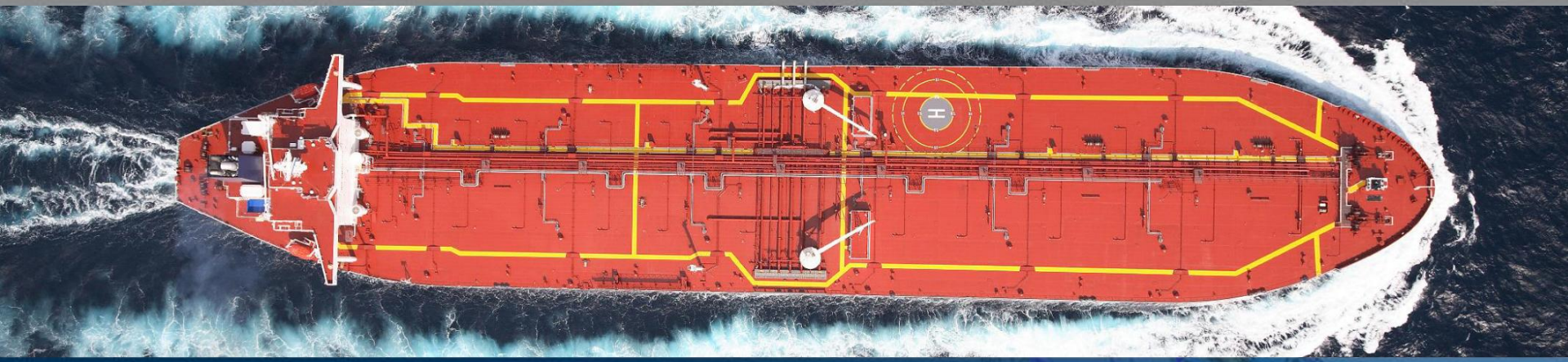
3rd TWLWG Meeting – Jeju Island, South Korea

5 – 7 April 2011

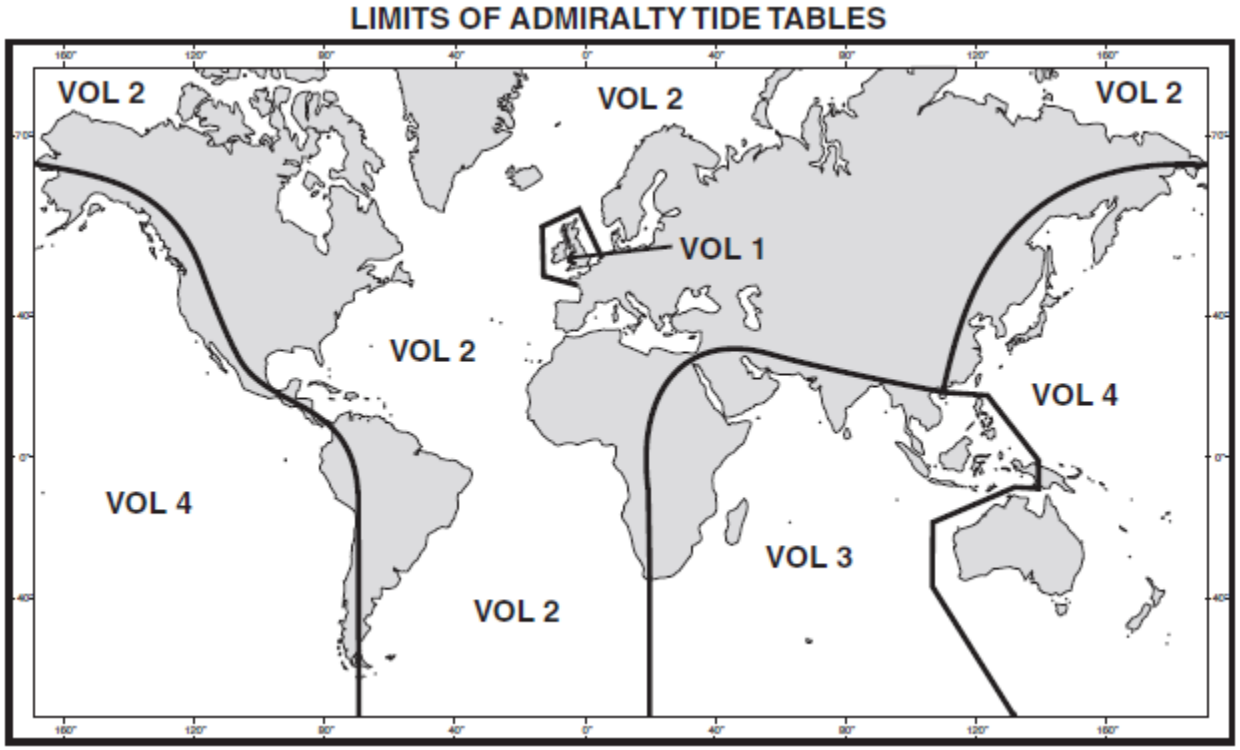
Tide Table Format: events per day & event selection



