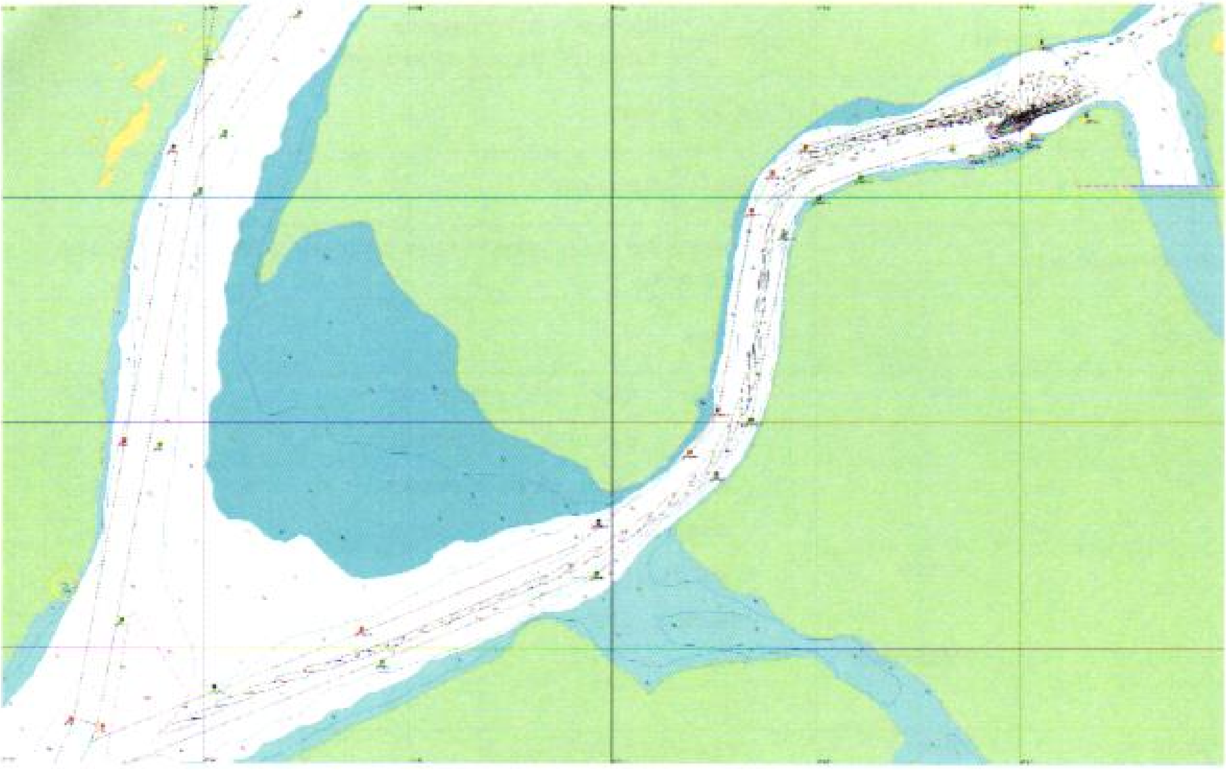
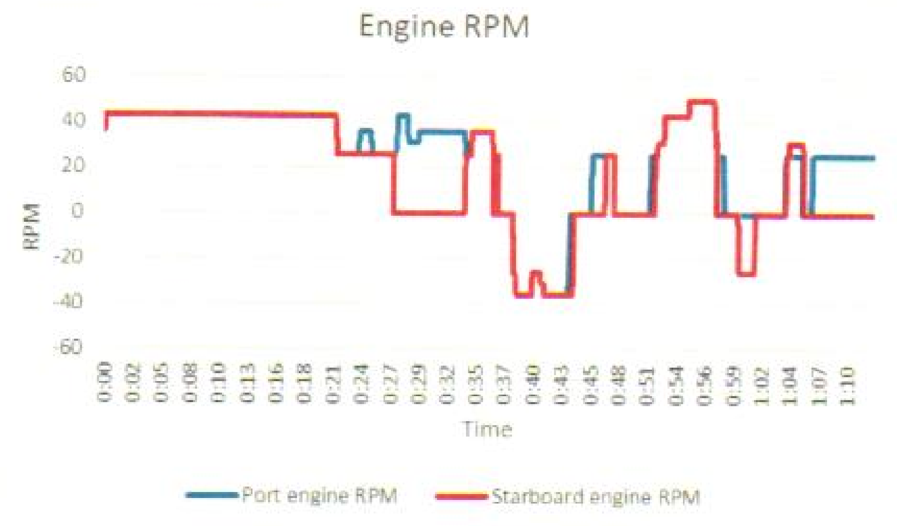
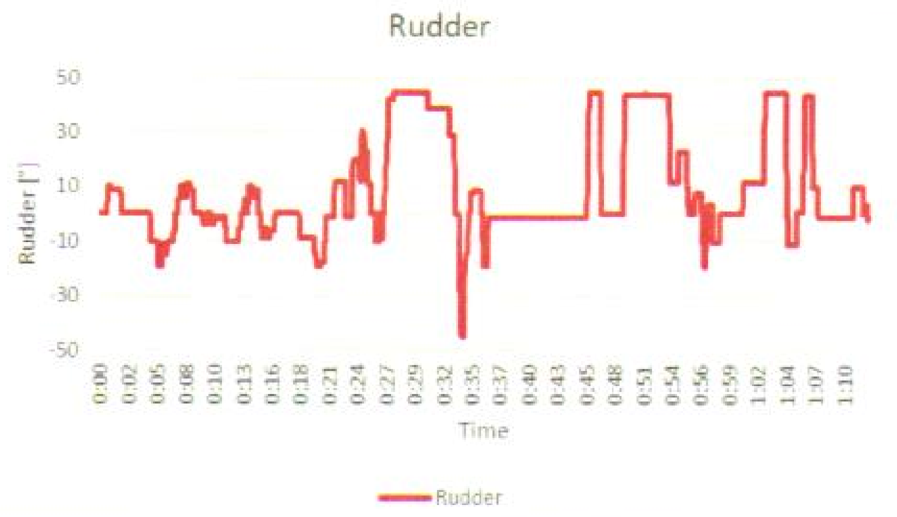
Date:	26/03/2019	Project:	Mitsubishi – JGC Corporation Tabeer LNG Terminal at Port Qasim
Time start:	15:50	Time finish:	16:40
Run n.	9	File name:	MTI2019_09
Manouvre description:		Arrival with Q-Max vessel – Flood 3 hours before HAT & 270° at 20 knots (with gusts to 25 knots)	
Captain		Ian Simpson	

Vessel	Type	Q-Max	(345m – 53.8m – 266,000m3)	☒
		Q-Flex	(315m – 50.0m – 210,000m3)	☐
		Moss	(300m – 52.0m – 177,000m3)	☐
		Membrane	(274m – 43.3m – 130,000m3)	☐
	Condition	Loaded	(Draft: 12.0 m)	☒
		Ballast	(Draft: 9.60 m)	☐
	Thruster used	Yes		☐
		No		☒
Condition	Position	From buoys B1-B2 to Terminal		☒
		From Terminal to buoys B1-B2		☐
		From buoys B1-B2 to second bend		☐
		From second bend to Terminal		☐
	Manoeuvre	Arrival		☒
		Departure		☐
	Tugs	N.: 4 tugs		
Metocean	Current	Dir.: Flood	Speed: 3 hours before HAT	
	Wind	Dir.: 270°	Speed: 20 Kts (gusts to 25 kts every 3 min)	

Note:
Maintaining optimum vessel positioning throughout the Creek transit is more demanding than the previous runs due to the higher current regime and leeway induced by the higher wind speed. Although the ship can be controlled and is able to complete the bends, aggressive manoeuvring techniques are required to ensure the vessel may safely navigate the bends and avoid excessive lateral drift Swinging of the ship prior to approaching the berthed FSRU requires the full longitudinal extent of the proposed swinging basin as the vessel experiences larger set due to combination of the high current and westerly wind.

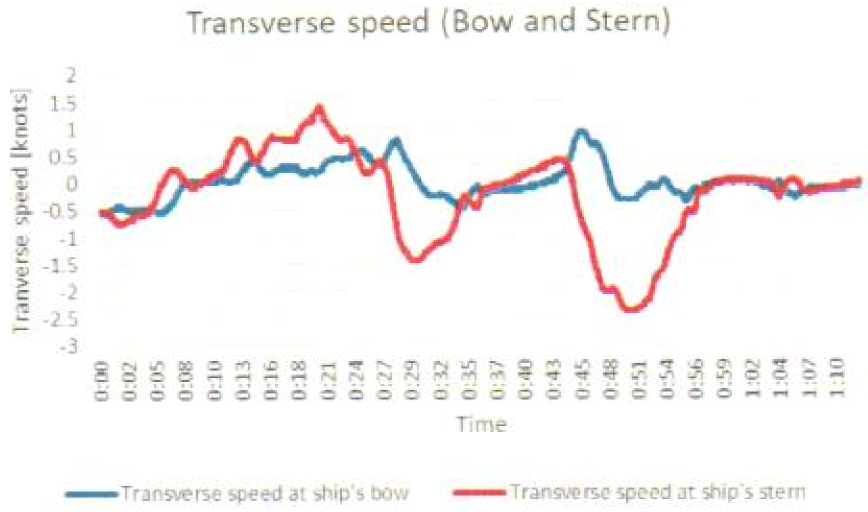


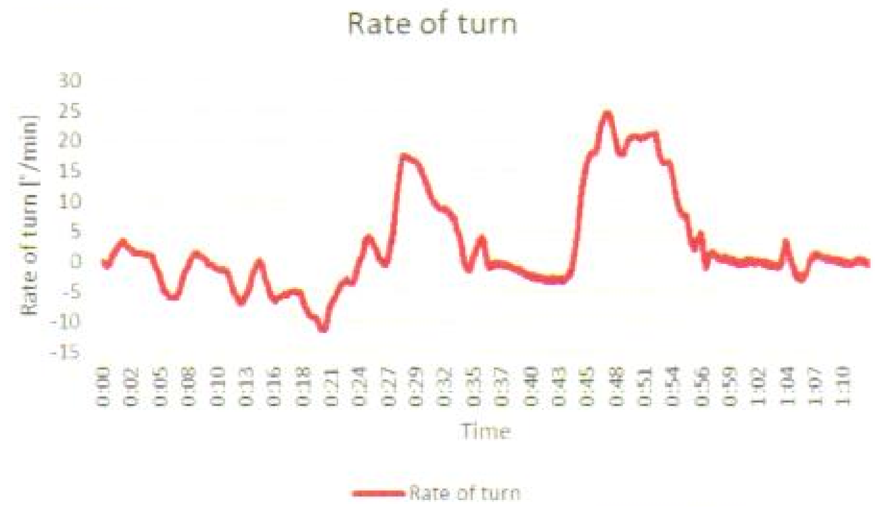

Engine RPM
RPM
Time
Port engine RPM
Starboard engine RPM

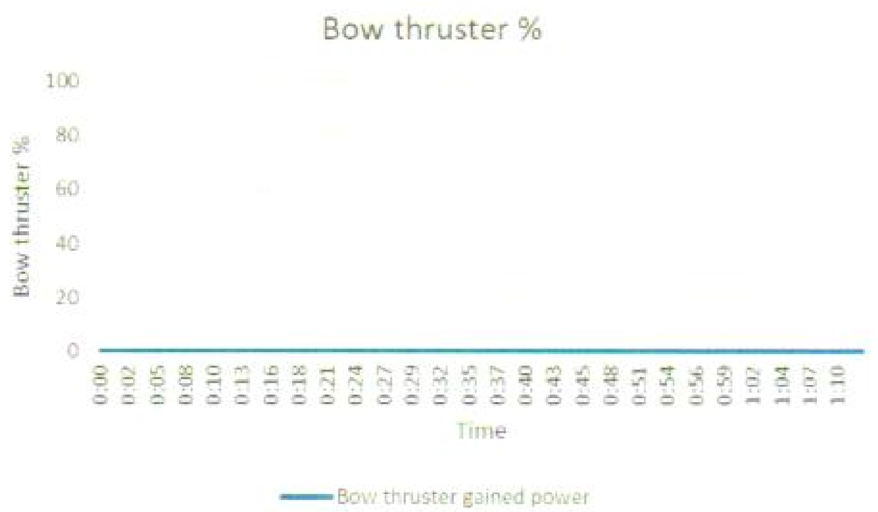

Rudder
Rudder [°]
Time
Rudder

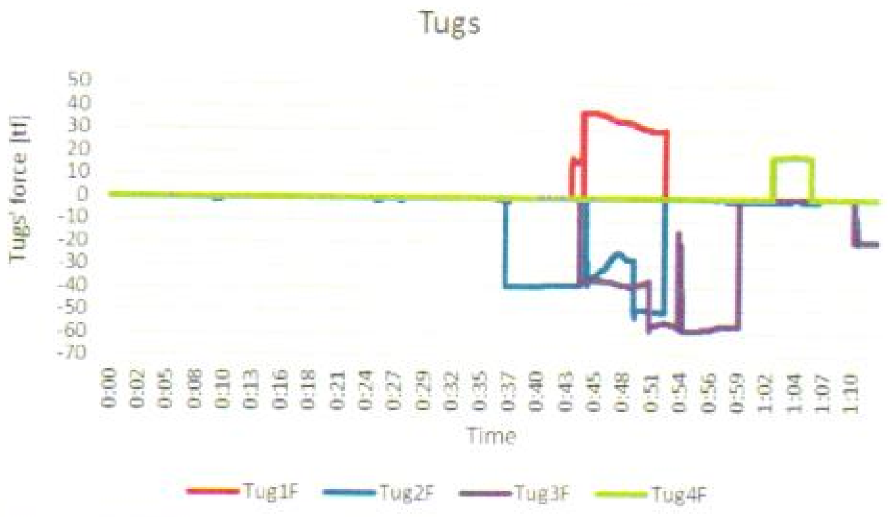

Speed OverGround (SOG)
SOG [knots]
Time
SOG

349


Transverse speed (Bow and Stern)
Tranverse speed [knots]
Time
Transverse speed at ship's bow
Transverse speed at ship's stern


Rate of turn
Rate of turn [°/min]
Time
Rate of turn


Bow thruster %
Bow thruster %
Time
Bow thruster gained power

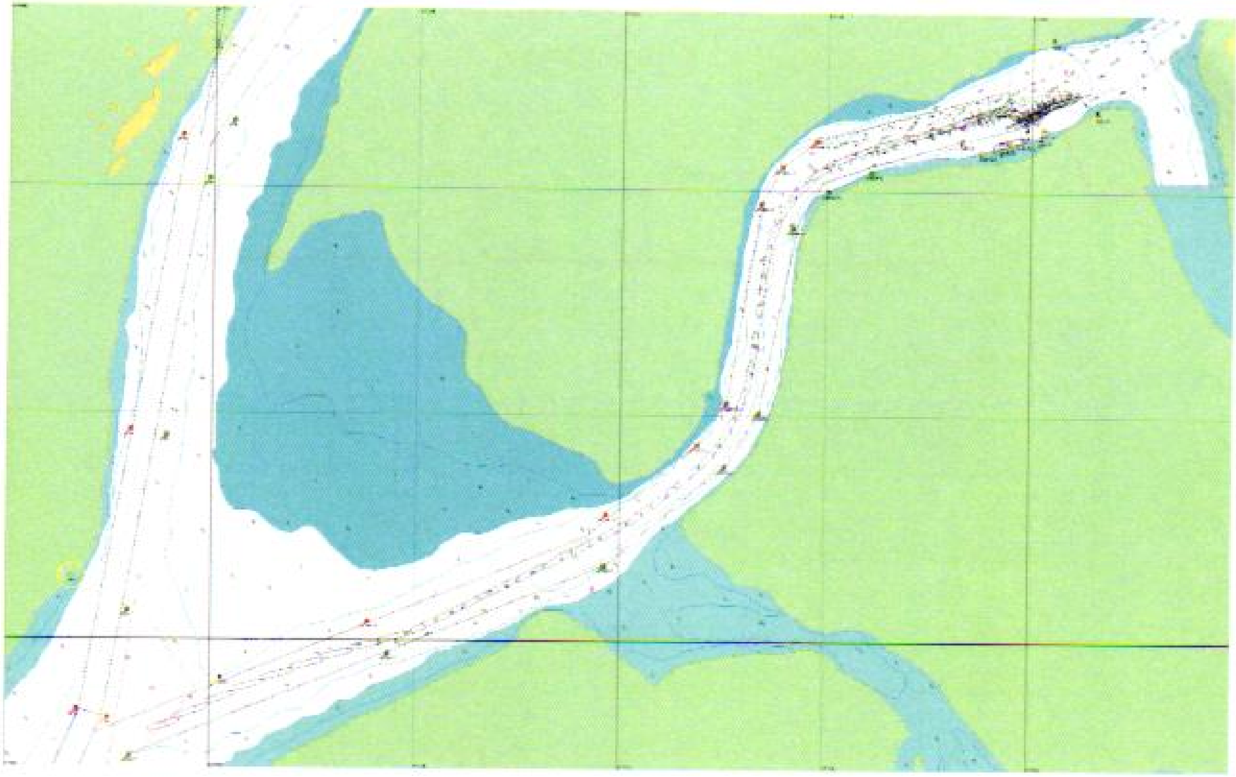

Tugs
Tugs' force [tf]
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
0:00
0:02
0:05
0:08
0:10
0:13
0:16
0:18
0:21
0:24
0:27
0:29
0:32
0:35
0:37
0:40
0:43
0:45
0:48
0:51
0:54
0:56
0:59
1:02
1:04
1:07
1:10
Time
Tug1F
Tug2F
Tug3F
Tug4F


Tugs' Angle
Tugs'angle [°]
400
350
300
250
200
150
100
50
0
0:00
0:02
0:05
0:08
0:10
0:13
0:16
0:18
0:21
0:24
0:27
0:29
0:32
0:35
0:37
0:40
0:43
0:45
0:48
0:51
0:54
0:56
0:59
1:02
1:04
1:07
1:10
Time
Tug1Angle
Tug2Angle
Tug3Angle
Tug4Angle

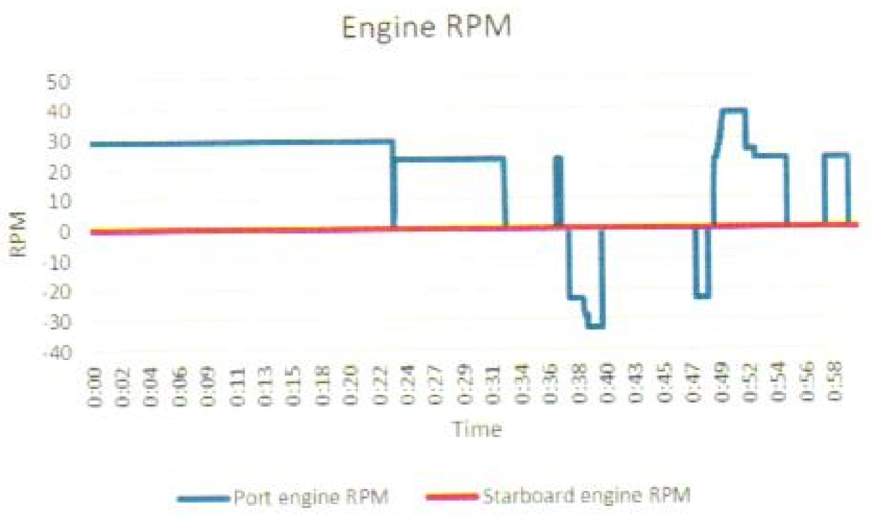
357

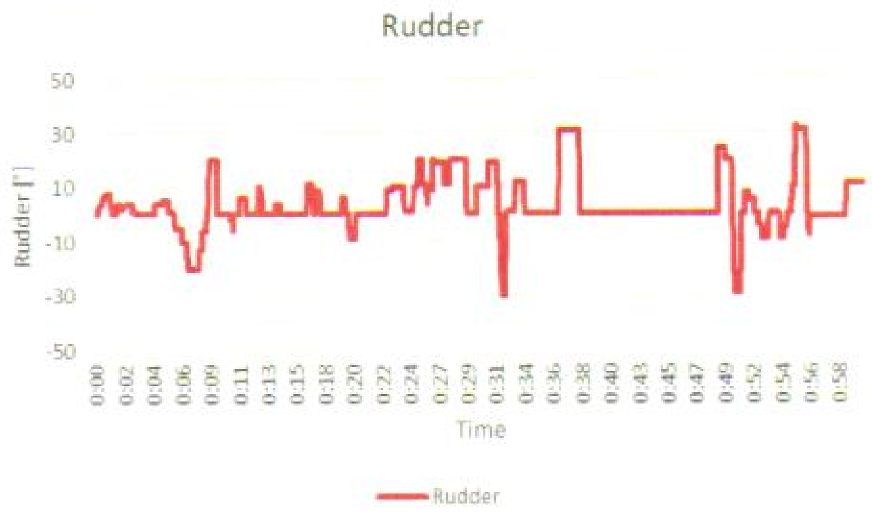
Date:	27/03/2019	Project:	Mitsubishi – JGC Corporation Tabeer LNG Terminal at Port Qasim	
Time start:	9:10	Time finish:	10:15	
Run n.	10	File name:	MTI2019_10	
Manouvre description:		Arrival with Membrane 130k m³ vessel – Flood 3 hours before HAT & 270° at 20 knots (with gusts to 25 knots)		
Captain		Ian Simpson		
Vessel	Type	Q-Max	(345m – 53.8m – 266,000m3)	☐
		Q-Flex	(315m – 50.0m – 210,000m3)	☐
		Moss	(300m – 52.0m – 177,000m3)	☐
		Membrane	(274m – 43.3m – 130,000m3)	☒
	Condition	Loaded	(Draft: 10.86 m)	☒
		Ballast	(Draft: 9.50 m)	☐
	Thruster used	Yes		☐
		No		☒
Condition	Position	From buoys B1-B2 to Terminal		☒
		From Terminal to buoys B1-B2		☐
		From buoys B1-B2 to second bend		☐
		From second bend to Terminal		☐
	Manoeuvre	Arrival		☒
		Departure		☐
	Tugs	N.: 4 tugs		
Metocean	Current	Dir.: Flood	Speed: 3 hours before HAT	
	Wind	Dir.: 270°	Speed: 20 Kts (gusts to 25 kts every 3 min)	

Note:
Safe transit, swing and berthing can be safely achieved using similar techniques as those employed for larger vessels.

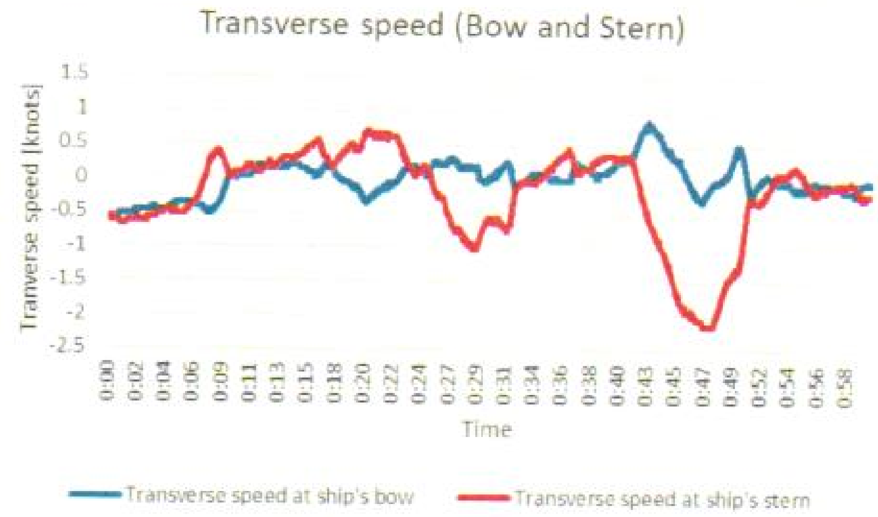


953

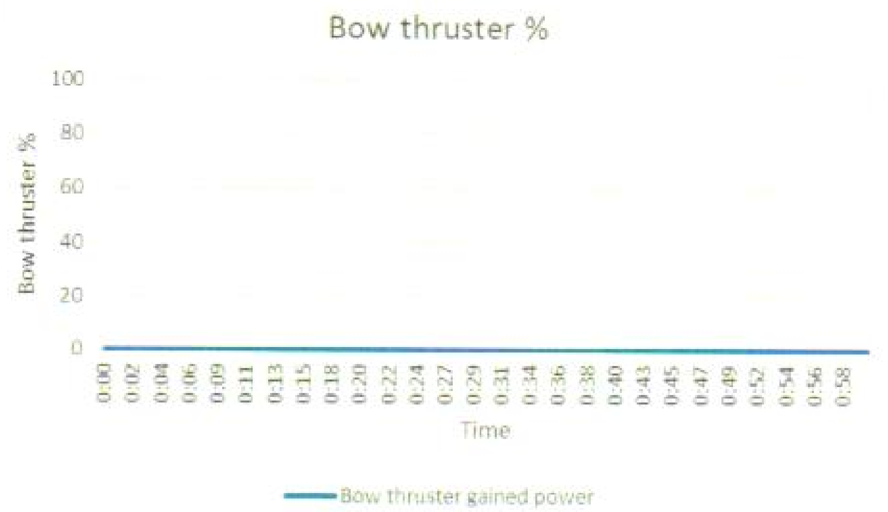

Engine RPM
RPM
50
40
30
20
10
0
-10
-20
-30
-40
Time
Port engine RPM
Starboard engine RPM


Rudder
Rudder [°]
50
30
10
-10
-30
-50
Time
Rudder

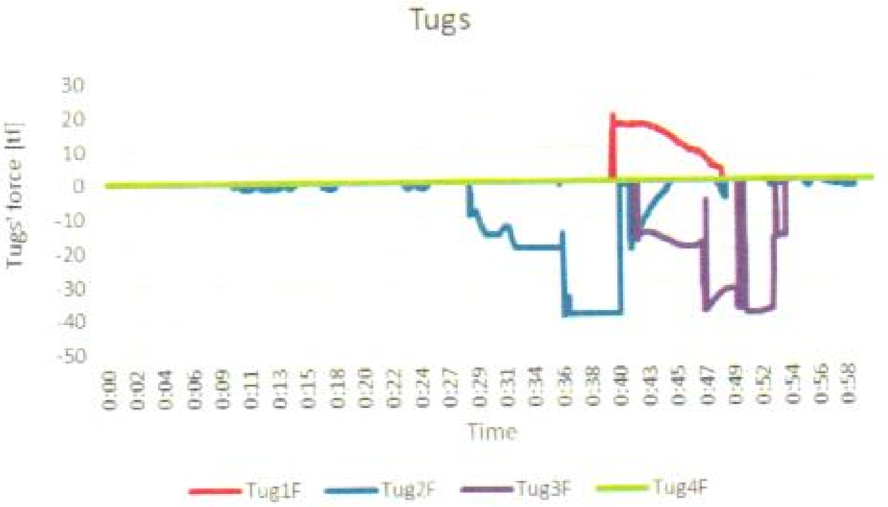

Speed OverGround (SOG)
SOG [knots]
5
4
3
2
1
0
Time
SOG


Transverse speed (Bow and Stern)
Tranverse speed [knots]
Time
Transverse speed at ship's bow
Transverse speed at ship's stern


Rate of turn
Rate of turn [°/min]
Time
Rate of turn


Bow thruster %
Bow thruster %
Time
Bow thruster gained power

955


Tugs
Tugs' force [tf]
30
20
10
0
-10
-20
-30
-40
-50
0:00 0:02 0:04 0:06 0:09 0:11 0:13 0:15 0:18 0:20 0:22 0:24 0:27 0:29 0:31 0:34 0:36 0:38 0:40 0:43 0:45 0:47 0:49 0:52 0:54 0:56 0:58
Time
Tug1F
Tug2F
Tug3F
Tug4F

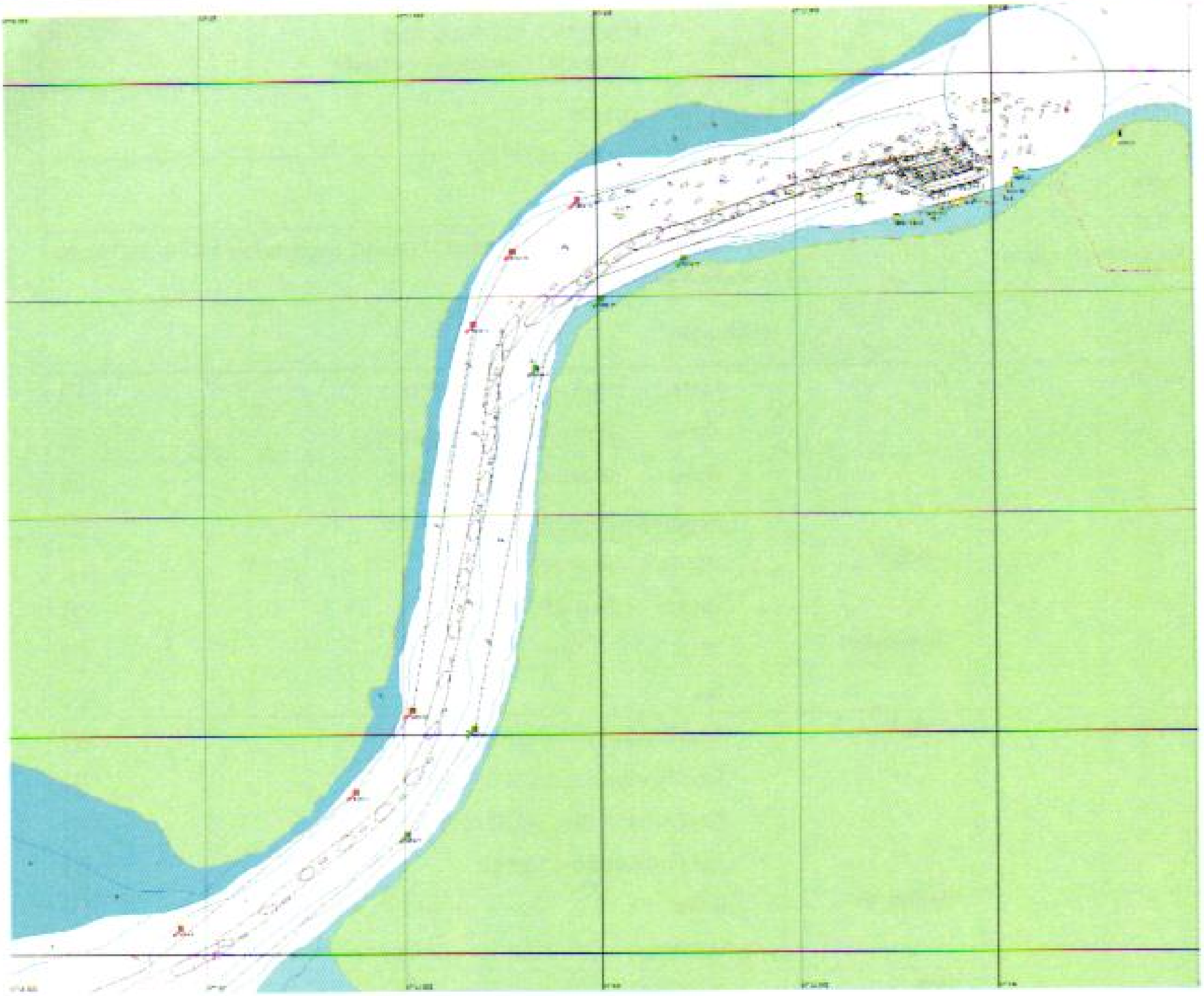

Tugs' Angle
Tugs'angle [°]
400
350
300
250
200
150
100
50
0
0:00 0:02 0:04 0:06 0:09 0:11 0:13 0:15 0:18 0:20 0:22 0:24 0:27 0:29 0:31 0:34 0:36 0:38 0:40 0:43 0:45 0:47 0:49 0:52 0:54 0:56 0:58
Time
Tug1Angle
Tug2Angle
Tug3Angle
Tug4Angle

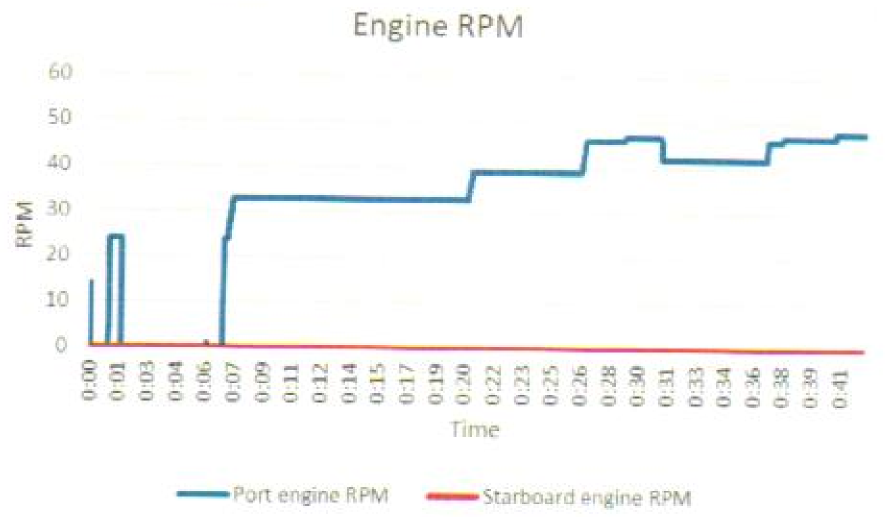
RINA

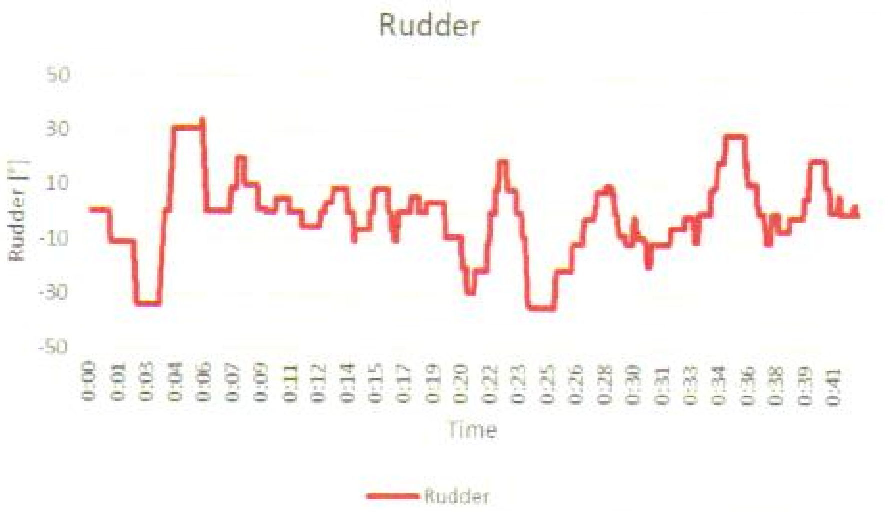
Date:	27/03/2019	Project:	Mitsubishi – JGC Corporation Tabeer LNG Terminal at Port Qasim
Time start:	10:45	Time finish:	11:30
Run n.	11	File name:	MTI2019_11
Manouvre description:		Departure with Moss 170k m^3 vessel – Flood 3 hours before HAT & 253° at 20 knots (with gusts to 25 knots)	
Captain		Ian Simpson	

Vessel	Type	Q-Max	(345m – 53.8m – 266,000m3)	☐
		Q-Flex	(315m – 50.0m – 210,000m3)	☐
		Moss	(300m – 52.0m – 177,000m3)	☒
		Membrane	(274m – 43.3m – 130,000m3)	☐
	Condition	Loaded	(Draft: 11.55 m)	☐
		Ballast	(Draft: 9.50 m)	☒
	Thruster used	Yes		☐
		No		☒
Condition	Position	From buoys B1-B2 to Terminal		☐
		From Terminal to buoys B1-B2		☒
		From buoys B1-B2 to second bend		☐
		From second bend to Terminal		☐
	Manoeuvre	Arrival		☐
		Departure		☒
	Tugs	N.: 4 tugs		
Metocean	Current	Dir.: Flood	Speed: 3 hours before HAT	
	Wind	Dir.: 253°	Speed: 20 Kts (gusts to 25 kts every 3 min)	

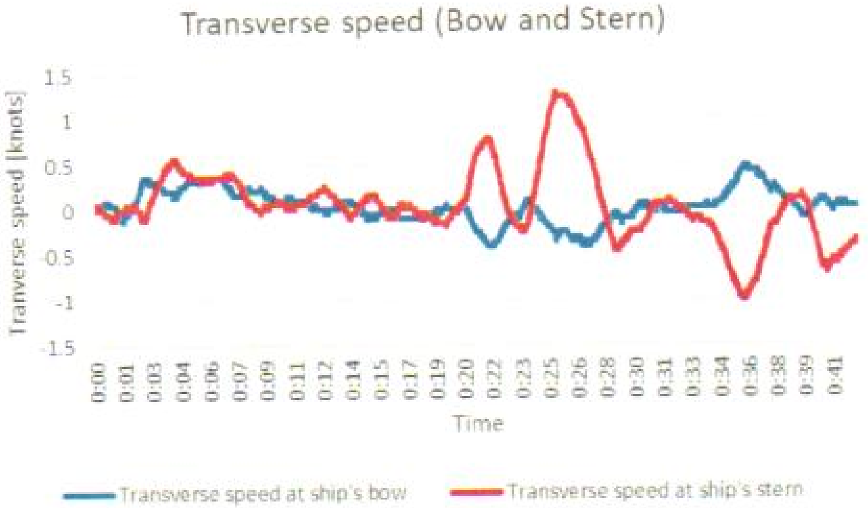
Note:
For this vessel: outward passage is achievable in the same conditions as arrivals. Care is necessary to achieve optimum vessel positioning when rounding bend west of terminal as vessel experiences high degree of set & leeway in these environmental conditions. Similar speeds to those of the inward passage are required to achieve safe transit.



