



SIGTTO NEWS

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MESSAGE FROM GENERAL MANAGER



SIGTTO to celebrate its 40th anniversary

SIGTTO General Manager Andrew Clifton explains how the Society's 40th birthday celebrations will be only part of a busy year

As the Society prepares to celebrate its 40th birthday in 2019, it is now well settled into its new London liaison office. The new premises, customised to our specific needs, have exceeded all expectations and I am confident our new location will serve SIGTTO well for many years to come.

We have welcomed many of you at the office, situated close to Liverpool Street station in the City of London, since we moved last July. Some of you have attended meetings held here on the premises while others have simply stopped by to see us on your visits to London. We look forward to seeing more of the membership over the coming year, at meetings and whenever your itineraries enable a visit.

In 2018 we held one Panel Meeting, the 64th in the series, which took place in London on 11-12 April. We also held 10 SIGTTO Regional Forums last year, in Oslo, Singapore, Athens, Buenos Aires, Tokyo, Perth, Shanghai, Dubai and Houston (the venue for two such meetings).

SIGTTO was also at Gastech in Barcelona in September 2018 where, together with Witherbys, our publishers, we shared a much larger exhibition stand than we've occupied at previous Gastechs. This arrangement proved to be very popular amongst those members attending the conference and exhibition, as they were able to utilise the stand's meeting rooms for



The autumn 2018 SIGTTO Board of Directors meeting was held in Doha

“On 10 September we will be holding a Liquefied Gas Shipping Forum followed by a reception in London to celebrate SIGTTO's 40th anniversary.”

networking. We intend to book a similar-sized stand at Gastech 2019, to be held in Houston in September of this year.

Last December we hosted the fourth Liquefied Gas Senior Executive Forum in Houston, together with the US Coast Guard (USCG) and the Society for Gas as a Marine Fuel (SGMF). Riviera Maritime Media assisted as our media partner.

As with the previous three meetings in the series, the 4th Senior Executive Forum proved to be a particularly popular meeting,

with 250 delegates in attendance. US exports of LNG, LPG and chemical gases are growing rapidly, as is the use of LNG as marine fuel in North America. The Senior Executive Forums provide opportunities for USCG staff to hear directly from gas shipping and terminal experts about >

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MESSAGE FROM GENERAL MANAGER

> industry best practice developments and for owners and operators to learn how the Coast Guard is developing its safety regime to handle the growing traffic.

The seventh and eighth paid publications to be delivered by SIGTTO in the last four years were published in 2018. These were *Ship/Shore Interface for LPG/Chemical Gas Carriers and Terminals* and *Guidelines for the Alleviation of Excessive Surge Pressures on ESD for Liquefied Gas Transfer Systems*.

Because our industry is staging two global events in 2019 – LNG 2019 in Shanghai in April and Gastech 2019 in Houston in September – SIGTTO will not have a Panel Meeting this year. LNG 2019 is the 19th meeting in this particular series while the Houston gathering will be the 31st Gastech and the third such event in the US energy capital.

SIGTTO will hold its 79th General Purposes Committee meeting (GPC 79) in Shanghai in April in conjunction with LNG 2019 while GPC 80 will take place in Houston in September in tandem with the Gastech event. I will be chairing the conference shipping sessions at both LNG 2019 and Gastech 2019. I am pleased to have been appointed co-chair of the Gastech technical committee.

Our full 2019 agenda of internal SIGTTO meetings signals another busy year ahead for the Society. In addition to our normal biannual GPC meetings, we will have two gatherings each of our Board of Directors and the Human Element Committee (HEC). In addition, SIGTTO plans to stage 12 Regional Forums this year.

The memberships of GPC and HEC, chaired by Mark Hodgson of Shell and John Adams of Teekay, respectively, continue to make good progress with their work. The two issues of SIGTTO News published in 2019, as well as the Society's 2018 Annual Report, will update readers on the progress being made by each committee.

We are also looking forward to an extra special occasion. On 10 September we will be holding a Liquefied Gas Shipping Forum followed by a reception in London to celebrate SIGTTO's 40th anniversary. The Society, which was formally established in October 1979, will also produce a special 100-page publication to commemorate the event. More details about our anniversary celebrations will be sent to the membership in due course.

We are pleased to welcome Laura Else to the SIGTTO Secretariat in the role of Technical Support Executive. Another new appointment is imminent. Arrangements for an additional, seconded Technical Advisor were being finalised at press time. Details will be provided in the Autumn 2019 edition of the SIGTTO newsletter.

BENEFITS OF SIGTTO MEMBERSHIP

SIGTTO members are actively encouraged to promote membership when dealing with any new players in the industry. Please direct them to our website and to the London Liaison Office for further details of how to join.

