243	2666	
22	1579	7/4/2024	06:58.8	7/4/2024	06:58.6	Primary	2	0	-2360	2370	7770	0.66	-1000000	26	9.8	18.6	2.7	1000000	L2 msmx	8.1	335361.996	4262723.489	-718.271	06:58.6	0 days 00:51:25.158172	3085	
23	1678	7/4/2024	10:21.0	7/4/2024	10:20.8	Primary	2	0	-2240	2290	7710	-0.2	-1000000	26	3.9	4.9	1.8	1000000	L2 msmx	12.48	335337.612	4262760.065	-699.983	10:20.8	0 days 00:54:47.327041	3287	
24	1698	7/4/2024	11:04.9	7/4/2024	11:04.8	Primary	2	0	-400	2090	8100	-0.51	-1000000	26	4.9	6.9	1.9	1000000	L2 msmx	9.35	335276.652	4263320.897	-818.855	11:04.8	0 days 00:55:31.305401	3331	
25	1812	7/4/2024	14:55.1	7/4/2024	14:55.2	Primary	2	0	-810	2000	8240	-0.32	-1000000	26	30.6	18.3	2.1	1000000	L2 msmx	7.89	335249.22	4263195.929	-861.527	14:55.2	0 days 00:59:21.695041	3561	
26	2023	7/4/2024	22:39.2	7/4/2024	22:38.9	Primary	2	0	-2240	2210	8130	0.36	-1000000	26	44	111	3.1	1000000	L2 msmx	46.62	335313.228	4262760.065	-827.999	22:38.9	0 days 01:07:05.381526	4025	
27	2151	7/4/2024	27:00.4	7/4/2024	27:00.4	Primary	2	0	-2470	2250	7920	-0.07	-1000000	26	7.3	10.2	2.2	1000000	L2 msmx	8.83	335325.42	4262689.961	-763.991	27:00.4	0 days 01:11:26.941334	4286	
28	2329	7/4/2024	33:32.6	7/4/2024	33:32.5	Primary	2	0	-20	2810	8730	0.27	-1000000	26	36.7	59.6	2	1000000	L2 msmx	9.5	335496.108	4263436.721	-1010.879	33:32.5	0 days 01:17:58.978137	4678	
29	2474	7/4/2024	38:45.3	7/4/2024	38:45.2	Primary	2	0	20	2190	8080	-0.46	-1000000	26	7.8	5.8	1.6	1000000	L2 msmx	8.1	335307.132	4263448.913	-812.759	38:45.2	0 days 01:23:11.771202	4991	



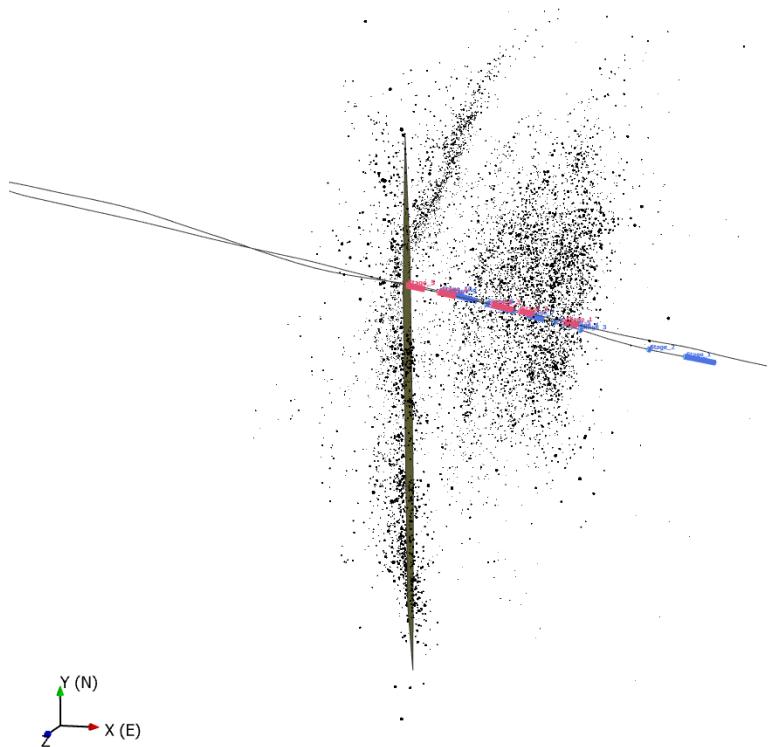
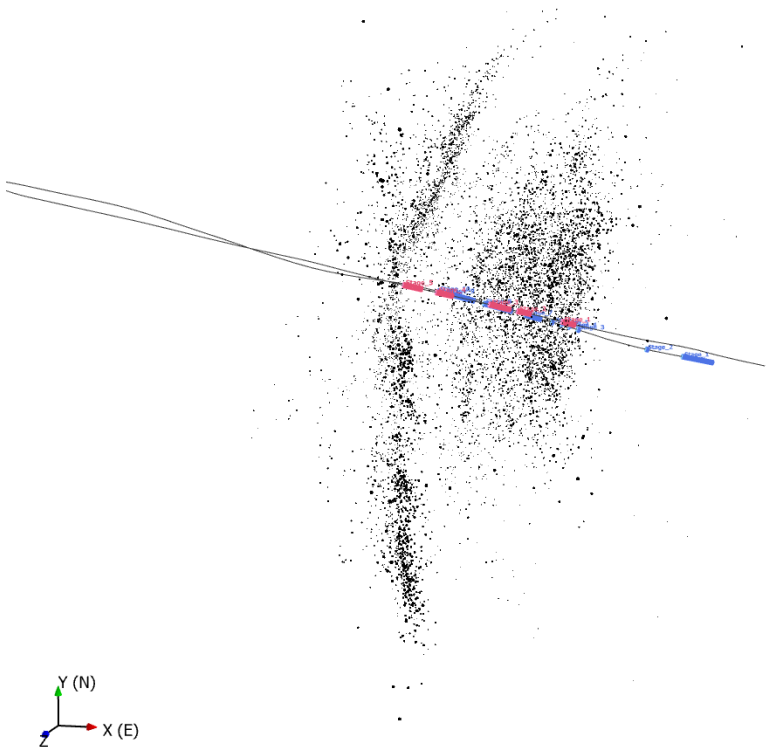
Frac Hits line up with large
aperture natural fractures
from FMI