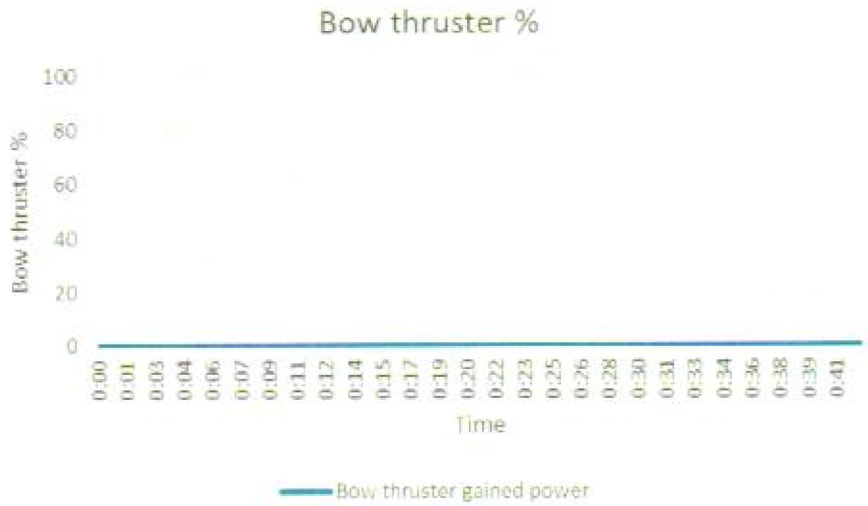

Engine RPM
60
50
40
30
20
10
0
RPM
0:00
0:01
0:03
0:04
0:06
0:07
0:09
0:11
0:12
0:14
0:15
0:17
0:19
0:20
0:22
0:23
0:25
0:26
0:28
0:30
0:31
0:33
0:34
0:36
0:38
0:39
0:41
Time
Port engine RPM
Starboard engine RPM

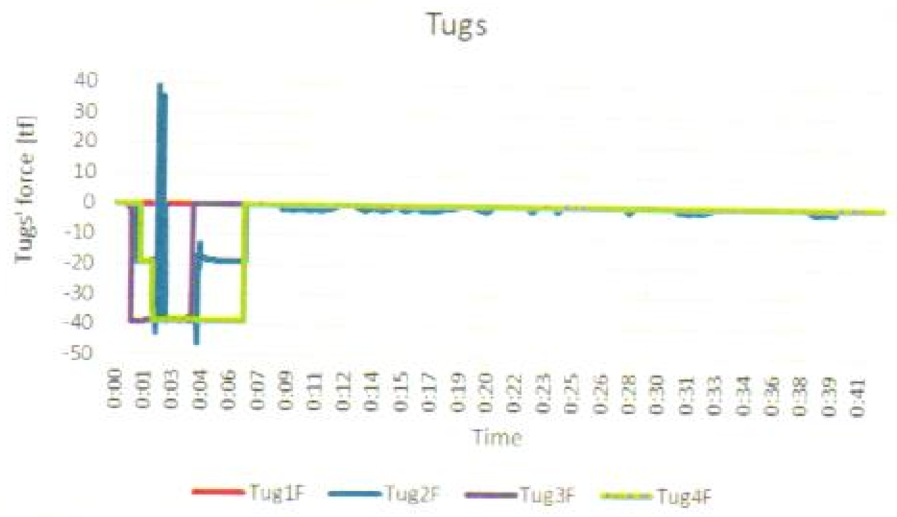

Rudder
50
30
10
-10
-30
-50
Rudder [°]
Time
Rudder


Speed OverGround (SOG)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
SOG [knots]
Time
SOG


Transverse speed (Bow and Stern)
Tranverse speed [knots]
Time
Transverse speed at ship's bow
Transverse speed at ship's stern


Rate of turn
Rate of turn [°/min]
Time
Rate of turn


Bow thruster %
Bow thruster %
Time
Bow thruster gained power


Tugs
40
30
20
10
0
-10
-20
-30
-40
-50
Tugs' force [tf]
0:00
0:01
0:03
0:04
0:06
0:07
0:09
0:11
0:12
0:14
0:15
0:17
0:19
0:20
0:22
0:23
0:25
0:26
0:28
0:30
0:31
0:33
0:34
0:36
0:38
0:39
0:41
Time
Tug1F
Tug2F
Tug3F
Tug4F

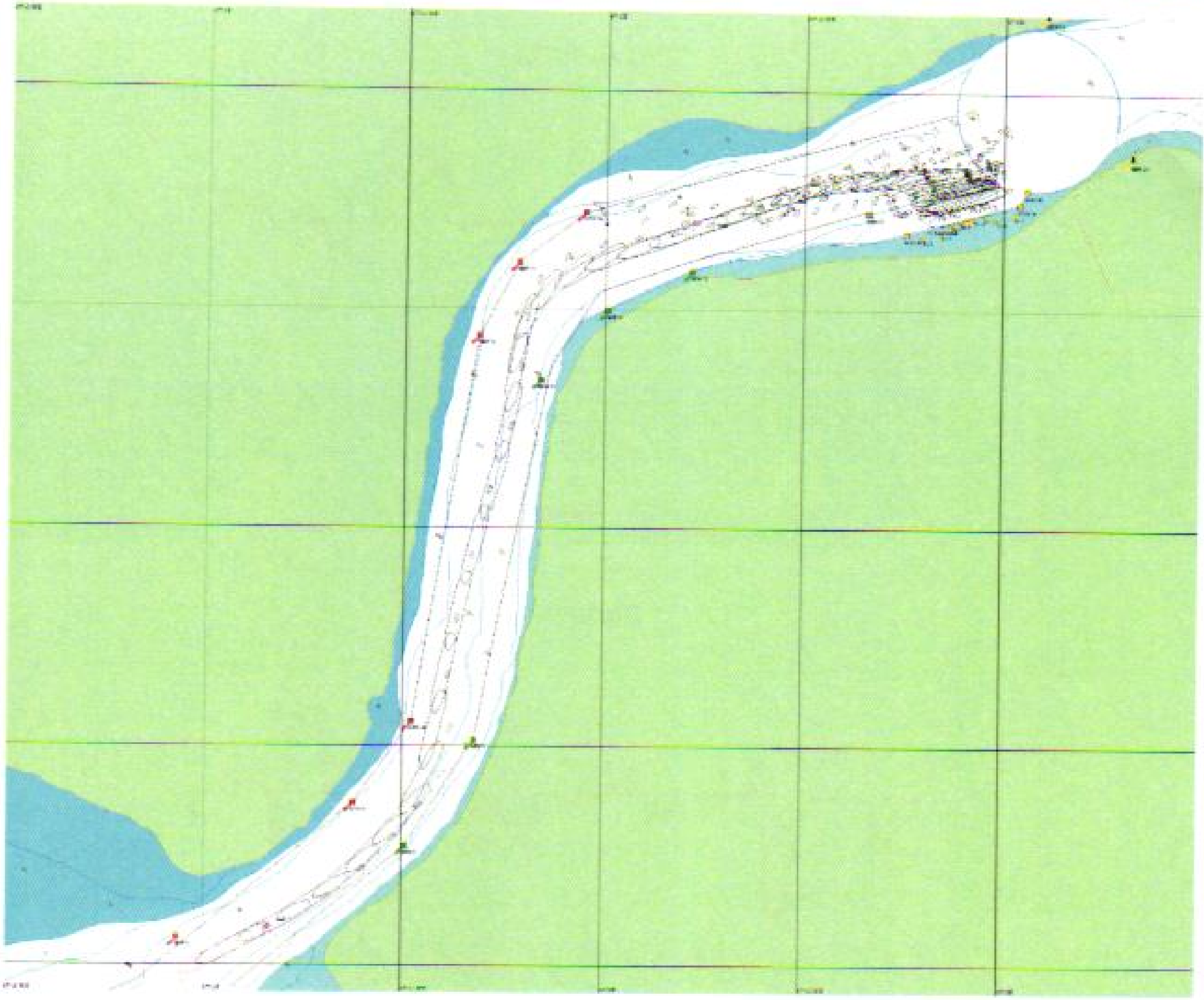

Tugs' Angle
350
300
250
200
150
100
50
0
Tugs'angle [°]
0:00
0:01
0:03
0:04
0:06
0:07
0:09
0:11
0:12
0:14
0:15
0:17
0:19
0:20
0:22
0:23
0:25
0:26
0:28
0:30
0:31
0:33
0:34
0:36
0:38
0:39
0:41
Time
Tug1Angle
Tug2Angle
Tug3Angle
Tug4Angle

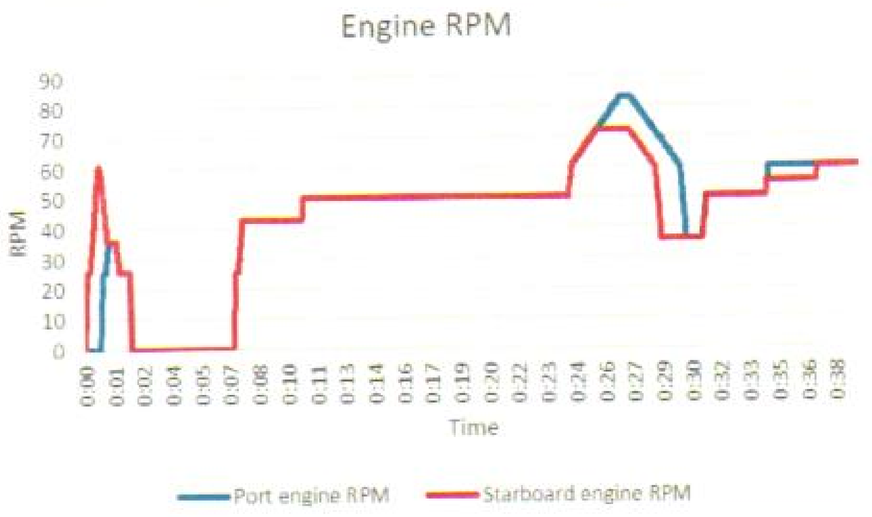
Date:	27/03/2019	Project:	Mitsubishi – JGC Corporation Tabeer LNG Terminal at Port Qasim
Time start:	11:45	Time finish:	12:20
Run n.	12	File name:	MTI2019_12
Manouvre description:		Departure with Q-Max vessel – Flood 3 hours before HAT & 253° at 20 knots (with gusts to 25 knots)	
Captain		Ian Simpson	

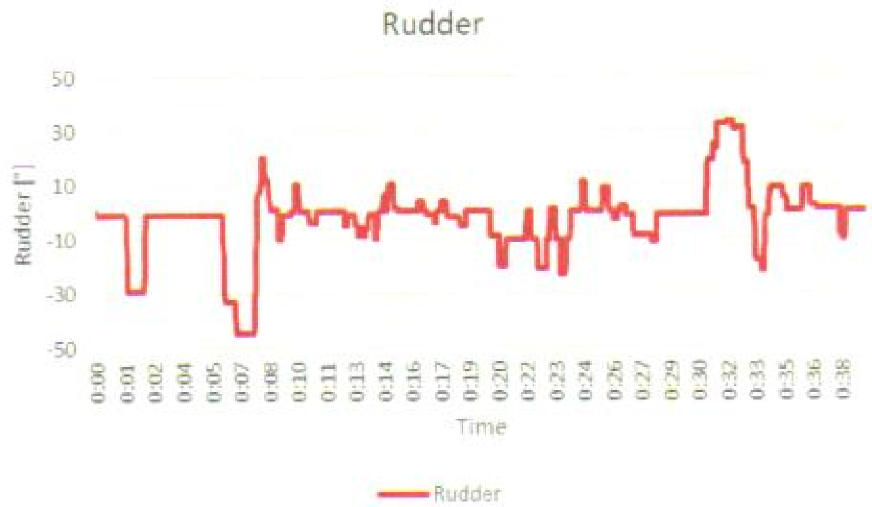
Vessel	Type	Q-Max	(345m – 53.8m – 266,000m3)	☒
		Q-Flex	(315m – 50.0m – 210,000m3)	☐
		Moss	(300m – 52.0m – 177,000m3)	☐
		Membrane	(274m – 43.3m – 130,000m3)	☐
	Condition	Loaded	(Draft: 12.0 m)	☐
		Ballast	(Draft: 9.60 m)	☒
	Thruster used	Yes		☐
		No		☒
Condition	Position	From buoys B1-B2 to Terminal		☐
		From Terminal to buoys B1-B2		☒
		From buoys B1-B2 to second bend		☐
		From second bend to Terminal		☐
	Manoeuvre	Arrival		☐
		Departure		☒
	Tugs	N.: 4 tugs		
Metocean	Current	Dir.: Flood	Speed: 3 hours before HAT	
	Wind	Dir.: 253°	Speed: 20 Kts (gusts to 25 kts every 3 min)	

Note:

For this vessel: outward passage is achievable in the same conditions as arrivals. Similar speeds to those of the inward passage are required to achieve safe transit.

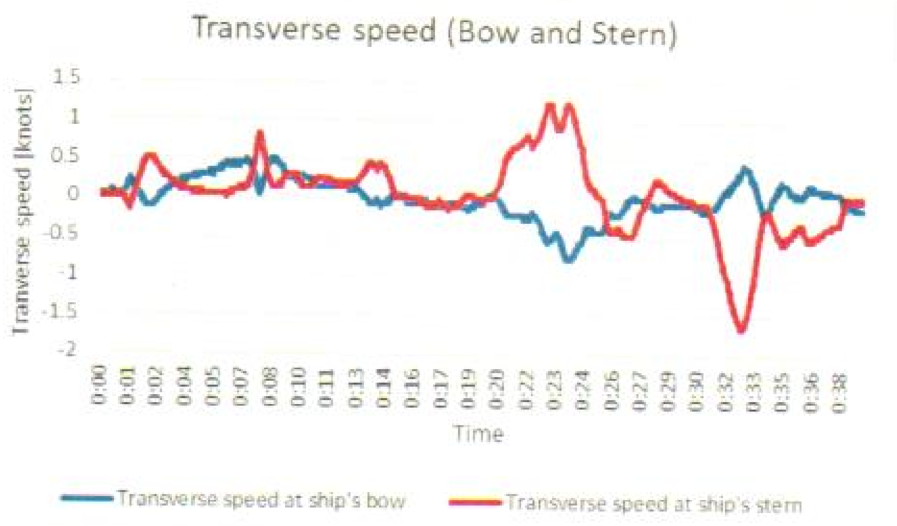



Engine RPM
90
80
70
60
50
40
30
20
10
0
RPM
0:00
0:01
0:02
0:04
0:05
0:07
0:08
0:10
0:11
0:13
0:14
0:16
0:17
0:19
0:20
0:22
0:23
0:24
0:26
0:27
0:29
0:30
0:32
0:33
0:35
0:36
0:38
Time
Port engine RPM
Starboard engine RPM

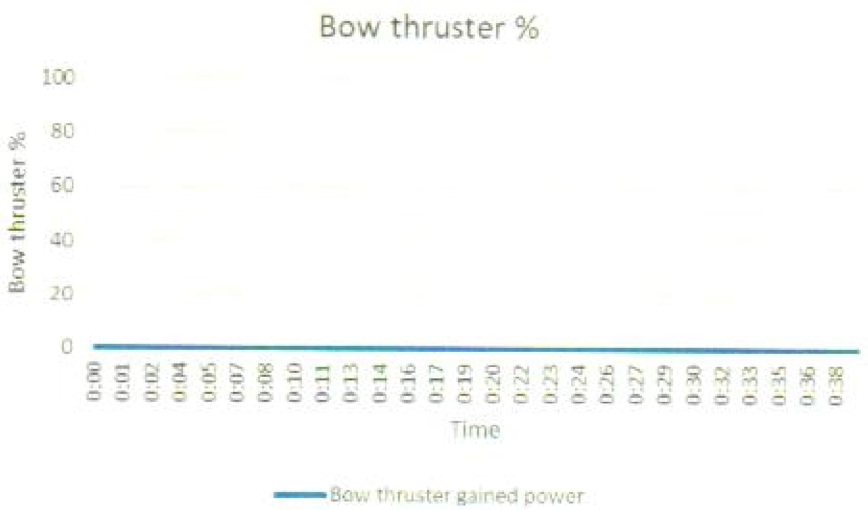

Rudder
50
30
10
-10
-30
-50
Rudder [°]
0:00
0:01
0:02
0:04
0:05
0:07
0:08
0:10
0:11
0:13
0:14
0:16
0:17
0:19
0:20
0:22
0:23
0:24
0:26
0:27
0:29
0:30
0:32
0:33
0:35
0:36
0:38
Time
Rudder


Speed OverGround (SOG)
6
5
4
3
2
1
0
SOG [knots]
0:00
0:01
0:02
0:04
0:05
0:07
0:08
0:09
0:11
0:12
0:14
0:15
0:17
0:18
0:19
0:21
0:22
0:24
0:25
0:26
0:28
0:29
0:31
0:32
0:34
0:35
0:36
0:38
Time
SOG

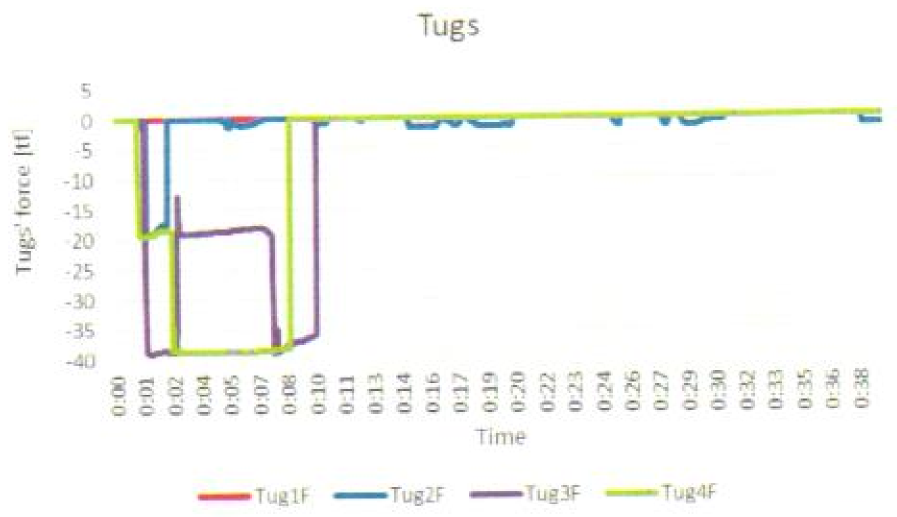
964H

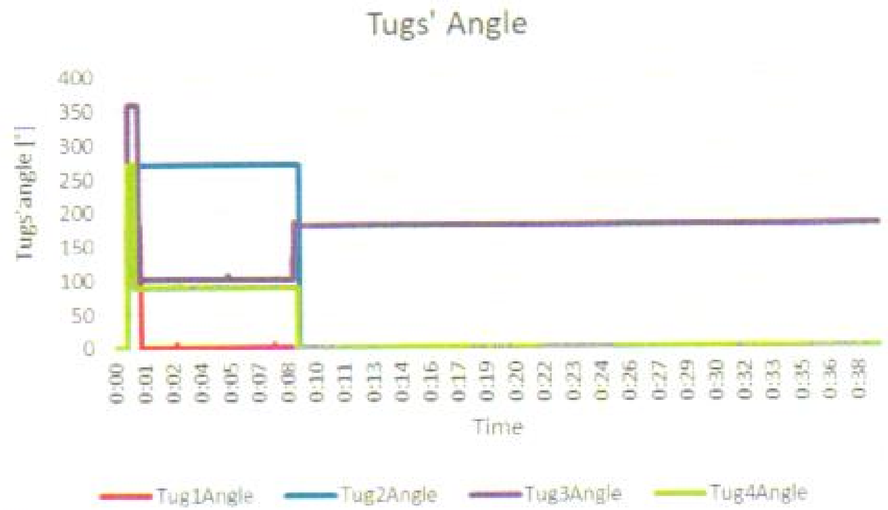

Transverse speed (Bow and Stern)
Tranverse speed [knots]
Time
Transverse speed at ship's bow
Transverse speed at ship's stern


Rate of turn
Rate of turn [°/min]
Time
Rate of turn


Bow thruster %
Bow thruster %
Time
Bow thruster gained power

365


Tugs
Tugs' force [tf]
5
0
-5
-10
-15
-20
-25
-30
-35
-40
0:00 0:01 0:02 0:04 0:05 0:07 0:08 0:10 0:11 0:13 0:14 0:16 0:17 0:19 0:20 0:22 0:23 0:24 0:26 0:27 0:29 0:30 0:32 0:33 0:35 0:36 0:38
Time
Tug1F
Tug2F
Tug3F
Tug4F


Tugs' Angle
Tugs'angle [°]
400
350
300
250
200
150
100
50
0
0:00 0:01 0:02 0:04 0:05 0:07 0:08 0:10 0:11 0:13 0:14 0:16 0:17 0:19 0:20 0:22 0:23 0:24 0:26 0:27 0:29 0:30 0:32 0:33 0:35 0:36 0:38
Time
Tug1Angle
Tug2Angle
Tug3Angle
Tug4Angle

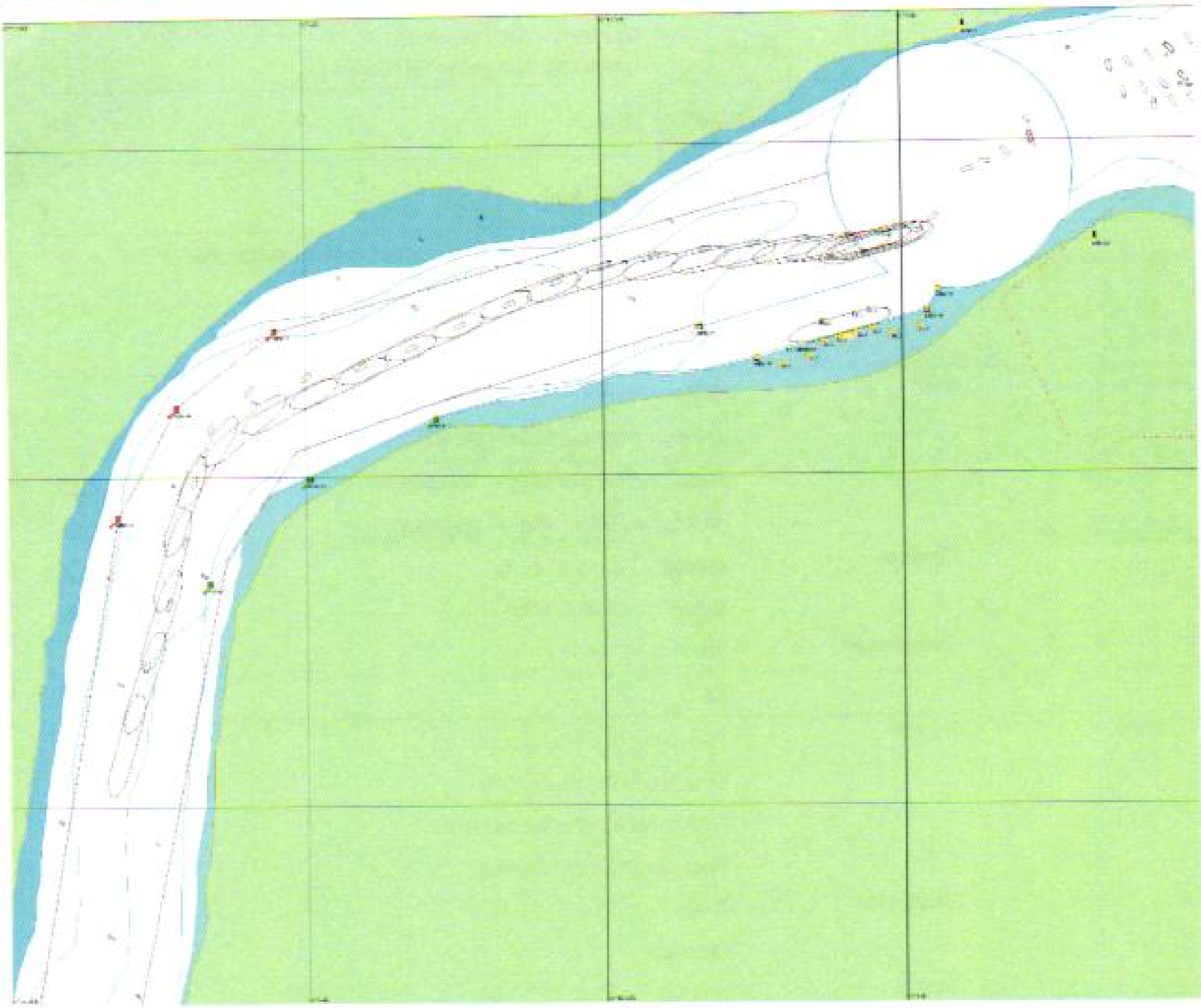
RINA

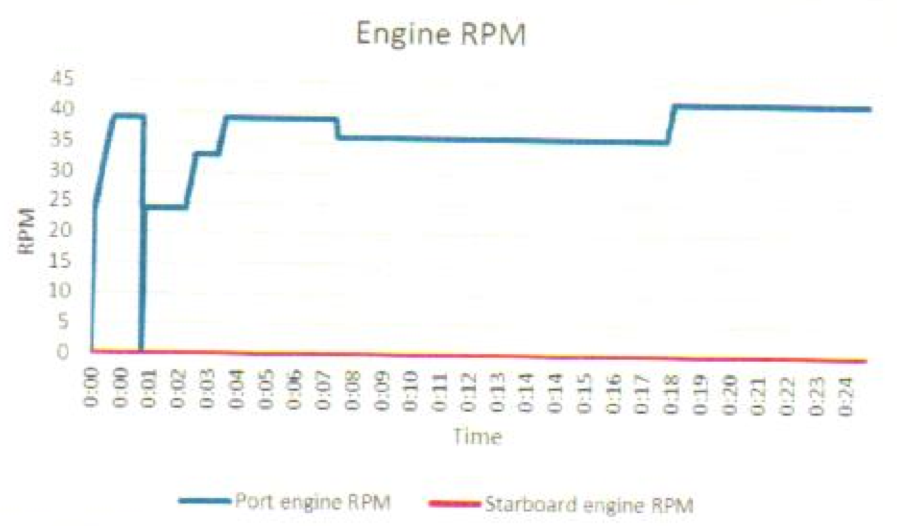
Date:	27/03/2019	Project:	Mitsubishi - JGC Corporation Tabeer LNG Terminal at Port Qasim
Time start:	12:45	Time finish:	13:10
Run n.	13	File name:	MTI2019_13
Manouvre description:		Departure with Moss 170k m^3 vessel – Flood 3 hours before HAT & 253° at 20 knots (with gusts to 25 knots)	
Captain		Ian Simpson	

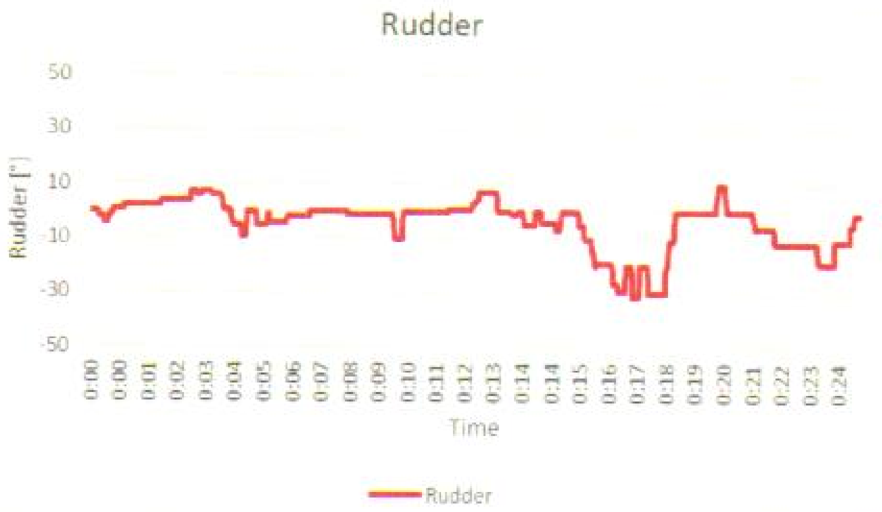
Vessel	Type	Q-Max	(345m – 53.8m – 266,000m3)	☐
		Q-Flex	(315m – 50.0m – 210,000m3)	☐
		Moss	(300m – 52.0m – 177,000m3)	☒
		Membrane	(274m – 43.3m – 130,000m3)	☐
	Condition	Loaded	(Draft: 11.55 m)	☐
		Ballast	(Draft: 9.50 m)	☒
	Thruster used	Yes		☐
		No		☒
Condition	Position	From buoys B1-B2 to Terminal		☐
		From Terminal to buoys B1-B2		☒
		From buoys B1-B2 to second bend		☐
		From second bend to Terminal		☐
	Manoeuvre	Arrival		☐
		Departure		☒
	Tugs	N.: 1 tug		
Metocean	Current	Dir.: Flood	Speed: 3 hours before HAT	
	Wind	Dir.: 253°	Speed: 20 Kts (gusts to 25 kts every 3 min)	

Note:
Repeat of run 11 to address issues identified at 1st outward bend. Commencing outward turn when further west with higher rate of turn results in vessel following a safer track. Conclusion-is these vessels may safely transit in these conditions if a similar speed profile and lateral channel position is adopted as on inward passage.

367

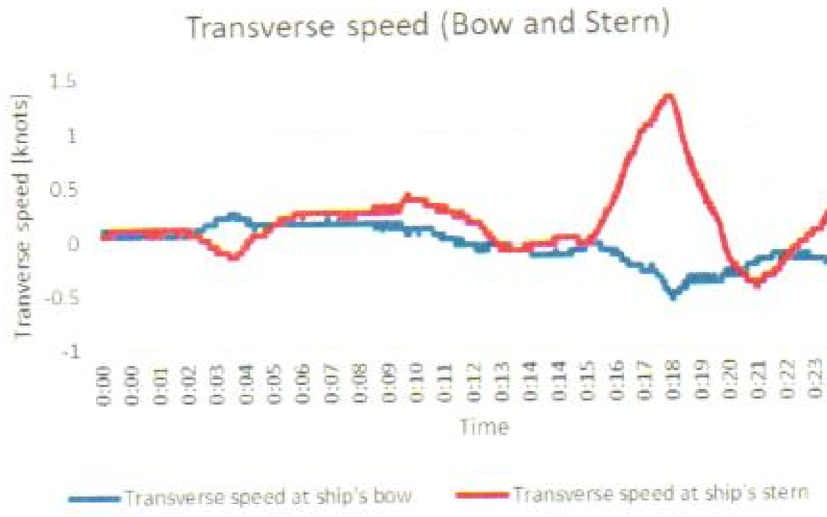



Engine RPM
RPM
0
5
10
15
20
25
30
35
40
45
Time
Port engine RPM
Starboard engine RPM

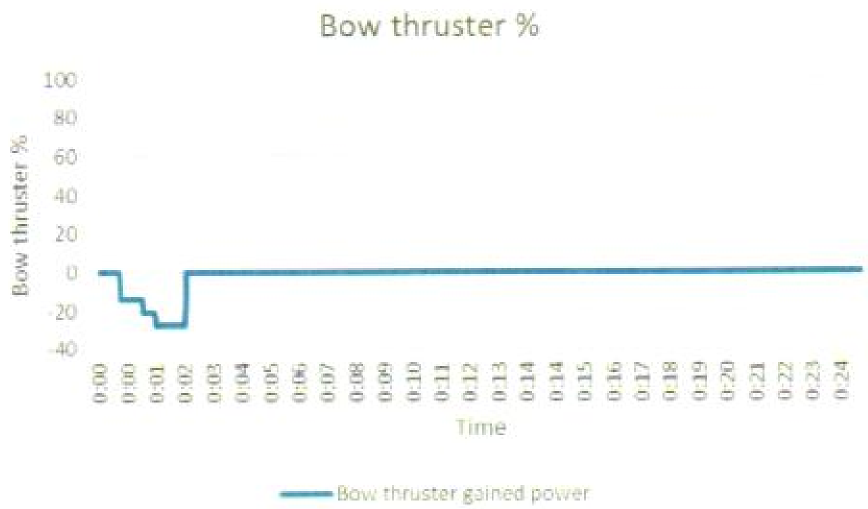

Rudder
Rudder [°]
50
30
10
-10
-30
-50
Time
Rudder

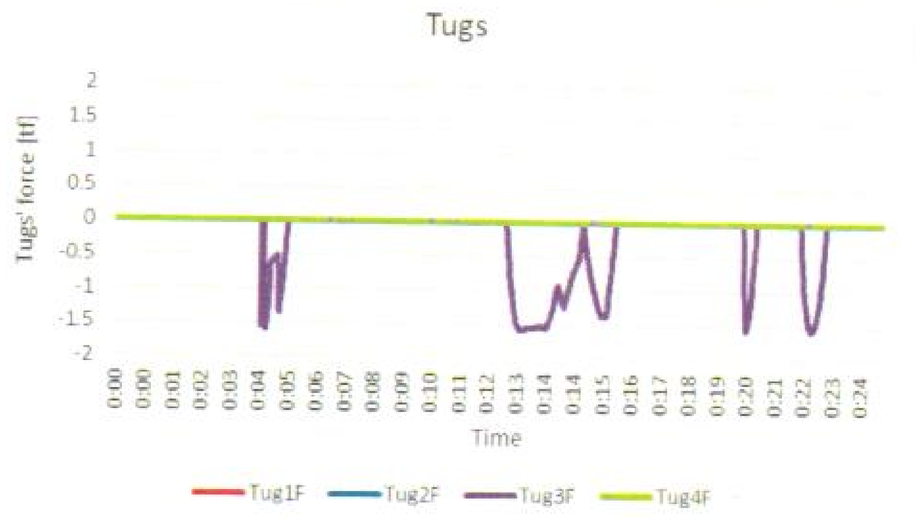

Speed OverGround (SOG)
SOG [knots]
0
0.5
1
1.5
2
2.5
3
3.5
Time
SOG

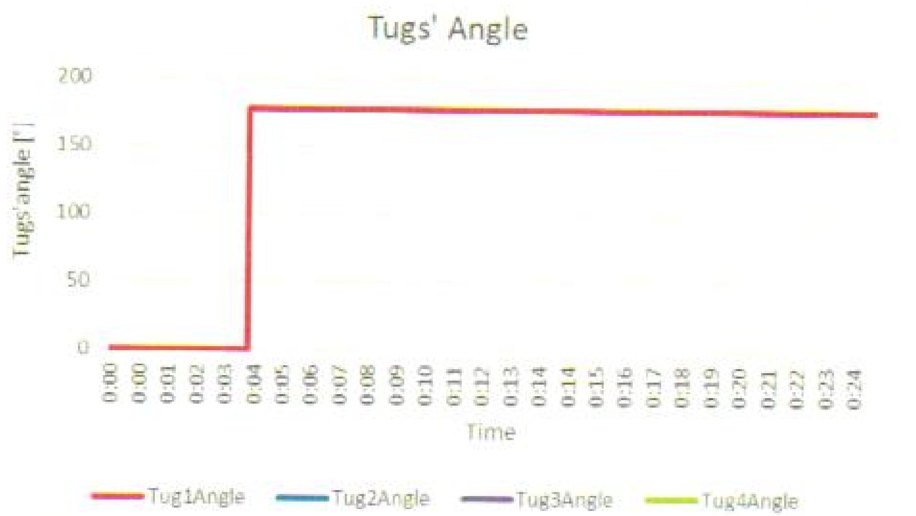
969


Transverse speed (Bow and Stern)
Tranverse speed [knots]
Time
Transverse speed at ship's bow
Transverse speed at ship's stern


Rate of turn
Rate of turn [°/min]
Time
Rate of turn


Bow thruster %
Bow thruster %
Time
Bow thruster gained power


Tugs
Tugs' force [tf]
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
0:00
0:00
0:01
0:02
0:03
0:04
0:05
0:06
0:07
0:08
0:09
0:10
0:11
0:12
0:13
0:14
0:14
0:15
0:16
0:17
0:18
0:19
0:20
0:21
0:22
0:23
0:24
Time
Tug1F
Tug2F
Tug3F
Tug4F


Tugs' Angle
Tugs'angle [°]
200
150
100
50
0
0:00
0:00
0:01
0:02
0:03
0:04
0:05
0:06
0:07
0:08
0:09
0:10
0:11
0:12
0:13
0:14
0:14
0:15
0:16
0:17
0:18
0:19
0:20
0:21
0:22
0:23
0:24
Time
Tug1Angle
Tug2Angle
Tug3Angle
Tug4Angle

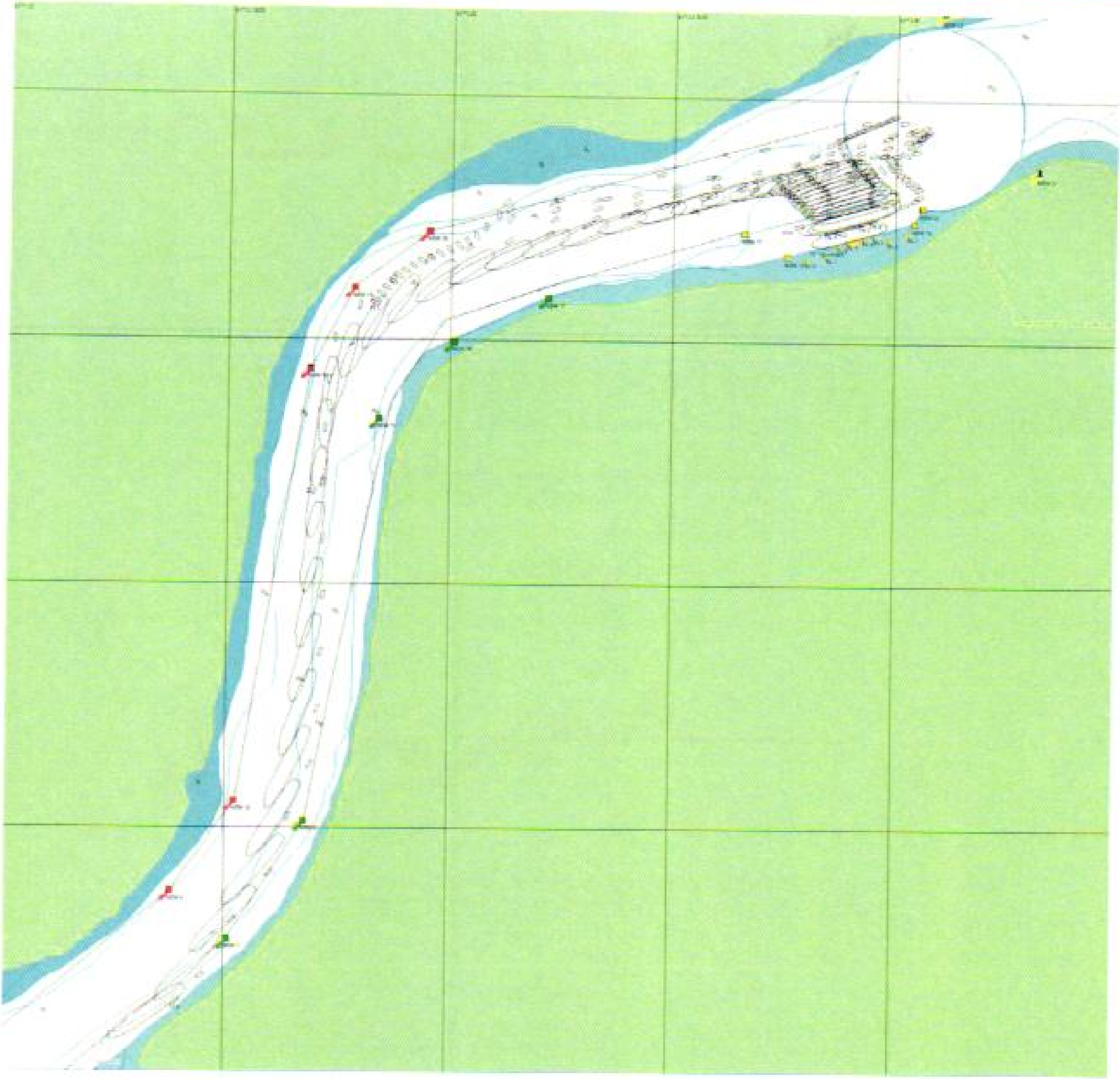
371

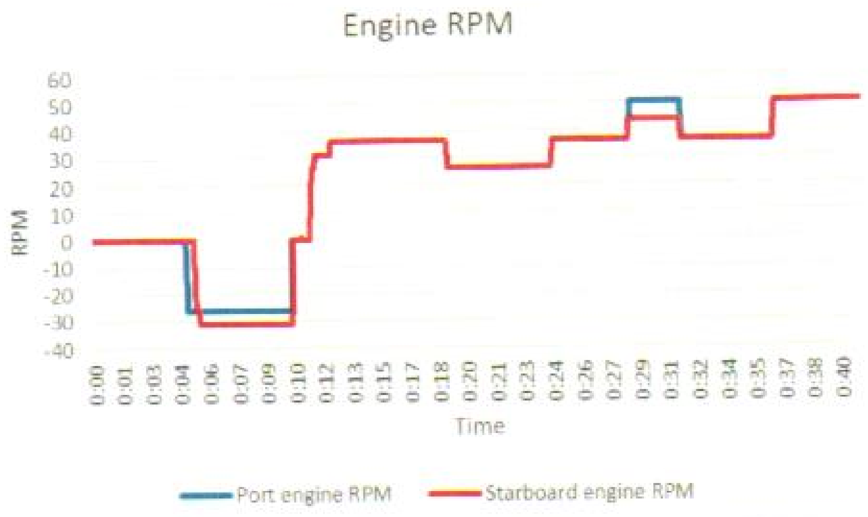
RINA

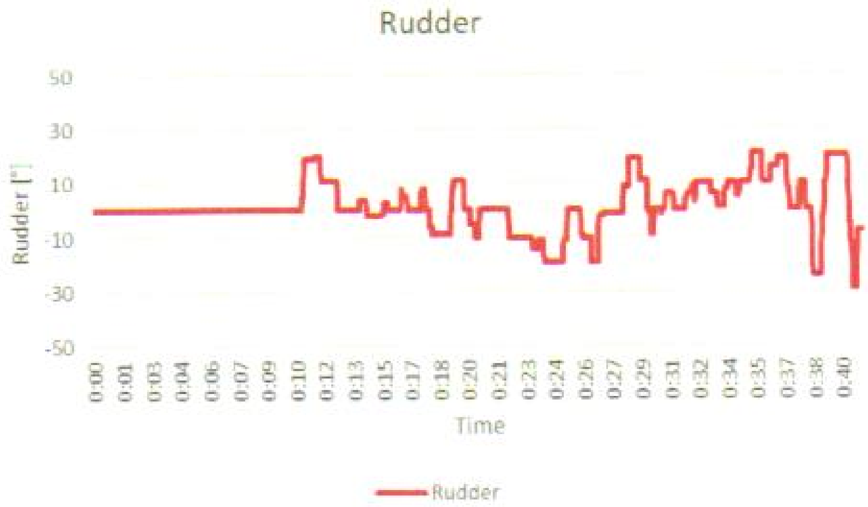
Date:	27/03/2019	Project:	Mitsubishi – JGC Corporation Tabeer LNG Terminal at Port Qasim
Time start:	14:45	Time finish:	15:30
Run n.	14	File name:	MTI2019_14
Manouvre description:		Departure with Q-Max vessel – Ebb 15 minutes before max ebb & 253° at 20 knots (with gusts to 25 knots)	
Captain		Ian Simpson	

Vessel	Type	Q-Max	(345m – 53.8m – 266,000m3)	☒
		Q-Flex	(315m – 50.0m – 210,000m3)	☐
		Moss	(300m – 52.0m – 177,000m3)	☐
		Membrane	(274m – 43.3m – 130,000m3)	☐
	Condition	Loaded	(Draft: 12.0 m)	☐
		Ballast	(Draft: 9.60 m)	☒
	Thruster used	Yes		☐
		No		☒
Condition	Position	From buoys B1-B2 to Terminal		☐
		From Terminal to buoys B1-B2		☒
		From buoys B1-B2 to second bend		☐
		From second bend to Terminal		☐
	Manoeuvre	Arrival		☐
		Departure		☒
	Tugs	N.: 4 tugs		
Metocean	Current	Dir.: Ebb	Speed: 15 minutes before max ebb	
	Wind	Dir.: 253°	Speed: 20 Kts (gusts to 25 kts every 3 min)	

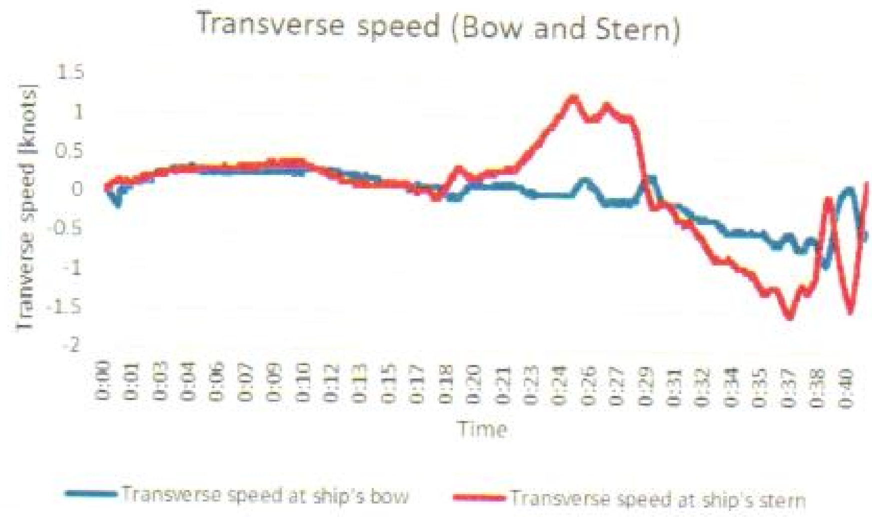
Note:
The outward transit cannot be safely achieved. In the 2nd bend, the ship is set to south and grounded due to the significant lateral motion induced by current acting on vessels beam when setting the turn into 2nd outward bend. Difficult to maintain transit speeds required in the following current. Not recommended to be performed.