In addition to the credibility in the industry that membership brings, SIGTTO members benefit by:

- Access to information that is exclusive to members, such as casualty information and industry statistics
- Regular updates on matters affecting the industry such as legislation, either new or pending, technical or operational developments
- Access to the very comprehensive technical library maintained in the London Office
- Submitting proposals for projects and studies to the General Purposes and Human Element Committees

- Access to the Technical Advisers in the London Liaison Office who can give advice and obtain advice, on behalf of a member, from within the Society
- Participating in discussion forums with other members each year on topics of particular and mutual interest
- New members receive a copy of all publications, free of charge, produced by SIGTTO
- Free access to the LNGwebinfo portal for updated LNG information as required to conduct compatibility studies. This information is restricted to members of SIGTTO and GIIGNL only

UPCOMING MEETINGS 2019

MEETINGS	DATE	LOCATION
79 th General Purposes Committee	1 Apr	Shanghai
LNG 2019	1-5 Apr	Shanghai
Pan American Regional Forum	13 May	Houston
Spring Board Meeting	22 May	San Ramon
Singapore Regional Forum	30 May	Singapore
7 th Human Element Committee	17 Jul	London
Liquefied Gas Forum & 40 th Anniversary Reception	10 Sep	London
Gastech 2019	16-19 Sep	Houston
80 th General Purposes Committee	20 Sept	Houston
South American Regional Forum	TBC	Buenos Aires
Singapore Regional Forum	14 Nov	Singapore
Autumn Board & AGM	19 Nov	Kuala Lumpur
Middle East Regional Forum	3 Dec	Muscat
Pan American Regional Forum	XX Dec	Houston
5 th SIGTTO/USCG/SGMF Senior Executive Forum	XX Dec	Houston
Australian Regional Forum	XX Dec	Perth
China Regional Forum	XX Dec	Shanghai
Scandinavia Regional Forum	TBC	TBC
India Regional Forum	TBC	TBC
Mediterranean Regional Forum	TBC	Athens



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GENERAL PURPOSES COMMITTEE WORKING GROUPS

The following paragraphs provide updates of progress being made by currently active working groups established under the auspices of the SIGTTO General Purposes Committee (GPC).

Floating LNG installations

The Sub-Committee for Floating LNG Installations (SC), a subsidiary body of the General Purposes Committee (GPC), continues to direct the tasks being carried out by the working groups established to develop specific areas for guidance. The last SC meeting was held in December 2018 at the SIGTTO Secretariat's London office. Ed Scott of Exceleerate Energy is the SC chair and the following working groups have been established.

- Working Group 1 for Floating LNG Installations (WG 1) deals with topics relating to site assessment guidance for nearshore/offshore floating LNG assets. Andrew Brown of Smit Lamnalco chairs WG 1.
- Working Group 2 for Floating LNG Installations (WG 2) deals with topics relating to design criteria guidance for nearshore/offshore floating LNG assets. Stuart Thomson of BP chairs WG 2.
- Working Group 3 for Floating LNG Installations (WG 3) deals with topics relating to operational guidance for nearshore/offshore floating LNG assets. Jeff Meadows of Exceleerate Energy chairs WG 3.

The three working groups last met on 22, 23 and 24 January 2019, respectively. They have continued to gather information and are now working on the final content of a draft master document. To increase productive efficiency during the review process, WG 1 and WG 2 will conduct joint meetings in future. The SC and its working groups are on track to produce a final document for review at the 81st GPC meeting (GPC 81) in spring 2020.

Propulsion and reliquefaction

The Propulsion and Reliquefaction Working Groups are chaired by Kenny English of BP Shipping. The working group members are beginning their collaboration to produce documents that will effectively upgrade existing industry best practice guidelines to consider recent technology advances.

A first draft is scheduled for review after face-to-face meetings of the two groups on 18 and 19 March to be held in the SIGTTO Secretariat office. There will be three further workshops to follow during the year. The collaborative working group will request approval of the two documents at the spring 2020 GPC meeting, i.e. GPC 81.

Gangways

The Gangways Working Group is chaired by Rick Boudiette of Chevron Shipping. A revision of the first draft of guidance for designers, terminals, vessel owners and operators on safe landing areas and gangway operations is currently being circulated for additional review and

comment from the working group members.

The working group will meet at the SIGTTO Secretariat office in either April or May of this year. A final draft is scheduled to be ready by June 2019, to enable the group to request approval of its draft guidance document at the autumn 2019 GPC meeting, i.e. GPC 80.

Pressure relief valves

The draft pressure relief valve (PRV) guidance document has undergone final technical review by industry experts. It has been submitted for approval at the spring 2019 GPC meeting, i.e. GPC 79. The document will update gas carrier cargo system PRV design and maintenance guidance previously issued by SIGTTO in 1998.