THE UNITED KINGDOM
HYDROGRAPHIC OFFICE

Admiralty Tide Tables (ATT)

- Four Volumes – global coverage



Standard Ports (daily predictions in Admiralty Tide Tables)

ENGLAND — PORT OF BRISTOL (AVONMOUTH)

LAT 51°30′N LONG 2°44′W

TIME ZONE **UT(GMT)** — TIMES AND HEIGHTS OF HIGH AND LOW WATERS — YEAR **2012**

JANUARY

	Time	m		Time	m
1 SU ☽	0544	3.0	**16** M ☾	0547	2.2
	1153	10.8		1149	11.9
	1815	3.0		1810	2.4
2 M	0010	10.4	**17** TU	0015	11.3
	0628	3.4		0634	2.7
	1245	10.2		1246	11.2
	1904	3.4		1900	3.0
3 TU	0107	9.9	**18** W	0120	10.7
	0726	3.8		0736	3.3
	1354	9.9		1402	10.6
	2006	3.7		2015	3.6
4 W	0224	9.8	**19** TH	0248	10.4
	0838	3.9		0925	3.6
	1510	10.0		1531	10.6
	2120	3.6		2216	3.5
5 TH	0340	10.1	**20** F	0411	10.8
	0957	3.6		1053	3.0
	1615	10.4		1646	11.2
	2234	3.1		2329	2.8
6 F	0441	10.8	**21** SA	0518	11.6
	1108	3.0		1158	2.3
	1711	11.1		1747	11.9
	2337	2.5			
7 SA	0533	11.5	**22** SU	0029	2.0
	1206	2.4		0613	12.5
	1800	11.7		1256	1.6
				1840	12.6

FEBRUARY

	Time	m		Time	m
1 W	0002	10.2	**16** TH	0048	10.5
	0624	3.4		0702	3.4
	1236	9.8		1336	10.2
	1902	3.6		1934	3.9
2 TH	0104	9.6	**17** F	0226	9.9
	0733	4.0		0901	3.9
	1357	9.4		1517	10.0
	2023	4.0		2200	3.9
3 F	0237	9.5	**18** SA	0357	10.4
	0905	4.1		1039	3.3
	1531	9.7		1634	10.7
	2149	3.7		2314	3.0
4 SA	0403	10.1	**19** SU	0506	11.3
	1028	3.5		1143	2.3
	1641	10.5		1736	11.6
	2303	3.0			
5 SU	0506	11.0	**20** M	0012	2.0
	1138	2.7		0600	12.3
	1737	11.4		1238	1.5
				1826	12.5
6 M	0006	2.2	**21** TU ●	0104	1.2
	0556	11.9		0647	13.1
	1237	2.1		1329	0.9
	1825	12.2		1911	13.1
7 TU O	0102	1.7	**22** W	0153	0.8
	0642	12.7		0730	13.5
	1332	1.7		1416	0.6
	1909	12.7		1952	13.3

