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The EU Directive on port reception facilities for ship-generated waste and cargo residues: the results of a second survey on the provision and uptake of facilities in North Sea Ports

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Abstract

The aim of this paper is to evaluate the results of a survey of the availability and uptake of port reception facilities within the North Sea area. The evaluation is based primarily on original survey data from the autumn of 2002 which followed on from a similar survey conducted in the summer of 2000. The EU Directive on port reception facilities for ship-generated waste etc. (Directive 2000/59/EC) was due to enter into force in December 2002, and required all EU ports to provide reception facilities to meet the needs of the vessels normally calling in at them. This paper examines the readiness of North Sea ports to meet that requirement and also considers the actual uptake levels of facilities, where ports were able to provide such information.

Keywords: European Union; North Sea; Port Reception Facilities; MARPOL 73/78; Waste discharge.

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[**] In Memoriam. Sally Macgill, Professor of Integrated Environmental Management in the School of Earth and Environment, was killed in Thailand during the Tsunami of 26th December 2004

1. Introduction

Carpenter and Macgill (2003) examined the current availability of port reception facilities within the North Sea area following a survey in the summer of 2000 and noted that it was the intention of the authors to conduct a second survey in the autumn of 2002 to "expand on the results discussed in [that] paper, and to examine whether any positive impact of the Directive is apparent" (page 32). That second survey was undertaken in late 2002, with responses received from ports around the same time as Directive 2000/59/EC was due to be transposed into national law in all EU member states (end of December 2002).

The EU Commission (2000) set out the specific requirement that all EU ports provide reception facilities for vessels normally using that port, these facilities covering a wide range of ship-generated waste including oily waste, chemical waste, sewage and garbage. All wastes generated on board vessels visiting those ports were to be discharged into reception facilities, unless vessels had sufficient capacity on board to travel to their next port of call, with a system of vessel documentation and inspections to ensure that vessels were capable of reaching that next port without the need to discharge waste illegally at sea. The Directive also includes a requirement for advance notification by vessels to ports of their intention to use facilities, a fee system to encourage use of facilities and a system to monitor compliance by vessels and the provision of adequate sanctions for non-compliance.

195 North Sea ports in Belgium, Denmark, Germany, the Netherlands, Norway and the United Kingdom were approached using postal surveys to determine the levels of provision of port reception facilities available in those ports prior to the introduction

of the EU Directive. Norway was included, although not an EU member, in order to provide a comprehensive picture of provision of facilities in the region. The surveys were issued to ports, based on information published by the Marine Environment Protection Committee of the International Maritime Organization in a number of circulars examining provision of facilities under MARPOL 73/78 Annexes, and also to a large number of ports identified in the Fairplay Ports Guide (2001). A breakdown of the number of surveys issued by country, and the number of responses to each of the two surveys, appears at Table 1.

82 ports (42%) provided usable responses to either one or both surveys. There was no response to either survey from 86 ports (44%). The remaining 14% is made up of ports in the category "other". Of the 27 ports in this category, 5 were either unable to complete the survey or sent port brochures and 13 could not be contacted as their address details were incorrect. The remaining 9 ports indicated specific reasons why they could not complete the survey: 2 are classified as not North Sea; 3 are not responsible for any vessels calling in; 3 no longer receive any vessels; and 1 is exempt from the Directive as it only receives military vessels. If we exclude these 9 ports, the response rate is 82 ports out of 186 (44%).

While 42 out of the 83 UK Ports (50%) provided returns to one or both surveys, two port returns covered three separate port localities and one response covered seven separate ports, bringing the actual total UK response rate up to 52 (63%). However, because it is not clear whether each separate port has all or only some of the facilities identified in those specific cases, the returns for these groups of ports have been

considered as a single entity for the purposes of this analysis, and the number of UK responses is given as 42.

