

MEETING THE AMPHII MODERATE AMENITY STANDARDS

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1. Introduction

This paper describes the practical approaches being adopted to ensure that intermittent sewage discharges to inland watercourses comply with the AMPHII moderate amenity standards.

The AMPHII guidelines provide the basis for the response by the water industry regulators of England and Wales to the Urban Wastewater Treatment Directive (UWWTD). These guidelines are seen as the framework for a flexible approach to the problem of complying with the directive and they encourage a greater co-operation between the service providers and the regulators.

2. AMPHII Guidelines - Description

The Urban Pollution Management Manual referring to the above guidelines describes unsatisfactory CSOs as those which:

- a) Cause significant visual or aesthetic impact due to solids or fungus and has a history of justified public complaint;
- b) Cause or make a significant contribution to a deterioration in river chemical or biological class;
- c) Cause or make a significant contribution to a failure to comply with Bathing Water Quality Standards for identified bathing waters;
- d) Operate in dry weather conditions;
- e) Operate in breach of consent conditions provided that they are still appropriate;
- f) Cause a breach of water quality standards and other EC Directives.

It should be noted that the cause of the "unsatisfactory" designation can be a combination of causes described above. A CSO which causes visual impact may operate in dry weather and in breach of its consent condition.

This paper describes how to deal with unsatisfactory CSOs which cause an aesthetic impact. Dealing with unsatisfactory CSOs which fall into the other categories are dealt with elsewhere.

The emission standards required of the upgraded CSO vary depending on the amenity classification of the receiving watercourse. There are three amenity classifications, viz:

- High Amenity, e.g. Bathing areas;
- Moderate Amenity, e.g. Watercourses with adjacent footpaths;
- Low/Non Amenity, e.g. Watercourse in Remote area.

The high amenity watercourse classification requires 6 mm solid separation for CSOs which operate more frequently than once per year.

The low/non amenity watercourse classification requires only good engineering design.

The moderate amenity standards are described below;

3. Moderate Amenity Standards - Description

The moderate amenity standards require that "Separation, from the effluent, of a significant quantity of persistent material and faecal/organic solids greater than 6 mm in any two dimensions. This should be applied to at least 80% of the spilled volume in a typical year, the remainder being subject to 10 mm solids separation." This standard applies to CSOs which presently or in future spill or will spill more frequently than 30 times per annum.

The less stringent criteria for CSOs spilling less frequently and for spills in excess of the 80% spilled volume is as follows:

"Separation, from the effluent, of a significant quantity of persistent material and faecal/organic solids giving a performance equivalent to that of a 10 mm bar screen."

Whilst the 10 mm solids separation standard specifically mentions screens the 6 mm solid separation standard implies screen by stating 'two dimensions', thereby suggesting mesh screens.

The moderate amenity standards themselves pose two questions.

- What is meant by 'Significant Quantity of Persistent Material' and
- Can the performance of other devices economically match those of screens.

It should be noted that the regime of each CSO can be altered and its performance upgraded. To move from the "6 mm" requirement to the "10 mm" requirement may need the provision of storage to ensure the CSO operates less frequently than 30 times per annum. It should be noted that even when storage is provided 10 mm screens are still required.

4. Cost Comparison - Screens Vs Storage

MWL recently undertook a study during which it was necessary to determine the most economic method of meeting the moderate amenity guidelines for a number of CSO.

The watercourse concerned suffers from visual signs of pollution following storms despite a high river quality classification.

As a preliminary assessment to obtain a 'feel' for the likely capital and maintenance costs, the storage requirement for 30 spills per year and the necessary parameters to size screens were established for each unsatisfactory CSO. The necessary Civils work and M&E plant and maintenance were subject to costing for ;

- 6 mm Mesh Screens & 10mm Bar Screen and
- Storage & 10mm Bar Screens

This allows a cost comparison to be made. The results of the cost comparison are presented below in Figure 1.

The cost comparison indicates that for the size of storage tanks considered, the use of storage is preferred. It should be noted that the maximum storage requirement was under 500m³ and therefore for CSOs requiring larger storage tanks, 6 & 10 mm screen installations may be more economic. There may be instances where storage tanks may be precluded on the basis of space availability, this is particularly true in dense urban areas. The space problem may be avoided by the provision of small "footprint", deep, 'off-line', storage tanks. For such installations M&E costs increase as in addition to screens pump installation is required.

It should be noted that a series of unsatisfactory CSOs can be grouped together and a solution developed for the new equivalent CSO. This will reduce the number of locations where construction works are required. This can substantially reduce both capital & revenue costs.

5. Screens - Practical Considerations

Any device which presents a restriction to sewage flow brings with it the need to ensure blockage does not occur. This is particularly true for 6 mm bi-directional screens, but also true of 10 mm uni-directional screens. To avoid blockage the following methods of maintenance and design considerations should be considered:

- Frequent visits by operatives are necessary to clear blocked screens;
- Provision of mechanically raked/cleaned screens and less frequent maintenance visits;
- Adequate screen sizing to reduce the risk of blinding; and
- Design of screenings devices which use a combination of gravity and mechanical cleaning. It is suggested that this is the most robust method with the least reliance on maintenance.

