[redacted][US] (MS)

From: [redacted]
Sent: Friday, September 13, 2019 10:34 AM
To: [redacted][US] (MS)
Cc: [redacted]
Subject: EXT :Pressure tolerances for dive profiles
Attachments: DOTF Dive Profiles and Tolorances.pdf

Hi [redacted]
Please see attached spreadsheet for OceanGates requested dive profiles and pressure tolerance around them. In short I'm requesting a **-0 psi / +2.5 % psi.** This gives us a max over pressure of 161psi (at max planned depth)

Thanks,
[redacted]

[redacted]
Director of Systems Integration & Marine Operations

OceanGate Inc
[redacted]
Everett, Washington 98210
www.OceanGate.com

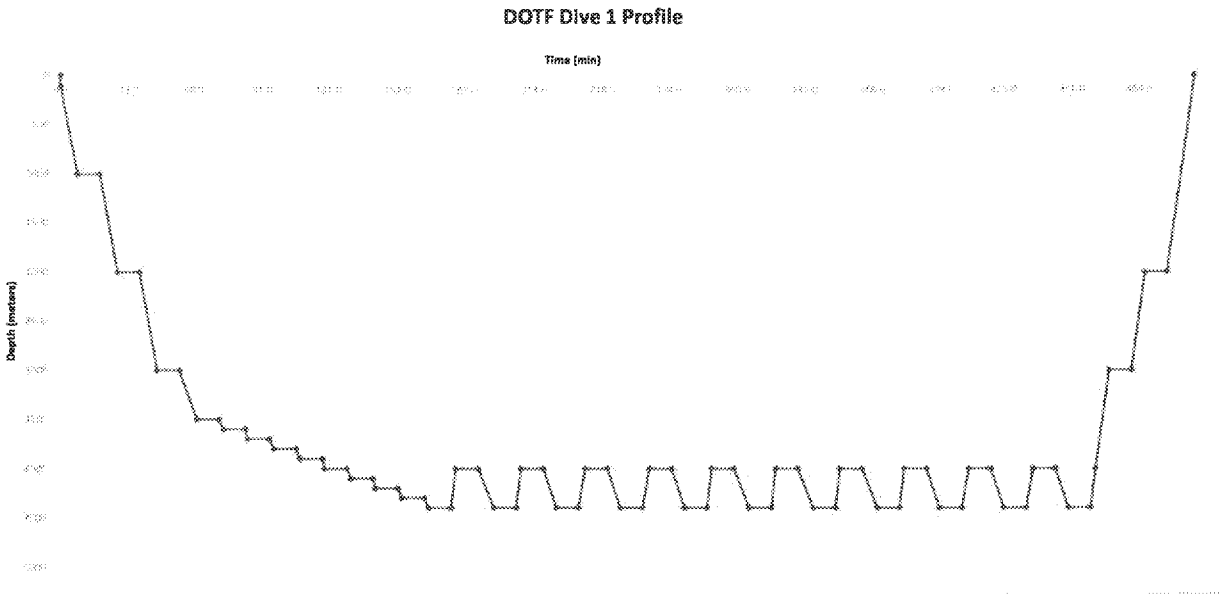
[redacted]

www.shipwreckstories.com

Max Operational Depth	4000	meters
Proof Test Spec	1.10	% of Max Ops
Proof Depth	4400	meters
Pressurization Rate 1	180.00	psi / min
Pressurization Rate 2	90.00	psi / min
De-pressurization Rate	250.00	psi / min

DOTF DIVE 1 PLAN

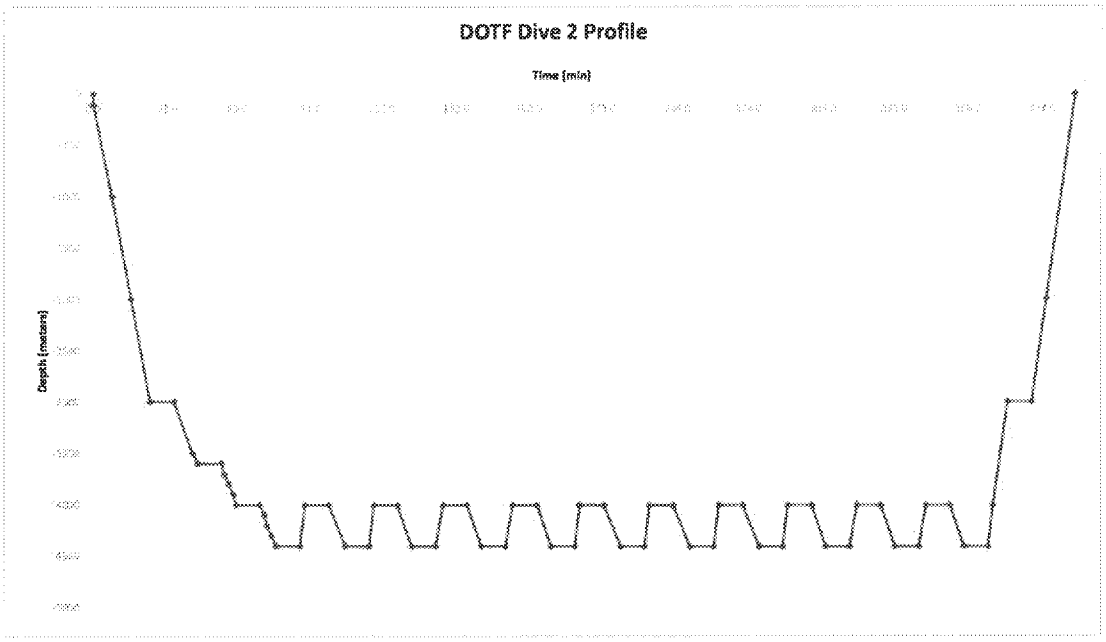
Step Description	Depth (m)	Depth (ft)	Atm (gauge)	Atm (abs)	PSI	Pressurization Rate (psi/min)	Pressurization Time (min)	% Proof Depth	Hold Times	Cummulative Time (min)	Cummulative Time (Hr)
Pressurize	-1	-3	0.1	1	15	180	0.1	0.00	0	0.1	0.0
Pressurize	-100	-328	9.9	11	161	180	0.8	0.03	0	1	0.0
Pressurize	-1000	-3281	99.4	100	1476	180	7.3	0.25	0	8	0.1
Hold	-1000	-3281	99.4	100	1476	250	0.0	0.25	10	18	0.3
Pressurize	-2000	-6562	198.8	200	2938	180	8.1	0.50	0	26	0.4
Hold	-2000	-6562	198.8	200	2938	250	0.0	0.50	10	36	0.6
Pressurize	-3000	-9843	298.3	299	4399	180	8.1	0.75	0	44	0.7
Hold	-3000	-9843	298.3	299	4399	250	0.0	0.75	10	54	0.9
Pressurize	-3500	-11483	348.0	349	5130	90	8.1	0.88	0	63	1.0
Hold	-3500	-11483	348.0	349	5130	250	0	0.88	10	73	1.2
Pressurize	-3600	-11811	357.9	359	5276	90	2	0.90	0	74	1.2
Hold	-3600	-11811	357.9	359	5276	250	0	0.90	10	84	1.4
Pressurize	-3700	-12139	367.9	369	5422	90	2	0.93	0	86	1.4
Hold	-3700	-12139	367.9	369	5422	250	0	0.93	10	96	1.6
Pressurize	-3800	-12467	377.8	379	5568	90	2	0.95	0	97	1.6
Hold	-3800	-12467	377.8	379	5568	250	0	0.95	10	107	1.8
Pressurize	-3900	-12795	387.7	389	5714	90	2	0.98	0	109	1.8
Hold	-3900	-12795	387.7	389	5714	250	0	0.98	10	119	2.0
Pressurize	-4000	-13123	397.7	399	5861	90	2	1.00	0	121	2.0
Hold	-4000	-13123	397.7	399	5861	250	0	1.00	10	131	2.2
Pressurize	-4100	-13451	407.6	409	6007	90	2	1.03	0	132	2.2
Hold	-4100	-13451	407.6	409	6007	250	0	1.03	10	142	2.4
Pressurize	-4200	-13780	417.6	419	6153	90	2	1.05	0	144	2.4
Hold	-4200	-13780	417.6	419	6153	250	0	1.05	10	154	2.6
Pressurize	-4300	-14108	427.5	429	6299	90	2	1.08	0	156	2.6
Hold	-4300	-14108	427.5	429	6299	250	0	1.08	10	166	2.8
Pressurize	-4400	-14436	437.4	438	6445	90	2	1.10	0	167	2.8
Hold	-4400	-14436	437.4	438	6445	250	0	1.10	10	177	3.0
Pressurize	-4000	-13123	397.7	399	5861	250	2	1.00	0	180	3.0
Hold	-4000	-13123	397.7	399	5861	250	0	1.00	10	190	3.2
Pressurize	-4400	-14436	437.4	438	6445	90	6	1.10	0	196	3.3
Hold	-4400	-14436	437.4	438	6445	250	0	1.10	10	206	3.4
Pressurize	-4000	-13123	397.7	399	5861	250	2	1.00	0	208	3.5
Hold	-4000	-13123	397.7	399	5861	250	0	1.00	10	218	3.6
Pressurize	-4400	-14436	437.4	438	6445	90	6	1.10	0	225	3.7
Hold	-4400	-14436	437.4	438	6445	250	0	1.10	10	235	3.9
Pressurize	-4000	-13123	397.7	399	5861	250	2	1.00	0	237	4.0
Hold	-4000	-13123	397.7	399	5861	250	0	1.00	10	247	4.1
Pressurize	-4400	-14436	437.4	438	6445	90	6	1.10	0	254	4.2
Hold	-4400	-14436	437.4	438	6445	250	0	1.10	10	264	4.4
Pressurize	-4000	-13123	397.7	399	5861	250	2	1.00	0	266	4.4
Hold	-4000	-13123	397.7	399	5861	250	0	1.00	10	276	4.6
Pressurize	-4400	-14436	437.4	438	6445	90	6	1.10	0	283	4.7
Hold	-4400	-14436	437.4	438	6445	250	0	1.10	10	293	4.9
Pressurize	-4000	-13123	397.7	399	5861	250	2	1.00	0	295	4.9
Hold	-4000	-13123	397.7	399	5861	250	0	1.00	10	305	5.1
Pressurize	-4400	-14436	437.4	438	6445	90	6	1.10	0	311	5.2
Hold	-4400	-14436	437.4	438	6445	250	0	1.10	10	321	5.4
Pressurize	-4000	-13123	397.7	399	5861	250	2	1.00	0	324	5.4
Hold	-4000	-13123	397.7	399	5861	250	0	1.00	10	334	5.6
Pressurize	-4400	-14436	437.4	438	6445	90	6	1.10	0	340	5.7
Hold	-4400	-14436	437.4	438	6445	250	0	1.10	10	350	5.8
Pressurize	-4000	-13123	397.7	399	5861	250	2	1.00	0	353	5.9
Hold	-4000	-13123	397.7	399	5861	250	0	1.00	10	363	6.0
Pressurize	-4400	-14436	437.4	438	6445	90	6	1.10	0	369	6.2
Hold	-4400	-14436	437.4	438	6445	250	0	1.10	10	379	6.3
Pressurize	-4000	-13123	397.7	399	5861	250	2	1.00	0	381	6.4
Hold	-4000	-13123	397.7	399	5861	250	0	1.00	10	391	6.5
Pressurize	-4400	-14436	437.4	438	6445	90	6	1.10	0	398	6.6
Hold	-4400	-14436	437.4	438	6445	250	0	1.10	10	408	6.8
Pressurize	-4000	-13123	397.7	399	5861	250	2	1.00	0	410	6.8
Hold	-4000	-13123	397.7	399	5861	250	0	1.00	10	420	7.0
Pressurize	-4400	-14436	437.4	438	6445	90	6	1.10	0	427	7.1
Hold	-4400	-14436	437.4	438	6445	250	0	1.10	10	437	7.3
Pressurize	-4000	-13123	397.7	399	5861	250	2	1.00	0	439	7.3
Hold	-4000	-13123	397.7	399	5861	250	0	1.00	10	449	7.5
Pressurize	-4400	-14436	437.4	438	6445	90	6	1.10	0	456	7.6
Hold	-4400	-14436	437.4	438	6445	250	0	1.10	10	466	7.8
Pressurize	-4000	-13123	397.7	399	5861	250	2	1.00	0	468	7.8
Hold	-4000	-13123	397.7	399	5861	250	0	1.00	0	468	7.8
De-Pressurize	-3000	-9843	298.3	299	4399	250	6	0.75	0	474	7.9
Hold	-3000	-9843	298.3	299	4399	250	0	0.75	10	484	8.1
De-Pressurize	-2000	-6562	198.8	200	2938	250	6	0.50	0	490	8.2
Hold	-2000	-6562	198.8	200	2938	250	0	0.50	10	500	8.3
De-Pressurize	0	0	0.0	1	15	250	12	0.00	0	511	8.5



Max Operational Depth	4000	meters
Proof Test Spec	1.10	% of Max Ops
Proof Depth	4400	meters
Pressurization Rate 1	180.00	psi / min
Pressurization Rate 2	90.00	psi / min
De-pressurization Rate	250.00	psi / min