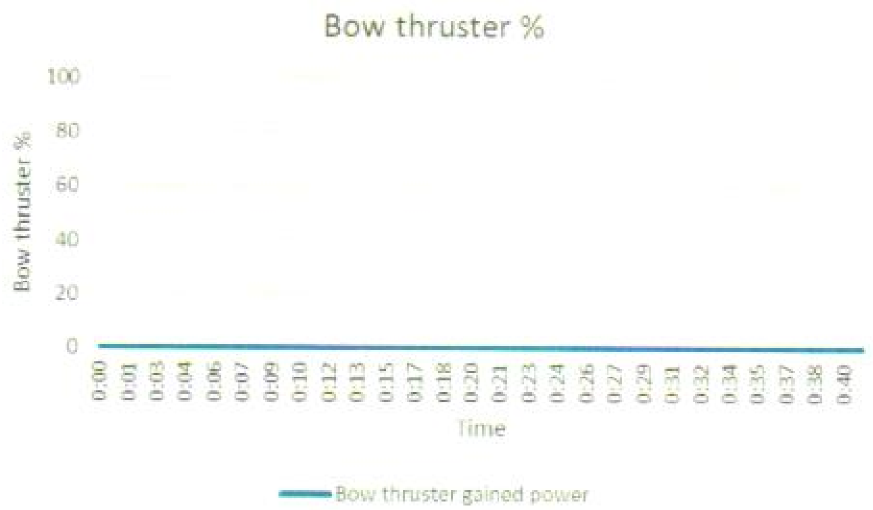

Engine RPM
60
50
40
30
20
10
0
-10
-20
-30
-40
RPM
0:00
0:01
0:03
0:04
0:06
0:07
0:09
0:10
0:12
0:13
0:15
0:17
0:18
0:20
0:21
0:23
0:24
0:26
0:27
0:29
0:31
0:32
0:34
0:35
0:37
0:38
0:40
Time
Port engine RPM
Starboard engine RPM

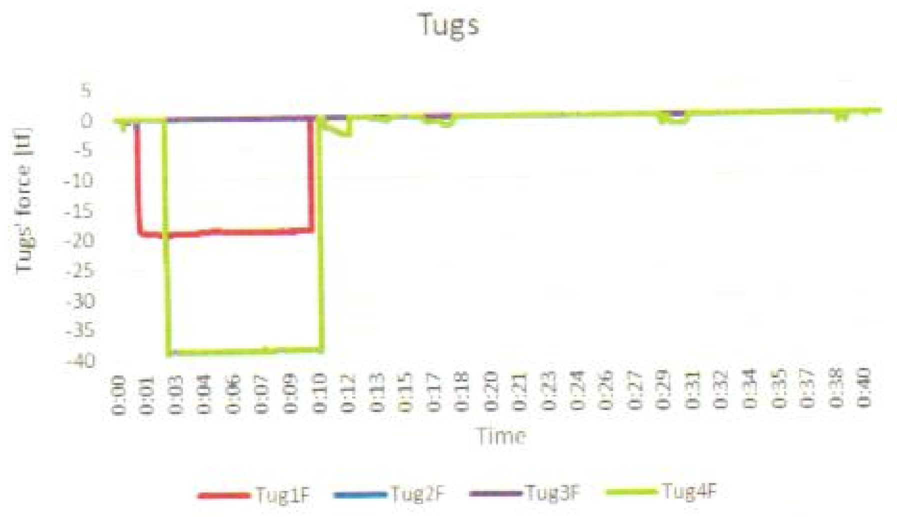

Rudder
50
30
10
-10
-30
-50
Rudder [°]
0:00
0:01
0:03
0:04
0:06
0:07
0:09
0:10
0:12
0:13
0:15
0:17
0:18
0:20
0:21
0:23
0:24
0:26
0:27
0:29
0:31
0:32
0:34
0:35
0:37
0:38
0:40
Time
Rudder

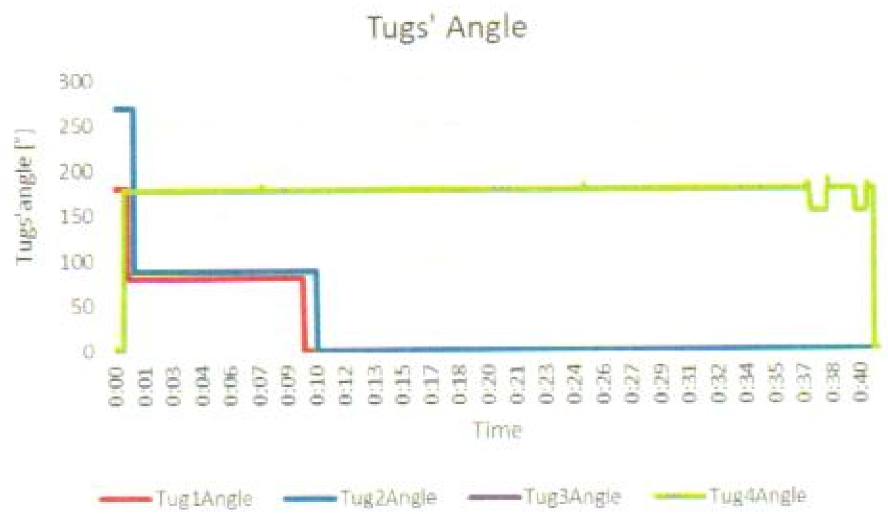

Speed OverGround (SOG)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
SOG [knots]
0:00
0:01
0:03
0:04
0:06
0:07
0:09
0:10
0:12
0:13
0:15
0:17
0:18
0:20
0:21
0:23
0:24
0:26
0:27
0:29
0:31
0:32
0:34
0:35
0:37
0:38
0:40
Time
SOG


Transverse speed (Bow and Stern)
Tranverse speed [knots]
1.5
1
0.5
0
-0.5
-1
-1.5
-2
0:00 0:01 0:03 0:04 0:06 0:07 0:09 0:10 0:12 0:13 0:15 0:17 0:18 0:20 0:21 0:23 0:24 0:26 0:27 0:29 0:31 0:32 0:34 0:35 0:37 0:38 0:40
Time
Transverse speed at ship's bow
Transverse speed at ship's stern


Rate of turn
Rate of turn [°/min]
20
15
10
5
0
-5
-10
-15
0:00 0:01 0:03 0:04 0:06 0:07 0:09 0:10 0:12 0:13 0:15 0:17 0:18 0:20 0:21 0:23 0:24 0:26 0:27 0:29 0:31 0:32 0:34 0:35 0:37 0:38 0:40
Time
Rate of turn

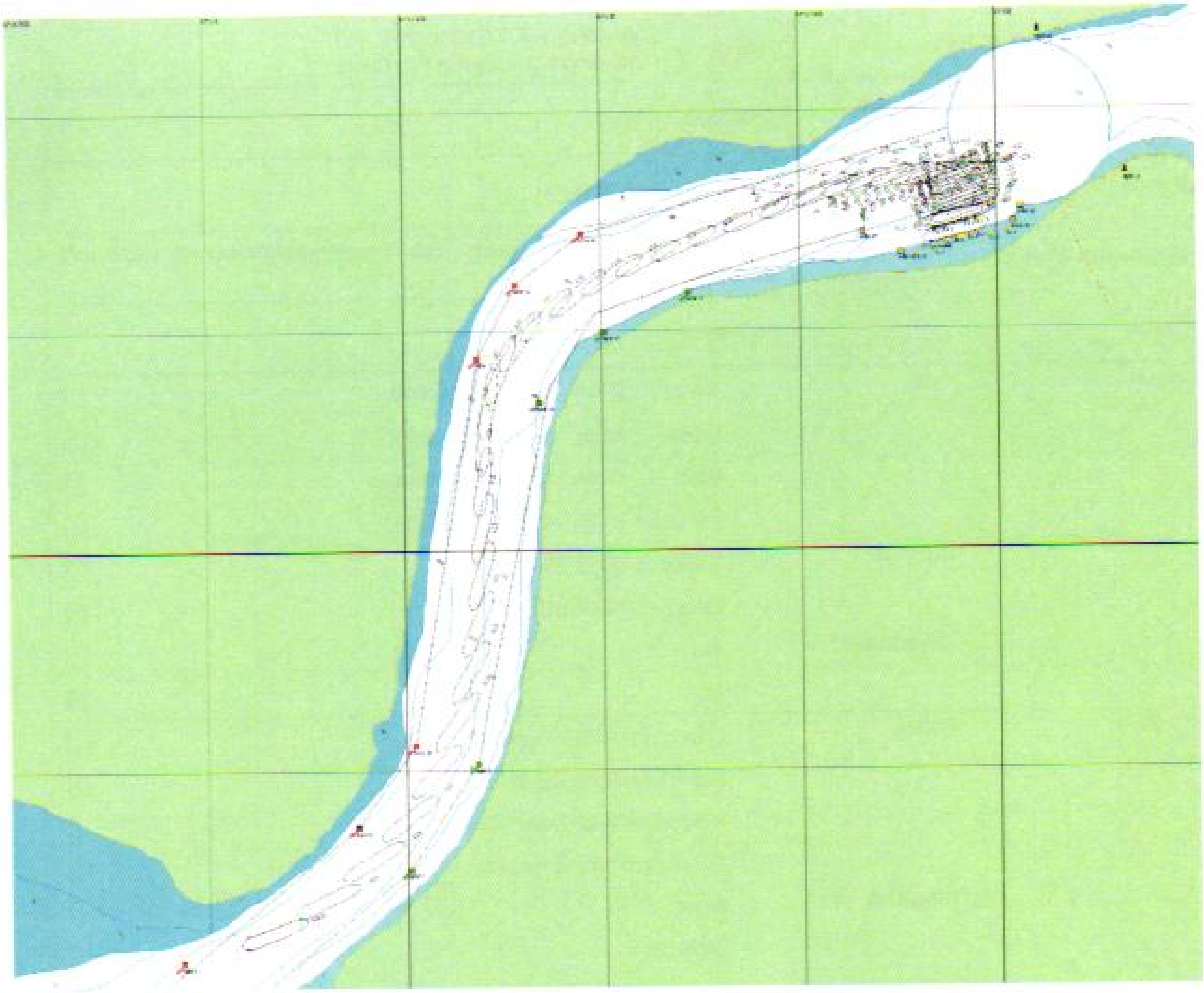

Bow thruster %
Bow thruster %
100
80
60
40
20
0
0:00 0:01 0:03 0:04 0:06 0:07 0:09 0:10 0:12 0:13 0:15 0:17 0:18 0:20 0:21 0:23 0:24 0:26 0:27 0:29 0:31 0:32 0:34 0:35 0:37 0:38 0:40
Time
Bow thruster gained power

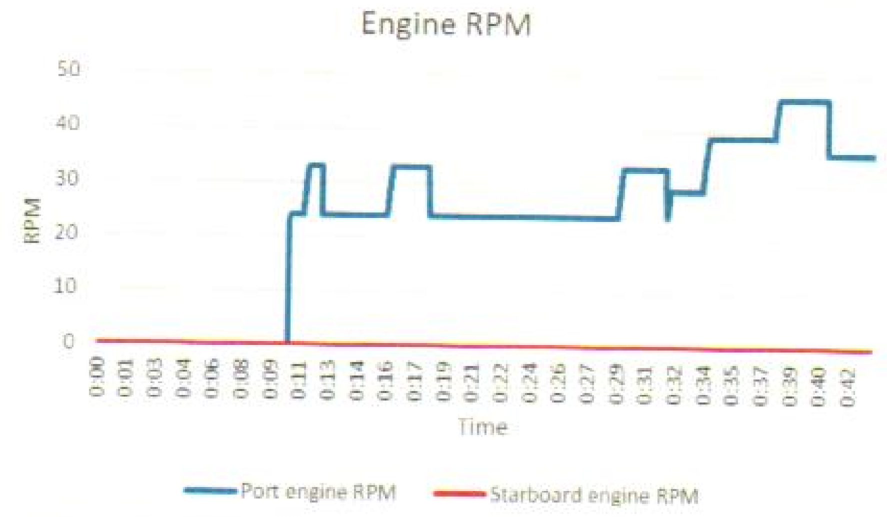

Tugs
Tugs' force [tf]
Time
Tug1F
Tug2F
Tug3F
Tug4F

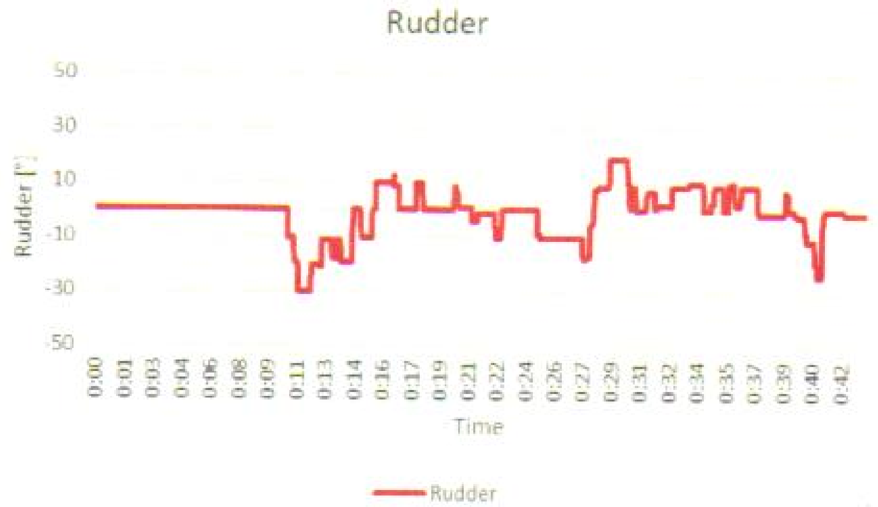

Tugs' Angle
Tugs' angle [°]
Time
Tug1Angle
Tug2Angle
Tug3Angle
Tug4Angle

Date:	27/03/2019	Project:	Mitsubishi – JGC Corporation Tabeer LNG Terminal at Port Qasim	
Time start:	15:40	Time finish:	16:25	
Run n.	15	File name:	MTI2019_15	
Manouvre description:		Departure with Moss 170k m^3 vessel – Ebb 15 minutes before max ebb & 253° at 20 knots (with gusts to 25 knots)		
Captain		Ian Simpson		
Vessel	Type	Q-Max	(345m – 53.8m – 266,000m3)	☐
		Q-Flex	(315m – 50.0m – 210,000m3)	☐
		Moss	(300m – 52.0m – 177,000m3)	☒
		Membrane	(274m – 43.3m – 130,000m3)	☐
	Condition	Loaded	(Draft: 11.55 m)	☐
		Ballast	(Draft: 9.50 m)	☒
	Thruster used	Yes		☐
		No		☒
Condition	Position	From buoys B1-B2 to Terminal		☐
		From Terminal to buoys B1-B2		☒
		From buoys B1-B2 to second bend		☐
		From second bend to Terminal		☐
	Manoeuvre	Arrival		☐
		Departure		☒
	Tugs	N.: 4 tugs		
Metocean	Current	Dir.: Ebb	Speed: 15 minutes before max ebb	
	Wind	Dir.: 253°	Speed: 20 Kts (gusts to 25 kts every 3 min)	

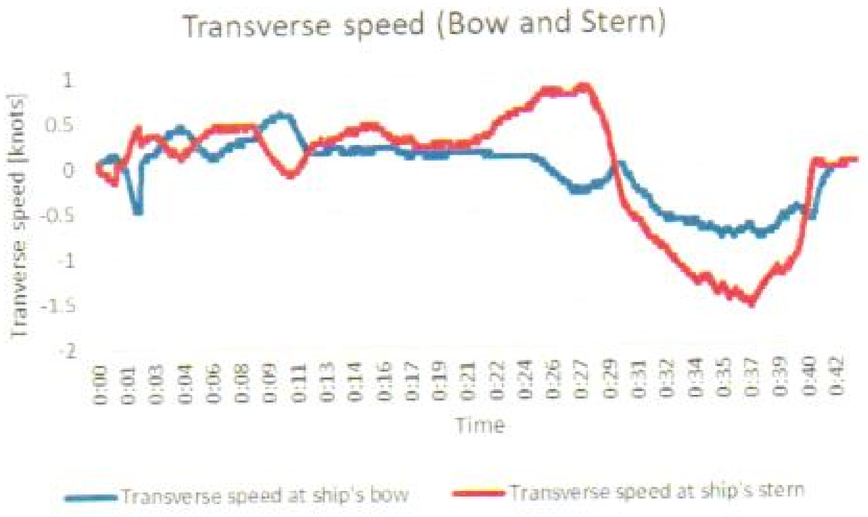
Note:
Similar outcome to run 14. Vessel remains within the channel but only by employing aggressive manoeuvring techniques & use of stern tug. Transits in these conditions are not recommended to be performed as vessel uses full extent of available channel and is not fully in control.

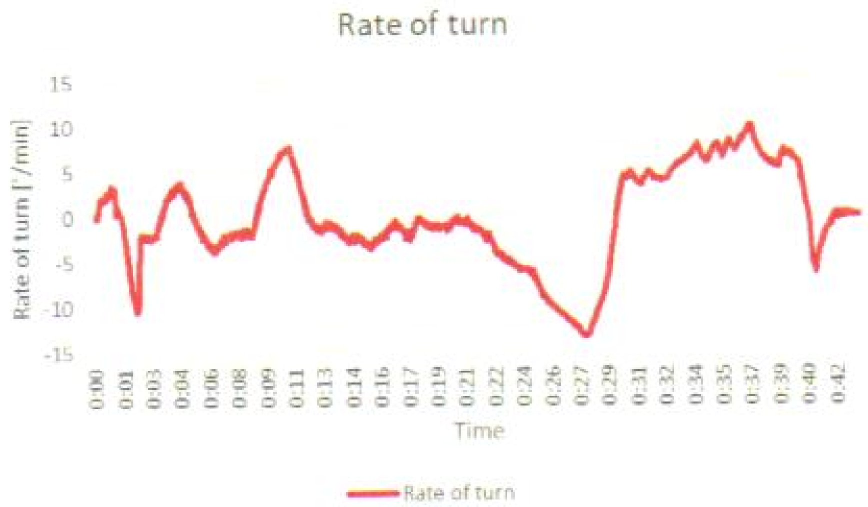


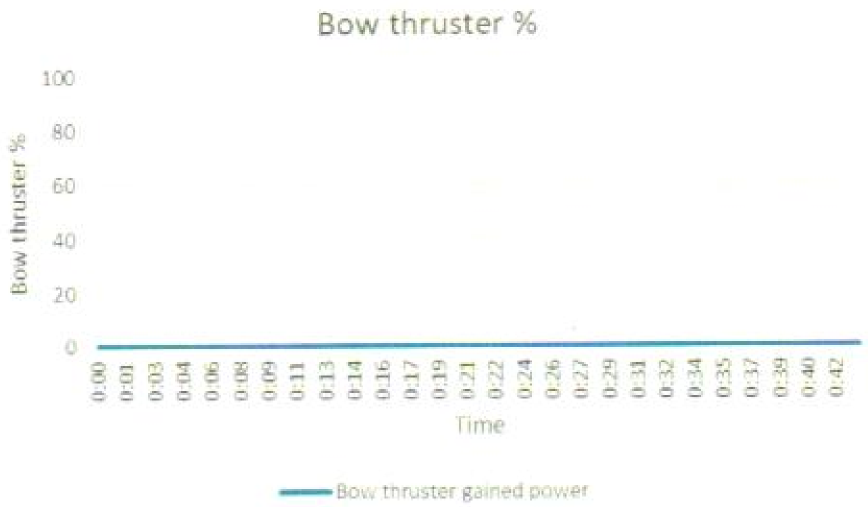

Engine RPM
50
40
30
20
10
0
RPM
Time
Port engine RPM
Starboard engine RPM


Rudder
50
30
10
-10
-30
-50
Rudder [°]
Time
Rudder

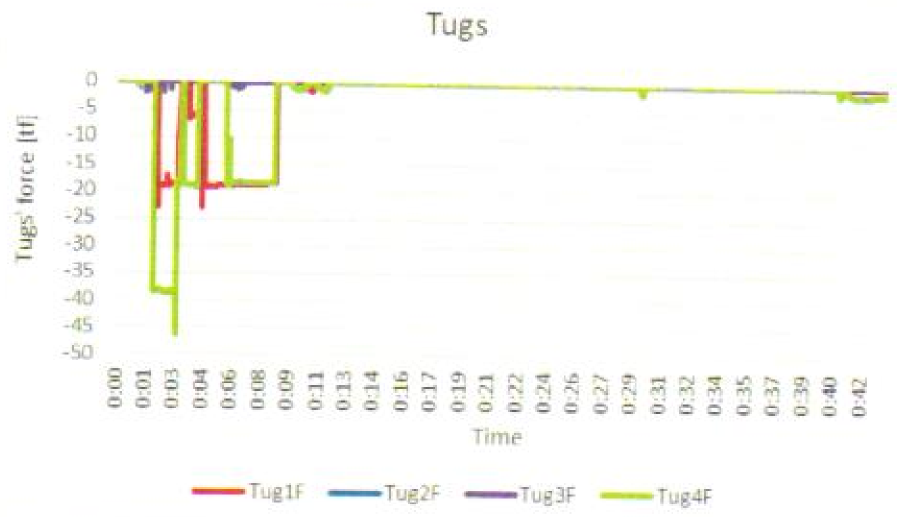

Speed OverGround (SOG)
5
4
3
2
1
0
SOG [knots]
Time
SOG

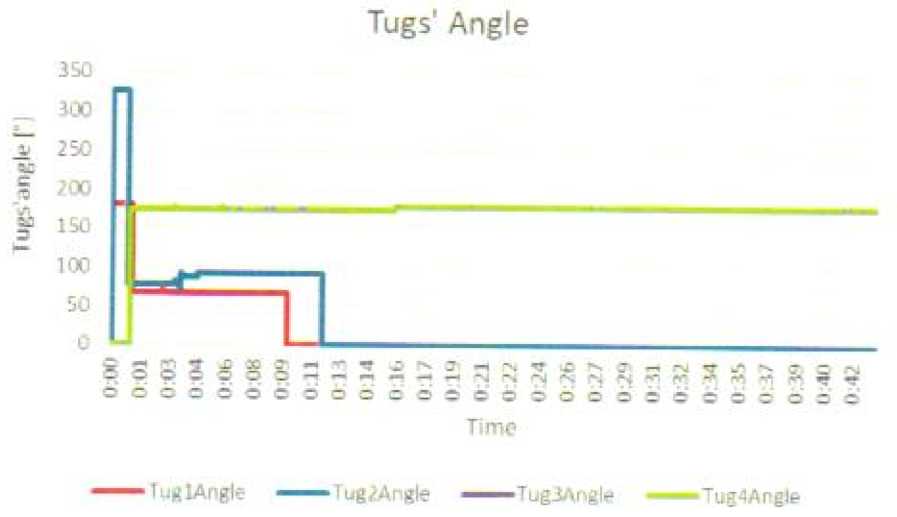

Transverse speed (Bow and Stern)
Tranverse speed [knots]
Time
Transverse speed at ship's bow
Transverse speed at ship's stern


Rate of turn
Rate of turn [°/min]
Time
Rate of turn


Bow thruster %
Bow thruster %
Time
Bow thruster gained power

980


Tugs
Tugs' force [tf]
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
0:00
0:01
0:03
0:04
0:06
0:08
0:09
0:11
0:13
0:14
0:16
0:17
0:19
0:21
0:22
0:24
0:26
0:27
0:29
0:31
0:32
0:34
0:35
0:37
0:39
0:40
0:42
Time
Tug1F
Tug2F
Tug3F
Tug4F


Tugs' Angle
Tugs'angle [°]
350
300
250
200
150
100
50
0
0:00
0:01
0:03
0:04
0:06
0:08
0:09
0:11
0:13
0:14
0:16
0:17
0:19
0:21
0:22
0:24
0:26
0:27
0:29
0:31
0:32
0:34
0:35
0:37
0:39
0:40
0:42
Time
Tug1Angle
Tug2Angle
Tug3Angle
Tug4Angle

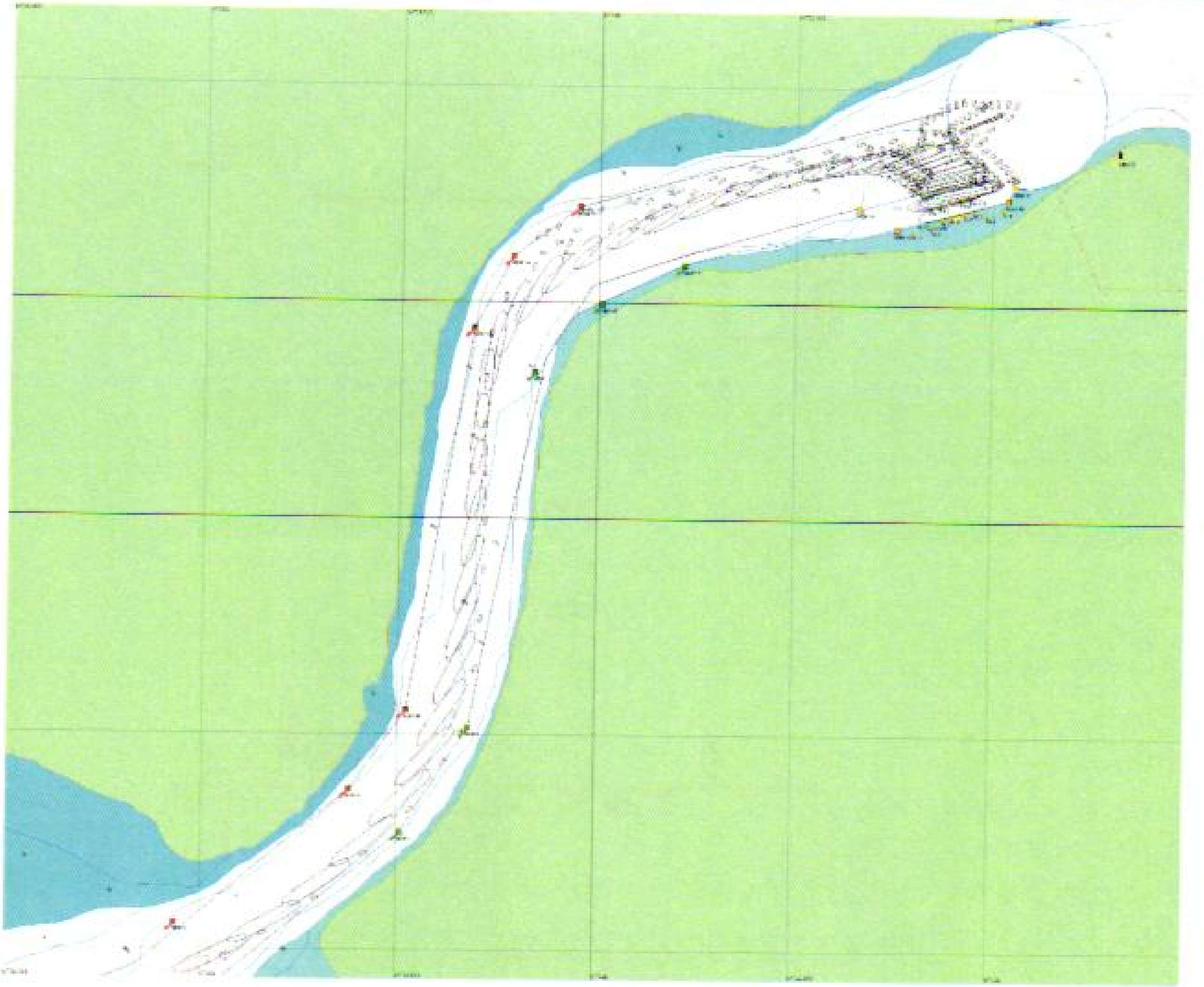
981

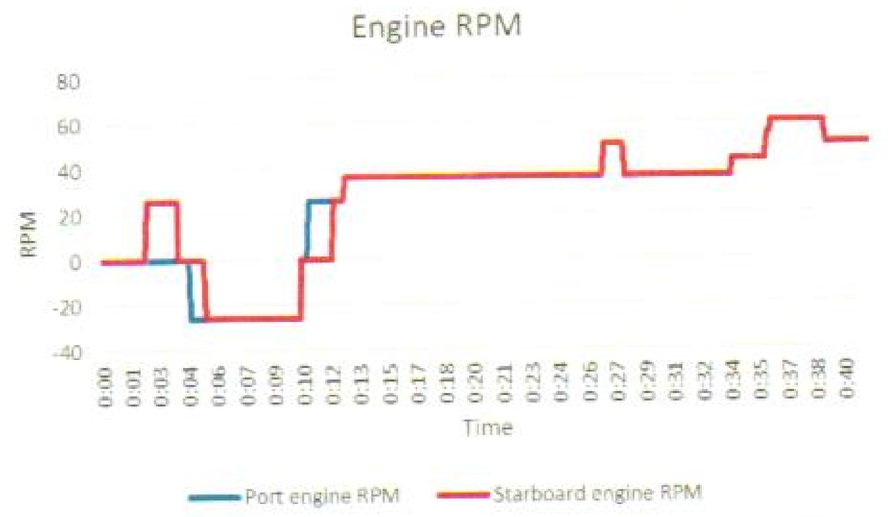
Date:	27/03/2019	Project:	Mitsubishi – JGC Corporation Tabeer LNG Terminal at Port Qasim
Time start:	16:30	Time finish:	17:15
Run n.	16	File name:	MTI2019_16
Manouvre description:		Departure with Q-Max vessel – Ebb 15 minutes before max ebb & 253° at 20 knots (with gusts to 25 knots)	
Captain		Ian Simpson	

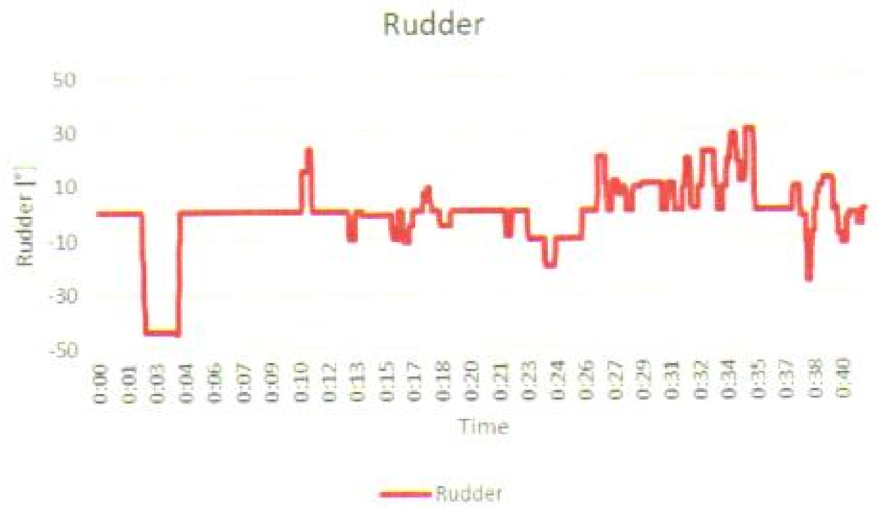
Vessel	Type	Q-Max	(345m – 53.8m – 266,000m3)	☒
		Q-Flex	(315m – 50.0m – 210,000m3)	☐
		Moss	(300m – 52.0m – 177,000m3)	☐
		Membrane	(274m – 43.3m – 130,000m3)	☐
	Condition	Loaded	(Draft: 12.0 m)	☐
		Ballast	(Draft: 9.60 m)	☒
	Thruster used	Yes		☐
		No		☒
Condition	Position	From buoys B1-B2 to Terminal		☐
		From Terminal to buoys B1-B2		☒
		From buoys B1-B2 to second bend		☐
		From second bend to Terminal		☐
	Manoeuvre	Arrival		☐
		Departure		☒
	Tugs	N.: 4 tugs		
Metocean	Current	Dir.: Ebb	Speed: 15 minutes before max ebb	
	Wind	Dir.: 253°	Speed: 20 Kts (gusts to 25 kts every 3 min)	

Note:
Similar outcome to run 14. Vessel remains within the channel but only by employing aggressive manoeuvring techniques & use of stern tug.

