Summary: Intervention & Options

Department /Agency:	Title:	
Maritime & Coastguard Agency	**Impact Assessment of the Merchant Shipping (Prevention of Pollution by Sewage and Garbage from Ships) Regulations 2008**	
Stage: Consultation	**Version:** 1.14	**Date:** 06 February 2008
Related Publications: Draft Statutory instrument, Marine Guidance Note and Merchant Shipping Notice as attached as part of the Consultation Package		

Available to view or download at:

http://www.mcga.gov.uk/c4mca/mcga-guidance-regulation/mcga-consultations.htm

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What is the problem under consideration? Why is government intervention necessary?

Pollution of the sea by sewage and garbage from shipping has numerous environmental, social and economic impacts which affect the UK but which are not included in the cost of running a ship. The International Convention on the Prevention of Pollution from Ships MARPOL (73/78) Annexes IV (sewage) and V (garbage) have been developed to address these issues and, having ratified MARPOL, the UK is committed to implementing them. Markets, if left to their own devices, cannot adequately deal with pollution, and the particular provisions of MARPOL could not be achieved through guidelines or targeted campaigns. Legislation is therefore the only appropriate method of implementation.

What are the policy objectives and the intended effects?

1) Full implementation of Annex IV.

2)Amendments to Annex V mean that current UK Regulations regarding pollution by garbage from ships are now out of date. The introduction of the new Regulations will mean that the UK has fully implemented Annex V as currently amended .

3) As the UK is a Party to MARPOL, the UK will meet the policy objective of complying with its obligations under international law to implement Annexes IV and V .

4) A reduction in pollution from sewage and garbage from ships will result from the introduction of the new legislation, leading to associated environmental, social and economic benefits.

What policy options have been considered? Please justify any preferred option.

1) Fully Implement Annex IV and the revisions to Annex V. This is the preferred option. It allows all policy objectives to be met at minimum, yet not insignificant cost.

2) Go beyond the international requirements by extending the Regulations to include vessels completing only domestic voyages. Considered 'goldplating' and excessive to requirements despite reducing pollution further than option 1. Most importantly, it would also be outside the Secretary of State's existing legislative powers to do this, so new primary legislation would be needed for option 2 to be followed.

The 'Do Nothing' option could not even be considered due to the duty on the UK to meet international requirements. There would be numerous additional negative repercussions as well.

When will the policy be reviewed to establish the actual costs and benefits and the achievement of the desired effects?

Review will take place one year after the implementation date of the new Regulation.

Ministerial Sign-off For consultation stage Impact Assessments:

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible Minister:

..... Date: 29/2/2008

Summary: Analysis & Evidence

Policy Option: 1	Description: Fully Implement MARPOL Annex IV and the Revisions to Annex V

COSTS

ANNUAL COSTS	Description and scale of **key monetised costs** by 'main affected groups'
One-off (Transition) **Yrs** **£ 8.043m - £ 9.967m**	The costs will be borne by the shipping industry (installation of compliant equipment + cost of upgrade, certification of vessels + renewal of certification). Costs will be borne only by vessels that engage in international voyages.
Average Annual Cost (excluding one-off) **£ 488k - £ 598k**	**Total Cost** (PV) **£ 14.952m - £ 18.278m**

Other **key non-monetised costs** by 'main affected groups' N/A

BENEFITS

ANNUAL BENEFITS	Description and scale of **key monetised benefits** by 'main affected groups'
One-off **Yrs** **£ 0 - £ 0**	See Option 2 below, but excluding 28.4% of vessels that complete only domestic voyages.
Average Annual Benefit (excluding one-off) **£ 302k - £ 301k**	**Total Benefit** (PV) **£ 4.526m - £ 4.550m**

Other **key non-monetised benefits** by 'main affected groups' **ENVIRONMENT** Reduction in harm to marine environment. **TOURISM** reduction of impacts upon tourist industry by aesthetic impacts of pollution **HEALTH** Reduction in impacts of consuming contaminated fish / shellfish or bathing in water containing untreated sewage. **UK REGISTER** the UK will maintain reputation as quality flag.

Key Assumptions/Sensitivities/Risks Assume the environmental impact of the shipping industry is constant over time in the absence of data on likely growth rate. Inflation is assumed to be on average 2%, reflecting CPI from 2000 to the present. **VESSEL CERTIFICATION COSTS** Assuming there are renewal costs equal to one half of initial certification, payable every five years, three renewals will be necessary over the 20 year appraisal period. **NPV BEST ESTIMATE** There is no central case within the calculations so the range constitutes best estimate (see below)

Price Base Year 2007	Time Period Years 2007-27	**Net Benefit Range** (NPV) **£ -14.230 - £ -10.042m**	**NET BENEFIT** (NPV Best estimate) **£ See net benefit range**

What is the geographic coverage of the policy/option?			United Kingdom	
On what date will the policy be implemented?			TBA	
Which organisation(s) will enforce the policy?			MCA	
What is the total annual cost of enforcement for these organisations?			£ 0 – Enforcement will be carried out under existing Port State Control regime.	
Does enforcement comply with Hampton principles?			Yes	
Will implementation go beyond minimum EU requirements?			No	
What is the value of the proposed offsetting measure per year?			£ n/a	
What is the value of changes in greenhouse gas emissions?			£ n/a	
Will the proposal have a significant impact on competition?			No	
Annual cost (£-£) per organisation (excluding one-off)	Micro	Small	Medium	Large
Are any of these organisations exempt?	Yes	Yes	N/A	N/A

Impact on Admin Burdens Baseline (2005 Prices) (Increase - Decrease)

Increase of £ Decrease of £ **Net Impact** £

Key: **Annual costs and benefits: Constant Prices** **(Net) Present Value**

Summary: Analysis & Evidence

Policy Option: 2	Description: Go beyond international requirements by extending the regulations to vessels completing only domestic voyages.