DOTF DIVE 2 PLAN

Step Description	Depth (m)	Depth (ft)	Atm (gauge)	Atm (abs)	PSI	Pressurization Rate (psi/min)	Pressurization Time (min)	% Proof Depth	Hold Times	Cummulative Time (min)	Cummulative Time (Hr)
Pressurize	-1	-3	0.1	1	15	180	0.1	0.00	0	0.1	0.0
Pressurize	-100	-328	9.9	11	161	180	0.8	0.03	0	1	0.0
Pressurize	-1000	-3281	99.4	100	1476	180	7.3	0.25	0	8	0.1
Hold	-1000	-3281	99.4	100	1476	0	0.0	0.25	0	8	0.1
Pressurize	-2000	-6562	198.8	200	2938	180	8.1	0.50	0	16	0.3
Hold	-2000	-6562	198.8	200	2938	0	0.0	0.50	0	16	0.3
Pressurize	-3000	-9843	298.3	299	4399	180	8.1	0.75	0	24	0.4
Hold	-3000	-9843	298.3	299	4399	0	0.0	0.75	10	34	0.6
Pressurize	-3500	-11483	348.0	349	5130	90	8.1	0.88	0	43	0.7
Hold	-3500	-11483	348.0	349	5130	0	0.0	0.88	0	43	0.7
Pressurize	-3600	-11811	357.9	359	5278	90	1.6	0.90	0	44	0.7
Hold	-3600	-11811	357.9	359	5278	0	0.0	0.90	10	54	0.9
Pressurize	-3700	-12139	367.9	369	5422	90	1.6	0.93	0	56	0.9
Hold	-3700	-12139	367.9	369	5422	0	0.0	0.93	0	56	0.9
Pressurize	-3800	-12467	377.8	379	5568	90	1.6	0.95	0	57	1.0
Hold	-3800	-12467	377.8	379	5568	0	0.0	0.95	0	57	1.0
Pressurize	-3900	-12795	387.7	389	5714	90	1.6	0.98	0	59	1.0
Hold	-3900	-12795	387.7	389	5714	0	0.0	0.98	0	59	1.0
Pressurize	-4000	-13123	397.7	399	5861	90	1.6	1.00	0	61	1.0
Hold	-4000	-13123	397.7	399	5861	0	0.0	1.00	10	71	1.2
Pressurize	-4100	-13451	407.6	409	6007	90	1.6	1.03	0	72	1.2
Hold	-4100	-13451	407.6	409	6007	0	0.0	1.03	0	72	1.2
Pressurize	-4200	-13780	417.6	419	6153	90	1.6	1.05	0	74	1.2
Hold	-4200	-13780	417.6	419	6153	0	0.0	1.05	0	74	1.2
Pressurize	-4300	-14108	427.5	429	6299	90	1.6	1.08	0	76	1.3
Hold	-4300	-14108	427.5	429	6299	0	0.0	1.08	0	76	1.3
Pressurize	-4400	-14436	437.4	438	6445	90	1.6	1.10	0	77	1.3
Hold	-4400	-14436	437.4	438	6445	0	0.0	1.10	10	87	1.5
Pressurize	-4000	-13123	397.7	399	5861	250	2.3	1.00	0	90	1.5
Hold	-4000	-13123	397.7	399	5861	0	0.0	1.00	10	100	1.7
Pressurize	-4400	-14436	437.4	438	6445	90	6.5	1.10	0	106	1.8
Hold	-4400	-14436	437.4	438	6445	0	0.0	1.10	10	116	1.9
Pressurize	-4000	-13123	397.7	399	5861	250	2.3	1.00	0	118	2.0
Hold	-4000	-13123	397.7	399	5861	0	0.0	1.00	10	128	2.1
Pressurize	-4400	-14436	437.4	438	6445	90	6.5	1.10	0	135	2.2
Hold	-4400	-14436	437.4	438	6445	0	0.0	1.10	10	145	2.4
Pressurize	-4000	-13123	397.7	399	5861	250	2.3	1.00	0	147	2.5
Hold	-4000	-13123	397.7	399	5861	0	0.0	1.00	10	157	2.6
Pressurize	-4400	-14436	437.4	438	6445	90	6.5	1.10	0	164	2.7
Hold	-4400	-14436	437.4	438	6445	0	0.0	1.10	10	174	2.9
Pressurize	-4000	-13123	397.7	399	5861	250	2.3	1.00	0	176	2.9
Hold	-4000	-13123	397.7	399	5861	0	0.0	1.00	10	186	3.1
Pressurize	-4400	-14436	437.4	438	6445	90	6.5	1.10	0	193	3.2
Hold	-4400	-14436	437.4	438	6445	0	0.0	1.10	10	203	3.4
Pressurize	-4000	-13123	397.7	399	5861	250	2.3	1.00	0	205	3.4
Hold	-4000	-13123	397.7	399	5861	0	0.0	1.00	10	215	3.6
Pressurize	-4400	-14436	437.4	438	6445	90	6.5	1.10	0	221	3.7
Hold	-4400	-14436	437.4	438	6445	0	0.0	1.10	10	231	3.9
Pressurize	-4000	-13123	397.7	399	5861	250	2.3	1.00	0	234	3.9
Hold	-4000	-13123	397.7	399	5861	0	0.0	1.00	10	244	4.1
Pressurize	-4400	-14436	437.4	438	6445	90	6.5	1.10	0	250	4.2
Hold	-4400	-14436	437.4	438	6445	0	0.0	1.10	10	260	4.3
Pressurize	-4000	-13123	397.7	399	5861	250	2.3	1.00	0	263	4.4
Hold	-4000	-13123	397.7	399	5861	0	0.0	1.00	10	273	4.5
Pressurize	-4400	-14436	437.4	438	6445	90	6.5	1.10	0	279	4.7
Hold	-4400	-14436	437.4	438	6445	0	0.0	1.10	10	289	4.8
Pressurize	-4000	-13123	397.7	399	5861	250	2.3	1.00	0	291	4.9
Hold	-4000	-13123	397.7	399	5861	0	0.0	1.00	10	301	5.0
Pressurize	-4400	-14436	437.4	438	6445	90	6.5	1.10	0	308	5.1
Hold	-4400	-14436	437.4	438	6445	0	0.0	1.10	10	318	5.3
Pressurize	-4000	-13123	397.7	399	5861	250	2.3	1.00	0	320	5.3
Hold	-4000	-13123	397.7	399	5861	0	0.0	1.00	10	330	5.5
Pressurize	-4400	-14436	437.4	438	6445	90	6.5	1.10	0	337	5.6
Hold	-4400	-14436	437.4	438	6445	0	0.0	1.10	10	347	5.8
Pressurize	-4000	-13123	397.7	399	5861	250	2.3	1.00	0	349	5.8
Hold	-4000	-13123	397.7	399	5861	0	0.0	1.00	10	359	6.0
Pressurize	-4400	-14436	437.4	438	6445	90	6.5	1.10	0	366	6.1
Hold	-4400	-14436	437.4	438	6445	0	0.0	1.10	10	376	6.3
Pressurize	-4000	-13123	397.7	399	5861	250	2.3	1.00	0	378	6.3
Hold	-4000	-13123	397.7	399	5861	0	0.0	1.00	0	378	6.3
De-Pressurize	-3000	-9843	298.3	299	4399	250	5.8	0.75	0	384	6.4
Hold	-3000	-9843	298.3	299	4399	0	0.0	0.75	10	394	6.6
De-Pressurize	-2000	-6562	198.8	200	2938	250	5.8	0.50	0	400	6.7
Hold	-2000	-6562	198.8	200	2938	0	0.0	0.50	0	400	6.7
De-Pressurize	0	0	0.0	1	15	250	11.7	0.00	0	411	6.9



		0	Max Under Pressure (psi)
		0	Max Under Depth (m)
0.0%	Min Tolorance	161	Max Over Pressure (psi)
2.5%	Max Tolorance	110	Max Over Depth (m)

DIVE 1 and DIVE 2 PRESSURE TOLORANCE CALCS							
Min Depth (m)	Min Pressure(psi)	Max Depth (m)	Max Pressure(psi)	Delta Under Pressure (psi)	Max Under Depth (m)	Delta Over Pressure (psi)	Max Over Depth (m)
-1	16	-1.025	17	0	0	0	0
-100	161	-102.5	165	0	0	4	3
-1000	1476	-1025	1513	0	0	37	25
-1000	1476	-1025	1513	0	0	37	25
-2000	2938	-2050	3011	0	0	73	50
-2000	2938	-2050	3011	0	0	73	50
-3000	4399	-3075	4509	0	0	110	75
-3000	4399	-3075	4509	0	0	110	75
-3500	5130	-3587.5	5258	0	0	128	88
-3500	5130	-3587.5	5258	0	0	128	88
-3600	5276	-3690	5408	0	0	132	90
-3600	5276	-3690	5408	0	0	132	90
-3700	5422	-3792.5	5558	0	0	136	93
-3700	5422	-3792.5	5558	0	0	136	93
-3800	5568	-3895	5707	0	0	139	95
-3800	5568	-3895	5707	0	0	139	95
-3900	5714	-3997.5	5857	0	0	143	98
-3900	5714	-3997.5	5857	0	0	143	98
-4000	5861	-4100	6007	0	0	147	100
-4000	5861	-4100	6007	0	0	147	100
-4100	6007	-4202.5	6157	0	0	150	103
-4100	6007	-4202.5	6157	0	0	150	103
-4200	6153	-4305	6307	0	0	154	105
-4200	6153	-4305	6307	0	0	154	105
-4300	6299	-4407.5	6456	0	0	157	108
-4300	6299	-4407.5	6456	0	0	157	108
-4400	6445	-4510	6606	0	0	161	110
-4400	6445	-4510	6606	0	0	161	110
-4000	5861	-4100	6007	0	0	147	100
-4000	5861	-4100	6007	0	0	147	100
-4400	6445	-4510	6606	0	0	161	110
-4400	6445	-4510	6606	0	0	161	110
-4000	5861	-4100	6007	0	0	147	100
-4000	5861	-4100	6007	0	0	147	100
-4400	6445	-4510	6606	0	0	161	110
-4400	6445	-4510	6606	0	0	161	110
-4000	5861	-4100	6007	0	0	147	100
-4000	5861	-4100	6007	0	0	147	100
-4400	6445	-4510	6606	0	0	161	110
-4400	6445	-4510	6606	0	0	161	110
-4000	5861	-4100	6007	0	0	147	100
-4000	5861	-4100	6007	0	0	147	100
-4400	6445	-4510	6606	0	0	161	110
-4400	6445	-4510	6606	0	0	161	110
-4000	5861	-4100	6007	0	0	147	100
-4000	5861	-4100	6007	0	0	147	100
-4400	6445	-4510	6606	0	0	161	110
-4400	6445	-4510	6606	0	0	161	110
-4000	5861	-4100	6007	0	0	147	100
-4000	5861	-4100	6007	0	0	147	100
-4400	6445	-4510	6606	0	0	161	110
-4400	6445	-4510	6606	0	0	161	110
-4000	5861	-4100	6007	0	0	147	100
-4000	5861	-4100	6007	0	0	147	100
-4400	6445	-4510	6606	0	0	161	110
-4400	6445	-4510	6606	0	0	161	110
-4000	5861	-4100	6007	0	0	147	100
-4000	5861	-4100	6007	0	0	147	100
-4400	6445	-4510	6606	0	0	161	110
-4400	6445	-4510	6606	0	0	161	110
-4000	5861	-4100	6007	0	0	147	100
-4000	5861	-4100	6007	0	0	147	100
-4400	6445	-4510	6606	0	0	161	110
-4400	6445	-4510	6606	0	0	161	110
-4000	5861	-4100	6007	0	0	147	100
-4000	5861	-4100	6007	0	0	147	100
-4400	6445	-4510	6606	0	0	161	110
-4400	6445	-4510	6606	0	0	161	110
-4000	5861	-4100	6007	0	0	147	100
-4000	5861	-4100	6007	0	0	147	100
-3000	4399	-3075	4509	0	0	110	75
-3000	4399	-3075	4509	0	0	110	75
-2000	2938	-2050	3011	0	0	73	50
-2000	2938	-2050	3011	0	0	73	50

Max Operational Depth	4000	meters	Start Time	
Proof Test Spec	1.25	% of Max Ops	End Time	
Proof Depth	5000	meters	DOTF RATES	
Pressurization Rate 1	180.00	<4500 psi	180.00	psi / min
Pressurization Rate 2	90.00	> 4500 psi	90.00	psi/min
De-pressurization Rate	250.00		600.00	psi / min

Dive Summary

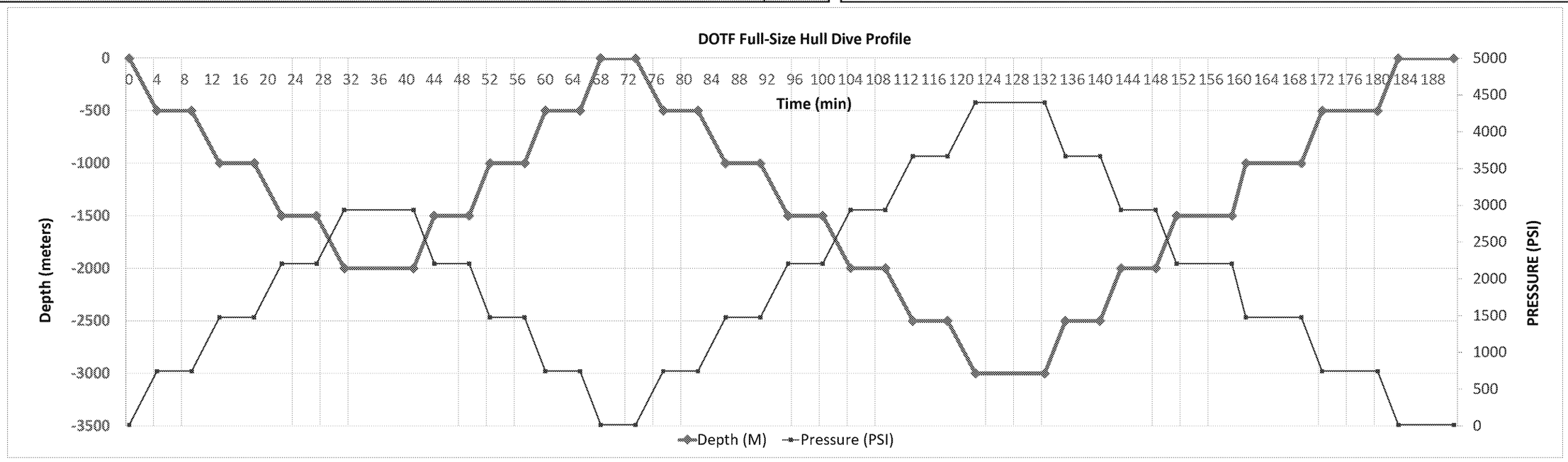
Total Dive Time (min):	**191.6**
Total Dive Time (hrs):	**3.19**
Max Dive Depth (m):	**-3000**
Max Dive Pressure (PSI):	**4399**

University of Washington DIVE 1 - PLAN

Step Description	Depth (m)	Depth (ft)	Atm (gauge)	Atm (abs)	PSI	Pressurization Rate (psi/min)	Pressurization Time (min)	% Proof Depth	Hold Times	Cummulative Time (min)	Cummulative Time (Hr)	Projected Time of Day
Pressurize 1	0	0	0.0	1	15	180	0.1	0%	0	0.1	0.0	
Pressurize 1	-500	-1640	49.7	51	745	180	4.1	10%	0	4.1	0.1	
Hold	-500	-1640	49.7	51	745	180	0.0	10%	5	9.1	0.2	
Pressurize 1	-1000	-3281	99.4	100	1476	180	4.1	20%	0	13.2	0.2	
Hold	-1000	-3281	99.4	100	1476	180	0.0	20%	5	18.2	0.3	
Pressurize 1	-1500	-4921	149.1	150	2207	180	4.1	30%	0	22.3	0.4	
Hold	-1500	-4921	149.1	150	2207	180	0.0	30%	5	27.3	0.5	
Pressurize 1	-2000	-6562	198.8	200	2938	180	4.1	40%	0	31.3	0.5	
Hold	-2000	-6562	198.8	200	2938	180	0.0	40%	10	41.3	0.7	
De-pressurize	-1500	-4921	149.1	150	2207	250	2.9	30%	0	44.2	0.7	
Hold	-1500	-4921	149.1	150	2207	250	0	30%	5	49.2	0.8	
De-pressurize	-1000	-3281	99.4	100	1476	250	3	20%	0	52.2	0.9	
Hold	-1000	-3281	99.4	100	1476	250	0	20%	5	57.2	1.0	
De-pressurize	-500	-1640	49.7	51	745	250	3	10%	0	60.1	1.0	
Hold	-500	-1640	49.7	51	745	250	0	10%	5	65.1	1.1	
De-pressurize	0	0	0.0	1	15	250	3	0%	0	68.0	1.1	
Hold	0	0	0.0	1	15	250	0	0%	5	73.0	1.2	
Pressurize 1	-500	-1640	49.7	51	745	180	4	10%	0	77.1	1.3	
Hold	-500	-1640	49.7	51	745	180	0	10%	5	82.1	1.4	
Pressurize 1	-1000	-3281	99.4	100	1476	180	4	20%	0	86.1	1.4	
Hold	-1000	-3281	99.4	100	1476	180	0	20%	5	91.1	1.5	
Pressurize 1	-1500	-4921	149.1	150	2207	180	4	30%	0	95.2	1.6	
Hold	-1500	-4921	149.1	150	2207	180	0	30%	5	100.2	1.7	
Pressurize 1	-2000	-6562	198.8	200	2938	180	4	40%	0	104.3	1.7	
Hold	-2000	-6562	198.8	200	2938	180	0	40%	5	109.3	1.8	
Pressurize 1	-2500	-8202	248.5	250	3668	180	4	50%	0	113.3	1.9	
Hold	-2500	-8202	248.5	250	3668	180	0	50%	5	118.3	2.0	
Pressurize 1	-3000	-9843	298.3	299	4399	180	4	60%	0	122.4	2.0	
Hold	-3000	-9843	298.3	299	4399	180	0	60%	10	132.4	2.2	
De-pressurize	-2500	-8202	248.5	250	3668	250	3	50%	0	135.3	2.3	
Hold	-2500	-8202	248.5	250	3668	250	0	50%	5	140.3	2.3	
De-pressurize	-2000	-6562	198.8	200	2938	250	3	40%	0	143.2	2.4	
Hold	-2000	-6562	198.8	200	2938	250	0	40%	5	148.2	2.5	
De-pressurize	-1500	-4921	149.1	150	2207	250	3	30%	0	151.1	2.5	
Hold	-1500	-4921	149.1	150	2207	250	3	30%	5	159.1	2.7	
De-pressurize	-1000	-3281	99.4	100	1476	250	3	20%	0	162.0	2.7	
Hold	-1000	-3281	99.4	100	1476	250	3	20%	5	169.9	2.8	
De-pressurize	-500	-1640	49.7	51	745	250	3	10%	0	172.8	2.9	
Hold	-500	-1640	49.7	51	745	250	3	10%	5	180.8	3.0	
De-pressurize	0	0	0.0	1	15	250	3	0%	0	183.7	3.1	
Hold	0	0	0.0	1	15	250	5	0%	5	191.6	3.2	