Plane Fitting

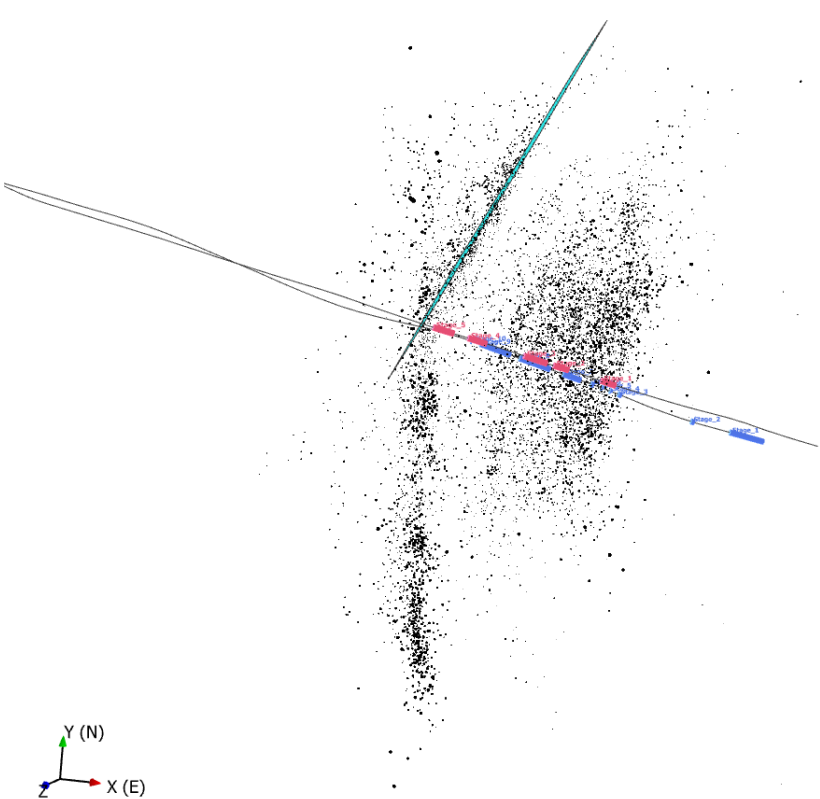
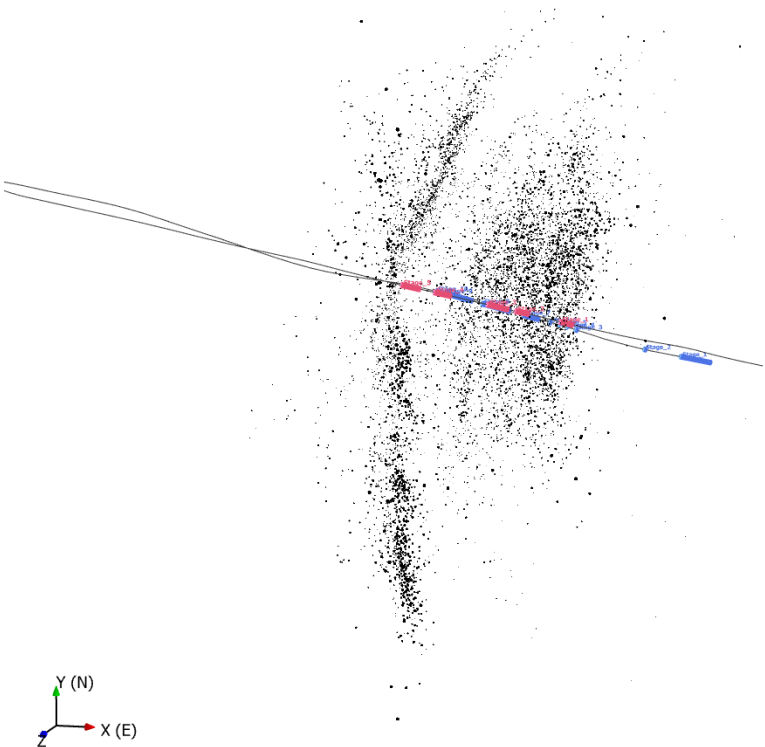


Large North-South trending vertical plane

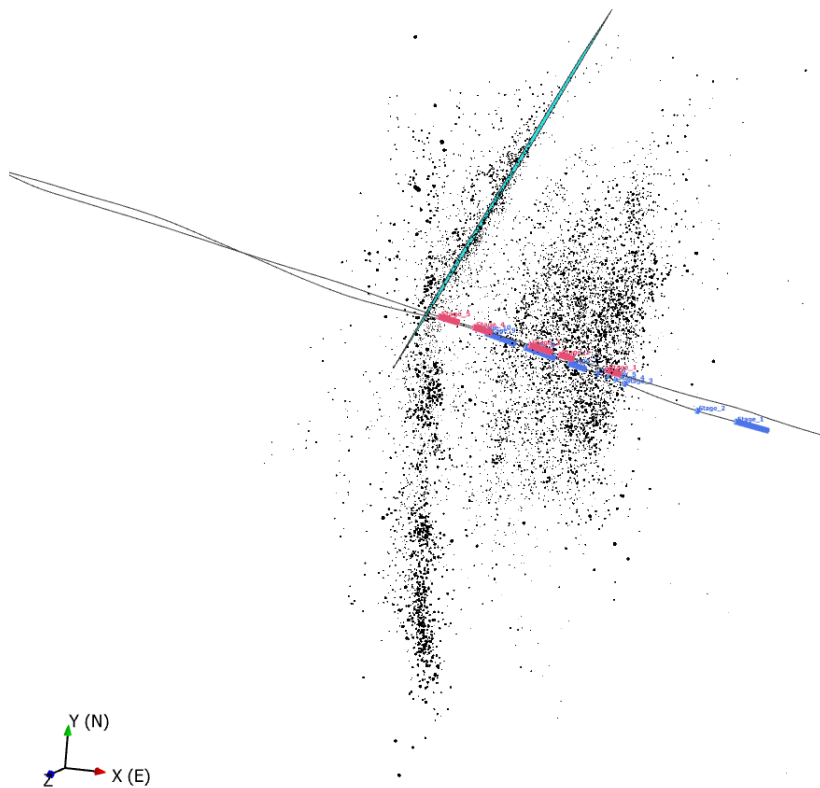
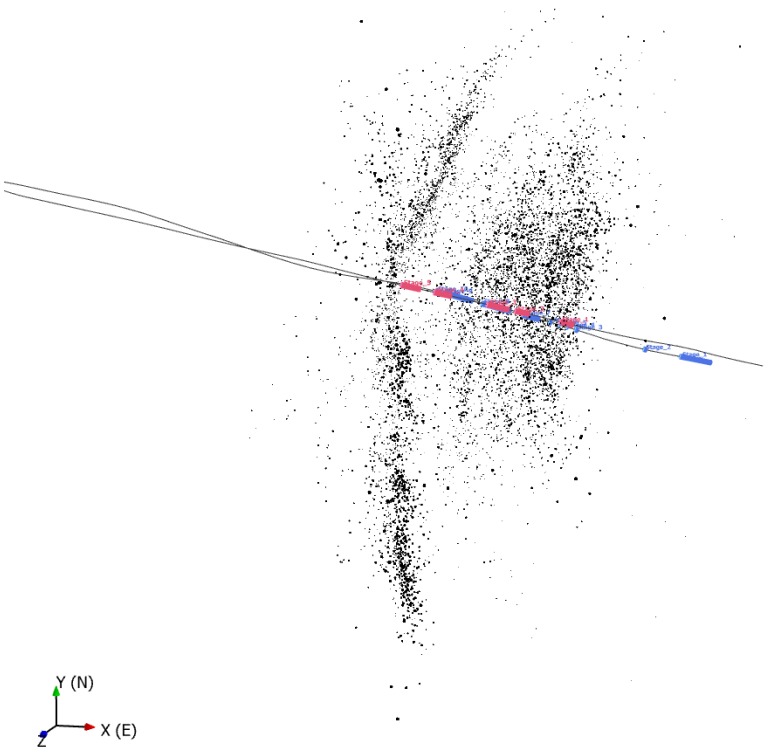