Since there are great uncertainties over the provision of revenue budgets in the future it is essential that maintenance requirements are minimized. A proposed screen strategy should consider not only capital costs but revenue costs discounted over the design life of the screen installation. Any cost comparison should similarly be made on the basis of "whole life" costs.

The risk associated with screen failure/blockage should be considered at the Design Stage. At this time the consequences of failure should also be considered.

6. Solid Separation Devices - An Alternative to Screens ?

Even when screens are maintained in a pristine condition is it possible for them to provide "significant" separation required by the guidelines?

Water service companies and the regulator are traditionally more satisfied with the idea of using screens as a physical barrier to remove gross solids. Their benefits can be seen. After a storm the screens will have some evidence of operation by some solids being retained by the screens. This being said however no-one really knows how efficient screens are in removing gross solids. Very little post project appraisal on recently installed screens has been undertaken to address this lack of knowledge. Recent research carried out by Sheffield Hallam University, which will be presented shortly will address this issue.

As an alternative it may be possible to use other separation devices as long as they are capable of achieving similar separation efficiencies for similar costs. While separation devices can achieve high separation efficiencies this often involves a larger sized structure and increased costs. For this solution to be acceptable at a particular site it is essential to be able to compare the performance of a screen installation with that of a solid separation device.

Figure 2, indicates a typical relationship between efficiency and cost of a series of solid separation devices. It indicates the point that a comparison between screens and various separation devices can be undertaken if the efficiency of the screen can be quantified.

This point is difficult to quantify as the efficiencies of both screens and separation devices in terms of their universal application are unknown and for a full range of pollutants cannot easily be quantified. Research is similarly in hand to address this issue.

There is no doubt that 'separation devices' represent an alternative to conventional screens from the point of view of maintenance, possibly cost and performance.

Neither water services providers or the regulators are entirely comfortable with non-screen options and require further information concerning such devices to give them this comfort.

7. Summary

This paper has discussed:

- The AMPII moderate amenity standards.
- How, in a study area requiring only small storage tanks to meet the 30 spills per annum criteria, a comparison of costs concluded that storage tanks were the cheapest option.
- Practical considerations concerning the installation of screening devices.
- The issues concerning the provision of 'separation devices' as an alternative to screens.
- How further work is required to establish the efficiencies of screens in order to set standards for significant solid separation.

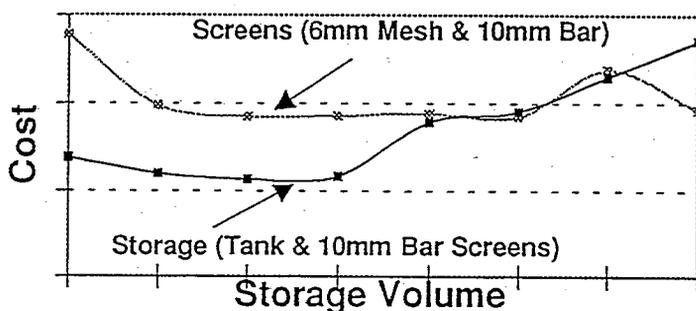


Figure 1 : Cost Comparison : Screens Vs Storage

Solid Separation Devices : When Do They Become Economic ?

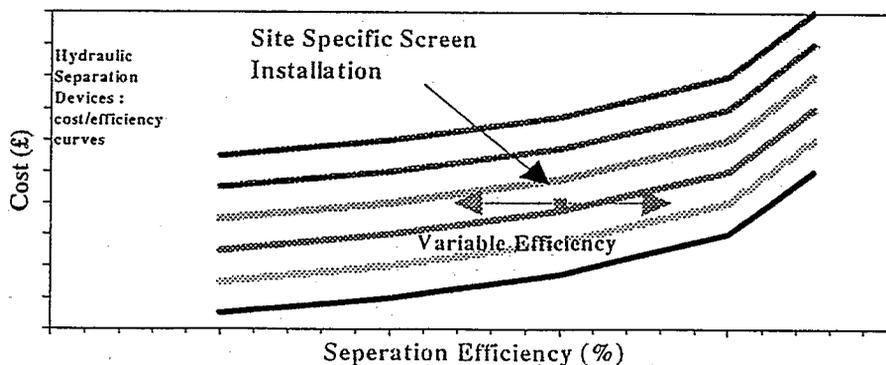


Figure 2 : Cost/Efficiency Comparison : Screens vs Hydraulic Separators

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Question David Balmforth Sheffield Hallam University

You said that Water Service Companies are not happy with no screens could you explain ?

Answer

A screen provides tangible evidence that it actually worked, screenings are collected and can be seen . This is not the case with other methods of solid separation.

Question Richard Marshall Sheffield City Council

If best efficiency is 64% and reasonable target for design is 50%, this means 50% is still not caught. Is it really worth it.

Answer

Yes storage is a better environmental solution, especially in low amenity areas.