

## **SCIENTIFIC, TECHNICAL AND OPERATIONAL ADVICE**

### **NOTE** **STOp 4/09**

This STOp notice replaces STOp 5/99, please destroy your  
copy of STOp 5/99

## **GUIDELINES FOR THE PREPARATION OF COASTAL AND ESTUARINE BOOMING PLANS**

- 1. INTRODUCTION**
- 2. PLANNING, FORMAT AND CONTENT**
- 3. USES AND LIMITATIONS OF BOOMS**
- 4. METHODOLOGY OF PLAN PRODUCTION**
- 5. VALIDATION OF PLAN**
- 6. CONCLUSIONS**

### **APPENDIX 1. EXAMPLE OF A VALIDATED OPERATIONAL PLAN**

The Environment Agency  
Rio House  
Waterside Drive  
Aztec West  
Bristol  
BS32 4UD

The Northern Ireland  
Environment Agency  
Klondyke Building, Cromac  
Avenue  
Gasworks Business Park  
Lower Ormeau Road,  
Belfast, BT7 2JA

The Maritime and Coastguard  
Agency  
Spring Place  
105 Commercial Road  
Southampton  
S015 1EG

## 1.0 INTRODUCTION

A boom is a floating barrier designed to contain and minimise the spread of oil on water. Booms can be used to protect environmentally and economically sensitive areas of tidal rivers, estuarine waters and harbours from contamination by floating oil. Effective and efficient deployment of booms in incidents can only be satisfactorily accomplished where there is a well-prepared and validated booming plan. Development of a booming strategy and operational plan is an integral part of preparing an overall contingency plan for an estuary or port. This is a complex task that must be carried out by personnel with appropriate experience.

**The aim of this STOp notice is to give guidance and examples to those with responsibilities for preparing oil spill contingency plans on:**

<b>Content and format of a booming plan</b>	<b>(What, where and how)</b>
<b>Uses and limitations of booming</b>	<b>(Constraints)</b>
<b>Methodology of booming plan production</b>	<b>(Step by step guide)</b>
<b>Validation (trials) of booming plans.</b>	<b>(Testing plan for real)</b>

This information may also be used to review critically existing plans. The development of new plans and the review of existing ones is urgent. A survey of relevant authorities in England, Wales and Northern Ireland with potential to hold booming contingency plans for the Environment Agency (EA), the Maritime and Coastguard Agency (MCA) and the Northern Ireland Environment Agency (previously Environment and Heritage Service), provided an overview of coastal contingency plans. The main conclusions were:

1. The majority of organisations in England, Wales and Northern Ireland do not have any provision for protection of coastal and estuarine areas by booming plans,
2. There was considerable regional variation with little relationship between the frequency of oil spills and the availability of booming plans,
3. Where protective booming was a significant issue many existing plans were technically inadequate and did not contain sufficient information to enable a successful boom deployment to be carried out.

These findings demonstrate that local authorities, Environment Agency regional officers and port and harbour administrations are not always adequately prepared to protect sensitive areas from contamination in the event of an oil spill.

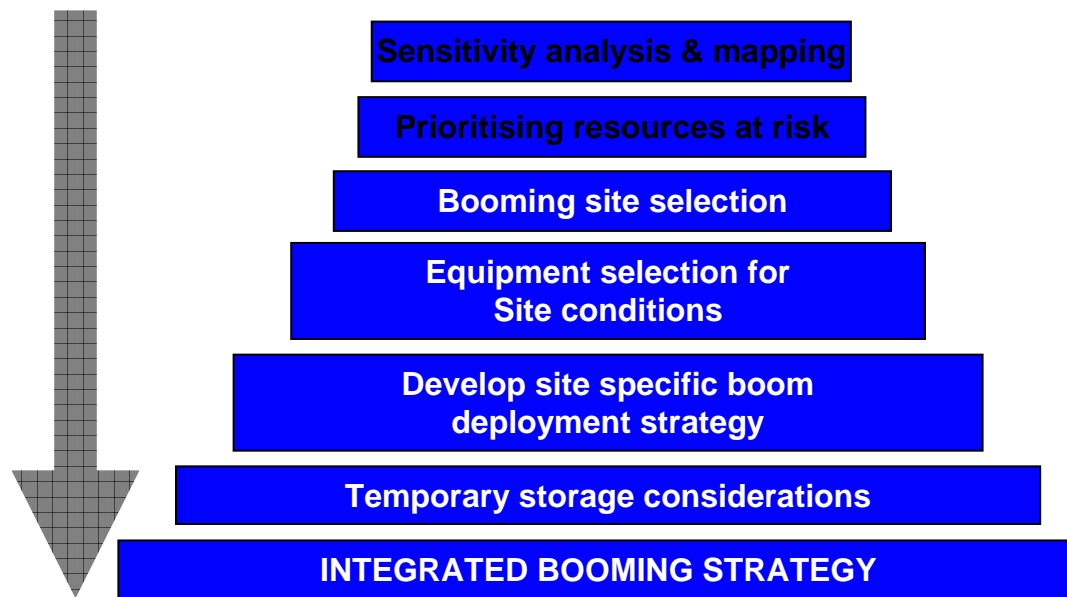
## 2.0 PLANNING, FORMAT AND CONTENT OF A BOOMING PLAN

### 2.1 Analysis of Resources at Risk and Selection of Priority Areas

The initial stage in producing a booming plan is to identify environmental and socio-economic features at risk. A full environmental or economic resources analysis will provide this information which can then be used to determine priorities for booming site selection

### 2.2 Planning and Resources

Careful pre-planning is the key to the preparation of an effective booming strategy. It is a complex task that can only be carried out by people with the relevant background knowledge and operational experience of boom deployment. The development of an integrated booming strategy is described fully in section 4, but the key stages are shown in Figure 1.



**Fig 1 Key Stages in the Development of a Booming Strategy**

Throughout the development process consultation with other relevant bodies such as neighbouring local authorities, fisheries departments, tourist boards and nature conservation bodies is essential to ensure their co-operation and input. Plans must be flexible and allow for reasonable variations.

When a plan has been completed it should be evaluated by a full-scale trial. This is very useful because the failure of a boom in an incident can waste valuable time and resources. In addition an unsuccessful deployment would appear incompetent to the public and media. However, there will be some sensitive locations where the planning or validation may show that booming is not possible.

In these cases it is essential to keep detailed records to demonstrate that booming has been considered but would not work in that particular location.

### **2.3 Format**

All plans should be clear, concise and complete. References to other documents should be limited to a brief description of how this plan fits in with other plans in a tiered contingency plan for an area or country. In general, booming plans should follow a similar format with variations to allow for local economic, environmental and geographical conditions. A useful example of a standard format is shown in Appendix 1. The advantages of adopting this recommended standard format are that plans will be:

- Consistent and easily understood,
- Compatible with plans from other areas,
- Helpful to teams from other areas.

### **2.4 Contents**

The contents of a booming plan should, like all good contingency plans, be divided into a strategy section and an operational plan. Full details of the contents of each section are given in section 4.

### **2.4 Further Information:**

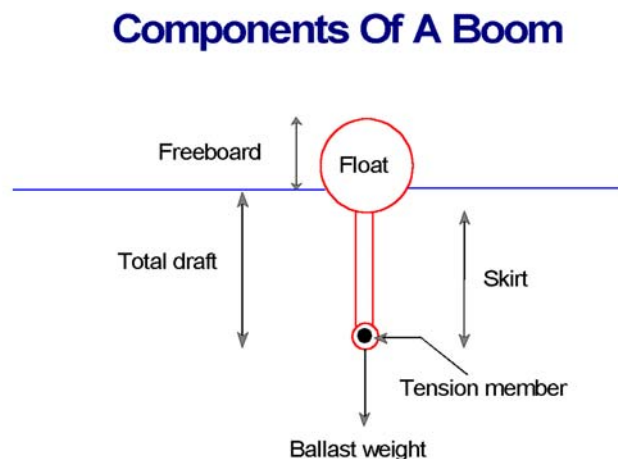
1. Newman, D.E. and N.I. Macbeth, October 1973. Oil Booms at A Tidal Inlet. Hydraulic Research Institute Report No INT 118.
2. ITOPF, 1981. *Use of Booms in Combating Oil Pollution*. Technical Information Paper No 2.
3. CONCAWE Report No. 9/81. *A Field Guide to Coastal Oil Spill Control and Cleanup Techniques*.
4. Environmental Consultancy Services Limited 1999. R&D Technical Report. *Coastal and Estuarine Booming Contingency Planning*. Report for the Environment Agency, Marine Pollution Control Unit, Environment and Heritage Services for Northern Ireland.