Large NE trending vertical plane

17

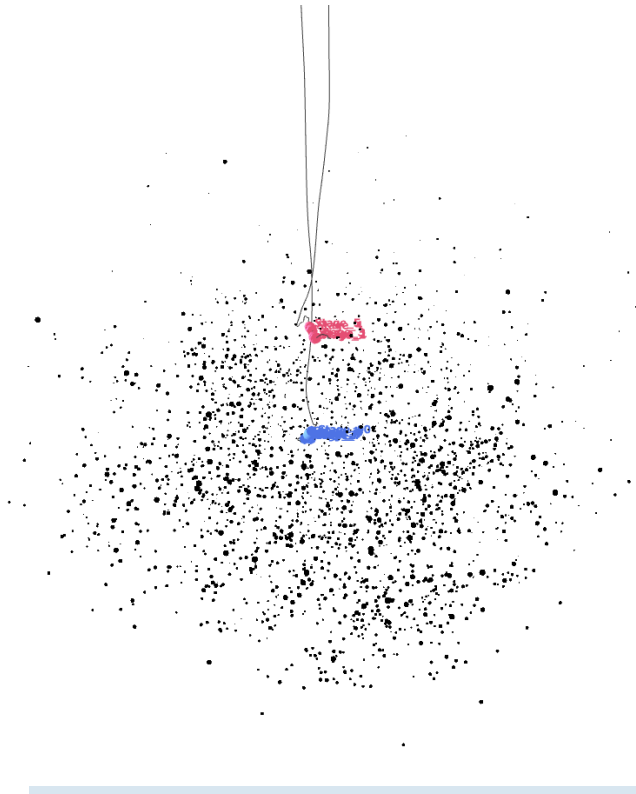


Large NE trending vertical plane

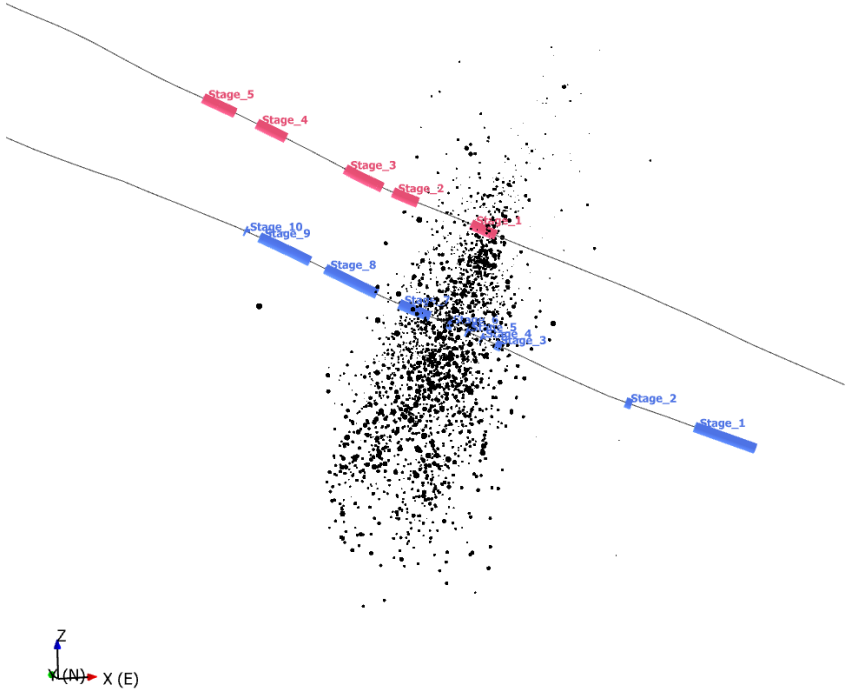


No obvious planar features for MEQ from stages 3R to 6

19

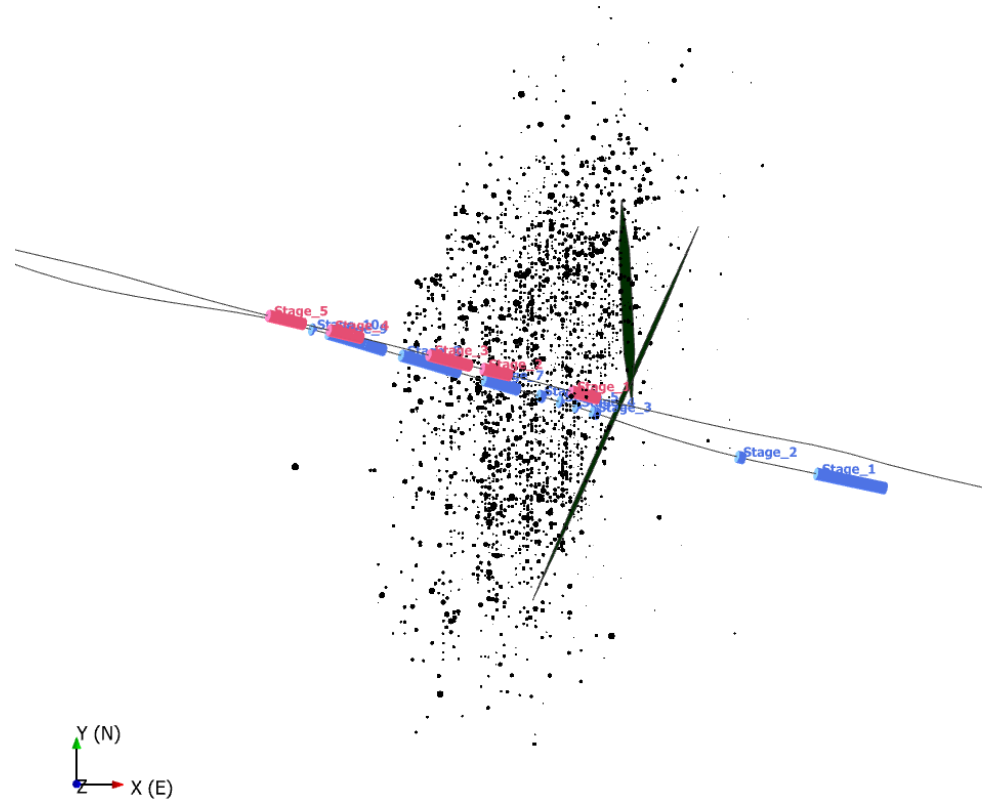


Equidistant to downward growth looking along well trajectory



