

TEES VALLEY REGENERATION

MIDDLEHAVEN DOCK

MIDDLESBROUGH

WATER QUALITY MONITORING

2005 ANNUAL REPORT

JANUARY 2006

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Report reference: **REPORT/E005241/SW/JAN2006/WQMAR/FINAL**

Job No: **E005241**

Issue No:	FINAL			
Date:	21.02.2006			
Prepared by:	Stuart Walker			
Signature:				
Approved by:	Paul Davies			
Signature:				

E005241 Middlehaven Dock, Middlesbrough Water Quality Monitoring 2005 Annual Report

Executive Summary

Reclamation Works Environmental Water Quality Monitoring

Pre-reclamation the original two historic dock gates on the lock on the dock entrance channel from the River Tees had been removed and the Middlehaven Dock was therefore in full direct continuity with the tidal estuary of the River Tees. Estuarial river water was therefore freely flowing in and out of the dock over each twice-daily tidal cycle. Therefore, at this time the dock water quality would predominantly have been influenced by and reflected the poor river water quality of this heavily urbanised and industrialised stretch of the River Tees.

The pre-reclamation Middlehaven Dock investigation works identified that the historic dock base silts were heavily polluted. However as part of the dock reclamation works these historic dock base silts were removed from the dock by dredging as far as was reasonably practical when working underwater.

During the reclamation works the Environment Agency did not raise any concerns that the works had caused pollution of the River Tees.

Post Reclamation Works Environmental Water Quality Monitoring

Post reclamation environmental water quality monitoring of the Middlehaven Dock and River Tees has been carried out for 3 years since October 2002.

River Tees

At the location of the Middlehaven Dock the River Tees is a tidal estuary. The post reclamation works water quality monitoring indicates that the River Tees waters are of poor quality and do not meet current UK environmental water quality standards for estuarine waters.

Middlehaven Dock

As part of the reclamation works a new dock gate was installed to maintain minimum dock water levels for vessels to berth within the dock. However, the British Waterways Board make use of the penstocks in the gates for the management of water levels within the dock (daily during spring tides), and the dock management plan includes for 10x a year opening of the dock gate for 24 hours over 2 river tidal cycles to flush the dock in order to prevent the dock water becoming stagnant. These water management activities will have the result that the water quality within Middlehaven dock is still being predominantly influenced by and shall reflect the poor water quality of this heavily urbanised and industrialised stretch of the River Tees. As a result the post reclamation Middlehaven Dock Waters have also to date not met current UK environmental water quality standards for estuarine waters.

As discussed above it is WYGE's opinion that the poor water quality in the Middlehaven Dock reflects the poor water quality in the River Tees and that there are no significant indicators that the reclaimed Middlehaven Dock is having any adverse impact on the water quality of the River Tees. It is therefore WYGE's opinion that further post reclamation works environmental water quality monitoring of the Middlehaven Dock and River Tees shall be of little benefit and therefore can now cease.

Recreational Water Sports Water Quality Monitoring

Tees Valley Regeneration are giving consideration to the redevelopment of the Middlehaven Dock as a recreational water sports facility. Activities may include full body water contact water sports such as swimming, windsurfing, jet skiing, water skiing, kayaking with Eskimo Rolls, snorkelling and sub aqua diving; and incidental body water contact water sports such as sailing, rowing, and canoeing.

It should be noted that at this time UK Bathing Water Regulations and EU Bathing Water Directive Guideline (Blue Flag) standards only apply to resort beaches and their adoption for water sports facilities is purely voluntary.

Microbiological Monitoring

Since the 12 May 2005 the Analytical Testing Suite has included microbiological testing every 2 weeks for UK Bathing Water Regulations and EU Bathing Water Directive Guideline (Blue Flag) microbiological parameters comprising Total Coliforms, Faecal Coliforms, and Faecal Streptococci (nowadays called Intestinal Enterococci).

River Tees

- a. **Up to the 4th January 2006 the River Tees waters have FAILED the EU Bathing Water (Blue Flag) standards.**
- b. **Up to the 4th January 2006 the River Tees waters have FAILED the UK Bathing Water (Mandatory) standards.**

It is considered that this is probably a result of untreated foul sewerage discharges into the river from old combined (storm and foul) drains. However, the predominant influence on microbiological exceedances in the river appear to be the results of short term peaks in microbiological levels probably as a result of periods of heavy rainfall bringing into operation foul sewer storm water overflows of untreated foul effluent into the storm water drainage system that then discharges this effluent directly into the river. The most elevated microbiological peaks generally occur most commonly in the summer and early autumn when river flows are at their lowest and heavy rainfall follows a dry spell.

Middlehaven Dock

- a. **Up to the 4th January 2006 the Middlehaven Dock waters have FAILED the EU Bathing Water (Blue Flag) standards**
- b. **Up to the 4th January 2006 the Middlehaven Dock waters have PASSED (100%) the UK Bathing Water (Mandatory) Regulation standards.**

However the Middlehaven Dock waters are regularly flushed out using high volumes of River Tees waters (40-60% of dock volume). There are also further river water inflows during spring tides daily water level management operations using the gate penstocks and when the dock gates are opened for vessels entering and leaving the dock. The River Tees waters have consistently failed the UK Mandatory Bathing Water Regulations microbiological standards. **It is therefore considered that there is a significant risk that there may be occasions when the Middlehaven Dock water may also fail the UK Mandatory Bathing Water Regulations microbiological standards if the above dock activities coincide with highly elevated microbiological concentrations in the River Tees.**

The above appears to have been confirmed by the 26/01/2006 testing when the first exceedance of nearly 2x above the UK Bathing Water standards was recorded (Total Coliforms 19,000/100ml – UK Standard 10,000/100ml) which reduced the pass rate from 100% to 97.2% (UK Standard 95%).

It is also probable that a new EU Bathing Water Directive shall be adopted this year that shall have to be adopted as UK legislation within 2/3 years after the date of EU adoption. The current draft of the proposed directive has 3 standards for 2 microbiological parameters as follows:

There will only be Mandatory values for each water quality grade with percentage pass rates for **Coastal and Transitional Waters** of:

	Parameter	Excellent	Good	Sufficient
1	Intestinal Enterococci**	100	200	200
2	Escherichia Coli	250	500	500
3	Pass Rate	95%	95%	90%

** Intestinal Enterococci is the current preferred name for Faecal Streptococci.

The "Sufficient" standard is a temporary transitional standard for 8 years after the date the new EU Directive is adopted (i.e. possibly 5/6 years after Directive has to be incorporated into UK legislation). This transitional standard will then be withdrawn and not renewed.

These proposed draft new EU standards appear to potentially be significantly more stringent than the current UK Bathing Water microbiology standards of:

	Parameter	UK Standard
1	Total Coliforms	10,000
2	Faecal Coliforms	2,000
3	Pass Rate	95%

There is therefore a potential risk that the Middlehaven Dock waters shall not meet the current draft of the proposed EU Bathing Water Directive microbiological standards if and when they become incorporated into UK legislation.

Faecal Streptococci (Intestinal Enterococci) is included in the current microbiological testing suite and if the above draft new EU Directive standards were in force today the results between 12 May 2005 to 6 February 2006 would be:

Draft EU Standard Faecal Streptococci	Pass Rate	River Tees	Middlehaven Dock
Excellent	95%	72.7% - FAIL	89.5% - FAIL
Good	95%	81.8% - FAIL	89.5% - FAIL
Satisfactory (8 Year Transitional)	90%	81.8% - FAIL	89.5% - FAIL

It is therefore recommended that water quality monitoring is continued for the UK Bathing Water Regulations and EU Bathing Water Directive Guideline (Blue Flag) standards plus the additional draft new EU Directive parameter Escherichia Coli (E Coli).

The water quality monitoring has also recorded concentrations of Ammonium in the dock waters above the UK Drinking Water standards odour threshold. Persons in very close contact with the water may detect this odour.

Therefore at the current time WYGE would not recommend the use of the dock for whole body contact water sports by the general public that may include sensitive receptors such as young children, persons with pre-existing health problems, etc.

WYGE consider that careful consideration shall need to be given to the types of whole body water contact recreational water sports that can be permitted in the dock by water sports professionals and dedicated enthusiasts who may be prepared to tolerate occasional incidents of ill health subject to appropriate health and safety risk management procedures being in place.

WYGE consider that careful consideration shall need to be given to the types of incidental body water contact recreational water sports by the general public that would be permitted in the dock subject to appropriate health and safety risk management procedures being in place.

Therefore WYGE consider that health and safety risk management procedures shall need to be in place that are appropriate for both the proposed type(s) of water sport(s) and to the nature of the participants in the water sport(s). Appropriate health and safety risk management procedures may include the erection of prominent health and safety risk warning notices; restrictions on who may use the facility (e.g. only adults in good health with no cuts and/or abrasions); the provision of suitable hygiene facilities with prominent notices giving clear instructions as to their use by all participants before eating, drinking, smoking, etc; regular dock water quality microbiology monitoring with action plans in place ready for if exceptionally high microbiological levels are recorded, etc.

WYGE would therefore recommend that before a final decision is made as to the opening and/or redevelopment of the Middlehaven Dock as a recreational open water watersport(s) facility that advice is obtained from a health and safety professional with specialist experience in the assessment and management of the risks from the health and safety hazards associated with the operation of water sports facilities.

**E005241 Middlehaven Dock, Middlesbrough
2005 Baseline Water Quality Appraisal Report
January 2006**

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**E005241 Middlehaven Dock, Middlesbrough
2005 Baseline Water Quality Appraisal Report
January 2006**

1.0 Introduction

This report provides an appraisal of the results of the environmental water quality monitoring that has been undertaken up to December 2005 on the Middlehaven Dock as part of the reclamation strategy for the redevelopment of the dock.

Tees Valley Regeneration are considering redeveloping the dock as a recreational water sports facility and the report therefore also provides an appraisal of the results of the water quality monitoring for this proposed end use.

2.0 Pre-Reclamation Water Quality Assessment

Prior to commencement of the site works Apem Ltd analysed a suite of contaminants in the water, from samples taken at 10 locations around the dock, on the 22nd October 1999.

An overview of these results is detailed below.

The **W S Atkins November 1999 report: Reappraisal of Development Options** advised that:-

“Due to the high salinity of the dock, the techniques used results in moderately high detection limits for most determinands (i.e. metals and organics). It should be noted that the bulk of the data considered represents only a single sampling occasion (Oct 1999), whereas considerable seasonal and yearly variation can be expected in several parameters. To provide a fully representative picture of water quality and processes within the dock, a survey period including at least one summer and also one bathing season (May – September) would be required.

In order to establish the potential toxicity of the water to humans in the event of accidental ingestion, comparison was made between the available test results and WHO guidelines for drinking water. Compliance with these standards in relation to certain contaminants does not imply that the dock water is suitable for drinking; its salinity alone would preclude this.

As the WHO guidelines are applicable to drinking water for continuous consumption the results indicate that the quality of the water in the dock is extremely good in relation to nitrate, total mercury, total arsenic, total selenium, gamma, HCH, 1, 2 – dichloromethane, chloroform and pentachlorophenol whilst the exceedances for total chromium and for benzo(a)pyrene do not necessarily indicate a problem with the quality of the water in relation to an accidental intake.

Overall the quality of the dock water (as tested for one single event) in terms of the WHO standards for drinking water, appropriate for continuous consumption, is acceptable, with some limited exceptions. The survey indicates no significant risk to health as a result of accidental ingestion of water”.

Following the above report, a further report dated January 2000 was issued by W S Atkins; the executive summary advised that:-

“The report addresses the quality of Middlehaven Dock water in terms of contact water sports and accidental ingestion. Two water samples were taken and analysed for faecal indicator bacteria. Both were well below the EC guideline levels for designated bathing waters. This is indicative of very good quality dock water with regard to faecal contamination. However, a study of water quality over at least one bathing season is recommended to provide data to assess the suitability of the dock for contact water sports.

Overall, the water quality of the dock in terms of the World Health Organisation standards for drinking water is generally good. A small number of exceedances were measured but as the WHO guidelines are framed in terms of continuous consumption, these do not necessarily indicate a problem with the quality of the water in relation to an accidental intake.