### 3. USES AND LIMITATIONS OF BOOMS

#### 3.1 General

Booming is a complex activity and the successful deployment of boom to protect a sensitive area, or to collect oil for recovery depends on several factors. Key factors in the selection of a boom for a given location are: the width of the area to be boomed, current and tidal flow, wind and waves, sea or river bed composition and depth of water. Booming plans are best prepared by personnel who have significant practical experience in all aspects of booming operations. Boom deployments require trained supervisors who have considerable practical experience.

Booms are floating barriers, whose purpose is to stop the flow or spread of oil in a particular direction and to concentrate the oil into a sufficiently thick layer for recovery. To achieve this, booms can either be moored to a shoreline, riverbank, or buoy. Alternatively, to concentrate the oil for recovery they can be towed through the water by suitable boats.



**Fig 2 Components of a Skirted Boom**

There are several different types of boom and although the construction varies, all types have common features. Figure 2 shows the common features of a boom. All booms must have sufficient material above the waterline (freeboard) to prevent waves from washing oil over the boom. Similarly, under the water, the skirt must have sufficient material (draught or skirt depth) to minimise the flow of trapped oil underneath the boom. To keep it afloat the boom must have buoyancy. Usually this achieved by building in permanent floats of cork or

polystyrene or having an inflatable air tube. Finally, to keep the boom upright, it must have some form of ballast weight at the bottom. This is often provided by a wire or chain, which can also give additional tensile strength to the boom.

### 3.2 Boom Types

There are three main types of boom:

#### 3.2.1 Fence Booms

Fence booms generally consist of a flat piece of material, serving both as freeboard and skirt, having integral permanent buoyancy and ballast weights attached to the base of the skirt. Fence booms can be used where rapid deployment is the primary requirement. However, their fixed shape and poor wave following characteristics tend to make them less effective at containing oil.

#### 3.2.2 Skirted Booms

Curtain booms consist of a buoyancy tube, with the skirt attached to the underside (see Fig 2). Frequently a wire or chain is attached to the base as ballast and tension member. This type is probably the most effective for containing oil, as they have a better underwater shape and wave following characteristics. However, as they have to be inflated, they are slower to deploy and require regular maintenance.

#### 3.2.3 Shore Sealing Booms

Shore sealing booms are normally made in a cloverleaf pattern with an air tube above two tandem tubes filled with water. The purpose of the boom is to form seal at the water/shore interface thus creating a barrier in the inter-tidal area.

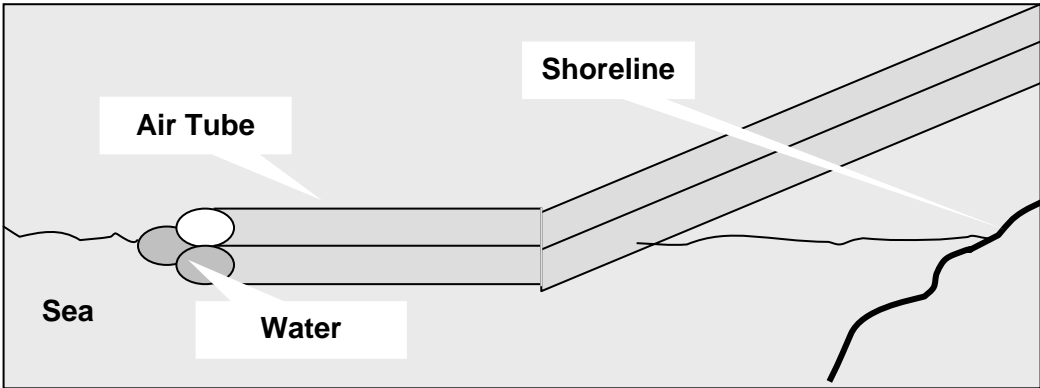


Fig 3 Diagram of the Sections of a Shore Sealing Boom

### 3.3 Boom Material and Sections

The material from which the boom is made also helps to determine the service for which the boom is suitable. Booms made of heavy neoprene coated fabric are generally used in open sea applications or exposed inshore waters. Booms designed for use in inshore and estuarine use are generally manufactured from polyurethane-coated fabric. This is generally lighter than neoprene and thus easier to handle.

The size of the boom required will depend on the location and weather conditions. The key dimensions are freeboard and skirt depth. In general, greater freeboard is required in open estuaries and smaller booms are more suitable for sheltered situations.

Booms, particularly skirted booms, designed for inshore use are manufactured in short sections which are portable to enable ease of handling on shorelines and by crews of small boats. These short sections are joined together by connectors and since there is no universal standard connector it is essential to check that all sections are compatible.

### 3.4 Use and limitations of Booms

#### 3.4.1 Units of Measurement

In marine applications, wind and current speeds are given in knots. However, certain hydrological information may be provided in metres per second. For conversion purposes, 1 knot  $\approx$  0.5 metre per second.

#### 3.4.2 Limitations

The effectiveness of booms in oil containment is constrained by a number of factors:

**Winds.** Strong winds generate waves, which can splash over the boom. Although oil on the surface tends to dampen waves, eventually oil may splash over the boom. Strong winds can also generate additional tensile forces on the boom.

**Currents and Tides.** Currents and tides will initially concentrate oil in a wedge in the boom cusp. At current speeds of less than half a knot at right angles to the boom, this wedge can be several metres wide, and will contain the majority of oil that accumulates against the boom. However, as the current speed increases, the leading edge of the wedge of oil is pushed towards the boom, and as the water dives below the boom it may take some of the oil with it. At speeds of 1.5 knots at right angles to the boom, all the oil may be lost under the boom. A similar effect occurs when a boom is towed through the water, limiting the towing speed to less than 1.5 knots.

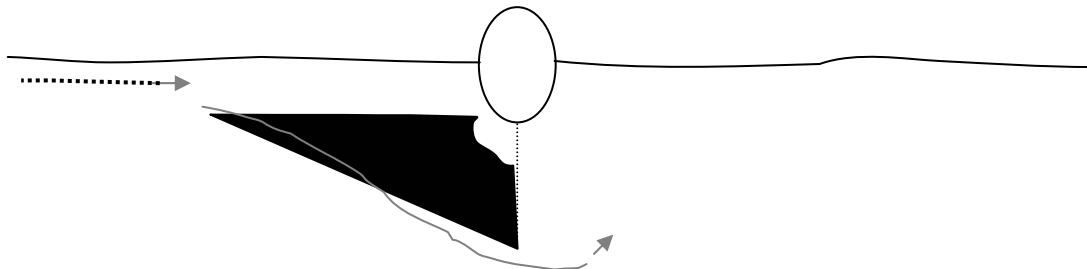


Fig 4 Oil being dragged under the Boom Skirt

**Length.** Long lengths of boom are difficult to deploy and control. The maximum deployable length will depend on the current speed and weather conditions.