COSTS

ANNUAL COSTS	Description and scale of **key monetised costs** by 'main affected groups'
One-off (Transition) **Yrs**	The costs will be borne by the shipping industry (installation of compliant equipment + cost of upgrade, certification of vessels + renewal of certification). Costs will be borne by both vessels that trade internationally and vessels completing only domestic voyages.
£ 11.223 - £ 13.921m	
Average Annual Cost (excluding one-off)	**Total Cost** (PV) **£ 20.883m - £ 25.529m**
£ 676k - £ 779k	

Other **key non-monetised costs** by 'main affected groups' N/A

BENEFITS

ANNUAL BENEFITS	Description and scale of **key monetised benefits** by 'main affected groups'
One-off **Yrs**	The main affected groups that may expect to benefit from the regulations include: **TOURISM** Removal of debris from beaches (up to £279k PA), **SAFETY** Rescue and Repair of Fouled Vessels (up to £19k PA), **FISHING & AGRICULTURE** Shore Based Agriculture (up to £104k PA) **OTHER INDUSTRIAL** Power Stations (filtering) (up to £16k PA)
£ 0 - £ 0	
Average Annual Benefit (excluding one-off)	**Total Benefit** (PV) **£ 6.322m - £ 6.355m**
£ 420k - £ 422k	

Other **key non-monetised benefits** by 'main affected groups'. **ENVIRONMENT** Reduction in harm to marine environment. **TOURISM** reduction of impacts upon tourist industry by aesthetic impacts of pollution **HEALTH** Reduction in impacts of consuming contaminated fish / shellfish or bathing in water containing untreated sewage. **UK REGISTER** the UK will maintain reputation as quality flag.

Key Assumptions/Sensitivities/Risks Assume the environmental impact of the shipping industry is constant over time in the absence of data on likely growth rate. Inflation is assumed to be on average 2%, reflecting CPI from 2000 to the present. **VESSEL CERTIFICATION COSTS** Assuming there are renewal costs equal to one half of initial certification, payable every five years, three renewals will be necessary over the 20 year appraisal period. **NPV BEST ESTIMATE** There is no central case within the calculations so the range constitutes best estimate (see below)

Price Base Year 2007	Time Period Years 2007-27	**Net Benefit Range** (NPV) **£ -19.247m - £ -14.528m**	**NET BENEFIT** (NPV Best estimate) **£ See net benefit range**

What is the geographic coverage of the policy/option?				United Kingdom	
On what date will the policy be implemented?				TBA	
Which organisation(s) will enforce the policy?				MCA	
What is the total annual cost of enforcement for these organisations?				£ 0 – Enforcement will be carried out under existing Port State Control regime	
Does enforcement comply with Hampton principles?				Yes	
Will implementation go beyond minimum EU requirements?				No	
What is the value of the proposed offsetting measure per year?				£ n/a	
What is the value of changes in greenhouse gas emissions?				£ n/a	
Will the proposal have a significant impact on competition?				No	
Annual cost (£-£) per organisation (excluding one-off)	Micro	Small	Medium	Large	
Are any of these organisations exempt?	Yes	Yes	N/A	N/A	

Impact on Admin Burdens Baseline (2005 Prices) (Increase - Decrease)

Increase of £ Decrease of £ **Net Impact** £

Key: **Annual costs and benefits: Constant Prices** **(Net) Present Value**

Evidence Base (for summary sheets)

The Issues

The OSPAR pilot project on marine litter estimates 10-20% of marine debris is attributable to shipping. Beachwatch 2006 found Sewage to represent 10.4% of the waste found, however it is impossible to distinguish between land based sources of sewage pollution and that discharged by shipping. It is likely that a much greater proportion of sewage originates from land-based discharges than the 80-90% of garbage reported by OSPAR, so this analysis makes the upper bound assumption that 5% of sewage originates from shipping.

Raw sewage discharged from ships into shallow seas can cause a range of social, economic and environmental impacts. In a 1995 opinion survey public concern about sewage on beaches was rated as the fourth most important environmental issue (MORI Research 1995).

Shipping related marine litter includes fishing nets, wooden pallets, small oil drums (plastic jerry cans), ropes and general domestic waste, as well as many items thrown overboard. With the growth of plastic use in recent decades, the problem of garbage has become more serious as it can travel over long distances with the currents and winds, thus transferring the impact beyond the site of the initial dumping. The majority of garbage will be degraded by the sea, but this process can take long periods of time, ranging from one year for cotton rope to 600 years for monofilament fishing line, and may cause serious environmental and economic problems during this period. This is particularly true of plastics. Degradation of plastics in seawater is slower than in air exposure, mainly due to the lower water temperatures which slow the process, with estimates for plastic degradation ranging from 450 years to 1000 years.

Environmental Impacts

Raw sewage can change the physical nature and biological capacity of certain environments which will be unable to absorb and break down the sewage. These effects on the marine ecosystem include oxygen depletion and eutrophication resulting in localised fish kills and damage to the ecosystem, leading to changes in the local flora and fauna.

Disposal of garbage at sea can have a range of impacts, from directly affecting wildlife to impacts at the ecosystem level. The full impacts of garbage on wildlife and the ecosystem are difficult to assess as research is limited.