Emergency shutdown systems

At GPC 78 in September 2018 the terms of reference for the Emergency Shutdown Systems (ESD) Working Group were approved. The core purpose of the WG is to revise SIGTTO's publication *ESD Arrangements and Linked Ship/Shore Systems for Liquefied Gas Carriers - 2009*. The revision will consider technical improvements that have been made and lessons learnt from incidents since the earlier document was published. The group, which is chaired by Ajay Edakkara of Shell, met for the first time in SIGTTO's London office in February 2019. It will also consider the issue of testing cargo tank overflow systems, as raised at IMO, and ensure all ESD references are aligned across SIGTTO publications.

HUMAN ELEMENT COMMITTEE WORKING GROUPS

The following paragraphs provide updates of progress being made by currently active working groups established under the auspices of the SIGTTO Human Element Committee (HEC).

Cargo control room ergonomics

Under the chairmanship of Ray Gillet of GTT Training, the Cargo Control Room (CCR) Ergonomics Working Group completed its work on *Recommendations for Management of Cargo Alarm Systems* at its seventh meeting in October 2018. The document was approved by the Human Element Committee at its 6th meeting (HEC 06) in January 2019 and will be submitted to the Board for final approval in May.

The CCR Working Group also considered its next steps at the October 2018 meeting and agreed to focus on cargo control room layout and ergonomics, considering aspects such as control station layout, physical environment, operator interface,

controls, displays and the human/machine interface (HMI). The aim is to develop guidance for operators on how to improve the safety of cargo operations through detailed consideration of operational practice within the specification and design of CCR workstations and HMI.

Gap analysis of competency guidelines

The initial Task Force for the Gap Analysis of SIGTTO Competency Guidelines has been expanded into a full-term working group and its terms of reference (ToR) were approved at HEC 06. The Gap Analysis Competency Working Group most recently met on 7 February 2019 and is continuing to establish methodology for the major revision of SIGTTO's four competency publications. The introduction of new technologies in the LNG industry has resulted in a need to revise relevant parts of the Society's competency guidelines. Steve Allibone of MOL LNG Transport is chairing this group.

Shore staff competencies

At its most recent meeting, on 7 February 2019, the Working Group for Shore Staff Competencies continued to scope the applicability of topics within the agreed terms of reference. Topics covered include shore staff competencies for owners/operators of gas carriers and their interfaces with vessels and terminals. Dr Linda Sørensen of BW Gas is chairing this group.



SIGTTO is developing competency standards for gas carrier company shore staff



El Paso Paul Kayser was on her 13th voyage when the grounding occurred; the inset shows the damage to the bottom hull plating

El Paso Paul Kayser makes first ship-to-ship LNG transfer

The most dramatic accident suffered by an LNG carrier in the 55 years that such ships have been sailing the world's oceans occurred 40 years ago this summer. Late on the night of 29 June 1979 the 125,000 m³ *El Paso Paul Kayser* ran aground on La Perla Pinnacle on the north side of the Strait of Gibraltar while proceeding at speed westbound with a cargo of LNG loaded at Arzew in Algeria for transport across the Atlantic to the Cove Point terminal on the US East Coast.

The ship's speed when it struck the seabed was put at anywhere from 16 to 19 knots, depending on the source quoted. The 1977-built *El Paso Paul Kayser* had entered service in 1978 and was on her 13th transatlantic voyage when the accident occurred. The impact caused extensive bottom damage over the length of the cargo space and the ship remained hard aground for four days. Ruptures of the outer hull plating resulted in the flooding of her starboard double bottom and wing ballast tanks, giving the ship a 5.5-metre trim by the bow and a list to starboard of about 5.5°.

However, although the impact caused some upward movement of the inner hull supporting the ship's Gaz Transport membrane containment system in the two forward cargo tanks, the membrane retained its integrity and there was no leakage of cargo. The grounding incident provided a powerful demonstration of the ability of LNG carriers to survive major bottom damage.

Engineering analysis by the shipowner showed that it would be safe to remove *El Paso Paul Kayser* from the grounding site without the need to transfer any cargo to smaller LNG carriers. On 4 July the ship was refloated on a rising tide by introducing compressed air into the flooded ballast

tank spaces. With the approval of the Spanish authorities, *El Paso Paul Kayser* was towed to nearby Algeciras Bay for the second phase of the rescue mission.

El Paso LNG Company, the owner of the nine LNG carriers that had been ordered to serve the large-scale Algeria-US East Coast trade, quickly deployed another of its ships, *El Paso Sonatrach*, to Algeciras Bay to offload the stricken ship and began to muster an on-site salvage team within hours of receiving news of the grounding. The company, one of the nine founder members of SIGTTO when the Society was established later that same year, had adopted a safety-first philosophy to its LNG shipping operation from the outset. Dealing with grounding scenarios was part of El Paso's emergency response planning.