MARCH

	Time	m		Time	m
1 TH ☽	0538	3.0	**16** F	0030	10.4
	1144	10.0		0644	3.5
	1807	3.4		1322	9.9
				1914	4.1
2 F	0007	9.8	**17** SA	0214	9.8
	0632	3.8		0845	4.0
	1250	9.3		1503	9.8
	1919	4.1		2143	4.0
3 SA	0128	9.3	**18** SU	0339	10.3
	0809	4.2		1019	3.3
	1438	9.3		1616	10.5
	2105	4.1		2252	3.0
4 SU	0320	9.7	**19** M	0444	11.2
	0950	3.8		1120	2.3
	1610	10.1		1714	11.5
	2231	3.3		2347	2.0
5 M	0435	10.7	**20** TU	0538	12.1
	1110	2.9		1212	1.5
	1711	11.2		1803	12.3
	2340	2.4			
6 TU	0531	11.8	**21** W	0037	1.2
	1214	2.1		0623	12.8
	1801	12.2		1301	0.9
				1845	12.9
7 W	0038	1.7	**22** TH ●	0124	0.8
	0618	12.7		0704	13.2
	1310	1.5		1346	0.7
	1846	13.0		1924	13.1

APRIL

	Time	m		Time	m
1 SU	0045	9.7	**16** M	0311	10.4
	0716	3.9		0943	3.2
	1341	9.4		1544	10.5
	2015	4.1		2218	3.1
2 M	0224	9.7	**17** TU	0412	11.0
	0905	3.8		1044	2.5
	1527	10.0		1641	11.2
	2151	3.5		2313	2.3
3 TU	0355	10.6	**18** W	0505	11.8
	1033	3.0		1137	1.8
	1637	11.0		1730	12.0
	2306	2.6			
4 W	0457	11.7	**19** TH	0003	1.6
	1142	2.1		0551	12.3
	1731	12.1		1226	1.3
				1813	12.5
5 TH	0007	1.8	**20** F	0050	1.2
	0549	12.7		0632	12.7
	1240	1.5		1311	1.1
	1818	13.0		1851	12.7
6 F O	0102	1.1	**21** SA ●	0134	1.1
	0636	13.5		0710	12.7
	1332	1.0		1353	1.1
	1903	13.7		1926	12.7
7 SA	0152	0.7	**22** SU	0214	1.2
	0721	13.9		0744	12.6
	1419	0.7		1430	1.3
	1946	14.0		1958	12.6

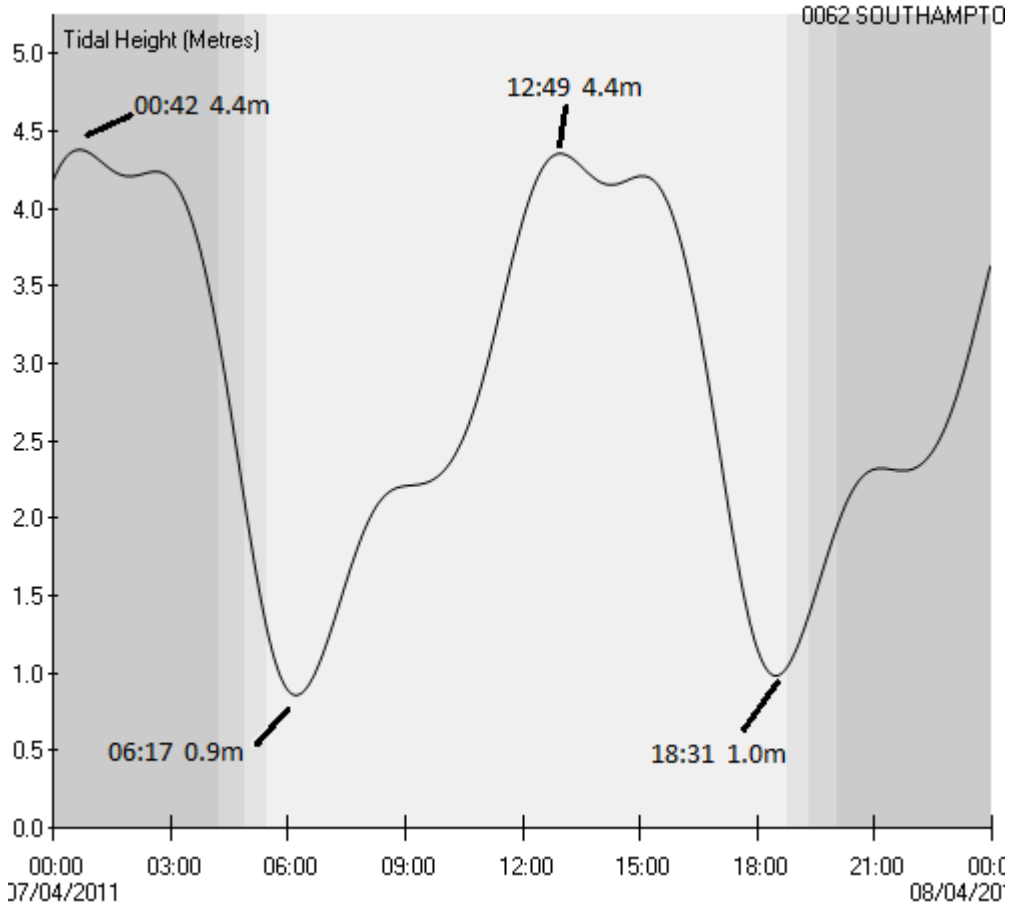
Max of 4 events per day for semi-diurnal tides (2 events per day for diurnal tides, or combination for mixed-tides).