It has been reported that144 different marine species have at some time been entangled in marine debris, resulting in reduction in movement, injury and death by starvation or drowning. Ingestion of garbage has been reported in 177 marine species. Ingestion results in damage to the digestion tract, leading to infection, starvation and death, blockage resulting in starvation and ingestion of contaminated debris. Toxicity of waste, particularly plastics and contaminated containers (oil/chemical drums, paint tins), is also a concern. Reduced immunity, increased mortality rates, masculination of females and spontaneous abortion are all recorded impacts. (Beachwatch 2006)

Ecosystem level impacts can be seen not only in coastal regions but within benthic communities on the seabed which become smothered resulting in a reduction in light and nutrients reaching the sea floor. From 1987 to 1995, surveys of the seabed in the Dutch sector of the North Sea found an average of 166 individual items of litter per km^2 of seabed. Local variations in bathymetry, currents and wave exposure can result in litter sinks, leading to widespread destruction of local environments. Floating debris provides an efficient method of transport for colonisation for a variety of species as well as offering shelter and food for fish and migrating animals. The introduction of alien species to an ecosystem can have devastating effects on local flora and fauna.

An indirect environmental impact of garbage in the marine environment is the impact that beach cleaning can have on the resident flora and fauna. Mechanical beach cleaners can threaten the stability of beaches and destroy the habitats of resident species, resulting in a reduction in population numbers.

Social & Economic

With one of the longest coastlines in the EU the UK is particularly at risk from garbage and sewage which lands onshore or contaminates coastal waters. Impacts include hazards to human health, a reduction of the aesthetic quality of shoreline areas, impact upon the tourism industry and the economic costs of clearing garbage.

Tourism, Leisure & Aesthetic

More than 20 million people use the coast each year, contributing approx £11 billion annually (Maritime Technology Foresight Panel, 1996), excluding daytrips, which contributed an additional £3.1 billion in 2003 (British Resorts Association, 2005). Any damage, environmental or aesthetic, from sewage or garbage, to the coastal environment has the potential to impact upon the income generated through tourism.

In a survey of 56 Local Authorities in the UK, the annual expenditure on beach cleaning ranged from £15/km to £50,000/km, coming to a total of £2,197,138 (KIMO, 2000). A more recent Environment Agency study estimated that approximately £14million a year is spent by local authorities, industry and coastal communities to clean up marine debris (EA, 2004).

Damage to leisure craft through fouled propellers or other damage to the vessels, can result in costs of up to £2,000 to clear, repair or replace damaged equipment. Also associated with the damage to leisure vessels are the costs associated with rescuing such vessels when they get into difficulties. The RNLI put the cost of rescuing 'fouled boats' at approximately £900,000 per year, based upon 1998 figures when there were more than 200 incidents. Harbours also incur costs due to marine litter and sewage. A survey of 42 harbours reported costs of £50,960 to clear 182 fouled propellers and more to remove debris from the water (KIMO, 2000)

Health

Bathing in contaminated waters or eating contaminated fish/shellfish can cause health impacts to humans whilst untreated sewage can also cause direct problems for water users. There are a number of enteroviruses (*Rotavirus, Adenovirus, Calcicivirus, Astrovirus)* as well as *Hepatitis A* and *Poliovirus* found in sewage effluent that can cause debilitating illness, or even fatality in

the most vulnerable victims (children, diabetics, pregnant women and the elderly). The World Health Organisation predicts that one in every twenty bathers who swim in 'acceptable waters' will become ill after entering the sea just once and 250 million cases of gastroenteritis and upper respiratory disease are recorded every year worldwide.

Detailed records of such health impacts are hard to ascertain. Surfers Against Sewage hold details of illnesses reported by coastal water users, but this is an informal arrangement and does not prove that the illnesses are directly caused by exposure to contaminated waters. Only informal illness statistics, regarding illness caused by contaminated seafoods, are available due to most fish / shellfish-associated outbreaks not getting through to the official statistics. Individual incidents of illness are not reported at all. It is therefore hard to quantify the costs of such incidents to the health service and to the general economy due to loss of working days etc.

Fishing Industry

The impacts of excessive sewage in the marine environment can lead to eutrophication of waters; this can impact upon marine aquaculture. There are no figures available for the impacts of sewage on aquaculture, figures are available for freshwater fisheries and may offer a comparison. Revenue loss for commercial aquaculture, fisheries and shellfisheries due to freshwater eutrophication is estimated by to be between £29,000 and £118,000 annually (Pretty, Mason, Nedwell , Hine, 2002).

Marine litter and debris can become entangled in fishing equipment and cause damage to fishing vessels. This can result in expensive repairs due to damage to the propeller and engine and a loss of income from time spent repairing the ship. KIMO estimates that North Sea fishermen spend an average of 1-2 hours per week clearing nets of litter, at a cost of £1300 per tonne in lost time; this does not include the cost in loss of catch, damage to equipment or disposal of the garbage.

A survey of Shetland fishermen revealed that 92% reported marine debris being caught in their nets, with 69% confirming their catch was contaminated by the debris. Costs associated with this impact include time to clear and repair nets and loss of catch due to contamination and loss of time at sea. The total cost is estimated to be up to £2000 per incident, based on only one incident per year and working only a 40 hour week (following KIMO, 2000) this gives an annual cost of between £6000 and £30000.

Power Stations

Power stations around the UK remove between 100 and 10,000 tonnes annually of waste from the water intake screens, depending upon their location. This is estimated to cost up to £50,000 per station annually to clear (KIMO, 2000). All of this waste cannot be attributed to sewage and garbage from shipping; however a proportion will be of ship origin.