The survey results indicate that the dock bottom sediments are quite highly polluted. Until long term monitoring (over a period of at least a year or two) had indicated low and stable levels of contamination within fish or shellfish flesh, it would be sensible to advise against consumption of any animals taken from the dock, whatever future water management regime is used.”

The Middlehaven Dock is located on a heavily urbanised and industrialised stretch of the tidally influenced lower reaches of the River Tees. Downstream of the River Tees tidal barrage this estuarial section of the River Tees was known to be of poor water quality. It should be noted that at this time, prior to the reclamation of the dock, that the historic dock gates on the dock entrance channel had been removed. The dock was therefore in full direct continuity with the tidal estuary of the River Tees and there were thus significant volumes of poor quality estuarial river water flowing into and out of the dock over the twice daily tidal cycle which would have had a significant impact on water quality within the dock.

3.0 Reclamation Works

The reclamation works on the dock were undertaken between 2000 and 2002

In summary these works comprised:

- 1) The isolation of the dock waters from the River Tees and the pumping down of the dock waters to gain "low water" (approx. 6m depth) access for the excavation and removal of the historic dock bed silts; the refurbishment of the existing dock walls; and the construction of new dock walls,
- 2) The excavation of the contaminated historic dock bed silts down to the natural ground base of the dock and their removal to on site temporary stockpiles,
- 3) The on site geochemical treatment of the temporarily stockpiled contaminated historic dock bed silts so as to enable their re-use as suitable fill,
- 4) The refurbishment of the existing dock walls,
- 5) The construction of new dock walls across the 3 western fingers of the dock,
- 6) Following geochemical treatment the re-use of the excavated dock bed silts to infill 2 of the 3 dock fingers, and
- 7) The construction of a new dock gate at the entrance to the dock to control water levels within the dock.

As there would be inevitable disturbance of the dock bed silts during the dredging/excavation process it was agreed with the Environment Agency, Middlesbrough Borough Council, and all other interested parties, as part of the Earthworks and Remediation Strategy for the site, that the dock water would be contained during these works so that there was minimal risk of potentially contaminated water escaping to the river. Therefore the dock entrance channel was fully sealed off during these site works operations and for such time as was required for suspended solids to settle out of the water column.

By the nature of below water dredging operations it is not possible to ensure the total 100% removal of all the historic dock bed silts and some small pockets of residual historic contaminated dock bed silts may still remain undisturbed. In addition as noted above small quantities of historic contaminated dock bed silts that were suspended in the dock water by the dredging operations may have since settled out back onto the dock bed after the cessation of the dredging works. However it is considered that:

- There will remain only a relatively very small quantity of such residual historic contaminated dock bed silts,
- The depth of retained dock water will mitigate against future disturbance of these silts and so the release of contaminated suspended particles,
- The age of the contaminated dock bed silts means contaminants are likely to be of low solubility and with a slow rate of release into the dock water,
- The large volume of dock water that is available for dilution of any contaminant release from the silts, and
- The frequent flushing of the dock by river water to prevent both stagnation and any potential build up of contaminants levels in the dock water,

It is therefore considered that the continued presence of these small quantities of residual historic contaminated dock bed silts should not have a significant adverse impact on the post reclamation dock water quality.

The discharge of dock water to the River Tees, resulting from the pumping out to lower the dock water level was agreed to be acceptable by the Environment Agency. The water quality for these works was deemed to be compatible with the existing river quality and of similar quality to that predating the reclamation works. No complaints were raised during the reclamation works by the Environment Agency that these works were causing pollution of the River Tees.

The removal and treatment of the contaminated historic dock silts shall have removed a primary contamination source that was previously impacting on the dock water quality.

4.0 Entrance Channel Dock Gates

The new dock gate comprises 2 mitre gates with reversed head frames designed to ensure a minimum maintained water level of +2.0m OD with a maximum allowable +1m difference in water level (i.e. +3.0m OD) between the River Tees and the dock.

The base of the dock is at -8.0m OD and so there will be a minimum retained water depth of 10m within the dock basin.

The top of the dock gate is set at 3.11m OD, the dock entrance channel dock wall coping level is 4.30m OD, and the main dock wall coping level is 5.00m OD.

For the control of dock water levels the gates have 4 No. 1.3m x 1.3m square sluices set at an invert of about -3.0m OD controlled by penstocks. The gates have tide level monitoring sensors linked to the British Waterways Board (BWB) River Tees Barrage offices and there is also a site security office manned 24 hours a day 365 days a year whose guard regularly inspects the gates and reports any problems to the above BWB office. The penstock sluices are opened and closed as required to meet the gate design requirement for a maximum allowable +1m difference in water level between the River Tees and the dock minimum retained water level of +2.0m OD.

The tidal range of the River Tees is:

Highest Recorded	+4.01m OD	(+2.01m retained dock water +2.0m OD)
Highest Astronomical	+3.25m OD	(+1.25m retained dock water +2.0m OD)
High Mean Spring	+2.65m OD	(+0.65m retained dock water +2.0m OD)
High Mean Neap	+1.45m OD	(-0.55m retained dock water +2.0m OD)
Mean	+0.65m OD	(-1.35m retained dock water +2.0m OD)
Low Mean Neap	-0.85m OD	(-2.85m retained dock water +2.0m OD)
Low Mean Spring	-1.95m OD	(-3.95m retained dock water +2.0m OD)
Low Astronomical	-2.85m OD	(-4.85m retained dock water +2.0m OD)
Lowest Recorded	-3.63m OD	(-5.63m retained dock water +2.0m OD)

The actual tidal range shall be affected by the river flows and the wind speed and direction and so may be higher or lower than those detailed above.

There is daily operation of the dock gate penstock sluices during peak spring tides to control dock water levels.

High Spring tides in excess of +3.11m OD (River Tees Highest Astronomical Tide is +3.25m OD and the highest historic recorded tide was +4.01m OD) shall totally submerge the dock gates but this shall be a comparatively rare tidal event.

There shall also be occasions when the dock gates are opened for vessels to enter and leave the dock when the River Tees tidal water level is at or above 2.0m OD. It is understood that this happened on about 9 occasions over the last year.

The Atkins report recommended that the dock gates are opened on at least 10 occasions a year during periods of peak high spring tides (about 13 weeks a year) to flush out the water in the dock so as to prevent both stagnation and contamination build up. However it should be noted that the timing and duration of opening the dock gates shall need to be managed so as to minimise the risk of trapping migrating salmon and seals within the dock basin.

If the dock gate was kept open over a single High Mean Spring Tidal cycle (+2.65mAOD to -1.95mAOD) there would be a flushing replacement by River Tees water of about 39.5% $((2+1.95)/10)$ of the total minimum retained water volume (10m depth) in the dock basin. If the dock gate was kept open over two High Mean Spring Tidal cycles over 24 hours there would be a flushing replacement by River Tees water of about 61.94% $(39.5\% + 6.05/10.65 \times 100 \times (1 - 6.05/10)\%)$ of the total minimum retained water volume in the dock basin. **This indicates that on average each dock gate opening for dock flushing should result in a replacement by new River Tees water of between about 35% to 65% of the original total minimum retained water volume in the dock basin.**

For example when the British Waterways Board (BWB) opened the dock gate for dock water flushing in April 2003 the dock gate was kept open for over 24 hours from 09:24 hours on the Wednesday 23rd to 10:39 hours on the Thursday 24th. The tidal ranges and water movements over this period were as follows:

Date	Time	Tide Level		Tide Rise/Fall m	Dock Water (Base -8.0m.AOD)	
		Chart Datum	m.AOD		Depth m	Volume Change
23rd	09:24	2.85	+2.10	0.00	10.10	0.0 %
	14:56	1.6	-1.25	-3.35 fall	6.75	-33.17%
	22:25	4.3	+1.45	+2.70 rise	9.50	+40.75%
24th	02:14	1.8	-0.95	-2.40 fall	7.10	-25.26%
	10:39	4.2	+1.35	+2.3 rise	9.40	+32.4%
					10.00**	+40.85%

** Minimum dock retained water level 2.00m OD (10m depth) adjustment on a later tide.

This indicates that on this occasion there would have been a flushing replacement by new water from the River Tees of about 48% $(33.17\% + (1 - 0.4075) \times 25.26\%)$ of the original total minimum retained water volume in the dock basin.

5.0 Potential Current Sources of Water into and out of the Dock

Following the reclamation of the site and construction of the new dock gate there may be the following current sources of water inflows into and outflows from the dock basin from:

- 1) A one off Inflow of about 50% of the total water volume of the dock by the River Tees water from the post reclamation water refilling of the dock basin and the River Tees was of poor water quality at this time.
- 2) Continuing replacement by River Tees water of the order of between about 35% to 65% of the total minimum retained water volume of the dock basin during each of the 10x a year water flushing of the dock. These flows are therefore likely to be of high volume and the River Tees is of poor but improving water quality.
- 3) Inflows from and outflows to the River Tees during the opening and closing of the dock gate for the entry and exit of vessels. Depending on the actual usage of the dock and the state of the tide on each occasion these flows are likely to be of moderate to high volume and the River Tees is of poor but improving water quality.
- 4) Inflows from and outflows to the River Tees during the daily operation of the dock gate penstock sluices during peak spring tides to control dock water levels. These flows are likely to be of low to moderate volume and the River Tees is of poor but improving water quality.
- 5) Inflows from uncontaminated rainfall directly onto the area of dock water of about an average of 640mm a year that shall be reduced by evaporation from the dock water surface and so this inflow is considered likely to be of low to moderate volume and of good quality.
- 6) Inflows from rainfall run off average about 640mm a year via the Highway Authority drain entering the southeast corner of the dock. Water inflow from this source is considered to be of low volume, but as is typical of any highway surface water discharge from a heavily urbanised area is likely to be of moderately poor quality with suspended solids, oils, and heavy metals.
- 7) Inflows from rainfall run off average about 640mm a year from hard surfaces adjoining the dock. Water inflow from this source is likely to be of low volume and should be of good quality as it is not believed to be contaminated.
- 8) Groundwater inflows from the weepholes in the dock walls designed to prevent a build up in water pressure behind the walls. Groundwater inflow is likely to be of low volume but is known to be poor quality within this area of Middlesbrough.

There are no inflows of foul sewerage into the dock from adjoining developments or from vessels berthed in the dock (e.g. Tuxedo Royale).

There will be the intake from and discharge of water into the dock for vessel engine cooling water when vessels are in the dock.

The predominant water source that shall impact on water quality within the dock is therefore likely to be from the River Tees as 1) to 4) above. As noted the river water quality appears to be of poor but slowly improving water quality. This may include contaminated suspended solids (silts) that will settle out when the dock gates are closed. These deposits may build up over time. It is understood that the Environment Agency are currently undertaking a review of river water quality in the River Tees.

In view of the above it must therefore be recognised that any water quality monitoring of the Middlehaven Dock shall probably tend to reflect the River Tees water quality as the tidally influenced estuarial river is the predominant source of water inflows into the dock basin.

6.0 Post Reclamation Works Dock Water Quality Monitoring

The Dock Water Management Strategy includes for regular water quality sampling for chemical analysis at three (3) locations comprising:

- A Dock Water** within the main water body of the dock
- B Dock Water** within the dock channel leading to the dock gates
- C River Tees Water** just outside the dock gates in the channel off the River Tees

These water samples are chemically tested for a suite of analytes as agreed with the Environment Agency for the reclamation works.

Since the completion of the reclamation works water quality monitoring was undertaken on 7 occasions between October 2002 to September 2003

Since November 2004 a monthly cycle of water quality monitoring has been commenced and has been monitored on 11 occasions up to December 2005.

The Middlehaven Dock and River Tees water quality testing results up to December 2005 are included in both the following tables attached to this report:

Table 3 – Analysis of Environmental Water Quality Test Results

Table 4 - Analysis of Recreational Chemical Water Quality Test Results

Tees Valley Regeneration are giving consideration to the redevelopment of the Middlehaven Dock as a recreational water sports facility. Activities may include full body water contact water sports such as swimming, windsurfing, jet skiing, water skiing, kayaking with Eskimo Rolls, snorkelling and sub aqua diving; and incidental body water contact water sports such as sailing, rowing, and canoeing.