ACTUAL TEST NOTES - DATE 10/15/2019

TIME	TEST PRESSURE	DVL DEPTH (m)	PLANNED DEPTH	COMMENTS



Max Operational Depth	4000	meters	Start Time	
Proof Test Spec	1.25	% of Max Ops	End Time	
Proof Depth	5000	meters	DOTF RATES	
Pressurization Rate 1	180.00	<4500 psi	180.00	psi / min
Pressurization Rate 2	90.00	> 4500 psi	90.00	psi/min
De-pressurization Rate	250.00		600.00	psi / min

Dive Summary

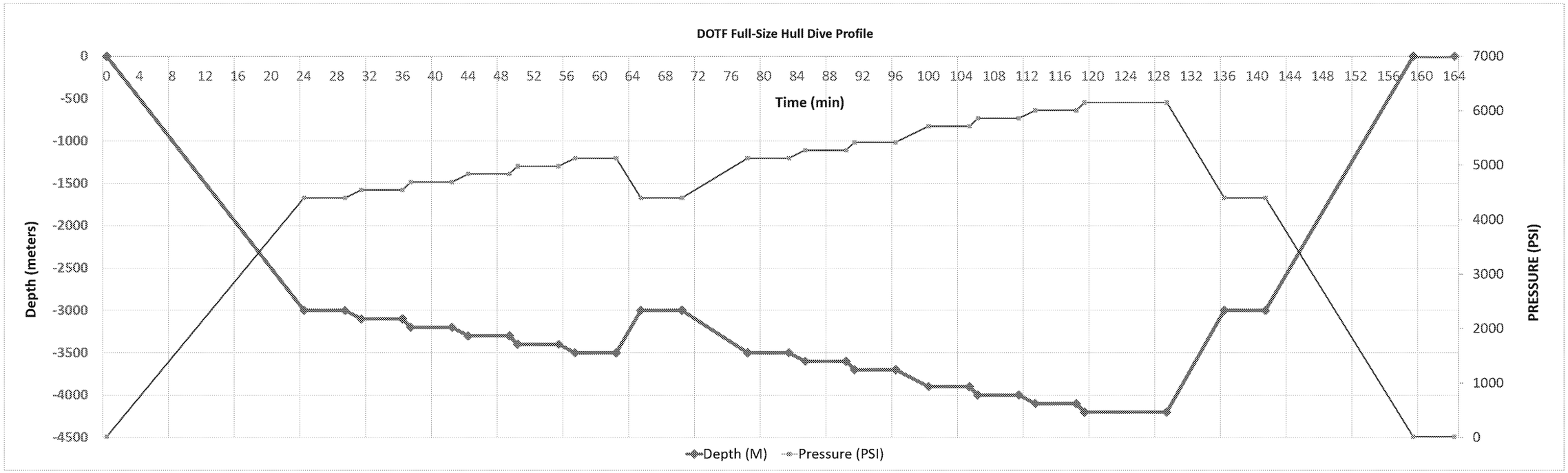
Total Dive Time (min):	**164.5**
Total Dive Time (hrs):	**2.74**
Max Dive Depth (m):	**-4200**
Max Dive Pressure (PSI):	**6153**

DOTF DIVE 2 - PLAN

Step Description	Depth (m)	Depth (ft)	Atm (gauge)	Atm (abs)	PSI	Pressurization Rate (psi/min)	Pressurization Time (min)	% Proof Depth	Hold Times	Cummulative Time (min)	Cummulative Time (Hr)
Pressurize 1	0	0	0.0	1	15	180	0.1	0%	0	0.1	0.0
Pressurize 1	-3000	-9843	298.3	299	4399	180	24.4	60%	0	24	0.4
Hold	-3000	-9843	298.3	299	4399	180	0.0	60%	5	29	0.5
Pressurize 2	-3100	-10171	308.2	309	4545	90	1.6	62%	0	31	0.5
Hold	-3100	-10171	308.2	309	4545	90	0.0	62%	5	36	0.6
Pressurize 2	-3200	-10499	318.1	319	4691	90	1.6	64%	0	38	0.6
Hold	-3200	-10499	318.1	319	4691	90	0.0	64%	5	43	0.7
Pressurize 2	-3300	-10827	328.1	329	4838	90	1.6	66%	0	44	0.7
Hold	-3300	-10827	328.1	329	4838	90	0.0	66%	5	49	0.8
Pressurize 2	-3400	-11155	338.0	339	4984	90	1.6	68%	0	51	0.8
Hold	-3400	-11155	338.0	339	4984	90	0.0	68%	5	56	0.9
Pressurize 2	-3500	-11483	348.0	349	5130	90	1.6	70%	0	58	1.0
Hold	-3500	-11483	348.0	349	5130	90	0.0	70%	5	63	1.0
De-pressurize	-3000	-9843	298.3	299	4399	250	2.9	60%	0	65	1.1
Hold	-3000	-9843	298.3	299	4399	250	0.0	60%	5	70	1.2
Pressurize 2	-3500	-11483	348.0	349	5130	90	8.1	70%	0	79	1.3
Hold	-3500	-11483	348.0	349	5130	90	0.0	70%	5	84	1.4
Pressurize 2	-3600	-11811	357.9	359	5276	90	1.6	72%	0	85	1.4
Hold	-3600	-11811	357.9	359	5276	90	0.0	72%	5	90	1.5
Pressurize 2	-3700	-12139	367.9	369	5422	90	1.6	74%	0	92	1.5
Hold	-3700	-12139	367.9	369	5422	90	0.0	74%	5	97	1.6
Pressurize 2	-3900	-12795	387.7	389	5714	90	3.2	78%	0	100	1.7
Hold	-3900	-12795	387.7	389	5714	90	0.0	78%	5	105	1.8
Pressurize 2	-4000	-13123	397.7	399	5861	90	1.6	80%	0	107	1.8
Hold	-4000	-13123	397.7	399	5861	90	0.0	80%	5	112	1.9
Pressurize 2	-4100	-13451	407.6	409	6007	90	1.6	82%	0	113	1.9
Hold	-4100	-13451	407.6	409	6007	90	0.0	82%	5	118	2.0
Pressurize 2	-4200	-13780	417.6	419	6153	90	1.6	84%	0	120	2.0
Hold	-4200	-13780	417.6	419	6153	90	0.0	84%	10	130	2.2
De-pressurize	-3000	-9843	298.3	299	4399	250	7.0	60%	0	137	2.3
Hold	-3000	-9843	298.3	299	4399	250	0.0	60%	5	142	2.4
De-pressurize	0	0	0.0	1	15	250	17.5	0%	0	160	2.7
Hold	0	0	0.0	1	15	250	0.0	0%	5	165	2.7

ACTUAL TEST NOTES - DATE 10/15/2019

TIME	TEST PRESSURE	DVL DEPTH (m)	NED I	BUCKET WATER LEVEL	COMMENTS



Max Operational Depth	4000	meters	Start Time	
Proof Test Spec	1.25	% of Max Ops	End Time	
Proof Depth	5000	meters	DOTF RATES	
Pressurization Rate 1	180.00	<4500 psi	180.00	psi / min
Pressurization Rate 2	90.00	> 4500 psi	90.00	psi/min
De-pressurization Rate	250.00		600.00	psi / min

Dive Summary

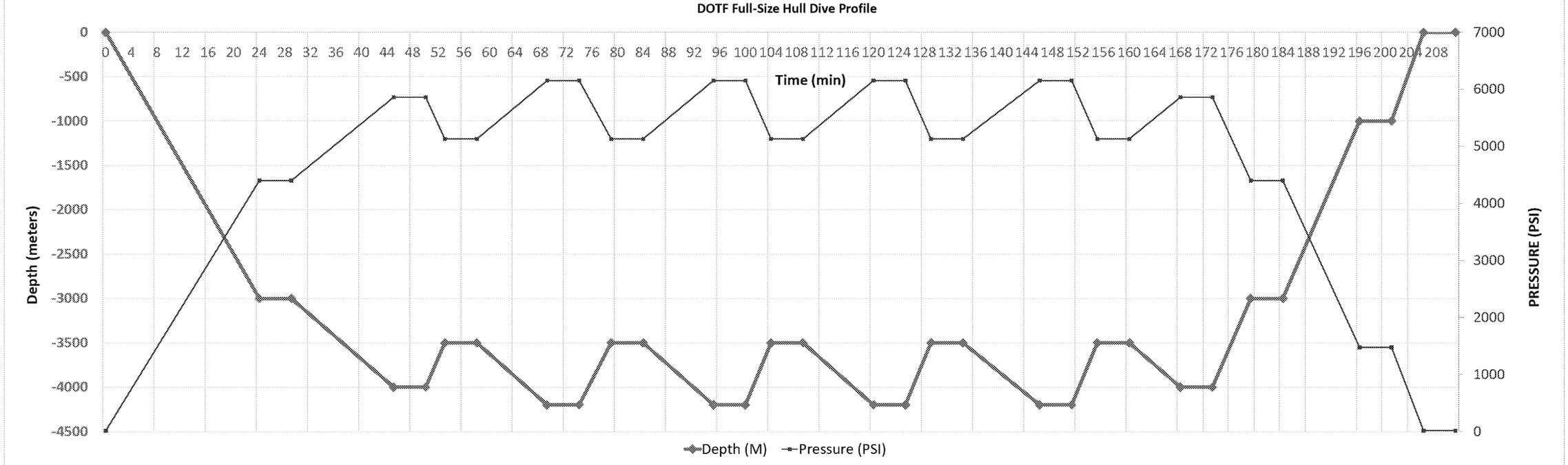
Total Dive Time (min):	211.9
Total Dive Time (hrs):	3.53
Max Dive Depth (m):	-4200
Max Dive Pressure (PSI):	6153

DOTF DIVE 2 - PLAN

Step Description	Depth (m)	Depth (ft)	Atm (gauge)	Atm (abs)	PSI	Pressurization Rate (psi/min)	Pressurization Time (min)	% Proof Depth	Hold Times	Cummulative Time (min)	Cummulative Time (Hr)
Pressurize 1	0	0	0.0	1	15	180	0.1	0%	0	0.1	0.0
Pressurize 1	-3000	-9843	298.3	299	4399	180	24.4	60%	0	24	0.4
Hold	-3000	-9843	298.3	299	4399	180	0.0	60%	5	29	0.5
Pressurize 2	-4000	-13123	397.7	399	5861	90	16.2	80%	0	46	0.8
Hold	-4000	-13123	397.7	399	5861	90	0.0	80%	5	51	0.8
De-pressurize	-3500	-11483	348.0	349	5130	250	2.9	70%	0	54	0.9
Hold	-3500	-11483	348.0	349	5130	250	0.0	70%	5	59	1.0
Pressurize 2	-4200	-13780	417.6	419	6153	90	11.4	84%	0	70	1.2
Hold	-4200	-13780	417.6	419	6153	90	0.0	84%	5	75	1.2
De-pressurize	-3500	-11483	348.0	349	5130	250	4.1	70%	0	79	1.3
Hold	-3500	-11483	348.0	349	5130	250	0.0	70%	5	84	1.4
Pressurize 2	-4200	-13780	417.6	419	6153	90	11.4	84%	0	95	1.6
Hold	-4200	-13780	417.6	419	6153	90	0.0	84%	5	100	1.7
De-pressurize	-3500	-11483	348.0	349	5130	250	4.1	70%	0	105	1.7
Hold	-3500	-11483	348.0	349	5130	250	0.0	70%	5	110	1.8
Pressurize 2	-4200	-13780	417.6	419	6153	90	11.4	84%	0	121	2.0
Hold	-4200	-13780	417.6	419	6153	90	0.0	84%	5	126	2.1
De-pressurize	-3500	-11483	348.0	349	5130	250	4.1	70%	0	130	2.2
Hold	-3500	-11483	348.0	349	5130	250	0.0	70%	5	135	2.2
Pressurize 2	-4200	-13780	417.6	419	6153	90	11.4	84%	0	146	2.4
Hold	-4200	-13780	417.6	419	6153	90	0.0	84%	5	151	2.5
De-pressurize	-3500	-11483	348.0	349	5130	250	4.1	70%	0	155	2.6
Hold	-3500	-11483	348.0	349	5130	250	0.0	70%	5	160	2.7
Pressurize 2	-4000	-13123	397.7	399	5861	90	8.1	80%	0	169	2.8
Hold	-4000	-13123	397.7	399	5861	90	0.0	80%	5	174	2.9
De-pressurize	-3000	-9843	298.3	299	4399	250	5.8	60%	0	179	3.0
Hold	-3000	-9843	298.3	299	4399	250	0.0	60%	5	184	3.1
De-pressurize	-1000	-3281	99.4	100	1476	250	11.7	20%	0	196	3.3
Hold	-1000	-3281	99.4	100	1476	250	0.0	20%	5	201	3.4
De-pressurize	0	0	0.0	1	15	250	5.8	0%	0	207	3.4
Hold	0	0	0.0	1	15	250	0.0	0%	5	212	3.5

ACTUAL TEST NOTES - DATE 10/15/2019

TIME	TEST PRESSURE	DVL DEPTH (m)	NED I	BUCKET WATER LEVEL	COMMENTS



Max Operational Depth	4000	meters	Start Time	
Proof Test Spec	1.25	% of Max Ops	End Time	
Proof Depth	5000	meters	DOTF RATES	
Pressurization Rate 1	180.00	<4500 psi	180.00	psi / min
Pressurization Rate 2	90.00	> 4500 psi	90.00	psi/min
De-pressurization Rate	250.00		600.00	psi / min

Dive Summary

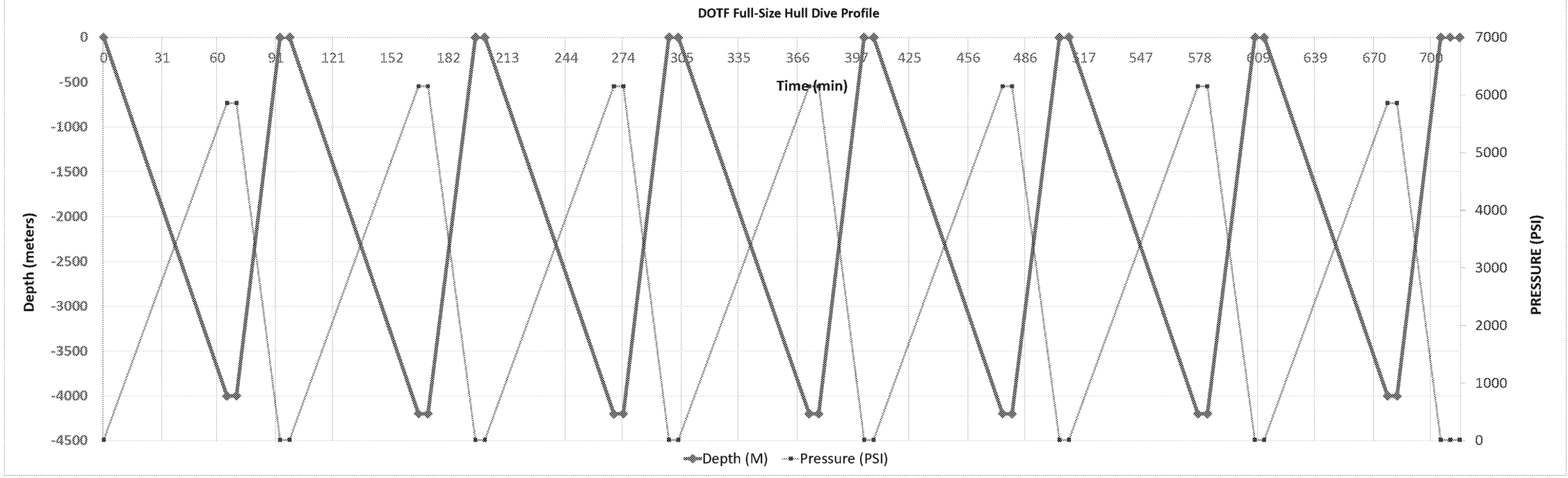
Total Dive Time (min):	715.5
Total Dive Time (hrs):	11.93
Max Dive Depth (m):	-4200
Max Dive Pressure (PSI):	6153