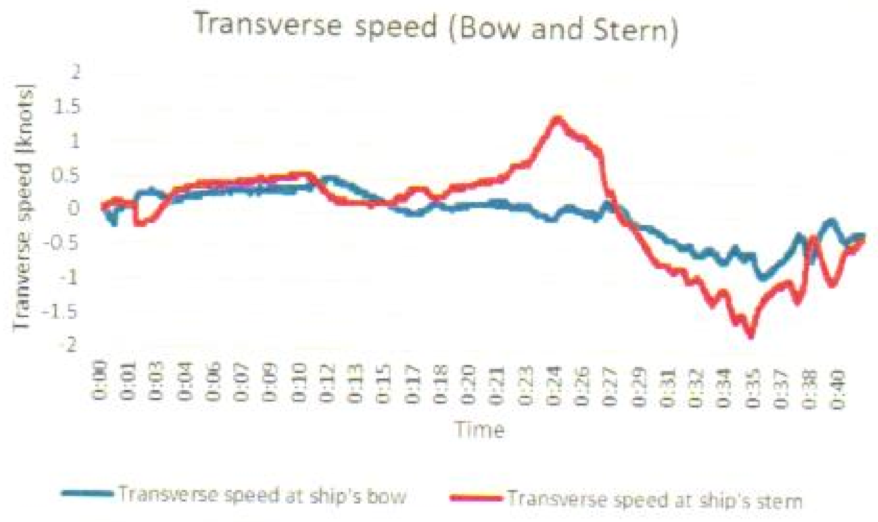
982



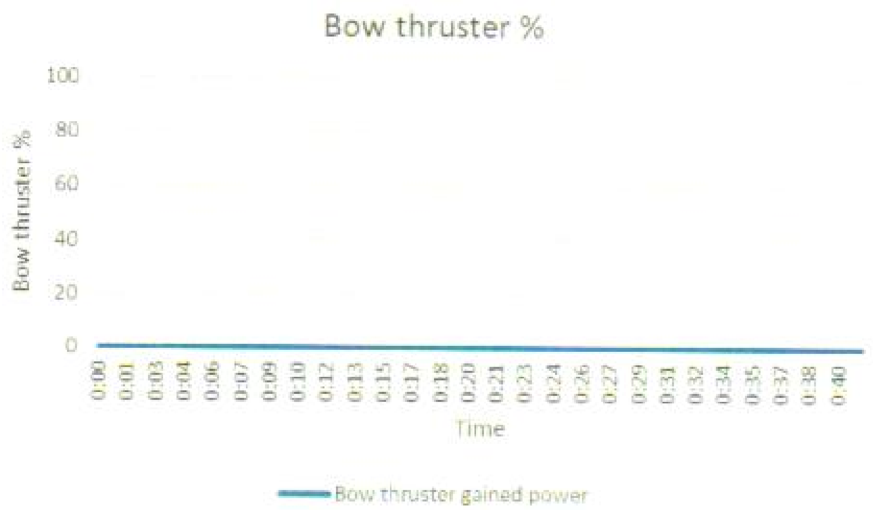

Engine RPM
80
60
40
20
0
-20
-40
RPM
Time
Port engine RPM
Starboard engine RPM

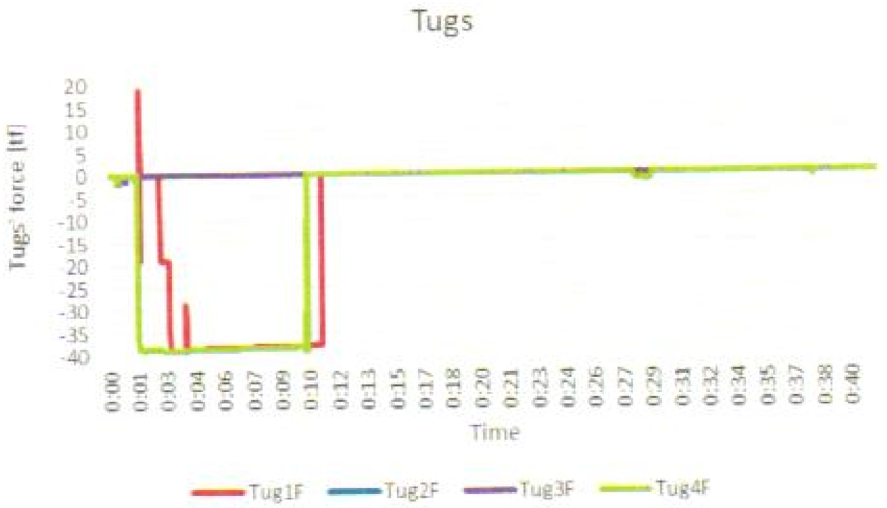

Rudder
50
30
10
-10
-30
-50
Rudder [°]
Time
Rudder

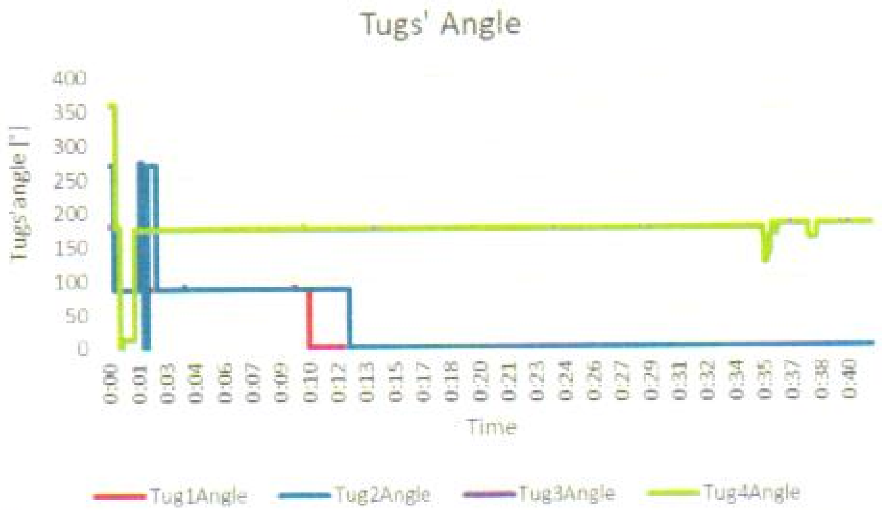

Speed OverGround (SOG)
5
4
3
2
1
0
SOG [knots]
Time
SOG


Transverse speed (Bow and Stern)
Tranverse speed [knots]
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
0:00
0:01
0:03
0:04
0:06
0:07
0:09
0:10
0:12
0:13
0:15
0:17
0:18
0:20
0:21
0:23
0:24
0:26
0:27
0:29
0:31
0:32
0:34
0:35
0:37
0:38
0:40
Time
Transverse speed at ship's bow
Transverse speed at ship's stern


Rate of turn
Rate of turn [°/min]
15
10
5
0
-5
-10
-15
-20
0:00
0:01
0:03
0:04
0:06
0:07
0:09
0:10
0:12
0:13
0:15
0:17
0:18
0:20
0:21
0:23
0:24
0:26
0:27
0:29
0:31
0:32
0:34
0:35
0:37
0:38
0:40
Time
Rate of turn


Bow thruster %
Bow thruster %
100
80
60
40
20
0
0:00
0:01
0:03
0:04
0:06
0:07
0:09
0:10
0:12
0:13
0:15
0:17
0:18
0:20
0:21
0:23
0:24
0:26
0:27
0:29
0:31
0:32
0:34
0:35
0:37
0:38
0:40
Time
Bow thruster gained power

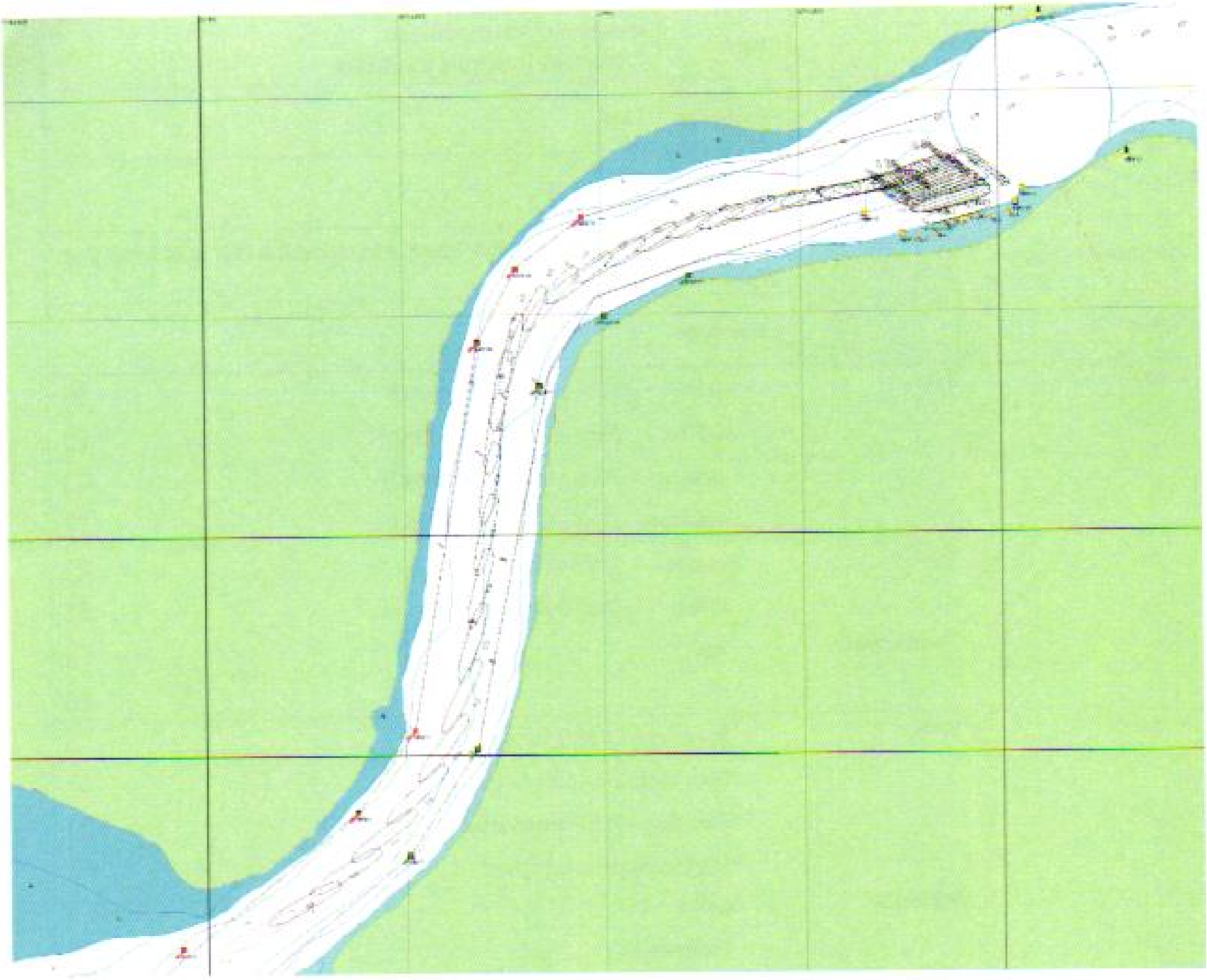

Tugs
Tugs' force [tf]
20
15
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
0:00
0:01
0:03
0:04
0:06
0:07
0:09
0:10
0:12
0:13
0:15
0:17
0:18
0:20
0:21
0:23
0:24
0:26
0:27
0:29
0:31
0:32
0:34
0:35
0:37
0:38
0:40
Time
Tug1F
Tug2F
Tug3F
Tug4F

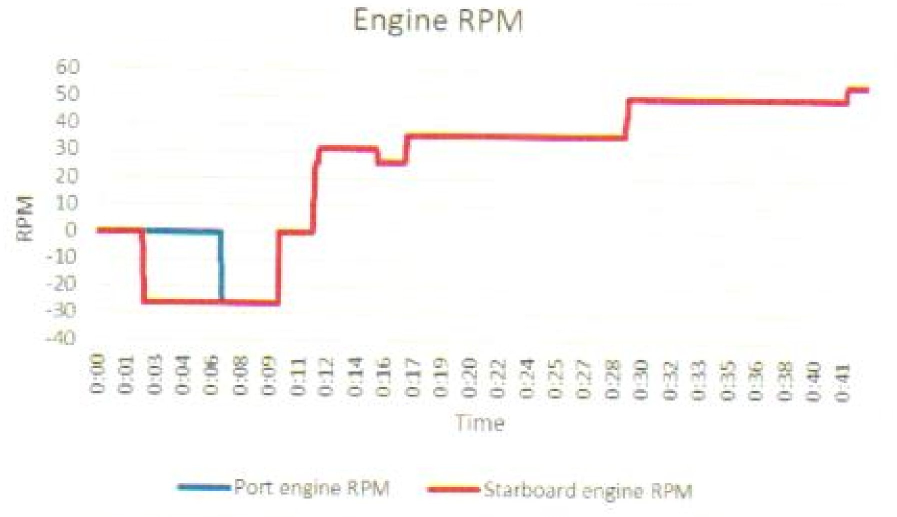

Tugs' Angle
Tugs'angle [°]
400
350
300
250
200
150
100
50
0
0:00
0:01
0:03
0:04
0:06
0:07
0:09
0:10
0:12
0:13
0:15
0:17
0:18
0:20
0:21
0:23
0:24
0:26
0:27
0:29
0:31
0:32
0:34
0:35
0:37
0:38
0:40
Time
Tug1Angle
Tug2Angle
Tug3Angle
Tug4Angle

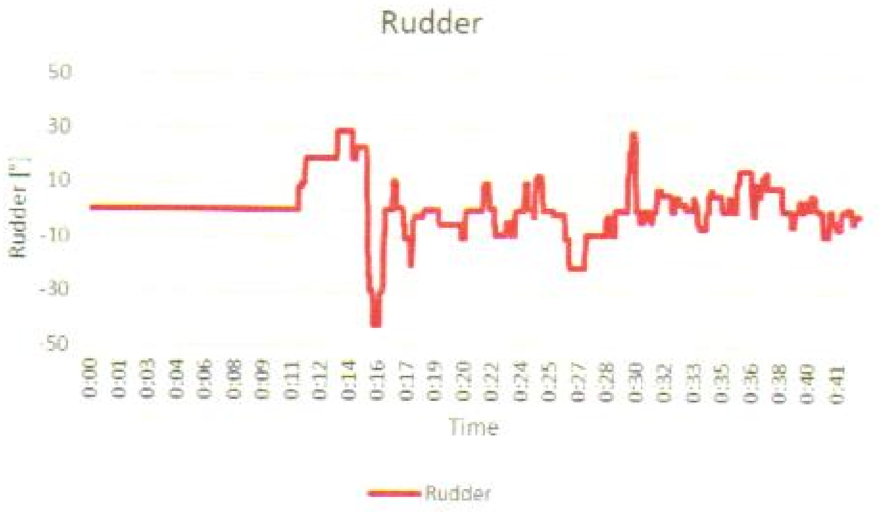
Date:	28/03/2019	Project:	Mitsubishi – JGC Corporation Tabeer LNG Terminal at Port Qasim	
Time start:	9:50	Time finish:	10:40	
Run n.	17	File name:	MTI2019_17	
Manouvre description:		Departure with Q-Max vessel – Ebb 1 hour after max ebb & 253° at 20 knots (with gusts to 25 knots)		
Captain		Ian Simpson		
Vessel	Type	Q-Max	(345m – 53.8m – 266,000m3)	☒
		Q-Flex	(315m – 50.0m – 210,000m3)	☐
		Moss	(300m – 52.0m – 177,000m3)	☐
		Membrane	(274m – 43.3m – 130,000m3)	☐
	Condition	Loaded	(Draft: 12.0 m)	☐
		Ballast	(Draft: 9.60 m)	☒
	Thruster used	Yes		☐
		No		☒
Condition	Position	From buoys B1-B2 to Terminal		☐
		From Terminal to buoys B1-B2		☒
		From buoys B1-B2 to second bend		☐
		From second bend to Terminal		☐
	Manoeuvre	Arrival		☐
		Departure		☒
	Tugs	N.: 4 tugs		
Metocean	Current	Dir.: Ebb	Speed: 1 hour after max ebb	
	Wind	Dir.: 253°	Speed: 20 Kts (gusts to 25 kts every 3 min)	

Note:
Transit is achievable if previously identified speed and heading are carefully controlled.

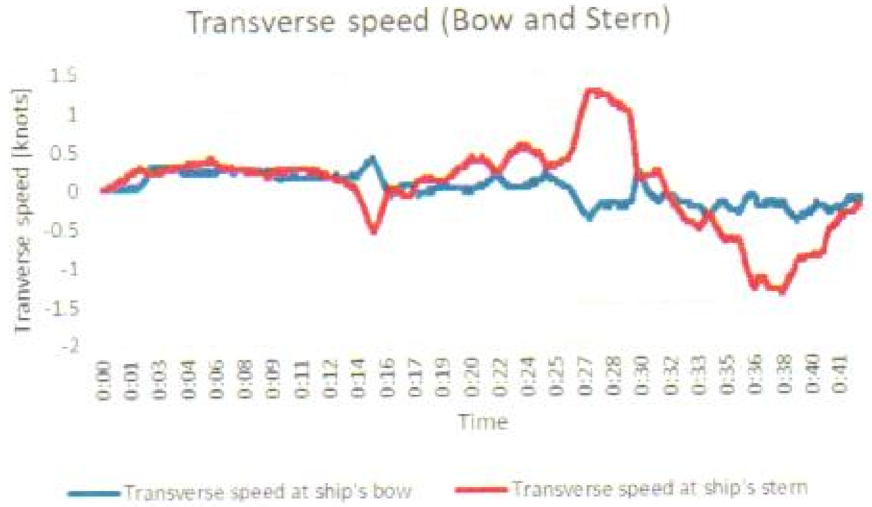
987

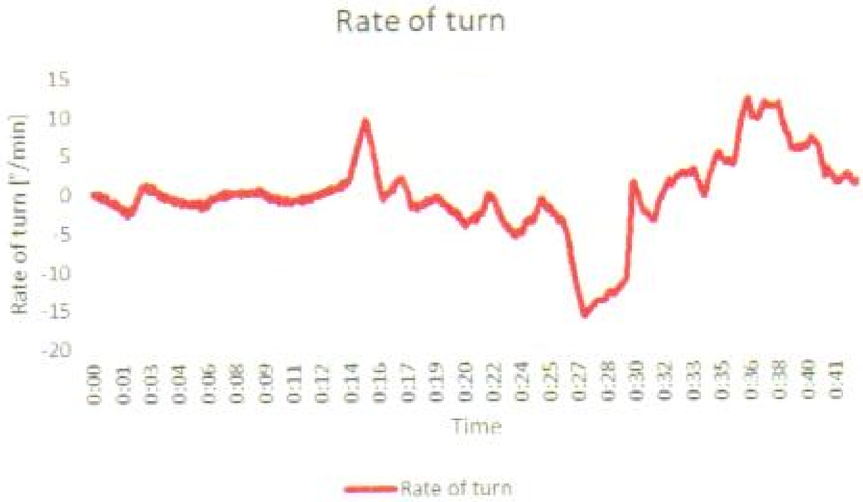


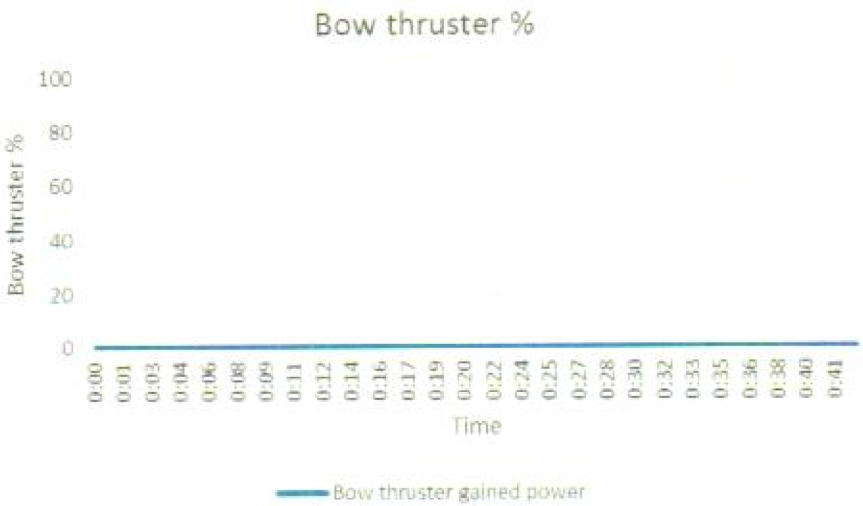

Engine RPM
60
50
40
30
20
10
0
-10
-20
-30
-40
RPM
0:00
0:01
0:03
0:04
0:06
0:08
0:09
0:11
0:12
0:14
0:16
0:17
0:19
0:20
0:22
0:24
0:25
0:27
0:28
0:30
0:32
0:33
0:35
0:36
0:38
0:40
0:41
Time
Port engine RPM
Starboard engine RPM

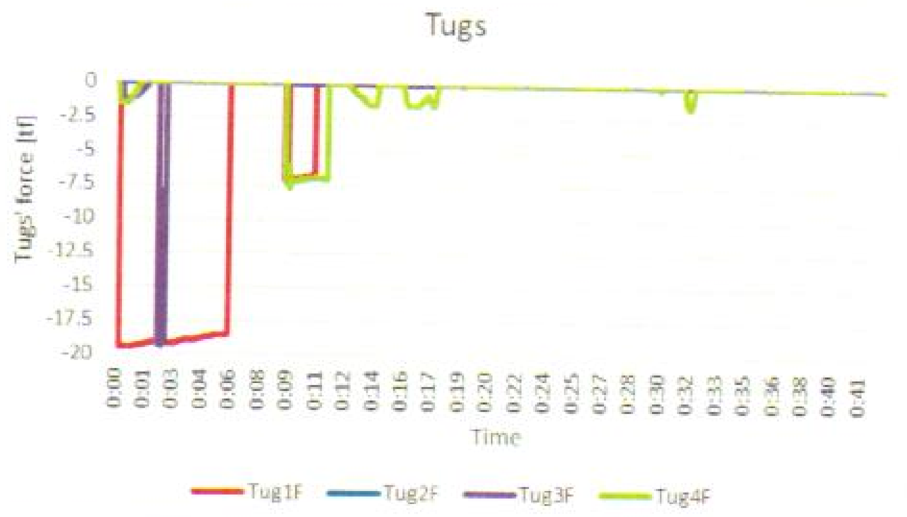

Rudder
50
30
10
-10
-30
-50
Rudder [°]
0:00
0:01
0:03
0:04
0:06
0:08
0:09
0:11
0:12
0:14
0:16
0:17
0:19
0:20
0:22
0:24
0:25
0:27
0:28
0:30
0:32
0:33
0:35
0:36
0:38
0:40
0:41
Time
Rudder

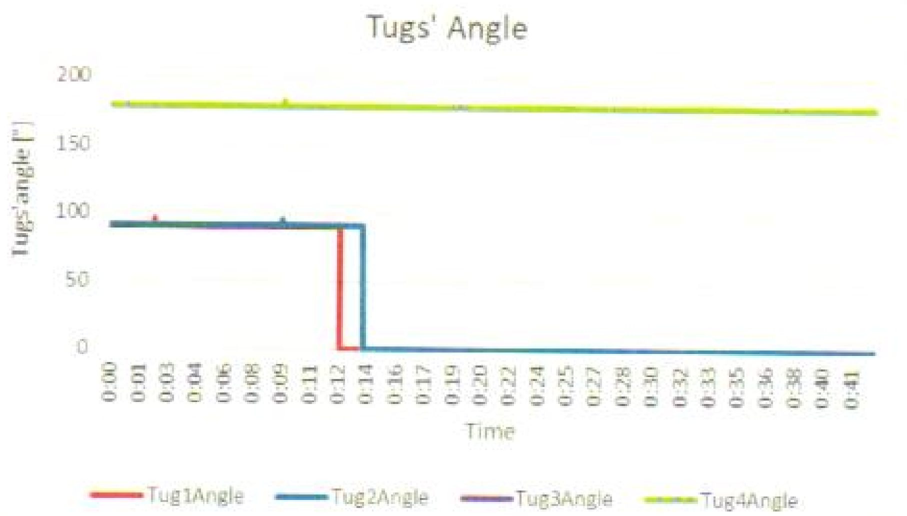

Speed OverGround (SOG)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
SOG [knots]
0:00
0:01
0:03
0:04
0:06
0:08
0:09
0:11
0:12
0:14
0:16
0:17
0:19
0:20
0:22
0:24
0:25
0:27
0:28
0:30
0:32
0:33
0:35
0:36
0:38
0:40
0:41
Time
SOG


Transverse speed (Bow and Stern)
Tranverse speed [knots]
1.5
1
0.5
0
-0.5
-1
-1.5
-2
Time
Transverse speed at ship's bow
Transverse speed at ship's stern


Rate of turn
Rate of turn [°/min]
15
10
5
0
-5
-10
-15
-20
Time
Rate of turn


Bow thruster %
Bow thruster %
100
80
60
40
20
0
Time
Bow thruster gained power


Tugs
Tugs' force [tf]
0
-2.5
-5
-7.5
-10
-12.5
-15
-17.5
-20
Time
Tug1F
Tug2F
Tug3F
Tug4F


Tugs' Angle
Tugs'angle [°]
200
150
100
50
0
Time
Tug1Angle
Tug2Angle
Tug3Angle
Tug4Angle

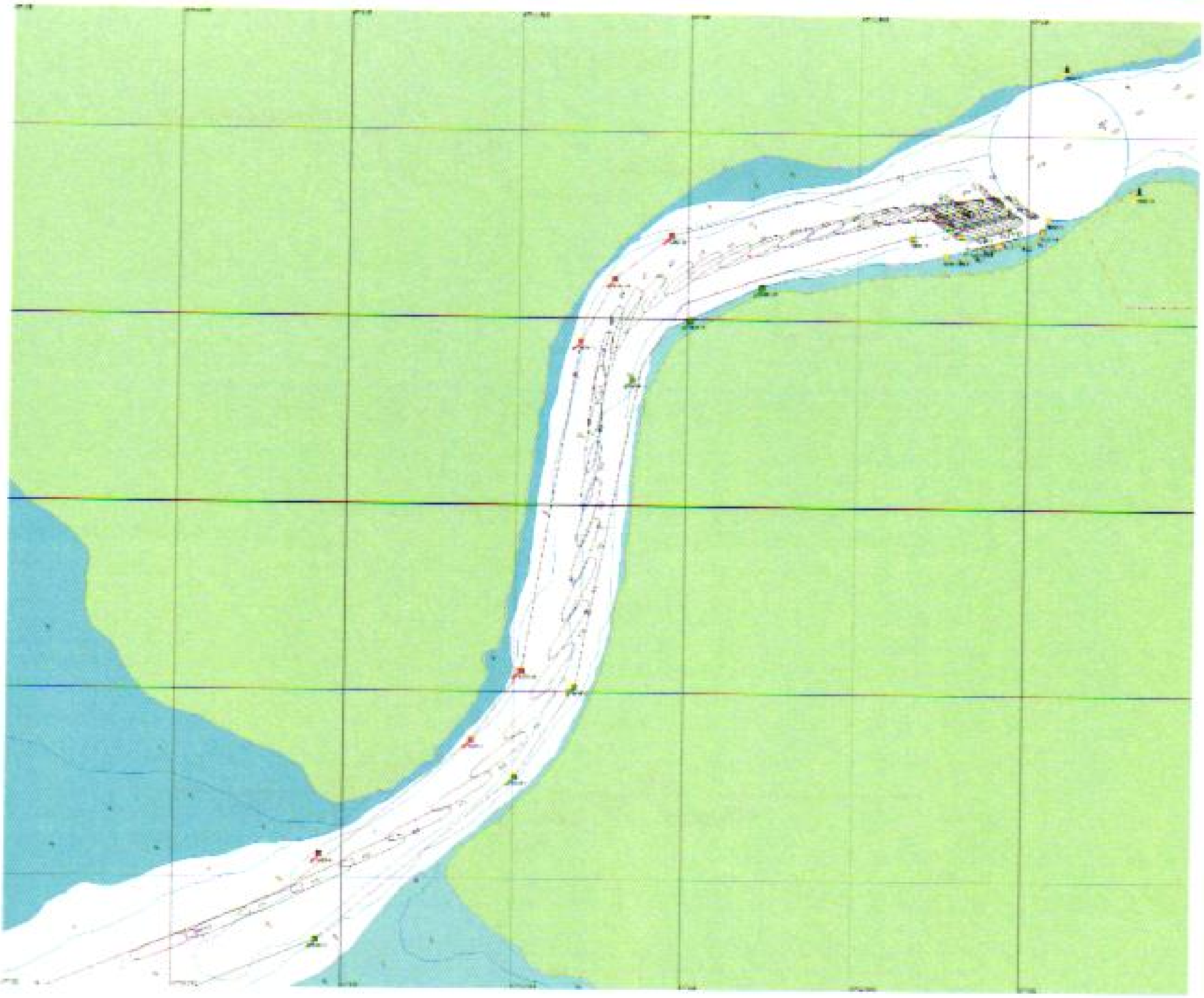
991

RINA

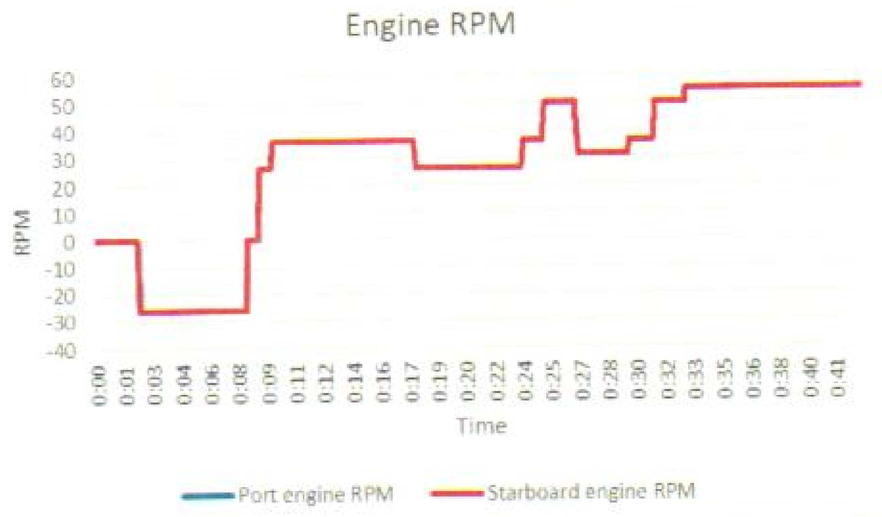
Date:	28/03/2019	Project:	Mitsubishi – JGC Corporation Tabeer LNG Terminal at Port Qasim
Time start:	10:50	Time finish:	11:25
Run n.	18	File name:	MTI2019_18
Manouvre description:		Departure with Q-Max vessel – Max ebb & 253° at 20 knots (with gusts to 25 knots)	
Captain		Ian Simpson	

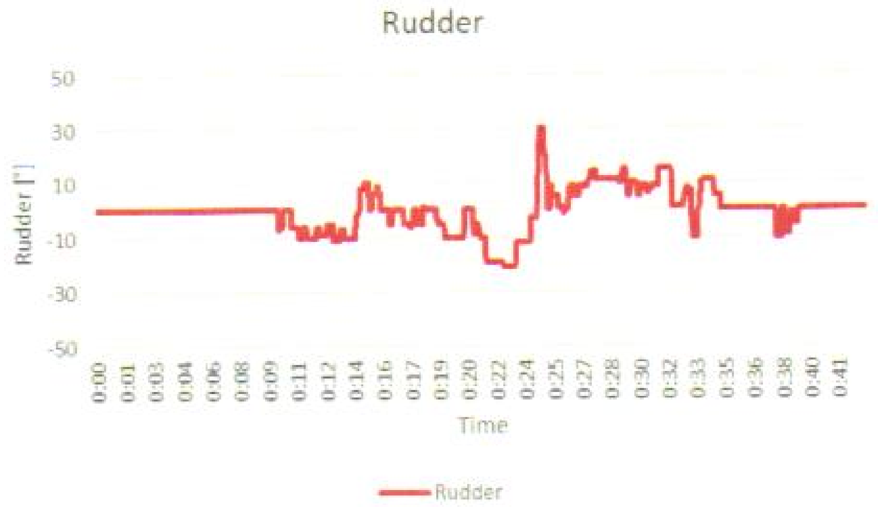
Vessel	Type	Q-Max	(345m – 53.8m – 266,000m3)	☒
		Q-Flex	(315m – 50.0m – 210,000m3)	☐
		Moss	(300m – 52.0m – 177,000m3)	☐
		Membrane	(274m – 43.3m – 130,000m3)	☐
	Condition	Loaded	(Draft: 12.0 m)	☐
		Ballast	(Draft: 9.60 m)	☒
	Thruster used	Yes		☐
		No		☒
Condition	Position	From buoys B1-B2 to Terminal		☐
		From Terminal to buoys B1-B2		☒
		From buoys B1-B2 to second bend		☐
		From second bend to Terminal		☐
	Manoeuvre	Arrival		☐
		Departure		☒
	Tugs	N.: 4 tugs		
Metocean	Current	Dir.: Ebb	Speed: Max ebb	
	Wind	Dir.: 253°	Speed: 20 Kts (gusts to 25 kts every 3 min)	

Note:
Similar outcome to run 15. Vessel remains within the channel but only by employing aggressive manoeuvring techniques and it is not easy to control of the ship's position particularly in the 2nd bend. Transits in these conditions are not recommended to be performed as vessel uses full extent of available channel and is not fully in control.



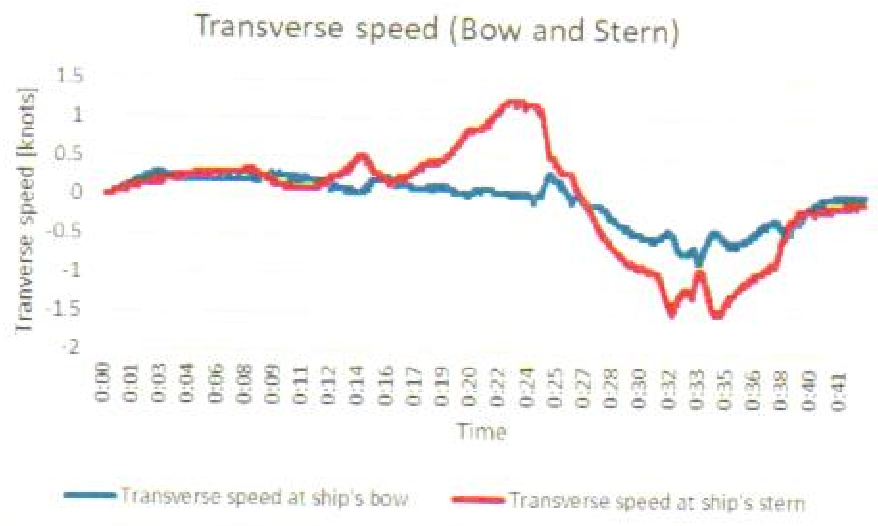
993

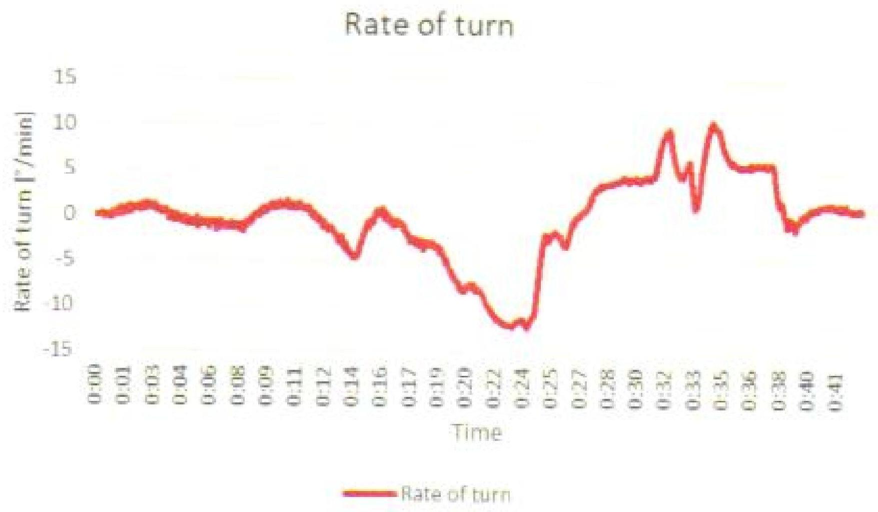

Engine RPM
60
50
40
30
20
10
0
-10
-20
-30
-40
RPM
0:00 0:01 0:03 0:04 0:06 0:08 0:09 0:11 0:12 0:14 0:16 0:17 0:19 0:20 0:22 0:24 0:25 0:27 0:28 0:30 0:32 0:33 0:35 0:36 0:38 0:40 0:41
Time
Port engine RPM
Starboard engine RPM

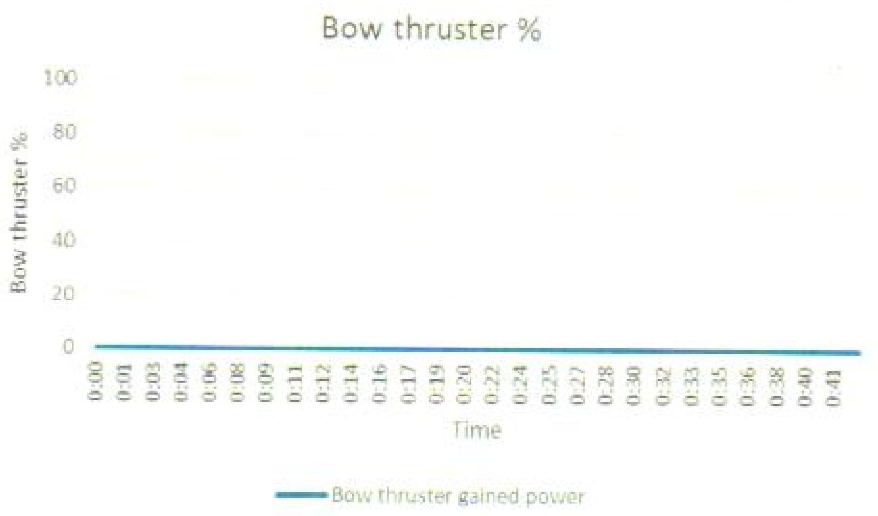

Rudder
50
30
10
-10
-30
-50
Rudder [°]
0:00 0:01 0:03 0:04 0:06 0:08 0:09 0:11 0:12 0:14 0:16 0:17 0:19 0:20 0:22 0:24 0:25 0:27 0:28 0:30 0:32 0:33 0:35 0:36 0:38 0:40 0:41
Time
Rudder


Speed OverGround (SOG)
6
5
4
3
2
1
0
SOG [knots]
0:00 0:01 0:03 0:04 0:06 0:07 0:09 0:10 0:12 0:13 0:15 0:17 0:18 0:20 0:21 0:23 0:24 0:26 0:27 0:29 0:31 0:32 0:34 0:35 0:37 0:38 0:40 0:41
Time
SOG

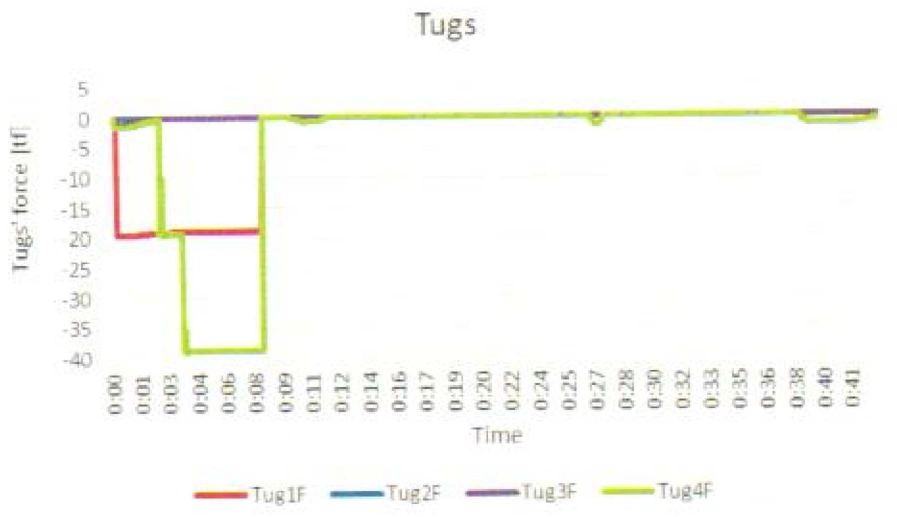
994

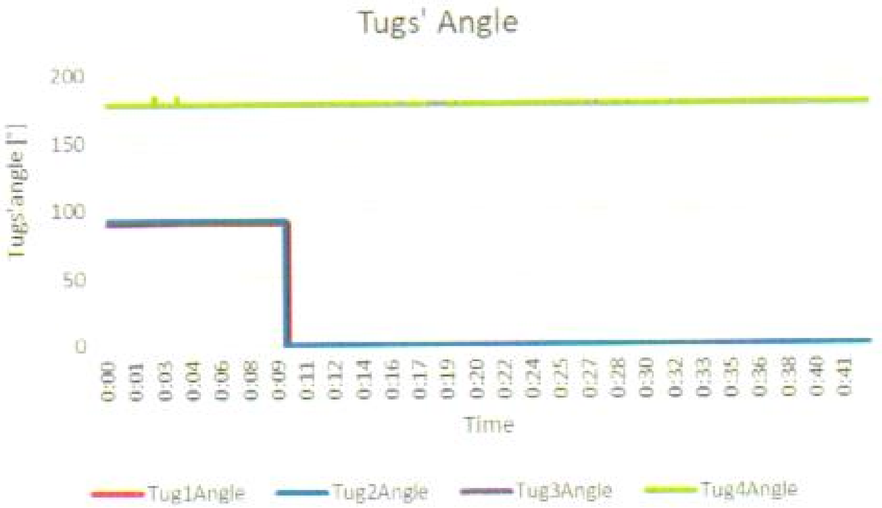

Transverse speed (Bow and Stern)
Tranverse speed [knots]
Time
Transverse speed at ship's bow
Transverse speed at ship's stern


Rate of turn
Rate of turn [°/min]
Time
Rate of turn


Bow thruster %
Bow thruster %
Time
Bow thruster gained power

895

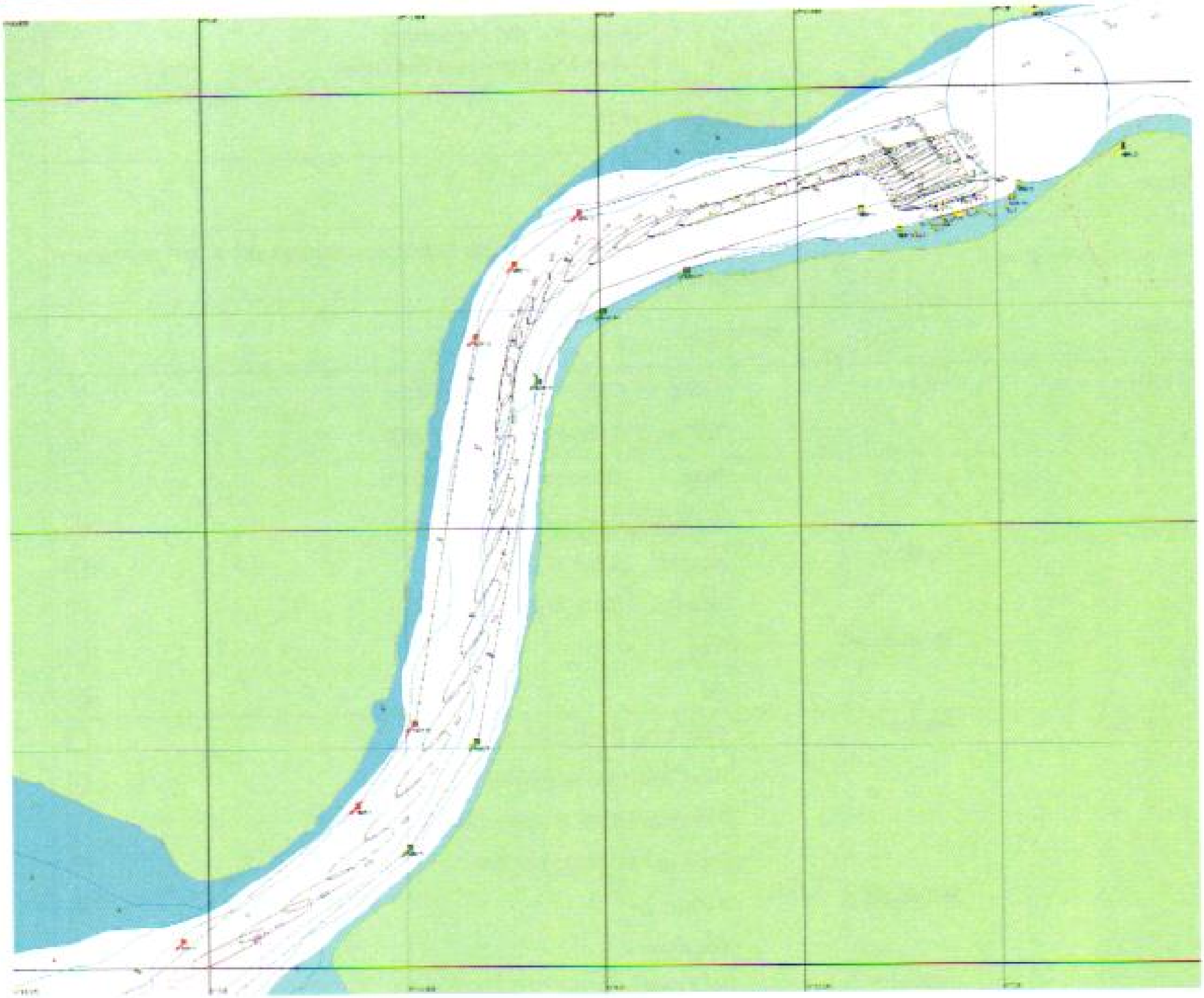

Tugs
Tugs' force [tf]
5
0
-5
-10
-15
-20
-25
-30
-35
-40
0:00 0:01 0:03 0:04 0:06 0:08 0:09 0:11 0:12 0:14 0:16 0:17 0:19 0:20 0:22 0:24 0:25 0:27 0:28 0:30 0:32 0:33 0:35 0:36 0:38 0:40 0:41
Time
Tug1F
Tug2F
Tug3F
Tug4F