Agriculture

Marine debris is known to cause damage to agricultural land and equipment. Garbage blown from the sea is responsible for approximately £600,000 of damage annually to crofters in Shetland. These costs consist of repairs to fencing and machinery and veterinary fees. Once again not all of this litter can be sourced back to shipping, however for illustrative purposes scaling these figures up to cover the whole of the UK coastline yields a potential cost of £5.2m (based on the relative length of coastline of Shetland and the UK as a whole).

On the basis of the above discussion a range for the total cost to the environment of sewage and garbage from shipping is estimated and shown in table 1. These estimates are very rough and based upon broad assumptions about the contribution of shipping to general garbage and sewage found in and around marine habitats, but they are useful as a starting point against which to appraise improvements resulting from the introduction of MARPOL annexes IV and V.

Table 1: Existing research into costs of shipping's contribution to sewage and garbage, £ millions, present value over 20 years

		Damage from Garbage	**Damage from Sewage**	**Total Damage**
Tourism and Leisure	Marine Debris clean-up cost	62.2	1.8	64
Safety	Rescue and repair of fouled vessels	3.6	-	3.6
	Port costs of fouling	0.2	-	0.2
Fishing and agriculture	Damage to Fisheries	0.12 – 0.47	0.003 – 0.014	0.12 – 0.48
	Clearing fouled nets	0.024 – 0.12	-	0.024 – 0.12
	Damage to shore-based agriculture	20.8	-	20.8
Other industrial	Power station filtering	0.18	0.0052	0.18
Monetised costs: total of above		**87.0 – 87.5**	**1.81 – 1.82**	**88.9 – 89.3**

It should be noted that there are additional non-monetised costs associated with ship generated sewage and garbage which are not included here, such as the environmental costs including damage to eco-system, localised fish kills and changes in local flora / fauna caused by sewage and entanglement and ingestion issues caused by garbage for marine species. There are also potential additional costs to tourism caused by reduction in trade due to the negative aesthetic impact on coastal areas that can be caused by sewage and garbage and costs to human health caused by either consuming shellfish contaminated by sewage or bathing in water containing untreated sewage.

Even if the UK did not introduce this new legislation imposing requirements on UK ships, there may also be an increase in violations and prosecution of UK ships internationally and in non-compliance with international standards by UK flagged ships generally. Instances of vessels being detained for failing to meet international standards will be costly, as freight rates of around £25,000 - £30,000 per day for larger vessels (100,000GT) will mean that any delays will have severe financial implications. In addition cargo owners or passengers would likely seek compensation for any delays caused by detention of a vessel creating further costs. There is the potential for fines and penalties to be imposed in relation to a UK ship by another state which has implemented MARPOL, if the ship fails to comply with the requirements in the other state's waters. These can range from fines in the region of £2,000 to imprisonment, depending on the port state.

This in turn will damage the reputation of the UK flag, potentially impacting on the UK's position on the Paris MOU white list, an indicator of a high quality flag, leading potentially to vessels 'flagging out'.

Regulatory Background

The International Convention for the Prevention of Pollution from Ships was adopted in 1973 at the International Convention on Marine Pollution which was convened by the International Maritime Organisation. (IMO). The Convention was modified by protocol in 1978 and became known as MARPOL 73/78. Regulations covering various sources of pollution from ships are contained within the Annexes of the Convention.

Annex IV - Regulations for the Prevention of Pollution by Sewage from Ships

Annex IV was developed to put in place requirements with regards to the treatment of sewage onboard ships and to identify locations at which it can be discharged from ships into the sea. The aim of the Annex is to reduce and, where possible, prevent the impacts of sewage on the marine and local environment. The ratification conditions of Annex IV were met in 2002, resulting in the Annex coming into force on 27 September 2003. Further amendments were made to the Annex in 2004 and 2006.

Following the slow ratification of the original text the IMO completed a study which found that countries had experienced difficulties in implementing the requirements to provide port reception facilities for sewage. The issues raised through the study were addressed through the 2004 amendments to the Annex which entered into force on 1 August 2005. The 2006 amendments focused on Port State Control (PSC) of the operational requirements of the Annex and came into force on 1 August 2007.

A significant requirement of Annex IV, in its current form, is that all ships must now have one of three approved sewage systems installed. These are a sewage treatment plant, a sewage comminuting / macerating and disinfecting system or a holding tank for the retention of sewage. Annex IV prohibits the discharge of sewage into the sea, unless discharging comminuted and disinfected sewage using an approved system, at a distance of more than 3 nautical miles from the nearest land, or untreated sewage which is not comminuted or disinfected at a distance of more than 12 nautical miles from the nearest land. The only other case where sewage can lawfully be discharged into the sea (without any restriction as to miles from land) is where the sewage has been treated by an approved sewage treatment plant and meets requirements about test results and not producing visible floating solids.

This applies to new ships of 400GT and over or those less than 400GT that are certified to carry more than 15 people, and are engaged on international voyages. Existing ships will be required to comply with the provisions five years after the date of its entry into force (i.e. on 27 September 2008), and Governments are required to ensure the provision of adequate reception facilities at ports and terminals for the reception of sewage. Annex IV does not apply to any warship, naval auxiliary or any other ship owned and operated by the state on non-commercial service. However, as a matter of good practice HMG will encourage these ships to comply.

Annex V – Regulations for the Prevention of Pollution of Garbage from Ships

Annex V controls the types of garbage that can be discharged into the sea and specifies the distances from land and the manner in which they may be disposed of. The requirements are much stricter in a number of "special areas" and there is a complete ban imposed on the dumping of all forms of plastic into the sea.