El Paso's initial assessment showed the vessel to be unseaworthy and at risk of a breaching of the containment system if it was to be moved further. Although it had geared up for a ship-to-ship (STS) transfer using flexible hoses as part of its contingency planning, El Paso never expected to have to carry out what would be the first such operation involving an LNG cargo. There were no rules or guidelines governing large-scale LNG transfers of LNG utilising flexible hoses available at the time.

Forty years ago the development of flexible cryogenic stainless steel hoses was at a relatively early stage of development; there were no specialist hose saddles available for positioning at the ship's manifold; and there was no experience of how best to accommodate the relative movements of a pair of large LNG carriers moored side-by-side in an open sea environment.

El Paso secured several lengths of specialist hose in Houston and had them flown out to the transfer site. El Paso's emergency response team, which included several of the company's senior officers, coordinated procedures from a hotel room in Algeciras and carried out the ship-to-ship operation onboard the two vessels.

Plywood sheets were placed on the

carbon steel deck plating of the two ships on which to lay the connected lengths of hose and minimise the risk of brittle fracture, while pneumatic fenders were placed between the two ships. To reduce the risk of static electricity generation and for protection, the onboard emergency team donned special outfits and all the tools employed were of the non-sparking variety, mainly brass.

Those were the days before mobile phones, laptops or any other of today's sophisticated means of communication. All interchanges between the various members of the onboard emergency response crew on the two ships were verbal, either face-to-face or using walkie-talkies.

El Paso Paul Kayser had 99,500 m³ of LNG onboard at the time of the grounding. The vessel utilised her cargo pumps to safely transfer all the cargo through the cryogenic hose to sistership *El Paso Sonatrach* according to an agreed discharge plan. Heavy sheets of canvas and water curtains were also utilised to protect the deck and side shell plating of the two LNGCs and the transfer operation took 41 hours to complete.

The salvage tugs assisted with the positioning of the LNG carriers and the weather remained ideal throughout. Some 1,000 tonnes of oil fuel bunkers was also safely offloaded from *El Paso Paul Kayser*. It was the first ever STS transfer of an LNG cargo at sea, and it would be another 25 years, until the introduction of regasification vessels, before such operations became a routine part of commercial operations in the LNG shipping industry.

A successful outcome of this striking ship grounding incident would certainly have been more difficult to achieve had the seas not remained calm in Algeciras Bay in early July 1979. However, El Paso's careful coordination and execution of its comprehensive contingency plan and the inherent structural strength of LNG carriers combined to ensure that the accident did not end up being a blemish on the LNG shipping industry's exemplary safety record.

Information on tap at Regional Forums

The dozen or so day-long Regional Forum meetings organised by SIGTTO each year enable the dissemination of a wealth of information amongst the membership. Presentations comprise a mix of reports by local members on regional ship and terminal projects on the one hand and, on the other, updates on the impact of key global gas shipping and terminal developments for the benefit of the regional membership.

SIGTTO organised five Regional Forums worldwide during the months of November and December 2018 alone. Over the same period it also participated in the 4th Senior Executive Forum in Houston which the Society co-hosts in tandem with the US Coast Guard (USCG) and the Society for Gas as a Marine Fuel (SGMF).

At SIGTTO's Pan American Regional Forum, held in Houston on 4 December, the day before the Senior Executive Forum, Lieutenant Commander Dallas Smith of the US Coast Guard's Liquefied Gas Carrier National Center of Expertise (LGC NCOE) was on hand to tell delegates about the expanding role and workload of his unit.

The Coast Guard is charged with inspecting gas carriers visiting US ports to verify their compliance with applicable regulations. To cope with the rapidly increasing traffic of such vessels, the LGC NCOE augments relevant USCG units with subject matter experts (SMEs), assists with workforce development and provides consultation and technical advice. LCDR Smith reported that US gas terminals accommodated approximately 2,000 gas carrier visits in 2018 and that the annual number is expected to increase to between 5,000 and 6,000 by 2022.

The areas of responsibility of the LGC NCOE also encompass LNG bunker vessels and LNG-powered ships. Amongst the December 2018 presentations enjoyed by the SIGTTO membership were two papers on the world's largest LNG bunkering project. The initiative involves the construction of the 18,600 m³ LNG bunker vessel (LNGBV) that will be utilised to fuel a fleet of nine 22,000 TEU, dual-fuel container ships building in China for CMA CGM of France. All the ships, including the LNGBV, are set for 2020 delivery.

