HYDROCARBON MANAGEMENT

Global crude oil voyage losses remain steady

The latest findings from analysis of the 2018 data on global marine crude oil voyage losses, presented by *Paul Harrison*, Consultant to the HMC-4A Marine Oil Transportation Database Committee.

The Energy Institute's (EI) HMC-4A Marine Oil Transportation Database Committee has been collecting and analysing worldwide oil shipping data for over 25 years and meets twice a year. The 2018 autumn meeting was hosted by Marathon Petroleum in New Orleans and the spring 2019 meeting was held in London.

Committee members submit data annually and receive a global analysis and a confidential individual company report.

The following companies submitted data for 2018: Bazan, BP Oil International, CEPSA, Chevron, Chinese Petroleum Corporation, Eni, Equinor, Essar Oil UK, ExxonMobil, Marathon Petroleum, Petrobras, Petrogal (GALP Energia), PetroIneos, Phillips 66, PREEM, Repsol, Saras, Shell and Total.

The main findings from the analysis are presented below. US inland barge movements are analysed separately and are not included.

Database development

The total number of ship voyages reported for 2018 fell slightly, with reported bill of lading (BOL) volume also falling to 5.6bn barrels. The volume of crude with complete voyage data was 4.2bn barrels, as shown in **Figure 1**.

Comparison with the *BP Statistical Review of World Energy* indicates that the 2018 database includes complete load and discharge data for around 28% of estimated global seaborne volume with BOL data for 37%.

Global losses

Following a steady fall since 2001, figures showed an increased in loss to –0.172% in 2011 (by convention losses are given as negative). Losses then remained fairly steady until 2015, which saw a significant fall to –0.160%; a record low level. Recent year-on-year changes have not been statistically significant but the mean NSV (net standard volume) loss for 2018 was a little higher than in 2017, at –0.168%.

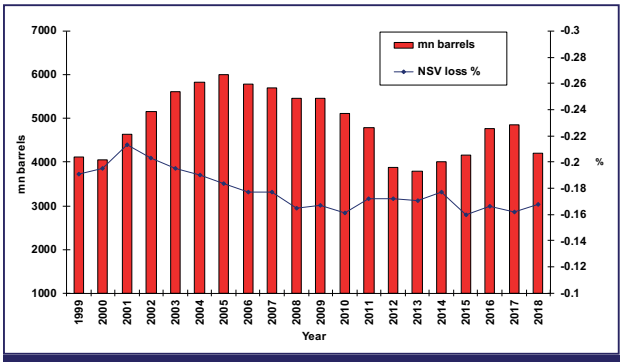

Figure 1: Database volume and average recorded net loss of crude oil, 1999–2018 *Source: HMC-4A*

Note that losses include apparent and physical losses. Apparent losses result from the combination of fixed and random errors in the measurement systems used at load and discharge.

As can be seen from **Figure 2**, gross or total calculated volume (TCV) loss stayed fairly constant between 2000 and 2007, while water losses fell, reducing NSV loss. Changes in TCV loss have largely driven NSV losses since 2006, with water loss steadily reducing to a record low of –0.011 in 2018.

TCV loss comprises any real losses due to evaporation plus any apparent losses due to systematic measurement differences. Water loss represents any additional water reported at discharge compared with that reported at load, ie an accounting loss in terms of oil quantity but not a real loss of either oil or water.

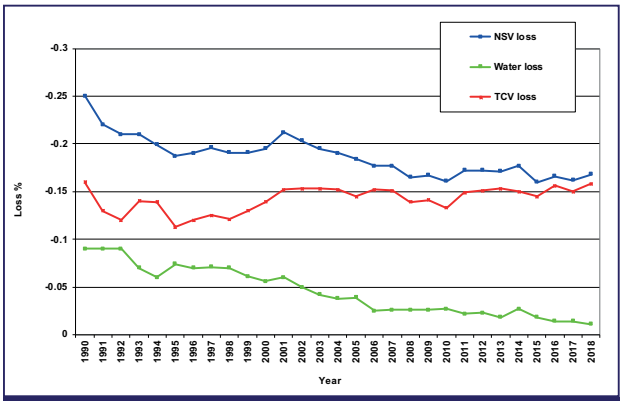

Figure 2: NSV, water and TCV losses, 1990–2018 *Source: HMC-4A*

Loss comparison for individual crude oils

Table 1 gives mean NSV loss and standard deviation for crudes in the database with 20 or more voyages. The mean of the reported API gravity is also given, together with the overall percentage loss based on total barrels shipped. For comparison, figures for NSV loss calculated by voyage are given for 2018 and 2017.

Detailed loss analysis

The database contains details of all measurements made through each voyage. This enables detailed analysis to determine where losses are occurring and to set benchmarks for each stage in the measurement chain.

