

## MILFORD HAVEN PORT AUTHORITY

### Approach to and use of Risk Assessments

In 1982, the Authority (then the Milford Haven Conservancy Board) commissioned Burgoyne Consultants Limited to produce a report into the potential consequences of fires and explosions involving the significant amount of hazardous cargo being handled by the port including LPG (Liquefied Petroleum Gas).

The outcome was used to assist in the development of both the Port Emergency Plan and provision of moving exclusion zones around certain vessels.

In 1997, a Quantified Risk Assessment (QRA) was undertaken by Borel Consulting Engineers. The study, the first of its kind in the UK, included the specific traffic pattern experienced by the port including LPG tankers. This study formed the basis on which MHPA devised and introduced its Safety Management System (SMS) which in compliance with the Port Marine Safety Code is the basis on which all the Authority's operations and planning are approached.

In 2004 and due to the impending arrival of LNG (Liquefied Natural Gas) from the end of 2007 onwards, the Authority required Burgoyne's to update their report to include such LNG vessels.

It is important to note that the report commissioned and provided considers the consequences of events without giving any consideration to the adequacy of the precautions in place to prevent or minimise the consequences of each incident type. In short, the report is a "HAZID" (hazard identification).

To take this further it was decided to commission Lloyds Register to consider the Burgoyne report's findings and produce a QRA for the port, set against worldwide statistics and convert those findings into readily understandable, layman's terms - e.g. "Any explosion (including fire) large enough to potentially injure people nearby is only slightly more likely per year as being struck by lightning."

The Lloyds' study further concluded "The likelihood of an LNG incident is extremely low. There has never been a recorded incident of a major release of LNG from a ship to external atmosphere. Similarly, "No member of the public has ever been injured by LNG from a ship."

For more than twenty years Milford Haven has been the largest Gas handling port in the UK with approximately 1,000,000 tonnes of LPG handled annually. Although there have been a number of minor

incidents with LPG vessels, no uncontrolled loss of containment has been recorded.

The arrival of LNG will dovetail well with the existing procedures for handling hazardous vessels including exclusion zones within the main channels enforced by Port Control and patrol boat. However, additional resource in the form of a shadow tug will be made available to further ensure that vessels are correctly separated from each other.

In addition, and in compliance with SIGTTO (Society of International Gas Tanker & Terminal Operators Ltd) guidance the Authority has further widened the channel in the vicinity of the South Hook terminal and opposite the Dragon terminal to provide a larger separation distance for certain vessels (e.g. ferries) whilst passing LNG ships which are alongside at either facility.

June 2005

## **Milford Haven Port Authority's Approach to Planning for the Management of LNG Shipping**

In common with all other UK ports, we have a duty to accept all those who wish to enter the port. We do not have the ability to deny entry to any vessel except in very specific circumstances. Thus, our whole approach is to determine the way in which we manage ships and other uses of the Waterway so as to identify risks and in the way in which we regulate water movements, mitigate or remove such risks entirely.

Thus, given the fact that LNG ships will be using the Waterway from the third quarter of 2007 our whole approach has been to work alongside the technical teams of both developers so that we get an understanding of what their shipping requirements are, and also feed into them our own comments and approach so that they can be incorporated into their planning. We have identified a wide range of scenarios which we have then tested within the framework of our Safety Management System, the basis of which is that all activities are underpinned by a comprehensive risk assessment. Such scenarios and risks have been tested in a variety of ways through both internal and

external discussions and analyses; the use of simulators at MARIN in Holland and also Fleetwood; visits that members of our Marine team have made to various LNG facilities and ships; the commissioning of various reports from specialists and a detailed and continuing dialogue with all those involved.

In particular we have researched, assessed and identified such factors as the capacity of the Haven to accommodate traffic increases, the stages of tide at which LNG ships will be allowed to move; the circumstances relating to the number and size of tugs, the number of Pilots, and weather conditions that will allow or prevent movements; the need for any modifications or changes to the navigation marks or facilities that we have in the Haven; any changes required to the navigation channels with deepening or widening; and a similar approach to turning areas. We have also taken into account the appropriateness of current security provisions under the Security Plans that we have for controlling our facilities which are approved by the security arm of the Department for Transport (TRANSEC), and will be making modifications to these where necessary to meet TRANSEC's own assessment. We have also identified the need to revise and update our emergency response plans, and have entered into dialogue with the Fire Service, the terminal operators and the emergency response division of Pembrokeshire County Council among others.