2. Provision of Reception Facilities in 77 North Sea Ports – General Information

Carpenter and Macgill (2003) provide a broad range of background data from the summer 2000 survey on the types of business activities undertaken in the North Sea region, the physical environment and geographical location of ports, and on vessel numbers and sizes, and passenger numbers. This illustrates the very varied range of port types operating in the region. For example, one port in the Netherlands is spread out for many miles along a river estuary, is located in both urban (city) and rural areas, has vessels calling in ranging from very large tankers through to smaller vessels including fishing vessels, and undertakes 15 different business categories identified in the survey. In this port, reception facilities are provided for all categories of wastes, with a large number of contractors available to collect and handle vessel wastes. At the other end of the scale, there are a number of ports on the East Coast of Scotland situated in rural areas that are only used by small fishing vessels and the occasional small cargo vessel. The reception facilities provided in these ports are generally skips or bins on the quayside for oily waste or garbage.

Table 2 provides a breakdown of facilities provided by vessel type in 77 ports, together with details of whether those facilities are actually used by vessels. Using the most recent data supplied by ports, 51 indicated that they provided reception facilities for all vessel types calling in, including the largest port surveyed which provided facilities for 11 different categories of vessels. A further 26 ports indicated

that they provided facilities for all vessel types calling in, together with facilities for additional categories of vessels which do not normally use those ports. Only 24 ports specifically indicated that they did not provide facilities for all vessel categories. Two of the reasons for this were that some ports had very small numbers of vessels of those types using the port (generally less than 50) when compared to the numbers of other vessels using the port (several hundreds or even thousands), while a number of other ports identified that facilities were not provided for vessels in Category N – Other in their survey returns as those vessels did not readily fall into any of the vessel categories specified in the survey.

Figure 1 further examines the number of vessels in each category calling into the 77 ports, and illustrates the numbers of vessels for which facilities are or are not provided in those ports. The largest category of vessels calling into ports in at the survey ports is Category K – passenger ferries. 71,585 such vessels call in at 20 ports, which over two thirds of there calling in at just 2 Norwegian ports (28,500 and 28,000 passenger ferries respectively). However, in terms of passenger numbers, these two ports would rank only 2nd and 10th in the top 10 North Sea ports, based on the reported number of passengers travelling through those ports in one calendar year (3,250,000 and 290,000 respectively). The number 1 ranking port is situated in the UK and is visited by 25,000 Ro-Ro ferries (Category M) carrying 16,300,000 passengers and a further 120 cruise ships (Category L) carrying 150,000 passengers.

Category F – General Cargo vessels is the second largest group of vessels with 44,000 vessels calling in at 44 ports. Category N – Other is the third largest group with 40,627 vessel movements in 31 ports, but ranks top in terms of the lack of provision

of reception facilities for these vessels. Almost 55% of vessels (22,218) make use of the 16 ports where facilities are not provided. Category L – Cruise Ships is the second-ranked group in terms of facilities not being provided, with 1,095 vessels calling in at 28 ports of which 25% (267) call in at 4 ports which do not provide facilities. Category J – Ro-Ro Cargo vessels is third-ranked in terms of lack of provision for the 11,972 vessels visiting 34 ports. In this category, the 5 ports not providing facilities are visited by 20% of the total number of vessels (2,992).

From the survey responses it is clear that the majority of ports were meeting the requirement of Article 4 of Directive 2000/59/EC which states that "Member States shall ensure the availability of port reception facilities adequate to meet the needs of the ships normally using the port…". However, it also clear that by the time of the second survey, there were still a small number of ports for each category of vessels that were in breach of Article 4 and might be required to introduce additional port reception facilities if it was considered that sufficient vessels in each category called in each year to meet any specified definition of "normally using the port". This might be difficult when considering the large number of different types of vessels, from oil rig supply vessels or dredgers, through to the three orange juice tankers calling in at one Netherlands port, that fall into Category N. However, for those EU ports visited by Category J vessels but not providing facilities prior to the Directive, it may be difficult to argue that they do not need to provide appropriate facilities because of the large number of such vessels visiting those ports.