TCV differences; shore-to-ship, ship-at-load to ship-at-discharge and ship-to-shore are analysed along with vessel load and discharge ratios, OBQ (onboard quantity), ROB (remaining onboard) and other measurements.

OBQ is the TCV of any cargo onboard the ship prior to loading and ROB is cargo remaining onboard as measured after discharge.

Conclusion

Marginal reductions in water loss have continued, but any significant improvement in mean NSV loss will depend on reducing TCV loss. While global mean loss remains fairly steady, there are significant differences for individual ports and the work of the Committee helps to highlight those where improvements might be made. Offshore loadings are particularly susceptible to large swings in gross measurement and water determination.

The HMC-4 Committee also analyses US crude oil barge movements and has developed product loss benchmarks for ships and barges. New members are always welcome and should contact Kishan Kansara at the Energy Institute, **kkansara@energyinst.org**

Crude type	API gravity	Overall volumes (NSV)			Calculation by voyage					
					2018 NSV loss %			2017 NSV loss %		
		Total barrels	Barrels loss	Barrels loss %	Mean	St. dev.	No.	Mean	St. dev.	No.
Al Shaheen	29.4	37,452,652	–116,791	–0.31	–0.32	0.13	57	–0.23	0.23	57
Alaskan North Slope	32.8	79,264,248	–81,337	–0.10	–0.10	0.16	94	–0.04	0.30	132
Alvheim	34.6	27,444,788	–33,424	–0.12	–0.13	0.19	34	–0.16	0.19	24
Amenam Blend	39.3	20,944,974	–63,058	–0.30	–0.26	0.23	25	–	–	–
Arabian Extra Light	39.7	90,844,786	–178,964	–0.20	–0.22	0.27	168	–0.27	0.44	177
Arabian Heavy	27.5	31,022,602	–59,362	–0.19	–0.19	0.39	55	–0.18	0.49	32
Arabian Light	33.2	315,234,750	–684,549	–0.22	–0.22	0.32	407	–0.16	0.25	348
Arabian Medium	31.2	29,713,039	–46,300	–0.16	–0.14	0.40	56	–0.08	0.34	77
Arctic Oil	23.7	20,823,206	–32,783	–0.16	–0.16	0.10	30	–0.11	0.16	25
Asgard	51.3	23,499,648	–38,510	–0.16	–0.16	0.14	31	–0.18	0.19	42
Azeri Light	37.0	136,622,515	–184,220	–0.13	–0.14	0.12	183	–0.12	0.12	193
Bakken	43.4	17,851,204	–18,454	–0.10	–0.10	0.21	42	–0.18	0.14	25
Basrah Heavy	24.0	71,000,176	–122,981	–0.17	–0.12	0.27	80	–0.13	0.34	96
Basrah Light	29.1	150,683,868	–235,648	–0.16	–0.18	0.37	142	–0.25	0.32	113
Bonga	28.0	42,225,061	–25,307	–0.06	–0.06	0.21	48	–0.13	0.62	45
Bonny Light	34.7	38,315,224	–193,381	–0.50	–0.49	0.29	48	–0.24	0.40	24
Brass	37.0	18,639,207	–65,781	–0.35	–0.39	0.26	24	–0.20	0.24	25
Bu Attifel	41.1	14,770,168	–51,446	–0.35	–0.32	0.51	27	–	–	–
Castilla Blend	17.9	39,900,891	–41,816	–0.10	–0.10	0.21	61	–0.04	0.25	90
Clov	32.4	22,589,857	–70,204	–0.31	–0.31	0.13	23	–0.15	0.18	25
CPC Blend	46.3	225,380,779	–590,856	–0.26	–0.26	0.15	267	–0.20	0.16	318
Dolphin Condensate	60.3	10,927,417	–25,014	–0.23	–0.22	0.21	22	–	–	–
Eagle Ford	44.1	11,861,645	–33,926	–0.29	–0.19	0.26	30	–0.03	0.29	59
Ekofisk	39.0	45,061,165	–7,843	–0.02	–0.02	0.13	71	–0.03	0.18	72
El Sharara	42.5	30,632,633	2,292	0.01	0.01	0.16	45	0.02	0.18	44