We would wish to emphasise that this is very much an iterative process which is constantly being refined to ensure the optimum procedures are in place to facilitate the safe and efficient handling of LNG vessels, indeed all vessels utilising the Haven.

September 2005

## **Summary of some of the Risk Assessments and Analyses undertaken to assist in planning for the continuing safe and efficient management of shipping with the advent of LNG Ships from 2007**

### **Introduction**

MHPA have been on a continual path to assess the risks and prepare for arrival of these vessels which will bring the port traffic up to the levels previously handled safely in the Haven. This path of assessment uses our Safety Management System (SMS) approach which was developed through a quantified risk assessment and provides for detailed assessment of risks and the identification of the most appropriate management strategies. This complies with the requirements of the Port Marine Safety Code which applies to all UK ports and for which the policy is laid down by the Department for Transport in consultation with the industry and monitored by the Maritime and Coastguard Agency.

This process has included navigation and engineering studies, ship simulations and risk assessments using the Authority's pilots and technical staff, information and studies from the LNG project teams and the commissioning of a number of studies and risk assessments (both quantitative and qualitative) from independent, professional experts. In co-ordination with the developers we continue to evaluate and assess all potential threats as part of the planning and preparation process for LNG operations.

As part of this continuing preparation several studies have been conducted to determine ways to reduce the risk of LNG marine traffic. As a consequence of these studies, a number of measures will be implemented. For example, the channel is to be widened to provide greater separation of ships in the Haven; while LNG carriers are unloading the traffic speed of passing ships in the Haven is to be reduced; a minimum of two pilots are to be aboard LNG vessels entering the Haven; the existing fleet of tugs is to be augmented with new state-of-the-art tugs equipped with the latest technology.

## **Making detailed Information Publicly Available**

The broad scope of these studies mean that certain scenarios are assessed which, if generally publicised, might be sensitive from a national or local security perspective. These considerations combined with ongoing legal challenges prompt an understandable reluctance on the part of the Port Authority and the developers to release these documents into the public domain.

We are also concerned that our experience is that when detailed rather than summary and conclusive information is made available then it is misused by those opposing the projects by information taken out of context and used for scaremongering, unjustified allegations and superficial challenging of the conclusions. Examples of this include the decrying of Royal Haskoning QRA by misquoting the HSE, misuse of SIGTTO guidelines, and taking out of context a piece of information in the comprehensive assessment undertaken and published by Dragon LNG.

Thus our policy, agreed as a common approach with all those involved in these developments, is to outline and describe what has been undertaken and why, together with the results and how they have been used, but not to make publicly available the large amount of detail of the work done.

However we do accept that we have both a duty and a business need to be as open as possible and explain our position as widely as we can. Thus we have made many presentations, had many discussions and offered to meet many individuals so as to fully explain the approach we are taking and will continue to develop as the introduction of LNG shipping draws near. We have also carried summaries of what we have done and will be doing in our Annual Reports, press releases, interviews to the media and many other ways, including keeping our politicians fully informed and placing a priority on responding to any questions that they have of us.

## **What actual information have we made available.**

One of the accusations is that we have not made any information available especially about our approach to managing LNG shipping. This is far from the truth as a considerable amount of such information has been, and will continue to be put into the public domain. Some examples of the information and mechanism of its public promotion are given below.