3. Provision and Uptake of Reception Facilities by MARPOL 73/78 Annex

3.1 Statistical Method

Where appropriate, the data from the 2000 and 2002 surveys have been compared using the χ^2 two-by-two contingency table method calculating the value p with 1 degree of freedom, in order to assess whether there was any statistically significant change between the two surveys, based on the proportion of vessels using facilities.

3.2 Annex I – Oily Waste

Across both surveys, 81 ports provided information on Annex I facilities, with 41 of these ports responding to both surveys. Only 1 port indicated any change between the two surveys, and in that port one extra category of facility was being provided by the time of the second survey. 71 ports indicated that they provided facilities under a range of different headings, as set out in Table 3. Of these 71 ports, 34 provided facilities for all 5 categories of Annex I wastes, 10 provided 4 categories, 13 provided 3 and 14 ports provided only 1 or 2 categories. The most widely available facilities are those for Oily Bilge Water, Oily Sludge and Used Lubricating Oil and, in the majority of ports, roadside tankers are the most commonly used type of facility.

For the10 ports indicating that no facilities were available, 8 stated that they did not provide any Annex I facilities, one noted that facilities could be brought in from other ports in the region although it did not provide them itself, and one port indicated that no segregated facilities were provide under the MARPOL 73.78 Annexes but that there were skips and bins available on the quayside into which oily waste might be deposited.

Data was also requested from ports on the number of vessels using Annex I facilities by vessel type. 26 ports provided this information in Survey 1 and 24 for Survey 2 on the total numbers of vessels using or not using facilities, as set out in Table 4. There was no statistically significant difference between the two surveys.

A similar analysis was then undertaken for the 20 ports which provided data to both surveys, the results of which appear in Table 5, and again there was no significant difference between the two surveys.

The surveys identified that, prior to the implementation of the EU Directive, the majority of North Sea ports provided facilities for Annex I oily wastes and, even if a port did not provide every specific category under that Annex, such facilities were widely available in the region. Although the Directive requires ports to provide facilities for all vessels normally calling in, should the EU require ports to provide additional facilities for this category of waste, it may difficult to persuade ports to provide anything other than the most basic of additional facilities such as bringing in roadside tankers. The cost of infrastructure is likely to deter ports from investing in anything other than the most basic systems, unless they can achieve guaranteed profits which outweigh any costs involved.

3.3 Annex II – Noxious Liquid Substances

82 ports provided information on availability of Annex II facilities of which 42 responded to both surveys. Only 39 ports stated that they provided Annex II facilities of which 32 provided all categories, 6 provided 4 and 1 provided a single category (Category A). All of these ports are located either within chemical plants or provide

storage for chemicals and oil. A further 2 ports indicated that they would be able to arrange for facilities on request while one port reported that it had stopped provided facilities after the first survey.

41 ports provide no Annex II facilities and were not normally visited by vessels carrying chemical wastes or cargo residues and so these ports would not be required to provide facilities under the terms of Article 4 of the Directive. Even if a vessel carrying such wastes was forced to call into one of these ports, for example as a result of bad weather or because of damage to the vessel, the port would not be required to provide facilities for the chemical waste. The port could, however, still provide facilities for oily wastes, sewage and garbage, if the vessel was of an appropriate size to access those facilities.

Table 6 outlines the number of ports with specific types of facilities available for each of the Annex II waste categories, Category A being the most hazardous to human health and the aquatic environment and Other Liquid Substances being virtually non-toxic. As with Annex I, roadside tankers are most commonly used to deal with Annex II wastes.

Only 7 ports provided information under both Surveys on total numbers of vessels calling in and the number of vessels actually using facilities. A further 6 ports provided information for one survey only – 3 ports in each case. Of the 7 ports responding on both occasions, only one Norwegian port reported any change between surveys. There was an increase from 130 to 150 in the number of vessels calling in at

that port but the number using facilities remained at 100 on each occasion, resulting in an uptake rate of 76.92% in Survey 1 and 66.67% in Survey 2.