DOTF DIVE 2 - PLAN

Step Description	Depth (m)	Depth (ft)	Atm (gauge)	Atm (abs)	PSI	Pressurization Rate (psi/min)	Pressurization Time (min)	% Proof Depth	Hold Times	Cummulative Time (min)	Cummulative Time (Hr)
Pressurize 1	0	0	0.0	1	15	180	0.1	0%	0	0.1	0.0
Pressurize 2	-4000	-13123	397.7	399	5861	90	65.0	80%	0	65	1.1
Hold	-4000	-13123	397.7	399	5861	90	0.0	80%	5	70	1.2
De-pressurize	0	0	0.0	1	15	250	23.4	0%	0	93	1.6
Hold	0	0	0.0	1	15	250	0.0	0%	5	98	1.6
Pressurize 2	-4200	-13780	417.6	419	6153	90	68.2	84%	0	167	2.8
Hold	-4200	-13780	417.6	419	6153	90	0.0	84%	5	172	2.9
De-pressurize	0	0	0.0	1	15	250	24.6	0%	0	196	3.3
Hold	0	0	0.0	1	15	250	0.0	0%	5	201	3.4
Pressurize 2	-4200	-13780	417.6	419	6153	90	68	84%	0	269	4.5
Hold	-4200	-13780	417.6	419	6153	90	0	84%	5	274	4.6
De-pressurize	0	0	0.0	1	15	250	25	0%	0	299	5.0
Hold	0	0	0.0	1	15	250	0	0%	5	304	5.1
Pressurize 2	-4200	-13780	417.6	419	6153	90	68	84%	0	372	6.2
Hold	-4200	-13780	417.6	419	6153	90	0	84%	5	377	6.3
De-pressurize	0	0	0.0	1	15	250	25	0%	0	402	6.7
Hold	0	0	0.0	1	15	250	0	0%	5	407	6.8
Pressurize 2	-4200	-13780	417.6	419	6153	90	68	84%	0	475	7.9
Hold	-4200	-13780	417.6	419	6153	90	0	84%	5	480	8.0
De-pressurize	0	0	0.0	1	15	250	25	0%	0	504	8.4
Hold	0	0	0.0	1	15	250	0	0%	5	509	8.5
Pressurize 2	-4200	-13780	417.6	419	6153	90	68	84%	0	578	9.6
Hold	-4200	-13780	417.6	419	6153	90	0	84%	5	583	9.7
De-pressurize	0	0	0.0	1	15	250	25	0%	0	607	10.1
Hold	0	0	0.0	1	15	250	0	0%	5	612	10.2
Pressurize 2	-4000	-13123	397.7	399	5861	90	65	80%	0	677	11.3
Hold	-4000	-13123	397.7	399	5861	90	0	80%	5	682	11.4
De-pressurize	0	0	0.0	1	15	250	23	0%	0	706	11.8
Hold	0	0	0.0	1	15	250	0	0%	5	711	11.8
Hold	0	0	0.0	1	15	250	0	0%	0	711	11.8
Hold	0	0	0.0	1	15	250	0	0%	5	716	11.9

ACTUAL TEST NOTES - DATE 10/15/2019

TIME	TEST PRESSURE	DVL DEPTH (m)	NED	BUCKET WATER LEVEL	COMMENTS



Max Operational Depth	4000	meters	Start Time	
Proof Test Spec	1.25	% of Max Ops	End Time	
Proof Depth	5000	meters	DOTF RATES	
Pressurization Rate 1	180.00	<4500 psi	180.00	psi / min
Pressurization Rate 2	90.00	> 4500 psi	90.00	psi/min
De-pressurization Rate	250.00		600.00	psi / min

Dive Summary

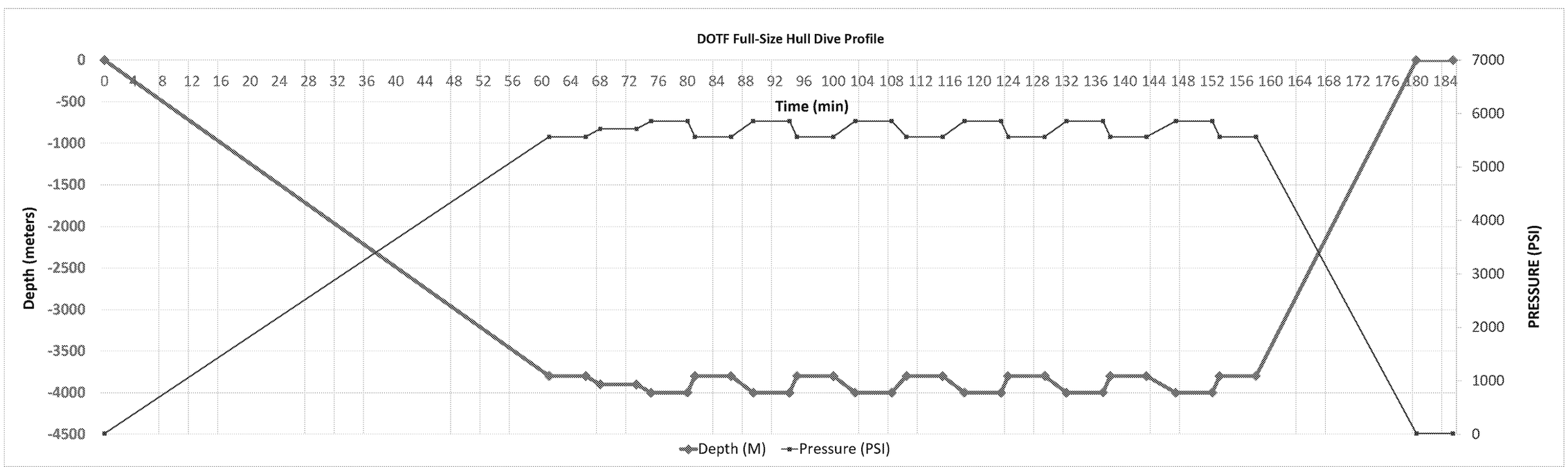
Total Dive Time (min):	**185.5**
Total Dive Time (hrs):	**3.09**
Max Dive Depth (m):	**-4000**
Max Dive Pressure (PSI):	**5861**

DOTF DIVE 2 - PLAN

Step Description	Depth (m)	Depth (ft)	Atm (gauge)	Atm (abs)	PSI	Pressurization Rate (psi/min)	Pressurization Time (min)	% Proof Depth	Hold Times	Cummulative Time (min)	Cummulative Time (Hr)
Pressurize 1	0	0	0.0	1	15	180	0.1	0%	0	0.1	0.0
Pressurize 2	-3800	-12467	377.8	379	5568	90	61.7	76%	0	62	1.0
Hold	-3800	-12467	377.8	379	5568	90	0.0	76%	5	67	1.1
Pressurize 2	-3900	-12795	387.7	389	5714	90	1.6	78%	0	68	1.1
Hold	-3900	-12795	387.7	389	5714	90	0.0	78%	5	73	1.2
Pressurize 2	-4000	-13123	397.7	399	5861	90	1.6	80%	0	75	1.3
Hold	-4000	-13123	397.7	399	5861	90	0.0	80%	5	80	1.3
De-pressurize	-3800	-12467	377.8	379	5568	250	1.2	76%	0	81	1.4
Hold	-3800	-12467	377.8	379	5568	250	0.0	76%	5	86	1.4
Pressurize 2	-4000	-13123	397.7	399	5861	90	3.2	80%	0	89	1.5
Hold	-4000	-13123	397.7	399	5861	90	0.0	80%	5	94	1.6
De-pressurize	-3800	-12467	377.8	379	5568	250	1.2	76%	0	96	1.6
Hold	-3800	-12467	377.8	379	5568	250	0.0	76%	5	101	1.7
Pressurize 2	-4000	-13123	397.7	399	5861	90	3.2	80%	0	104	1.7
Hold	-4000	-13123	397.7	399	5861	90	0.0	80%	5	109	1.8
De-pressurize	-3800	-12467	377.8	379	5568	250	1.2	76%	0	110	1.8
Hold	-3800	-12467	377.8	379	5568	250	0.0	76%	5	115	1.9
Pressurize 2	-4000	-13123	397.7	399	5861	90	3.2	80%	0	118	2.0
Hold	-4000	-13123	397.7	399	5861	90	0.0	80%	5	123	2.1
De-pressurize	-3800	-12467	377.8	379	5568	250	1.2	76%	0	124	2.1
Hold	-3800	-12467	377.8	379	5568	250	0.0	76%	5	129	2.2
Pressurize 2	-4000	-13123	397.7	399	5861	90	3.2	80%	0	133	2.2
Hold	-4000	-13123	397.7	399	5861	90	0.0	80%	5	138	2.3
De-pressurize	-3800	-12467	377.8	379	5568	250	1.2	76%	0	139	2.3
Hold	-3800	-12467	377.8	379	5568	250	0.0	76%	5	144	2.4
Pressurize 2	-4000	-13123	397.7	399	5861	90	3.2	80%	0	147	2.5
Hold	-4000	-13123	397.7	399	5861	90	0.0	80%	5	152	2.5
De-pressurize	-3800	-12467	377.8	379	5568	250	1.2	76%	0	153	2.6
Hold	-3800	-12467	377.8	379	5568	250	0.0	76%	5	158	2.6
De-pressurize	0	0	0.0	1	15	250	22.2	0%	0	181	3.0
Hold	0	0	0.0	1	15	250	0.0	0%	5	186	3.1

ACTUAL TEST NOTES - DATE 10/15/2019

TIME	TEST PRESSURE	DVL DEPTH (m)	NED	BUCKET WATER LEVEL	COMMENTS



MARCH 2017 – MARCH 2023

Deep Ocean Test Facility Log Book

Tank A

Deep Ocean Test Facility - Tank A

TEST NAME: Ocean Gate SIGNATURE: [redacted]

TEST ID #: 1949 DATE: 15 October, 2019

Time	Pressure	Mode	Temp	Comments
09:08	29	↗	86.9	
0920	1024	→	87.0	Emptied Cylinder 1,000mL
0924	1497	↗	87.1	10 min hold 460mL
0935	1492	↗	87.2	
0942	2280	→	87.3	10200mL 1800mL ↓
0946	2990	↗	87.4	10 min hold 7800mL
0957	2962	↗	87.5	7400mL
0959	3315	→	87.5	10100mL 1000mL
1009	4472	↗	87.6	10 min hold
1219	4420	↘	87.4	
1228	3745	↳	87.4	Hold
1240	3743	↗	87.4	
1244	4423	↗	87.8	
1257	4302	↳	87.8	Hold
1319	4298	↗	87.6	
1323	4722	↗	87.6	Hold
1337	4708	↘	87.8	
1341	4447	↳	87.5	Hold
1428	4413	↗	87.5	
1433	4901	↗	87.6	
1502	4464	↳	87.6	Hold
1505	4449	↘	87.7	
1508	3967	↳	87.6	Hold
1512	3963	↘	87.6	
1517	3693	↳	87.7	Hold

60

Lead Screw Nut Cycles: 20

Deep Ocean Test Facility - Tank A

TEST NAME: OceanGate SIGNATURE: [redacted]

TEST ID #: 1949 DATE: 15 October 2019

Time	Pressure	Mode	Temp	Comments
1612	3660	↘	87.8	
1649	107	→	88.0	Hold overnight
0913	81	↗	86.5	16 October 2019
0926	1493	↗	86.9	Hold ~10min
0940	1491	↗	86.9	
0955	2987	↗	87.0	Hold
1005	2983	↘	87.1	
1010	2233	→	87.1	Hold
1024	2229	↗	87.1	
1030	2988	↗	87.1	HOLD
1040	2984	↘	87.2	
1044	2234	→	87.2	HOLD
1054	2240	↗	87.4	
1059	2987	↗	87.2	HOLD
1111	2984	↘	87.2	
1119	1984	→	87.1	HOLD
1124	1982	↘	87.2	
1128	1016	→	87.2	HOLD
1134	1015	COB	87.2	
1140	206	→	87.2	HOLD
1144	207	↘	87.2	
1148	45	→	87.3	Hold
1159	46	↗	87.6	
1217	981	↗	87.7	
1222	979	↗	87.8	
1231	1501	↗	87.8	Hold

Lead Screw Nut Cycles: 20

61

Deep Ocean Test Facility - Tank A

TEST NAME: OceanGate SIGNATURE: [redacted]

TEST ID #: 1949 DATE: 16 October 2019

Time	Pressure	Mode	Temp	Comments
1241	1491	↗	87.9	
1314	2987	↱	88.2	Hold
1323	2983	↘	88.2	
1329	2210	↳	88.1	Hold
1340	2206	↗	87.9	
1355	2987	↱	88.0	Hold
1405	2985	↘	88	
1410	2224	↳	87.9	Hold
1420	2223	↗	87.8	
1425	2987	↱	87.8	Hold
1512	2973	↘	87.9	
1527	2159	↳	87.6	HOLD
1533	2131	↘	87.7	
1551	1232	↳	87.7	HOLD
1554	1225	↘	87.7	
1627	45	↳	87.8	Hold
1638	45	↗	87.8	
1705	2936	↱	88.1	Hold
1715	2934	↘	88.1	
1745	45	↳	87.9	

Lead Screw Nut Cycles: 20

62

NORTHROP GRUMMAN

[redacted] Senior Principal Contract Administrator
Northrop Grumman Systems Corporation – Mission Systems
Navigation & Maritime Systems Division – Undersea Systems
[redacted]

15 October 2020

In reply refer to: NGSC Proposal No. 2018 Rev-

OceanGate, Inc. (OG)
[redacted]
Everett, Washington 98201

Attention: [redacted] COO

Subject: NGSC Proposal No. 2018 Rev-, Pressure Testing Services

References: (1) 20200807 – RFQ – DraftB
Enclosure: (a) NGSC Standard Terms & Conditions for Pressure Testing Services at the Deep Ocean Test Facility, Annapolis, Maryland (Revision A, dated 20 March 2019)

Dear [redacted]

Northrop Grumman Systems Corporation (NGSC) is pleased to provide a firm fixed price (FFP) proposal, in response to the reference (1) RFQ, in the amount of $76,365, to conduct pressure testing in the A-Tank, for five (5) days, at the Deep Ocean Test Facility, Annapolis, Maryland (DOTF) in accordance with the reference (1) email.

The time frame for the subject testing is estimated to occur in January 2021, with the exact testing start date to be determined. Therefore, NGSC requests that any resultant contract/purchase order be provided to include a period of performance of six (6) months after receipt of order (ARO). All testing dates provided are estimates, due to unforeseen circumstances and/or problems with customer equipment, changes in test procedures, testing labor or test schedule that may occur. Any OG-directed changes during testing shall be considered outside of the scope of this proposed effort. If any such OG-directed changes occur during testing (to include, but not be limited to, proceeding with an extended test schedule), NGSC will determine the impact of said changes on labor and/or facility costs, and promptly communicate such impacts. In order to proceed with any such OG-directed changes during testing, OG must first provide written authorization to NGSC, from a duly authorized representative of OG, authorizing such changes, and explicitly stating OG's agreement to promptly modify the resulting contract/purchase order to incorporate such changes and the additional reasonable costs thereof.