**Forces on the boom.** The current speed also imposes a severe strain on the boom itself, according to the formula:

$$F=26 \times A \times V^2$$

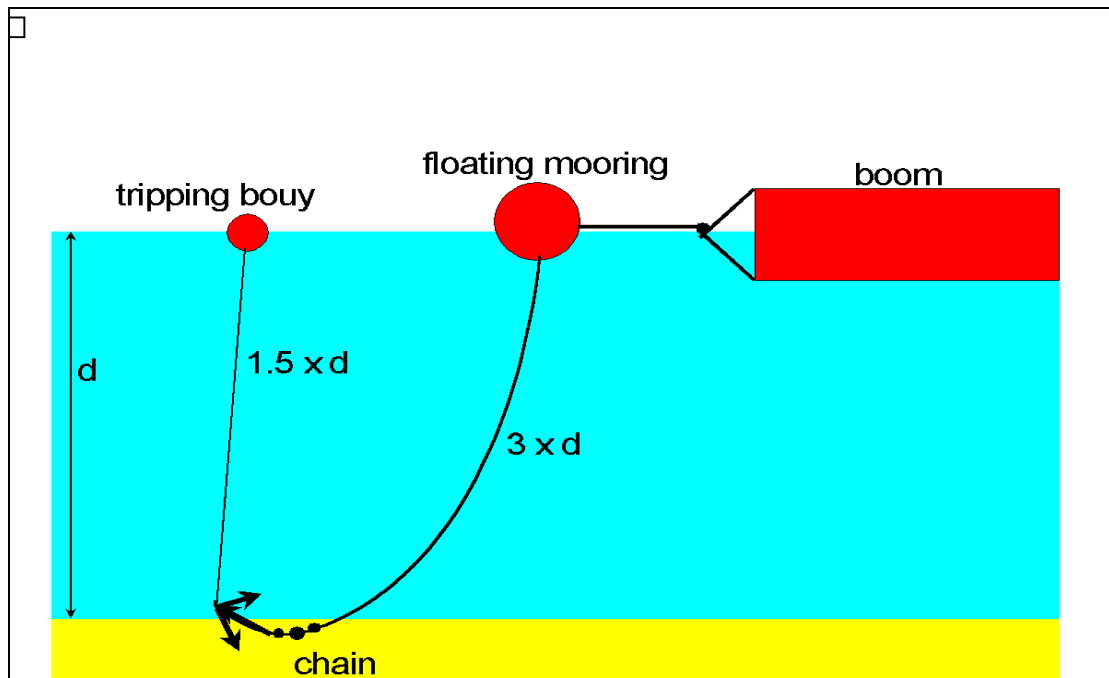
Where: F is the force on the boom, in kg,  
26 is a constant,  
A is the cross sectional area in square metres exposed to the current,  
V is the velocity of the current in knots.

Thus, the force acting on a 200-metre boom, with a 0.6 metre skirt depth in a 0.5-knot current will be 780 kg. Doubling of the current speed will increase the force on the boom fourfold, and the force on the same boom will be 3100 Kg. It is very important that the boom will be able to withstand these forces.

**Anchors.** Booms exposed to currents must be securely anchored, both on the bank or shoreline and in the water. The method of anchoring must be appropriate to the estimated tensile loading on the boom. On the shoreline temporary booms can be anchored using wooden or metal stakes driven into the ground (Holdfasts). In soft ground a number of stakes driven in line with the direction of the boom and tied together with ropes, may be required to spread the load. Alternatively, if the site sensitivity allows, anchor plates or railway sleepers can be buried to provide a sound anchorage. Permanent shore moorings may be installed once the boom configuration has been fully tested and validated. This will save valuable time when the boom has to be in place quickly.

The outboard end of the boom will sometimes need to be anchored in the water. This may present several problems. If a boom is directly connected to an anchor, increasing current speed may result the end of the boom being dragged below the surface. Therefore it is necessary to attach the anchor rope to a buoy and thence to the boom. The anchor rope or chain should be four times the depth of the water to minimise the submerging force on the boom and buoy. To enable easy recovery of the anchor, they must be fitted with a tripping buoy. This will also aid recovery if the anchor has snagged on an underwater obstruction.

Where the current speed is high, and/or the boom is long, calculation of the forces may well show the need for intermediate moorings, both to prevent excessive strain on the boom as a whole and to maintain the correct configuration. It is also likely that they may be required on both sides of the boom to maintain optimum configuration through ebb and flood stages of the tide.



**Fig 5 Diagram of Boom Anchoring**

The number of anchors required and the spacing between them will be determined by several factors. These include current speed, size, length of boom, and additional factors relating to the holding power of the anchors. The holding power will vary according to the type of anchor, its weight and the composition of the sea or riverbed. For example, anchors of the Bruce or Danforth type will be most effective on sand and mud substrates, but a fisherman's anchor (hook type) will be better on a rocky bottom.

Table 1 gives examples of the holding power of different weights of Danforth/Bruce type anchors in different substrates. (Substrate types are marked on Admiralty charts).

Anchor Weight (kg)	Holding Power (kg force)		
	Mud	Sand	Clay
15	200	250	300
25	350	400	500
35	600	700	700

**Table 1 Examples of Holding Power of Different Anchor Weights**

For example, a 200 metre boom, in a 1 knot current, giving a 3.1 tonne force on the boom, but now assuming a loose muddy bottom and a boom with a 3 tonne breaking strain, it is likely that one intermediate 25kg anchor would be required to prevent boom failure and maintain the boom in its correct configuration.

**Shoreline Anchor sites.** Some shoreline anchor sites may have sensitive vegetation and substrate that could be damaged by booming operations. When planning work at or near to environmentally sensitive sites the statutory nature conservation agencies (NE, SNH or CCW) must be consulted.

### 3.4.3 Methods to reduce the impact of current speed

Current force acting at right angles to the boom will have a tendency to drag oil under the boom. This can be reduced in two ways

**Angling the boom to the direction of flow.** By angling the boom in the direction of the flow, forces can be reduced. The effect of current velocity on boom angle is shown in Fig 6. However, angling the boom will always increase the total length of boom required. This method has been used to deploy booms in areas with current speeds up to 6 knots. At greater speeds the length of boom and the numbers of anchors required to hold it in place becomes excessive, if not impossible.