## **Formal Public Information**

The following summary of our approach was included in the bundles available to Safe Haven and their legal team in MHPA's Summary Grounds as part of the Judicial Review:-

The Authority has undertaken and/or participated in and/or considered many risk assessment reports as part of its continuing work with each developer. The range of risk assessment analysis undertaken includes the following (as an illustration for the purpose of these summary grounds of the extent of the Authority's active participation in what has been and continues to be a thorough process of evaluation and risk assessment):-

- a. Marico Marine, a well established and reputable Marine and Risk Consultant, was commissioned to conduct a marine traffic analysis of vessel movements through the port during a 25 day period in November 2002.
- b. South Hook LNG submitted a concept risk assessment dated 9-10 December 2002 to identify hazards, consequences and possible mitigation measures relating to the potential use of the port of Milford Haven for the importing of LNG. The Authority participated in the assessment process.
- c. Marin, the Maritime Research Institute Netherlands, produced a report, dated 14 February 2003, on simulations to check the nautical consequences of future 200,000 m<sup>3</sup> LNG carriers (in respect of the South Hook LNG's proposal).
- d. In March 2003 Marico Marine produced a navigational risk assessment in respect of the Dragon LNG's proposal. The report concluded that the risks inherent in the movement of LNG tankers in the Haven are manageable and tolerable. It identified a number of additional risk management measures to further reduce residual risk. An addendum to this report was produced in March 2004 and assessed the use of Berth 1 for LNG vessels. The report reflects the continuing dialogue between the Authority and Dragon LNG in respect of marine risk assessment.
- e. Marin reported on fast time simulations for large LNG ships in a report issued on 19 May 2003.
- f. Det Norske Veritas (USA) Inc. ("DNV"), a major classification society, produced a technical report dated 13 October 2003 in respect of South Hook LNG's proposal

assessing the marine risk associated with vessel manoeuvres in the channel and around the South Hook terminal for discharging cargo from LNG carriers. The report recommended mitigation measures which have been accepted by the authority and developer.

- g. ABS Consulting Inc. an international consulting operation experienced in the analysis of shipping collisions, produced a report dated 20 February 2004 for South Hook LNG dealing with potential damage to LNG tankers due to ship collisions.
- h. The Authority commissioned a report from Burgoyne Consultants, International Consulting Engineers and Risk Consultants, dealing with the potential consequences of fires and explosions involving ships carrying petroleum products (including LNG), which updated a similar report obtained in the early 1980's. The Authority used the findings in the earlier report to develop procedures for regulating and managing shipping movements, and, in the light of the proposal to handle LNG, commissioned the latest report dated March 2005. It confirmed the continuing relevance of the current systems and procedures that applied to ships carrying petroleum products to those that would convey LNG.
- i. South Hook LNG commissioned a report in November 2003 from HR Wallingford, the former research establishment for the Ministry of Defence, dealing with mooring safety and the possibility of disturbance caused to moored vessels and made this available to MHPA.
- j. [A report by Gordon Milne](#), Senior Risk Analyst at Lloyd's Register of Shipping, was commissioned by the Authority to assess the risk of explosion and gas release from LNG carriers. It concludes that: "LNG has specific parameters which make the likelihood of a major explosion remote. ....These features combined with the high standards of design and operation throughout the industry mean that compared to other chemicals LNG poses one of the lowest threats to the general public and property".

## **Other Public Information**

The above is a description of the actual assessments and studies. We have also explained our approach in more general terms to a wide range of enquirers over the past six months including Safe Haven, local residents, politicians, Lord Crickhowell, and in press releases etc.

We have explained that we have researched, assessed and identified such factors as:

- the capacity of the Haven to accommodate traffic increases
- the way in which LNG ships will be allowed to move according to the state of tide;
- the number and size of tugs they will need;
- whether those tugs should provide active escorting (coming in with the tanker with a line attached);
- the number of pilots per movement, the number of pilots to be employed in total;
- identifying the training programme required for our pilots and others;
- weather and tidal conditions that will allow or prevent movements;  
where ships will swing to get onto a berth;
- the need for any modifications or changes to our navigation aids such as buoys or other facilities;
- any changes required to the navigation channels or turning areas themselves.
- we have fully taken into account any implication from LNG shipping with the security plans that we now have in place in compliance with the ISPS code (International Ship and Port Facility Security code)
- we have assessed the need to update our various response plans and capabilities, and the need for and process of consultation and working with other authorities and agencies.