A comparison of the uptake of Annex II facilities for each of the 10 ports responding to each survey is set out in Table 7, which indicates that there is a statistically significant difference between the two surveys. However, this is coming from a very small set of data and the 0.42% decline in the percentage uptake across all ports may be accounted for by the sole Norwegian port which indicated a change between surveys and this port may also account for the significant result produced by the analysis.

In the case of Annex II, noxious liquid substances, all ports normally visited by vessels carrying such cargo wastes or residues already provide appropriate facilities. It appears unlikely that any additional facilities for Annex II would be provided in the North Sea region.

3.4 Annex IV – Sewage Wastes

Annex IV of MARPOL 73/78 was, at the time of the survey, an optional Annex as it had not yet been ratified by sufficient signatory states. The IMO (2002) announced that the Annex had been finally ratified in September 2002, when Norway deposited its instrument of acceptance with the IMO and the entry into force criteria for Annex IV was finally met. This required ratification of the Annex by at least 15 states with a combined merchant fleet of not less than 50% of the world's combined merchant fleet by tonnage.

Entry into force of Annex IV was due on 27 September 2003. However, the IMO (2004(a)) subsequently announced that, having formally been adopted by the IMO's Marine Environment Protection Committee at its 51st Session in April 2004, the Annex was expected to enter into force on 1 August 2005. However, Article 16 of the Directive 2000/59/EC allows for an additional 12-month period before introduction of facilities, so ports will not be required to provide facilities under the Directive until August 2006.

The IMO (2004(b)) also sets out conditions under which vessels are allowed to discharge sewage wastes at sea, rather than into reception facilities. Such discharges can be made at least 3 nautical miles from the nearest land where a vessel uses an approved sewage treatment plant. Vessels can also discharge non-comminuted (not reduced to small particles) and undisinfected sewage wastes outside the 12-mile limit.

Although not yet a legal requirement that ports provide Annex IV waste facilities, 28 out of 71 ports indicated that such facilities were available and these included waste bins on the quayside, roadside tankers for pumping out waste, and direct connections to local sewage works. Of the 28 ports, 7 provided them at the time of Survey 1, 7 at Survey 2, 12 under both surveys, and 2 ports (1 Norwegian and 1 UK) introduced facilities during the interval between the two surveys. 43 ports stated that they did not provide any facilities.

9 ports (7 in Survey 1 and 6 in Survey 2) provided information on both total numbers of vessels and also numbers using facilities and this data is outlined at Table 8 which indicates that there was no significant change between the two surveys.

For Annex IV, until it becomes mandatory that facilities are provided and that all vessels visiting EU ports must make use of them, then it is unlikely that there will be a great expansion of provision in the region. A mandatory discharge requirement for vessels may also be difficult to implement while the 3 and 12 mile limits exist. For Annex IV wastes, the cost of any physical infrastructure in ports is likely to be high, particularly if it is necessary to build physical connections to local sewage works. In ports which a very high volume of passenger vessels, for example, local sewage works may be unable to cope with the additional wastes from these vessels, and so they will also be faced with additional costs and the expansion of their infrastructure to handle this waste. Even were ports to use roadside tankers to take wastes from the port to the sewage works, this will still result in additional infrastructure costs for the sewage works and also to an increase in road traffic and associated pollution.

3.5 Annex V – Garbage

76 ports provided information on the categories of Annex V facilities available, of which 40 ports completed both surveys, 17 completed Survey 1 only and 19 Survey 2 only. Table 9 outlines the number of facilities available for each category under MARPOL 73/78 Annex V, these categories being: Category 1 – Plastic; Category 2 - Floating dunnage, lining or packaging material; Category 3 - Ground paper products, rags, glass, metal, bottles, crockery etc.; Category 4 - Paper products, rags, glass, metal, bottles, crockery etc.; Category 5 - Food waste; and Category 6 - Incinerator ash. In total, 42 ports provided facilities for all categories under Annex V, 22 ports provided categories 1 to 5 and 12 ports provided 4 or less categories.

The most common type of facility for every category of waste is the use of contractors to collect and dispose of wastes. Although segregation and recycling is used in a

number of ports, this generally takes place in around one quarter or less of the ports providing each category.