The LNGBV newbuilding was described to those attending SIGTTO's Shanghai Regional Forum on 14 December by Mitsui OSK Line's Eiji Kato, the site and project manager at CSSC Hudong Zhonghua yard where the vessel is being built. On delivery the LNG fueller, which will be jointly owned by Mitsui



LNG bunkering of Sovcomflot's X-DF-powered *Gargarin Prospect*, the world's first gas-fuelled Aframax tanker, in Rotterdam in October 2018

OSK Lines (MOL) and Total, is set to provide the LNG-powered fleet of box ships with an aggregate 300,000 tonnes of LNG annually. The MOL-operated LNGBV will be stationed in North West Europe and Rotterdam will be the primary bunkering site although fuelling operations will also be possible in Dunkirk, Zeebrugge and Le Havre.

The LNGBV is being provided with two GTT Mark III Flex membrane cargo tanks of 9,300 m³ each. The aggregate capacity aligns with that of the single, 18,600 m³ GTT Mark III LNG bunker tank on each container ship. The container ships will sail on CMA CGM's Asia-Europe route where roundtrips take 84 days. The fleet fuelling plan calls for approximately 40 bunkering operations in Europe per annum, each involving around 17,300 m³ of LNG.

The use of the GTT Mark III Flex membrane containment system means that the 18,600 m³ LNGBV will not be subject to cargo tank filling restrictions. The arrangement will provide a boiloff gas rate of 0.18% per day and will be able to accommodate working pressures of 0.7 barg. The LNG fueller will have an elevated manifold amidships for LNG loading while ship-to-ship LNG bunkering will be handled at a lower manifold forward.

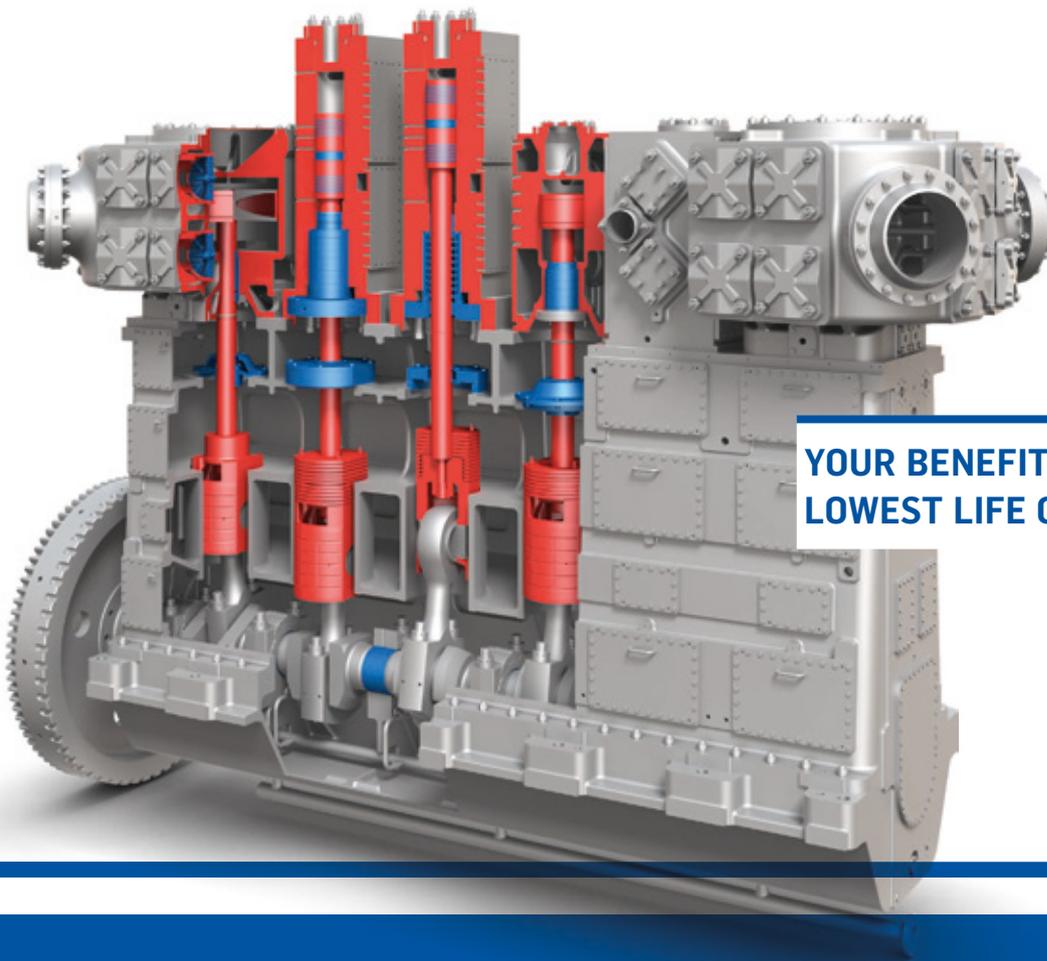
MOL's LNGBV will be provided with four dual-fuel, medium-speed diesel generators driving two stern azimuthing thrusters. The propulsion system, in combination with a bow thruster and joy stick navigation,

is designed to provide the fueller with a high degree of manoeuvrability and to obviate the need for tug assistance.