Standard Ports (daily predictions)

Complex tidal regimes (double high or low waters, high or low water stands)

- Analysis of double high / double low water ports can be undertaken by a “HiLo” harmonic analysis technique
- Two separate analyses are carried out
- (1) a ‘normal’ analysis of regular heights; constituents describe the whole curve
- (2) an analysis of just the turning points of the whole curve; constituents describe just the turning points
- Advantage: the Tide Table predictions are guaranteed to fit the maximum 4 events per day
- Disadvantage: The turning points of the curve in (1) above do not always match the turning points in (2) above.

Example of “HiLo” Port Curve / Event Mis-match



07/04/2011		
	Time	Height
High	00:23	4.3 m
	12:42	4.3 m
Low	06:17	0.8 m
	18:30	1.0 m

Other examples of display of Complex Ports

Hoek van Holland predictions with footnote

NETHERLANDS — HOEK VAN HOLLAND

LAT 51°59′N LONG 4°07′E

TIME ZONE **–0100** TIMES AND HEIGHTS OF HIGH AND LOW WATERS YEAR **2012**

JANUARY

	Time	m		Time	m
1	0120	0.6	**16**	0224	0.5
	0749	2.0		0729	2.0
SU	1324	0.2	M	1249	0.1
☽	2026	2.0	☾	1959	2.2
2	0226	0.5	**17**	0215	0.5
	0846	1.9		0835	2.0
M	1425	0.3	TU	1404	0.2
	2126	1.9		2105	2.1
3	0334	0.5	**18**	0305	0.5
	0944	1.8		0940	1.9
TU	1630	0.4	W	1526	0.2
	2234	1.8		2220	2.0
4	0456	0.5	**19**	0355	0.5
	1116	1.8		1056	1.9
W	1736	0.4	TH	1635	0.3
	2355	1.8		2340	1.9
5	0556	0.5	**20**	0510	0.4
	1205	1.8		1205	2.0
TH	1815	0.4	F	1734	0.4

FEBRUARY

	Time	m		Time	m
1	0204	0.4	**16**	0245	0.3
	0856	1.8		0916	1.9
W	1424	0.3	TH	1525	0.3
	2125	1.8		2153	1.8
2	0420	0.4	**17**	0356	0.4
	1006	1.7		1035	1.9
TH	1700	0.4	F	1624	0.4
	2245	1.7		2323	1.7
3	0515	0.4	**18**	0445	0.4
	1125	1.7		1155	1.9
F	1754	0.4	SA	1957	0.4
4	0010	1.7	**19**	0039	1.8
	0614	0.4		0835	0.3
SA	1236	1.8	**SU**	1305	2.1
	1850	0.4		2125	0.4
5	0105	1.8	**20**	0135	1.9
	0706	0.4		0935	0.2
SU	1326	2.0	M	1349	2.2
	2110	0.4		2200	0.4