The Annex originally entered into force on 31st December 1988 and was subsequently amended. One of these amendments tightened the controls on the dumping at sea of incinerator ashes from plastics that may contain toxic or heavy metal residues.

Through the Merchant Shipping (Prevention of Pollution by Garbage) Regulations 1998 (SI 1998/1377), the UK currently has in place a framework for addressing the disposal of garbage from ships into the sea. But following the most recent amendments to Annex V, the existing legislation no longer reflects the requirements in their up to date form.

The amendments made to Annex V are minor but include the prohibition of disposing into the sea of incinerator ashes from plastic products as they may contain toxic or heavy metal residues, as well as some changes to the form of the garbage record book, a change to the co-ordinates of the baseline for the definition of 'nearest land' off the coast of Australia and the addition of Spanish as one of the prescribed languages for placards and entries in the garbage record book. It is therefore necessary to update the existing legislation.

Simplification

The introduction of the Merchant Shipping (Prevention of Pollution by Sewage and Garbage from Ships) Regulations 2008 addresses the two discrete but related areas of pollution from ships which form Annexes IV and V of MARPOL 73/78. In the interests of reducing the number of legislative proposals and limiting the burden of multiple sets of regulations, consultations and guidance documents, the decision has been taken to implement the two Annexes by a single set of UK Regulations.

There are also numerous domestic and European water quality standards for bathing waters and other coastal areas that have to be complied with. A reduction in the instances of sewage and garbage pollution from ships will help the United Kingdom to meet these standards.

Intervention

The environmental, social and economic costs of sewage and garbage are not directly felt by the ships responsible for producing the pollution and as such the polluter pays principle is not being applied. This is considered a market failure because ships benefit from waste disposal without paying for the pollution costs. Intervention of some form is therefore necessary.

As the UK has ratified MARPOL, there is no scope for not fulfilling UK commitments under this Convention. It is Government policy to ensure that it satisfies its international obligations. This immediately rules out such measures as creating voluntary guidelines for reducing pollution from sewage and raising awareness in the shipping industry through targeted campaigns as opposed to implementing new legislation.

Supporting documentation, such as a Merchant Shipping Notice and a Marine Guidance Note will be used to educate and inform ship owners/masters and relevant bodies about the requirements of the Regulations and reduce the impact that both UK and non-UK ships have upon the marine and coastal environment. The Merchant Shipping Notice also sets out some technical details which are referred to in the Regulations. In addition the Regulations will ensure that the UK is in compliance with international Convention to which the UK is a Party, and that UK ships have a framework in place for gaining certification.

<u>Implementation and delivery plan</u>

UK flagged ships are already compliant with the majority of the MARPOL requirements about garbage. With regards to the MARPOL requirements about sewage, parts of the industry are already compliant with the international Convention requirements and have been issued with Certificates of Compliance by Classification Societies in advance of the UK implementation. For those who are not currently compliant, there has already been a significant lead time since the development and adoption of the Annex and it is therefore not expected that there will be significant practical difficulties for ships in complying.

The implementation of the MARPOL requirements about garbage is not expected to be an onerous process as most of the provisions have already been implemented, and the amendments are minor.

Options

1) Fully implement Annexes and associated Amendments

The UK has already ratified Annexes IV and V of MARPOL and has prepared draft Regulations to implement them, taking into account all the current amendments. This option will allow the UK to fulfil its treaty obligations and will provide improved protection for the UK coast and the wider global environment.

Introducing the new Regulations to implement Annexes IV and V would directly benefit the UK by reducing the impacts of sewage and garbage on the marine and coastal environments.

UK flagged ships may have to invest in the installation of sewage systems, at a cost of between £4,000 and £60,000 approx per system depending on the requirements of the ship. An overall estimated headline cost of installation to the UK flag is £10.4m -£12.7m, although this takes into account all ships on the UK Flag which are of the relevant size. There would also be certification costs ranging from £800 to £1100 per ship, which applied to a maximum of 1,030 ships would represent a maximum cost of £1.2million. The calculations used to estimate these costs and the assumptions made are further outlined within the Costs and Benefits section with associated spreadsheets in the Annex 1.

Costs to industry of implementing the amendments to Annex V into UK law would be negligible. As a worst case scenario, if every ship on the UK flag needed to replace record books, update plans and fit new placards the cost would be in the region of £70,000.

Generally speaking, the garbage provisions of the new legislation will apply to all UK flagged ships, wherever they are, and to other ships in UK waters. The sewage provisions will generally apply to ships of UK ships of 400 GT or above, or less than 400 GT but certified to carry more than 15 persons, if they are engaged in international voyages. (The sewage provisions will also apply to similar ships which are not UK flagged, if they are in UK waters.) It is suggested that in order for ships undertaking only domestic voyages to register the fact as regards compliance with the sewage requirements and avoid delays during inspection, they may wish to notify the administration of the fact and keep the relevant correspondence on board. This can be backed up through other evidence kept on board concerning the ship's voyages.

2) Go beyond International Requirements

It is not UK policy to deliberately exceed international requirements when it is not necessary. However, the MCA has received enquiries from the NGO sector as to the potential benefits of this option and hence feel it prudent to include it in this impact assessment.

There is a clear environmental benefit to be derived from extending the restrictions placed upon ships that are potentially engaged in international voyages to domestic traffic. Controlling the discharge of sewage from all ships operating around the UK coast regardless of the type of journey they engage in would in effect bring such ships within the international regime. They would be required to fit appropriate equipment and ensure that they only discharged sewage and garbage as prescribed by the Annexes.