Each of the CMA CGM box ships will be driven by a WinGD W12X92DF engine, the most powerful gas-fuelled engine yet constructed. Rudolph Wettstein, general manager marketing & application for Winterthur Gas & Diesel Ltd (WinGD), the engine manufacturer, explained to attendees of the Senior Executive Forum in Houston on 4 December, that the company is now making strides in the supply of its low-speed, dual-fuel propulsion units for both LNG carriers and LNG-powered ships.

The main engine on each of the CMA CGM box ships will weigh 2,140 tonnes and develop 63.84 MW of power. The engines operate to the lean-burn Otto combustion cycle principle, ensuring that they are in compliance with the IMO Tier III nitrogen oxide emissions requirements at all times when operating in the gas mode.

At the time of Mr Wettstein's presentation 18 ships powered by WinGD's X-DF dual fuel engines had successfully completed sea trials and were in service, comprising eight conventional size LNG carriers, one coastal LNG tanker, four coastal chemical tankers, three coastal asphalt carriers and three Aframax oil tankers. Furthermore, an additional 43 conventional-size X-DF LNGCs were on order, as were a further 29 X-DF-powered commercial vessels of other types, including the CMA CGM box ships.



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The LNG bunker tanks on Ilshin Shipping's recently completed 50,000 dwt bulk carrier Green Iris are constructed of the new high-manganese steel



Recent gas-related developments at IMO

High-manganese steel

At its 5th Session in September 2018 IMO's Sub-Committee on the Carriage of Cargoes and Containers (CCC 5) agreed to a draft Maritime Safety Committee (MSC) circular on *Interim Guidelines on the application of high manganese austenitic steel for cryogenic service* and to expand the terms of reference to include related guidance for approving alternative metallic material for cryogenic service more generally. Both the Guidelines and the expanded terms of reference were subsequently approved at the 100th MSC Session (MSC 100) in December 2018. The Guidelines have now been published as MSC.1/Circ.1599.

Gas cargo minimum requirements

The UK proposed to make consequential amendments to Chapter 19 of the revised International Gas Carrier (IGC) Code, which entered into force in 2016. Chapter 19 provides a summary of the minimum requirements for gas carrier cargoes, and the amendments are deemed to be necessary to correct those anomalies introduced during the revision process that result in differences between the "old" and "amended" Codes.

CCC 5 acknowledged that the list of products as provided in Chapter 19 of the IGC Code for ships constructed on or after 1 July 1986 and before 1 July 2016 was not up-to-date. As an interim solution, a draft MSC circular clarifying the issue was agreed for submission to MSC 101 for approval in June 2019.

IGC Code Unified Interpretations

The intent of paragraph 11.3.4 of the IGC Code concerning the capacity of the emergency fire pump, considering the supply of fire hydrants, the water spray system and foam system

(and combinations thereof), was raised by the International Association of Classification Societies (IACS). Clarification was sought on the text and in particular whether a single failure mode philosophy should be applied. CCC 5 agreed it should, and it is expected that a Unified Interpretation (UI) will be submitted to the next CCC session.

A detailed UI was proposed to clarify the requirements for deck water spray systems (paragraphs 11.3.1, 11.3.3 and 11.3.4 of the IGC Code) concerning, respectively:

- (a) what constitutes "two complete athwartship tank groupings";
- (b) the interconnections between the spray and fire systems; and
- (c) the capacity of the fire pumps serving water spray systems and protection of exposed survival craft with water spray.

UIs were agreed on all issues except for paragraph 11.3.4 of the Code. CCC 5 also noted concerns regarding the reference to "fire in one compartment" and it is expected a further UI will be submitted to the next session on this point.

IACS submitted a UI concerning the required heating for the structural material of the cargo containment systems and emergency power requirements. Paragraph 4.19.1.6 of the IGC Code requires the means of heating to "... be arranged so that, in the event of failure in any part of the system, standby heating can be maintained equal to

not less than 100% of the theoretical heat requirement". The UI clarifies the aspects of the system that should be powered by the emergency generator and this was accepted by the Sub-committee at its 5th Session.

IACS also proposed a UI to clarify the requirements for emergency shutdown valve fire test requirements (paragraph 5.13.1.1.4 of the IGC Code) to allow material with a melting temperature lower than 925°C in components such as rubber handle covers (where failure would not cause deterioration of shell or seat tightness intrinsically). CCC 5 agreed to the proposed IACS text, albeit with a slight modification.