## **Summary**

From the above it is quite clear that the Authority has undertaken and facilitated a detailed assessment of marine risks involved in the LNG proposals. It gave informed advice to the LNG developers, to the Planning Authorities and to the HSE in respect of the decisions which they took. Pursuant to its continuing duties to operate a safe port, the Authority is continuing work in respect of risk assessment and mitigation measures to ensure that the port continues to operate safely and efficiently.

October 2005

## **PLANNING FOR LNG SHIPPING (Article for Coastal Forum Public Newsletter)**

When the first ship carrying LNG (Liquified Natural Gas) arrives in Milford Haven in 2007 it will not be the first time that the pilots, bridge team and tugs involved will have brought the ship into the port - they will have done so on many occasions before, under a variety of testing conditions on the simulators in the Marine Research Institute in Holland and the Nautical College in Fleetwood. The use of these simulators is just one of the ways in which Milford Haven Port Authority is preparing for this new development.

There have been calls for the Authority to publish the risk assessment that has been undertaken that confirms that LNG ships will be allowed into the port. There is no single such document however but rather a series of processes, assessments and scenario testing, such as the use of the simulator, that define the way in which the Authority will continue to safely and effectively manage the port with LNG ships added to the variety of other users that currently make Milford Haven the fourth largest cargo port in the UK and one of the largest oil and gas ports in Northern Europe.

This misunderstanding that unlike say a Planning Authority we do not come to a yes or no decision as to whether LNG ships will be allowed into the port arises from the fact that in common with all other UK ports, we have a duty to accept any ships who wish to enter the port. We do not have the ability to deny entry to any vessel except in very specific circumstances. Thus, our whole approach is to determine the way in which we manage ships and other users of the Waterway so as

to identify risks and in the way in which we regulate water movements, mitigate or remove such risks entirely.

So, starting from the fact that LNG ships will be using the Waterway from the third quarter of 2007 our whole approach has been to work alongside the technical teams of both developers so that we get an understanding of what their shipping requirements are, and also feed into them our own comments and approach so that they can be incorporated into their planning. We have identified a wide range of scenarios which we have then tested within the framework of our Safety Management System which itself is underpinned by a comprehensive quantified risk assessment. Such scenarios and risks have been tested in a variety of ways through both internal and external discussions and analyses; the use of simulators as mentioned above; visits that members of our Marine team have made to various LNG facilities and ships; the commissioning of various reports from specialists and a detailed and continuing dialogue with all those involved.

In particular we have researched, assessed and identified such factors as the capacity of the Haven to accommodate traffic increases, the stages of tide at which LNG ships will be allowed to move; the circumstances relating to the number and size of tugs, the number of Pilots, and weather conditions that will allow or prevent movements; the need for any modifications or changes to the navigation marks or facilities that we have in the Haven; any changes required to the navigation channels with deepening or widening; and a similar approach to turning areas. We have also taken into account the appropriateness of current security provisions under the Security Plans that we have for controlling our facilities which are approved by the security arm of the Department for Transport (TRANSEC), and will be making modifications to these where necessary to meet TRANSEC's own assessment. We will revise and update our emergency response plans, and have entered into dialogue with the Fire Service, the terminal operators and the emergency response division of Pembrokeshire County Council among others.

One of the risk assessments that we initiated was from the Risk Analysis team at Lloyd's Register of Shipping. They were commissioned by the Authority earlier this year to assess the risk of explosion and gas release from LNG carriers in Milford Haven. [Their report](#) concludes that:

"LNG has specific parameters which make the likelihood of a major explosion remote. ....These features combined with the high standards of design and operation throughout the industry mean that compared to other chemicals LNG poses one of the lowest threats to the general public and property".

It is important to emphasise that this is very much an iterative process which is constantly being refined to ensure the optimum procedures are in place to facilitate the safe and efficient handling of LNG vessels, indeed all vessels utilising the Haven.

September 2006

**Brief to Staff and the Public  
LNG and Leisure Craft on the Haven**

No significant extra restrictions will be enforced on leisure craft as a result of the LNG ships expected to call regularly at the Haven's two terminals from the end of 2007.