NGSC reserves the right to update this proposal for rates and factors prior to final negotiation. This proposal shall remain valid for thirty (30) days from the date hereof.

The attached Enclosure (a) Terms and Conditions shall exclusively govern this proposed effort, and Enclosure (a) shall be incorporated by reference into the resulting contract/purchase order. The Enclosure (a) Terms and Conditions are non-negotiable. Any request to negotiate the Enclosure (a) Terms and Conditions shall be immediately rejected and may delay the subject pressure testing services.

This proposal assumes the prompt and seamless issuance of an acceptable contract/purchase order, as set forth herein, without significant NGSC contractual administrative support. In the event that any OG purchasing system limitation prevents the removal of OG's standard terms and conditions, and/or the replacement thereof with NGSC's Terms and Conditions, within the resulting contract/purchase order, it is OG's responsibility to manually update the resulting contract/purchase order to effectuate compliance herewith. Any contractual/purchase order issues or requirements necessitating significant NGSC contractual administrative support may delay the subject testing, and shall result in a revised proposal to include additional costs for prolonged NGSC contractual administrative support.

NGSC looks forward to your response and to working with you on this testing effort. Please do not hesitate to contact [redacted] at [redacted] for questions of a technical nature and scheduling. All other questions may be forwarded to the undersigned.

Best Regards,

NORTHROP GRUMMAN SYSTEMS CORPORATION

[redacted]

[redacted] Senior Principal Contract Administrator

	Day 1		Day 2	Day 3	Day 4
	Dive 1	Dive 2	Dive 2	Dive 4	Dive 5
Max Depth (m)	3000	4200	4200	4200	4000
Max Pressure (psi)	4399	6153	6153	6153	5861
Total Time (min)	191.60	164.52	211.94	715.53	185.50
Total Time (hrs)	3.19	2.74	3.53	11.93	3.09

Day 1 Dive Hours	5.94
Day 2 Dive Hours	3.53
Day 3 Dive Hours	11.93
Day 4 Dive Hours	3.09

Total Dive Hours	24.48

Est. Other Total Hours	26.38

Overall Total Hours	**50.86**

DOTF ($ /8 hr)	$ 12,000.00

Total Test Cost	**$ 76,289.77**

OceanGate, Inc.
[redacted]
Everett, WA 98201
[redacted]
http://www.oceangate.com

Purchase Order

VENDOR
[redacted]
Northrop Grumman Systems Corporation
[redacted]

P.O. NO. 100-106
DATE 10/20/2020

SHIP VIA	TERMS	CODE #
tbd	Net 30	8135

DESCRIPTION	QTY	RATE	AMOUNT
SERVICES NGSC Proposal No. 2018 Pressure Testing Services, OG Submersible Testing Version Dated 10-15-2020	1	76,365.00	76,365.00

Questions may be addressed to [redacted] COO e-mail: [redacted] FFP proposal - Pressure testing in the A-tank at the Deep Ocean Testing Facility, Annapolis, MD

TOTAL $76,365.00

Start date : Feb 27, 2021

Approved By _____

Date _____

Message

From: [redacted]US] (MS) ["/o=NG/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=ebea90e181054ce0ac704a3518b2d1bb-D24796"]
on behalf of [redacted]US] (MS)
Sent: 8/10/2020 9:38:48 PM
To: [redacted]
Subject: RE: Oceangate DOTF

[redacted]

Your schedule looks good. It is a perfect world plan when it comes to pressure rates and hold times, so I added a few hours for ramping up/down. The total cost for this effort comes to $72,200. That is for 2020, and will most likely increase starting January 2021. I am not sure what the percentage will be for the increase, but last year it was 5% and I would hope it is not higher than that. I have you scheduled for the two weeks already, and you can use any dates within that time period. If something changes I will call you to discuss. Please let me know if you have any questions or concerns.

Best Regards,
[redacted]

[redacted]
Deep Ocean Test Facility
[redacted]

From: [redacted]
Sent: Friday, August 7, 2020 8:28 PM
To: [redacted]
Subject: EXT :RE: Oceangate DOTF

Hi [redacted]

Here is the test profile I promised you a few weeks ago. Please let us know your thoughts.

Also, it looks like we'll be ready Jan 2nd for the testing instead of December. COVID is continuing to effect our suppliers, but at least in only incremental ways. Does that timing still work for you? Are there any considerations for us coming in January on your schedule?

Thanks,
[redacted]

From: [redacted]
Sent: Monday, June 29, 2020 5:58 AM
To: [redacted]
Subject: RE: Oceangate DOTF

[redacted]

Currently the weeks of December 14th and December 21st are available. There is some risk with those slots as Northrop has testing scheduled during the 4-5 weeks leading up to it. If they push out or need to extend then they would have priority and you would need to slip as well.

Best Regards,

[redacted]

[redacted]
Deep Ocean Test Facility
[redacted]

From: [redacted]
Sent: Friday, June 26, 2020 1:15 PM
To: [redacted]
Subject: EXT :Oceangate DOTF

Hi [redacted]

The schedule for the full sized hull testing for us at DOTF is moving out a bit – we're now looking at needing to test between Thanksgiving and Christmas of this year. How does that timeframe look for you guys?

Hope you are all well, if you want to catch up by phone that would be great too,

Cheers,
[redacted]

Deep Ocean Test Facility - Tank A

TEST NAME: Oceangate SIGNATURE: [redacted]

TEST ID #: 2018 DATE: 25 Feb 2021

Time	Pressure	Mode	Temp	Comments
1801	80	→	61	Hold over night
0628	55	→	60	26 FEB 2021
0725	53	→	60	
0756	1477	→	60	
0806	1476	→	60	
0816	1111	→	60	
0826	1109	→	60	
0857	2939	→	60	
0908	2932	→	60	
0917	2571	→	57	
0929	2567	→	60	
1001	4400	→	61	
1013	4393	→	60	
1021	4032	→	60	
1032	4035	→	61	
1051	5131	→	61	
1102	5127	→	61	
1106	4982	→	60	
1117	4977	→	61	
1123	5277	→	61	
1133	5270	→	61	
1135	5203	→	60	
1146	5199	→	61	
1150	5423	→	61	
1201	5416	→	61	

Lead Screw Nut Cycles: 59

Deep Ocean Test Facility - Tank A

TEST NAME: OCEANGATE SIGNATURE: [redacted]

TEST ID #: 2018 DATE: 26 FEB 2021

Time	Pressure	Mode	Temp	Comments
1204	5347	↳	61	
1214	5343	↗	61	
1218	5568	↱	61	
1228	5562	↘	61	
1231	5493	↳	61	
1241	5489	↗	61	
1246	5715	↱	61	
1256	5710	→	61	
1259	5642	↳	61	
1310	5637	↗	61	
1314	5862	↱	61	
1344	5858	→	61	
1359	5131	↳	60	
1409	5128	↗	61	
1422	5862	↱	61	
1502	5858	→	62	
1658	26	↳	59	TEST RUN 1 COMPLETE
0653	16	↗	64	
0654	49	↱	64	
0735	47	↗	64	
0800	1477	↱	64	
0806	1473	⇄	63	
0815	1111	↳	63	
0821	1109	↗	64	
0852	2939	↱	64	

Lead Screw Nut Cycles: 59

115

Deep Ocean Test Facility - Tank A

TEST NAME: OceanGate SIGNATURE: [redacted]

TEST ID #: 2018 DATE: 8-1 March 2021

Time	Pressure	Mode	Temp	Comments
0857	2934	↘	64	
0906	2572	→	63	
0912	2570	↗	64	
0943	4400	↗	64	
0948	4400	↘	64	
0957	4033	→	63	
1062	4028	↗	64	
1021	5131	↗	64	
1027	5130	↘	64	
1031	4985	→	63	
1036	4978	↗	64	
1042	5277	↗	64	
1047	5276	↘	64	
1050	5202	→	63	
1055	5203	↗	64	
1059	5423	↗	64	
1105	5420	↘	64	
1107	5348	→	63	
1113	5346	↗	64	
1117	5569	↗	64	
1122	5568	↘	64	
1126	5493	→	64	
1131	5493	↗	64	
1135	5715	↗	64	
1140	5712	↘	64	
1143	5638	→	63	

Lead Screw Nut Cycles: 59

Deep Ocean Test Facility - Tank A

TEST NAME: Ocean Gate SIGNATURE: [redacted]

TEST ID #: 2018 DATE: 1 March 2021

Time	Pressure	Mode	Temp	Comments
1148	5640	→	64	
1152	5862	↗	64	
1158	5960	↘	64	
1201	5785	↳	64	
1206	5784	→	64	
1211	6008	↗	64	
1216	6008	↘	64	
1219	5935	↳	63	
1225	5931	→	64	
1229	6154	↗	64	
1249	6148	↘	64	
1311	5130	↳	64	
1322	5726	→	64	
1335	5862	↗	64	
1345	5856	↘	64	
1401	5129	↳	64	
1412	5128	→	64	
1425	5862	↗	64	
1436	5856	↘	64	
1451	5130	↳	63	
1502	5127	→	64	
1515	5862	↗	64	
1526	5856	↘	64	
1729	25	↳	63	End test
1740	80	→	64	Hold overnight

Lead Screw Nut Cycles: 59

117

Deep Ocean Test Facility - Tank A

TEST NAME: OceanGate

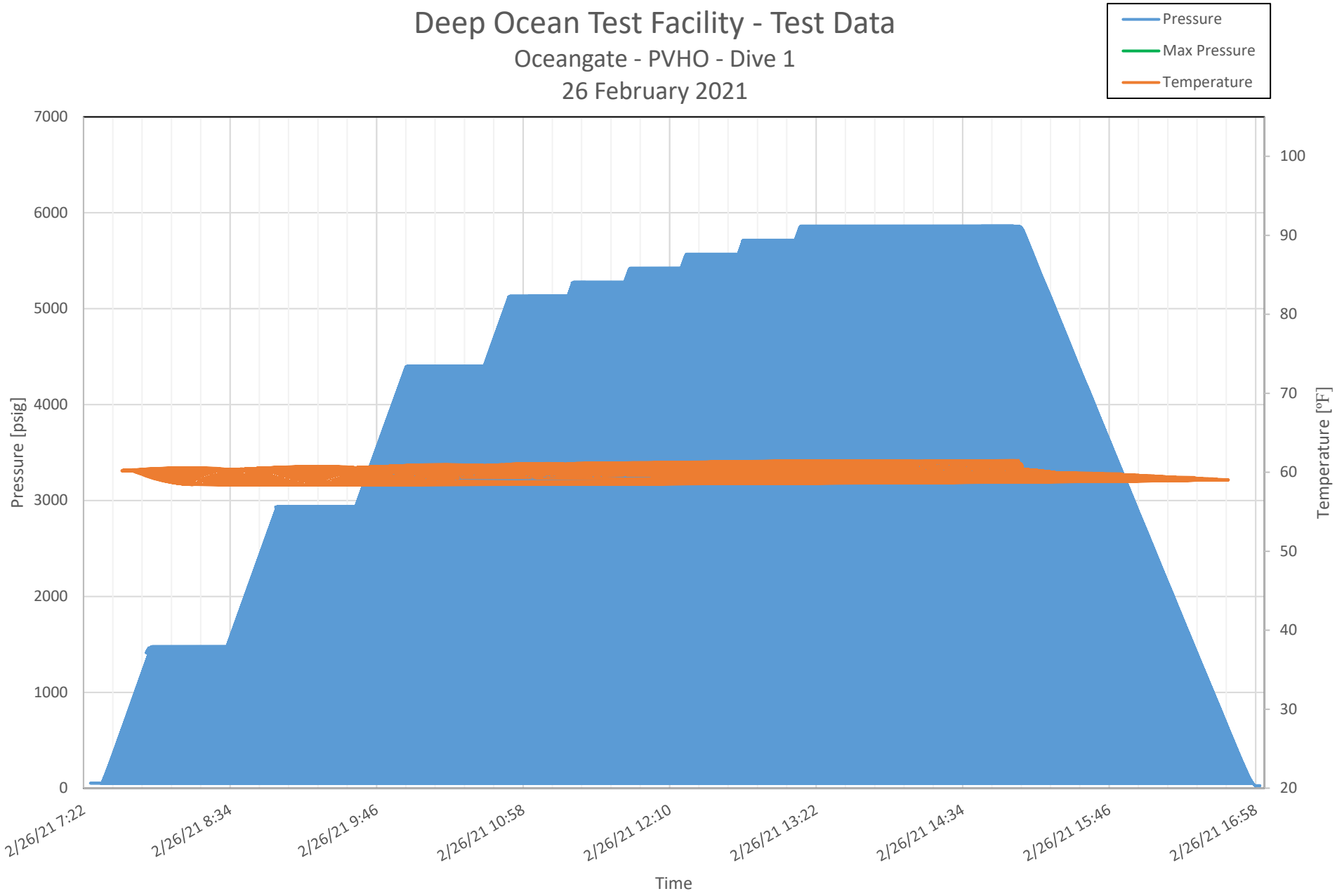
SIGNATURE [redacted]

TEST ID #: 2018

DATE: 2 March 2021

Time	Pressure	Mode	Temp	Comments
0713	39	→	64	
0728	39	↗	64	
0901	5628	↱	65	BEGIN HOLD
1302	5627	↓	65	
1508	25	↳	63	
~				
0001	79	→	65	3 March 2021
0734	56	↗	65	
0911	5628	↱	65	Hold
1311	5626	↘	65	End Hold
1509	26	↳	64	TEST COMPLETE

Lead Screw Nut Cycles: 59



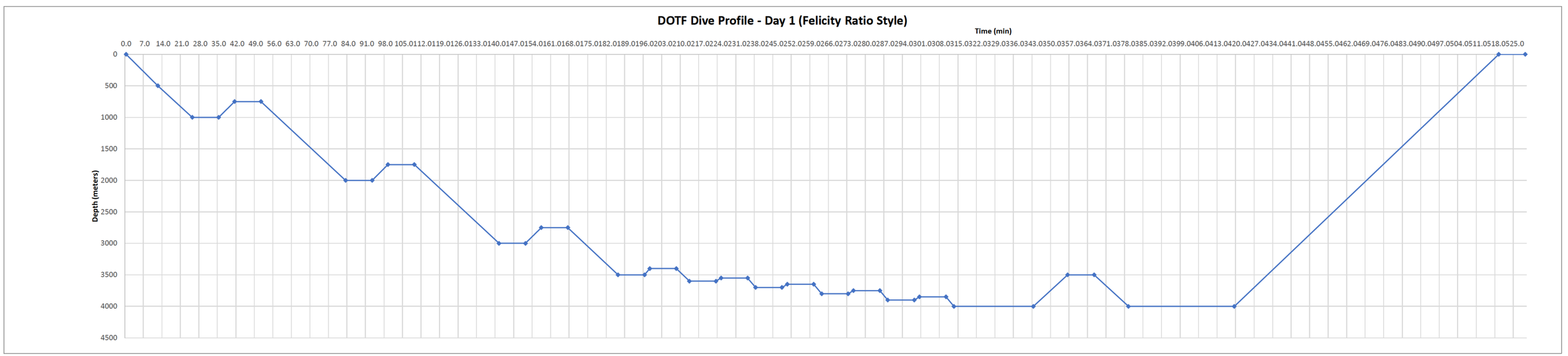
Max Operational Depth	4300	meters	Note: limited by Hypersizer's calculated limit on the titanium of 4,300m				**UW says 60psi / sec minimum rate of pressurization**
Proof Test Spec	1.25	% of Max Ops					
Proof Depth	5375	meters	DOTF Max Rates				
Pressurization Rate 1	58.00	psi / min	180.00	psi / min			
Pressurization Rate 2	58.00	psi / min	90.00	psi / min		OceanGate Start Time	
De-pressurization Rate	58.00	psi / min	250.00	psi / min		OceanGate End Time	