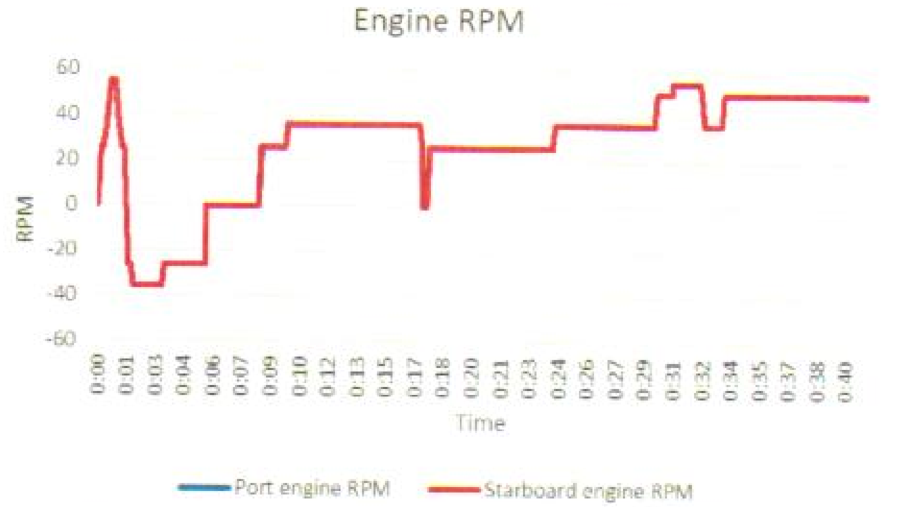

Tugs' Angle
Tugs'angle [°]
200
150
100
50
0
0:00 0:01 0:03 0:04 0:06 0:08 0:09 0:11 0:12 0:14 0:16 0:17 0:19 0:20 0:22 0:24 0:25 0:27 0:28 0:30 0:32 0:33 0:35 0:36 0:38 0:40 0:41
Time
Tug1Angle
Tug2Angle
Tug3Angle
Tug4Angle

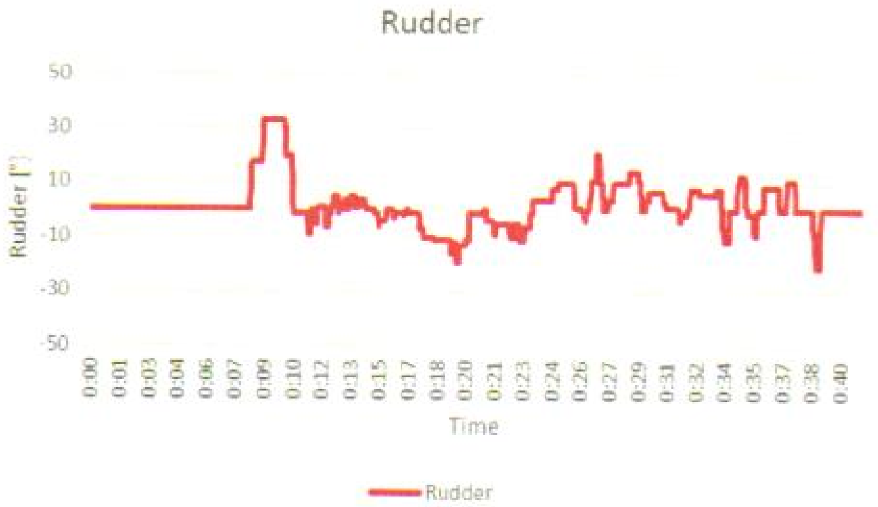
Date:	28/03/2019	Project:	Mitsubishi – JGC Corporation Tabeer LNG Terminal at Port Qasim	
Time start:	11:45	Time finish:	12:25	
Run n.	19	File name:	MTI2019_19	
Manouvre description:		Departure with Q-Max vessel – Ebb 30 minutes after max ebb & 253° at 20 knots (with gusts to 25 knots)		
Captain		Ian Simpson		
Vessel	Type	Q-Max	(345m – 53.8m – 266,000m3)	☒
		Q-Flex	(315m – 50.0m – 210,000m3)	☐
		Moss	(300m – 52.0m – 177,000m3)	☐
		Membrane	(274m – 43.3m – 130,000m3)	☐
	Condition	Loaded	(Draft: 12.0 m)	☐
		Ballast	(Draft: 9.60 m)	☒
	Thruster used	Yes		☐
		No		☒
Condition	Position	From buoys B1-B2 to Terminal		☐
		From Terminal to buoys B1-B2		☒
		From buoys B1-B2 to second bend		☐
		From second bend to Terminal		☐
	Manoeuvre	Arrival		☐
		Departure		☒
	Tugs	N.: 4 tugs		
Metocean	Current	Dir.: Ebb	Speed: 30 minutes after max ebb	
	Wind	Dir.: 253°	Speed: 20 Kts (gusts to 25 kts every 3 min)	

Note:

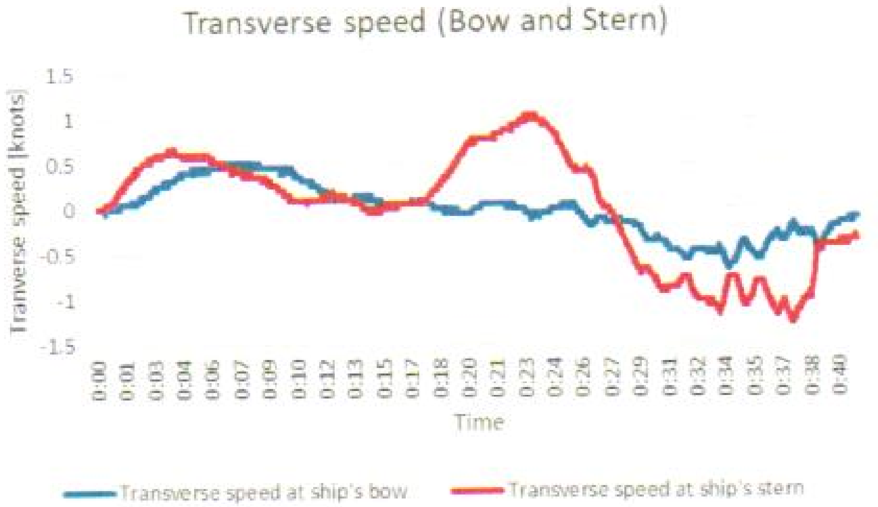
Less demanding than run 14 but still difficult. Manoeuvre is manageable with an appropriate manoeuvring strategy: this is the limiting condition for ebb current. Commencing transits earlier on the ebb tide are not recommended.



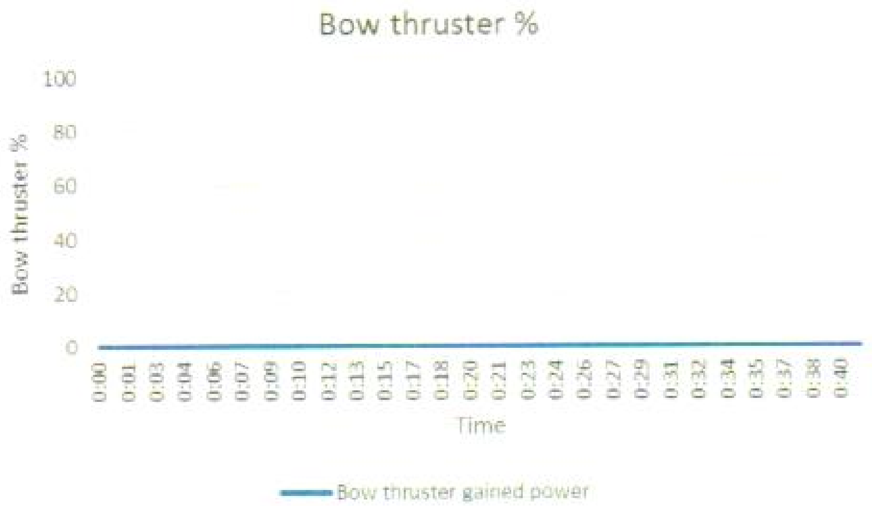

Engine RPM
60
40
20
0
-20
-40
-60
RPM
0:00
0:01
0:03
0:04
0:06
0:07
0:09
0:10
0:12
0:13
0:15
0:17
0:18
0:20
0:21
0:23
0:24
0:26
0:27
0:29
0:31
0:32
0:34
0:35
0:37
0:38
0:40
Time
Port engine RPM
Starboard engine RPM


Rudder
50
30
10
-10
-30
-50
Rudder [°]
0:00
0:01
0:03
0:04
0:06
0:07
0:09
0:10
0:12
0:13
0:15
0:17
0:18
0:20
0:21
0:23
0:24
0:26
0:27
0:29
0:31
0:32
0:34
0:35
0:37
0:38
0:40
Time
Rudder

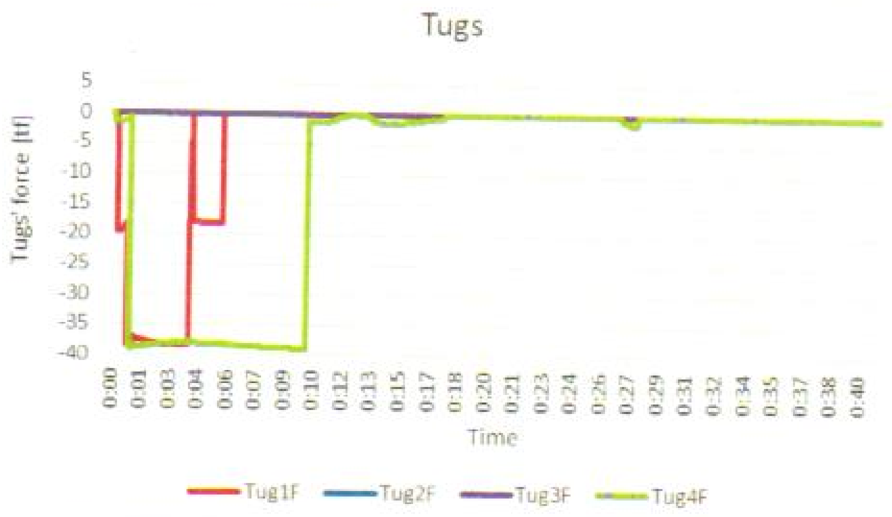

Speed OverGround (SOG)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
SOG [knots]
0:00
0:01
0:03
0:04
0:06
0:07
0:09
0:10
0:12
0:13
0:15
0:17
0:18
0:20
0:21
0:23
0:24
0:26
0:27
0:29
0:31
0:32
0:34
0:35
0:37
0:38
0:40
Time
SOG


Transverse speed (Bow and Stern)
Tranverse speed [knots]
1.5
1
0.5
0
-0.5
-1
-1.5
0:00 0:01 0:03 0:04 0:06 0:07 0:09 0:10 0:12 0:13 0:15 0:17 0:18 0:20 0:21 0:23 0:24 0:26 0:27 0:29 0:31 0:32 0:34 0:35 0:37 0:38 0:40
Time
Transverse speed at ship's bow
Transverse speed at ship's stern


Rate of turn
Rate of turn [°/min]
15
10
5
0
-5
-10
-15
0:00 0:01 0:03 0:04 0:06 0:07 0:09 0:10 0:12 0:13 0:15 0:17 0:18 0:20 0:21 0:23 0:24 0:26 0:27 0:29 0:31 0:32 0:34 0:35 0:37 0:38 0:40
Time
Rate of turn


Bow thruster %
Bow thruster %
100
80
60
40
20
0
0:00 0:01 0:03 0:04 0:06 0:07 0:09 0:10 0:12 0:13 0:15 0:17 0:18 0:20 0:21 0:23 0:24 0:26 0:27 0:29 0:31 0:32 0:34 0:35 0:37 0:38 0:40
Time
Bow thruster gained power

1400


Tugs
Tugs' force [tf]
5
0
-5
-10
-15
-20
-25
-30
-35
-40
0:00
0:01
0:03
0:04
0:06
0:07
0:09
0:10
0:12
0:13
0:15
0:17
0:18
0:20
0:21
0:23
0:24
0:26
0:27
0:29
0:31
0:32
0:34
0:35
0:37
0:38
0:40
Time
Tug1F
Tug2F
Tug3F
Tug4F


Tugs' Angle
Tugs'angle [°]
200
150
100
50
0
0:00
0:01
0:03
0:04
0:06
0:07
0:09
0:10
0:12
0:13
0:15
0:17
0:18
0:20
0:21
0:23
0:24
0:26
0:27
0:29
0:31
0:32
0:34
0:35
0:37
0:38
0:40
Time
Tug1Angle
Tug2Angle
Tug3Angle
Tug4Angle

/601

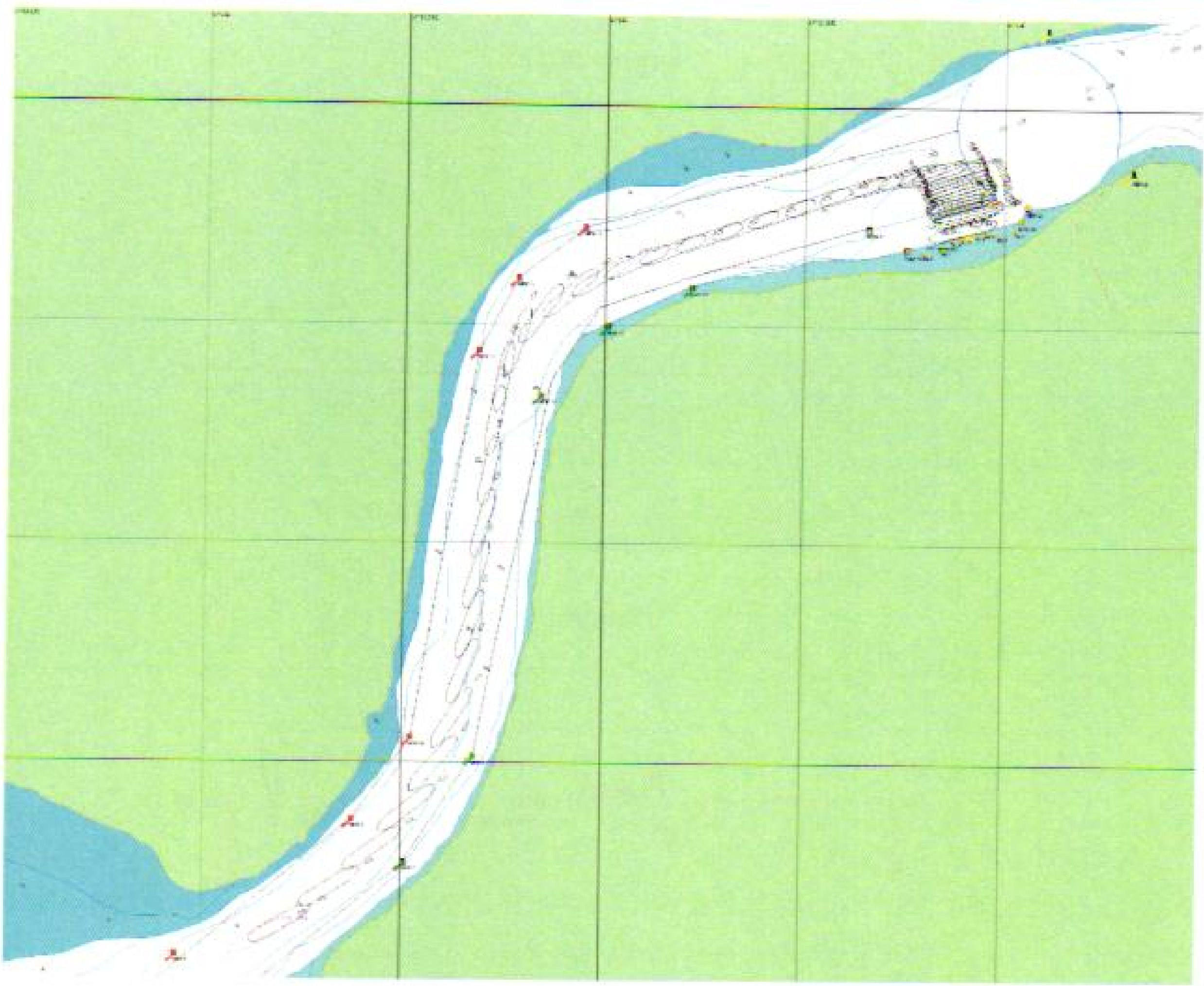
RINA

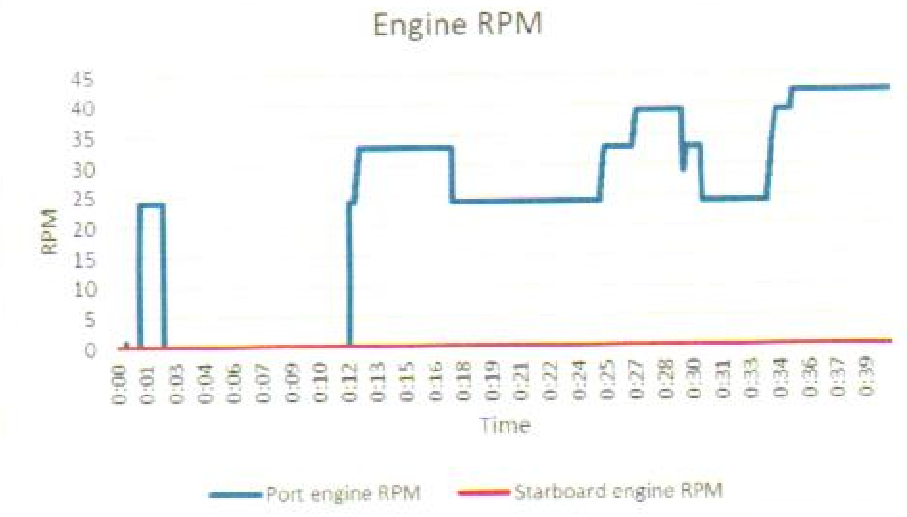
Date:	28/03/2019	Project:	Mitsubishi – JGC Corporation Tabeer LNG Terminal at Port Qasim
Time start:	12:45	Time finish:	13:20
Run n.	20	File name:	MTI2019_20
Manouvre description:		Departure with Moss 170k m³ vessel – Ebb 30 minutes after max ebb & 253° at 20 knots (with gusts to 25 knots)	
Captain		Ian Simpson	

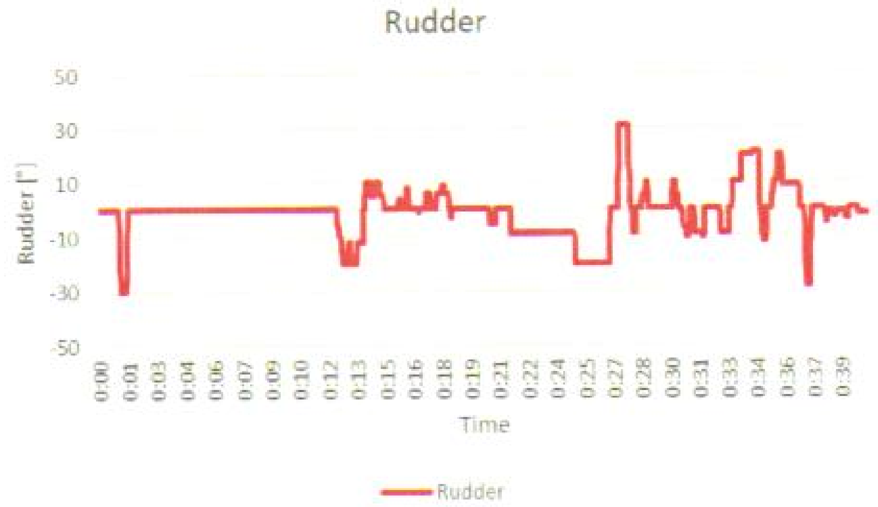
Vessel	Type	Q-Max	(345m – 53.8m – 266,000m3)	☐
		Q-Flex	(315m – 50.0m – 210,000m3)	☐
		Moss	(300m – 52.0m – 177,000m3)	☒
		Membrane	(274m – 43.3m – 130,000m3)	☐
	Condition	Loaded	(Draft: 11.55 m)	☐
		Ballast	(Draft: 9.50 m)	☒
	Thruster used	Yes		☐
		No		☒
Condition	Position	From buoys B1-B2 to Terminal		☐
		From Terminal to buoys B1-B2		☒
		From buoys B1-B2 to second bend		☐
		From second bend to Terminal		☐
	Manoeuvre	Arrival		☐
		Departure		☒
	Tugs	N.: 4 tugs		
Metocean	Current	Dir.: Ebb	Speed: 30 minutes after max ebb	
	Wind	Dir.: 253°	Speed: 20 Kts (gusts to 25 kts every 3 min)	

Note:
Transits with this vessel at this time on the tide are achievable but still require careful speed management and vessel positioning. Same as run 19.

1002

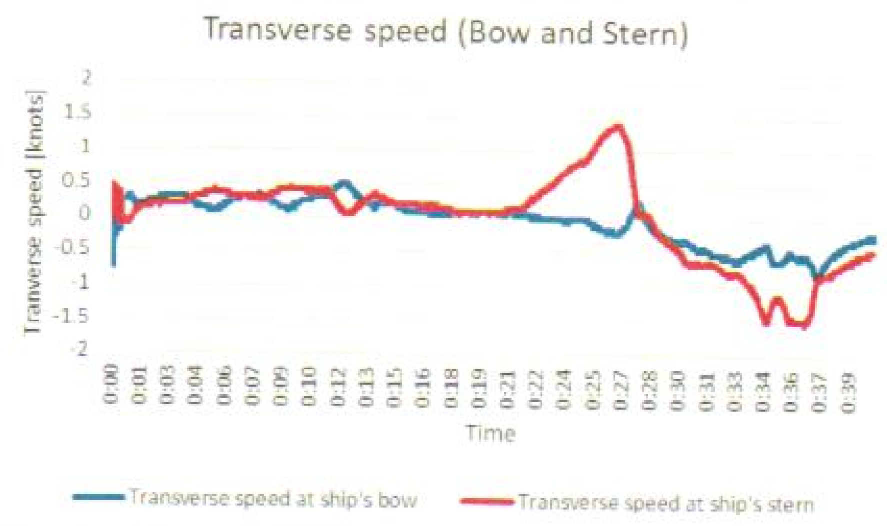



Engine RPM
RPM
Time
Port engine RPM
Starboard engine RPM

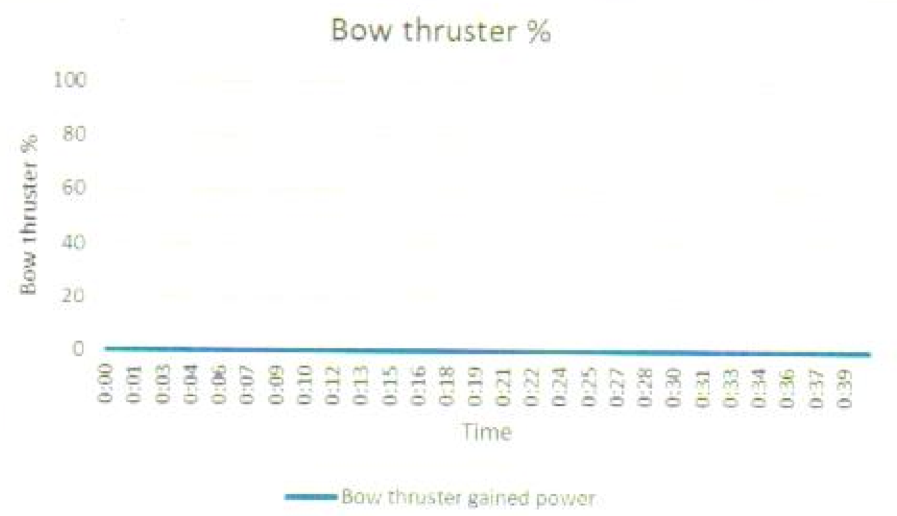

Rudder
Rudder [°]
Time
Rudder

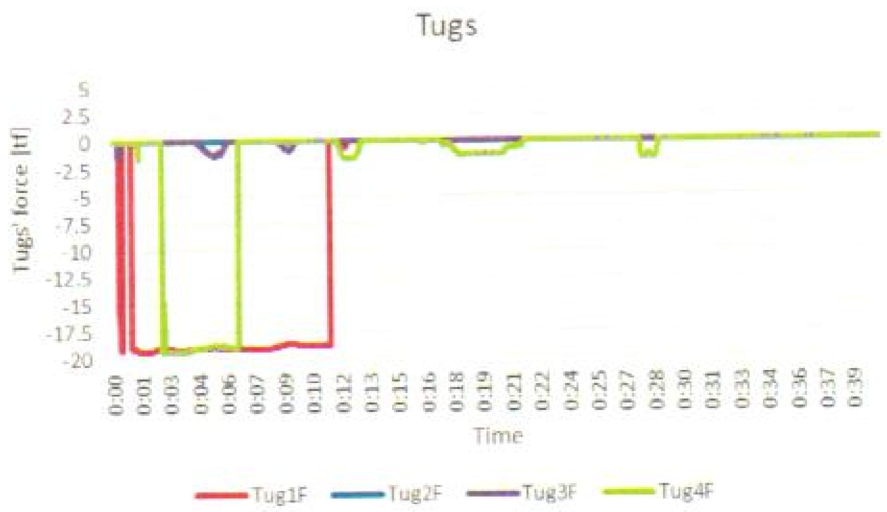

Speed OverGround (SOG)
SOG [knots]
Time
SOG

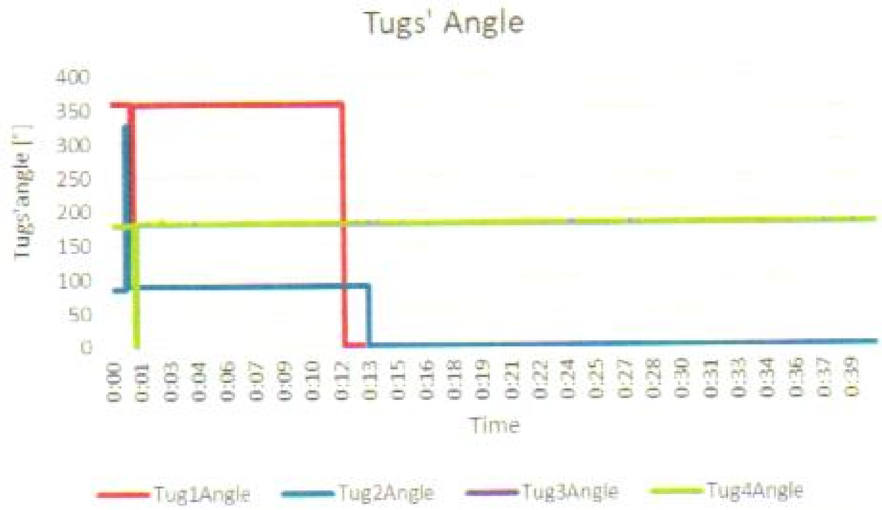
1004


Transverse speed (Bow and Stern)
Tranverse speed [knots]
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
0:00
0:01
0:03
0:04
0:06
0:07
0:09
0:10
0:12
0:13
0:15
0:16
0:18
0:19
0:21
0:22
0:24
0:25
0:27
0:28
0:30
0:31
0:33
0:34
0:36
0:37
0:39
Time
Transverse speed at ship's bow
Transverse speed at ship's stern


Rate of turn
Rate of turn [°/min]
15
10
5
0
-5
-10
-15
-20
0:00
0:01
0:03
0:04
0:06
0:07
0:09
0:10
0:12
0:13
0:15
0:16
0:18
0:19
0:21
0:22
0:24
0:25
0:27
0:28
0:30
0:31
0:33
0:34
0:36
0:37
0:39
Time
Rate of turn


Bow thruster %
Bow thruster %
100
80
60
40
20
0
0:00
0:01
0:03
0:04
0:06
0:07
0:09
0:10
0:12
0:13
0:15
0:16
0:18
0:19
0:21
0:22
0:24
0:25
0:27
0:28
0:30
0:31
0:33
0:34
0:36
0:37
0:39
Time
Bow thruster gained power


Tugs
Tugs' force [tf]
5
2.5
0
-2.5
-5
-7.5
-10
-12.5
-15
-17.5
-20
Time
Tug1F
Tug2F
Tug3F
Tug4F

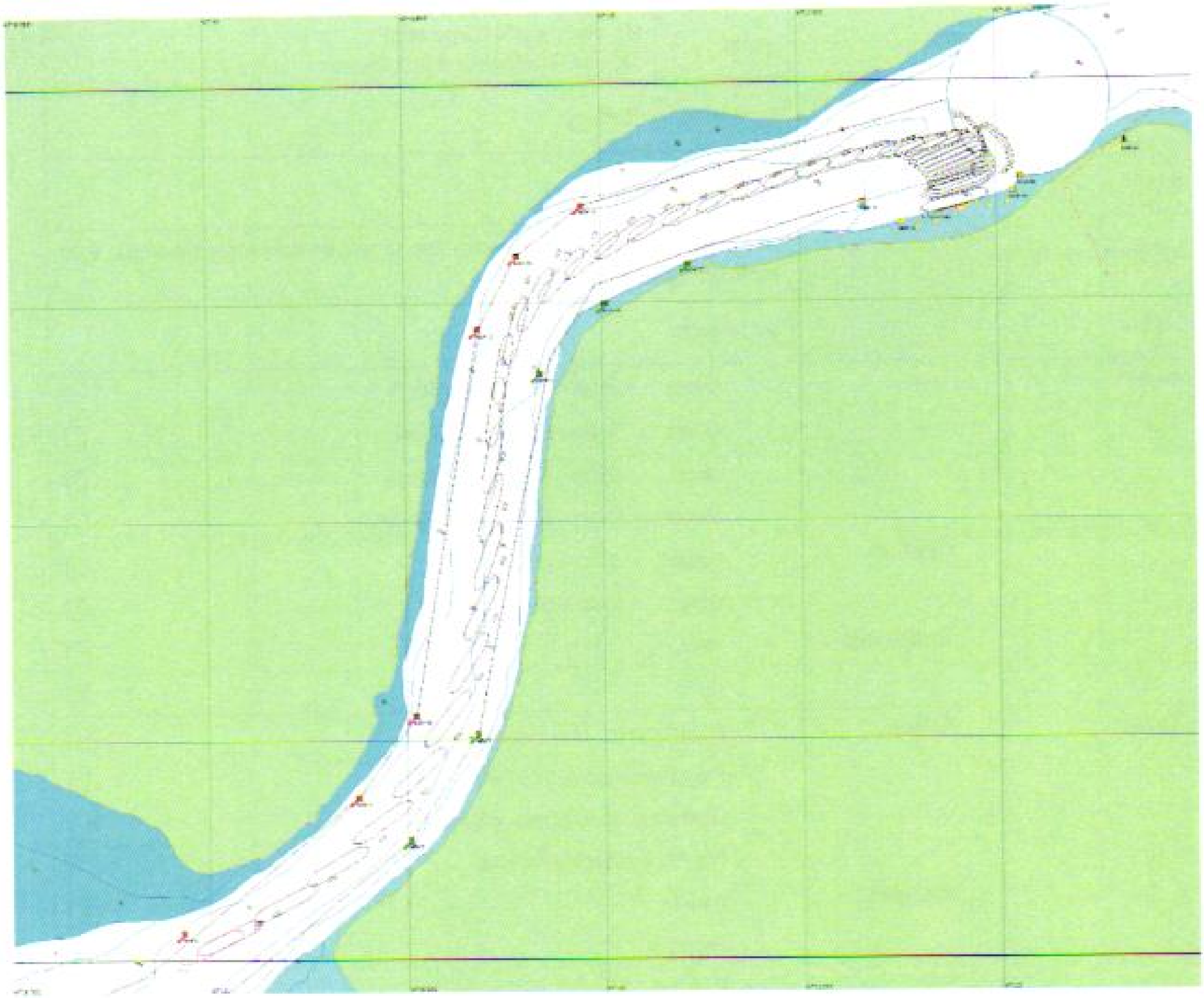

Tugs' Angle
Tugs'angle [°]
400
350
300
250
200
150
100
50
0
Time
Tug1Angle
Tug2Angle
Tug3Angle
Tug4Angle

1906

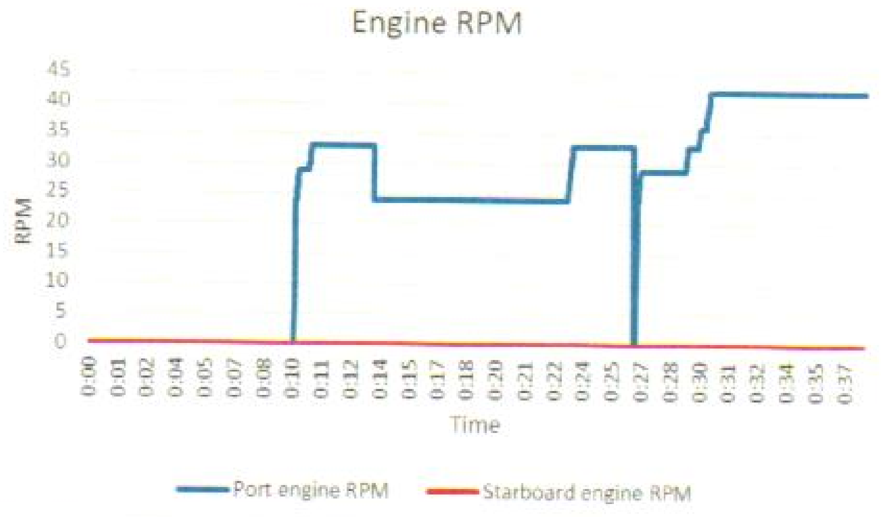
Date:	28/03/2019	Project:	Mitsubishi – JGC Corporation Tabeer LNG Terminal at Port Qasim
Time start:	14:40	Time finish:	15:15
Run n.	21	File name:	MTI2019_21
Manouvre description:		Departure with Moss 170k m³ vessel – Ebb 15 minutes before max ebb & 253° at 20 knots (with gusts to 25 knots)	
Captain		Ian Simpson	

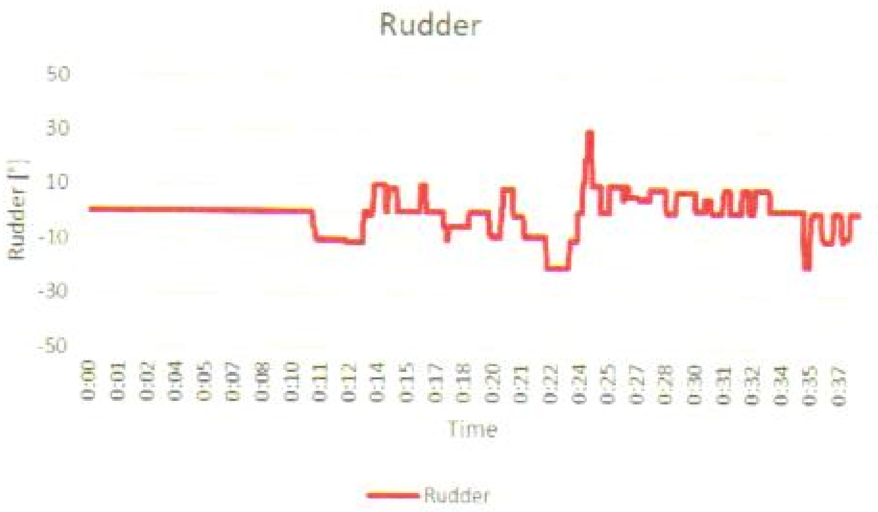
Vessel	Type	Q-Max	(345m – 53.8m – 266,000m3)	☐
		Q-Flex	(315m – 50.0m – 210,000m3)	☐
		Moss	(300m – 52.0m – 177,000m3)	☒
		Membrane	(274m – 43.3m – 130,000m3)	☐
	Condition	Loaded	(Draft: 11.55 m)	☐
		Ballast	(Draft: 9.50 m)	☒
	Thruster used	Yes		☐
		No		☒
Condition	Position	From buoys B1-B2 to Terminal		☐
		From Terminal to buoys B1-B2		☒
		From buoys B1-B2 to second bend		☐
		From second bend to Terminal		☐
	Manoeuvre	Arrival		☐
		Departure		☒
	Tugs	N.: 4 tugs		
Metocean	Current	Dir.: Ebb	Speed: 15 minutes before max ebb	
	Wind	Dir.: 253°	Speed: 20 Kts (gusts to 25 kts every 3 min)	

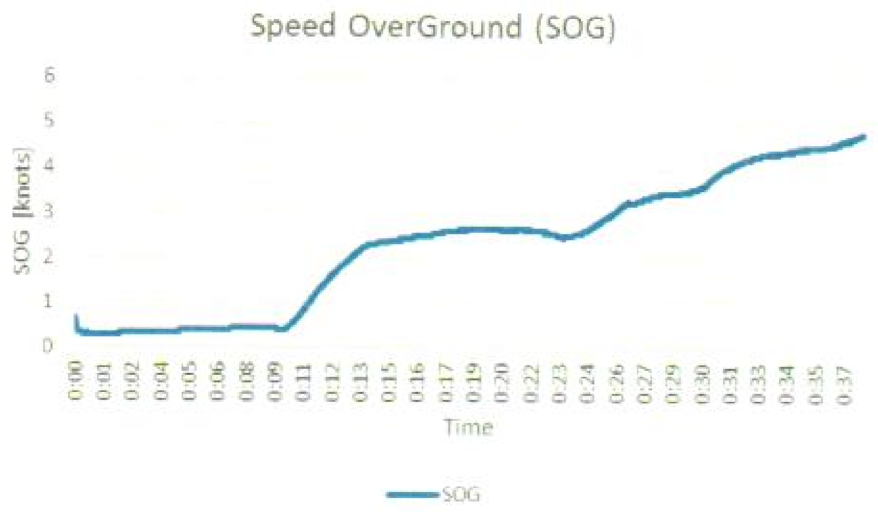
Note:
Similar outcome to run 14. Vessel remains within the channel but only by employing aggressive manoeuvring techniques & use of stern tug. Transits in these conditions are not recommended to be performed as vessel uses full extent of available channel and is not fully in control.