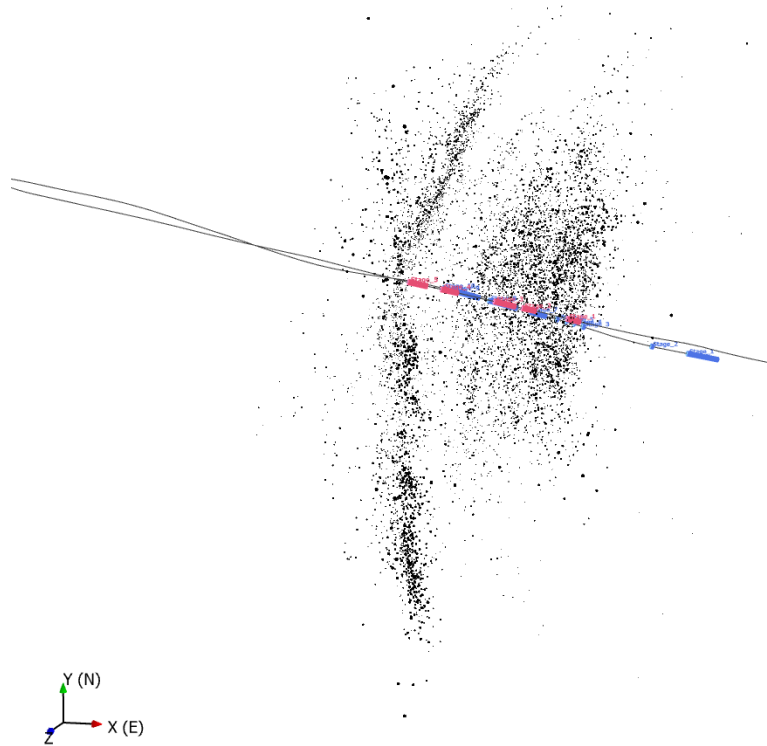
Microseismic cloud restricted in East-West direction

Not many (new) MEQ points in stimulated zone of Stages 1-3
(showing MEQ from Stages 3R to 6)



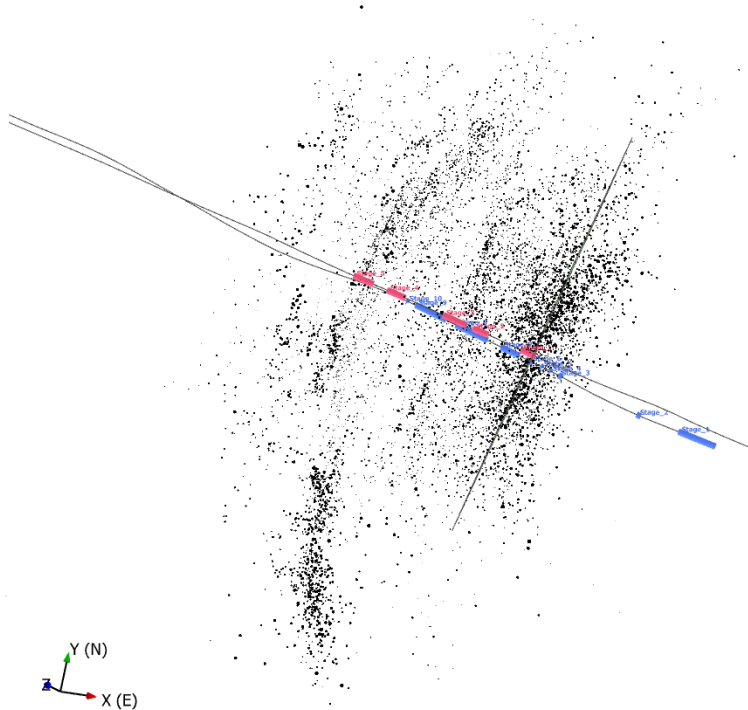
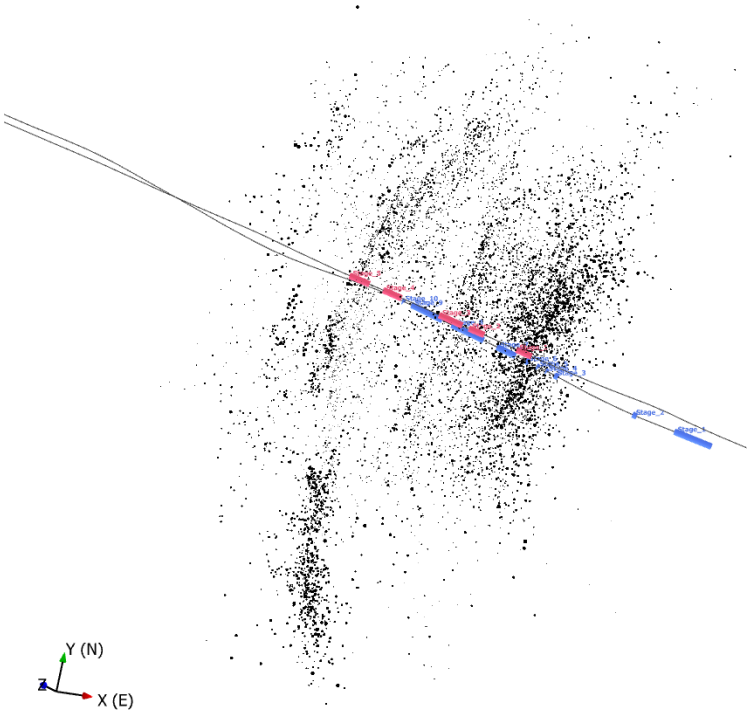
Two previously fitted fracture planes
from Stage 3 shown for reference