DOTF DIVE 1 - PLAN

Step Description	Depth (m)	Depth (ft)	Atm (gauge)	Atm (abs)	PSI	Pressurization Rate (psi/min)	Pressurization Time (min)	% Proof Depth	Hold Times	Cumulative Time (min)	Cumulative Time (Hr)
Pressurize	0	0	0.0	1	15	58	0.3	0.00	0	0.3	0.0
Pressurize	500	1640	49.7	51	745	58	12.6	0.12	0	13	0.2
Pressurize	1000	3281	99.4	100	1476	58	12.6	0.23	0	25	0.4
Hold	1000	3281	99.4	100	1476	58	0.0	0.23	10	35	0.6
Pressurize	750	2461	74.6	76	1111	58	6.3	0.17	0	42	0.7
Hold	750	2461	74.6	76	1111	58	0.0	0.17	10	52	0.9
Pressurize	2000	6562	198.8	200	2938	58	31.5	0.47	0	83	1.4
Hold	2000	6562	198.8	200	2938	58	0.0	0.47	10	93	1.6
Pressurize	1750	5741	174.0	175	2572	58	6.3	0.41	0	100	1.7
Hold	1750	5741	174.0	175	2572	58	0.0	0.41	10	110	1.8
Pressurize	3000	9843	298.3	299	4399	58	31.5	0.70	0	141	2.4
Hold	3000	9843	298.3	299	4399	58	0.0	0.70	10	151	2.5
Pressurize	2750	9022	273.4	274	4034	58	6.3	0.64	0	157	2.6
Hold	2750	9022	273.4	274	4034	58	0.0	0.64	10	167	2.8
Pressurize	3500	11483	348.0	349	5130	58	18.9	0.81	0	186	3.1
Hold	3500	11483	348.0	349	5130	58	0.0	0.81	10	196	3.3
Pressurize	3400	11155	338.0	339	4984	58	2.5	0.79	0	199	3.3
Hold	3400	11155	338.0	339	4984	58	0.0	0.79	10	209	3.5
Pressurize	3600	11811	357.9	359	5276	58	5.0	0.84	0	214	3.6
Hold	3600	11811	357.9	359	5276	58	0.0	0.84	10	224	3.7
Pressurize	3550	11647	352.9	354	5203	58	1.3	0.83	0	225	3.8
Hold	3550	11647	352.9	354	5203	58	0.0	0.83	10	235	3.9
Pressurize	3700	12139	367.9	369	5422	58	3.8	0.86	0	239	4.0
Hold	3700	12139	367.9	369	5422	58	0.0	0.86	10	249	4.1
Pressurize	3650	11975	362.9	364	5349	58	1.3	0.85	0	250	4.2
Hold	3650	11975	362.9	364	5349	58	0.0	0.85	10	260	4.3
Pressurize	3800	12467	377.8	379	5568	58	3.8	0.88	0	264	4.4
Hold	3800	12467	377.8	379	5568	58	0.0	0.88	10	274	4.6
Pressurize	3750	12303	372.8	374	5495	58	1.3	0.87	0	275	4.6
Hold	3750	12303	372.8	374	5495	58	0.0	0.87	10	285	4.8
Pressurize	3900	12795	387.7	389	5714	58	3.8	0.91	0	289	4.8
Hold	3900	12795	387.7	389	5714	58	0.0	0.91	10	299	5.0
Pressurize	3850	12631	382.8	384	5641	58	1.3	0.90	0	300	5.0
Hold	3850	12631	382.8	384	5641	58	0.0	0.90	10	310	5.2
Pressurize	4000	13123	397.7	399	5861	58	3.8	0.93	0	314	5.2
Hold	4000	13123	397.7	399	5861	58	0.0	0.93	30	344	5.7
Pressurize	3500	11483	348.0	349	5130	58	12.6	0.81	0	357	5.9
Hold	3500	11483	348.0	349	5130	58	0.0	0.81	10	367	6.1
Pressurize	4000	13123	397.7	399	5861	58	12.6	0.93	0	379	6.3
Hold	4000	13123	397.7	399	5861	58	0.0	0.93	40	419	7.0
Pressurize	0	0	0.0	1	15	58	100.8	0.00	0	520	8.7
Hold	0	0	0.0	1	15	58	0.0	0.00	10	530	8.8

ACTUAL TEST NOTES - DATE 2/27/2021

TIME	TEST PRESSURE	DVL DEPTH (m)	PLANNED DEPTH	BUCKET WATER LEVEL	COMMENTS



Max Operational Depth	4300	meters	Note: limited by Hypersizer's calculated limit on the titanium of 4,300m				
Proof Test Spec	1.25	% of Max Ops					
Proof Depth	5375	meters	DOTF Max Rates				
Pressurization Rate 1	58.00	psi / min	180.00	psi / min			
Pressurization Rate 2	58.00	psi / min	90.00	psi / min		OceanGate Start Time	
De-pressurization Rate	58.00	psi / min	250.00	psi / min		OceanGate End Time	

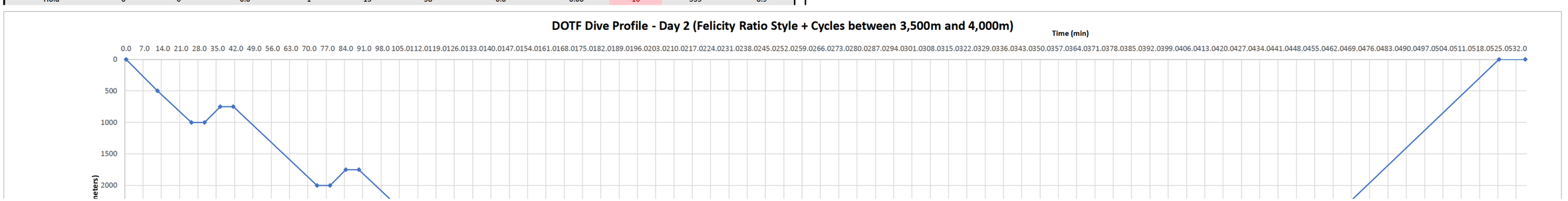
UW says 60psi / sec minimum rate of pressurization

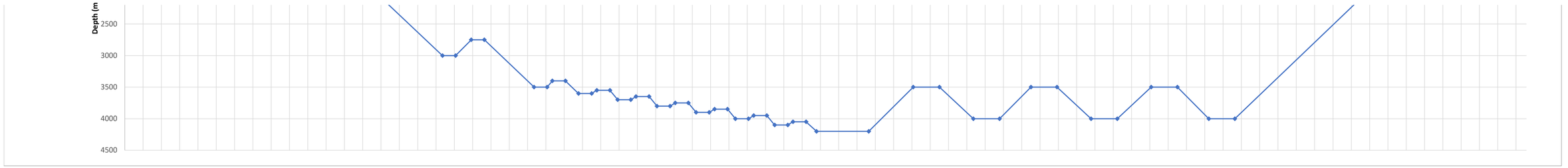
DOTF Day 2 Plan

Step Description	Depth (m)	Depth (ft)	Atm (gauge)	Atm (abs)	PSI	Pressurization Rate (psi/min)	Pressurization Time (min)	% Proof Depth	Hold Times	Cumulative Time (min)	Cumulative Time (Hr)
Pressurize	0	0	0.0	1	15	58	0.3	0.00	0	0.3	0.0
Pressurize	500	1640	49.7	51	745	58	12.6	0.12	0	13	0.2
Pressurize	1000	3281	99.4	100	1476	58	12.6	0.23	0	25	0.4
Hold	1000	3281	99.4	100	1476	58	0.0	0.23	5	30	0.5
Pressurize	750	2461	74.6	76	1111	58	6.3	0.17	0	37	0.6
Hold	750	2461	74.6	76	1111	58	0.0	0.17	5	42	0.7
Pressurize	2000	6562	198.8	200	2938	58	31.5	0.47	0	73	1.2
Hold	2000	6562	198.8	200	2938	58	0.0	0.47	5	78	1.3
Pressurize	1750	5741	174.0	175	2572	58	6.3	0.41	0	85	1.4
Hold	1750	5741	174.0	175	2572	58	0.0	0.41	5	90	1.5
Pressurize	3000	9843	298.3	299	4399	58	31.5	0.70	0	121	2.0
Hold	3000	9843	298.3	299	4399	58	0.0	0.70	5	126	2.1
Pressurize	2750	9022	273.4	274	4034	58	6.3	0.64	0	132	2.2
Hold	2750	9022	273.4	274	4034	58	0.0	0.64	5	137	2.3
Pressurize	3500	11483	348.0	349	5130	58	18.9	0.81	0	156	2.6
Hold	3500	11483	348.0	349	5130	58	0.0	0.81	5	161	2.7
Pressurize	3400	11155	338.0	339	4984	58	2.5	0.79	0	164	2.7
Hold	3400	11155	338.0	339	4984	58	0.0	0.79	5	169	2.8
Pressurize	3600	11811	357.9	359	5276	58	5.0	0.84	0	174	2.9
Hold	3600	11811	357.9	359	5276	58	0.0	0.84	5	179	3.0
Pressurize	3550	11647	352.9	354	5203	58	1.3	0.83	0	180	3.0
Hold	3550	11647	352.9	354	5203	58	0.0	0.83	5	185	3.1
Pressurize	3700	12139	367.9	369	5422	58	3.8	0.86	0	189	3.1
Hold	3700	12139	367.9	369	5422	58	0.0	0.86	5	194	3.2
Pressurize	3650	11975	362.9	364	5349	58	1.3	0.85	0	195	3.3
Hold	3650	11975	362.9	364	5349	58	0.0	0.85	5	200	3.3
Pressurize	3800	12467	377.8	379	5568	58	3.8	0.88	0	204	3.4
Hold	3800	12467	377.8	379	5568	58	0.0	0.88	5	209	3.5
Pressurize	3750	12303	372.8	374	5495	58	1.3	0.87	0	210	3.5
Hold	3750	12303	372.8	374	5495	58	0.0	0.87	5	215	3.6
Pressurize	3900	12795	387.7	389	5714	58	3.8	0.91	0	219	3.6
Hold	3900	12795	387.7	389	5714	58	0.0	0.91	5	224	3.7
Pressurize	3850	12631	382.8	384	5641	58	1.3	0.90	0	225	3.8
Hold	3850	12631	382.8	384	5641	58	0.0	0.90	5	230	3.8
Pressurize	4000	13123	397.7	399	5861	58	3.8	0.93	0	234	3.9
Hold	4000	13123	397.7	399	5861	58	0.0	0.93	5	239	4.0
Pressurize	3950	12959	392.7	394	5787	58	1.3	0.92	0	240	4.0
Hold	3950	12959	392.7	394	5787	58	0.0	0.92	5	245	4.1
Pressurize	4100	13451	407.6	409	6007	58	3.8	0.95	0	249	4.1
Hold	4100	13451	407.6	409	6007	58	0.0	0.95	5	254	4.2
Pressurize	4050	13287	402.6	404	5934	58	1.3	0.94	0	255	4.3
Hold	4050	13287	402.6	404	5934	58	0.0	0.94	5	260	4.3
Pressurize	4200	13780	417.6	419	6153	58	3.8	0.98	0	264	4.4
Hold	4200	13780	417.6	419	6153	58	0.0	0.98	20	284	4.7
Pressurize	3500	11483	348.0	349	5130	58	17.6	0.81	0	302	5.0
Hold	3500	11483	348.0	349	5130	58	0.0	0.81	10	312	5.2
Pressurize	4000	13123	397.7	399	5861	58	12.6	0.93	0	324	5.4
Hold	4000	13123	397.7	399	5861	58	0.0	0.93	10	334	5.6
Pressurize	3500	11483	348.0	349	5130	58	12.6	0.81	0	347	5.8
Hold	3500	11483	348.0	349	5130	58	0.0	0.81	10	357	5.9
Pressurize	4000	13123	397.7	399	5861	58	12.6	0.93	0	369	6.2
Hold	4000	13123	397.7	399	5861	58	0.0	0.93	10	379	6.3
Pressurize	3500	11483	348.0	349	5130	58	12.6	0.81	0	392	6.5
Hold	3500	11483	348.0	349	5130	58	0.0	0.81	10	402	6.7
Pressurize	4000	13123	397.7	399	5861	58	12.6	0.93	0	415	6.9
Hold	4000	13123	397.7	399	5861	58	0.0	0.93	10	425	7.1
Pressurize	0	0	0.0	1	15	58	100.8	0.00	0	525	8.8
Hold	0	0	0.0	1	15	58	0.0	0.00	10	535	8.9

ACTUAL TEST NOTES - DATE 2/27/2021

TIME	TEST PRESSURE	DVL DEPTH (m)	PLANNED DEPTH	BUCKET WATER LEVEL	COMMENTS





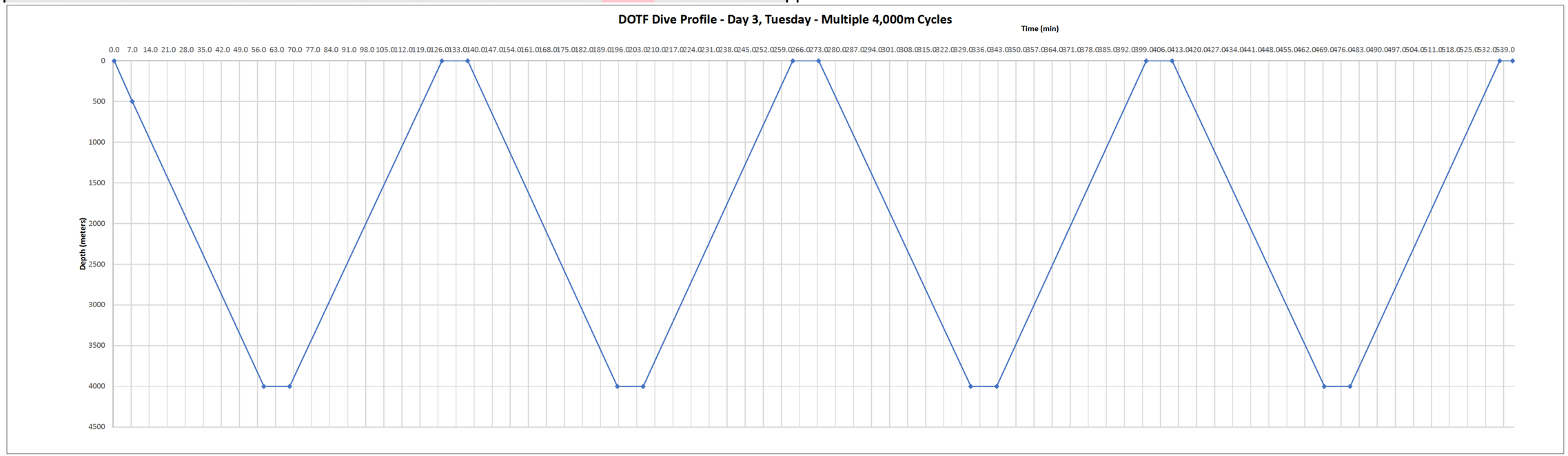
Max Operational Depth	4300	meters	Note: limited by Hypersizer's calculated limit on the titanium of 4,300m		**UW says 60psi / sec minimum rate of pressurization**	
Proof Test Spec	1.25	% of Max Ops				
Proof Depth	5375	meters	DOTF Max Rates			
Pressurization Rate 1	100.00	psi / min	180.00	psi / min		
Pressurization Rate 2	100.00	psi / min	90.00	psi / min		OceanGate Start Time
De-pressurization Rate	100.00	psi / min	250.00	psi / min		OceanGate End Time