Since the 12 May 2005 the Analytical Testing Suite has included microbiological testing every 2 weeks for UK Bathing Water and EU Bathing Water microbiological parameters comprising Total Coliforms, Faecal Coliforms, and Faecal Streptococci. The results up to the 4th January 2006 are reported in:

Table 5 – Analysis of Recreational Microbiological Water Quality Test Results.

7.0 Water Quality Assessment Criteria

7.1 Reclamation Works Environmental Water Quality Criteria

The Environment Agency requirement was that the Middlehaven Dock environmental water quality during the works was not to exceed the contaminant concentrations recorded in the dock water prior to the commencement of the reclamation works. The reclamation works were completed in 2002 and this requirement shall have now ceased.

7.2 General Environmental Water Quality Criteria for Estuarine and Coastal Waters

The relevant criteria for monitoring the general environmental water quality in the dock and River Tees (see attached **Table 1**) are considered to be:

- 1) UK Environmental Quality Standards for Saltwater Estuarine and Coastal Waters with especial reference to estuarine waters
- 2) River Ecosystem Classification (RE2 – Good)
- 3) River General Quality Assessment Scheme (GQA B – Good)
- 4) Environmental Assessment Level (EAL) Fisheries

As this section of the River Tees is a tidal estuary flowing through a highly industrialised urban area it is not considered appropriate to use UK drinking water standards as assessment criteria for those chemical analytes where there are no published UK environmental quality standards.

It should be noted that the Environment Agency monitoring of the River Tees has recorded a number of these parameters with contaminant concentrations exceeding these water quality assessment criteria and the Agency has particular concerns about the depleted oxygen levels that have been recorded. It is understood that the Agency is currently carrying out a review of water quality in the River Tees.

In view of this, and the fact that the predominant source of water into the dock is from the River Tees, comparison of dock water quality with river water quality may be a more appropriate assessment criteria for determining if there is a worsening of the general environmental water quality because of conditions in the dock. However caution should be exercised in the direct comparison of dock water quality results with the River Tees water quality results. This is because the dock water quality will probably reflect the River Tees state of tide, flow, and water quality present at the time when the previous flushing of the dock was carried out. The River Tees state of tide, flow, and quality water quality may therefore be significantly different (better or worse) at the time that water sampling takes place for the dock water quality monitoring.

7.3 Recreational Water Sports Water Quality Criteria

The relevant criteria for monitoring water quality for the recreational use of the Middlehaven Dock (see attached **Table 2**) are considered to be:

7.3.1 Bathing Waters

The UK bathing water standards are set out in **The UK Bathing Waters (Classification) Regulations 1991/1597** that incorporates into UK legislation the Mandatory values (I) as set out in the **Bathing Water Quality Directive 76/160/EEC**. The EU Bathing Water Quality Directive Guidance values (G - Blue Flag) have as yet not been incorporated into UK legislation.

It should be noted that the EU is preparing a revised Bathing Water Directive but the EU Environment Ministers and Parliament have as yet not given the directive final approval and it may be subject to revision. Once the directive is given final approval the individual EU Member States will have two to three (2-3) years to incorporate the directive into each state's National Law.

It is understood that the final directive is close to agreement and likely principal changes are:

- 1) There shall be separate standards for:
 - a) Inland Waters
 - b) Coastal Waters and Transitional Waters
- 2) There will be 3 water quality grades with different standards comprising:
 - a) Sufficient
 - b) Good Quality
 - c) Excellent Quality

The "Sufficient" quality standard appears to be a transitional standard that shall only apply for a limited period (8 years in current draft) after the date of entry into force of the EU Directive and shall not be renewed. National states shall have 2 to 3 years to incorporate the EU Directive into national legislation and so the "Sufficient" quality standard may be withdrawn 5 to 6 years after the EU Directive is enacted into UK legislation.

- 3) The current Directive's 19 microbiological, physical, and chemical parameters 18 shall be withdrawn and replaced by just 2 new microbiological parameters comprising:
 - a) Escherichia Coli (E. Coli) and
 - b) Intestinal Enterococci (same bacteria as Faecal Streptococci which is a current EU Bathing Water Guideline Parameter but is **NOT** included in the current UK Mandatory Bathing Water Regulations).

It is of note that only microbiological parameters are now included in the proposed new EU Bathing Water Directive and all current Directive physical and chemical parameters have been excluded.

- 4) There will only be Mandatory values for each water quality grade with percentage pass rates for Coastal and Transitional Waters of:

	Parameter	Excellent	Good	Sufficient
1	Intestinal Enterococci	100	200	200
2	Escherichia Coli (E.Coli)	250	500	500
3	Pass Rate	95%	95%	90%

Intestinal Enterococci is now the preferred name for Faecal Streptococci that is a current EU Directive Guideline (Blue Flag) parameter (100 with 90% pass rate). Escherichia Coli is a new EU Directive parameter. **Neither parameter is currently included in the UK Bathing Water Regulations.**

These proposed draft new EU standards appear to potentially be significantly more stringent than the current UK Bathing Water microbiology standards of:

	Parameter	UK Standard
1	Total Coliforms	10,000
2	Faecal Coliforms	2,000
3	Pass Rate	95%

7.3.2 Drinking Water Criteria

The current Middlehaven Dock and River Tees environmental water quality monitoring analytical suite includes parameters that are not incorporated into **The UK Bathing Waters (Classification) Regulations 1991/1597** but are covered by the **Bathing Water Quality Directive 76/160/EEC Guidance Values (G – Blue Flag)**. However for a number of these parameters no specific standard has been set with a footnote that they are to be agreed with the appropriate health authority.

In addition the current Middlehaven Dock and River Tees environmental water quality monitoring analytical suite includes parameters that are not covered by either **The UK Bathing Waters (Classification) Regulations 1991/1597** or the **Bathing Water Quality Directive 76/160/EEC Guidance Values (G – Blue Flag)**.

The UK drinking water standards are set out in **The UK Water Supply (Water Quality) Regulations 2000/3184 and 2001/2885** and **The UK Surface Waters (Abstraction for Drinking Water) Classification Regulations 1996/3001**. It should be noted that as the River Tees at this point is a saltwater tidal estuary flowing through a heavily urbanised industrial city that it is unlikely that the river would be considered for use as a suitable source of untreated potable drinking water. The dock water is saline and therefore is likely to be unpalatable for voluntary human ingestion by young children and others. However drinking water quality standards shall have to be considered in respect of the involuntary ingestion of water that is unavoidable with recreational water sports.

The Atkins pre-reclamation works reports and previous WYG reports have assessed the dock water quality against the criteria as set out in the **World Health Organisation (WHO) Guidelines for Drinking Water Quality 1993 and Addendum No. 1 1998**.

In this report the drinking water criteria are based on UK drinking water standards. Where there is no UK Drinking Water standard then the assessment criteria have been based on firstly EU drinking water guidance, secondly WHO Drinking Water guidance, and only where there is no UK, EU, or WHO Drinking Water Standard then other international standards (e.g. US EPA Drinking Water Standards have been used for PCB's).

It should be noted that the **World Health Organisation (WHO) in their Guidelines for Safe Recreational Water Environments, Volume 1, Coastal and Fresh Waters, 2003**, estimate that the direct human consumption of drinking water is normally 2 litres a day and it is considered that for contact during recreational water activities that a water ingestion through mouth and nasopharynx of 0.2 litres a day (0.1 litre per session with 2 one hour sessions per day) may often be reasonably assumed. However the WHO recreational incidental water ingestion was derived from swimming data as no data appears to be available on other recreation water activities including incidental water contact activities such as boating, rowing, canoeing, and angling; and whole body water contact activities such as windsurfing, jet skiing, water skiing, kayaking with Eskimo Rolls, snorkelling and sub aqua diving.

Drinking water standards are therefore based on a life long daily direct human water consumption of 2 litres per day. This is 10x the estimated potential water human ingestion of 0.2 litres per day that the WHO estimate may occur during recreational water activities. In addition, with the exception of highly dedicated water sports enthusiasts, it is also to be anticipated that it is unlikely that the majority of water sports participants will have long term daily 2 hour exposure through their chosen water sports activity.

Drinking water standards also take account of non human health criteria such as taste, odour, and appearance which can result in more stringent criteria than would be required solely to protect human health.

The use of drinking water standards as a recreational water sport assessment criteria will therefore be very conservative in terms of the actual risk to human health from recreational water sport activities.

This appears to be recognised by the UK Bathing Water standards and EU Bathing Water guidance (not incorporated in UK legislation). For example:

- The Phenols UK Drinking Water standard is 0.0005mg/l,
- The UK Bathing Water standard for Phenol is 0.05mg/l (100x UK drinking water), and
- The EU Bathing Water (Blue Flag) guidance value for Phenol is 0.005mg/l (10x UK drinking water).

It is therefore considered that a balanced approach needs to be taken when using drinking water standards as monitoring assessment criteria for recreational water sport usage especially at those locations where only incidental water contact activities such as boating, rowing, canoeing, and angling are taking place.

It is therefore considered that assessment of recreational water quality in the dock for drinking water determinands should be based on:

WHOLE BODY WATER CONTACT WATER SPORTS (WBWCWS)

Swimming, windsurfing, jet skiing, water skiing, kayaking with Eskimo Rolls, snorkelling and sub aqua diving, etc:

- | | | |
|----|-------------------------------|---------------------------------------|
| a) | WBWCWS Threshold Value | UK Drinking Water standard |
| b) | WBWCWS Action Value | 10x UK Drinking Water standard |

Where the WBWCWS Threshold Value is exceeded the frequency of water quality monitoring should be increased until the dock water quality can be demonstrated to have improved so as to meet this standard. A risk assessment should be carried out to assess the possible reasons for the exceedance(s), remedial action(s) that may be required, and whether or not the dock should be closed for the use of whole body contact recreational water sports

Where the WBWCWS Action Value is exceeded the dock should be closed for the use of whole body contact recreational water sports until the dock water quality can be demonstrated to have improved so as to meet this standard. A risk assessment should be carried out to assess the possible reasons for the exceedance(s) and remedial action(s) that may be required.

INCIDENTAL BODY WATER CONTACT WATER SPORTS (IBWCWS)

Boating, rowing, canoeing, angling, etc:

- | | | |
|----|-------------------------------|--|
| a) | IBWCWS Threshold Value | 10x UK Drinking Water standard |
| b) | IBWCWS Action Value | 100x UK Drinking Water standard |

Where the IBWCWS Threshold Value is exceeded the frequency of water quality monitoring should be increased until the dock water quality can be demonstrated to have improved so as to meet this standard. A risk assessment should be carried out to assess the possible reasons for the exceedance(s), remedial action(s) that may be required, and whether or not the dock should be closed for the use of incidental body contact recreational water sports.

When the IBWCWS Action Value is exceeded the dock should be closed for the use of incidental body contact recreational water sports until the dock water quality can be demonstrated to have improved so as to meet this standard. A risk assessment should be carried out to assess the possible reasons for the exceedance(s) and remedial action(s) that may be required.

8.0 Environmental Water Quality Assessment

Since the reclamation works were completed the chemical water quality in the dock and river has been monitored on **9** occasions between October 2002 and December 2004, and on **9** occasions in 2005.

All the water quality chemical testing results available on the site up to December 2005 are attached to this report in **Table 3 – Analysis of Environmental Chemical Water Quality Test Results**

The table shows in “**BLUE TEXT**” the relevant environmental water quality assessment criteria used in this report for assessing the chemical test results. Those water quality chemical test results that exceed the relevant environmental assessment criteria are highlighted in “**RED**”.

The table shows in “**BOLD TEXT**” the dock water test results that are more elevated than the River Tees water result at the time of sampling.

The table shows highlighted “**YELLOW**” the test results that did not exceed the chemical analysis minimum detection limit.

From the **Table 3** it can be seen that, apart from a small number of random isolated results, that the post reclamation works water quality analysis carried out to date has generally not detected Polychlorinated Biphenyls (PCB's), Polyaromatic Hydrocarbons (PAH's), Organotins, Organo-halogen and Organo-phosphorous compounds, and chlorinated solvents in the analytical suite being tested.