Energy Efficiency Design Index

IMO's Marine Environment Protection Committee (MEPC) is carrying out a review of the Energy Efficiency Design Index (EEDI) provisions applicable to new ships, including gas carriers. A correspondence group (CG) is reviewing the Phase 3 requirements with a view to potentially changing the implementation date and emission reduction requirements. This CG will report to MEPC's 74th Session (MEPC 74) in May 2019 when a decision is anticipated.

Correspondence Groups

There are two IMO Correspondence Groups (CG) currently considering gas-related provisions. The outcomes of their deliberations will be covered in *SIGTTO News* once each group's work has been concluded and the CCC Sub-committee has decided on its merit.

The first CG is focused on the revision of *Guidelines for the approval of fixed dry chemical powder fire-extinguishing systems for the protection of ships carrying liquefied gases in bulk* (MSC.1/Circ.1315), and has been tasked with considering the approval of dry chemical powders and capability testing.

Following IMO's recent work on high-manganese steel, mentioned above, the second Correspondence Group is developing guidance for approving alternative metallic material for cryogenic service more generally (relating to paragraph 4.19.22 in the IGC Code).

Exceptional bravery nominations

IMO's Secretary-General is inviting nominations for candidates for the 2019 IMO Award for Exceptional Bravery at Sea through 15 April 2019. All nominations should be submitted to ero@imo.org and/or addressed to the Secretary-General, International Maritime Organization, 4 Albert Embankment, London SE1 7SR, UK.

Nominees will be judged on the basis of actions performed between 1 March 2018 and 28 February 2019. Those proposing candidates will be asked to complete a questionnaire to provide an Assessment Panel and a Panel of Judges with sufficient information to decide on the merit of a nomination.



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NEW MEMBERS

Quartet joins the club

Four companies have joined the Society's membership since the Autumn 2018 edition of SIGTTO News was published. The new members and their date of joining the Society are shown below. The SIGTTO membership now stands at 138 full members, 48 associate members and 27 non-contributory members.

Single Buoy Moorings Inc	1 Oct 2018
Global Meridian Holdings Ltd	1 Jan 2019
Signet Maritime Corporation	1 Jan 2019
Minerva Gas Inc	1 Mar 2019

SBM was involved with the design, construction, mooring and operation of *Sanha LPG*, the world's first floating LPG production vessel



Single Buoy Moorings Inc (SBM) is an engineering company specialising in offshore floating solutions for the oil and gas industry. The company has developed designs for newbuild and converted floating LNG production (FLNG) vessels. SBM was involved with the design, construction, mooring and operation of *Sanha LPG*, the first LPG FLNG vessel. The 135,000 m³ *Sanha LPG* went into service off the coast of Angola in April 2005. SBM is a previous member of SIGTTO, from 2004 until 2012 when it resigned.

Part of JP Morgan Asset Management, **Global Meridian Holdings Ltd** owns four LPG vessels of the fully refrigerated very large gas carrier (VLGC) type. The 80,000 m³ ships were delivered in 2017 and 2018, fly the Maltese flag and are managed by Bernhard Schulte Shipmanagement.

Based in Houston, Texas, **Signet Maritime Corporation** is an international marine transport and logistics services company. Towing and tugboat services constitute a key element of this portfolio and amongst the fleet of tugs owned and operated by Signet are a pair of LNG terminal support/escort units. Built to Robert Allan's RAstar 3100 class design, the two azimuthing stern drive (ASD) tugs have an 80-tonne bollard pull rating.

Minerva Gas Inc was established as a subsidiary by Minerva Marine in 2018 to manage the Greek shipping company's entry into the LNG carrier field. Minerva ordered two 173,400 m³ LNG carriers at Daewoo Shipbuilding and Marine Engineering (DSME) in March 2018 and two 174,000 m³ LNG carriers at Samsung Heavy Industries (SHI), in October and December 2018. All four ships are scheduled to enter into service in 2021.

PEOPLE

Laura Else joins SIGTTO



Laura Else – coordinating SIGTTO publications

Laura Else has joined the SIGTTO Secretariat in London as the Society's Technical Support Executive. "This is my first job after university," states Laura. "I have a BA and an MA in History from the University of Southampton, and graduated from my Masters course in December 2018."

The Technical Support Executive role involves supporting SIGTTO's Technical Advisors with researching, editing, writing and updating publications and information papers. Another important function is the

coordination of the document preparation process by liaising with the Society's publisher, Witherby, regarding SIGTTO publications.

"In addition, I am currently putting together a style guide to ensure consistency in style and terminology across SIGTTO's documents," comments Laura. "Another task involves writing a series of internal procedures to be followed in SIGTTO's publishing process. The role also involves maintaining records of all correspondence relating to technical enquiries and I will be reviewing SIGTTO's library system."