DOTF Day 3 Plan

Step Description	Depth (m)	Depth (ft)	Atm (gauge)	Atm (abs)	PSI	Pressurization Rate (psi/min)	Pressurization Time (min)	% Proof Depth	Hold Times	Cumulative Time (min)	Cumulative Time (Hr)
Pressurize	0	0	0.0	1	15	100	0.1	0.00	0	0.1	0.0
Pressurize	500	1640	49.7	51	745	100	7.3	0.12	0	7	0.1
Pressurize	4000	13123	397.7	399	5861	100	51.2	0.93	0	59	1.0
Hold	4000	13123	397.7	399	5861	100	0.0	0.93	10	69	1.1
Pressurize	0	0	0.0	1	15	100	58.5	0.00	0	127	2.1
Hold	0	0	0.0	1	15	100	0.0	0.00	10	137	2.3
Pressurize	4000	13123	397.7	399	5861	100	58.5	0.93	0	196	3.3
Hold	4000	13123	397.7	399	5861	100	0.0	0.93	10	206	3.4
Pressurize	0	0	0.0	1	15	100	58.5	0.00	0	264	4.4
Hold	0	0	0.0	1	15	100	0	0.00	10	274	4.6
Pressurize	4000	13123	397.7	399	5861	100	58	0.93	0	332	5.5
Hold	4000	13123	397.7	399	5861	100	0	0.93	10	342	5.7
Pressurize	0	0	0.0	1	15	100	58	0.00	0	401	6.7
Hold	0	0	0.0	1	15	100	0	0.00	10	411	6.8
Pressurize	4000	13123	397.7	399	5861	100	58	0.93	0	469	7.8
Hold	4000	13123	397.7	399	5861	100	0	0.93	10	479	8.0
Pressurize	0	0	0.0	1	15	100	58	0.00	0	538	9.0
Hold	0	0	0.0	1	15	100	0	0.00	5	543	9.0

ACTUAL TEST NOTES - DATE MM/DD/2021

TIME	TEST PRESSURE	DVL DEPTH (m)	PLANNED DEPTH	BUCKET WATER LEVEL	COMMENTS



Max Operational Depth	4300	meters	Note: limited by Hypersizer's calculated limit on the titanium of 4,300m			
Proof Test Spec	1.25	% of Max Ops				
Proof Depth	5375	meters	DOTF Max Rates			
Pressurization Rate 1	58.00	psi / min	180.00	psi / min		
Pressurization Rate 2	58.00	psi / min	90.00	psi / min		OceanGate Start Time
De-pressurization Rate	58.00	psi / min	250.00	psi / min		OceanGate End Time

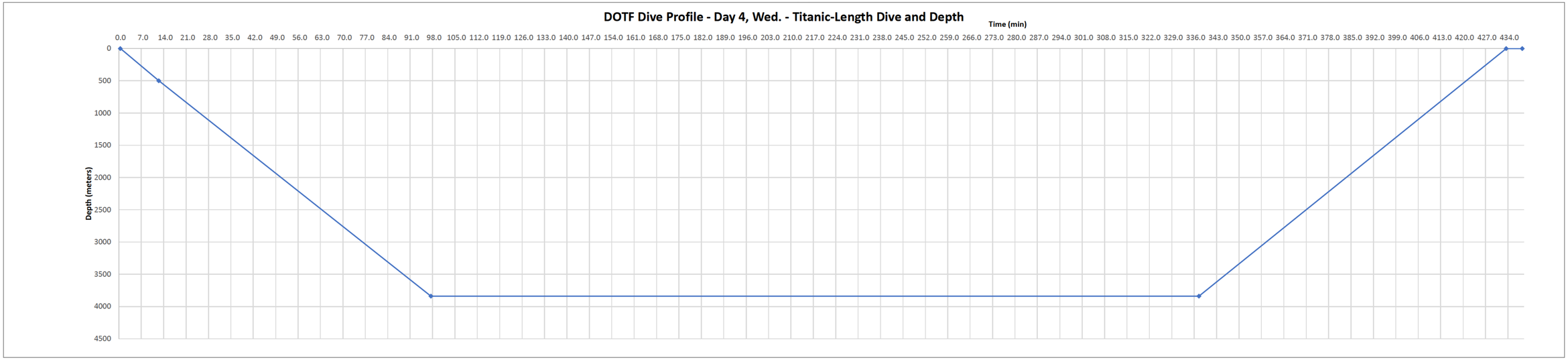
UW says 60psi / sec minimum rate of pressurization

DOTF Day 4 Plan

Step Description	Depth (m)	Depth (ft)	Atm (gauge)	Atm (abs)	PSI	Pressurization Rate (psi/min)	Pressurization Time (min)	% Proof Depth	Hold Times	Cumulative Time (min)	Cumulative Time (Hr)
Pressurize	0	0	0.0	1	15	58	0.3	0.00	0	0.3	0.0
Pressurize	500	1640	49.7	51	745	58	12.6	0.12	0	13	0.2
Pressurize	3840	12598	381.8	383	5627	58	84.2	0.89	0	97	1.6
Hold	3840	12598	381.8	383	5627	58	0.0	0.89	240	337	5.6
Pressurize	0	0	0.0	1	15	58	97	0.00	0	434	7.2
Hold	0	0	0.0	1	15	58	0	0.00	5	439	7.3

ACTUAL TEST NOTES - DATE MM/DD/2021

TIME	TEST PRESSURE	DVL DEPTH (m)	PLANNED DEPTH	BUCKET WATER LEVEL	COMMENTS



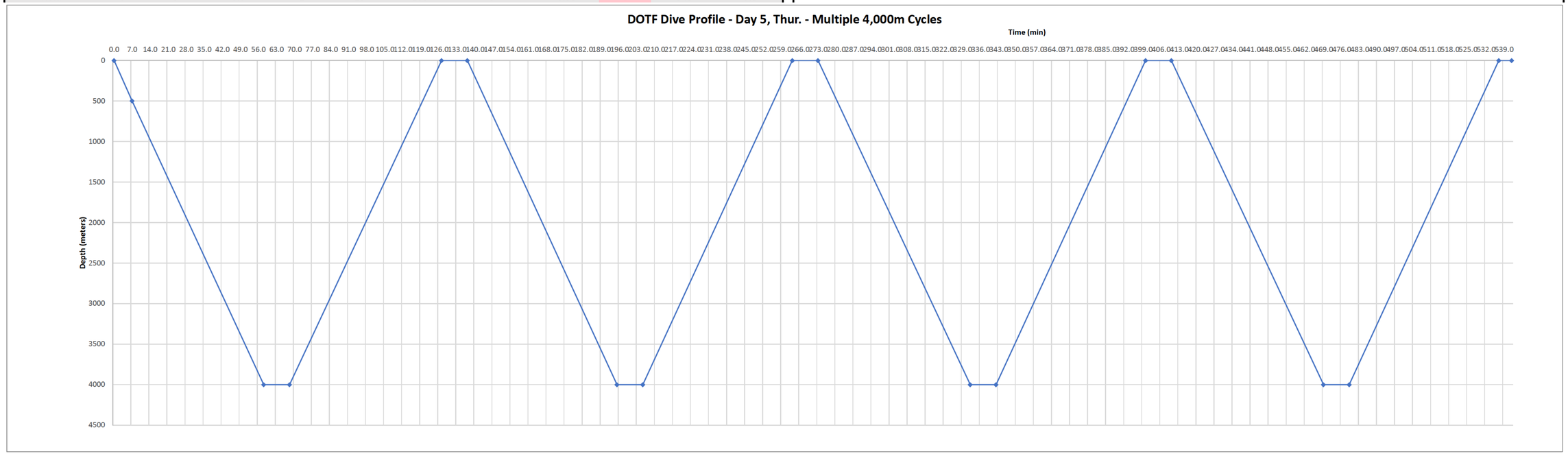
Max Operational Depth	4300	meters	Note: limited by Hypersizer's calculated limit on the titanium of 4,300m		**UW says 60psi / sec minimum rate of pressurization**	
Proof Test Spec	1.25	% of Max Ops				
Proof Depth	5375	meters	DOTF Max Rates			
Pressurization Rate 1	100.00	psi / min	180.00	psi / min		
Pressurization Rate 2	100.00	psi / min	90.00	psi / min		OceanGate Start Time
De-pressurization Rate	100.00	psi / min	250.00	psi / min		OceanGate End Time

DOTF Day 5 Plan

Step Description	Depth (m)	Depth (ft)	Atm (gauge)	Atm (abs)	PSI	Pressurization Rate (psi/min)	Pressurization Time (min)	% Proof Depth	Hold Times	Cumulative Time (min)	Cumulative Time (Hr)
Pressurize	0	0	0.0	1	15	100	0.1	0.00	0	0.1	0.0
Pressurize	500	1640	49.7	51	745	100	7.3	0.12	0	7	0.1
Pressurize	4000	13123	397.7	399	5861	100	51.2	0.93	0	59	1.0
Hold	4000	13123	397.7	399	5861	100	0.0	0.93	10	69	1.1
Pressurize	0	0	0.0	1	15	100	58.5	0.00	0	127	2.1
Hold	0	0	0.0	1	15	100	0.0	0.00	10	137	2.3
Pressurize	4000	13123	397.7	399	5861	100	58.5	0.93	0	196	3.3
Hold	4000	13123	397.7	399	5861	100	0.0	0.93	10	206	3.4
Pressurize	0	0	0.0	1	15	100	58.5	0.00	0	264	4.4
Hold	0	0	0.0	1	15	100	0	0.00	10	274	4.6
Pressurize	4000	13123	397.7	399	5861	100	58	0.93	0	332	5.5
Hold	4000	13123	397.7	399	5861	100	0	0.93	10	342	5.7
Pressurize	0	0	0.0	1	15	100	58	0.00	0	401	6.7
Hold	0	0	0.0	1	15	100	0	0.00	10	411	6.8
Pressurize	4000	13123	397.7	399	5861	100	58	0.93	0	469	7.8
Hold	4000	13123	397.7	399	5861	100	0	0.93	10	479	8.0
Pressurize	0	0	0.0	1	15	100	58	0.00	0	538	9.0
Hold	0	0	0.0	1	15	100	0	0.00	5	543	9.0

ACTUAL TEST NOTES - DATE MM/DD/2021

TIME	TEST PRESSURE	DVL DEPTH (m)	PLANNED DEPTH	BUCKET WATER LEVEL	COMMENTS



Max Operational Depth	4300	meters	Note: limited by Hypersizer's calculated limit on the titanium of 4,300m			
Proof Test Spec	1.25	% of Max Ops				
Proof Depth	5375	meters	DOTF Max Rates			
Pressurization Rate 1	58.00	psi / min	180.00	psi / min		
Pressurization Rate 2	58.00	psi / min	90.00	psi / min		OceanGate Start Time
De-pressurization Rate	58.00	psi / min	250.00	psi / min		OceanGate End Time

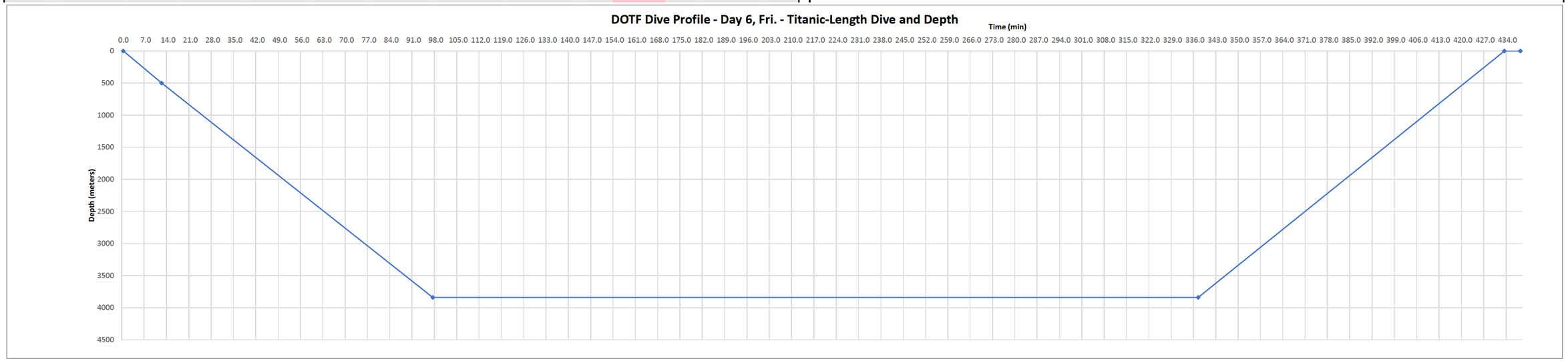
UW says 60psi / sec minimum rate of pressurization

DOTF Day 6 Plan

Step Description	Depth (m)	Depth (ft)	Atm (gauge)	Atm (abs)	PSI	Pressurization Rate (psi/min)	Pressurization Time (min)	% Proof Depth	Hold Times	Cumulative Time (min)	Cumulative Time (Hr)
Pressurize	0	0	0.0	1	15	58	0.3	0.00	0	0.3	0.0
Pressurize	500	1640	49.7	51	745	58	12.6	0.12	0	13	0.2
Pressurize	3840	12598	381.8	383	5627	58	84.2	0.89	0	97	1.6
Hold	3840	12598	381.8	383	5627	58	0.0	0.89	240	337	5.6
Pressurize	0	0	0.0	1	15	58	97	0.00	0	434	7.2
Hold	0	0	0.0	1	15	58	0	0.00	5	439	7.3

ACTUAL TEST NOTES - DATE MM/DD/2021

TIME	TEST PRESSURE	DVL DEPTH (m)	PLANNED DEPTH	BUCKET WATER LEVEL	COMMENTS



Max Operational Depth	4300	meters	Note: limited by Hypersizer's calculated limit on the titanium of 4,300m		
Proof Test Spec	1.25	% of Max Ops			
Proof Depth	5375	meters	DOTF Max Rates		
Pressurization Rate 1	58.00	psi / min	180.00	psi / min	
Pressurization Rate 2	58.00	psi / min	90.00	psi / min	OceanGate Start Time
De-pressurization Rate	58.00	psi / min	250.00	psi / min	OceanGate End Time

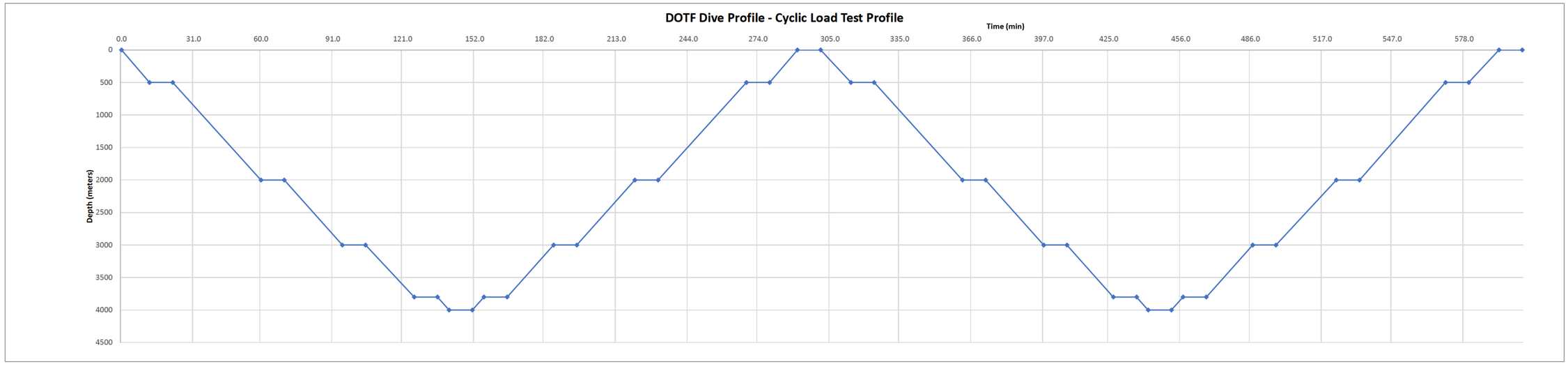
UW says 60psi / sec minimum rate of pressurization