Environmental Water Quality Monitoring between October 2002 to December 2004

From **Table 3** it can be seen that comparison of the post reclamation works water quality test results from the water sampling undertaken on 9 occasions between October 2002 to December 2004 with the environmental water quality assessment criteria have recorded that elevated contaminant concentrations have been recorded as follows:

River Tees Environmental Water Quality October 2002 to December 2004

Parameter	Samples	EQS Exceeded	Unit	Minimum	Median	Maximum
Ammoniacal Nitrogen	8		mg/l	<0.1	1.3	4.1
Ammonium	8	5 (63%)	mg/l	<0.5	1.7	5.4
COD	8		mg/l	342	1362	3375
BOD	9	8 (89%)	mg/l	4	855	3600
Suspended Solids	9	7 (78%)	mg/l	6	74	286
Nitrate	9	1 (11%)	mg/l	<1	1	36
Phenols	8	2 (22%)	mg/l	<0.01	0.01	0.24
Copper Dissolved	9	8 (89%)	µg/l	<10	10	50
Zinc Dissolved	9	9 (100%)	mg/l	0.05	0.08	0.27

Middlehaven Dock Environmental Water Quality October 2002 to December 2004

Parameter	Samples	EQS Exceeded	Unit	Minimum	Median	Maximum
Ammoniacal Nitrogen	18		mg/l	<0.1	0.9	5.9
Ammonium	18	11 (61%)	mg/l	<0.5	1.1	7.6
COD	16		mg/l	411	1365	2526
BOD	18	16 (89%)	mg/l	<2	556	2640
Suspended Solids	18	16 (89%)	mg/l	<5	91	270
pH	18	6 (33%)	unit	7.6	8.0	9.4
Phenols	16	3 (19%)	mg/l	<0.01	0.02	0.15
Copper Dissolved	18	16 (89%)	µg/l	<10	10	40
Zinc Dissolved	18	16 (89%)	mg/l	<0.01	0.07	0.4

- 1) There have generally been consistently elevated concentrations above the environmental water quality assessment criteria for Ammoniacal Nitrogen, Ammonium, Biological Oxygen Demand (BOD), Suspended Solids, Copper, and Zinc for both the Middlehaven Dock and River Tees waters.
- 2) There are no UK EQS standards for Chemical Oxygen Demand (COD) and Ammoniacal Nitrogen; however these parameters are often used as an indicator of poor quality water. As shown on **Table 3** and above there are generally consistently elevated concentrations of COD and Ammoniacal Nitrogen for both the Middlehaven Dock and River Tees waters.

Environmental Water Quality Monitoring during 2005

From **Table 3** it can be seen that comparison of the post reclamation works water quality test results from the water sampling undertaken on 9 occasions during 2005 with the environmental water quality assessment criteria have recorded that elevated contaminant concentrations have been recorded as follows:

River Tees Environmental Water Quality during 2005

Parameter	Samples	EQS Exceeded	Unit	Minimum	Median	Maximum
Ammoniacal Nitrogen	9		mg/l	0.1	1.1	2.5
Ammonium	9	7 (78%)	mg/l	<0.5	1.4	3.2
COD	9		mg/l	21	558	1725
BOD	8	8 (100%)	mg/l	<2	48	450
Suspended Solids	9	7 (78%)	mg/l	11	41	88
Nitrate	9	2 (22%)	mg/l	<1	2.7	119.3
Phenols	9	1 (11%)	mg/l	<0.01	0.02	0.06
Copper Dissolved	9	5 (56%)	µg/l	<10	10	80
Zinc Dissolved	9	5 (56%)	mg/l	<0.01	0.08	0.45

Middlehaven Dock Environmental Water Quality during 2005

Parameter	Samples	EQS Exceeded	Unit	Minimum	Median	Maximum
Ammoniacal Nitrogen	18		mg/l	0.4	0.75	2.7
Ammonium	18	13 (72%)	mg/l	<0.5	0.9	3.5
COD	18		mg/l	<20	771	3150
BOD	18	17 (94%)	mg/l	<2	77	816
Suspended Solids	18	13 (72%)	mg/l	6	43	85
pH	18	6 (33%)	unit	7.5	8.4	8.9
Phenols	18	2 (11%)	mg/l	<0.01	<0.01	0.04
Copper Dissolved	18	9 (50%)	µg/l	<10	10	70
Zinc Dissolved	18	10 (56%)	mg/l	<0.01	0.06	0.5

- 1) There have generally been consistently elevated concentrations above the environmental water quality assessment criteria for Ammonium, Biological Oxygen Demand (BOD), Suspended Solids, Copper, and Zinc for both the Middlehaven Dock and River Tees waters.
- 2) There are no UK EQS standards for Chemical Oxygen Demand (COD) and Ammoniacal Nitrogen; however these parameters are often used as an indicator of poor quality water. As shown on **Table 3** there are generally consistently elevated concentrations of COD and Ammoniacal Nitrogen for both the Middlehaven Dock and River Tees waters.

**Comparison of River Tees and Middlehaven Dock
Elevated Contaminant Concentrations**

Parameter	Unit		Oct 2002 to Dec 2004		2005	
			River Tees	Middlehaven Dock	River Tees	Middlehaven Dock
Ammoniacal Nitrogen	mg/l	Min	<0.1	<0.1	0.1	0.4
		Median	1.3	0.9	1.1	0.75
		Ave.	1.5	2	1.5	1.1
		Max.	4.1	5.9	2.5	2.7
Ammonium	mg/l	Min	<0.1	<0.5	<0.5	<0.5
		Median	1.7	1.1	1.4	0.9
		Ave.	2.25	1.91	1.4	1.36
		Max.	5.4	7.6	3.2	3.5
COD	mg/l	Min	342	411	21	<20
		Median	1362	1365	558	771
		Ave.	1459	1399	720	905
		Max.	3375	2526	1725	3150
BOD	mg/l	Min	4	<2	16.7	<2
		Median	855	556	56.65	77
		Ave.	1043	930	133.78	132
		Max.	3600	2640	450	816
Suspended Solids	mg/l	Min	6	<5	11	6
		Median	74	91	41	43
		Ave.	98	102	50	45
		Max.	286	270	88	85
pH	unit	Min	7.6	7.6	7.5	7.5
		Median	7.7	8.0	7.9	8.4
		Ave.	7.8	8.3	8.0	8.4
		Max.	8.3	9.4	8.9	8.9
Phenols	mg/l	Min	<0.01	<0.01	<0.01	<0.01
		Median	0.01	0.02	0.02	0.01
		Ave.	0.05	0.03	0.02	0.02
		Max.	0.24	0.15	0.06	0.04
Copper Dissolved	µg/l	Min	<10	<10	<10	<10
		Median	10	10	10	10
		Ave.	18.9	17	35.6	33
		Max.	50	40	80	70
Zinc Dissolved	mg/l	Min	0.05	<0.01	<0.01	<0.01
		Median	0.08	0.07	0.06	0.06
		Ave.	0.11	0.13	0.11	0.12
		Max.	0.27	0.4	0.45	0.5

1. There are some indications of improved environmental water quality, albeit still in excess of the environmental quality assessment criteria, in reduced contaminant concentrations for the 2005 results in comparison to the October 2002 to December 2004 results.
2. In general the environmental water quality in the Middlehaven Dock reflects the environmental water quality in the River Tees
3. From Table 3 it can be seen that on occasion there are some indications of slight to moderate elevated concentrations in the Dock Water in comparison to the River Tees waters. However it is considered likely that this reflects the River Tees water quality at the time when the last dock water flushing was carried and caution has to be exercised in drawing any conclusions based on these results.

4. It should be noted that the recreational water sports microbiological monitoring (**see Table 5 and Section 9.1.2**) has consistently recorded significantly elevated microbiological levels in the River Tees. This indicates that the River Tees water quality is regularly being adversely impacted on by human waste in foul water effluent sewer discharges that probably also shall include commercial/industrial trade effluent chemical contaminants. It is considered that this situation is unlikely to improve until major sewer improvements are made to intercept and direct these foul flows to a sewerage treatment works prior to discharge into the River Tees.

In summary the post reclamation works water quality monitoring indicates that both the post reclamation Middlehaven Dock waters and River Tees waters have to date not met current UK environmental quality standards (EQS) for estuarine waters. The elevated contaminant concentrations recorded in the dock waters are considered to be consistent with those recorded in the River Tees and it is likely that the River Tees is the source of the elevated contaminant concentrations recorded in the dock waters.

9.0 Recreational Water Sports Water Quality Assessment

Tees Valley Regeneration are giving consideration to the redevelopment of the Middlehaven Dock as a recreational water sports facility.

Activities may include:

- Full body water contact water sports such as swimming, windsurfing, jet skiing, water skiing, kayaking with Eskimo Rolls, snorkelling and sub aqua diving; and
- Incidental body water contact water sports such as sailing, rowing, and canoeing.

The recommended assessment criteria are set out in **Section 7.3** above and the attached **Table 2**.

9.1 Recreational Water Sports Microbiological Water Quality Assessment

Since the 12 May 2005 the Analytical Testing Suite has included microbiological testing every 2 weeks for UK Bathing Water and EU Bathing Water microbiological parameters comprising Total Coliforms, Faecal Coliforms, and Faecal Streptococci.

The results are reported in **Table 5 – Analysis of Recreational Microbiological Water Quality Test Results**.

For the individual microbiological test results the table shows:

- “**GREEN TEXT**” individual microbiological results that **PASS** the UK Bathing Water (Mandatory) standards
- “**BLUE TEXT**” individual microbiological results that **PASS** the EU Bathing Water (Blue Flag) standards
- “**RED TEXT**” individual microbiological results that **FAIL** either the UK Bathing Water standards and/or the EU Bathing Water standards

For the statistical assessment of all of the microbiological test results the table shows:

- “**BLUE TEXT**” percentage of microbiological results that **PASS** the EU Bathing Water (Blue Flag) standards
- “**GREEN TEXT**” percentage of microbiological results that **PASS** the UK Bathing Water (Mandatory) standards
- “**RED TEXT**” percentage microbiological results that **FAIL** either the UK Bathing Water (Mandatory) standards and/or the EU Bathing Water (Blue Flag) standards

On the table the microbiology test results are summarised as follows:

	Water body PASSES all the EU Bathing Water (Blue Flag) guideline standards
	Water body PASSES all the UK Bathing Water (Mandatory) standards but FAILS one or more of the EU Bathing Water (Blue Flag) standards
	Water body FAILS one or more of the UK Bathing Water (Mandatory) standards

9.1.1 Middlehaven Dock Microbiology Assessment

The UK Bathing Water Regulations and EU Bathing Water Directive covers the annual period from the 1st May to 30th September.

During the UK Bathing Water Regulations mandatory monitoring period the results of the Middlehaven Dock water microbiology testing of 20 samples on taken on 10 occasions at 2 weekly intervals between the **12th May 2005 and the 26th September 2005** are as follows:

The Middlehaven Dock waters FAILED the EU Bathing Water (Blue Flag) standards

The Middlehaven Dock waters PASSED the UK Bathing Water (Mandatory) standards.

As TVR would probably wish to keep the Middlehaven Dock open all year round for recreational water sports microbiological monitoring was continued after the 30th September 2005 the end of the UK Bathing Water Regulations mandatory monitoring period.

Between the 12th May 2005 and the 4th January 2006 the results of the Middlehaven Dock water microbiology testing of 32 samples on taken on 16 occasions at 2 weekly intervals are as follows:

Up to the 4th January 2006 the Middlehaven Dock waters have FAILED the EU Bathing Water (Blue Flag) standards

Up to the 4th January 2006 the Middlehaven Dock waters have always PASSED the UK Bathing Water (Mandatory) standards.

9.1.2 River Tees Microbiology Testing Assessment

The UK Bathing Water Regulations and EU Bathing Water Directive covers the annual period from the 1st May to 30th September.

During the UK Bathing Water Regulations mandatory monitoring period the results of the River Tees water microbiology testing of 11 samples taken on 11 occasions at 2 weekly intervals between the 12th May 2005 and the 26th September 2005 are as follows:

The River Tees waters FAILED the EU Bathing Water (Blue Flag) guidance standards.

The River Tees waters FAILED the UK Bathing Water (Mandatory) standards.