It is not, however, felt to be appropriate to "over-implement" the regulations at this time for a number of reasons:

Most importantly, the Secretary of State's existing enabling powers for making secondary legislation would cover the implementation of the MARPOL provisions, but would not cover the imposition of significant additional requirements - such as extending the requirements to ships on domestic voyages. So for this option to be pursued, new primary legislation would be required, and waiting for this is likely to entail substantial further delays to the programme for implementing MARPOL.

This option would require ships to conform to the Regulations at all times even if they were engaged in domestic voyages between UK ports and were never engaged in international voyages. There would be an increased impact of the regulations upon leisure craft operating around the UK coastline. This would incur considerable costs on owners/operators of the affected vessels.

UK law already allows for provisions to be introduced that enable Harbour Authorities to implement controls on the discharge of sewage from ships within port limits. Such controls take the form of local port entry requirements and/or bylaws. This provides a level of control on sewage discharges beyond that found in MARPOL Annex IV and allows for a level of control of the discharge of sewage from all ships including those on domestic voyages.

The situation with respect to sewage from domestic ships will be kept under review through normal stakeholder meetings as part of the review process for the regulations.

Over implementation is likely to be strongly opposed by the maritime industry and all those that would be affected due to the additional costs they would incur.

Post-implementation Review

The implementation of the Regulations will be reviewed domestically through the MCA's normal contact with industry and NGO groups at regular stakeholder meetings. In addition the UK is active in ongoing work within the international community to tackle pollution from shipping both within the IMO's Marine Environment Protection Committee structure and through other UN and EU initiatives. For all of these bodies the input of the industry and NGO's is sought when developing a UK position both through standing meetings before IMO Committee meetings and ad hoc consultation

Costs and Benefits of the Preferred Option

Economic

The economic costs of the Regulations will largely be borne by the shipping industry, with the majority of the costs associated with the implementation of Annex IV requirements as opposed to implementing the amendments to Annex V.

Costs of Annex V

Implementation of the original Annex V 1998 Regulations was estimated to cost in the region of £55,000[1] for the entire UK fleet to fit placards outlining the rules onboard the ships, develop garbage management plans and purchase garbage record books. This was a one-off cost with limited recurring costs relating to the purchase of replacement record books and maintenance of plans. Factoring in inflation[2] and rounding upwards it is considered that if the entire UK fleet needed to replace record books, update plans and fit new placards the cost would be in the region of £70,000. There is not expected to be any increase in administrative costs, as the record keeping system is not materially altered.

[1] From the Merchant Shipping (Prevention of Pollution from Garbage) Regulations 1998 Compliance Cost Assessment

[2] Using Office of National Statistics headline CPI rate.

Costs of Annex IV

In assessing the total cost of the policy to implement Annex IV requirements the MCA has spoken to manufacturers and ship owners and developed indicative costs for the UK industry. In order to calculate a maximum cost the MCA made a number of assumptions, which has resulted in a likely substantial overestimate of the real situation but provides for an estimated maximum cost for the measure.

To meet the requirements of Annex IV, UK flagged ships may have to invest in the installation of sewage systems, at a cost of between £4,000 and £60,000 approx per system, depending on the requirements of the ship. Class Societies recognised by the UK have already issued 125 International Sewage Pollution Prevention (ISPP) Certificates or Statements of Compliance (SoC) to UK Flagged ships. It is also likely that those ships that trade internationally will already have systems fitted to meet the requirements of other countries but have not yet applied for the relevant certification.

Data used to calculate the costs to industry was based upon the Flag information collated from the Seaweb database on 5th September 2007, which gave a total of 1030 ships on the UK flag of 400gt or over or carrying 15 or more passengers. The preferred option does not extend to 293 of these ships, which are known to trade domestically, but for reasons of commercial sensitivity the types of sewage system on this sub-group of ships is not easy to establish. Therefore, the costs of upgrading all UK flagged vessels is calculated, and scaled down appropriately.

To give a high-end cost estimate, it was assumed that no UK flagged ships have compliant sewage systems and that all ships would choose to fit top-of-the-range sewage treatment plants rather than lower cost solutions. Table 2 shows the costs of fitting these high-cost sewage systems. To come to a low-cost estimate, the sewage systems fitted were assumed to cost as much as the high-cost systems for the next smallest class of vessel. This is designed to reflect the fact that businesses do not in general go beyond minimum requirements, so would prefer to fit cheaper systems. Information on the costs of cheaper treatment systems is not available, so it is assumed that the cost of a one-class-smaller top-end system is roughly equivalent to the cost of a larger, cheaper system. For example, if a ship was required to fit a category F sewage system, the low cost estimate would use the figure for a top of the range class E system.

Table 2: Classes of sewage systems and high-cost scenario estimates

System Ref/Class	Recommended No. People	Cost (£)
A	8	3500
B	14	4200
C	26	5200
D	39	6200
E	51	7200
F	80	8500
G	101	10200
H	135	12500
I	178	14200
J	246	16500
K	325	20300
L	390	23000
M	454	25600
N	614	32000
O	768	55000
P	959	62000

Anonymity of systems and suppliers is maintained to ensure commercial confidence.

Figures used in estimating the sizes of sewage treatment system required on each vessel category were based upon the average number of crew onboard each vessel plus a 50% margin. Further explanation and details of the figures used are given within Annex 1.

The set-up cost generated using such assumptions is a range between £12m and £14.4m non-recurring cost for all ships on the UK flag. This assumes that no UK ship has pre-existing treatment systems, and reflects the estimated cost of option 2 that goes beyond international requirements. As many modern ships (particularly passenger ships that generate the greatest amounts of sewage) have been built with Annex IV in mind and/or have had systems retrofitted the total number of ships that will need to comply will be lower than that used for the calculation. For example, 125 vessels are known to already hold an SoC so would not require further expenditure. Consequently, the remaining cost to industry falls to £10.4m - £12.7m.