## Effect Of Current On Boom Angle

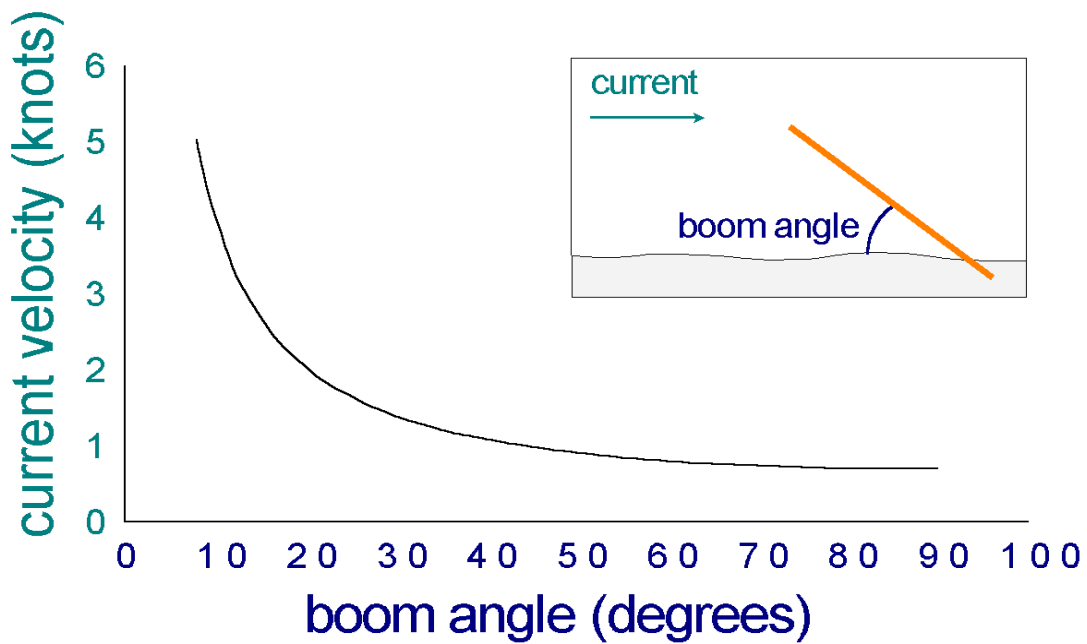
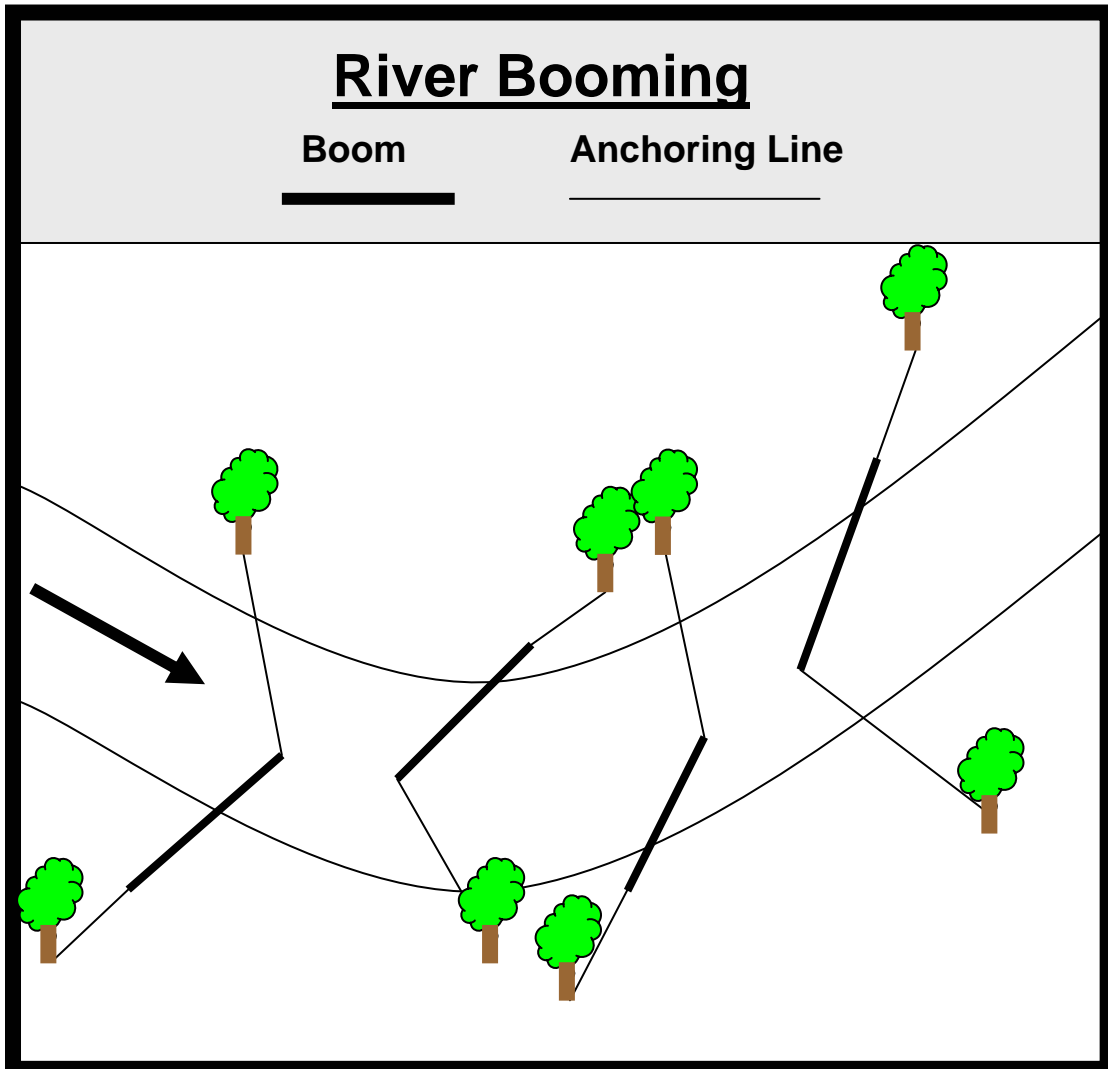


Fig 6 Effect of Current Velocity on Boom Angle

**Placing the boom in areas of slowest current.** By placing the boom where the current speed is relatively low the force on the boom can be reduced. In a river, this will generally be on the inside of a bend but current speeds are generally slowest in the shallower water closest to the bank. Suitable areas are shown in Figure 7. .



**Fig 7 River Booming**

### **3.5 Uses of Booms**

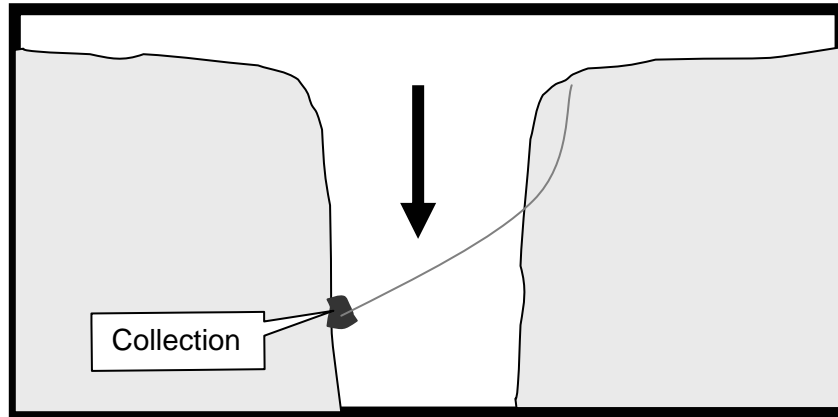
#### **General**

This notice describes the use of booms in coastal and estuarine areas **and not in the open sea**. Where booms are used in areas with high current speed to collect and recover oil is important to remove the collected oil as quickly as possible to prevent it from building up and being dragged under the boom. Collection points should be sited to facilitate the easy removal of oil

Booms must not be used to collect light and volatile products such as naphtha, due to the risk of fire and explosion. It is better to allow those products to evaporate naturally in the atmosphere. However, in calm and sheltered areas booms can be used to recover diesel or gas oils.

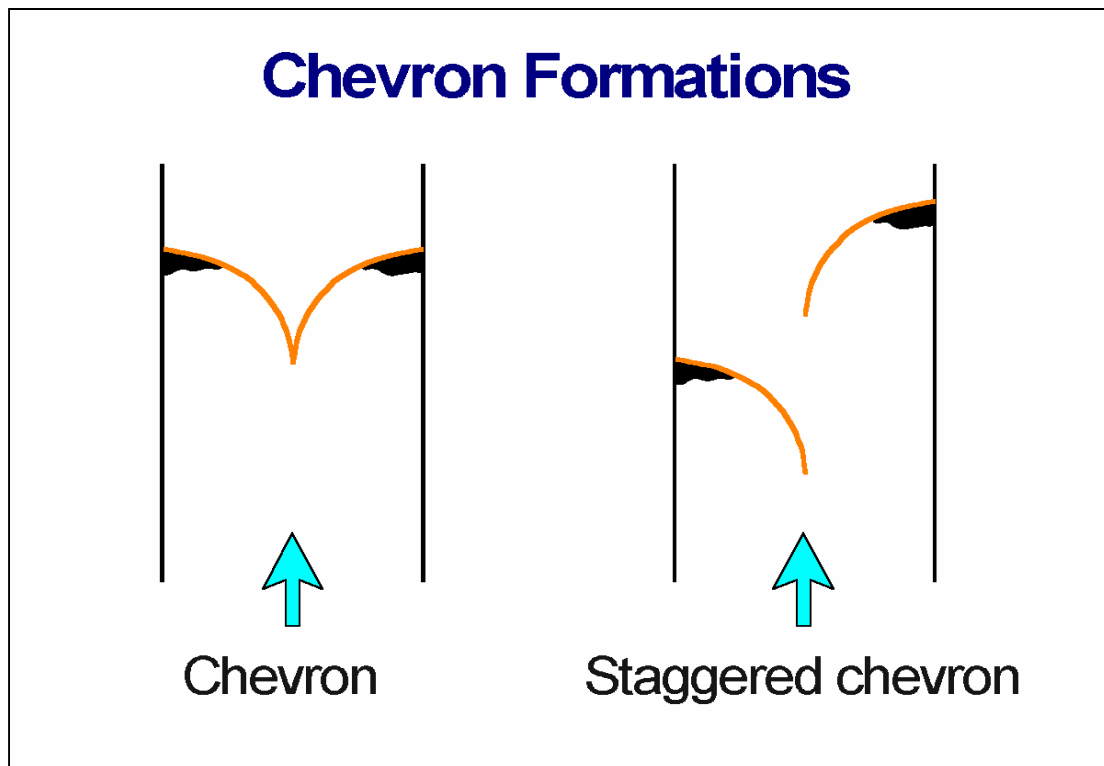
**Booming Estuaries.** Booms can be used to prevent oil entering a river, estuary or harbour. There are few estuaries in the UK where the peak tidal flow is less than 0.5 knot, booming directly across a river or estuary (exclusion booming) will rarely be effective. As a result, it may be necessary to deflect oil to a suitable point for collection (deflection booming). A number of deflection layouts can be used:

**Single Collection Boom.** Where the river is not too wide or is not used for navigation a single collection boom can be used as shown in figure 8



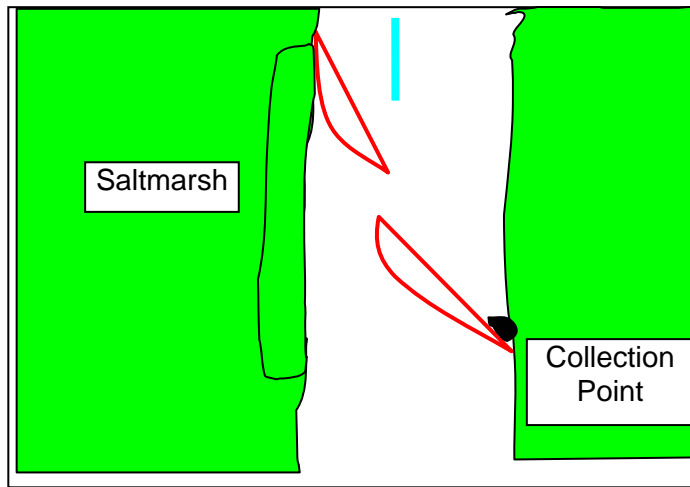
**Fig 8 Collection Booming**

**Chevron Booming.** Where a river is too wide for a single boom or it is necessary to maintain a channel for vessel navigation a staggered chevron boom can be used. A chevron boom can be closed if required. Figure 10 shows two formations of chevron boom.



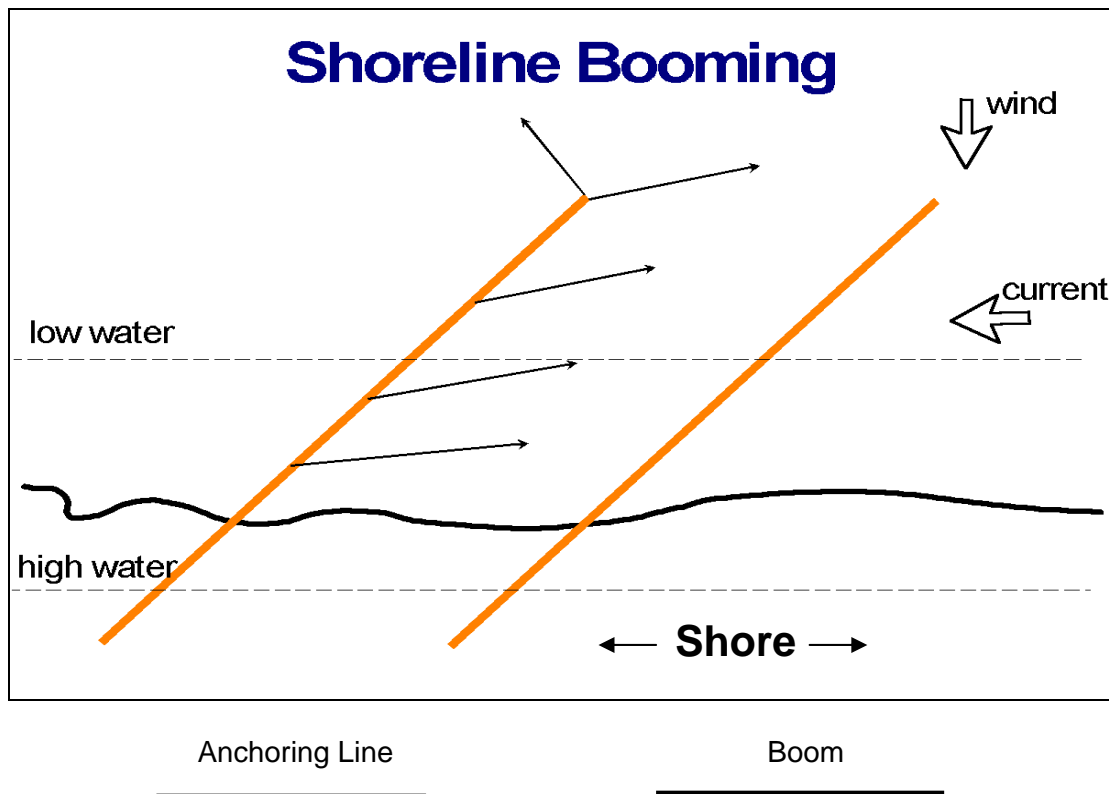
**Fig 9 Chevron Booming**

**Deflection Booming.** Deflection booming is similar to chevron booming but the oil is deflected away from a sensitive area, for collection in a less sensitive area.



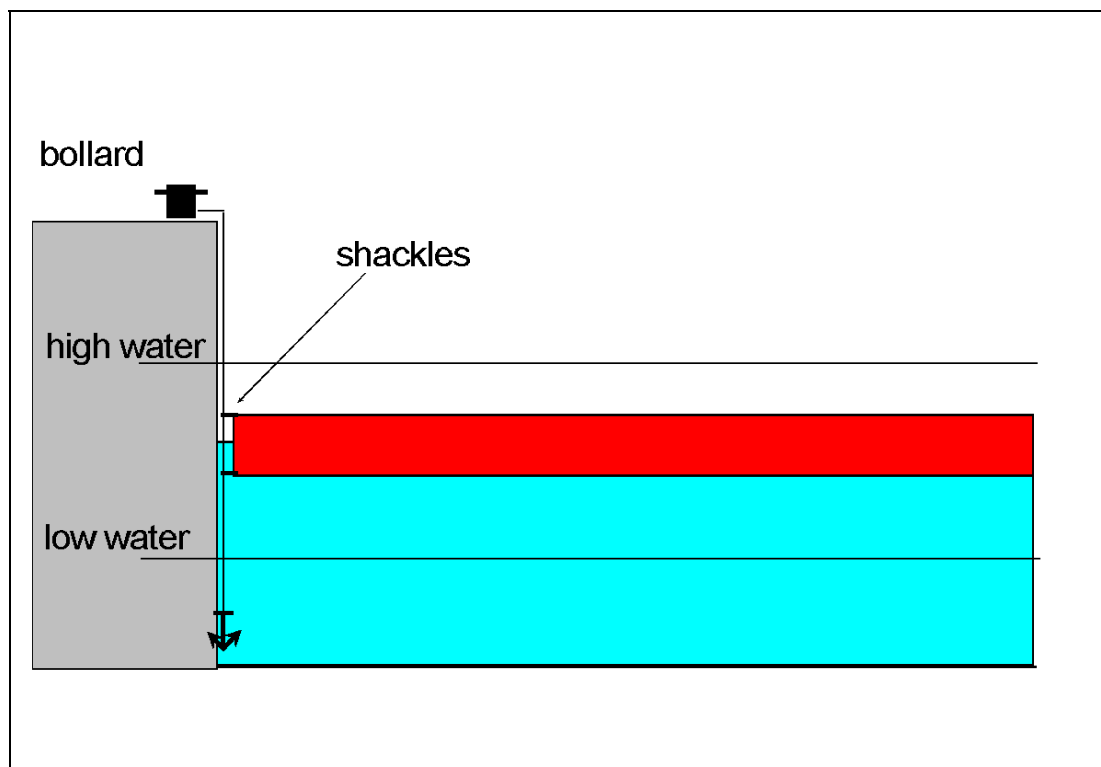
**Fig 10 Protection Booming**

**Spur Booms.** Spur booms can be used to prevent longshore spreading of oil by deflecting the oil onto a shoreline with little environmental sensitivity, or one which is relatively easy to clean.