As TVR would probably wish to keep the Middlehaven Dock open all year round for recreational water sports microbiological monitoring was continued after the 30th September 2005 the end of the UK Bathing Water Regulations mandatory monitoring period.

Between the 12th May 2005 and the 4th January 2006 the results of the River Tees water microbiology testing of 17 water samples taken on 17 occasions at 2 weekly intervals are as follows:

Up to the 4th January 2006 the River Tees waters have FAILED the EU Bathing Water (Blue Flag) standards.

Up to the 4th January 2006 the River Tees waters have FAILED the UK Bathing Water (Mandatory) standards.

9.2 Recreational Water Sports Chemical Water Quality Assessment

It should be noted that the water quality chemical suite was derived for monitoring the Middlehaven Dock reclamation works and post reclamation works environmental water quality and not the water quality for bathing waters and recreational water sports. As such the environmental water quality monitoring chemical suite did not include all the physico-chemical parameters as set out in the UK Bathing Water Regulations and EU Bathing Water Directive (e.g. Transparency Seetchi's Disc, Surface-active substances reacting with Methylene Blue, Dissolved Oxygen Saturation, Nitrogen Kjeldahl as N, Hexavalent Chromium, Cyanide, Parathion, and Phosphates). This section of the report has to be read in this context.

Since the reclamation works were completed the water quality in the dock and river has been monitored on 9 occasions between October 2002 and December 2004, and on 9 occasions in 2005.

All the water quality chemical testing results available on the site up to December 2005 are attached to this report in **Table 4 - Analysis of Recreational Water Sports Water Quality Chemical Test Results**

The table shows in "**BLUE TEXT**" the relevant recreational water quality assessment criteria used in this report for assessing the chemical test results. Those water quality test results that exceed the relevant assessment criteria are highlighted as follows:

- a) "**PINK**" for **whole body water contact water sports** as exceeding the **WBWCWS Threshold Value** (i.e. Bathing Water and/or 1x Drinking Water),
- b) "**RED**" for **whole body water contact water sports** as exceeding **WBWCWS Action Value** and **incidental body water contact water sports** as exceeding the **IBWCWS Threshold Value** (i.e. Bathing Water and/or 10x Drinking Water),
- c) "**PURPLE**" for **incidental body water contact water sports** as exceeding **IBWCWS Action Value** (i.e. Bathing Water and/or 100x Drinking Water)

The table shows in "**BOLD**" text the Middlehaven Dock water test results that are more elevated than the River Tees water quality at the time of sampling.

The table shows highlighted "**YELLOW**" the test results that did not exceed the laboratory's chemical analysis minimum detection limit.

From the **Table 4** it can be seen that, apart from a small number of random isolated results, that the post reclamation works water quality analysis carried out to date has generally not detected Polychlorinated Biphenyls (PCB's), Polyaromatic Hydrocarbons (PAH's), Organotins, Organo-halogen and Organo-phosphorous compounds, and chlorinated solvents in the analytical suite being tested.

9.2.1 October 2002 to December 2004 - Recreational Water Sports Assessment of Water Quality Chemical Analysis Results

Since the reclamation works were completed the water quality in the River Tees and Middlehaven Dock has been monitored on 9 occasions between October 2002 and December 2004.

UK Bathing Water Regulations Mandatory Parameters

River Tees

Mineral Oil and pH passed both the UK and EU bathing water standards on all 9 occasions.

Phenols failed the UK bathing water standard on 2 of 8 occasions (0.24 mg/l September 2003 and 0.07 mg/l December 2004). The September 2003 result (0.24 mg/l) exceeded the maximum permitted annual limit (0.05 mg/l + 50% = 0.075 mg/l).

Middlehaven Dock

Mineral Oil passed both the UK mandatory and EU guideline bathing water standards on all 9 occasions.

pH failed both the UK mandatory and EU guideline bathing water standards on 1 of 9 occasions (9.1 and 9.4 July 2003).

Phenols failed the UK mandatory bathing water standard on 2 of 8 occasions (0.15 mg/l September 2003 and 0.06 mg/l December 2004). The September 2003 result (0.15 mg/l) exceeded the maximum permitted annual limit (0.05 mg/l + 50% = 0.075 mg/l). **It is to be noted that these were both the same occasions when exceedances were recorded in the River Tees.**

Additional EU Bathing Water Directive Guideline Parameters

River Tees

Ammonium was the only Additional EU Bathing Water Directive Guideline parameter that recorded results in excess of the whole body contact water sports threshold value (1x drinking water – 1.5 mg/l) with exceedances recorded on 4 of 8 occasions (January, April, May, and September 2003) ranging 2.2 to 5.4 mg/l.

Middlehaven Dock

Ammonium was the only Additional EU Bathing Water Directive Guideline parameter that recorded results in excess of the whole body contact water sports threshold value (1x drinking water – 1.5 mg/l) with exceedances recorded on 4 of 8 occasions (January, April, May, and September 2003) ranging 1.7 to 7.6 mg/l. **It is to be noted that these were all the same occasions when exceedances were recorded in the River Tees.**

Non UK or EU Bathing Water Parameters

River Tees

Manganese exceeded the whole body contact water sports threshold value (1x drinking water – 0.05 mg/l) on 1 of 9 occasions (July 2003 – 0.06 mg/l)

Nickel exceeded the whole body contact water sports threshold value (1x drinking water – 20 mg/l) on 1 of 9 occasions (November 2004 – 30 mg/l)

Chemical Oxygen Demand (COD) exceeded the whole body contact water sports action value and incidental body contact water sports threshold value (10x drinking water – 300 mg/l) on 7 of 8 occasions ranging 342 to 2460 mg/l; and the incidental body contact water sports action value (100x drinking water – 3000 mg/l) on the remaining 1 of 8 occasions (April 2003 – 3375 mg/l).

Biological Oxygen Demand (BOD) exceeded the whole body contact water sports threshold value (1x drinking water – 3 mg/l) on 9 of 9 occasions; the whole body contact water sports action value and incidental body contact water sports threshold value (10x drinking water – 30 mg/l) on 8 of 9 occasions; and the incidental body contact water sports action value (100x drinking water – 300 mg/l) on 5 of 9 occasions. BOD exceedances ranged from 4 to 3600 mg/l.

Middlehaven Dock

Manganese exceeded the whole body contact water sports threshold value (1x drinking water – 0.05 mg/l) on 2 of 9 occasions (January 2003 – 0.49 mg/l and November 2004 – 0.1 mg/l)

Nickel exceeded the whole body contact water sports threshold value (1x drinking water – 20 mg/l) on 1 of 9 occasions (January 2003 – 50 mg/l)

Chemical Oxygen Demand (COD) exceeded the whole body contact water sports action value and incidental body contact water sports threshold value (10x drinking water – 300 mg/l) on 8 of 8 occasions; and the incidental body contact water sports action value (100x drinking water – 3000 mg/l) on 1 of 8 occasions. COD exceedances ranged from 411 to 2526 mg/l.

Biological Oxygen Demand (BOD) exceeded the whole body contact water sports threshold value (1x drinking water – 3 mg/l) on 9 of 9 occasions; the whole body contact water sports action value and incidental body contact water sports threshold value (10x drinking water – 30 mg/l) on 8 of 9 occasions; and the incidental body contact water sports action value (100x drinking water – 300 mg/l) on 5 of 9 occasions. BOD exceedances ranged from 4 to 2640 mg/l.

9.2.2 2005 - Recreational Water Sports Assessment of Water Quality Chemical Analysis Results

The water quality in the River Tees and Middlehaven Dock has been monitored on 9 occasions during 2005.

UK Bathing Water Regulations Mandatory Parameters

River Tees

Mineral Oil and pH passed both the UK and EU bathing water standards on all 9 occasions.

Phenols failed the UK bathing water standard on 1 of 9 occasions (0.06 mg/l October 2005).

Middlehaven Dock

pH passed both the UK and EU bathing water standards on all 9 occasions.

Mineral Oil passed both the UK and EU bathing water standards on 8 of 9 occasions. The November 2005 Mineral Oil result for sample 1B (5.52 mg/l) exceeded the incidental body contact water sports action value (100x drinking water – 1 mg/l). However on the same occasion the Mineral Oil result for sample 1A did not exceed the laboratory detection limit (<0.01 mg/l).

Phenols passed the UK mandatory bathing water standard on all 9 occasions.

Additional EU Bathing Water Directive Guideline Parameters

River Tees

Ammonium was recorded on 3 of 9 occasions (April, August, and September 2005) in excess of the whole body contact water sports threshold value (1x drinking water – 1.5 mg/l) with exceedances ranging 1.8 to 3.2 mg/l.

Nitrates were recorded on 2 of 9 occasions (May and September 2005) in excess of the whole body contact water sports threshold value (1x drinking water – 50 mg/l) with exceedances ranging 54.2 to 119.3 mg/l.

Middlehaven Dock

Ammonium was recorded on 4 of 9 occasions (February, April, August, and September 2005) in excess of the whole body contact water sports threshold value (1x drinking water – 1.5 mg/l) with exceedances ranging 1.8 to 3.3 mg/l. **It is to be noted that 3 of the 4 occasions occurred when Ammonium exceedances were also recorded in the River Tees in April, August, and September 2005.**

Nitrates were recorded on 2 of 9 occasions (May and September 2005) in excess of the whole body contact water sports threshold value (1x drinking water – 50 mg/l) with exceedances ranging 67.0 to 92.4 mg/l. **It is to be noted that both these occasions occurred when Nitrates exceedances were also recorded in the River Tees.**

Non UK or EU Bathing Water Parameters

River Tees

Chemical Oxygen Demand (COD) exceeded the whole body contact water sports threshold value (1x drinking water – 30 mg/l) on 8 of 9 occasions; and the whole body contact water sports action value and incidental body contact water sports threshold value (10x drinking water – 300 mg/l) on 6 of 9 occasions. COD exceedances ranged from 72 to 1725 mg/l.

Biological Oxygen Demand (BOD) exceeded the whole body contact water sports threshold value (1x drinking water – 3 mg/l) on 8 of 9 occasions; the whole body contact water sports action value and incidental body contact water sports threshold value (10x drinking water – 30 mg/l) on 6 of 9 occasions; and the incidental body contact water sports action value (100x drinking water – 300 mg/l) on 2 of 9 occasions. BOD exceedances ranged from 16.7 to 450 mg/l.

Middlehaven Dock

Hexachlorobutadiene exceeded the whole body contact water sports threshold value (1x drinking water – 0.0006 mg/l) on 1 of 9 occasions (August 2005 – 0.001mg/l)

Chemical Oxygen Demand (COD) exceeded the whole body contact water sports threshold value (1x drinking water – 30 mg/l) on 9 of 9 occasions; the whole body contact water sports action value and incidental body contact water sports threshold value (10x drinking water – 300 mg/l) on 8 of 9 occasions; and the incidental body contact water sports action value (100x drinking water – 3000 mg/l) on 1 of 9 occasions. COD exceedances ranged from 96 to 3150 mg/l.

Biological Oxygen Demand (BOD) exceeded the whole body contact water sports threshold value (1x drinking water – 3 mg/l) on 9 of 9 occasions; the whole body contact water sports action value and incidental body contact water sports threshold value (10x drinking water – 30 mg/l) on 6 of 9 occasions; and the incidental body contact water sports action value (100x drinking water – 300 mg/l) on 1 of 9 occasions. BOD exceedances ranged from 15.2 to 816 mg/l.

9.3 Summary of Recreational Water Quality Testing Results

9.3.1 Recreational Water Sports Microbiological Testing

River Tees

- a. Up to the 4th January 2006 the River Tees waters have FAILED the EU Bathing Water (Blue Flag) standards.
- b. Up to the 4th January 2006 the River Tees waters have FAILED the UK Bathing Water (Mandatory) standards.

Middlehaven Dock

- a. Up to the 4th January 2006 the Middlehaven Dock waters have FAILED the EU Bathing Water (Blue Flag) standards
- b. Up to the 4th January 2006 the Middlehaven Dock waters have PASSED the UK Bathing Water (Mandatory) standards.