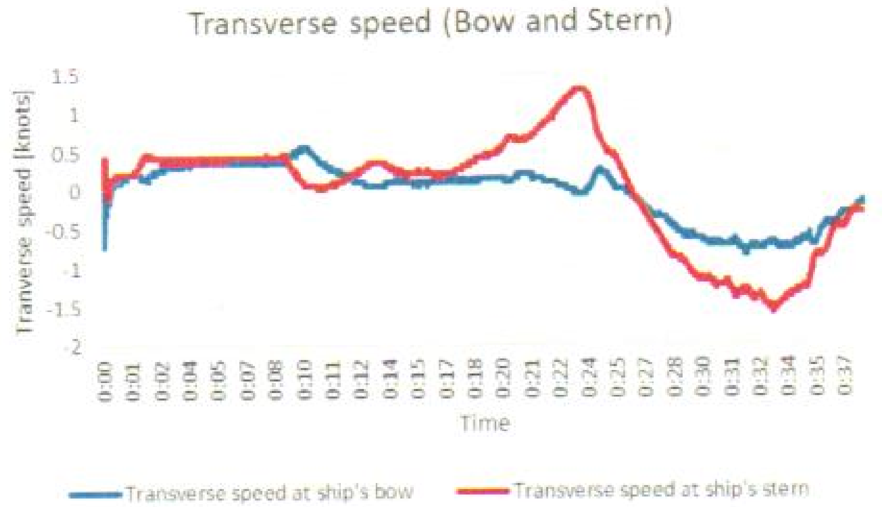


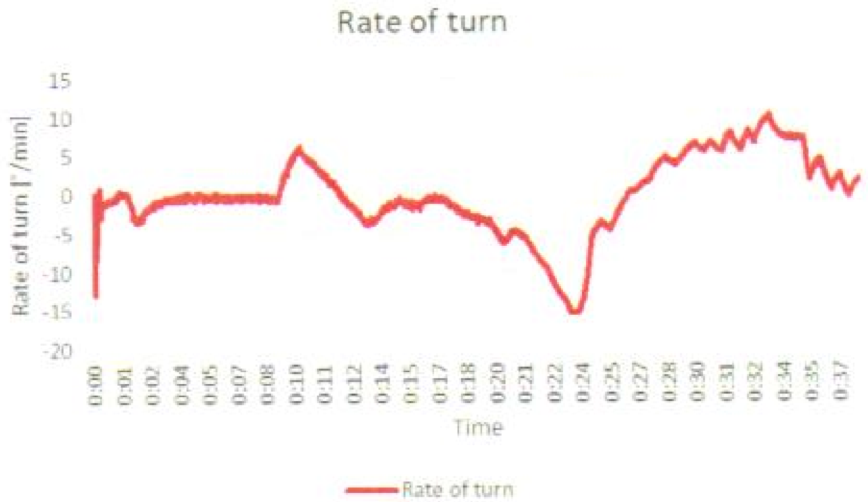
1008

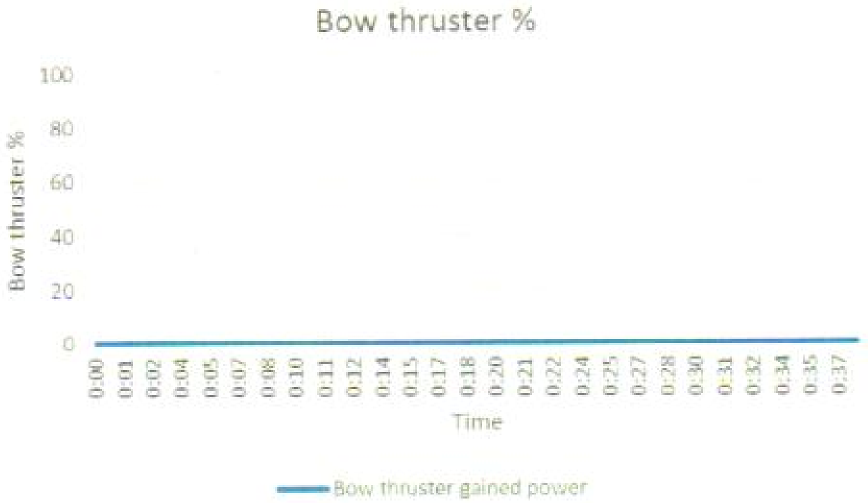

Engine RPM
45
40
35
30
25
20
15
10
5
0
RPM
0:00 0:01 0:02 0:04 0:05 0:07 0:08 0:10 0:11 0:12 0:14 0:15 0:17 0:18 0:20 0:21 0:22 0:24 0:25 0:27 0:28 0:30 0:31 0:32 0:34 0:35 0:37
Time
Port engine RPM
Starboard engine RPM

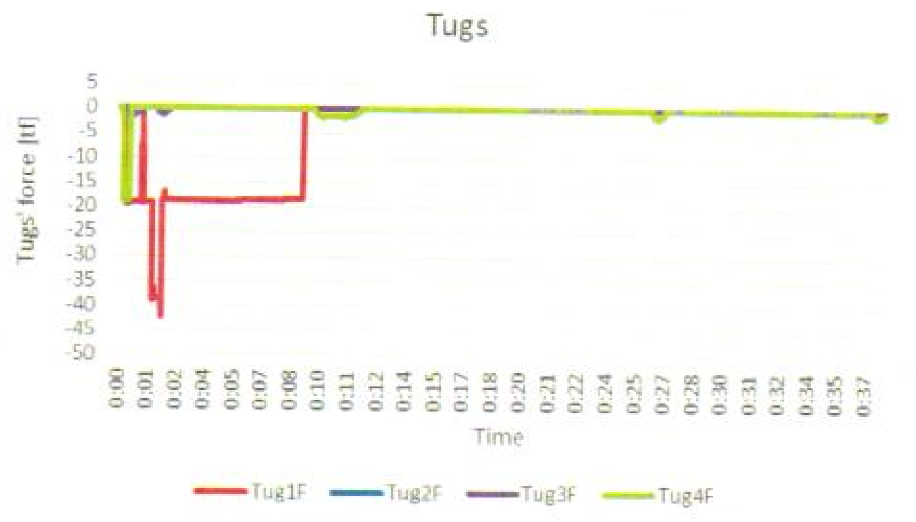

Rudder
50
30
10
-10
-30
-50
Rudder [°]
0:00 0:01 0:02 0:04 0:05 0:07 0:08 0:10 0:11 0:12 0:14 0:15 0:17 0:18 0:20 0:21 0:22 0:24 0:25 0:27 0:28 0:30 0:31 0:32 0:34 0:35 0:37
Time
Rudder

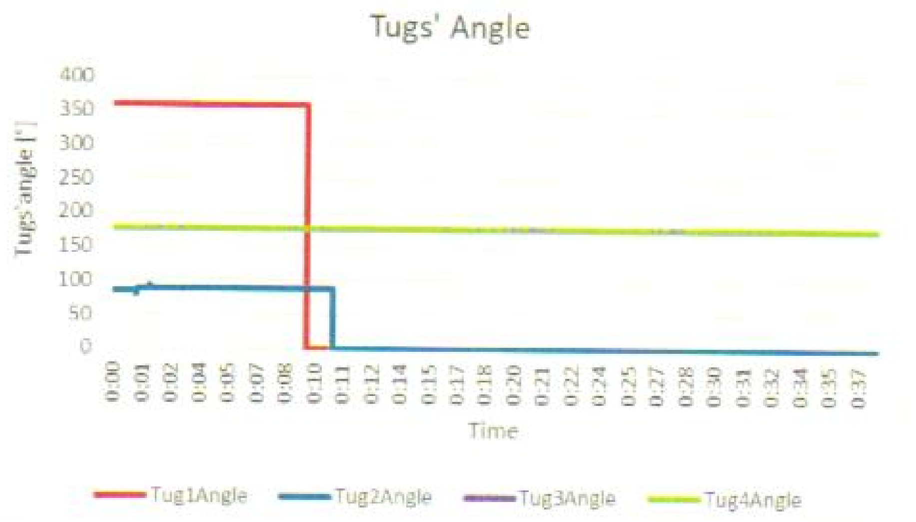

Speed OverGround (SOG)
6
5
4
3
2
1
0
SOG [knots]
0:00 0:01 0:02 0:04 0:05 0:06 0:08 0:09 0:11 0:12 0:13 0:15 0:16 0:17 0:19 0:20 0:22 0:23 0:24 0:26 0:27 0:29 0:30 0:31 0:33 0:34 0:35 0:37
Time
SOG


Transverse speed (Bow and Stern)
Tranverse speed [knots]
1.5
1
0.5
0
-0.5
-1
-1.5
-2
Time
Transverse speed at ship's bow
Transverse speed at ship's stern


Rate of turn
Rate of turn [°/min]
15
10
5
0
-5
-10
-15
-20
Time
Rate of turn


Bow thruster %
Bow thruster %
100
80
60
40
20
0
Time
Bow thruster gained power


Tugs
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
Tugs' force [tf]
0:00 0:01 0:02 0:04 0:05 0:07 0:08 0:10 0:11 0:12 0:14 0:15 0:17 0:18 0:20 0:21 0:22 0:24 0:25 0:27 0:28 0:30 0:31 0:32 0:34 0:35 0:37
Time
Tug1F
Tug2F
Tug3F
Tug4F

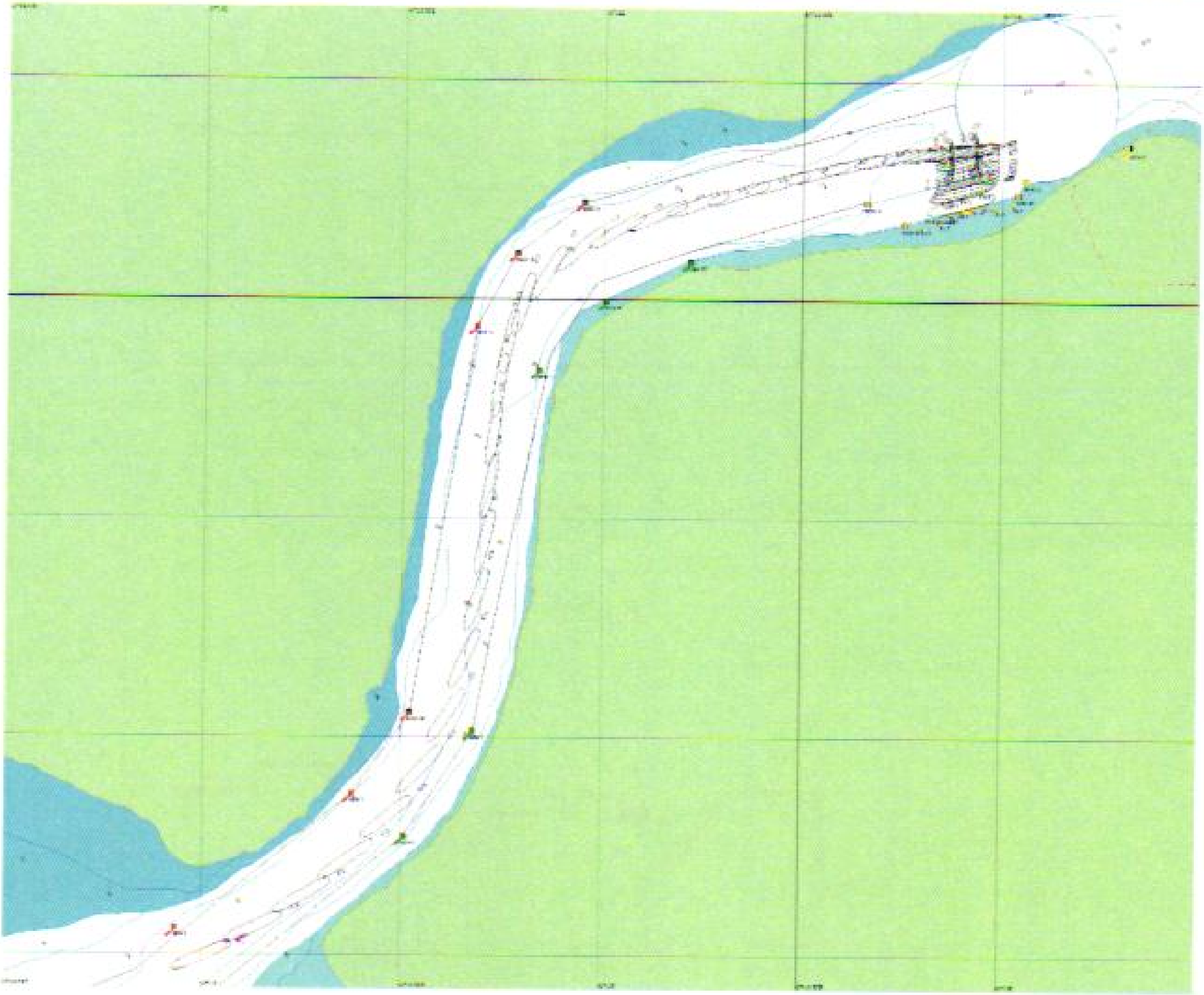

Tugs' Angle
400
350
300
250
200
150
100
50
0
Tugs'angle [°]
0:00 0:01 0:02 0:04 0:05 0:07 0:08 0:10 0:11 0:12 0:14 0:15 0:17 0:18 0:20 0:21 0:22 0:24 0:25 0:27 0:28 0:30 0:31 0:32 0:34 0:35 0:37
Time
Tug1Angle
Tug2Angle
Tug3Angle
Tug4Angle

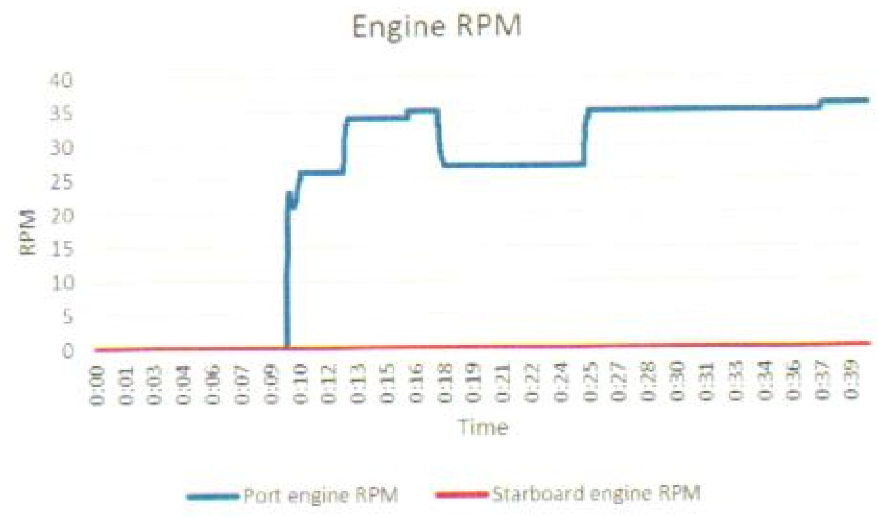
Date:	28/03/2019	Project:	Mitsubishi – JGC Corporation Tabeer LNG Terminal at Port Qasim
Time start:	15:35	Time finish:	16:20
Run n.	22	File name:	MTI2019_22
Manouvre description:		Departure with Membrane 130k m³ vessel – Ebb 15 minutes before max ebb & 253° at 20 knots (with gusts to 25 knots)	
Captain		Ian Simpson	

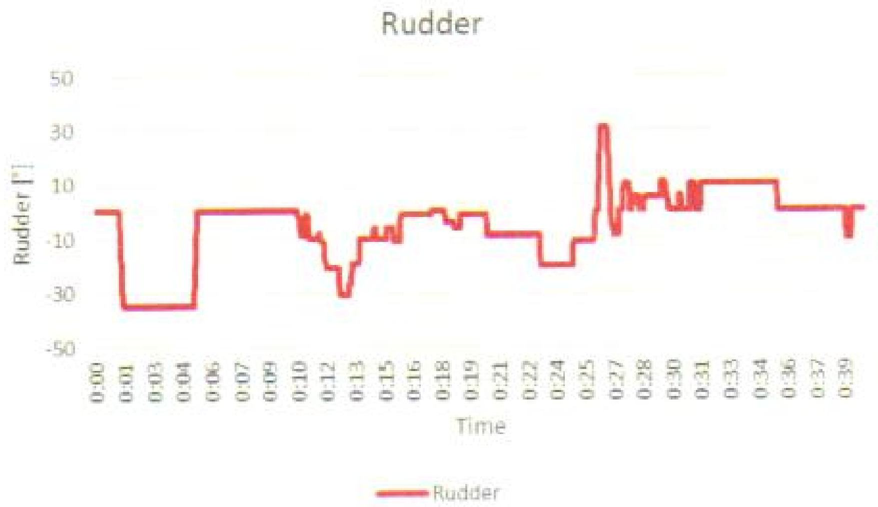
Vessel	Type	Q-Max	(345m – 53.8m – 266,000m3)	☐
		Q-Flex	(315m – 50.0m – 210,000m3)	☐
		Moss	(300m – 52.0m – 177,000m3)	☐
		Membrane	(274m – 43.3m – 130,000m3)	☒
	Condition	Loaded	(Draft: 10.86 m)	☐
		Ballast	(Draft: 9.50 m)	☒
	Thruster used	Yes		☐
		No		☒
Condition	Position	From buoys B1-B2 to Terminal		☐
		From Terminal to buoys B1-B2		☒
		From buoys B1-B2 to second bend		☐
		From second bend to Terminal		☐
	Manoeuvre	Arrival		☐
		Departure		☒
	Tugs	N.: 4 tugs		
Metocean	Current	Dir.: Ebb	Speed: 15 minutes before max ebb	
	Wind	Dir.: 253°	Speed: 20 Kts (gusts to 25 kts every 3 min)	

Note:
Outward transits of this vessel in these conditions may be achieved. Vessel uses full extent of the channel and similar speed and positioning must be employed to achieve safe transit.

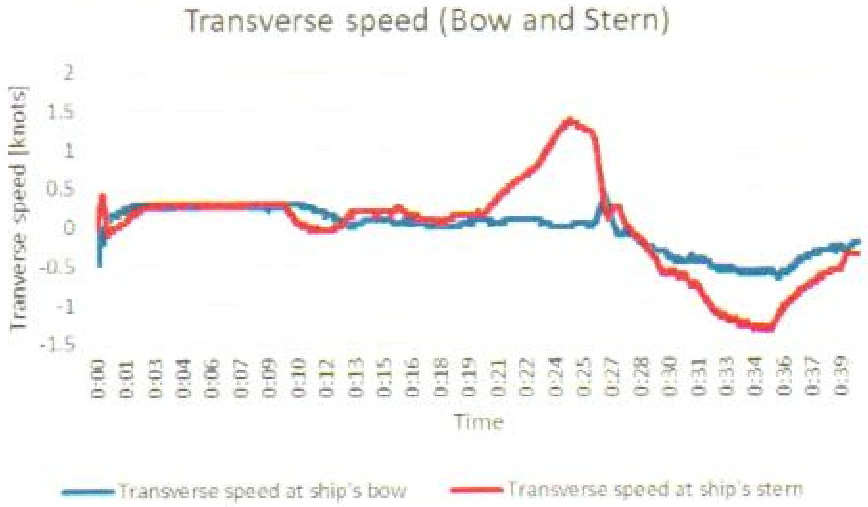
1012

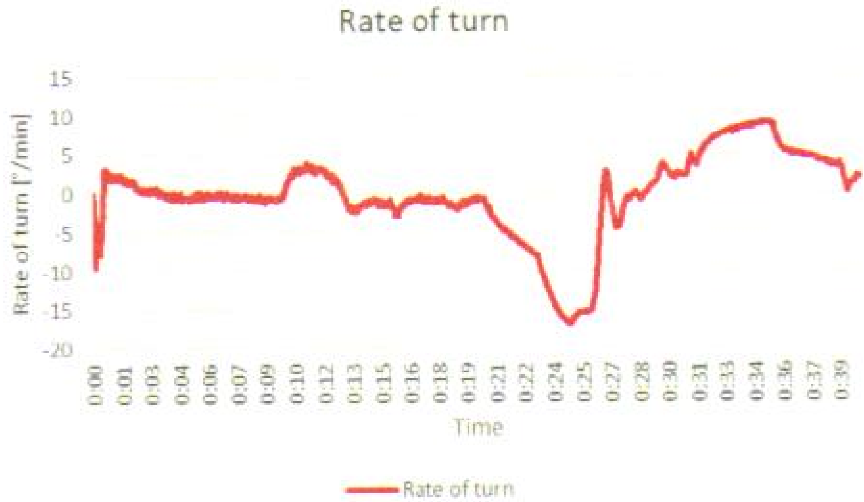


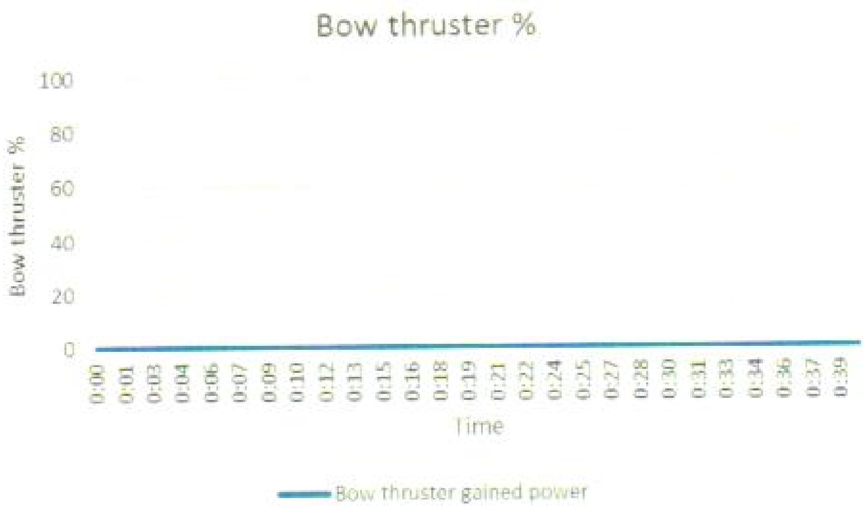

Engine RPM
RPM
Time
Port engine RPM
Starboard engine RPM

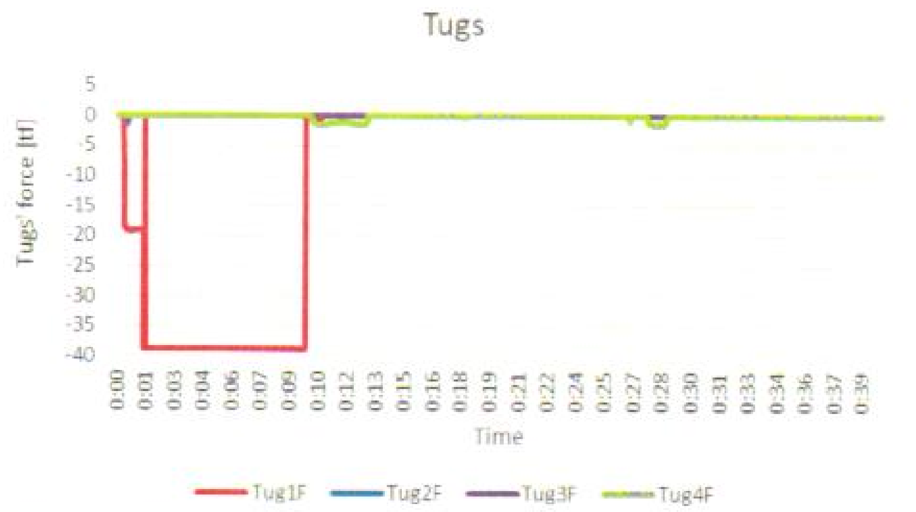

Rudder
Rudder [°]
Time
Rudder

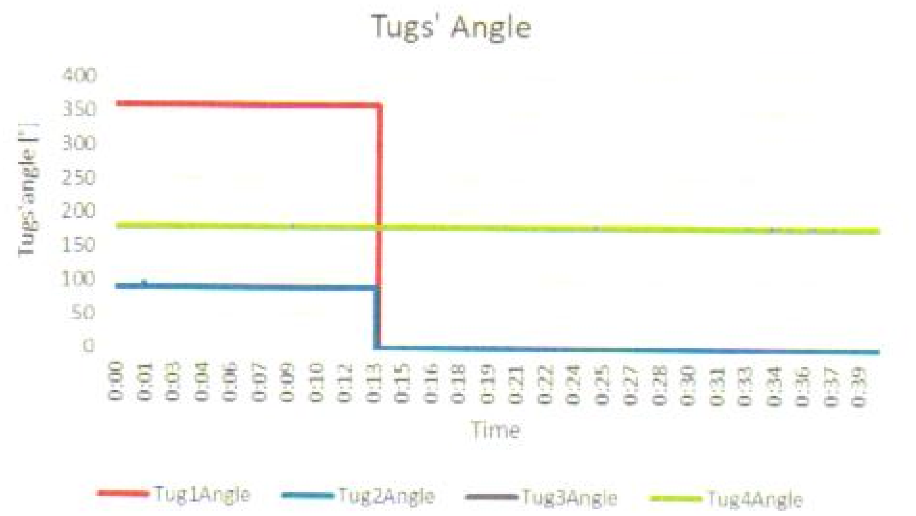

Speed OverGround (SOG)
SOG [knots]
Time
SOG


Transverse speed (Bow and Stern)
Tranverse speed [knots]
Time
Transverse speed at ship's bow
Transverse speed at ship's stern


Rate of turn
Rate of turn [°/min]
Time
Rate of turn


Bow thruster %
Bow thruster %
Time
Bow thruster gained power


Tugs
Tugs' force [tf]
5
0
-5
-10
-15
-20
-25
-30
-35
-40
Time
Tug1F
Tug2F
Tug3F
Tug4F


Tugs' Angle
Tugs'angle [°]
400
350
300
250
200
150
100
50
0
Time
Tug1Angle
Tug2Angle
Tug3Angle
Tug4Angle

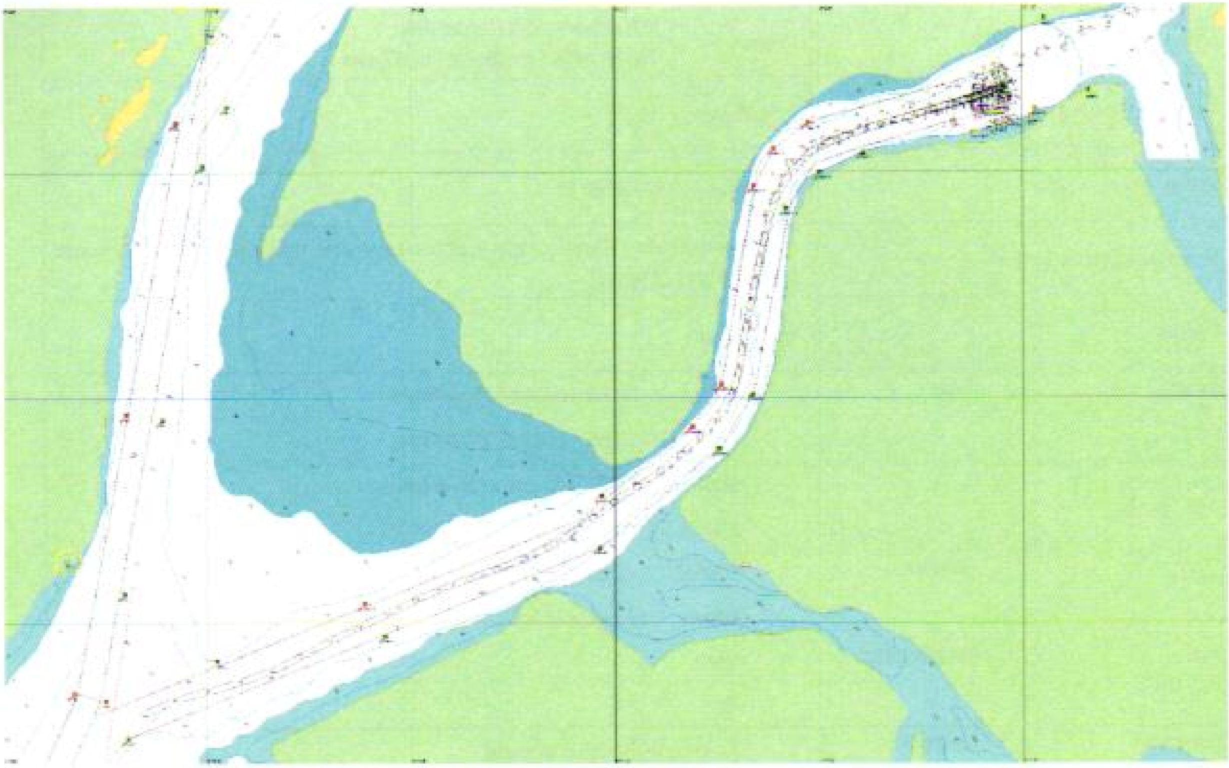
1 Q16

RINA

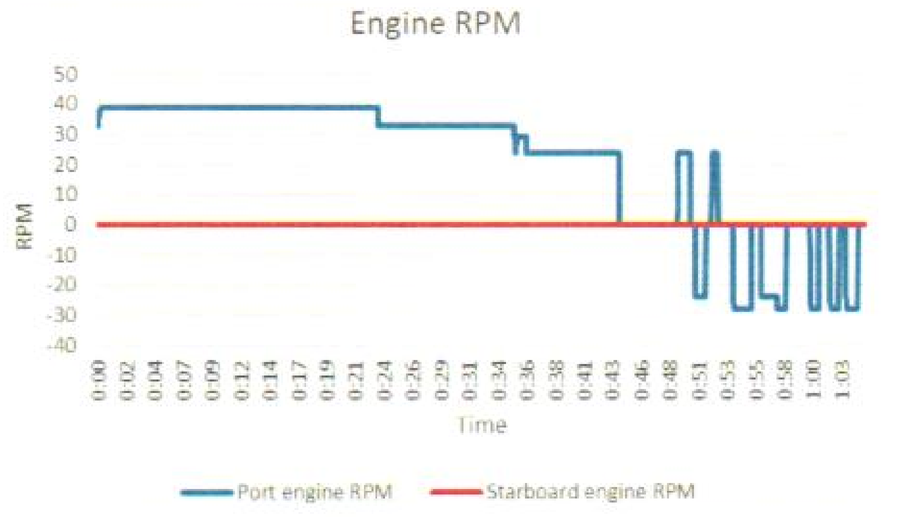
Date:	28/03/2019	Project:	Mitsubishi – JGC Corporation Tabeer LNG Terminal at Port Qasim
Time start:	17:30	Time finish:	18:30
Run n.	23	File name:	MTI2019_23
Manouvre description:		Arrival with Moss 170k m³ vessel – Ebb 1 hour after max ebb & 53° at 20 knots (with gusts to 25 knots)	
Captain		Ian Simpson	

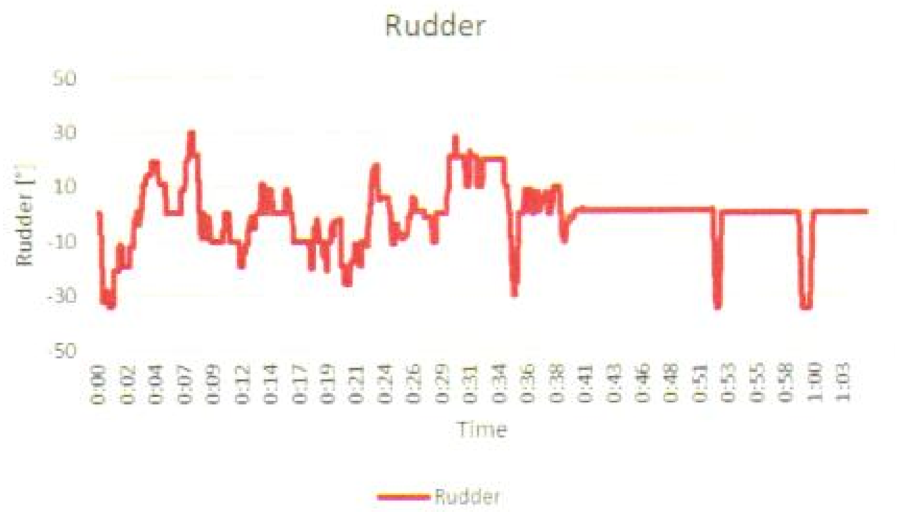
Vessel	Type	Q-Max	(345m – 53.8m – 266,000m3)	☐
		Q-Flex	(315m – 50.0m – 210,000m3)	☐
		Moss	(300m – 52.0m – 177,000m3)	☒
		Membrane	(274m – 43.3m – 130,000m3)	☐
	Condition	Loaded	(Draft: 11.55 m)	☒
		Ballast	(Draft: 9.50 m)	☐
	Thruster used	Yes		☐
		No		☒
Condition	Position	From buoys B1-B2 to Terminal		☒
		From Terminal to buoys B1-B2		☐
		From buoys B1-B2 to second bend		☐
		From second bend to Terminal		☐
	Manoeuvre	Arrival		☒
		Departure		☐
	Tugs	N.: 4 tugs		
Metocean	Current	Dir.: Ebb	Speed: 1 hour after max ebb	
	Wind	Dir.: 53°	Speed: 20 Kts (gusts to 25 kts every 3 min)	

Note:
To investigate arrival and swing in typical environmental conditions. In addition, to investigate minimum space required for swinging this vessel in non- extreme conditions.
Transit safely achieved by employing similar strategy as earlier runs. Sufficient space exists for vessel to safely swing adjacent to the terminal without provision of an additional turning circle.



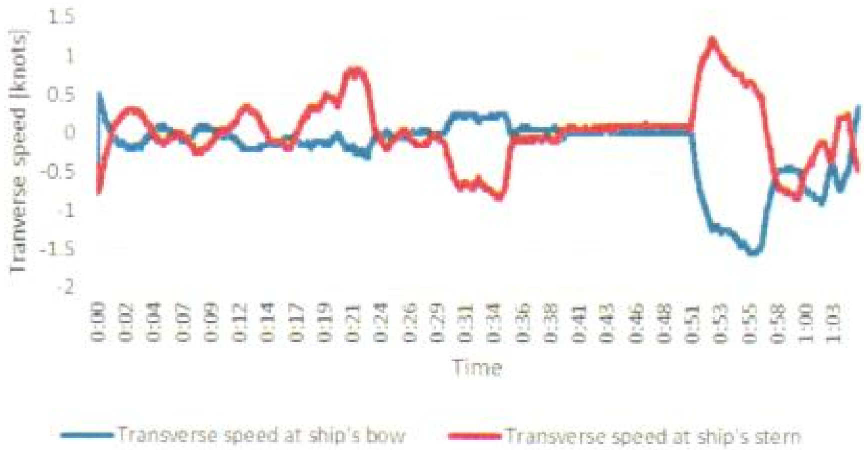
1018


Engine RPM
RPM
Time
Port engine RPM
Starboard engine RPM

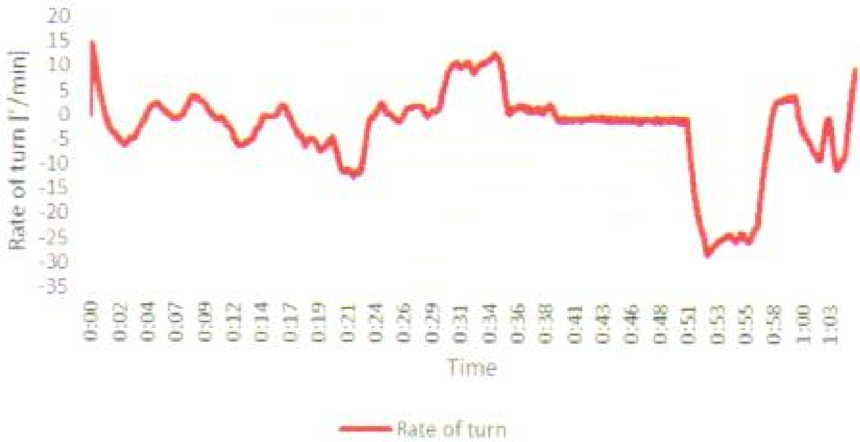

Rudder
Rudder [°]
Time
Rudder


Speed OverGround (SOG)
SOG [knots]
Time
SOG

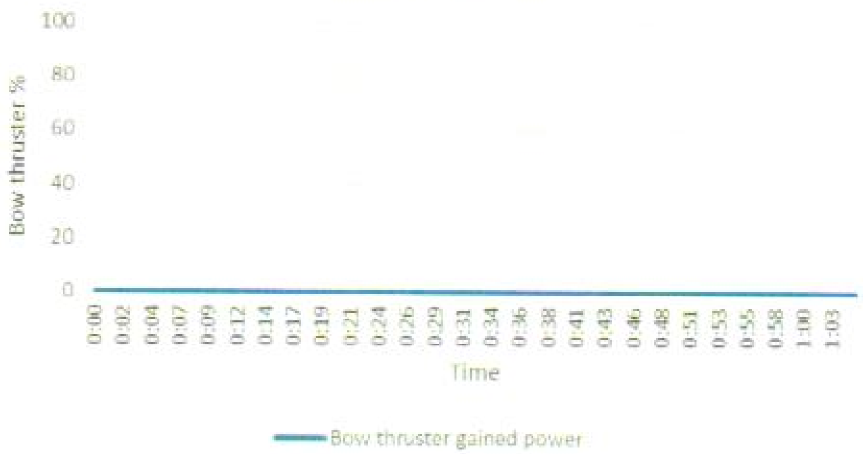
Transverse speed (Bow and Stern)

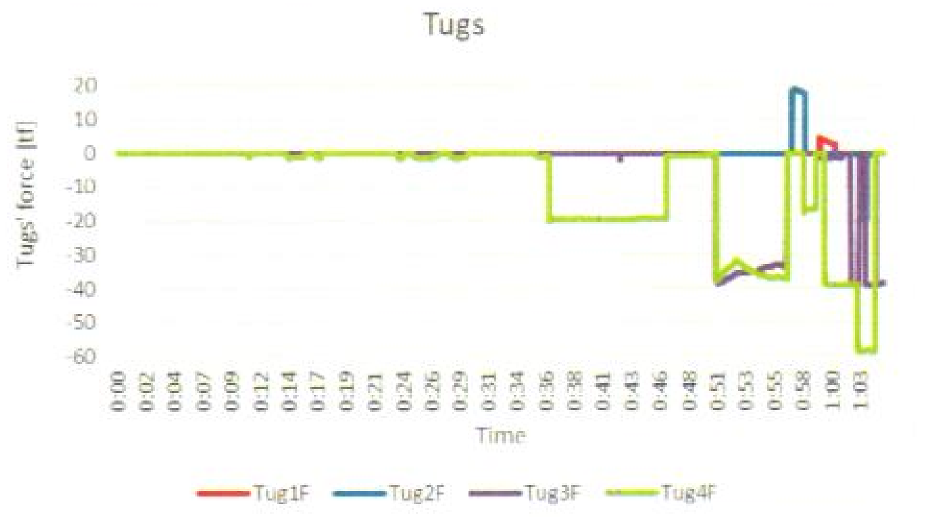


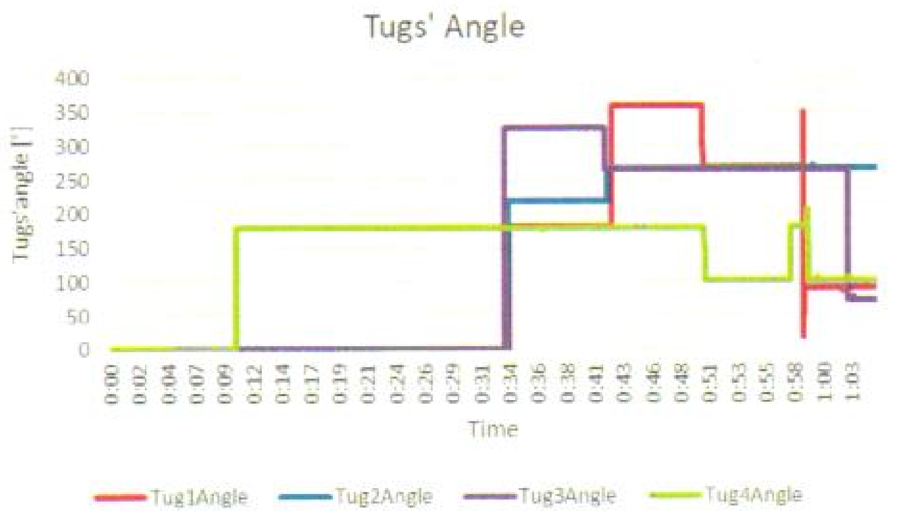
Rate of turn



Bow thruster %




Tugs
Tugs' force [tf]
Time
Tug1F
Tug2F
Tug3F
Tug4F


Tugs' Angle
Tugs'angle [°]
Time
Tug1Angle
Tug2Angle
Tug3Angle
Tug4Angle

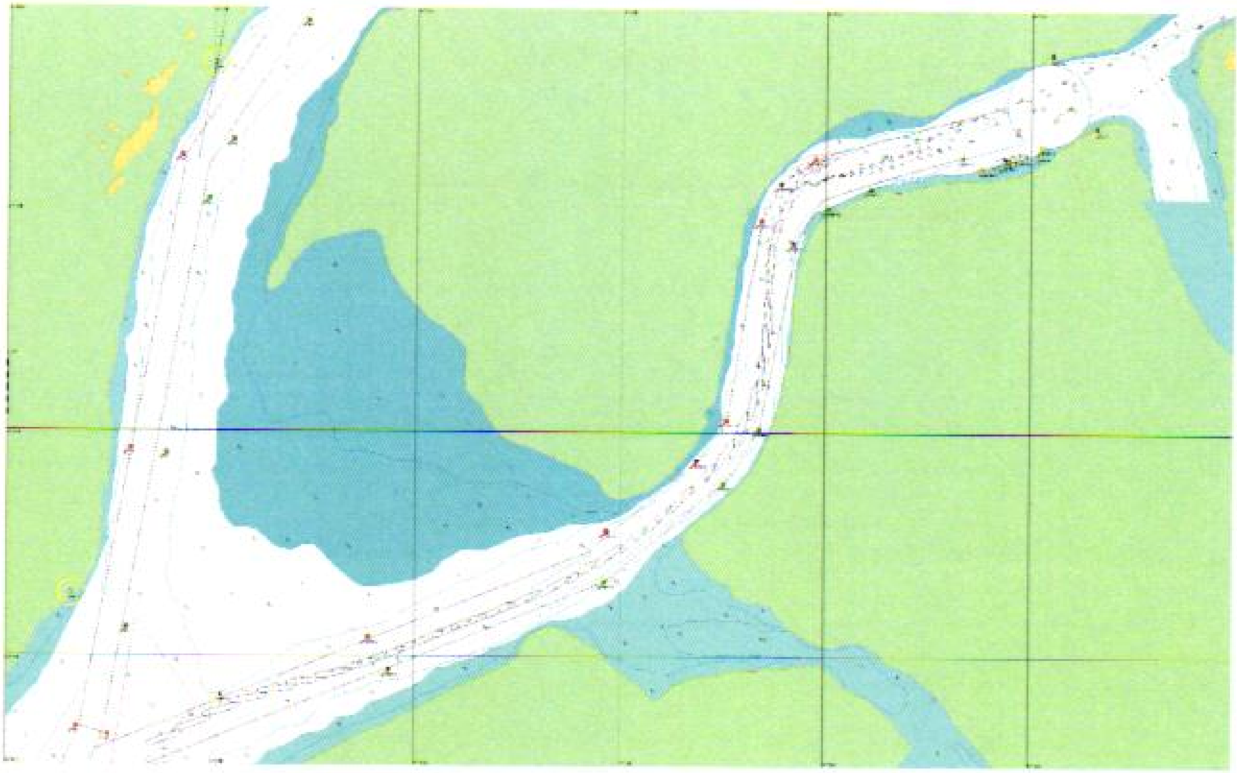
1 0 2 1

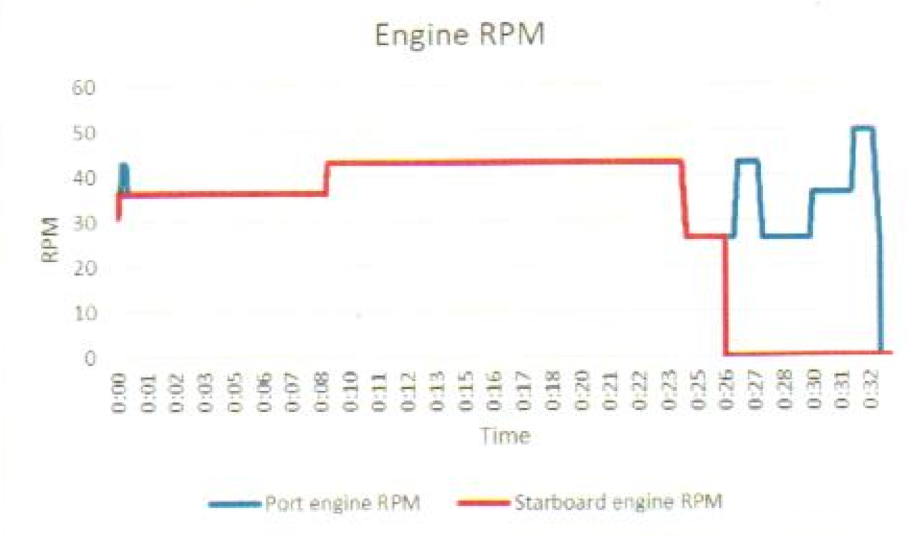
RINA

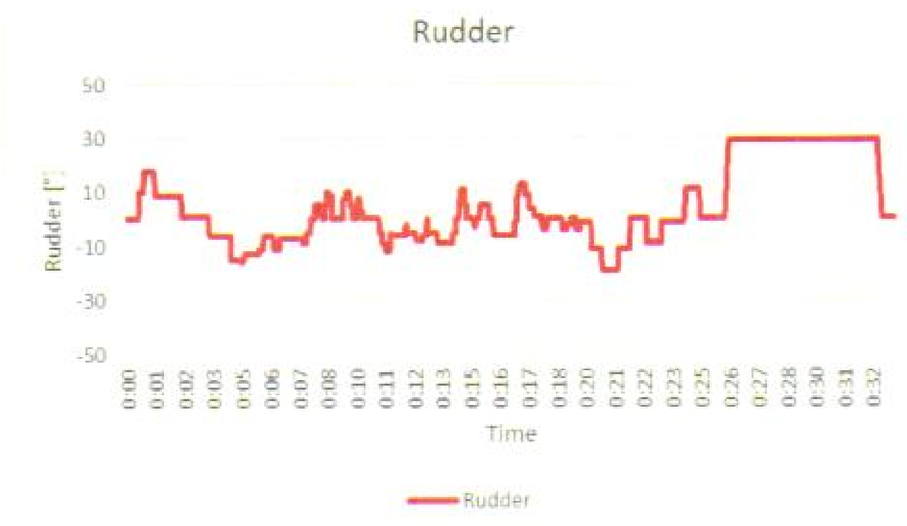
Date:	29/03/2019	Project:	Mitsubishi – JGC Corporation Tabeer LNG Terminal at Port Qasim	
Time start:	10:20	Time finish:	10:55	
Run n.	24	File name:	MTI2019_24	
Manouvre description:		Arrival with Q-Flex vessel – Flood 3 hours before HAT & 253° at 20 knots (with gusts to 25 knots)		
Captain		Ian Simpson		
Vessel	Type	Q-Max	(345m – 53.8m – 266,000m3)	☐
		Q-Flex	(315m – 50.0m – 210,000m3)	☒
		Moss	(300m – 52.0m – 177,000m3)	☐
		Membrane	(274m – 43.3m – 130,000m3)	☐
	Condition	Loaded	(Draft: 12.0 m)	☒
		Ballast	(Draft: 9.60 m)	☐
	Thruster used	Yes		☐
		No		☒
Condition	Position	From buoys B1-B2 to Terminal		☒
		From Terminal to buoys B1-B2		☐
		From buoys B1-B2 to second bend		☐
		From second bend to Terminal		☐
	Manoeuvre	Arrival		☒
		Departure		☐
	Tugs	N.: 2 tugs		
Metocean	Current	Dir.: Flood	Speed: 3 hours before HAT	
	Wind	Dir.: 253°	Speed: 20 Kts (gusts to 25 kts every 3 min)	

Note:
Q-Flex vessel experiences similar problems as the Q-Max vessel in these conditions. Vessel generates high lateral drift in bends that result in vessel grounding. Conclusions regarding Q-Flex vessel not significantly different from those regarding the Q-Max.