MARCH

	Time	m		Time	m
1	0136	0.3	**16**	0225	0.2
	0755	1.9		0900	1.9
TH	1354	0.3	F	1505	0.3
☽	2015	1.7		2156	1.7
2	0215	0.3	**17**	0330	0.2
	0925	1.7		1030	1.9
F	1635	0.4	SA	1810	0.4
	2156	1.6		2319	1.7
3	0505	0.3	**18**	0445	0.3
	1046	1.7		1149	1.9
SA	1734	0.4	**SU**	1950	0.4
	2315	1.6			
4	0544	0.3	**19**	0024	1.8
	1155	1.8		0815	0.2
SU	1825	0.4	M	1255	2.1
				2055	0.3
5	0023	1.7	**20**	0119	1.9
	0637	0.3		0914	0.1
M	1249	2.0	TU	1336	2.1
	2037	0.4		2147	0.4

APRIL

	Time	m		Time	m
1	0446	0.3	**16**	0420	0.2
	1006	1.8		1124	2.0
SU	1710	0.4	M	1905	0.3
	2236	1.6			
2	0536	0.3	**17**	0006	1.8
	1104	1.8		0746	0.1
M	1824	0.3	TU	1225	2.1
	2346	1.7		2040	0.3
3	0640	0.3	**18**	0055	1.9
	1209	2.0		0844	0.1
TU	2026	0.3	W	1308	2.1
				2125	0.3
4	0034	1.8	**19**	0134	2.0
	0846	0.2		0940	0.2
W	1255	2.1	TH	1355	2.1
	2126	0.3		2145	0.4
5	0125	1.9	**20**	0216	2.0
	0625	0.2		0724	0.2
TH	1335	2.3	F	1425	2.1
	2206	0.3		2220	0.4

LOW WATERS – IMPORTANT NOTE. DOUBLE LOW WATERS OFTEN OCCUR. PREDICTIONS ARE FOR THE LOWER LOW WATER WHICH IS USUALLY THE FIRST. SEE ALSO NOTE ON PAGE 344.

1503,‡ 1505–1509,‡ 1512,1521	Double low waters occur on the coast of the Netherlands between Scheveningen and Haringvlietsluizen and in the entrances to the River Rhine as far upstream as Krimpen and Spijkenisse. They are more pronounced at springs; on occasions when they do not occur, there is still a considerable distortion of the tidal curve which takes the form of a low water stand. The slight rise after the first low water is known as the agger.
	Predictions for the Standard Ports of Hoek van Holland and Rotterdam are for the *lower* low water. The *first* low water occurs about 5½ hours after high water and the *second* low water about 4 hours before the following high water. Time differences for low water refer to the *first* low water for Nos. 1505 & 1521 and to the *second* low water for Nos. 1503, 1506–1509 and 1512.

Complex ports

Poole Harbour with footnote

ENGLAND — POOLE HARBOUR

LAT 50°43′N LONG 1°59′W

TIME ZONE **UT(GMT)** TIMES AND HEIGHTS OF HIGH AND LOW WATERS YEAR **2012**

JANUARY

	Time	m		Time	m
1	0924	1.9	**16**	0908	2.1
		1.2			0.9
SU		1.8	M		1.9
☽	2142	1.2	☾	2134	0.9
2	1023	1.9	**17**	1012	2.0
		1.3			1.0
M		1.7	TU		1.9
	2243	1.3		2241	1.0
3	1133	1.8	**18**	1129	1.9
		1.3			1.1
TU		1.6	W		1.8
	2355	1.3			
4	1243	1.8	**19**	0000	1.1
		1.3			1.9
W		1.7	TH	1251	1.0
					1.9

FEBRUARY

	Time	m		Time	m
1	1011	1.8	**16**	1107	1.8
		1.3			1.1
W		1.6	TH		1.8
	2244	1.3		2346	1.2
2	1145	1.7	**17**	1239	1.8
		1.3			1.1
TH		1.6	F		1.8
3	0022	1.3	**18**	0114	1.1
		1.7			1.9
F	1306	1.3	SA	1355	1.0
		1.7			1.9
4	0134	1.3	**19**	0223	1.0
		1.8			2.0
SA	1405	1.1	**SU**	1453	0.8
		1.8			2.0

MARCH

	Time	m		Time	m
1	0908	1.8	**16**	1050	1.8
		1.2			1.1
TH		1.6	F		1.8
☽	2142	1.3		2335	1.2
2	1027	1.6	**17**	1222	1.7
		1.3			1.1
F		1.6	SA		1.8
	2332	1.4			
3	1224	1.6	**18**	0103	1.1
		1.3			1.8
SA		1.6	**SU**	1338	1.0
					1.9
4	0104	1.3	**19**	0210	1.0
		1.7			1.9
SU	1334	1.1	M	1433	0.8
		1.8			2.0