However the Middlehaven Dock waters are regularly flushed out using high volumes of River Tees waters. The River Tees waters have consistently failed the UK Mandatory Bathing Water Regulations microbiological standards. It is therefore considered that there is a significant risk that there may be occasions when the Middlehaven Dock water may also fail the UK Mandatory Bathing Water Regulations microbiological standards if a dock flushing operation coincides with a period when there are highly elevated microbiological concentrations in the River Tees.

It is to be noted that the proposed draft EU Bathing Water Directive does not include the current UK Bathing Water Regulations and/or the current EU Bathing Water Directive microbiological parameters. The introduction in 2 to 3 years time of the new EU Directive with its' proposed 2 new microbiological parameters and pass standards that are likely to set more stringent microbiological standards may therefore affect the assessment of the suitability of the dock for recreational water sports.

9.3.2 Recreational Water Sports Chemical Testing

- 1) In both the River Tees and Middlehaven Dock there have been consistent Ammonium exceedances of the whole body water contact threshold assessment criteria. The Ammonium UK drinking water standard of 1.5 mg/l is not derived as a human health standard but is based on odour. It should also be noted that WHO recommend a non human health standard of 35 mg/l for taste. **However it is considered that Ammonium odours may discourage persons from using the dock for whole body water contact water sports.**
- 2) In both the River Tees and Middlehaven Dock there have been consistent COD and BOD exceedances of the incidental body water contact assessment threshold and action criteria.

The **Chemical Oxygen Demand (COD)** test is a non specific test that measures the quantity of both **biodegradable and non biodegradable organic matter** and is extensively used as a screening test for the analysis of industrial wastes.

The **Biological Oxygen Demand (BOD)** test is a **non specific test** that measures the quantity of “**biologically-degradable**” **organic matter**. The test measures the quantity of oxygen depletion from the ability of common bacteria to digest organic matter over 5 days at 20 degrees C. The 5 days test period appears to be based on the premise that water in English rivers takes 5 days or less to reach the sea.

COD and BOD are non specific tests used as relatively low cost screening indicators of potential poor water quality. COD and BOD are therefore not chemical contaminants in their own right but are primarily indicators of the need for specific organic chemical testing. It is generally considered “as a rule of thumb” that alert levels for potential organic fouling of natural water are 5 mg/l BOD and 8 mg/l COD.

As a tidal estuary passing through a heavily urbanised and industrial area the River Tees water is likely to be receiving both surface water run off and foul water flows with a high organic matter content. The microbiological testing has indicated that this is the case. The flushing and water management of the Middlehaven Dock means that dock water quality will be heavily influenced by the water quality of the River Tees. It is therefore not surprising that high COD and BOD results have been recorded in the River Tees and the Middlehaven Dock waters.

The chemical analysis has not identified consistent significant levels of organic contaminants and therefore it is considered that the consistent elevated COD and BOD results can be discounted and would not preclude the use of the River Tees or Middlehaven Dock for recreational water sports.

- 3) In both the River Tees and Middlehaven Dock there have been random isolated infrequent elevated concentrations of specific chemical compounds above the assessment criteria. It is therefore considered that these results would not preclude the use of the River Tees or Middlehaven Dock for recreational water sports.
- 4) It is to be noted that the current draft new EU Bathing Water Directive does not include any requirements to monitor for chemical parameters. This implies that from experience of the operation of the current directive it is now considered that chemical contaminants are a far less significant hazard than previously thought in respect of human health risks in comparison to the human health risks from microbiological agents.

9.3.2 General Summary Recreational Water Sports Water Quality

River Tees Recreational Water Sports Water Quality

The River Tees is not considered suitable for either whole body contact or incidental body contact water sports unless there is only a very marginal risk of water contact such as with motor boats and powered sailing boats (not under sail) and fishing. Even then full hygiene precautions should be taken e.g. washing hands before eating and drinking.

Middlehaven Dock Recreational Water Sports Water Quality

Whilst the Middlehaven Dock currently appears to meet the UK Bathing Water Regulations there are strong reservations concerning the influence the poor water quality of the River Tees may have on dock water quality through the regular flushing of the dock, routine daily water level management of the dock, and dock gate openings for vessels to enter and exit the dock. In addition the proposed new EU Directive may introduce more stringent microbiological standards that when incorporated into UK legislation in 2/3 years time may adversely impact on the assessment of dock water quality for recreational water sports.

Therefore at the current time WYGE would not recommend the use of the dock for whole body contact water sports by the general public that may include sensitive receptors such as young children, persons with pre-existing health problems, etc.

WYGE consider that careful consideration shall need to be given to the types of whole body water contact recreational water sports that can be permitted in the dock by water sports professionals and dedicated enthusiasts who may be prepared to tolerate occasional incidents of ill health subject to appropriate health and safety risk management procedures being in place.

WYGE consider that careful consideration shall need to be given to the types of incidental body water contact recreational water sports by the general public that would be permitted in the dock subject to appropriate health and safety risk management procedures being in place.

Therefore WYGE consider that health and safety risk management procedures shall need to be in place that are appropriate for both the proposed type(s) of water sport(s) and to the nature of the participants in the water sport(s). Appropriate health and safety risk management procedures may include the erection of prominent health and safety risk warning notices; restrictions on who may use the facility (e.g. only adults in good health with no cuts and/or abrasions); the provision of suitable hygiene facilities with prominent notices giving clear instructions as to their use by all participants before eating, drinking, smoking, etc; regular dock water quality microbiology monitoring with action plans in place ready for if exceptionally high microbiological levels are recorded, etc.

WYGE would therefore recommend that before a final decision is made as to the opening and/or redevelopment of the Middlehaven Dock as a recreational open water watersport(s) facility that advice is obtained from a health and safety professional with specialist experience in the assessment and management of the risks from the health and safety hazards associated with the operation of water sports facilities.

10.0 Recommendations for Future Water Quality Monitoring

10.1 General Chemical Water Quality Monitoring Suite

From the attached tables of chemical test results it can be seen that, apart from a very small number of random isolated results, that the post reclamation works water quality analysis carried out to date has generally not recorded Polychlorinated Biphenyls (PCB's), Polyaromatic Hydrocarbons (PAH's), Pesticides, Organotins, Volatile Organic Compounds (VOC's), and Semi Volatile Organic Compounds (SVOC's) above the laboratory analytical detection limits.

It is therefore considered that there is little benefit in continuing to monitor the water quality for these parameters and it is recommended that, subject to the approval of the Environment Agency, that in future that these parameters are no longer included in the chemical analysis suite.

10.2 Environmental Water Quality Monitoring

The reclamation works have been completed for over 3 years.

There are no foul water discharges into the dock waters and vessels berthed in the dock are no longer permitted to discharge foul water effluent into the dock. There is only a highway surface water discharge into the dock.

As part of the reclamation works a new dock gate was installed to maintain minimum dock water levels for vessels to berth within the dock. However, the British Waterways Board make use of the penstocks in the gates for the management of water levels within the dock (daily during spring tides), and the dock management plan includes for 10x a year opening of the dock gate for 24 hours over 2 river tidal cycles to flush the dock in order to prevent the dock water becoming stagnant. These water management activities will have the result that the water quality within Middlehaven dock is still being predominantly influenced by and shall reflect the poor water quality of this heavily urbanised and industrialised stretch of the River Tees.

Since the works were completed the post reclamation works environmental water quality monitoring does not appear to have regularly recorded elevated chemical contaminant levels in the dock waters that would appear to be inconsistent with the elevated chemical contaminant levels that have been recorded in the River Tees. It is therefore considered likely that the River Tees poor water quality is the predominant source of the elevated contaminant concentrations that have been recorded in the dock waters. It is considered that unless major sewer interceptor works are carried out that the River Tees water is likely to remain of poor quality for the foreseeable future.

It is therefore considered that there is little benefit in continuing to carry out further post reclamation works water quality monitoring and, subject to the approval of the Environment Agency, it is considered that these monitoring works can now cease.

10.3 Recreational Water Sports Water Quality Monitoring

There are no UK regulations in respect of water quality standards for the recreational use of coastal and estuarine waters. The UK Bathing Water Regulations and EU Bathing Water Directive only apply to beaches at seaside resorts. It generally appears to be water sports industry practise to undertake water quality monitoring with reference to the above UK Bathing Water Regulations and EU Bathing Water Directive, however there is wide variation between water sports facilities as to the parameters tested and standards that are applied.

WYGE's previous report on the water quality monitoring within the recreational water sports industry in docks and tidal estuaries indicated that water quality testing is primarily of microbiological parameters and as set out in the UK Bathing Water Regulations (Total Coliforms and Faecal Coliforms) and occasionally also Faecal Streptococci (Intestinal Enterococci) an additional EU Bathing Water Directive Guideline (Blue Flag) parameter. This appears to be based on the health and safety assessment that microbiological parameters represent the most significant short term (hours) human health risk to participants in recreational watersports.

The above view is supported by the current draft of the proposed new EU Directive that currently advocates the withdrawal of 18 of the current EU Directives 19 microbiological, physical, and chemical parameters. The current proposed Draft EU Bathing Water Directive has just 2 microbiological parameters comprising:

- a) **Escherichia Coli (E. Coli) and**
- b) **Intestinal Enterococci** (same bacteria as Faecal Streptococci that is a current EU Bathing Water Directive Guideline (Blue Flag) parameter)

In order to determine the potential implications of the above proposed changes WYGE recommend that the current Middlehaven Dock water quality microbiology monitoring suite should include the new Escherichia Coli (E. Coli) microbiological parameter.

WYGE therefore recommended that recreational water quality microbiological monitoring is to be carried out on the Middlehaven Dock and River Tees every 2 weeks over the next 12 months and the monitoring parameters should comprise:

On Site Observations	Laboratory Testing
Water Colour (Change)	Total Coliforms
Mineral Oil Sheen	Faecal Coliforms
Lasting Foam	Faecal Streptococci
Floating detritus	Escherichia Coli (E. Coli)
Algal Blooms	
Gross sewerage floaters	

- Green – UK Bathing Water Parameters (Mandatory/Legal).**
- Blue – EU Bathing Water Guidance Parameters not incorporated into UK legislation.**
- Black - Neither UK nor EU Bathing Water Parameters.**
- Red - Additional proposed Draft EU Bathing Water Directive Parameter**

No monitoring of Salmonella and Enteroviruses has been recommended as there are reasonable concerns that the current standards (zero) are unrealistically too stringent in practical terms.

It is recommended that the recreational watersports water quality monitoring results are assessed against both the relevant UK Regulations, EC Directive Guideline (Blue Flag), and proposed Draft EU Directive Bathing Water Standards.

If any elevated microbiological parameter levels are recorded WYGE recommends that the 2 week monitoring frequency should to be increased to once a week (or such shorter period as agreed with TVR) until the water quality improves to an acceptable level.

On completion of the above monitoring for the next 12 months the results should be assessed and above monitoring regime and parameters reviewed and amended as appropriate.

**WHITE YOUNG GREEN ENVIRONMENTAL
REPORT CONDITIONS**

WHITE YOUNG GREEN ENVIRONMENTAL

REPORT CONDITIONS

This report is produced solely for the benefit of Tees Valley Regeneration and English Partnerships and no liability is accepted for any reliance placed on it by any other party unless specifically agreed in writing otherwise. This report refers, within the limitations stated, to the condition of the site at the time of the inspections. No warranty is given as to the possibility of future changes in the condition of the site as characteristics, especially liquid and gaseous materials, are likely to vary with time.

This report is based on readily available geological records, the recorded physical investigation, the strata observed in the works, together with the results of completed site and laboratory tests. Whilst skill and care has been taken to interpret these conditions likely between or below investigation points, the possibility of other characteristics not revealed cannot be discounted, for which no liability can be accepted. The impact of our assessment on other aspects of the development requires evaluation by other involved parties.

Whilst confident in the findings detailed within this report because ground conditions is not an exact science, subject to risk analysis, we are unable to give categoric assurances that they will be accepted by others as they may have differing objectives. This report is prepared for the proposed uses stated in the report and should not be used in a different context without reference to WYGE. In time improved practices or amended legislation may necessitate a re-assessment.