Around 300 will be arriving each year, a relatively small increase on the 3,500 ship calls already handled in the port. Milford Haven is the fifth busiest port in the UK, and the Port Authority is skilled at handling the movements of all shapes and sizes of vessels, some of which are as large, or larger, than those that will be carrying LNG.

Only minor modifications will be needed to accommodate the handling of LNG ships within the current mix of oil and gas tankers, ferries, fishing and general cargo vessels and the increasing number of recreational craft.

Thus there will continue to be restriction zones in the shipping channels within 100 metres of the jetties, as well as a moving restriction zone of one mile in front and behind a loaded LNG vessel, as is currently the case for loaded gas tankers. Leisure users navigating outside the main channel are unlikely to be affected at all. The small boat passages through the existing jetties will remain open, unless their temporary closure is required because the port is operating at higher than normal security levels. The existing Codes of Conduct outlined in the Recreation Plan and the annually published Leisure Guide will continue to apply.

As a Port Authority, we are fully committed to securing and developing the recreational role the Haven plays, including accommodating certain racing events and regattas. Whilst a new energy era is being embraced, so too is the continued use of the Haven as a safe and enjoyable leisure environment.

Any queries or comments on this should be sought from any MHPA manager or from  
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## **Liquefied Natural Gas... The Haven's new energy era**

With two LNG receiving terminals being built on the Haven we can expect specialist LNG ships to start using the port from the end of 2007. There has been much publicity surrounding these developments and unfortunately much misunderstanding of the true situation as a result of the way in which some opponents of LNG terminals have inaccurately portrayed their view of how this will impact on the users of the port and the local community.

Whilst Milford Haven Port Authority would be pleased to respond to any questions or concerns about any aspect of LNG shipping (contact the Chief Executive on 01646 696100 or e-mail [enquiries@mhp.co.uk](mailto:enquiries@mhp.co.uk)) a brief summary as to how we are planning for LNG ships to successfully co-exist with all recreational users of the Waterway is given below.

LNG shipping has been operating successfully and safely across the world for over 40 years. In over 45,000 loaded voyages whilst there have been some incidents none has resulted in a loss of any cargo. LNG shipping has an exemplary safety record and Milford Haven Port Authority has been working closely with both local projects in terms of the studies and risk assessments to ensure that the Port will continue to operate safely and efficiently. For the Haven's Leisure community, very little will in fact change – just the more regular sightings of quite spectacular commercial craft on the waterway!

No significant extra restrictions will be enforced, as a result of the 300 LNG ship calls expected each year once the terminals are fully operational – a relatively small increase on the 3,500 ship calls already handled in the port. In fact as the fourth largest port in the UK the Port Authority is skilled at handling the movements of all shapes and sizes of vessels – some of which are at present, as big, or larger than those that will be carrying LNG.

The independent research and risk assessments which have been commissioned by the Authority have confirmed both that there is sufficient capacity to accommodate the increase and that the current procedures, with some minor modifications are equally appropriate to handling LNG ships within the mix of current oil and gas tankers, ferries, fishing and general cargo vessels and the increasing number of recreational craft.

Thus there will continue to be restriction zones within 100 metres of the jetties, but this already applies as do the moving restriction zones of 1 mile in front and behind a loaded gas tanker. The small boat passages through the existing jetties will remain open following comprehensive risk assessments – (the point to note here is the possible temporary restriction on their use if the port is required to operate at a higher than normal security level) and the existing codes of conduct outlined in the Recreation Plan, the

annually published Leisure Guide and indeed within this Guide will continue to apply.

What is clear is that for the many people who use the waterway for leisure use, no significant changes will occur. The Port Authority is fully committed to securing and indeed developing the recreational role that the Haven plays. Thus whilst a new energy era is being embraced, so too is the continued use of the Haven as a safe and enjoyable leisure environment.

LNG is methane (Natural Gas) which is liquefied by cooling it to temperatures of minus 160 degrees Celsius. The chilled liquid is then stored in insulated storage tanks, until such time as it is pumped into specially built tankers and shipped as a liquid at this temperature. Discharged into insulated tanks onshore it is then sent to vaporisers where it is re-gasified by warming the cold liquid until it reverts to a Gas.