There will be further costs associated with the maintenance and operation of the new sewage systems that must be considered. A standard assumption is that maintenance and operating costs will equal five percent per year of the up-front cost of the system, which we appraise over 20 years. Present value costs over this period come to £19.4m – £23.3m for option 2.

However, the preferred option excludes 28.4 percent of the fleet because these vessels are recorded as trading exclusively domestically. In the absence of detailed information on the precise vessels included in this sub-group, best estimates can be achieved by down-rating the costs above by 28.4 percent, to yield present value cost estimates of the preferred option of between £13.9m and £16.7m.

Administrative costs:

Administrative costs associated with Survey and Certification must also be taken into account. Sewage certification is likely to cost between £800 and £1100 per ship. This generates an estimated cost under option 2 assumptions of £0.77m - £1.2m for all relevant ships on the UK flag. Excluding those ships that operate domestically, in line with option 1, this range falls to £550,000 - £830,000. Furthermore there will be costs associated with the renewal of certification, on a five yearly basis. It is assumed that renewal costs are half the initial certification cost, which appraised over the 20 year period (three renewals) provides a present value for option 2 of £1.5m - £2.2m and for option 1 of £1m - £1.6m.

The headline costs of £15.0m - £18.2m and initial certification cost of £1m - £1.6m for the preferred option will be staggered as ships may comply with the regulations in advance of the 2008 entry into force. Subsequent to discussions with the manufacturing sector it is considered likely that there will be no significant issue with supply and fitting of such systems.

Table 3: Summary of costs of options 1 and 2, appraised over 20 years

	Policy cost (£ millions pv)	**Admin cost** (£ millions pv)	**Total** (£ millions pv)
Option 1	13.9 – 16.7	1 - 1.6	15.0 – 18.2
Option 2	19.4 – 23.3	1.5 - 2.2	20.8 – 25.8

Benefits:

There may be some economic benefits from providing additional clarity and focus to the regulations with reduced likelihood of incorrect disposal of wastes overboard due to less clear regulations and a reduced chance of errors in record keeping occurring. The economic costs of

garbage and sewage pollution that can manifest in the form of beach cleaning costs and costs to the fishing and boat industries as a result of fouling of nets and propellers could be reduced. The costs to tourism that arise from the negative impact of garbage and sewage on beaches could also be reduced. It should be noted that the Environment Agency estimate that the cost to Local Authorities of clearing up coastal and marine litter is approximately £14 million per year. It is likely that only a very small percentage of this is attributable to garbage from shipping but a minor reduction in costs could potentially be achieved.

Benefit to the environment:

From a distance of 187.6km of North-west European coastline tested by the OSPAR (Oslo Paris Convention) Marine Litter Project, 19.36 tonnes of garbage were collected implying an average of 0.1 tonnes per kilometre. As discussed above, a maximum of 20% of this is likely to be attributable to shipping, implying 258 tonnes per year of garbage around the UK coast. To indicate the kind of costs that garbage has on the environment, it is worth remembering that landfill tax is charged at £24 per tonne. This implies that the cost to the environment over and above the cost paid by the consumer is £24 per tonne. Therefore, if the new UK legislation were to result in a reduction of garbage in UK waters by 258 tonnes per year, there would be a negligible effective saving to the environment of £6,192pa.

Benefits to the economy:

The tourism, leisure and port industries could benefit economically from the Regulations as the negative impacts of sewage and garbage upon these industries could be further reduced, resulting in improved water quality, particularly around ports and harbours. The fishing industry could also benefit from a reduction in instances of contamination. In the long term the shipping industry may benefit, in terms of ships engaged in international voyages, who will avoid potential costs in terms of fines and detentions from failure to comply with other States' legislation.

Studies carried out by the Washington State Department of Natural Resources Aquatic Resources Project[3] and carried out on behalf of the Government of Canada[4] have indicated that the benefits of measures to restrict ship users from releasing untreated sewage into the marine environment can outweigh the costs. In Canada, benefits were considered to accrue primarily to oyster farmers around a single port where new sewage systems were required to be fitted to all ships. These benefits amounted to £807,000 in 2003. Oyster production is not a major industry around any ports in the UK, so per port, fishing would benefit by significantly less than the Canadian case. However, even if the near-shore fishing industry only benefited by half as much for each port where these improvements applied, benefits could be of the order of £10m across the UK.

Social

The new UK legislation is expected to be beneficial for coastal communities and beach users. There should be reductions in the instances of negative impacts on human health through bathing in contaminated waters or eating contaminated fish / shellfish due to the resulting improvement in water quality. The potential health impacts of garbage and sewage washing up on beaches would be reduced. There could also be a reduction in amenity loss due to unsightly discharges.

A Swedish study of the Stockholm Archipelago revealed monetised benefits of up to £20.2m for improving the sight-depth of water by 1m (a measure of water quality behaviourally linked to

[3] www.dnr.wa.gov/htdocs/aqr/residentialuse
[4] www.canadagazette.gc.capartII/2007/20070628/html/sor133-e.html

recreational demand and scientifically linked to sewage ejection). The Stockholm archipelago is an exceptionally popular recreational destination, so it is not directly comparable to the more varied attraction of the British coastline (water quality will be less important to the tourist industry on industrialised stretches of coastline such as near ports), but these figures are at least indicative of the utility gains from reducing sewage in marine environments.