The opinions expressed cannot be absolute due to the limitations of time and resources within the context of the agreed brief and the possibility of unrecorded previous in ground activities. The ground conditions have been sampled or monitored in recorded locations and tested for some of the more common chemicals generally expected, including any highlighted in the client's instructions. Other concentrations or types of chemicals may exist. Factual results are presented initially compared to commonly adopted guidelines, which are not definitive in the UK and should be further assessed for actual risk.

WATER QUALITY ASSESSMENT TABLES

E005241 Middlehaven Dock, Middlesbrough

Table 1

**Estuarine and Saltwater Environmental
Water Quality Chemical Assessment Criteria**

December 2005

E005241 Middlehaven Dock, Middlesbrough

Table 1

**Environmental Estuarine Water Quality Chemical Assessment Criteria
December 2005**

Whilst drinking water standards are included for information in this table it is considered that this section of the River Tees as a saltwater tidal estuary flowing through a highly urbanised and industrial area is unlikely to be considered a suitable source for potable water abstraction for human consumption.

Determinand	Unit	UK EQS Estuarine Saltwater (e)	UK Drinking Water (b)	WHO Drinking Water (h)
pH	unit	6.0 to 8.5	6.5 to 10.0	
Colour			20.0 mg/l Pt/Co	15 TCU NH
Mineral Oil	mg/l		0.05 (c)	
Phenols	mg/l	0.03	0.0005	
Ammoniacal Nitrogen NH ₃ -N	mg/l	0.021	0.5	1.5 NH
Ammonium NH ₄ -N	mg/l	0.6 (f)	0.1 (c)	
Suspended Solids	mg/l	25 (g)		
Dissolved Oxygen O ₂ Saturation	%	70 (f)		
COD	mg/l		30.0 (d)	
BOD	mg/l	4.0 (f)		
Nitrate NO ₃	mg/l	30.0	50.0	50.0
Sulphide	mg/l			
Mercury Total	mg/l		0.001	0.001
Mercury Dissolved	mg/l	0.0005		
Arsenic Total	mg/l		0.01	0.01
Arsenic Dissolved	mg/l	0.025		
Selenium Total	mg/l		0.01	0.01
Selenium Dissolved	mg/l			
Lead Total	mg/l		0.025	0.01
Lead Dissolved	mg/l	0.025		
Copper Total	mg/l		2.0	2.0
Copper Dissolved	mg/l	0.005		
Zinc Total	mg/l		3.0 (c)	3.0 NH
Zinc Dissolved	mg/l	0.04		
Cadmium Total	mg/l		0.005	0.003
Cadmium Dissolved	mg/l	0.005		
Manganese Total	mg/l		0.05	0.5
Manganese Dissolved	mg/l			
Nickel Total	mg/l		0.02	0.02
Nickel Dissolved	mg/l	0.03		
Barium Total	mg/l		0.1 (c)	0.7
Barium Dissolved	mg/l			
Chromium Total	mg/l		0.05	0.05
Chromium Dissolved	mg/l	0.015		
PCB Congeners 28, 52, 101, 118, 138, 153, 180	mg/l			Total 0.0005 US EPA

Determinand	Unit	UK EQS Estuarine Saltwater (e)	UK Drinking Water (b)	WHO Drinking Water (h)
Benzo(ghi)perylene	mg/l		* PAH Total	
Benzo(b)fluoranthene	mg/l		* PAH Total	
Benzo(k)fluoranthene	mg/l		* PAH Total	
Indo(1,2,3-cd)pyrene	mg/l		* PAH Total	
Benzo(a)pyrene	mg/l		0.00001	0.0007
Fluoranthene	mg/l			0.004
Napthalene	mg/l	0.005 (0.08)		
Acenaphthylene	mg/l			
Acenephtene	mg/l			
Fluorene	mg/l			
Phenanthene	mg/l			
Anthracene	mg/l			
Pyrene	mg/l			
Benzo(a)anthracene	mg/l			
Chrysene	mg/l			
Dibenzo(ah)anthracene	mg/l			
PAH Total	mg/l		* 0.0001	
Fenithrothion	mg/l	0.00001 (0.00025)	0.0001	
Aldrin	mg/l	0.00001	0.00003	0.00003 Aldrin/Dieldrin
HCH - Gamma	mg/l	0.00002	0.0001	
Dichlorvos	mg/l	0.00004	0.0001	
Dieldrin	mg/l	0.00001	0.00003	0.00003 Aldrin/Dieldrin
Malathion	mg/l	0.00002 (0.0005)	0.0001	
DDT Total	mg/l	0.000025	0.0001	0.002
DDT (pp)	mg/l	0.00001	0.0001	
Endrin	mg/l	0.000005	0.0001	
Total Endosulphan Alpha and Endosulphan Beta	mg/l	0.000003	0.0001	
Hexachlorobenzene (HBC)	mg/l	0.00003	0.0001	0.001
1,2 Dichloroethene (Dichoroethylene)	mg/l			0.05
Pentachlorophenol (PCP)	mg/l	0.002	0.0001	0.009
Atrazine		0.002 (0.01)	0.0001	0.002
Simazine		0.002 (0.01)	0.0001	0.002
Total Atrazine & Simazine	mg/l	0.002 (0.01)		
Azinphos - methyl	mg/l	0.00001 (0.00004)	0.0001	
Hexachlorobutadiene (HCBd)	mg/l	0.0001		0.0006
Organotin Tributyl Tin Triphenyl Tin	mg/l	0.000002 0.000008		0.002 -

Determinand	Unit	UK EQS Estuarine Saltwater (e)	UK Drinking Water (b)	WHO Drinking Water (h)
Trifluralin Dissolved Total	mg/l	0.0001 (0.02)	0.0001	0.02
Chloroform	mg/l	0.012		0.2
Trichlorobenzene (TCB)	mg/l	0.0004		0.02
Carbon Tetrachloride	mg/l	0.012		0.002
Tetrachloroethylene (PER or PCE)	mg/l	0.01	0.01	0.04
Trichloroethylene (TCE)	mg/l	0.01	0.03	0.07
Total PCE & TCE Tetrachloroethylene and Trichloroethylene	mg/l		0.01	

Sources:

- a) The UK Bathing Waters (Classification) Regulations 1991/1597
- b) The UK Water Supply (Water Quality) Regulations 2000/3184 and 2001/2885
 - * PAH Total is the sum of:
 - Benzo(b)flouranthene
 - Benzo(k)flouranthene
 - Benzo(ghi)perylene
 - Indeno(1,2,3-cd)pyrene
- c) The UK Surface Waters (Abstraction for Drinking Water) Classification Regulations 1996/3001
- d) The EC Drinking Water Directive 75/440
- e) Environmental Quality Objectives (EQS) DOE Circular 7/89 **Saltwater Estuaries** and Coastal – figure in (maximum annual)
- f) River Ecosystem Classification (RE2 – Good) and River General Quality Assessment Scheme (GQA B – Good)
- g) Environmental Assessment Level (EAL) Fisheries
- h) WHO Guidelines for Drinking Water Quality 1993 and Addendum No. 1 1998
NH – Non Health parameter i.e. taste, odour etc

E005241 Middlehaven Dock, Middlesbrough

Table 2

**Recreational Water Sports
Water Quality Assessment Criteria**

December 2005

E005241 Middlehaven Dock, Middlesbrough
Table 2
Recreational Estuarine and Saltwater Water Quality Assessment Criteria
December 2005

The World Health Organisation (WHO) in their Guidelines for Safe Recreational Water Environments, Volume 1, Coastal and Fresh Waters, 2003, estimate that human consumption of drinking water is normally on average about 2 litres a day and that it is considered that for recreational water activities that an involuntary water ingestion through mouth and nasopharynx of 0.2 litres a day – 0.1 litre per full contact swimming session with 2 sessions a day – may often be reasonably assumed.

In respect of recreational water sports the use of UK, EU, and WHO drinking water standards are therefore “conservative” as based on daily long term human ingestion of at least 10x the potential quantity of water that may be ingested during occasional full contact immersion recreational water activities such as bathing, swimming, sub-aqua diving, water skiing, etc. It should also be noted that drinking water standards are also “conservative” in that they are often based on non human health criteria such as odour, taste, and appearance.

Therefore where there are no set UK and/or EC Bathing Water standards such as for pesticides, metals and metalloids, cyanides, etc it is recommended that these parameters are assessed against the appropriate UK/EU/WHO Drinking Water Standard as follows:

- Drinking Water Standard for regular full contact watersports such as jet skiing, water skiing, windsurfing, kayaking, rafting, surfing, swimming, sub-aqua diving, etc.
- 10 times the Drinking Water Standard for incidental contact watersports with risk of accidental immersion such as motor boating, sailing, rowing, canoeing, angling, etc.

The table below sets out the current UK and EU Bathing Water standards and the UK, EU, and WHO Drinking Water standards.

Determinand	Unit	UK Bathing Water (all 95% pass rate) EU Bathing Water Guideline (90% pass rate except TC and FC 80%) (a)	UK Drinking Water (b) (c) EU Drinking Water (d)	WHO Drinking Water (h)
Microbiological				
Total Coliforms (TC)	No 100ml	10,000 (4) (500 – 80%)	50 (d A1G) 5000 (d A2G)	Not Detectable
Faecal Coliforms (FC) or E Coli	No 100ml	2,000 (4) (100 – 80%)	20 (d A1G) 2000 (d A2G)	Not Detectable
Faecal Streptococci	No 100ml	N/A (100)	20 (d A1G) 1000 (d A2G)	
Salmonella	per 1 litre	Absent (0)	0 per 5L (d A2G)	
Enteroviruses - Plaque Forming Units	PFU per 10 litre	No PFU (0)		Not Present
Physico-chemical				
pH	unit	6.0 to 9.0 As above	6.5 to 10.0	<8.0
Colour		No abnormal change in colour (Test if Change) As above	20.0 mg/l Pt/Co	15 TCU NH
Mineral Oil at surface	mg/l	No film visible on surface of water and no odour (4) (≤ 0.3)	0.01 (b 1989) 0.05 (d A1I)	
Surface-active substances reacting with Methylene Blue (Lauryl sulphate)	mg/l	No lasting foam (4) (≤ 0.3)	0.2 (d A2G)	
Phenols C ₆ H ₅ OH	mg/l	No specific odour (4) 0.05 (Max 0.075) (≤ 0.005)	0.0005 0.005 (d A2I)	
Transparency Secchi's Disc	metre	1 (Min -50% or 0.5m) (2)		
Dissolved Oxygen % Saturation	% O ₂	N/A (80 ≤ to ≤ 120)	> 70 (d A1G)	
Tarry substances and floating materials such as wood, plastic articles, bottles, containers of glass, plastic, rubber, or any other substance. Waste or splinters.	Visual	N/A (Absence)		
Ammonia as NH ₄	NH ₄ mg/l	N/A NVS (a)**	0.5 1.5 (d A2I)	1.5 NH Odour 35 NH Taste
Nitrogen Kjeldahl as N (Ammonia and Organic Nitrogen)	TKN as N mg/l	N/A NVS (a)**	2 (d A2G)	

Determinand	Unit	UK Bathing Water (all 95% pass rate) EU Bathing Water Guideline (90% pass rate except TC and FC 80%) (a)	UK Drinking Water (b) (c) EU Drinking Water (d)	WHO Drinking Water (e)
Other Substances regarded as Indicators of Pollution				
Parathion		N/A NVS (a) *	0.0001	
Hexachlorocyclohexanes (HCH) all isomers	mg/l	N/A NVS (a) *	0.0001	
Dieldrin	mg/l	N/A NVS (a) *	0.00003	0.00003 Aldrin+Dieldrin
Total Pesticides – Sum of Parathion, HCH, and Dieldrin	mg/l	N/A NVS (a) *	0.0005 0.0025 (d A2I)	
Arsenic Total	mg/l	N/A NVS (a) *	0.01	0.01
Cadmium Total	mg/l	N/A NVS (a) *	0.005	0.003
Chromium Total Hexavalent Chromium CrVI	mg/l	N/A NVS (a) *	0.05	0.05
Lead Total	mg/l	N/A NVS (a) *	0.025	0.01
Mercury Total	mg/l	N/A NVS (a) *	0.001	0.001
Cyanides Cn	mg/l	N/A NVS (a) *	0.05	0.07
Nitrates NO ₃	mg/l	N/A NVS (a) *	50.0	50.0
Phosphates	mg/l	N/A NVS (a) *	0.7 P ₂ O ₅ (d A2G)	

Sources:

- a) The **UK Bathing Waters (Classification) Regulations 1991/1597**, annual monitoring requirements cover the period beginning on the 1st May and ending on 30th September. Water samples are to be taken preferably at 30cm below the surface except for Mineral Oils which must be taken at surface level. Results can be disregarded if variation is the result of abnormal weather condition, floods, or other natural disasters. **These UK regulations only apply to resort beaches and are not mandatory or legally binding for recreational water sports facilities on any inland freshwaters or coastal/estuarine saltwaters.**

GREEN Fortnightly testing – (4) – May be doubled to 4 weekly testing if previous years monitoring show waters are of an appreciably higher standard than required for classification in question and the quality of the waters has not subsequently deteriorated and is unlikely to do so. **RED – Maximum limits.**

BLACK Samples must be taken when there are grounds for suspecting there has been deterioration in the quality of the waters or the substance is likely to be present in the waters.