DOTF Cyclic Dive Plan

Step Description	Depth (m)	Depth (ft)	Atm (gauge)	Atm (abs)	PSI	Pressurization Rate (psi/min)	Pressurization Time (min)	% Proof Depth	Hold Times	Cumulative Time (min)	Cumulative Time (Hr)
Pressurize	0	0	0.0	1	15	58	0.3	0.00	0	0.3	0.0
Pressurize	500	1640	49.7	51	745	58	12.6	0.12	0	13	0.2
Hold	500	1640	49.7	51	745	58	0.0	0.12	10	23	0.4
Pressurize	2000	6562	198.8	200	2938	58	37.8	0.47	0	61	1.0
Hold	2000	6562	198.8	200	2938	58	0.0	0.47	10	71	1.2
Pressurize	3000	9843	298.3	299	4399	58	25.2	0.70	0	96	1.6
Hold	3000	9843	298.3	299	4399	58	0.0	0.70	10	106	1.8
Pressurize	3800	12467	377.8	379	5568	58	20.2	0.88	0	126	2.1
Hold	3800	12467	377.8	379	5568	58	0.0	0.88	10	136	2.3
Pressurize	4000	13123	397.7	399	5861	58	5	0.93	0	141	2.4
Hold	4000	13123	397.7	399	5861	58	0	0.93	10	151	2.5
Pressurize	3800	12467	377.8	379	5568	58	5	0.88	0	156	2.6
Hold	3800	12467	377.8	379	5568	58	0	0.88	10	166	2.8
Pressurize	3000	9843	298.3	299	4399	58	20	0.70	0	186	3.1
Hold	3000	9843	298.3	299	4399	58	0	0.70	10	196	3.3
Pressurize	2000	6562	198.8	200	2938	58	25	0.47	0	221	3.7
Hold	2000	6562	198.8	200	2938	58	0	0.47	10	231	3.9
Pressurize	500	1640	49.7	51	745	58	38	0.12	0	269	4.5
Hold	500	1640	49.7	51	745	58	0	0.12	10	279	4.7
Pressurize	0	0	0.0	1	15	58	13	0.00	0	292	4.9
Hold	0	0	0.0	1	15	58	0	0.00	10	302	5.0
Pressurize	500	1640	49.7	51	745	58	12.6	0.12	0	314	5.2
Hold	500	1640	49.7	51	745	58	0.0	0.12	10	324	5.4
Pressurize	2000	6562	198.8	200	2938	58	37.8	0.47	0	362	6.0
Hold	2000	6562	198.8	200	2938	58	0.0	0.47	10	372	6.2
Pressurize	3000	9843	298.3	299	4399	58	25.2	0.70	0	397	6.6
Hold	3000	9843	298.3	299	4399	58	0.0	0.70	10	407	6.8
Pressurize	3800	12467	377.8	379	5568	58	20.2	0.88	0	428	7.1
Hold	3800	12467	377.8	379	5568	58	0.0	0.88	10	438	7.3
Pressurize	4000	13123	397.7	399	5861	58	5	0.93	0	443	7.4
Hold	4000	13123	397.7	399	5861	58	0	0.93	10	453	7.5
Pressurize	3800	12467	377.8	379	5568	58	5	0.88	0	458	7.6
Hold	3800	12467	377.8	379	5568	58	0	0.88	10	468	7.8
Pressurize	3000	9843	298.3	299	4399	58	20	0.70	0	488	8.1
Hold	3000	9843	298.3	299	4399	58	0	0.70	10	498	8.3
Pressurize	2000	6562	198.8	200	2938	58	25	0.47	0	523	8.7
Hold	2000	6562	198.8	200	2938	58	0	0.47	10	533	8.9
Pressurize	500	1640	49.7	51	745	58	38	0.12	0	571	9.5
Hold	500	1640	49.7	51	745	58	0	0.12	10	581	9.7
Pressurize	0	0	0.0	1	15	58	13	0.00	0	593	9.9
Hold	0	0	0.0	1	15	58	0	0.00	10	603	10.1

ACTUAL TEST NOTES - DATE MM/DD/2021

TIME	TEST PRESSURE	DVL DEPTH (m)	PLANNED DEPTH	BUCKET WATER LEVEL	COMMENTS



Max Operational Depth	4300	meters	Note: limited by Hypersizer's calculated limit on the titanium of 4,300m				
Proof Test Spec	1.25	% of Max Ops					
Proof Depth	5375	meters	DOTF Max Rates				
Pressurization Rate 1	58.00	psi / min	180.00	psi / min			
Pressurization Rate 2	58.00	psi / min	90.00	psi / min		OceanGate Start Time	
De-pressurization Rate	58.00	psi / min	250.00	psi / min		OceanGate End Time	

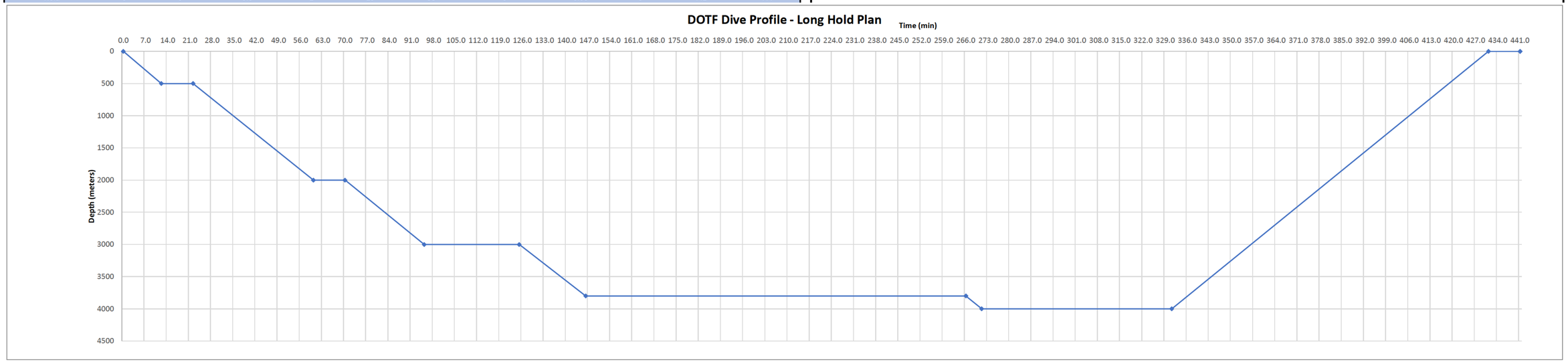
UW says 60psi / sec minimum rate of pressurization

DOTF Long Hold Plan

Step Description	Depth (m)	Depth (ft)	Atm (gauge)	Atm (abs)	PSI	Pressurization Rate (psi/min)	Pressurization Time (min)	% Proof Depth	Hold Times	Cumulative Time (min)	Cumulative Time (Hr)
Pressurize	0	0	0.0	1	15	58	0.3	0.00	0	0.3	0.0
Pressurize	500	1640	49.7	51	745	58	12.6	0.12	0	13	0.2
Hold	500	1640	49.7	51	745	58	0.0	0.12	10	23	0.4
Pressurize	2000	6562	198.8	200	2938	58	37.8	0.47	0	61	1.0
Hold	2000	6562	198.8	200	2938	58	0.0	0.47	10	71	1.2
Pressurize	3000	9843	298.3	299	4399	58	25.2	0.70	0	96	1.6
Hold	3000	9843	298.3	299	4399	58	0.0	0.70	30	126	2.1
Pressurize	3800	12467	377.8	379	5568	58	20.2	0.88	0	146	2.4
Hold	3800	12467	377.8	379	5568	58	0.0	0.88	120	266	4.4
Pressurize	4000	13123	397.7	399	5861	58	5	0.93	0	271	4.5
Hold	4000	13123	397.7	399	5861	58	0	0.93	60	331	5.5
Pressurize	0	0	0.0	1	15	58	101	0.00	0	432	7.2
Hold	0	0	0.0	1	15	58	0	0.00	10	442	7.4
Hold	0	0	0.0	1	15	58	0	0.00	0	442	7.4

ACTUAL TEST NOTES - DATE MM/DD/2021

TIME	TEST PRESSURE	DVL DEPTH (m)	PLANNED DEPTH	BUCKET WATER LEVEL	COMMENTS



Max Operational Depth	4300	meters	Note: limited by Hypersizer's calculated limit on the titanium of 4,300m		
Proof Test Spec	1.25	% of Max Ops			
Proof Depth	5375	meters	DOTF Max Rates		
Pressurization Rate 1	100.00	psi / min	180.00	psi / min	
Pressurization Rate 2	100.00	psi / min	90.00	psi / min	OceanGate Start Time
De-pressurization Rate	100.00	psi / min	250.00	psi / min	OceanGate End Time

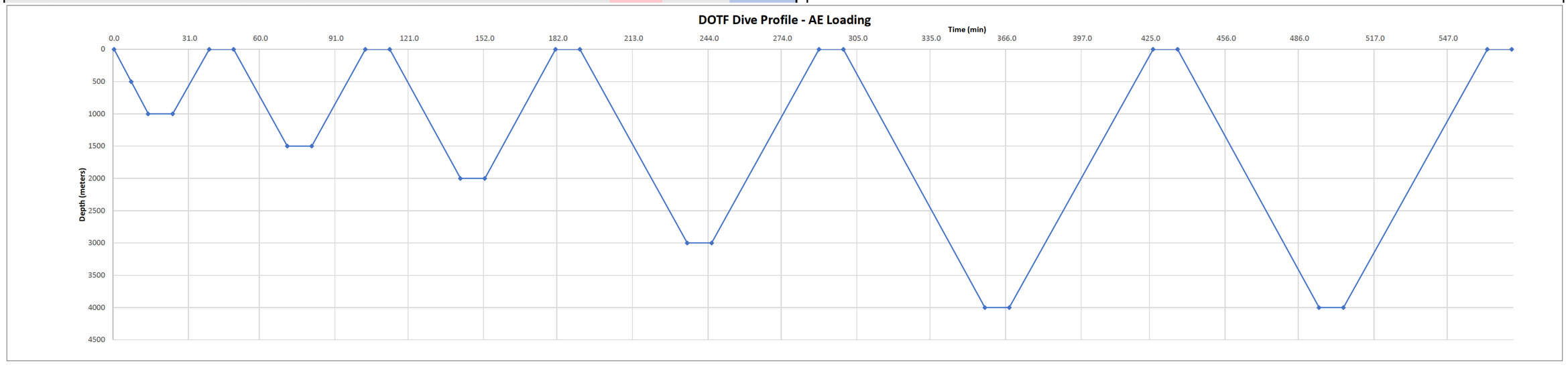
UW says 60psi / sec minimum rate of pressurization

DOTF AE Loading Plan

Step Description	Depth (m)	Depth (ft)	Atm (gauge)	Atm (abs)	PSI	Pressurization Rate (psi/min)	Pressurization Time (min)	% Proof Depth	Hold Times	Cumulative Time (min)	Cumulative Time (Hr)
Pressurize	0	0	0.0	1	15	100	0.1	0.00	0	0.1	0.0
Pressurize	500	1640	49.7	51	745	100	7.3	0.12	0	7	0.1
Pressurize	1000	3281	99.4	100	1476	100	7.3	0.23	0	15	0.2
Hold	1000	3281	99.4	100	1476	100	0.0	0.23	10	25	0.4
Pressurize	0	0	0.0	1	15	100	14.6	0.00	0	39	0.7
Hold	0	0	0.0	1	15	100	0.0	0.00	10	49	0.8
Pressurize	1500	4921	149.1	150	2207	100	21.9	0.35	0	71	1.2
Hold	1500	4921	149.1	150	2207	100	0.0	0.35	10	81	1.4
Pressurize	0	0	0.0	1	15	100	21.9	0.00	0	103	1.7
Hold	0	0	0.0	1	15	100	0	0.00	10	113	1.9
Pressurize	2000	6562	198.8	200	2938	100	29	0.47	0	142	2.4
Hold	2000	6562	198.8	200	2938	100	0	0.47	10	152	2.5
Pressurize	0	0	0.0	1	15	100	29	0.00	0	182	3.0
Hold	0	0	0.0	1	15	100	0	0.00	10	192	3.2
Pressurize	3000	9843	298.3	299	4399	100	44	0.70	0	236	3.9
Hold	3000	9843	298.3	299	4399	100	0	0.70	10	246	4.1
Pressurize	0	0	0.0	1	15	100	44	0.00	0	289	4.8
Hold	0	0	0.0	1	15	100	0	0.00	10	299	5.0
Pressurize	4000	13123	397.7	399	5861	100	58	0.93	0	358	6.0
Hold	4000	13123	397.7	399	5861	100	0	0.93	10	368	6.1
Pressurize	0	0	0.0	1	15	100	58	0.00	0	426	7.1
Hold	0	0	0.0	1	15	100	0	0.00	10	436	7.3
Pressurize	4000	13123	397.7	399	5861	100	58	0.93	0	495	8.2
Hold	4000	13123	397.7	399	5861	100	0	0.93	10	505	8.4
Pressurize	0	0	0.0	1	15	100	58	0.00	0	563	9.4
Hold	0	0	0.0	1	15	100	0	0.00	10	573	9.6

ACTUAL TEST NOTES - DATE MM/DD/2021

TIME	TEST PRESSURE	DVL DEPTH (m)	PLANNED DEPTH	BUCKET WATER LEVEL	COMMENTS



Max Operational Depth	4300	meters	Note: limited by Hypersizer's calculated limit on the titanium of 4,300m				
Proof Test Spec	1.25	% of Max Ops					
Proof Depth	5375	meters	DOTF Max Rates				
Pressurization Rate 1	58.00	psi / min	180.00	psi / min			
Pressurization Rate 2	58.00	psi / min	90.00	psi / min		OceanGate Start Time	
De-pressurization Rate	58.00	psi / min	250.00	psi / min		OceanGate End Time	

UW says 60psi / sec minimum rate of pressurization

DOTF Long Hold Plan

Step Description	Depth (m)	Depth (ft)	Atm (gauge)	Atm (abs)	PSI	Pressurization Rate (psi/min)	Pressurization Time (min)	% Proof Depth	Hold Times	Cumulative Time (min)	Cumulative Time (Hr)
Pressurize	0	0	0.0	1	15	58	0.3	0.00	0	0.3	0.0
Pressurize	500	1640	49.7	51	745	58	12.6	0.12	0	13	0.2
Hold	500	1640	49.7	51	745	58	0.0	0.12	10	23	0.4
Pressurize	2000	6562	198.8	200	2938	58	37.8	0.47	0	61	1.0
Hold	2000	6562	198.8	200	2938	58	0.0	0.47	10	71	1.2
Pressurize	3000	9843	298.3	299	4399	58	25.2	0.70	0	96	1.6
Hold	3000	9843	298.3	299	4399	58	0.0	0.70	30	126	2.1
Pressurize	3800	12467	377.8	379	5568	58	20.2	0.88	0	146	2.4
Hold	3800	12467	377.8	379	5568	58	0.0	0.88	120	266	4.4
Pressurize	4000	13123	397.7	399	5861	58	5	0.93	0	271	4.5
Hold	4000	13123	397.7	399	5861	58	0	0.93	60	331	5.5
Pressurize	0	0	0.0	1	15	58	101	0.00	0	432	7.2
Hold	0	0	0.0	1	15	58	0	0.00	10	442	7.4
Hold	0	0	0.0	1	15	58	0	0.00	0	442	7.4

ACTUAL TEST NOTES - DATE MM/DD/2021

TIME	TEST PRESSURE	DVL DEPTH (m)	PLANNED DEPTH	BUCKET WATER LEVEL	COMMENTS