Es Sider	36.4	41,193,754	–116,672	–0.28	–0.28	0.18	66	–0.29	0.33	44
Espo	35.9	15,678,470	–26,163	–0.17	–0.17	0.25	21	–0.14	0.26	28
Export Bend	29.9	24,405,624	–34,757	–0.14	–0.14	0.32	32	–0.16	0.26	54
Flotta Gold	36.4	13,501,297	–37,509	–0.28	–0.28	0.13	21	–0.31	0.15	41
Forcados Blend	32.8	52,681,563	–121,766	–0.23	–0.22	0.25	60	–0.11	0.17	37
Goliat	39.4	23,879,251	–29,860	–0.13	–0.13	0.16	30	–	–	–
Grane	28.5	58,340,539	6,634	0.01	0.02	0.17	96	–0.07	0.14	102
Gudrun Blend	51.2	13,316,343	–6,837	–0.05	–0.06	0.18	23	–0.08	0.18	44
Gullfaks	38.4	51,987,358	–79,628	–0.15	–0.16	0.19	64	–0.19	0.20	87
Heidrun	24.6	17,373,407	24,592	0.14	0.14	0.22	28	0.11	0.18	38
Hibernia	33.4	18,078,130	–12,155	–0.07	–0.07	0.13	31	–0.04	0.17	41
Iracema	31.7	37,243,793	–50,866	–0.14	–0.13	0.18	43	–0.19	0.26	80
Iranian Heavy	29.2	33,145,746	–74,760	–0.23	–0.20	0.30	35	–0.21	0.25	60
Kimanis	36.9	25,788,728	–15,206	–0.06	–0.06	0.16	49	–0.06	0.21	50
Kuwait Export	30.5	95,202,376	–268,199	–0.28	–0.31	0.27	99	–0.24	0.25	138
Lula	29.9	136,277,363	–129,635	–0.10	–0.08	0.24	138	–0.19	0.37	143
Maya	21.7	186,393,941	–225,032	–0.12	–0.11	0.40	356	–0.18	0.27	342
Mesla/Sarir	38.0	15,158,538	–44,180	–0.29	–0.29	0.21	22	–	–	–
Midland Sweet	42.3	31,077,341	–40,968	–0.13	–0.12	0.36	50	–	–	–
Murban	40.4	65,992,041	–181,519	–0.28	–0.28	0.21	110	–0.26	0.22	116
Novy Port	35.1	31,932,314	–53,057	–0.17	–0.17	0.11	42	–0.17	0.11	33
Oriente	23.7	8,827,469	23,637	0.27	0.06	0.77	21	–0.10	0.29	32
Oseberg	39.5	16,303,457	–37,291	–0.23	–0.22	0.22	27	–0.16	0.20	23
Patos Marinza	9.5	3,190,501	–589	–0.02	–0.02	0.15	26	–0.08	0.18	21
Peregrino	13.7	14,376,323	–24,804	–0.17	–0.19	0.50	23	–0.18	0.21	38
Qua Iboe	37.1	24,767,001	–46,686	–0.19	–0.19	0.13	26	–0.17	0.24	38
Roncador Heavy	20.2	22,078,415	–6,361	–0.03	–0.03	0.24	26	–0.12	0.32	42
Russian Export Blend	30.3	225,395,814	–425,188	–0.19	–0.19	0.17	313	–0.18	0.16	431
Saharan Blend	44.6	60,293,819	–58,362	–0.10	–0.07	0.16	111	–0.09	0.19	133
Sapinhoa	30.0	21,865,655	–17,975	–0.08	–0.10	0.29	30	–0.25	0.44	48
Schiehallion	24.5	28,263,727	–1,923	–0.01	0.00	0.66	48	–	–	–
Siberian Light	34.5	19,012,385	–34,996	–0.18	–0.18	0.17	33	–0.21	0.14	36
Sokol	35.2	26,834,072	–22,225	–0.08	–0.13	0.55	41	–0.07	0.19	36
Statfjord	39.7	36,436,192	–62,350	–0.17	–0.17	0.34	48	–0.15	0.24	89
Stones	28.5	7,508,801	–8,686	–0.12	–0.11	0.17	26	–0.18	0.26	24
Thunderhorse	31.8	14,702,029	–5,959	–0.04	–0.05	0.30	30	–	–	–
Upper Zakum	33.9	50,833,332	–168,228	–0.33	–0.30	0.43	71	–0.29	0.27	73
Varandey	36.9	36,256,853	–93,668	–0.26	–0.27	0.22	47	–0.41	0.14	56
Vasconia	23.6	60,798,782	–49,316	–0.08	–0.08	0.31	104	–0.07	0.24	125
West Texas Intermediate	42.6	92,239,863	–182,293	–0.20	–0.17	0.19	119	–0.09	0.17	111
Western Desert	41.3	25,384,168	–72,626	–0.29	–0.29	0.29	51	–0.33	0.27	66
Western Isle	31.7	11,666,609	–31,391	–0.27	–0.27	0.20	23	–0.16	0.38	36

Table 1: Analysis by crude oil type, 2018 and 2017 *Source: HMC-4A*