Large NE trending vertical plane



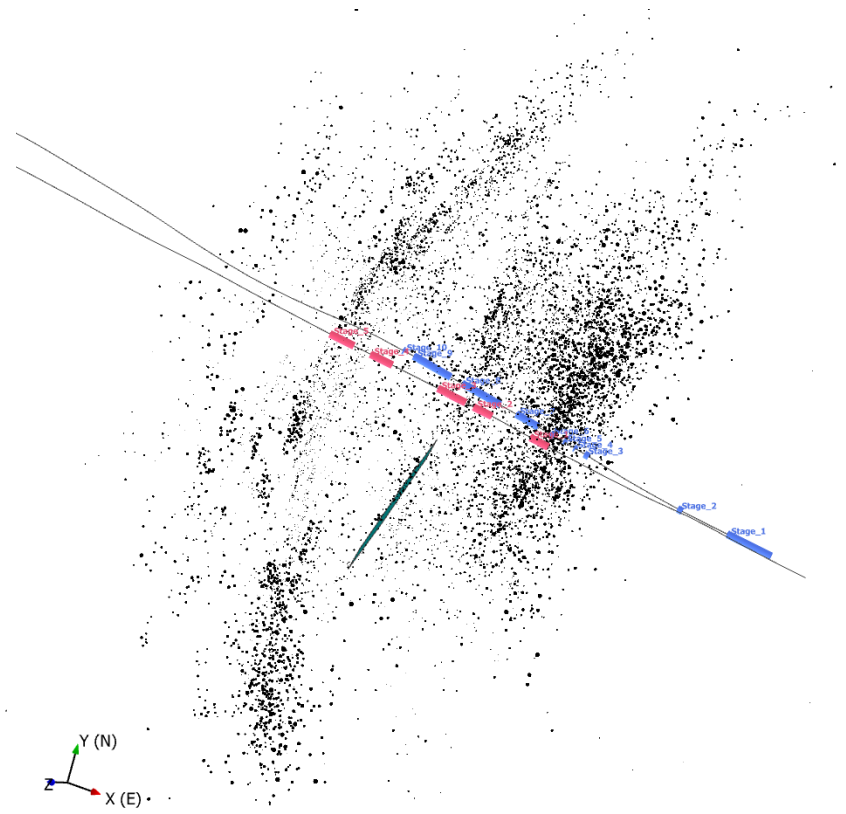
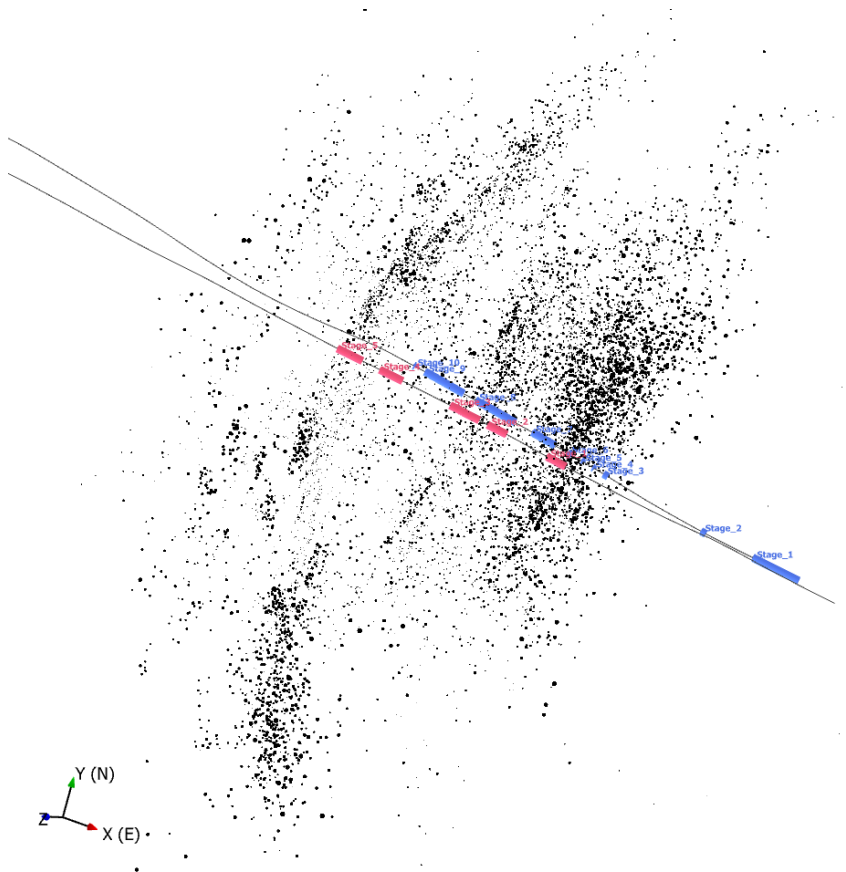
Large NE trending steeply dipping plane