1022

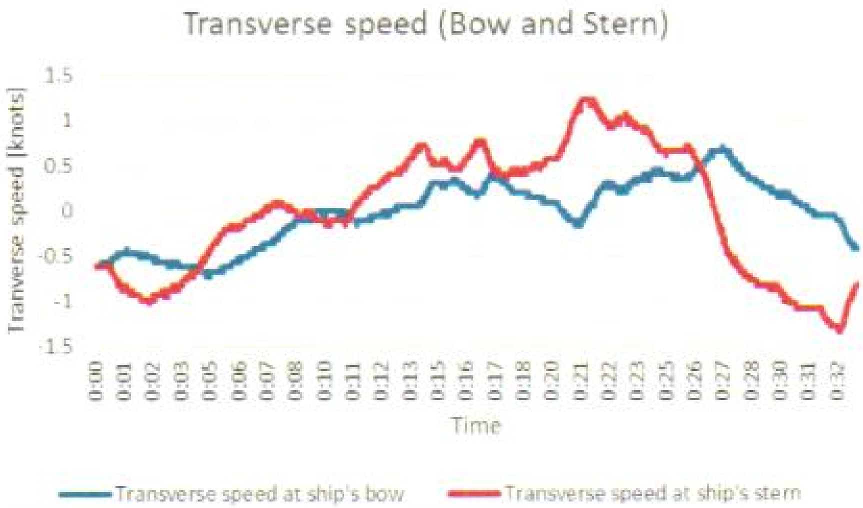


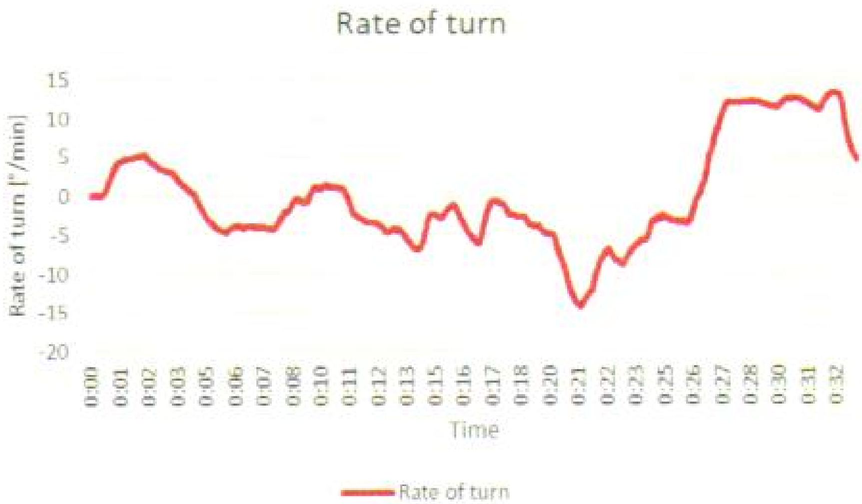

Engine RPM
RPM
Time
Port engine RPM
Starboard engine RPM

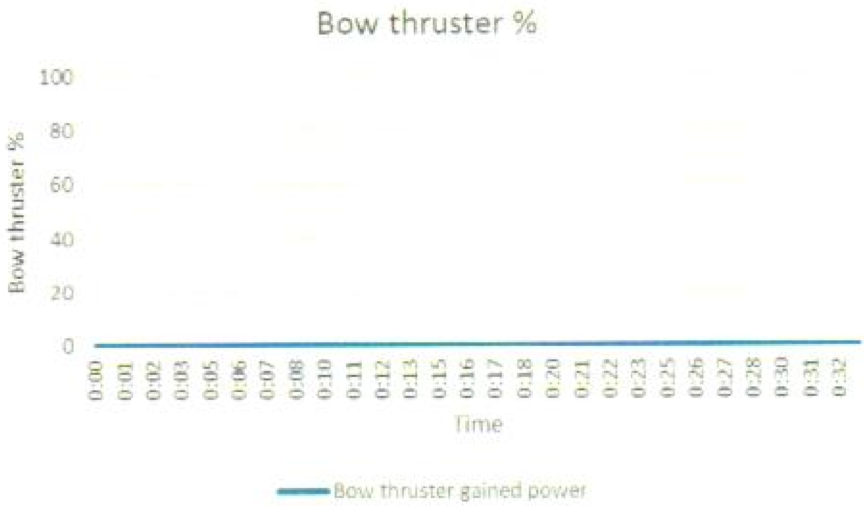

Rudder
Rudder [°]
Time
Rudder


Speed OverGround (SOG)
SOG [knots]
Time
SOG

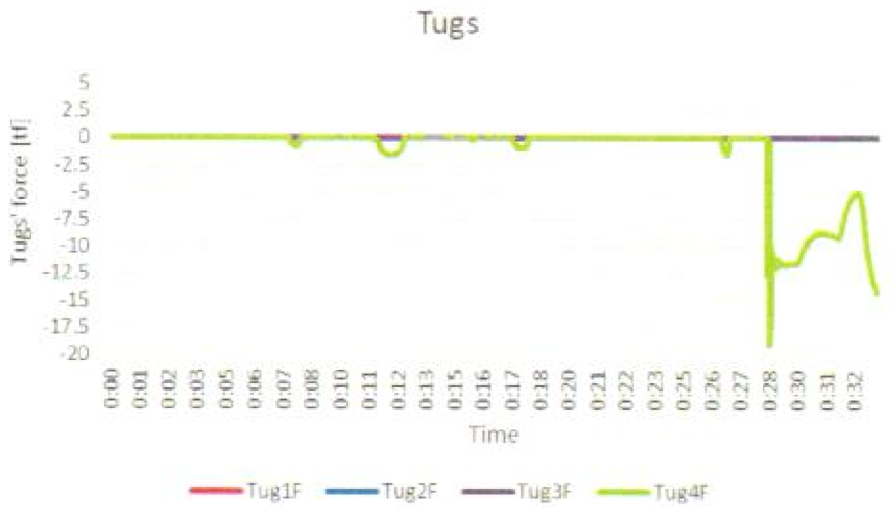
1024

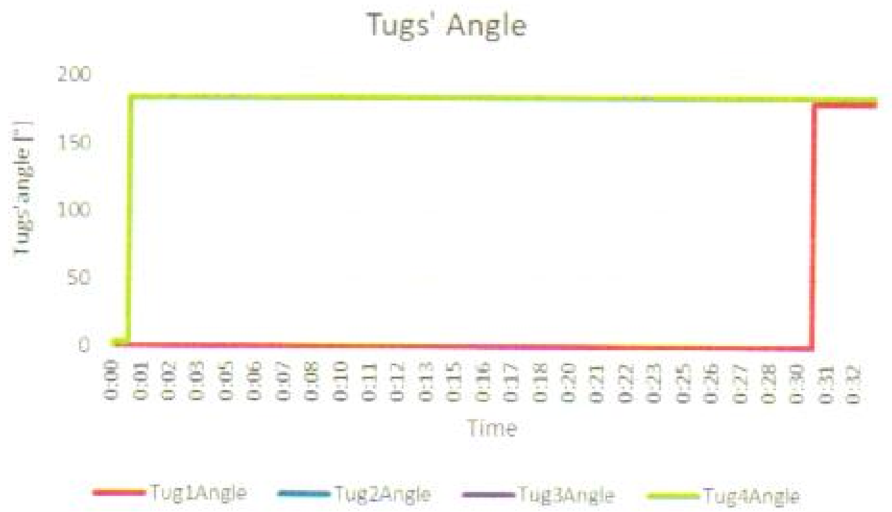

Transverse speed (Bow and Stern)
Tranverse speed [knots]
1.5
1
0.5
0
-0.5
-1
-1.5
0:00
0:01
0:02
0:03
0:05
0:06
0:07
0:08
0:10
0:11
0:12
0:13
0:15
0:16
0:17
0:18
0:20
0:21
0:22
0:23
0:25
0:26
0:27
0:28
0:30
0:31
0:32
Time
Transverse speed at ship's bow
Transverse speed at ship's stern


Rate of turn
Rate of turn [°/min]
15
10
5
0
-5
-10
-15
-20
Time
Rate of turn


Bow thruster %
Bow thruster %
100
80
60
40
20
0
Time
Bow thruster gained power

1925

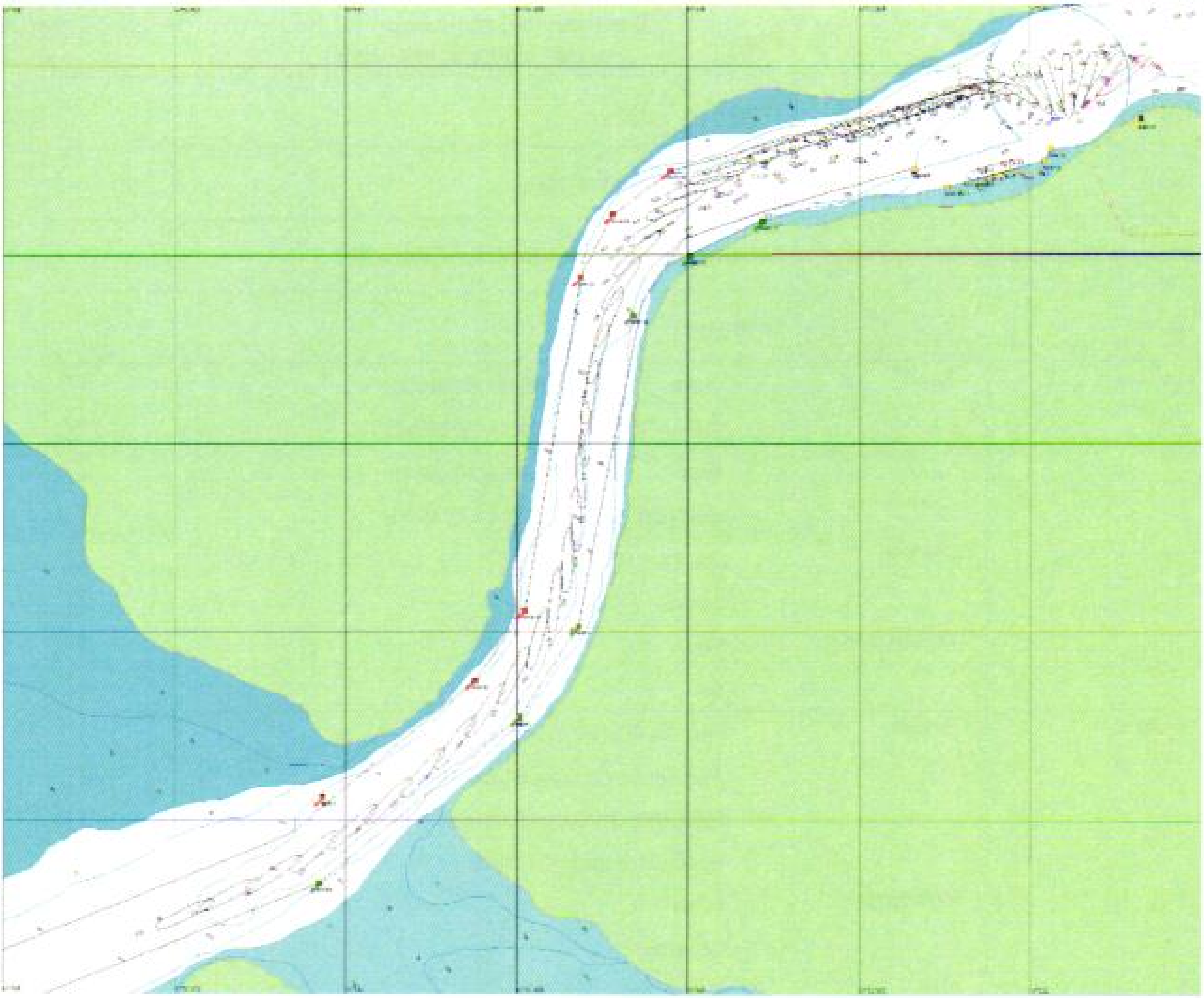

Tugs
Tugs' force [tf]
Time
Tug1F
Tug2F
Tug3F
Tug4F

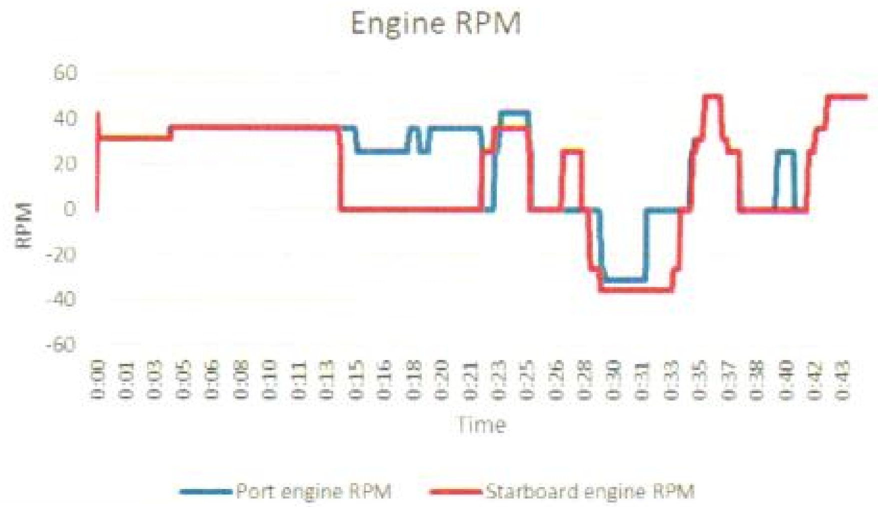

Tugs' Angle
Tugs'angle [°]
Time
Tug1Angle
Tug2Angle
Tug3Angle
Tug4Angle

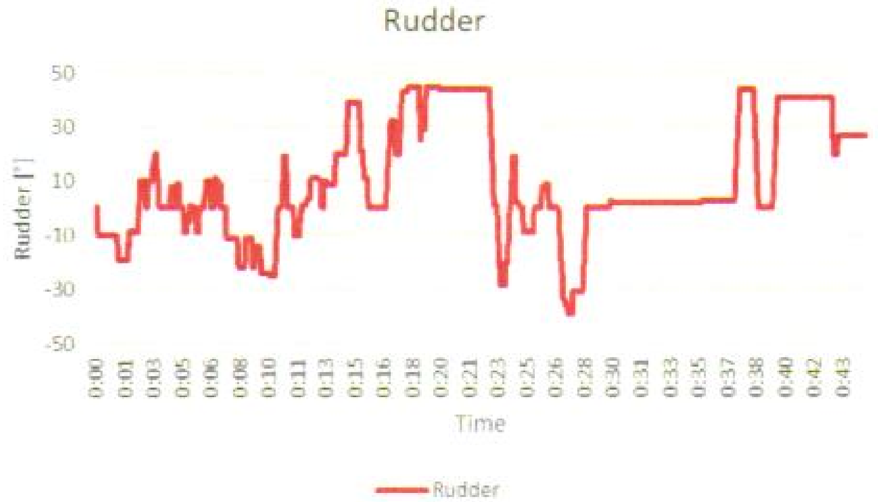
1026

Date:	29/03/2019	Project:	Mitsubishi – JGC Corporation Tabeer LNG Terminal at Port Qasim	
Time start:	11:05	Time finish:	11:50	
Run n.	24a	File name:	MTI2019_24a	
Manouvre description:		Arrival with Q-Flex vessel – Replicate of Run n. 24		
Captain		Ian Simpson		
Vessel	Type	Q-Max	(345m – 53.8m – 266,000m3)	☐
		Q-Flex	(315m – 50.0m – 210,000m3)	☒
		Moss	(300m – 52.0m – 177,000m3)	☐
		Membrane	(274m – 43.3m – 130,000m3)	☐
	Condition	Loaded	(Draft: 12.0 m)	☒
		Ballast	(Draft: 9.60 m)	☐
	Thruster used	Yes		☐
		No		☒
Condition	Position	From buoys B1-B2 to Terminal		☒
		From Terminal to buoys B1-B2		☐
		From buoys B1-B2 to second bend		☐
		From second bend to Terminal		☐
	Manoeuvre	Arrival		☒
		Departure		☐
	Tugs	N.: 4 tugs		
Metocean	Current	Dir.: Flood	Speed: 3 hours before HAT	
	Wind	Dir.: 253°	Speed: 20 Kts (gusts to 25 kts every 3 min)	

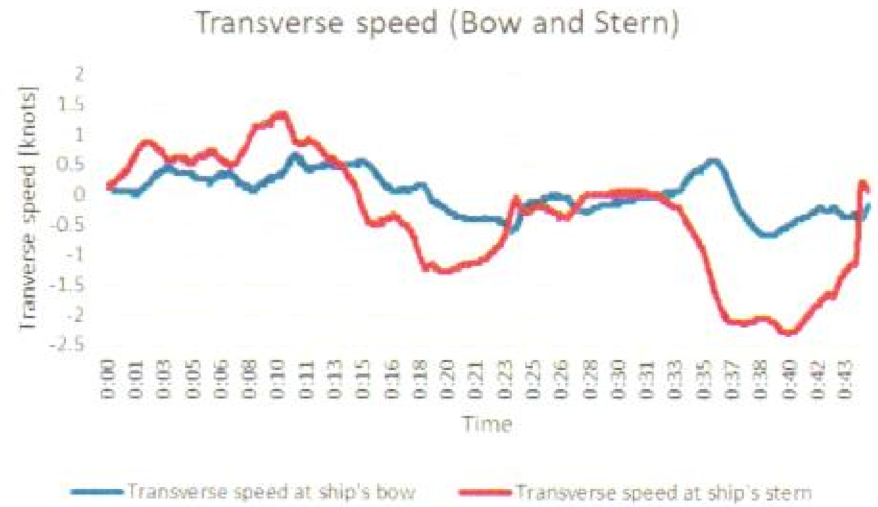
Note:
Repeat of run 24 to determine if use of escort tug will improve outcome. Vessel continues to experience high lateral set east of 2nd bend and uses maximum available channel width. Transits in these current conditions are extremely challenging. Consideration should be given to optimising the time of approach for these vessels.

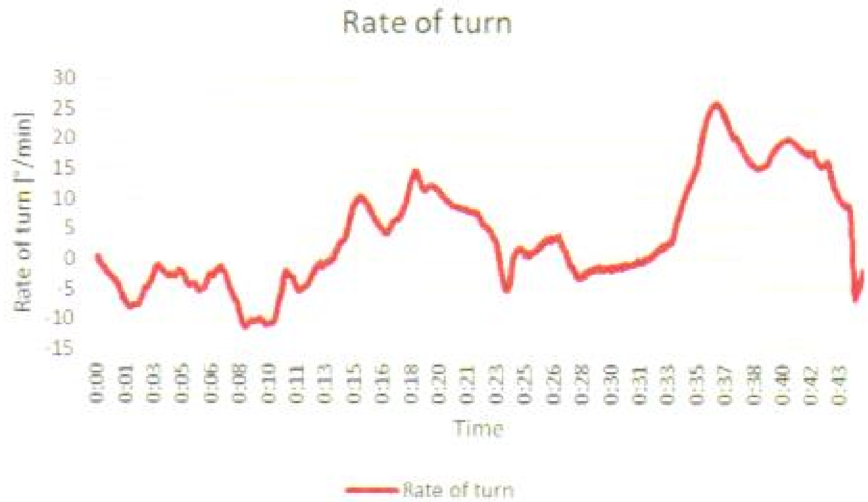


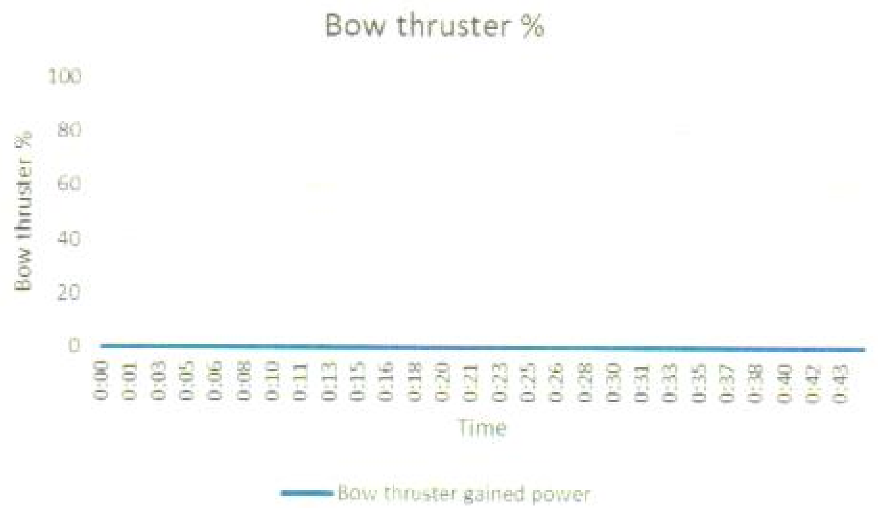

Engine RPM
RPM
Time
Port engine RPM
Starboard engine RPM


Rudder
Rudder [°]
Time
Rudder

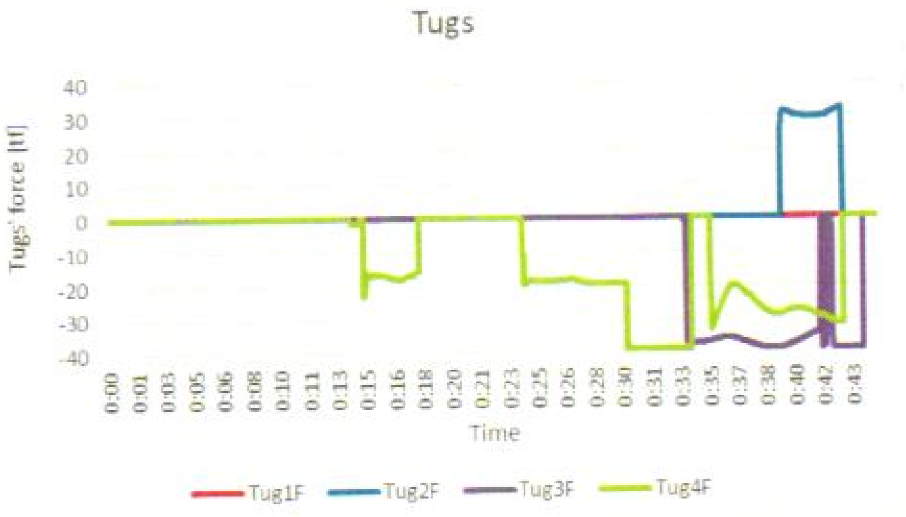

Speed OverGround (SOG)
SOG [knots]
Time
SOG


Transverse speed (Bow and Stern)
Tranverse speed [knots]
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
0:00
0:01
0:03
0:05
0:06
0:08
0:10
0:11
0:13
0:15
0:16
0:18
0:20
0:21
0:23
0:25
0:26
0:28
0:30
0:31
0:33
0:35
0:37
0:38
0:40
0:42
0:43
Time
Transverse speed at ship's bow
Transverse speed at ship's stern


Rate of turn
Rate of turn [°/min]
30
25
20
15
10
5
0
-5
-10
-15
0:00
0:01
0:03
0:05
0:06
0:08
0:10
0:11
0:13
0:15
0:16
0:18
0:20
0:21
0:23
0:25
0:26
0:28
0:30
0:31
0:33
0:35
0:37
0:38
0:40
0:42
0:43
Time
Rate of turn


Bow thruster %
Bow thruster %
100
80
60
40
20
0
0:00
0:01
0:03
0:05
0:06
0:08
0:10
0:11
0:13
0:15
0:16
0:18
0:20
0:21
0:23
0:25
0:26
0:28
0:30
0:31
0:33
0:35
0:37
0:38
0:40
0:42
0:43
Time
Bow thruster gained power

1030


Tugs
Tugs' force [tf]
40
30
20
10
0
-10
-20
-30
-40
Time
Tug1F
Tug2F
Tug3F
Tug4F


Tugs' Angle
Tugs' angle [°]
400
350
300
250
200
150
100
50
0
Time
Tug1Angle
Tug2Angle
Tug3Angle
Tug4Angle

103

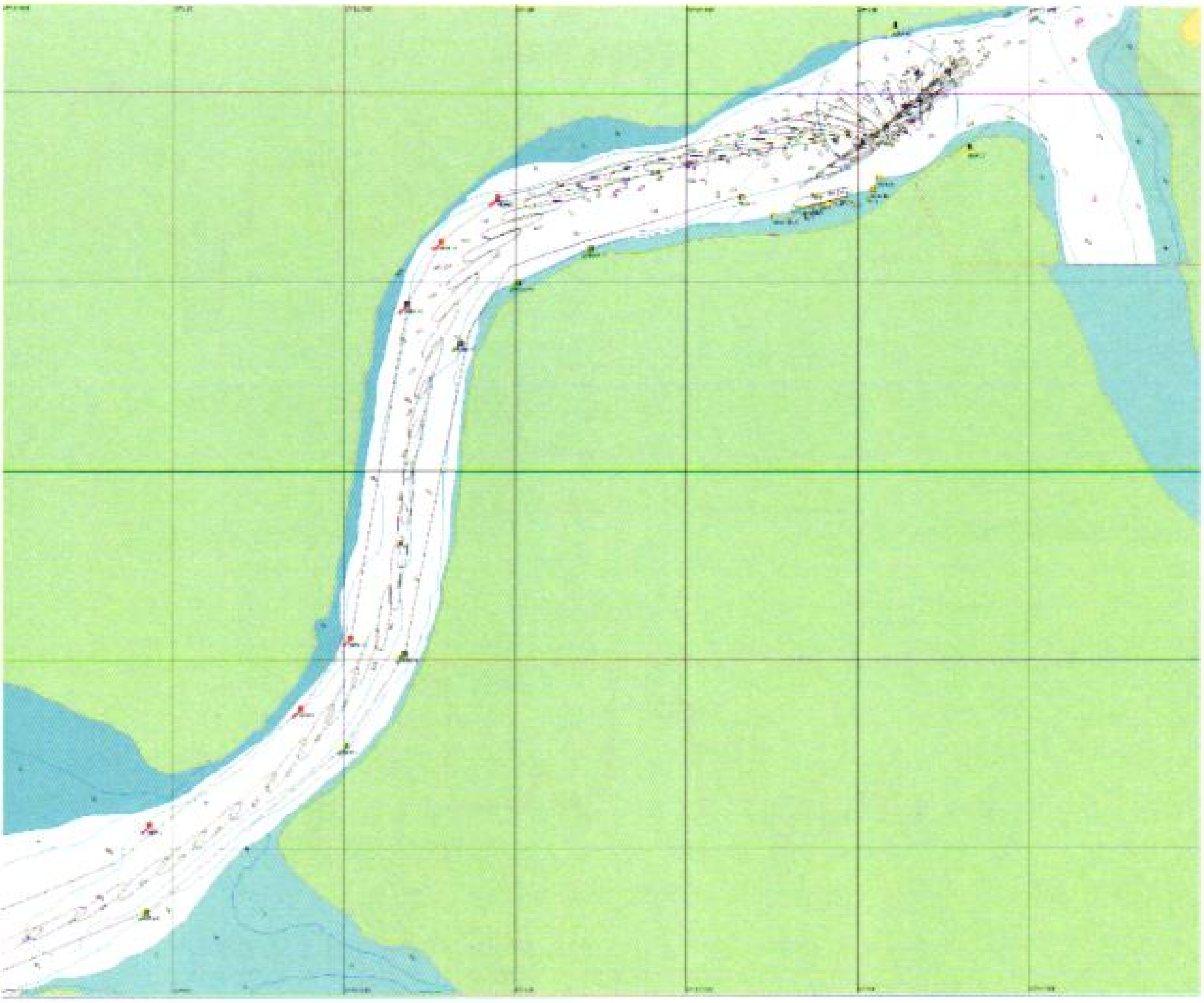
RINA

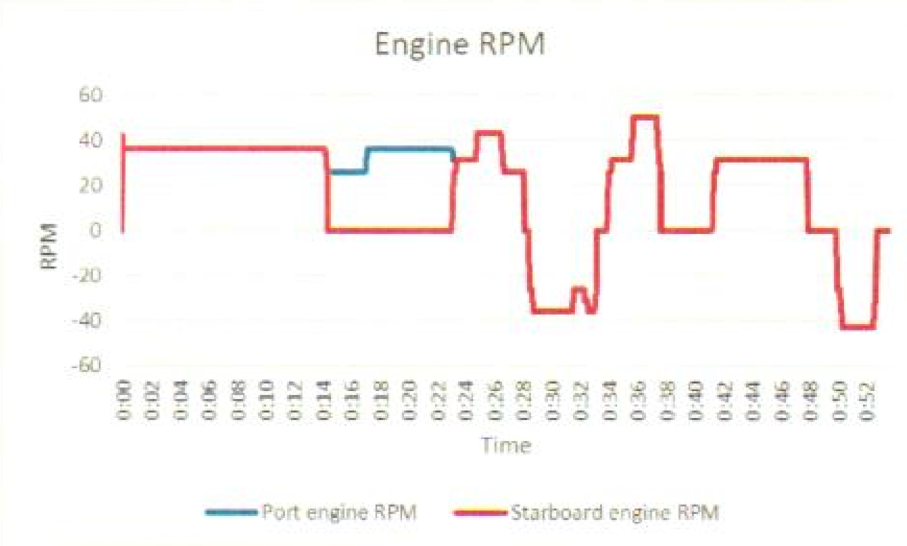
Date:	29/03/2019	Project:	Mitsubishi – JGC Corporation Tabeer LNG Terminal at Port Qasim
Time start:	12:20	Time finish:	13:15
Run n.	25	File name:	MTI2019_25
Manouvre description:		Arrival with Q-Flex vessel – Flood 3 hours before HAT & 253° at 10 knots	
Captain		Ian Simpson	

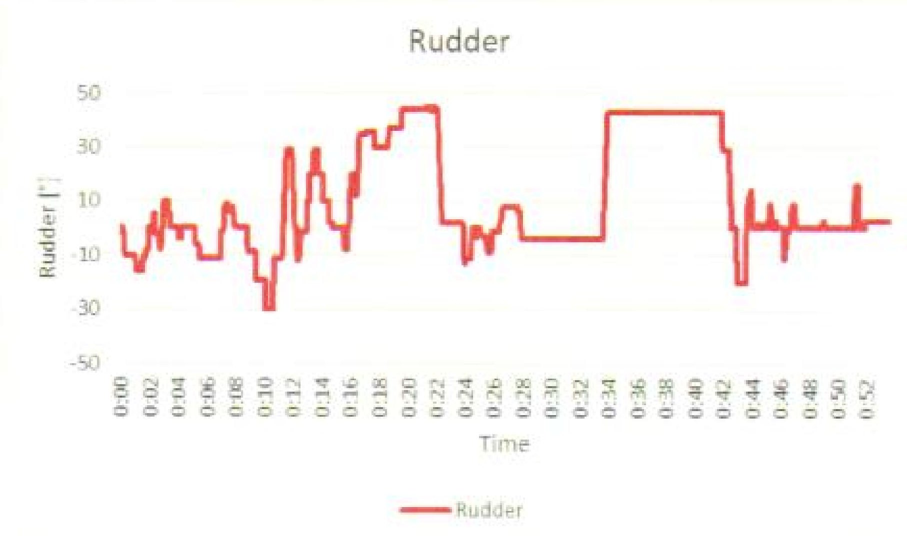
Vessel	Type	Q-Max	(345m – 53.8m – 266,000m3)	☐
		Q-Flex	(315m – 50.0m – 210,000m3)	☒
		Moss	(300m – 52.0m – 177,000m3)	☐
		Membrane	(274m – 43.3m – 130,000m3)	☐
	Condition	Loaded	(Draft: 12.0 m)	☒
		Ballast	(Draft: 9.60 m)	☐
	Thruster used	Yes		☐
		No		☒
Condition	Position	From buoys B1-B2 to Terminal		☒
		From Terminal to buoys B1-B2		☐
		From buoys B1-B2 to second bend		☐
		From second bend to Terminal		☐
	Manoeuvre	Arrival		☒
		Departure		☐
	Tugs	N.: 4 tugs		
Metocean	Current	Dir.: Flood	Speed: 3 hours before HAT	
	Wind	Dir.: 253°	Speed: 10 Kts	

Note:
Repeat of runs 24 & 24a. Similar outcome vessel on limit of channel. Consideration should be given to optimising the time of approach for these vessels.