**Fig 11 Spur Booming.**

**Jetty Booming.** In port and harbour areas booms can be connected to jetties or similar structures with a hard vertical or near vertical surface. When connecting booms to fixed structures a running mooring or sliding connector should be installed to allow the boom to rise and fall with the tide. This can be a rope or wire, attached at the top of the jetty to a bollard or other secure point, with a heavy anchor at the bottom. Some harbours may already have sliding connectors in place. All types of sliding connectors must be regularly maintained because, over time, they can become jammed with marine growth. This technique will only be effective where forces on the boom are minimal. Forces exerted onto the running mooring will tend to cause the wire or rope to bow out, restraining the ability of the boom to rise or fall.



**Fig 11 Jetty Booming**

**Sorbent Booms.** Sorbent booms absorb/adsorb oil by the attraction of oil to oliophilic materials. These are made from either natural materials such as feather, hair, wool, peat and straw or synthetic materials such as polypropylene. All are effective to a limited extent but in general synthetic sorbents have been found to be more durable and effective because their hydrophobic properties prevent them from becoming waterlogged.

Sorbent booms are particularly effective in containing and collecting lighter materials such as gas oil and light crude oils. They can be used in mudflat or saltmarsh areas where conventional booms may cause damage to the sensitive environment.

### **3.6 Boom Maintenance**

Once installed, boom systems must be regularly monitored to ensure that they are maintaining the correct configuration and that no damage or deflation of boom sections has occurred.

**Collection of Oil.** Effective recovery of oil trapped by a boom is essential. Plans should describe possible collection methods. The main methods of recovery are described in the

MCA Manual on shoreline clean up. Selection of the best method will depend upon the type of oil, the sensitivity of the site and vehicular access. All movement and storage, especially temporary storage of the recovery material, must comply with the EA's waste movement and disposal regulations.

### **3.7 Health and Safety**

The deployment of booms can be hazardous and all operations must comply with current Health and Safety regulations. Prior to deployment a full site and operational safety risk assessment must be carried out.

## **4. METHODOLOGY OF PLAN PRODUCTION**

Although the detailed content of individual plans will vary, there are several features, which should be common to all plans and must be incorporated. The use of a common format will help to ensure that all issues are properly considered, that plans from one area can be understood by responders coming from another area, improve compatibility between plans and to assist in a smooth transition for inter-regional and inter-organisational response. Booming plans should be circulated within local communities and interest groups to demonstrate that sites have been identified as result of priority planning

Booming plans form part of the local authority oil spill contingency plan, though the booming plans themselves can stand alone when given to response teams. However, the plans must contain all relevant information, especially details of the sensitivity of the boom site and recovery areas.

Booming plans like all contingency plans fall readily into two parts. The first part (strategy) will delineate the area of the plan, identify and prioritise the environmental and socio-economic sensitivities in the area, show the locations of the booming sites, prioritised in accordance with the sensitivities, and further describe which sites cannot be protected and why. This section will also include other more general information on health and safety, temporary oily waste storage and disposal routes (if any) and the equipment and personnel resources available locally. This information should be included as an appendix to the local authority contingency plan. The second part is the operational plan, which would be issued to the beach supervisor. Therefore it will describe each site in detail, with the relevant environmental sensitivity and health and safety information for that site. It will describe the access to the site and contact details for landowners, the purpose and location of the boom, together with a diagram and photographs, where possible, and sufficient information to allow the response team to install the boom, set up recovery equipment and temporary storage facilities. It is important that the exact location is clearly indicated. Remember, it is likely that boom deployment teams could be from outside the locality.

Recommended contents of the plans are given in tables 2 and 3. The use of Geographical Information Systems (GIS) to give accurate site references and digital photographs can be used to illustrate boom locations making plans more easily understood.

It is clearly good practise for booming plans to be written and checked by experienced staff familiar with both the theoretical and practical aspects of protective boom deployment.

<b>Table 2</b>	
<b>Outline Contents of a Booming Plan</b>	
<b>Strategic Plan</b>	
<b>Purpose:</b>	<b>Pre spill planning for inclusion in local authority contingency plan</b>
<b>Section</b>	
<b>1.</b>	Scope and Geographic Coverage of the Plan.
<b>2.</b>	Use of the Plan
<b>3.</b>	Environmental Resource Analysis 3.1 Sensitivity analysis and mapping 3.2 Prioritise sensitive Areas 3.3 Will boom deployment have a negative environmental impact?
<b>4.</b>	Physical Site Characteristics 4.1 Map showing location of all sites for protection 4.2 Area response strategy 4.3 Booming sites in order of priority 4.4 Identification of sites which cannot be protected (with reasons) 4.5 Details of laydown areas 4.6 Area emergency contact details
<b>5.</b>	Health and Safety Guidelines for boom deployment 5.1 Generic risk assessment 5.2 Operational Plan risk assessment
<b>6.</b>	Temporary storage and disposal of oily waste guidelines

**Table 3  
Outline Contents of a Booming Plan**

<b>Operational Plan</b>		
<b>Purpose</b>	<b>For Issue to Booming Supervisors</b>	
<b>Section</b>		
	Site priority	
<b>1.</b>	Health and safety	Generic Site specific
<b>2.</b>	Site information	Grid reference Access Landowners Contact details Physical description of site Bank characteristics and laydown area Shoreline load bearing characteristics Photographs
<b>3.</b>	River and tidal data	Tidal information Current speed Water depth Site specific information
<b>4.</b>	Manpower requirements	Shoreline Afloat Others
<b>5.</b>	Communications	VHF marine band frequency Mobile telephones (reception)
<b>6.</b>	Equipment requirements	Detailed list
<b>7.</b>	Boom deployment	Stepwise description
<b>8.</b>	Boom maintenance	Inspection schedule and tasks
<b>9.</b>	Oil recovery	Equipment and methods
<b>10.</b>	Temporary storage	Regulatory issues Methods and equipment
<b>11.</b>	Transport	Methods and equipment Waste transport regulations
<b>12.</b>	Boom recovery	Stepwise instructions Reinstatement

## **5. VALIDATION OF THE PLAN**

Even the most thoroughly prepared plan cannot guarantee effective deployment of a boom in an incident. Therefore it is essential to validate the plan by deploying the boom at the actual location. Not only will this test the accuracy of the information and instructions given in the plan but also reveal any peculiar tidal and weather effects. For example the volume of water flowing in a river can increase considerably following recent heavy rainfall within a river catchment.

There is therefore a need to test the plan by a real boom deployment. This is known as validating the plan. The procedure will normally allow the deployment team sufficient time to conduct a survey prior to the validation exercise, which together with the exercise itself will give a much better idea of the range of conditions which can be experienced. The validation will also identify the detailed equipment and personnel requirement, and identify the best deployment procedure. However, the validation will only demonstrate the effectiveness of the operation under one set of weather conditions, those prevailing on the day.

The validation should where possible be carried out by an experienced team to ensure that the plan is properly evaluated. The team leader will arrange to visit the site, generally over a two-day period, to become fully familiar with the local tidal/current regime. He will make the necessary liaison with the local authority, statutory nature conservation bodies (NE, SNH, CCW), country water quality and regulatory authorities (EA, SEPA, NIEA), harbour authority if appropriate and the landowner(s).

Once deployed the boom should be left throughout a full tidal cycle to experience both the flood and the ebb tide. Teams should be prepared to modify the deployment and adjust intermediate moorings.

Boom deployment exercises may readily form part of hands-on counter pollution exercises. The MCA and EA are willing to provide help and advice on all aspects of protective booming including site selection, plan compilation, practical deployment and validation. The MCA currently provides a rolling programme of practical training for maritime local authorities. Typically each training event will be developed in partnership with the EA and other organisations with an interest in counter pollution contingency planning

The original site plan must be updated to incorporate the validation results and lessons learnt. Unvalidated plans must be treated with caution. MCA boom deployments have shown that many theoretical plans require significant amendment to allow for lessons learnt.

## **6. CONCLUSIONS**

Booms can be used to protect environmentally sensitive or socio-economically important estuarine and coastal areas from oil pollution. Successful boom deployment depends upon the careful preparation and practical validation of a booming plan for each location. These plans should explain the reason for booming an area, prioritise the sites and give detailed and easily understood information to facilitate effective boom deployment. Preparation of booming plans is complex task that must be carried by personnel with sound practical and theoretical knowledge of the topic. Once a plan has been written it really should be tested in a real deployment (validation) and subsequently amended to allow for lessons learnt.