An analysis of the levels of uptake of facilities for the 26 ports completing Survey 1 produces an uptake rate of 32.31% for those ports providing data on both the volumes of traffic and levels of uptake of facilities. 10 of the 26 ports indicated that 100% of vessels used facilities. 2 of these are German ports where it is mandatory for vessels to discharge Annex V wastes in port, and the remaining 8 ports are in the UK. From the 24 returns for Survey 2, an uptake rate of 33.29% was apparent, a slightly less than 1% increase between the two surveys. For this second survey, 13 ports reported 100% uptake rates, including 3 from Germany, 1 from Norway and 9 from the UK.

For Annex V, 21 ports provided information under both surveys and this data appears at Table 10. 2 ports indicated that there was a increase in the percentage uptake of facilities by vessels calling in at them and 2 indicated that there had been a reduction. For the 21 ports, the percentage uptake increased by 1.63% between the two surveys and analysis of the data indicates a highly significant change in uptake levels for this group of ports, which is a much larger group than that examined in Table 7 for Annex II wastes, the only other set of data to show a statistically significant change.
While Annex V facilities are widely available in the North Sea region, only a small number of ports operate a system to segregate and recycle waste. Much of the waste is currently bagged and placed in skips or bins which are them emptied by contractors. There is very little information available at the current time on the actual volumes of waste generated on ships, and how much of this waste could be recycled in ports. Were ports required to introduce systems of segregation and recycling, and it

was mandatory that vessels recycled waste, then the space required to provide reception facilities would significantly increase. As in the case of Annex IV, this could lead to additional costs to ports to provide segregated facilities, possibly higher volumes of waste being transported by road, and to increased physical infrastructure at recycling plants to handle that waste. If recycling was not required, there might still be an increased volume of waste that would need to go into landfill sites or be incinerated.

4 Conclusions

The data collected under the two surveys provides a broad picture of the range of ports operating in the North Sea region. It illustrates that reception facilities for all the MARPOL 73/78 Annexes examined were already available in the North Sea region prior to the introduction of Directive 2000/59/EC.

Article 7 of Directive 2000/59/EC states that vessels can only proceed to their next port of call if there is sufficient capacity on board for the retention of both the waste on board before leaving a port plus any additional waste generated during the voyage to that port. In this case, vessels may be detained if they already have too much waste on board to make their journey, and will be required to discharge a proportion of that waste before being allowed to leave the port. Vessels may also be inspected upon arrival at a port to ensure that the volumes of waste on board are in line with what they are expected to generate during the voyage to that port. In this case, if a vessel does not have sufficient waste on board it may be assumed that there was been an

illegal discharge at sea and the vessel owner or captain might face some form of criminal sanction such as a fine or confiscation of assets.

In both of these examples it will be necessary to ensure that adequate systems of record keeping are developed, both in ports and on board vessels, to monitor levels of waste production and discharge. This information was not available from ports during the survey process. Most ports indicated that they did not have records available of the types and volumes of waste discharged, irrespective of whether information was available on the numbers of vessels making use of facilities. This is because many of the facilities are owned or operated by external contractors and many vessel owners/masters arrange for wastes to be delivered direct to these contractors, without the port being included in the process. As a result of the lack of information on actual volumes of waste discharged, all that can be said is that only in the case of Annex V does a large number of vessels (over 30%) actually make use of the facilities provided in the region, and uptake of facilities is less than 10% for all other Annexes- less than 1% in the case of Annex IV.

In order to assess the impact of Directive 2000/59/EC following its adoption and implementation, it will be necessary to collect information from ports on whether there has been any change in provision of facilities since the introduction of the Directive. It will also be necessary to collect information from those ports on the numbers of vessels using reception facilities and, if possible, on the volumes of wastes being discharged. It is therefore considered necessary that a further survey of North Sea ports is conducted in order to assess the impact and effectiveness of the Directive in increasing the provision of reception facilities by MARPOL 73/78

Annexes and by vessel categories, and whether it has led to an increased level of uptake of those facilities by vessels.