1032

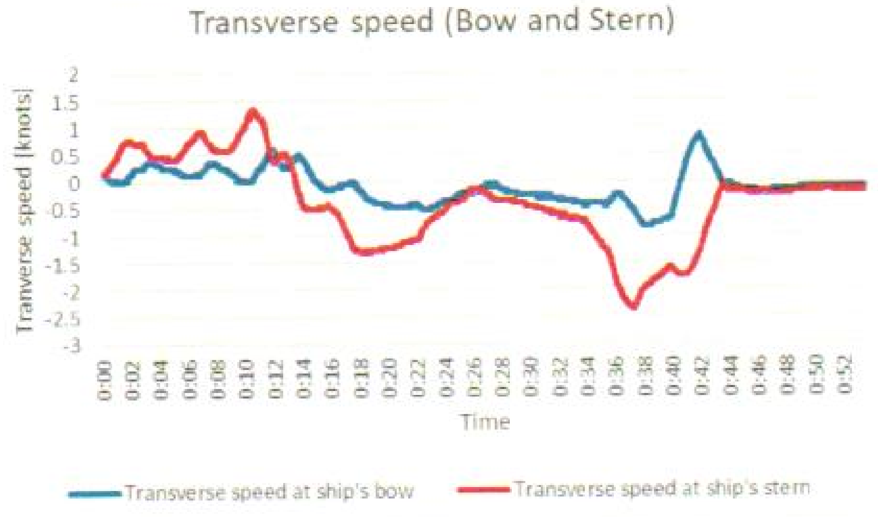


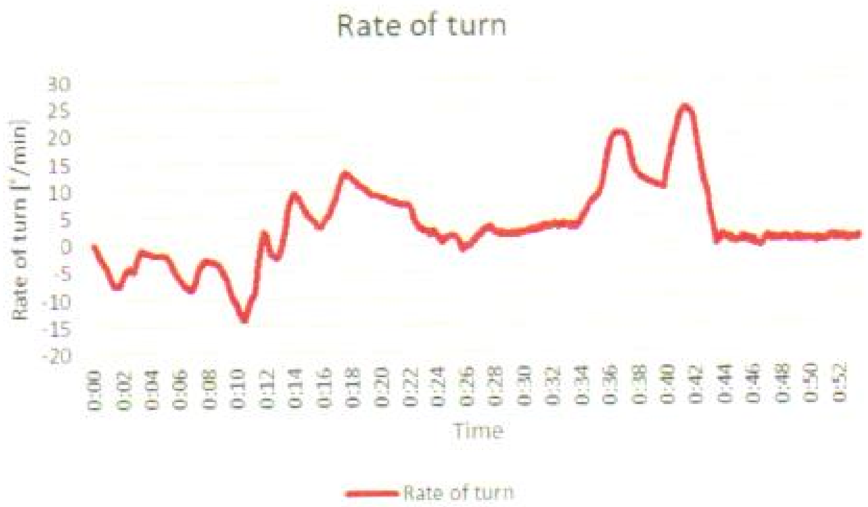

Engine RPM
RPM
Time
Port engine RPM
Starboard engine RPM

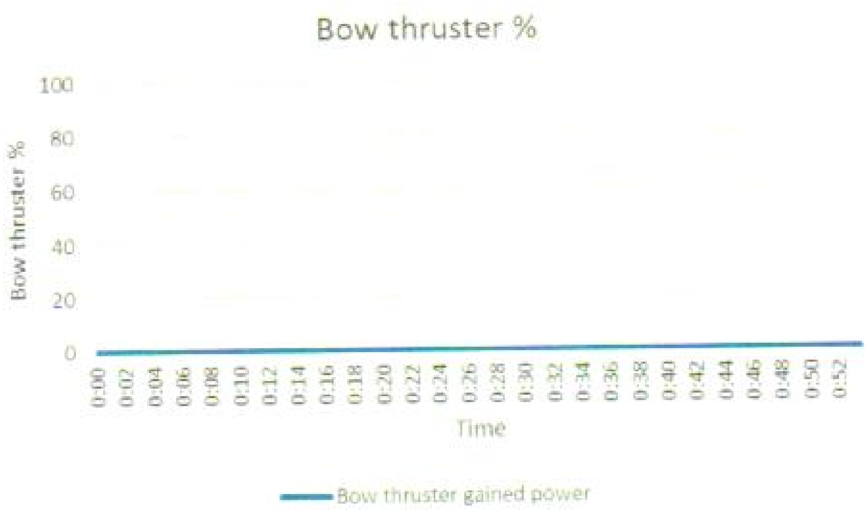

Rudder
Rudder [°]
Time
Rudder

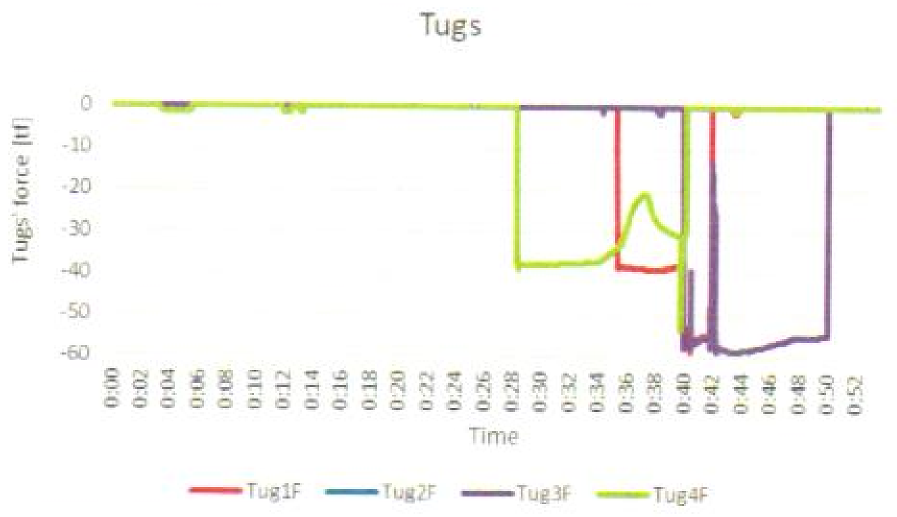

Speed OverGround (SOG)
SOG [knots]
Time
SOG

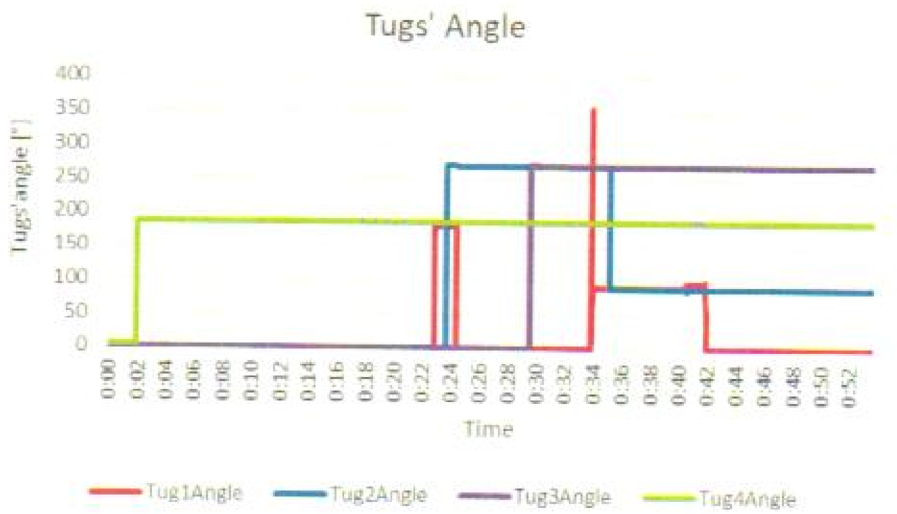
1034


Transverse speed (Bow and Stern)
Tranverse speed [knots]
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
0:00 0:02 0:04 0:06 0:08 0:10 0:12 0:14 0:16 0:18 0:20 0:22 0:24 0:26 0:28 0:30 0:32 0:34 0:36 0:38 0:40 0:42 0:44 0:46 0:48 0:50 0:52
Time
Transverse speed at ship's bow
Transverse speed at ship's stern


Rate of turn
Rate of turn [°/min]
30
25
20
15
10
5
0
-5
-10
-15
-20
0:00 0:02 0:04 0:06 0:08 0:10 0:12 0:14 0:16 0:18 0:20 0:22 0:24 0:26 0:28 0:30 0:32 0:34 0:36 0:38 0:40 0:42 0:44 0:46 0:48 0:50 0:52
Time
Rate of turn


Bow thruster %
Bow thruster %
100
80
60
40
20
0
0:00 0:02 0:04 0:06 0:08 0:10 0:12 0:14 0:16 0:18 0:20 0:22 0:24 0:26 0:28 0:30 0:32 0:34 0:36 0:38 0:40 0:42 0:44 0:46 0:48 0:50 0:52
Time
Bow thruster gained power


Tugs
Tugs' force [tf]
0
-10
-20
-30
-40
-50
-60
0:00 0:02 0:04 0:06 0:08 0:10 0:12 0:14 0:16 0:18 0:20 0:22 0:24 0:26 0:28 0:30 0:32 0:34 0:36 0:38 0:40 0:42 0:44 0:46 0:48 0:50 0:52
Time
Tug1F
Tug2F
Tug3F
Tug4F

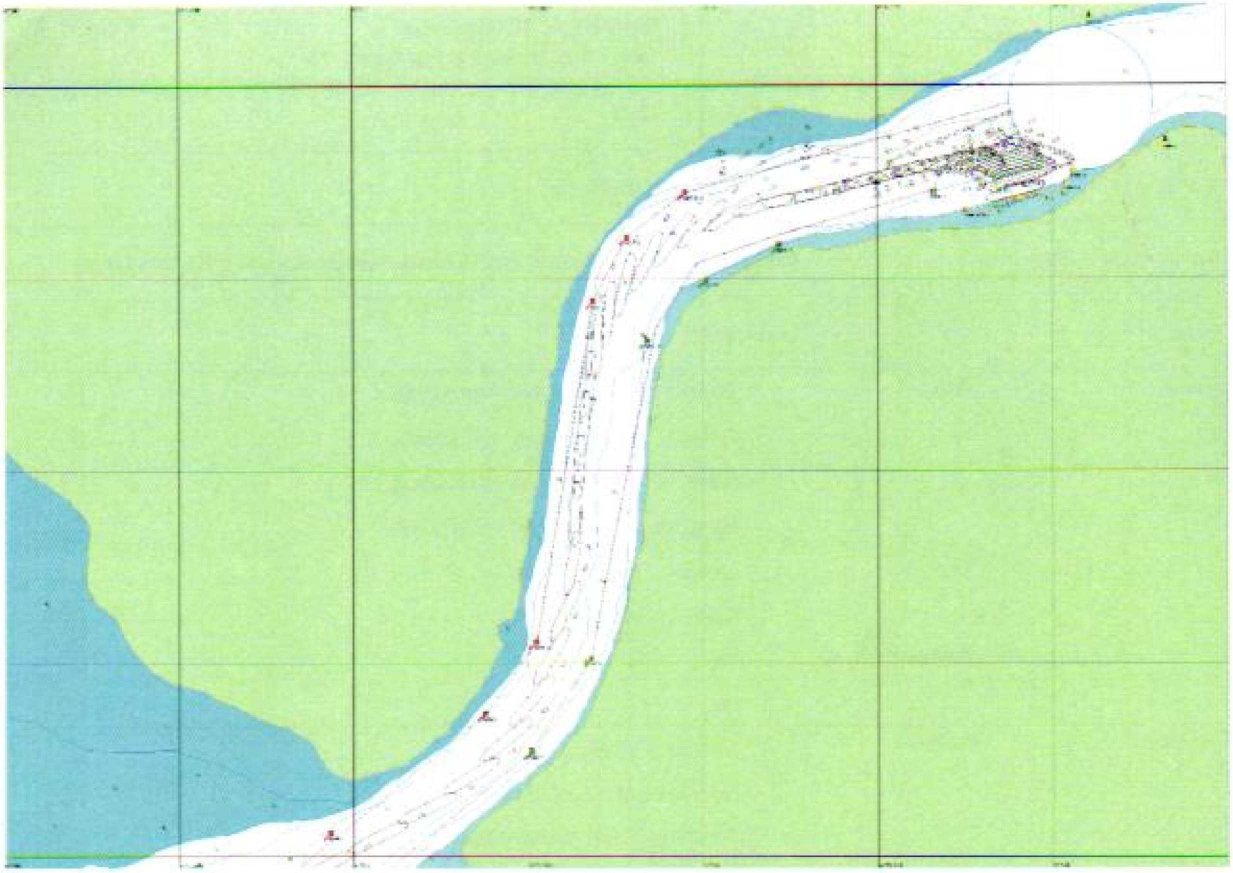

Tugs' Angle
Tugs' angle [°]
400
350
300
250
200
150
100
50
0
0:00 0:02 0:04 0:06 0:08 0:10 0:12 0:14 0:16 0:18 0:20 0:22 0:24 0:26 0:28 0:30 0:32 0:34 0:36 0:38 0:40 0:42 0:44 0:46 0:48 0:50 0:52
Time
Tug1Angle
Tug2Angle
Tug3Angle
Tug4Angle

1036

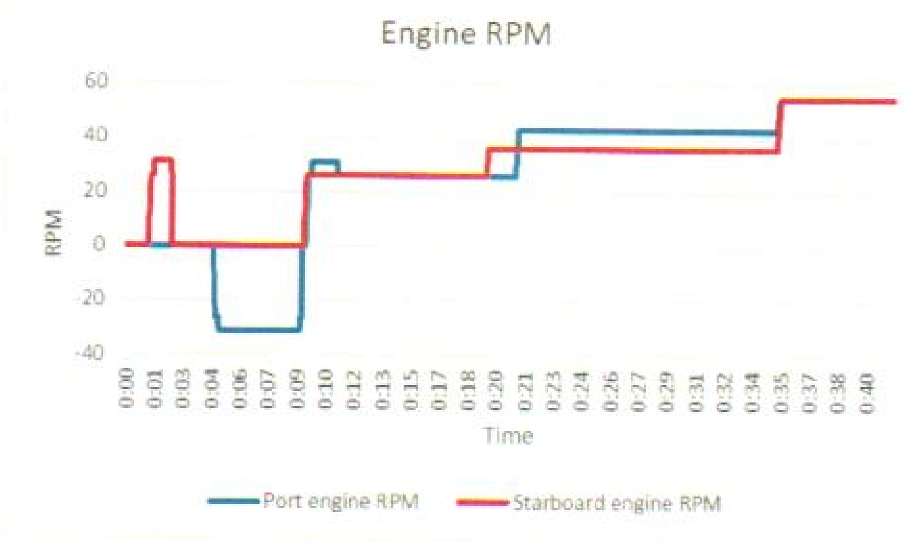
Date:	29/03/2019	Project:	Mitsubishi – JGC Corporation Tabeer LNG Terminal at Port Qasim
Time start:	14:15	Time finish:	15:00
Run n.	26	File name:	MTI2019_26
Manouvre description:		Departure with Q-Flex vessel – Ebb 15 minutes before max ebb & 253° at 10 knots	
Captain		Ian Simpson	

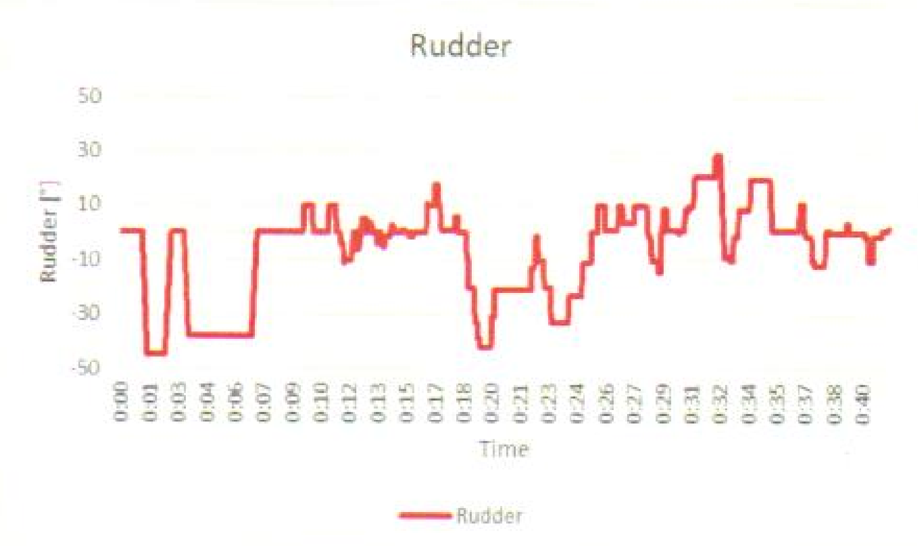
Vessel	Type	Q-Max	(345m – 53.8m – 266,000m3)	☐
		Q-Flex	(315m – 50.0m – 210,000m3)	☒
		Moss	(300m – 52.0m – 177,000m3)	☐
		Membrane	(274m – 43.3m – 130,000m3)	☐
	Condition	Loaded	(Draft: 12.0 m)	☐
		Ballast	(Draft: 9.60 m)	☒
	Thruster used	Yes		☐
		No		☒
Condition	Position	From buoys B1-B2 to Terminal		☐
		From Terminal to buoys B1-B2		☒
		From buoys B1-B2 to second bend		☐
		From second bend to Terminal		☐
	Manoeuvre	Arrival		☐
		Departure		☒
	Tugs	N.: 4 tugs		
Metocean	Current	Dir.: Ebb	Speed: 15 minutes before max ebb	
	Wind	Dir.: 253°	Speed: 10 Kts	

Note:
Vessel experiences strong lateral drift in bends. Conclusions similar to those of Q-Max vessel in similar conditions. See run 14.

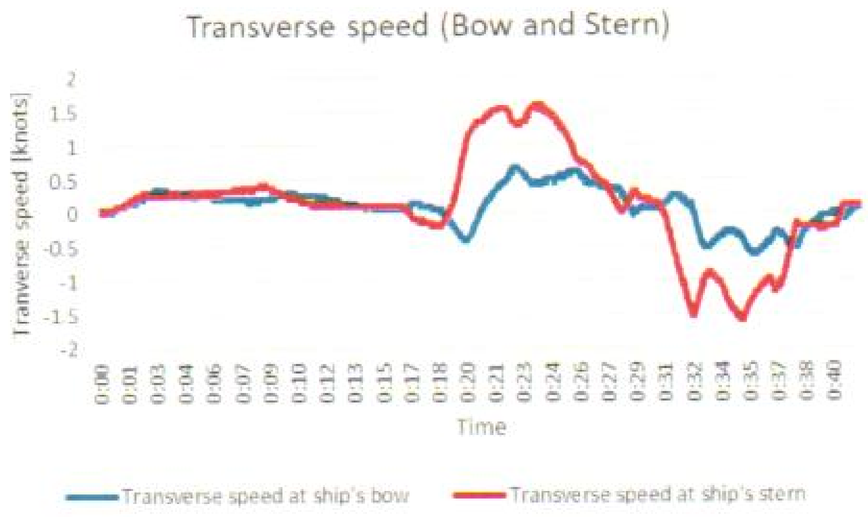


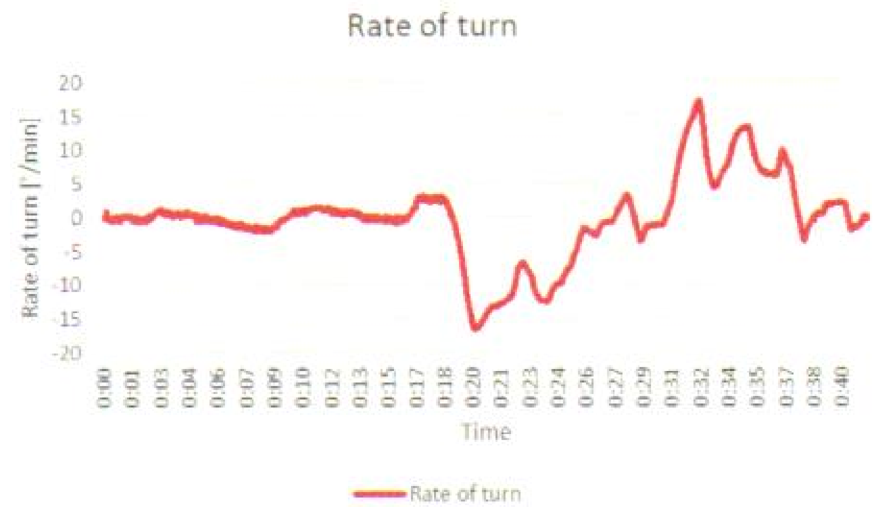
10 38

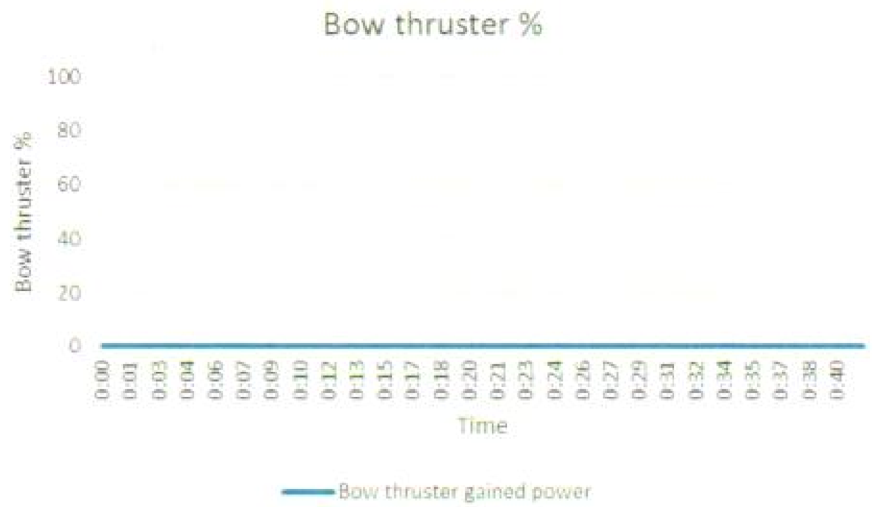

Engine RPM
60
40
20
0
-20
-40
RPM
0:00 0:01 0:03 0:04 0:06 0:07 0:09 0:10 0:12 0:13 0:15 0:17 0:18 0:20 0:21 0:23 0:24 0:26 0:27 0:29 0:31 0:32 0:34 0:35 0:37 0:38 0:40
Time
Port engine RPM
Starboard engine RPM


Rudder
50
30
10
-10
-30
-50
Rudder [°]
0:00 0:01 0:03 0:04 0:06 0:07 0:09 0:10 0:12 0:13 0:15 0:17 0:18 0:20 0:21 0:23 0:24 0:26 0:27 0:29 0:31 0:32 0:34 0:35 0:37 0:38 0:40
Time
Rudder

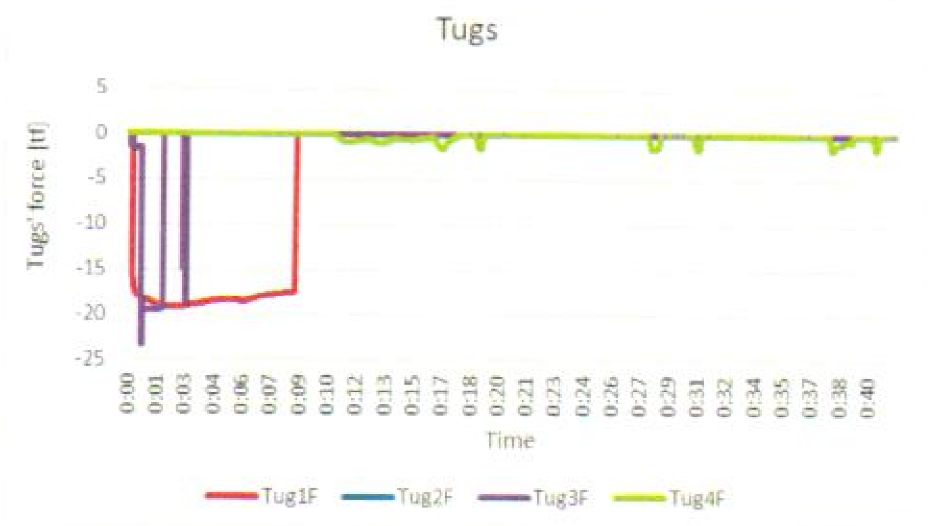

Speed OverGround (SOG)
6
5
4
3
2
1
0
SOG [knots]
0:00 0:01 0:03 0:04 0:06 0:07 0:09 0:10 0:12 0:13 0:15 0:16 0:18 0:19 0:21 0:22 0:24 0:25 0:27 0:28 0:30 0:31 0:33 0:34 0:36 0:37 0:39 0:40
Time
SOG

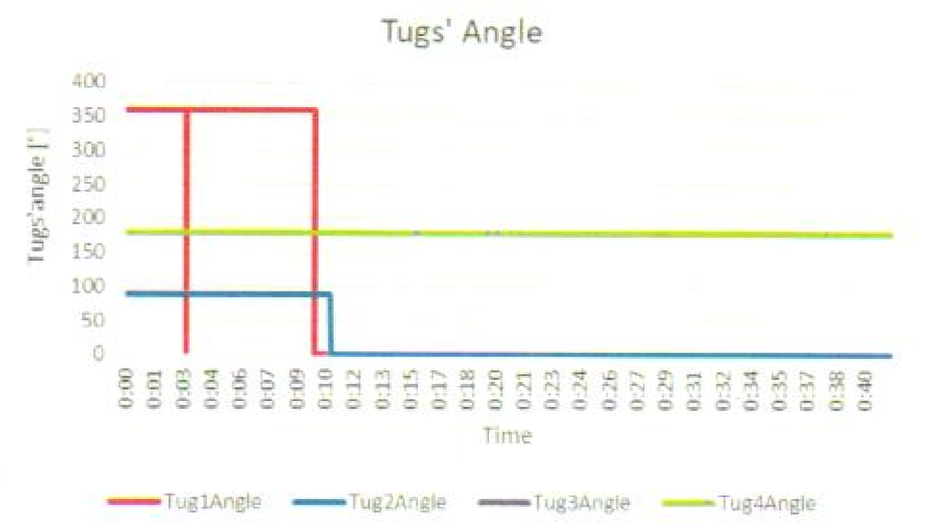

Transverse speed (Bow and Stern)
Tranverse speed [knots]
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
0:00
0:01
0:03
0:04
0:06
0:07
0:09
0:10
0:12
0:13
0:15
0:17
0:18
0:20
0:21
0:23
0:24
0:26
0:27
0:29
0:31
0:32
0:34
0:35
0:37
0:38
0:40
Time
Transverse speed at ship's bow
Transverse speed at ship's stern


Rate of turn
Rate of turn [°/min]
20
15
10
5
0
-5
-10
-15
-20
0:00
0:01
0:03
0:04
0:06
0:07
0:09
0:10
0:12
0:13
0:15
0:17
0:18
0:20
0:21
0:23
0:24
0:26
0:27
0:29
0:31
0:32
0:34
0:35
0:37
0:38
0:40
Time
Rate of turn


Bow thruster %
Bow thruster %
100
80
60
40
20
0
0:00
0:01
0:03
0:04
0:06
0:07
0:09
0:10
0:12
0:13
0:15
0:17
0:18
0:20
0:21
0:23
0:24
0:26
0:27
0:29
0:31
0:32
0:34
0:35
0:37
0:38
0:40
Time
Bow thruster gained power

1040

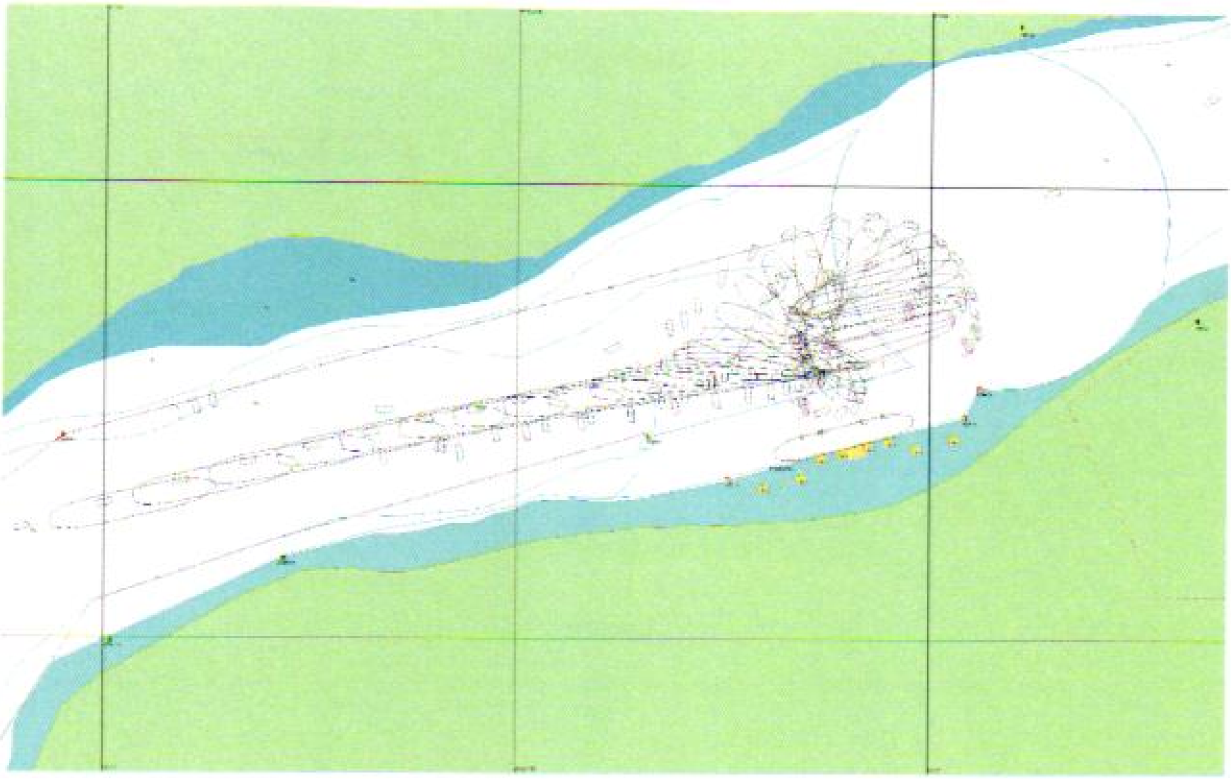

Tugs
Tugs' force [tf]
Time
Tug1F
Tug2F
Tug3F
Tug4F

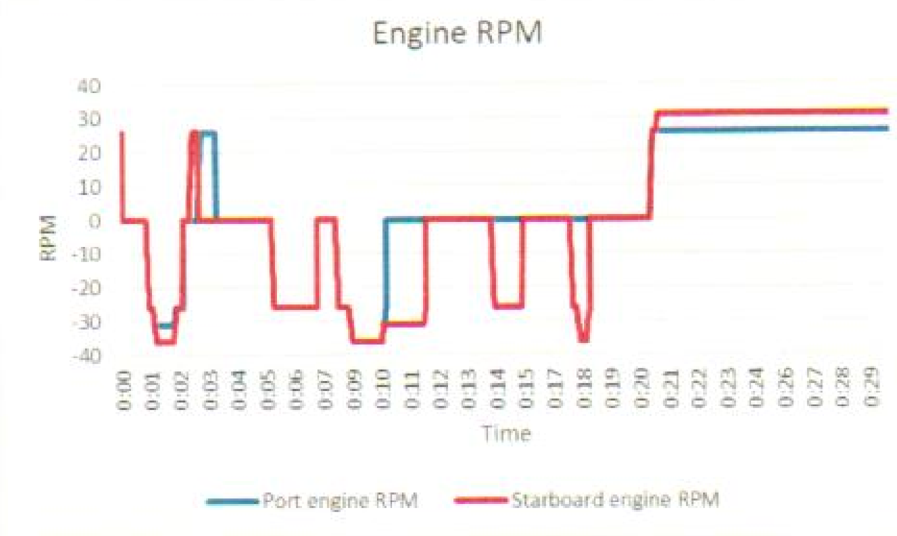

Tugs' Angle
Tugs'angle [°]
Time
Tug1Angle
Tug2Angle
Tug3Angle
Tug4Angle

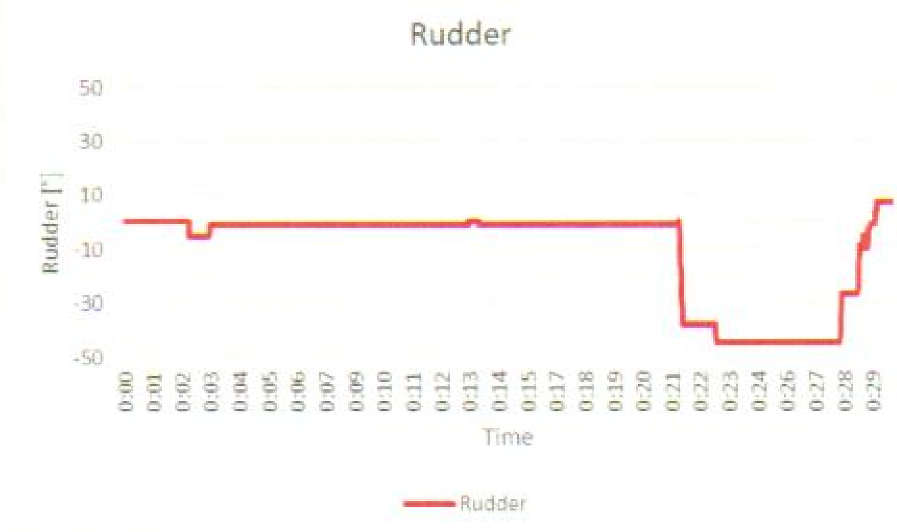
Date:	29/03/2019	Project:	Mitsubishi – JGC Corporation Tabeer LNG Terminal at Port Qasim	
Time start:	15:30	Time finish:	16:00	
Run n.	27	File name:	MTI2019_27	
Manouvre description:		Arrival with Q-Max vessel – Flood 1 hour before HAT & 253° at 10 knots		
Captain		Ian Simpson		
Vessel	Type	Q-Max	(345m – 53.8m – 266,000m3)	☒
		Q-Flex	(315m – 50.0m – 210,000m3)	☐
		Moss	(300m – 52.0m – 177,000m3)	☐
		Membrane	(274m – 43.3m – 130,000m3)	☐
	Condition	Loaded	(Draft: 12.0 m)	☒
		Ballast	(Draft: 9.60 m)	☐
	Thruster used	Yes		☐
		No		☒
Condition	Position	From buoys B1-B2 to Terminal		☐
		From Terminal to buoys B1-B2		☐
		From buoys B1-B2 to second bend		☐
		From second bend to Terminal		☒
	Manoeuvre	Arrival		☒
		Departure		☐
	Tugs	N.: 4 tugs		
Metocean	Current	Dir.: Flood	Speed: 1 hour before HAT	
	Wind	Dir.: 253°	Speed: 10 Kts	

Note:
To investigate arrival and swing in typical environmental conditions. In addition, to investigate minimum space required for swinging this vessel in non- extreme conditions.
Sufficient space exists for vessel to safely swing adjacent to the terminal without provision of an additional turning circle.

1042

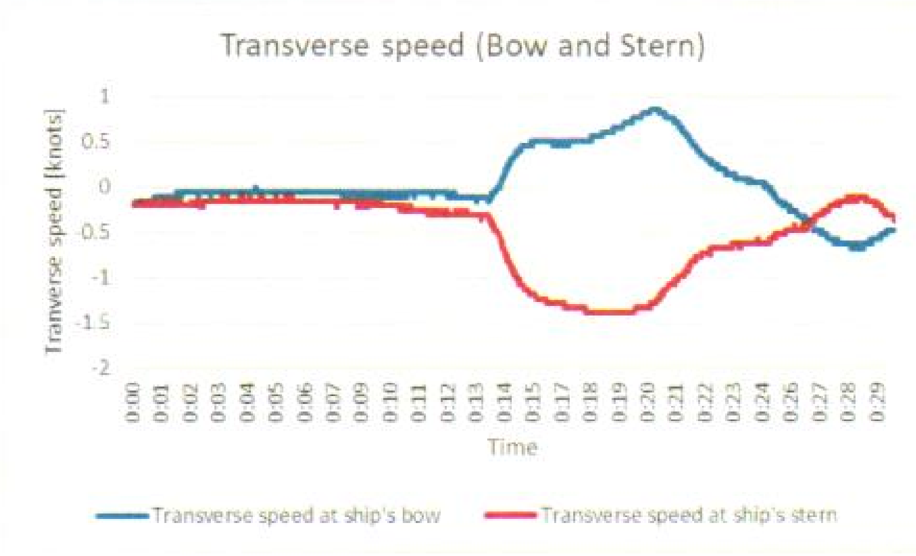


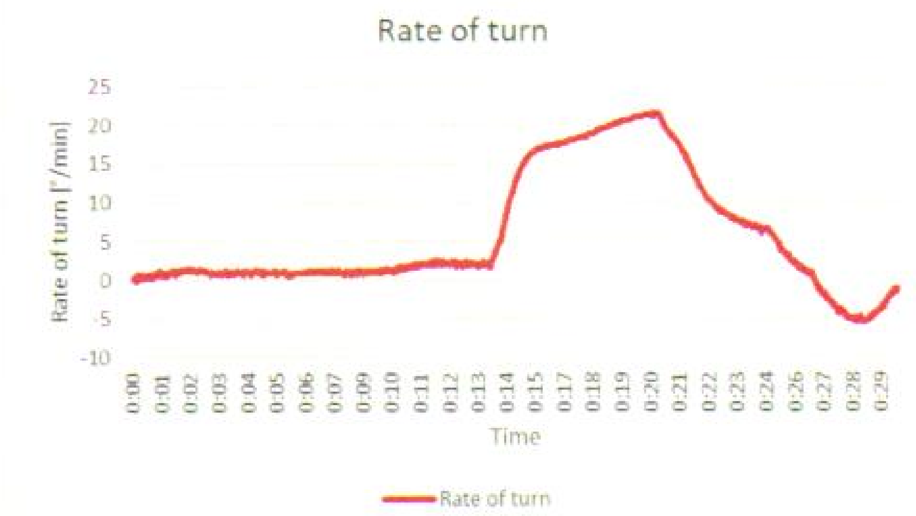

Engine RPM
40
30
20
10
0
-10
-20
-30
-40
RPM
0:00 0:01 0:02 0:03 0:04 0:05 0:06 0:07 0:09 0:10 0:11 0:12 0:13 0:14 0:15 0:17 0:18 0:19 0:20 0:21 0:22 0:23 0:24 0:26 0:27 0:28 0:29
Time
Port engine RPM
Starboard engine RPM

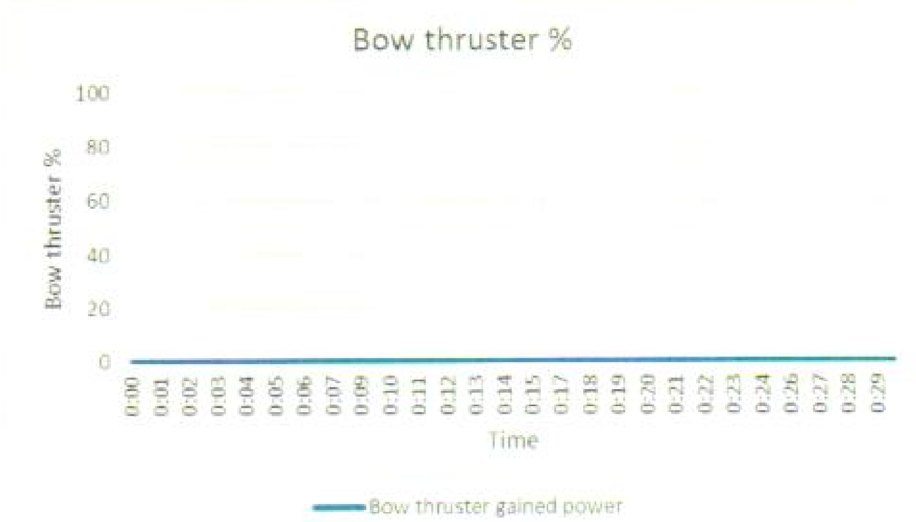

Rudder
50
30
10
-10
-30
-50
Rudder [°]
0:00 0:01 0:02 0:03 0:04 0:05 0:06 0:07 0:09 0:10 0:11 0:12 0:13 0:14 0:15 0:17 0:18 0:19 0:20 0:21 0:22 0:23 0:24 0:26 0:27 0:28 0:29
Time
Rudder


Speed OverGround (SOG)
3.5
3
2.5
2
1.5
1
0.5
0
SOG [knots]
0:00 0:01 0:02 0:03 0:04 0:05 0:06 0:07 0:09 0:10 0:11 0:12 0:13 0:14 0:15 0:17 0:18 0:19 0:20 0:21 0:22 0:23 0:24 0:26 0:27 0:28 0:29
Time
SOG

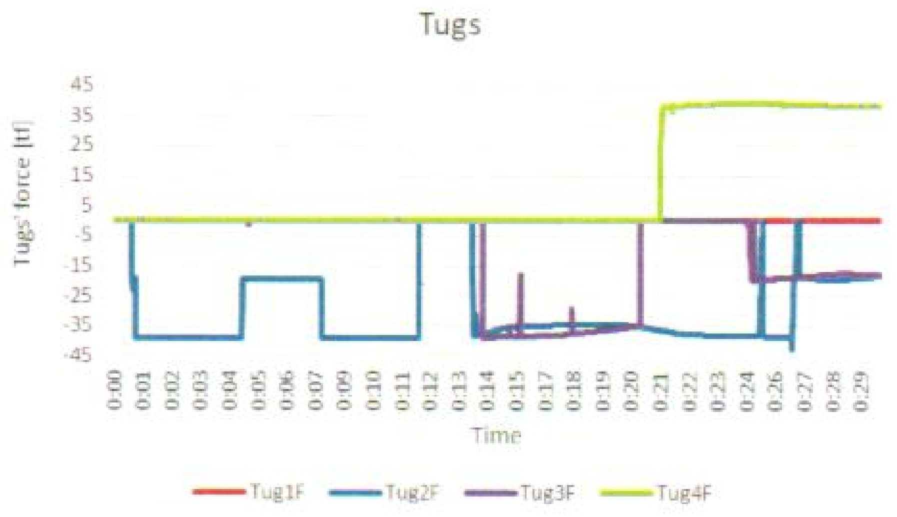
1044


Transverse speed (Bow and Stern)
Tranverse speed [knots]
Time
Transverse speed at ship's bow
Transverse speed at ship's stern


Rate of turn
Rate of turn [°/min]
Time
Rate of turn


Bow thruster %
Bow thruster %
Time
Bow thruster gained power

1045


Tugs
Tugs' force [tf]
45
35
25
15
5
-5
-15
-25
-35
-45
0:00 0:01 0:02 0:03 0:04 0:05 0:06 0:07 0:09 0:10 0:11 0:12 0:13 0:14 0:15 0:17 0:18 0:19 0:20 0:21 0:22 0:23 0:24 0:26 0:27 0:28 0:29
Time
Tug1F
Tug2F
Tug3F
Tug4F


Tugs' Angle
Tugs'angle [°]
400
350
300
250
200
150
100
50
0
0:00 0:01 0:02 0:03 0:04 0:05 0:06 0:07 0:09 0:10 0:11 0:12 0:13 0:14 0:15 0:17 0:18 0:19 0:20 0:21 0:22 0:23 0:24 0:26 0:27 0:28 0:29
Time
Tug1Angle
Tug2Angle
Tug3Angle
Tug4Angle