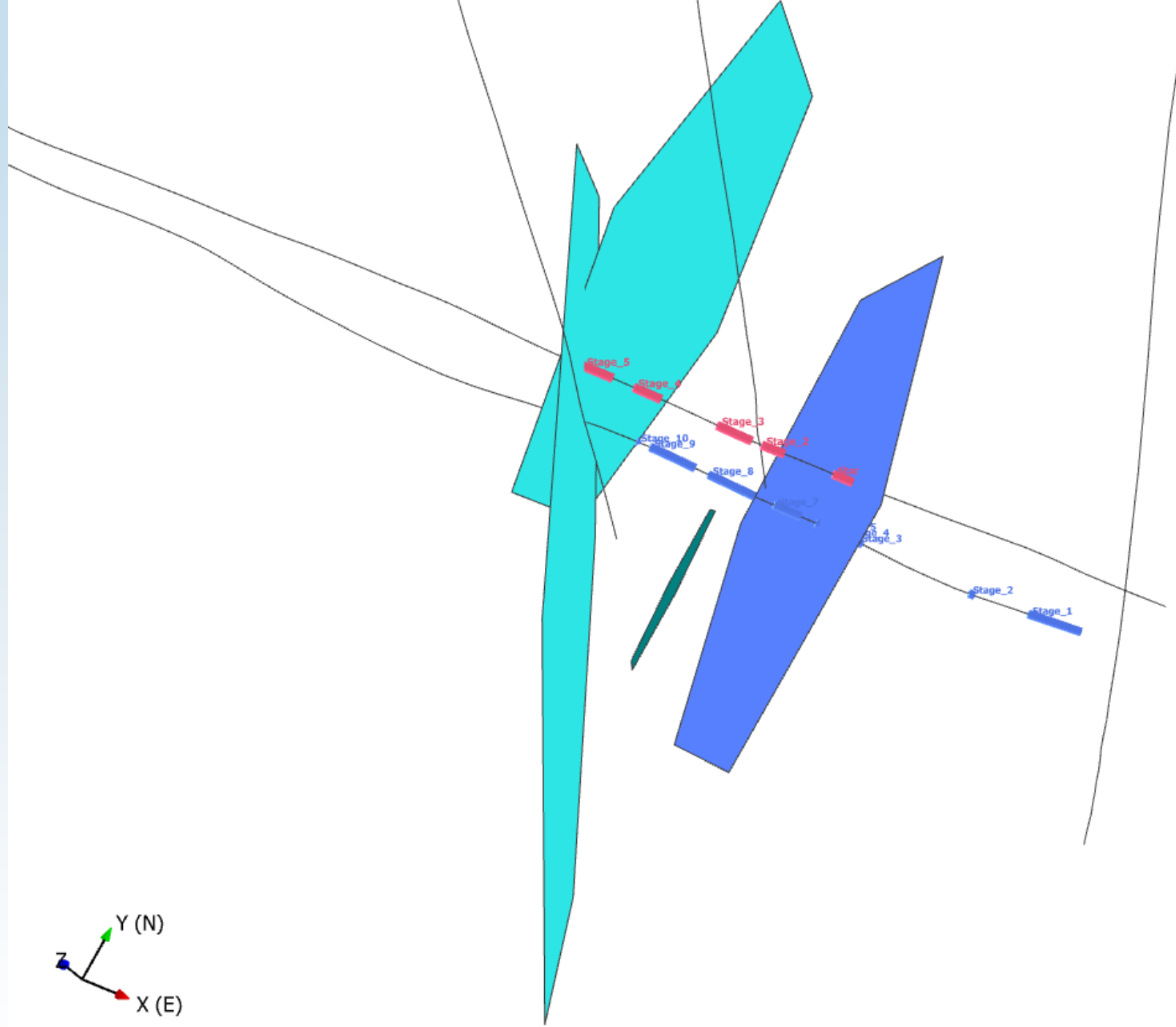
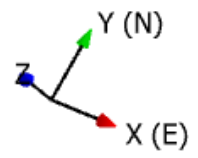
22



Smaller NE trending steeply dipping plane

23



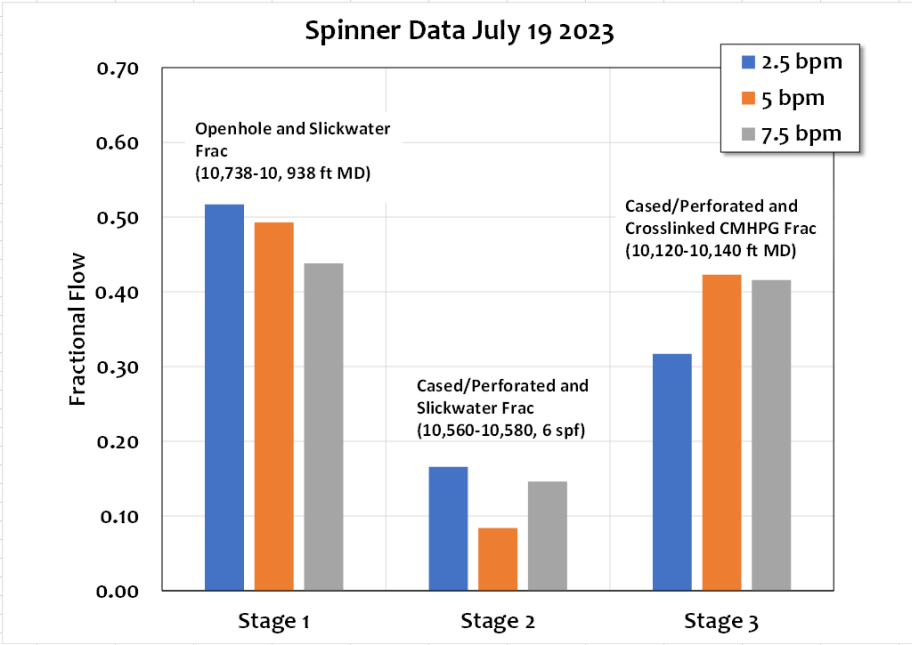


Add Hydrofracs on Stages based on Spinner Data

16A						16B			
Stage 1: 10,787 – 10,987 ft MD (Open-hole)						• Stage 1: 9,690 – 9,773 ft MD			
• Stage 2: 10,560 – 10,580 ft MD (Perforation interval)						• Stage 2: 9,429 – 9,512 ft MD			
• Stage 3: 10,120 – 10,140 ft MD (Perforation interval)						• Stage 3: 9,265 – 9,393 ft MD			
• Stage 4: 10,070 – 10,076 ft MD (Perforation interval)						• Stage 4: 8,958 – 9,058 ft MD			
• Stage 5: 10,020 – 10,026 ft MD (Perforation interval)						• Stage 5: 8,774 – 8,883 ft MD			
• Stage 6: 9,959 – 9,976 ft MD (2 Perforation clusters)									
• Stage 7: 9,798 – 9,901 ft MD (3 Perforation clusters)						Outflow rate		data suggest max of about 8	
• Stage 8: 9,545 – 9,723 ft MD (8 Perforation clusters)						Stage	Flow Percent		
• Stage 9: 9,320 – 9,493 ft MD (8 Perforation clusters)						stage 5	98.8	no proppant	
• Stage 10: 9,270 – 9,276 ft MD (Perforation interval)						stage 4	0.2		
						stage 3			
						stage 2	1		
						stage 1			
						Stage 0		Open hole	
Inflow rate	15 bpm								
injection temp	100 F								