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MEMBER PROFILE

YPF joins LNG exporters club

YPF SA, Argentina's leading energy company, is poised to become an LNG exporter in the next few months by making use of a unique liquefaction terminal solution. The development comes 10 years after the company first became involved with LNG as an importer of the product. All the pioneering YPF LNG projects to date have made use of floating facilities.

The opportunity for Argentina to export LNG has arisen as a result of rising gas production from the large Vaca Muerta shale basin in Neuquén province. YPF has chartered a floating LNG production (FLNG) barge from Exmar under a 10-year tolling agreement and positioned it at Bahia Blanca, Argentina's main deepwater harbour and gas pipeline node. Formerly known as *Caribbean FLNG*, the Exmar vessel has been renamed *Tango FLNG* and will allow the export of YPF's surplus natural gas production during the southern hemisphere's summer season which usually extends from October through to March.

"The use of *Tango FLNG* marks the transition of Bahia Blanca, situated some 600 km south of Buenos Aires, from an LNG import facility to an LNG export port," states Carlos Weis, YPF's head of LNG projects and operations. "YPF launched South America's first LNG import project at Bahia Blanca in 2008, making use of Excelerate Energy's 138,000 m³ floating storage and regasification unit (FSRU) *Excelsior* stationed at the Compañía Mega NGL terminal."

The YPF initiative became not only the world's first commercial LNG regasification operation utilising an FSRU but also the first commercial LNG project involving cargo transfers to an FSRU from an LNG carrier moored alongside by means of flexible hoses. This ship-to-ship (STS) LNG offloading method has since become widely used by the LNG industry worldwide, with over 700 STS transfers carried out at YPF's regasification terminals alone.

Over the years YPF steadily expanded the operational capacity of its Bahia Blanca regasification terminal, from 2.25 million tonnes per annum (mta) of LNG to 4.75 mta, through several improvements in pipeline infrastructure and hardware plus the replacement of *Excelsior* with a larger Excelerate FSRU, the 150,900 m³ *Exemplar*. In October 2018, with the Excelerate charter arrangement reaching its expiry date and increased shale gas production becoming available from the Vaca Muerta basin, *Exemplar* departed Bahia Blanca to make way for the *Tango FLNG* vessel at the Mega terminal jetty.

In 2011, following design and development



work by a team of company engineers, YPF opened its second Argentine FSRU-based LNG receiving facility, at a greenfield site on the Paraná River 50 km north of Buenos Aires. The fast-track Escobar project involved major dredging works and the construction of a port capable of accommodating Excelerate Energy's *Exemplar* FRSU as well as LNG delivery tankers of up to 315 metres in length.

YPF has improved the cargo-handling performance of Escobar over the years, first by replacing *Exemplar* with *Expedient*, another Excelerate Energy 150,900 m³ FSRU, and then by switching to the open-loop mode of regasification. The onshore and onboard improvements led to considerable fuel savings and an increased regasification capacity, initially reaching 5.6 mta of LNG and later 6 mta.

As this issue of *SIGTTO News* was going to press, the *Tango FLNG* liquefaction barge had been positioned at the Mega jetty in Bahia Blanca, following transport from a shipyard in China utilising a heavy lift vessel, and YPF was engaged in final preparation work prior the start of commissioning procedures. The preparations include the construction, commissioning and startup of a shore sweetening plant, a dehydration facility and a compression station, as well as making arrangements for reverse flow at the interconnection pipeline. In addition, a high-pressure loading arm is being provided.

Once the onboard outfitting work is finished and the onshore facility is ready to transfer natural gas to the barge, commissioning activities at the facility will start. The *FLNG Tango* barge will transfer its production through flexible hoses to LNG carriers moored alongside. For each STS loading the LNG carrier will remain alongside the barge for approximately 30-40 days, until the transfer of a full LNGC cargo has been completed. *Tango FLNG* has three IMO Type C cylindrical cargo tanks with a total storage capacity of 16,100 m³. The Exmar barge utilises Black

& Veatch's proprietary PRICO process to liquefy the treated feed gas and has an LNG production capacity of 0.5 mta.

YPF has been listed on the New York Stock Exchange as a publicly traded company since 1994 and has been a full member of SIGTTO since 2013. "We have valued our liaison with the Society," continues Carlos Weis, "deriving benefit from SIGTTO's accumulated body of work and participating in the Society's ongoing development of LNG industry best practices by calling on experience gained in our own pioneering floating LNG projects."

Since 2016 YPF has hosted SIGTTO's annual South American Regional Forum, events which have attracted amongst the largest gatherings of gas shipping and terminal professionals of all the Society's Regional Forum meetings.

SIGTTO

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