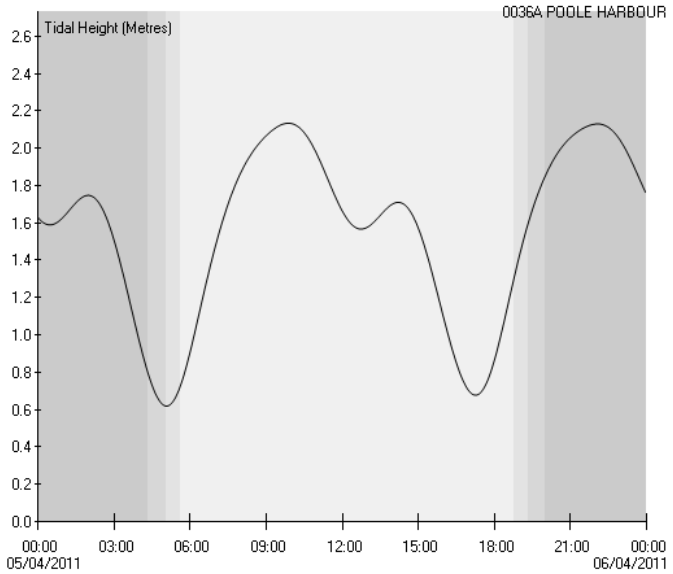
APRIL

	Time	m		Time	m
1	1125	1.6	**16**	0036	1.1
		1.2			1.8
SU		1.7	M	1306	1.0
					1.9
2	0019	1.3	**17**	0141	1.0
		1.6			1.9
M	1251	1.1	TU	1401	0.9
		1.8			2.0
3	0125	1.1	**18**	0230	0.9
		1.8			1.9
TU	1347	0.9	W	1445	0.8
		2.0			2.1
4	0214	0.9	**19**	0310	0.8
		1.9			2.0
W	1434	0.7	TH	1524	0.7
		2.1			2.1

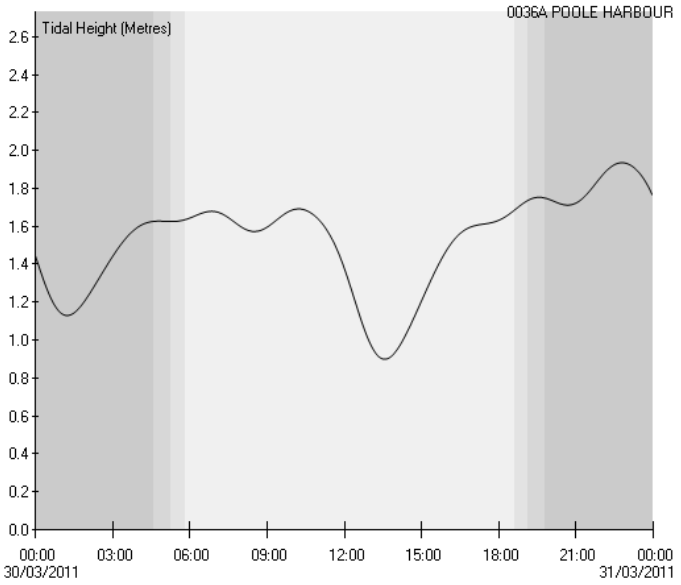
SEA LEVEL IS ABOVE MEAN TIDE LEVEL FROM 2.0 HOURS AFTER L.W. TO 2.0 HOURS BEFORE THE NEXT L.W. AND H.W. WILL OCCUR BETWEEN 5.0 HOURS AFTER L.W. AND 3.0 HOURS BEFORE THE NEXT L.W.