It is hoped as part of this consultation that the industry can comment upon the accuracy of these costs and indicate to what extent UK flagged ships are already compliant with the requirements of the annex

An alternative way of assessing the benefits from MARPOL annexes IV and V is to take a high-level view based upon the discussion of costs to the economy, society and environment at the beginning of this Impact Assessment. It was suggested that shipping contributes up to 20% of the garbage around the UK coast, and 5% of the sewage. Except where sewage has been processed through an approved treatment plant, MARPOL aims to impose a complete ban on sewage and garbage evacuation within three nautical miles of the coast, and further restrictions out to 12 nautical miles. For the purposes of this analysis therefore it is assumed that the contribution of shipping to marine sewage and garbage will decline near to zero. This is a strong assumption, but in the absence of detailed modelling it avoids adding spurious accuracy to the estimates. Note also that this is wider than the effect of just UK shipping complying with MARPOL. The contribution of UK shipping alone can be assessed on the basis that UK flagged vessels make up around 10% of vessels in UK waters. Furthermore, around 28% of these are purely domestic vessels that are excluded from option 1 but not option 2.

Table 4: Monetary impacts of reductions in sewage and garbage from shipping over 20 years

	Benefit that may be monetised	**Of which, benefits from UK flag compliance (option 2)**	**Of which, benefits excluding domestic ships (option1)**
Garbage	£62.0m	£6.2m	£4.4m
Sewage	£1.3m	£0.13m	£0.090m

MARPOL is an international treaty that will increasingly affect ships of all countries as it is further ratified. Consequently, although benefits to the UK flagged fleet are low compared to costs, other flags will increasingly comply and benefits to the UK of MARPOL as a whole will rise towards the £63m figure.

There are further benefits that can be obtained through implementation of Annexes IV and V associated with reduction of non-monetised costs such as the problems associated with plastic as garbage which continue after the scope of the appraisal period used in this document, various environmental costs impacting upon marine life, additional non-monetised costs to tourism that could be created by a reduction in the aesthetic appeal of coastal areas and costs to human health associated with sewage (caused by consumption of contaminated species / bathing in contaminated waters).

Small Firms Impact Test

It is envisaged that the impact on companies of the new UK legislation will be commensurate with their size; with smaller firms less affected than larger companies in the shipping industry. This is because companies operating smaller ships of less than 400GT will not have to install a sewage system, unless they are certified to carry more than 15 people. Such vessels generally generate less waste and would need smaller sewage systems if required to carry the equipment. The instance where the new Regulations could be seen to be impacting upon smaller firms is in the leisure craft industry where ships certified to carry more than 15 people will need to install a system. The MCA has worked to ensure that the measures were consulted upon with small,

medium and large businesses – a number of consultees including the British Chamber of Shipping, RYA and BMF have small business members and a number of the specific consultees would be classified as small or medium enterprises.

It is envisaged that a specific Small Firms Impact Test will not be required as the consultation should provide adequate information on this point. This will be kept under review during the consultation process and in the production of the final Impact Assessment

Competition Assessment

As the draft Regulations will implement the internationally agreed MARPOL 73/78 Annexes and do not go beyond these instruments it is not expected that the legislation will have any negative effect on UK international competitiveness.

Where there is increased cost to the industry it is believed to be fair as it will be a case of the polluter paying – larger ships and those with larger crews or greater numbers of passengers will generate more garbage and sewage and as a result have a greater impact. Ships that choose to invest in waste reduction systems and implement improved management practices will see a commensurate reduction in costs.

A failure to implement the internationally agreed standards will prevent UK flagged vessels from being certified against the prevailing international law. As such any UK flagged vessel operating internationally may face sanctions up to and including detention for non-compliance. It is likely that failing to implement the agreed international rules will render the UK flag less competitive and result in vessels leaving the UK flag

Enforcement, Sanctions and monitoring

Enforcement would be carried out by the Maritime and Coastguard Agency as part of its existing enforcement activities. The draft Regulations provide for sanctions for non-compliance. These include provisions for a fine not exceeding the statutory maximum (currently £5,000) on summary conviction in some cases, or a fine not exceeding £25,000 in the case of offences involving pollution of the sea by garbage or sewage. In the case of a conviction in the Crown Court, the Regulations do not impose any limit on the amount of the fine. These penalties are in line with those for other maritime pollution offences and are considered to be proportionate to the nature of the offences.

Provisions also exist whereby a ship may be detained in UK waters where a surveyor of ships suspects that a pollution offence has been committed.

The draft Regulations also provide for inspections to be carried out; this is in line with normal international maritime law. .

Surveys concerning sewage and garbage will tend to take place at the same time as other ship surveys, so as to reduce the administrative burden for the shipping industry through fulfilment of a number of requirements simultaneously.

The Home Office and the Scottish Executive Justice Department have indicated their satisfaction with the proposed sanctions.

Specific Impact Tests: Checklist

Use the table below to demonstrate how broadly you have considered the potential impacts of your policy options.

Ensure that the results of any tests that impact on the cost-benefit analysis are contained within the main evidence base; other results may be annexed.

Type of testing undertaken	*Results in Evidence Base?*	*Results annexed?*
Competition Assessment	Yes	
Small Firms Impact Test	Yes	
Legal Aid	No	
Sustainable Development	No	
Carbon Assessment	No	
Other Environment	Yes	
Health Impact Assessment	Yes	
Race Equality	No	
Disability Equality	No	
Gender Equality	No	
Human Rights	No	
Rural Proofing	No	

Annexes

Data used to calculate the estimated costs of implementing Annexes IV and V of MARPOL.

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