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Table Captions

Table 1

Survey Responses: (1) Summer 2001 and (2) Autumn 2003

Table 2

Facilities Available by Vessel Type – 77 Ports

Table 3

Facilities available for oily waste

Table 4

Comparison of levels of uptake of Annex I facilities for all ports responding to Surveys 1 and 2

Table 5

Comparison of levels of uptake of Annex I facilities for ports responding to both surveys only

Table 6

Facilities available for noxious liquid substances

Table 7

Comparison of levels of uptake of Annex II facilities for all ports responding to Surveys 1 and 2

Table 8

Comparison of levels of uptake of Annex IV facilities for all ports responding to Surveys 1 and 2

Table 9

Facilities available for garbage

Table 10

Comparison of levels of uptake of Annex V facilities for all ports responding to Surveys 1 and 2

Figure Captions

Figure 1

Vessel numbers by category calling in at 77 North Sea ports per annum

Table 1

Country	Survey response details					
	Surveys issued	Returns details				No response
		Survey 1 only	Survey 2 only	Both surveys	Other	
Belgium	8	0	0	1	3	4
Denmark	7	1	0	2	0	4
Germany	13	0	4	3	1	5
The Netherlands	23	1	1	4	6	11
Norway	61	8	6	9	4	34
United Kingdom	83	11	7	24	13	28
Totals	195	21	18	43	27	86

Source: Carpenter (2005), Table 7.1, page 145

Table 2

Vessel Type	Facilities Provided			Facilities Not Provided
	Available	Used	Not Used	
A. Bulk Carrier	43	39	4	5
B. Chemical Tankship	21	14	7	3
C. Container Ship	34	25	9	3
D. Factory Ship	13	5	8	2
E. Gas Carrier	21	16	5	2
F. General Cargo – Multipurpose	47	41	6	8
G. Oil Tankship	36	35	1	6
H. Ore/Bulk/Oil Carrier	20	12	8	1
I. Refrigerated Cargo Ship	22	16	6	4
J. Ro-Ro Cargo Ship	29	23	6	5
K. Passenger Ferry	28	19	9	1
L. Cruise Ship	24	22	2	4
M. Ro-Ro Passenger Ferry	18	11	7	0
N. Other	17	16	1	16

Source: Carpenter (2005), Table 7.4, page 148

Table 3

Waste Category	No. of Respondents	Type of Facility			
		Quayside Tank	Roadside Tanker	Terminal Facility	Other
Oily Tank Washing	49	11	31	15	6
Dirty Ballast Water	41	9	25	12	7
Oily Bilge Water	59	10	43	10	10
Oil Sludge	57	12	43	7	11
Used Lubricating Oil	62	17	41	9	11

Source: Carpenter (2005), Table 7.8, page 157

Table 4

	Survey 1 – 26 ports	Survey 2 - 24 ports
Using facilities	10066	9877
Not using facilities	117679	113929
Totals	127745	123806
Percentage uptake	7.88%	7.98%
$\chi^2 = 0.83$; p (1 degree of freedom) = 0.36		

Source: Carpenter (2005), Appendix 11, page 269

Table 5

	Survey 1	Survey 2
Using facilities	9765	9691
Not using facilities	102439	102659
Totals	112204	112350
Percentage uptake	8.70%	8.63%
$\chi^2 = 0.42$; p (1 degree of freedom) = 0.52		

Source: Carpenter (2005), Appendix 11, page 269

Table 6

Waste Category	No. of Respondents	Type of Facility			
		Quayside Tank	Roadside Tanker	Terminal Facility	Other
Category A	39	5	27	5	5
Category B	38	5	27	5	6
Category C	38	5	27	5	5
Category D	37	5	26	5	5
Other Liquid Substances	33	4	22	7	6

Source: Carpenter (2005), Table 7.9, page 159

Table 7

	Survey 1	Survey 2
Using facilities	2231	1834
Not using facilities	65065	61402
Totals	67296	63236
Percentage uptake	3.32%	2.90%
$\chi^2 = 18.61$; p (1 degree of freedom) = <0.001		