Suppression of high waters

Complex ports – Poole Harbour



Spring Tides – defined high water turning points (low waters always well defined)



Neap Tides – poorly defined high water turning points

UK South Coast Secondary Ports – complex ports

Extract from ATT Part II

			0000 and 1200	0600 and 1800	0500 and 1700	1100 and 2300	4.7	3.8	1.9	0.8
65	**PORTSMOUTH**	(see page 34)								
37	Bournemouth	50 43 1 52	−0240	+0055	−0050	−0030	−2.7	−2.2	−0.8	

SEASONAL CHANGES IN MEAN LEVEL

No	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	July 1	Aug. 1	Sep. 1	Oct. 1	Nov. 1	Dec. 1
1–60b						Negligible						

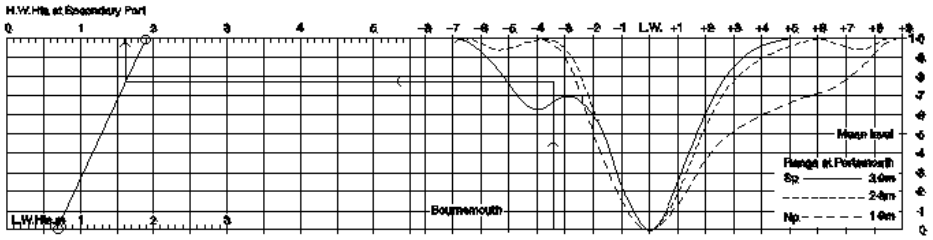
- **Time & Height Differences used for Turning Points**
- **But curves (Sp, Np and 'mean') drawn with respect to LW.**

TIDAL PREDICTION FORM

STANDARD PORT **Portsmouth** TIME ~~HEIGHT~~ REQUIRED **0200**

SECONDARY PORT **Bournemouth** DATE **18 Nov** TIME ZONE **GMT**

	TIME		HEIGHT		
STANDARD PORT	HW	LW	HW	LW	RANGE
	1 —	2 **0613**	3 **4.6**	4 **1.1**	5 **3.5**
Seasonal change	Standard Port		6 **0.0**	6 **0.0**	
DIFFERENCES	7 —	8 **−0046**	9 **−2.7**	10 **−0.4**	
Seasonal change	Secondary Port		11 **0.0**	11 **0.0**	
SECONDARY PORT	12 —	13 **0527**	14 **1.9**	15 **0.7**	
Duration	16 —				



Port Event Filters in Admiralty TotalTide

Port event filters get rid of spurious events (HW and LW) around the port height's turning points. These spurious events are an inevitable consequence of the harmonic origins of the port height curves, even for quite simple curves without double stands, additional turning points can occur close to the desired ones.

By default, all ports use the following filter **PeriodicHWandLW, 8.0**

However, other filters and filter parameters can be used, on a port by port basis. This is necessary for complex ports, such as those with a double stand which makes the periodicity of either the HW or LW too variable for a simple periodic filter.

Entry	Meaning
<number>, None	For port <number>. There is no filter. Avoids this port even using the default filter.
<number>, PeriodicHWandLW <hours>	For port <number>. For each HW, reject all lower HW within <hours>. For each LW, reject all higher LW within <hours>.
<number>, PeriodicLW_then_HighestHW, <hours>	For port <number>. For each LW, reject all higher LW within <hours>. Then between each pair of accepted LW, reject all but the highest HW.
<number>, PeriodicHW_then_LowestLW, <hours> <number>, PeriodicLW_then_FirstHW, <hoursLW> <hoursHW>	For port <number>. For each HW, reject all lower HW within <hours>. Then between each pair of accepted HW, reject all but the lowest LW. For port <number>. For each LW, reject all higher LW within <hoursLW>. Then between each pair of accepted LW, reject all but the earliest HW that is at least <hoursHW> after LW.
<number>, PeriodicLW_then_LastHW, <hoursLW> <hoursHW> <number>, PeriodicHW_then_FirstLW, <hoursHW> <hoursLW>	For port <number>. For each LW, reject all higher LW within <hoursLW>. Then between each pair of accepted LW, reject all but the latest HW that is at least <hoursHW> before LW. For port <number>. For each HW, reject all higher HW within <hoursHW>. Then between each pair of accepted HW, reject all but the earliest LW that is at least <hoursLW> after HW.
<number>, PeriodicHW_then_LastLW, <hoursHW> <hoursLW>	For port <number>. For each HW, reject all higher HW within <hoursHW>. Then between each pair of accepted HW, reject all but the latest LW that is at least <hoursLW> before HW.