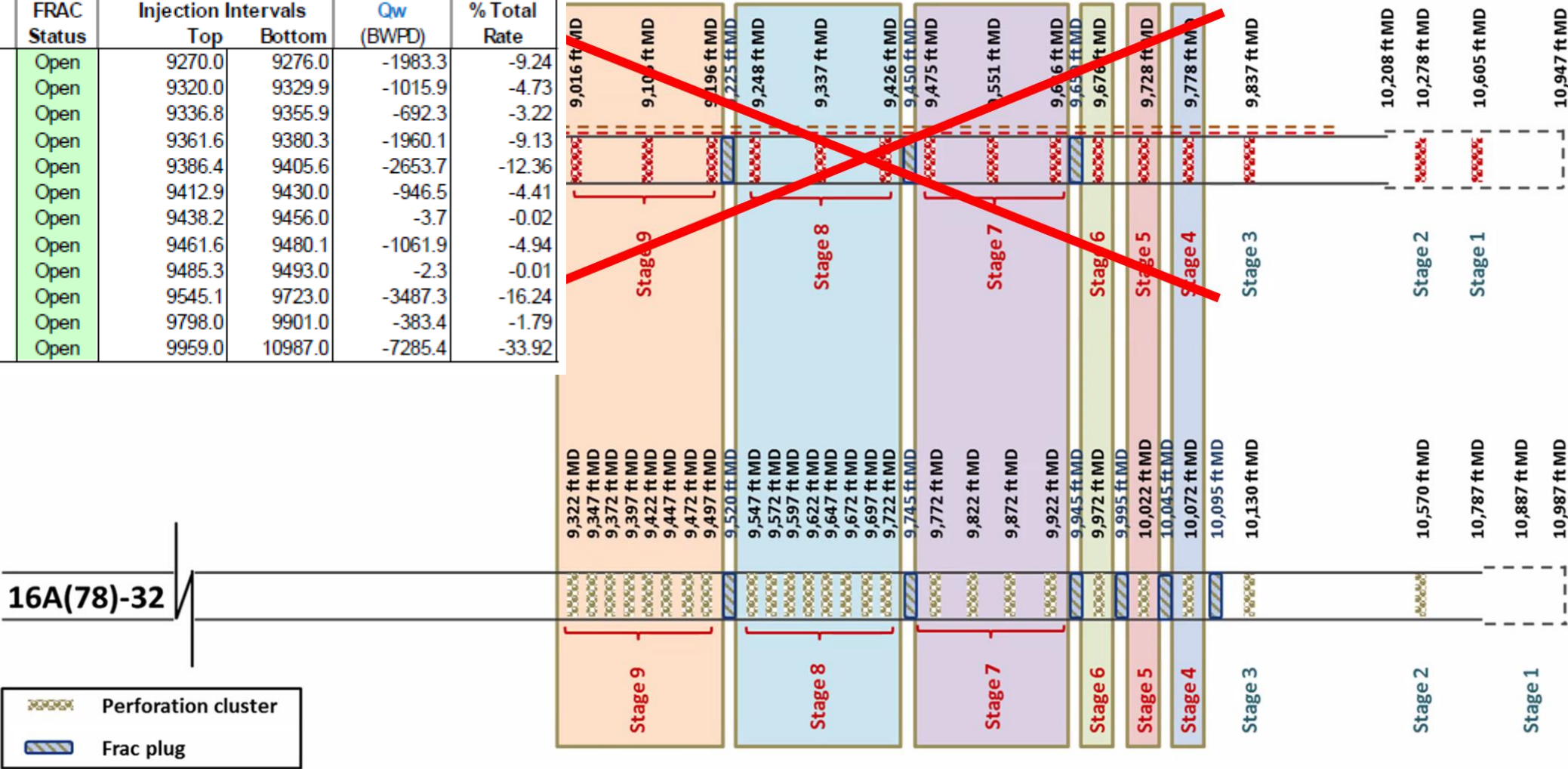
Stage	Flow Percent		
stage 10	9.24 include		
stage 9	38.8 see below		
stage 8	16.24 needs discussion		
stage 7	1.79 exclude didn't take proppant		
stage 6	exclude didn't take proppant		
stage 5	needs discussion		
stage 4	needs discussion		
stage 3	33.92	we have spinner	see fig on right
stage 2		data from previous	
stage 1		circ	OH

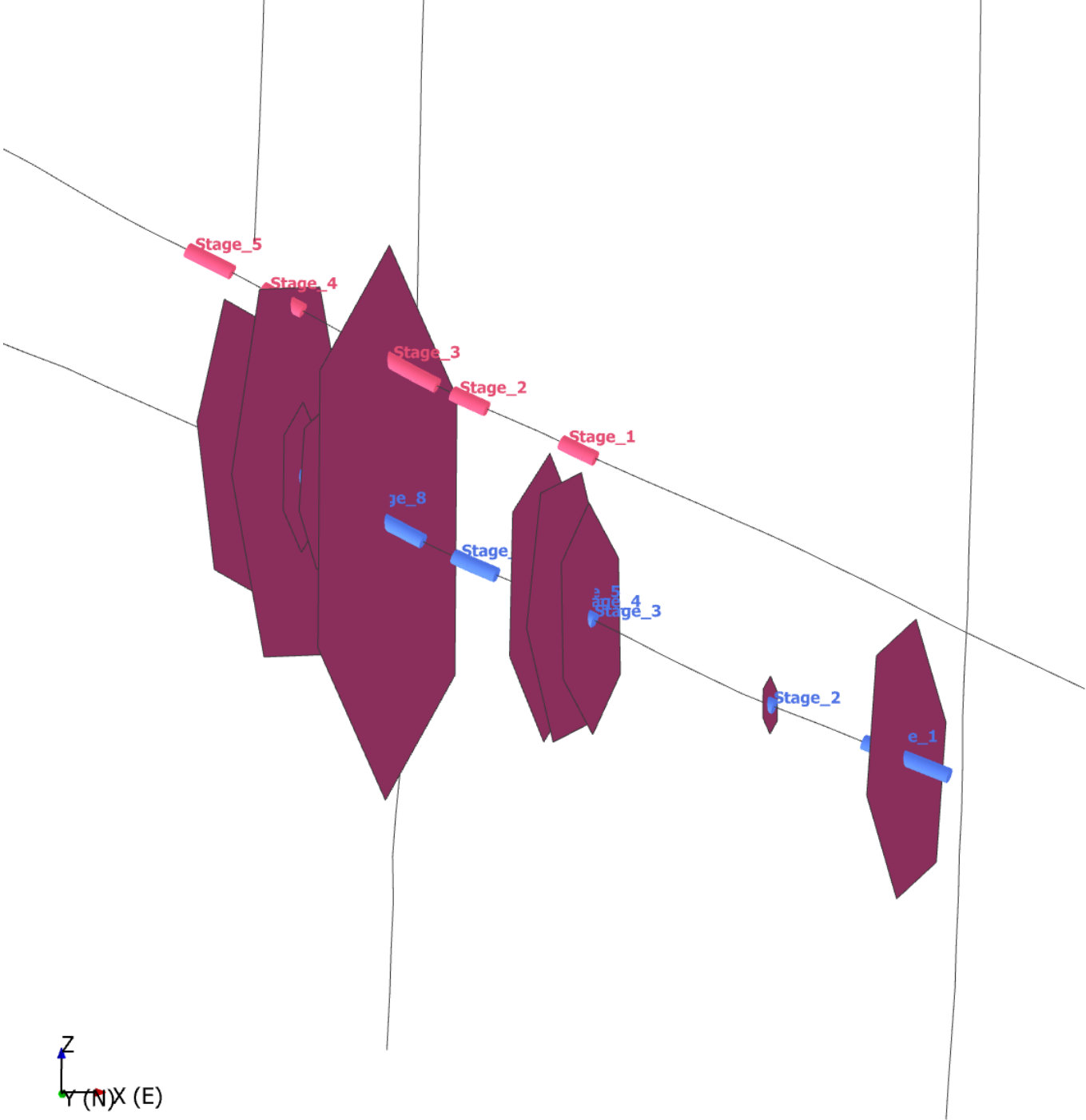
stage 9-8	4.73 include
stage 9-7	3.2 include
stage 9-6	9.1 include
stage 9-5	12.4 include
stage 9-4	4.4 include
stage 9-3	0.0172 exclude
stage 9-2	4.94 include
stage 9-1	0.0105 exclude