Source: Carpenter (2005), Appendix 11, page 271

Table 8

	Survey 1 – 7 ports	Survey 2 – 6 ports
Using facilities	235	210
Not using facilities	31553	26571
Totals	31788	26781
Percentage uptake	0.74%	0.78%
$\chi^2 = 0.39$; p (1 degree of freedom) = 0.53		

Source: Carpenter (2005), Appendix 11, page 271

Table 9

Waste Category	No. of Respondents	Type of Facility		
		Segregation/ Recycling	Contractor Disposes	Other
Category 1	72	10	50	6
Category 2	68	12	41	7
Category 3	73	13	49	6
Category 4	72	13	49	6
Category 5	71	12	47	8
Category 6	42	3	26	6

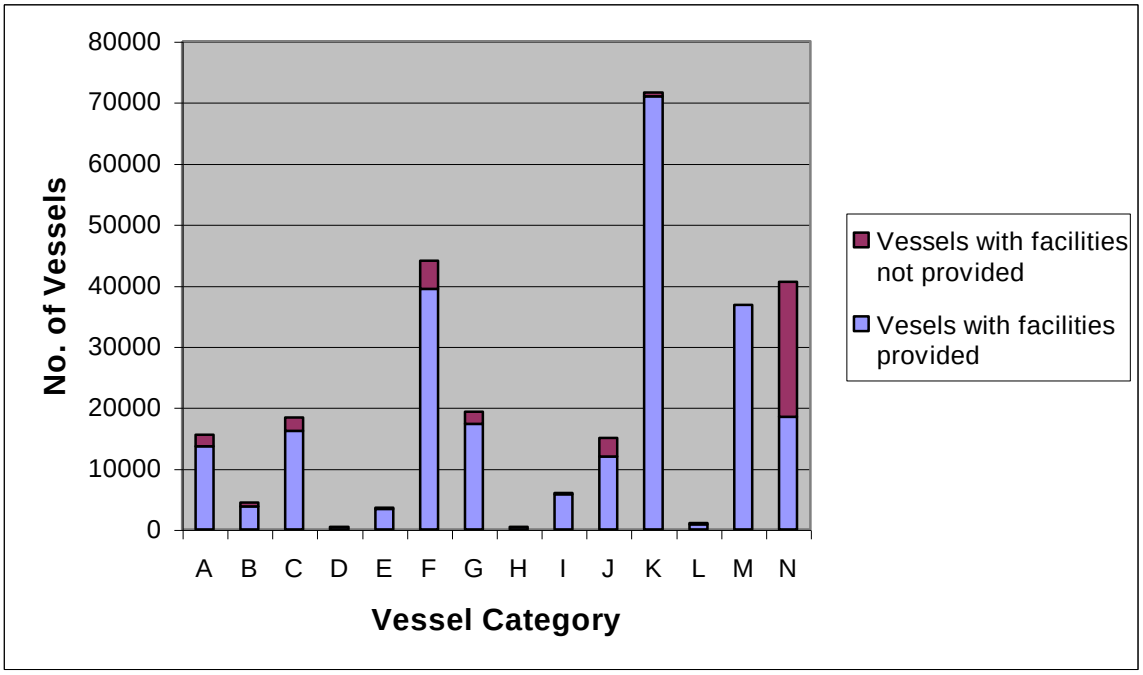
Source: Carpenter (2005), Table 7.10, page 162

Table 10

	Survey 1	Survey 2
Using facilities	24199	25373
Not using facilities	54508	52985
Totals	78707	78358
Percentage uptake	30.75%	32.38%
$\chi^2 = 48.61$; p (1 degree of freedom) = 3.1×10^{-12}		

Source: Carpenter (2005), Appendix 11, page 273

Figure 1



Source: Carpenter (2005), Figure 7.3, page 149

NOTE – TO BE PRINTED IN BLACK AND WHITE