Sometimes during preparation and validation of a plan some areas where, after careful study, booms can not be satisfactorily deployed. When this happens it is essential to record all work and the reasons why booms cannot be deployed at this location. This will show that booming has been considered but is not suitable for this location. Thus avoiding wasting time and resources on unsuccessful deployment in an incident. It will help explain to

government, local government, interest and pressure groups, and the media why nothing appears to be happening.

Well-prepared and tested plans can save many hours of discussion in the Shoreline Response Centre, and will enable response managers to mobilise equipment and personnel promptly to the most vulnerable and highest priority sites.

Once complete, the plans should be incorporated into port, Environment Agency, and local authority oil spill contingency plans. It is essential to exercise all plans as frequently as resources allow.

## APPENDIX 1

### EXAMPLE OF A VALIDATED OPERATIONAL PLAN

#### RIVER OGMORE

***NOTE. This plan is an example of well produced plan covering all the key points but it is not intended as a universal format.***



Maritime and Coastguard Agency

**Maritime and Coastguard Agency  
Environment Agency**

#### OGMORE ESTUARY PROTECTION PLAN - (2 sites)

Note: This is the operational plan dealing only with physical boom deployment at the two sites referred to here. Shoreline Response Centre will determine priorities for booming as part of the overall shoreline protection strategy. Validation work carried out by MCA & EA in partnership.

**SITES COVERED:**

Mouth of River Ogmore  
50m seaward of Portabello House

**HEALTH AND SAFETY:**

**Booming operations are potentially dangerous and before starting a full risk assessment must be carried out.**

**DATE OF VALIDATION:**

16 July 1998

**Site 1**

**LOCATION:**

Mouth of the River Ogmore OS Sheet 170 (1:50000)  
Grid ref.: SS 866760  
See appendix A for site plan and Appendix B for site photograph

**WEATHER** (On the day)

Dry, fine, wind light, West Southwest

**FLOW RATES:**

No accurate data available for this stretch of the estuary, figures quoted are best estimates.

**SPRING TIDES:**

Flood 3.5 knots, Ebb 4 knots

**NEAP TIDES:**

Flood 1-2 knots, Ebb 2 knots

Rates on the ebbing tide could increase according to rainfall.

**RANGE:**

**DEFINITIONS:**

The terminology and definitions used by the Environment Agency to define riverbanks, will be used by all organisations in order to avoid any confusion, and to ensure correct deployment of manpower and resources.

The definition is as follows:

"With your back to the flow of the river all locations in front of you will be defined as "Down Stream" and all locations behind you will be defined as "Up Stream". To your right hand side will be the Right Bank and to your left will be the Left Bank "

**SITE ACCESS and BOOM LOCATIONS:**

Contact for access: Cardiff and Vale of Glamorgan Emergency Planning Unit.  
Day: 01222 #####  
Out of Hours: 01222 #####

Access can be gained via an area set aside as a car park, adjacent to the B4524 and close to the Portobello house. A locked gate, (Key Holder - Cardiff and Vale of Glamorgan EPU) then gives way to the river bank and upper shore, the boom site lies some 400m downstream from this point.

The Right Bank boom anchor point will be at a location to be determined by the Beach Master. Access to the Right Bank anchor point will be via Welsh Waters Treatment Works. (see map - Appendix A).

During winter months, due to a combination of rain and high spring tides, this area may become boggy, for this reason it is recommended that only vehicles with all-terrain capabilities are used and strict control over vehicle movements are maintained to minimise surface damage. For most of its length, the Ogmore is of high conservation value.

**LOCAL LIAISON:** Environment Agency:  
Local Authority contacts:

**MAPS DIAGRAMS:**

See Appendices A & B.

## **EQUIPMENT LIST**

Work boat, 100 HP engine (40Hp engine was used on the day.)	x1	Mooring Chain x 3m	x 5
Dinghy	x1	Warps 25mm x 25m	x 2
Marker line and Floats	x1	Warps 18mm x 25m	x 20
Inflation boom x 25m	x 2	Sledge Hammer	x 20
Shore sealing boom x 25m	x 6	4WD with winch	
Shore sealing boom x 10m	x 2	or Tirfor machine	x 1
Towing bridles	x 2	Argocat or similar	x 1
Water pump & hoses	x 2	Water Bowser	x 1
Air blower and connector	x 2	Chest Waders	x 2
Ground anchor plates	x 10	VHF Handheld Radios (Channel 10)	
Danforth Anchor 15 Kg	x 3	Mobile Phones	
Sea Claw Anchor 40 Kg	x 2	(Vodafone & Cellnet reception is adequate over most of the site)	
		Temporary Storage Tanks	x3

## **MANPOWER:**

The response to an oil pollution incident on the river Ogmore will be co-ordinated by a Beach Master designated by the Shoreline Response Centre (SRC). The response may include the deployment of oil booms to prevent/minimise the spread of oil inshore.

The booms will be deployed by a team identified by the beach master. The team will be supervised by a supervisor with training in, and a working knowledge of boom development. This group of staff will be referred to as the Ogmore Team.

The Ogmore Team will comprise the following staff:

Beach Master	Boat Crew (1 coxswain, 1 boathandler)
Foreman	Boom Deployment Crew

The car park adjacent to Portobello House will be used as the Rendezvous Point (RvP), and the deployment of all equipment and manpower will be co-ordinated by the Beach Master at the RvP.

## **COMMUNICATIONS: Marine band Channel 10**

## **PHYSICAL DESCRIPTION OF THE SITE:**

The mouth of the River Ogmore, close to the proposed boom site is particularly protected from the open sea by a shingle spit, this has the effect of greatly reducing the channel width and accelerating the current in the narrow channel because of the close proximity of this potential hazard where loss of life has occurred. All personnel preparing to work at this location should be briefed of the danger.

Moving upstream to the area afforded protection by the shingle spit, the channel widens to a width of approximately 200m at mean high water and reducing to a low water channel of 50m which scour closely to the profile of the shingle spit, at this point the current speed reduces significantly and has been identified as the most suitable site for a boom to succeed. The shingle spit itself is backed to the Northwest by dune slacks and extensive salt marshes, the Southwest bank is backed by low unstable cliffs which extend upstream for approximately 400m at the boom site from the base of the cliff to the low water channel. The lower shore is firm sand shingle and small cobble.

## **BOOM DEPLOYMENT:**

The informal car park adjacent to the Portobello house (grid ref: SS873763) would be the most suitable area to be used as a vehicle park and equipment lay down area but permission should be sought from the land owner.

Easiest deployment of the boom is at low water slack allowing sufficient time to transport all necessary equipment from the lay down area to site.

Working from the Left Bank, it is recommended that a light 6mm line marked at 25m intervals with small buoys should be drawn across the river and secured to the permanent mooring points, this will give a visual aid of final boom configuration and a clear indication of where to position intermediate anchors. Particular care should be taken on the position of the two 40-Kg sea claw anchors, which will provide the main moorings on the edge of the low water channel where the greatest current speed will be exerted on the boom. All anchors should be fitted with recovery trips, when all anchors and ground anchor plates are laid; the marker line should be recovered.

The boom should be assembled on the Left Bank, ensuring the correct positioning of the section of inflation boom (i.e. 35m Shore sealing boom, 50m Inflation Boom, 125m Shore sealing boom). All air chambers to be inflated.

With a team of men positioned on the Right Bank, the work boat should tow the boom into the water channel and across to Right Bank where a heaving line should be passed ashore, the boom can now be pulled the correct distance onto the shore and secured to the permanent mooring point. With all personnel to the Left Bank, the boom can be tensioned and secured to the permanent recovery mooring point.

A Land Rover winch or Tirfor will be required for this operation. A dinghy will be required to assist the work boat securing mooring lines on the upstream side of the boom, all shore sealing water chambers should now be filled. Mooring lines secured to the ground anchor plates on the flood tide side of the boom should be secured to enable the boom to be adjusted into correct configuration as the boom is trimmed by the oncoming tide.