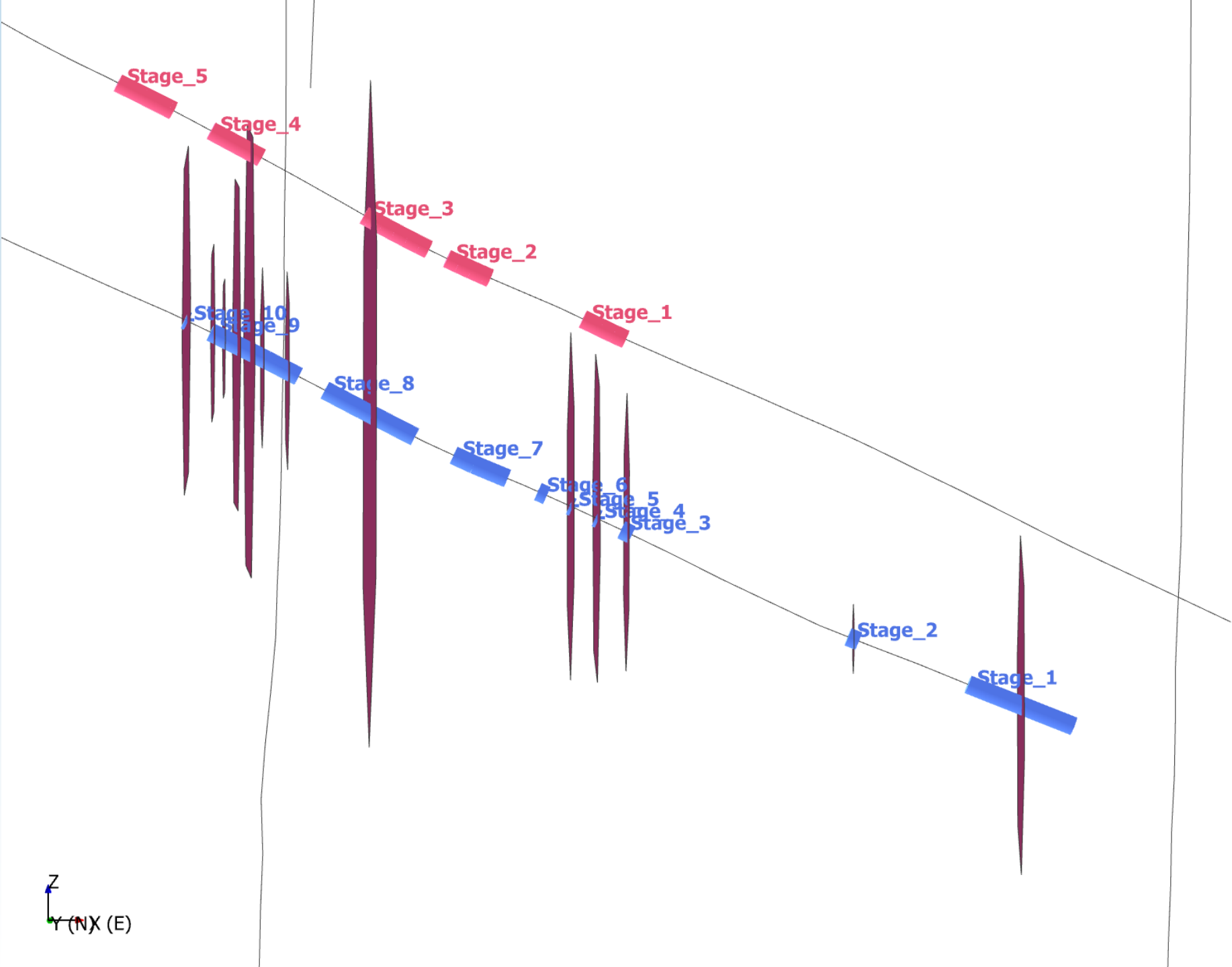
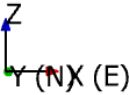


Intersection of frac stages at 16B(78)-32 determined by Hits

Injection at Downhole Conditions					
Layer	FRAC Status	Injection Intervals		Qw (BWPD)	% Total Rate
		Top	Bottom		
Stage 10	Open	9270.0	9276.0	-1983.3	-9.24
Stage 9-8	Open	9320.0	9329.9	-1015.9	-4.73
Stage 9-7	Open	9336.8	9355.9	-692.3	-3.22
Stage 9-6	Open	9361.6	9380.3	-1960.1	-9.13
Stage 9-5	Open	9386.4	9405.6	-2653.7	-12.36
Stage 9-4	Open	9412.9	9430.0	-946.5	-4.41
Stage 9-3	Open	9438.2	9456.0	-3.7	-0.02
Stage 9-2	Open	9461.6	9480.1	-1061.9	-4.94
Stage 9-1	Open	9485.3	9493.0	-2.3	-0.01
Stage 8	Open	9545.1	9723.0	-3487.3	-16.24
Stage 7	Open	9798.0	9901.0	-383.4	-1.79
Stage 1-6	Open	9959.0	10987.0	-7285.4	-33.92







Add stochastic fractures
where high MEQ point
cloud density not reached
by other fractures