## **OIL RECOVERY AND OIL STORAGE:**

Oil recovery equipment can be deployed to the area adjacent to the boom cusp where oil will collect. Choice of recovery equipment will be limited by accessibility. Small-trailerised skimmers may be towed to the site subject to the nature of the ground surface on the day. Lightweight vaculite systems can provide vacuum recovery. Rope mops and small disc or weir skimmers can access the area.

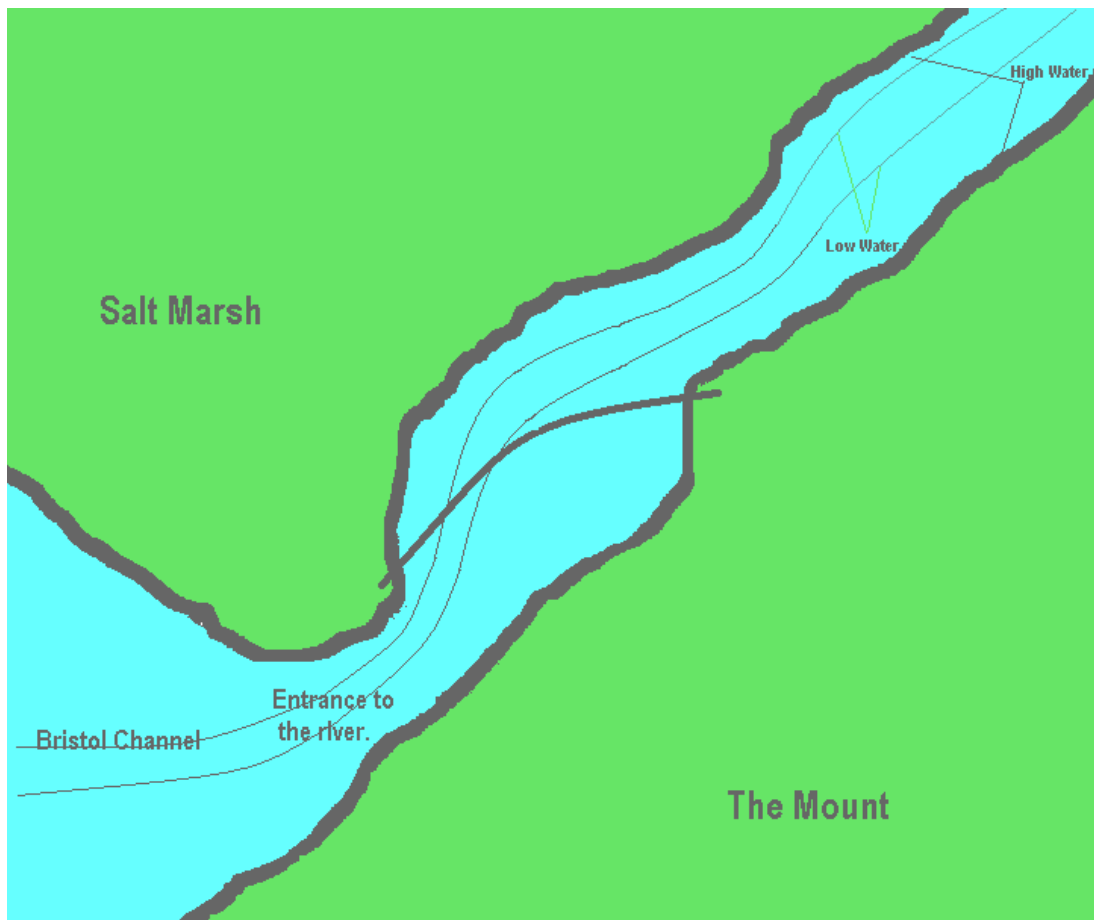
Temporary storage tanks can be utilised to provide temporary storage at this site, care must be taken during spring tides to ensure skimmers and storage tanks are not taken by the tide. Evacuation of temporary storage tanks will not be so easy. Powerful positive displacement pumps could be used to pump pollutant to a point where tractor vacs or tankers can access.

## **BOOM RECOVERY:**

The most suitable time for recovery of the boom would be low water slack. The water chamber valves on all sections of Shore sealing boom should be opened and all intermediate-mooring lines released. The main securing line to the Right Bank should be released and the tail towed by the work boat back to the Left Bank where the boom can be recovered and returned to the lay down area section by section.

All anchor and ground anchor plates should now be recovered; the workboat may require assistance from a land rover winch for this operation. A careful visual inspection of the site should be carried out to ensure all equipment has been recovered.

## **Appendix A Ogmore estuary site plan**



## Appendix B Ogmore Estuary Boom



### **SITE 2**

#### **LOCATION:**

50 m Seaward of Portobello House  
Grid Reference SS 872763  
Location Plan 1: 50000

#### **ACCESS:**

Access to site via informal car park at Portobello House, booming site is some 250m downstream of the car park. Keep to the track with vehicles to avoid damage to grassland. Track may be soft after heavy rain.

#### **PHYSICAL DESCRIPTION OF THE SITE:**

The location chosen for this contingency boom is at a point situated 50-m seaward of Portobello House where the estuary channel narrows to a more manageable contained channel. The boom location is identified as being at the head of the second salt marsh flood plain. The West boundary is contained by sand and shingle banks and the easterly boundary rising high ground protected by low limestone outcrops. The channel is tidal and at low water soft mud banks are exposed. In general the main riverbed is stony with soft mud areas and some deep pools, working in the river-wearing waders is possible. The river channel is approximately 30 m wide and the flood estuary channel is 80m wide.

## **EQUIPMENT:**

Essentially all auxiliary equipment is as required for the main boom at the estuary mouth. Principle equipment required is as follows:

Marker line and floats	x1	Air blower and connector	x1
Danforth anchors x 15 kg (2 either side of boom)	x4	Shore sealing boom x 25 m	x5
Warps 18 mm x 25 mm	x4	Towing bridles	x2
		Water pump and hoses	x1

## **MANPOWER:**

As for site one. Deployment at site one at low water, site two high water.

## **BOOM DEPLOYMENT:**

High water slack deployment. A stout mooring point is required on the Right Bank. Permanent mooring points have been installed on the Left bank. The marker line should be drawn between these two points to allow accurate deployment of the four intermediate anchors. The marker line must be recovered once anchors are deployed.

Boom to be pre-assembled on the Left bank and all air chambers inflated. Workboat will then tow boom across to the Right Bank. Positioning of the boom on the Right Bank can be achieved by use of a heaving line. Boom to be tensioned from the Left bank using a tirlor. Once boom is tensioned intermediate anchor points may be connected and the water chambers of the shore-sealing boom filled.

## **OIL RECOVERY AND OIL STORAGE:**

As site one, access is less difficult at site two. Ground conditions may allow direct access by vacuum tanker or tractor bowser.

## **BOOM RECOVERY:**

Best recovery time is high water slack. Water chamber valves to be opened, and intermediate moorings to be disconnected and recovered. Main mooring line to the Right Bank can then be released and passed to work boat, which will tow boom tail to the Left bank for recovery. Don't forget to check site thoroughly for any remaining equipment.

## **BEACHMASTER CHECKLIST:**

- 1) *Check that the site identified by the SRC as the site requiring booming is the correct site (the check will confirm that oil has or is likely to come ashore and that a booming plan exists for this site).*
- 2) *Ensure access to site is available  
telephone Swansea Emergency Planning  
telephone Dwr Cymru/Welsh Water*
- 3) *Establish Rendezvous Point at the car park by Portobello House.*
- 4) *Instruct Foremen and boat crew in the deployment of the boom(s).*
- 5) *Identify oil spill clean -up areas, and appoint foremen to arrange clean up.*
- 6) *Arrange for temporary beachhead storage facilities i.e. fast tanks.*
- 7) *Arrange for removal of oil from site to approved (licensed) disposal site(s).*
- 8) *As advised by the SRC arrange for boom(s) and associated equipment to be removed from the river and surrounding area, and instruct foremen to arrange.*
- 9) *Advise SRC when equipment has been recovered, and seek advice as to any future requirements.*

- 10) *Ensure all vehicles and manpower have departed the site and the RvP, and advise Welsh Water.*

Counter Pollution Branch  
Spring Place  
105 Commercial Road  
Southampton  
SO15 1EG  
Tel: 023 8032 9###  
Fax: 023 8032 9###