BLUE Bathing Water Quality Directive 76/160/EEC – Guideline (Blue Flag) – Resort Beaches Only and NOT incorporated into UK Legislation.

NVS (a)* No Value Set for either G or I with note that concentration is to be checked with the competent authorities

NVS (a)** No Value Set for either G or I with note that concentration is to be checked with the competent authorities where there is a tendency to eutrophication of the water (over enrichment of nutrients in the water leading to accelerated algae growth etc).

- b) The Water Supply (Water Quality) Regulations 2000/3184 and 2001/2885
c) The Surface Waters (Abstraction for Drinking Water) Classification Regulations 1996/3001
d) The EC Drinking Water Directive 75/440 – not incorporated into UK legislation.
e) WHO Guidelines for Drinking Water Quality 1993 and Addendum No. 1 1998 (**NH** = Non Health parameter i.e. taste, odour etc)

E005241 Middlehaven Dock, Middlesbrough

Table 3

**Estuarine and Saltwater Environmental
Water Quality Chemical Assessment**

December 2005

Table 3

Estuarine and Saltwater Environmental Water Quality Chemical Assessment

December 2005

The table shows in "**BLUE TEXT**" the relevant environmental water quality assessment criteria used in this report for assessing the chemical test results. Those water quality chemical test results that exceed the relevant environmental assessment criteria are highlighted in "**RED**".

The table shows in "**BOLD TEXT**" the dock water test results that are more elevated than the River Tees water result at the time of sampling.

The table shows highlighted "**YELLOW**" the test results that did not exceed the chemical analysis minimum detection limit.

Middlehaven Dock Reclamation
 Table 3/1 - Analysis of Environmental Water Quality Testing Results
 Pre-Works to October 2001

ANALYTE	Units	UK Estuarine EQS Values	Pre-Works	Pre-Works	Pre-Works	Oct 99 6B	Oct 99 6T
			Dock Water Bottom	Dock Water Surface	River Tees Water	Dock Water	Dock Water
Ammoniacal Nitrogen as N	mg/l		0.5	0.3	0.66		
Ammonium NH4-N	mg/l	0.6	0.55	0.39	0.66		
COD total	mg/l		201.60	171.4	39.0		
BOD	mg/l	4	2.00-5.90	4.40-8.00	2.8		
Chlorophyll a	µg/l		18.1	69.7	0.084		
Suspended Solids	mg/l	25	46.25-57.5	43.5-64.75	63.63		
pH	Units	<6, 8.5<	7.74-8.35	8.15-8.49	7.80		
Dissolved Oxygen O2	mg/l	<6 SEPA	5.35-12.10	11.75-12.60	10.85		
Dissolved O2 Saturation (%)	%	<70%	60.70-130.24	126.11-135.24	119.2		
Secchi Extinction Depth	metre		n/a	0.80 - 1.20	1.45		
Salinity (ppt(1000))	g/l		30.10-32.50	26.90-29.40	36.05		
Nitrate	mg/l	30	all <0.50	all <0.50	0.58		
Phenol Total Monohydride	mg/l	0.03	all <0.05	all <0.05	all <0.05		
Sulphide	mg/l		all <0.1	all <0.1	all <0.1		
Mineral Oil	mg/l		mostly <0.2	<0.02	<0.20		
Mercury (total)	µg/l		all <0.02	all <0.02		<0.02	<0.02
Mercury (dissolved)	µg/l	0.5	all <0.02	all <0.02			
Arsenic (total)	µg/l		<5.0	<5.0			
Arsenic (dissolved)	µg/l	25	<5.0	<5.0			
Selenium (total)	µg/l		all 1.00	all 1.00			
Selenium (dissolved)	µg/l		all 1.00	all 1.00			
Lead (total)	µg/l		<50	<50	<50		
Lead (dissolved)	µg/l	25	<50	<50	<50		
Copper (total)	µg/l		141	140	160		
Copper (dissolved)	µg/l	5	143.72	135.5	150		
Zinc (total)	mg/l		<0.04	<0.04	<0.04		
Zinc (dissolved)	mg/l	0.04	<0.04	<0.04	<0.04		
Cadmium (total)	µg/l		<3	6.75	<3		
Cadmium (dissolved)	µg/l	5	<3	<3	<3		
Manganese (total)	mg/l		all <1.0	<1.0			
Manganese (dissolved)	mg/l		all <1.0	all <1.1			
Nickel (total)	µg/l		<30	<30	<30		
Nickel (dissolved)	µg/l	30	<30	<30	<30		
Barium (total)	mg/l		all <1.0	all <1.0			
Barium (dissolved)	mg/l		all <1.1	all <1.1			
Chromium (total)	mg/l		<1.0	<1.0		<0.70	<0.70
Chromium (dissolved)	mg/l	0.015	<1.0	<1.0			

January 2001 - Works				
1	2	3	4	5
4.2	4.8	3.9	4.4	4.8
5.4	6.2	5	5.7	6.2
428	510	514	478	490
9.0	5.0	5.0	4.0	7.0
0.92	0.83	0.82	1.00	0.70
36	22	11	106	50
8.3	8.4	8.4	8.4	8.4
8.6	8.2	9.1	9.4	9.8
27.61	27.62	27.47	27.46	27.23
<1.0	<1.0	<1.0	<1.0	<1.0
<0.01	<0.01	<0.01	<0.01	<0.01
<0.1	<0.1	<0.1	<0.1	<0.1
<0.01	<0.01	<0.01	<0.01	<0.01
<0.1	<0.1	<0.1	<0.1	<0.1
0.2	<0.1	<0.1	<0.1	<0.1
6.6	5.9	6	6.4	6.5
4.9	5.3	4.9	5.3	5.3
<1.0	<1.0	<1.0	<1.0	<1.0
<1.0	<1.0	<1.0	<1.0	<1.0
<30.0	<30.0	<30.0	<30.0	<30.0
<30.0	<30.0	<30.0	<30.0	<30.0
<10.0	<10.0	<10.0	<10.0	<10.0
<10.0	<10.0	<10.0	<10.0	<10.0
1.22	1.10	1.11	1.16	1.14
1.16	1.00	1.02	1.02	1.02
<0.1	<0.1	<0.1	<0.1	<0.1
<0.1	<0.1	<0.1	<0.1	<0.1
1.44	1.39	1.38	1.36	1.38
1.27	1.24	1.25	1.25	1.27
180	190	170	190	190
50	50	50	50	70
0.06	0.06	0.06	0.07	0.07
0.05	0.05	0.06	0.06	0.07
0.11	0.13	0.12	0.11	0.11
0.08	0.07	0.06	0.08	0.07

Oct 01 Works Dock
1.2
1.6
529
2.0
8
8.0
8.7
20.5
<1.0
<0.01
<0.1
<0.01
<0.1
<0.1
5.3
5.3
1.9
1.6
<30.0
<30.0
<10
<10
0.36
0.36
<1.0
<1.0
0.23
0.13
40
40
0.1
0.07
<0.01
<0.01

Exceeds UK EQS	
Below Analysis Detection Limit	

Middlehaven Dock Reclamation
 Table 3/2 - Analysis of Environmental Water Quality Testing Results
 October 2002 to December 2005

ANALYTE	Units	UK Estuarine EQS Values	October 2002 - Post Works			January 2003 - Post Works			April 2003 - Post Works			May 2003 - Post Works			July 2003 - Post Works		
			1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River
Ammoniacal Nitrogen as N	mg/l		4.1	4.4	2.3	2.3	2.2	1.9	3.5	4.3	1.6	5.9	5.6	4.1	<0.1	<0.1	****
Ammonium NH4-N	mg/l	0.6	1.1	1.1	0.6	2.9	2.9	2.4	4.4	5.3	5.2	7.6	1.5	5.4	<0.5	<0.5	****
COD total	mg/l		505	411	400	492	496	484	1325	1550	3375	1700	2475	1500	****	****	****
BOD	mg/l	4	2	4	4	40	30	38	1380	1560	3600	1200	1680	1020	2640	2580	2640
Chlorophyll a	µg/l		<0.5	27	<0.5	<0.5	<0.5	0.6	6.9	3.1	1.4	4.8	4.3	0.6	2.8	13.4	<0.5
Suspended Solids	mg/l	25	270	237	286	<5	8	6	57	44	60	146	165	160	99	99	83
pH	units	<6, 8.5<	7.9	8.3	8.3	7.9	8.0	8.0	8.8	8.9	7.7	8.0	8.1	7.7	9.4	9.1	7.9
Dissolved Oxygen O2	mg/l	<6 SEPA	10.3	10.4	10.3	10.5	9.7	10.0	9.7	10	9.4	5.3	6.0	7.1	11.1	****	****
Dissolved O2 Saturation (%)	%	<70															
Secchi Extinction Depth	metre																
Salinity (ppt(1000))	g/l		26.36	25.28	25.36	11.9	11.56	8.91	3.74	3.39	3.22	2.94	2.78	2.77	7.07	6.55	6.57
Nitrate	mg/l	30	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.4	9.3	12.4	11.7	11.9	<1.0	<1.0	<1.0
Phenol Total Monohydride	mg/l	0.03	0.02	0.02	<0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.01	0.01	0.01
Sulphide	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	****
Mineral Oil	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mercury (total)	µg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	****
Mercury (dissolved)	µg/l	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	0.2	0.1	<0.1	<0.1	****
Arsenic (total)	µg/l		1.9	1.7	1.5	1.9	2.0	1.1	1.4	1.2	2.6	1.5	1.4	1.6	<1.0	<1.0	****
Arsenic (dissolved)	µg/l	25	1.6	1.6	1.4	2.2	2.0	<1.0	<1.0	<1.0	2.1	1.2	1.3	1.6	<1.0	<1.0	****
Selenium (total)	µg/l		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	****
Selenium (dissolved)	µg/l		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	****
Lead (total)	µg/l		<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0
Lead (dissolved)	µg/l	25	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0
Copper (total)	µg/l		20	20	20	10	10	<10	20	20	30	20	10	20	20	20	20
Copper (dissolved)	µg/l	5	20	20	20	<10	<10	<10	20	20	20	10	10	10	10	20	10
Zinc (total)	mg/l		0.22	0.25	0.2	0.54	0.47	0.36	0.24	0.19	0.24	0.09	0.11	0.09	0.15	0.18	0.33
Zinc (dissolved)	mg/l	0.04	0.19	0.18	0.16	0.39	0.4	0.27	0.05	0.05	0.06	0.04	0.05	0.06	0.07	0.07	0.08
Cadmium (total)	µg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	0.3	0.5	0.1	0.3	0.4	1.1	1.4	****
Cadmium (dissolved)	µg/l	5	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	0.6	0.5	0.6	0.8	<0.1	0.2	1.2	1.3	****
Manganese (total)	mg/l		<0.01	<0.01	<0.01	0.05	0.49	0.02	0.01	0.01	0.03	0.02	0.02	0.03	0.01	0.03	0.06
Manganese (dissolved)	mg/l		<0.01	<0.01	<0.01	0.05	0.05	0.01	<0.01	<0.01	0.02	<0.01	<0.01	0.02	<0.01	<0.01	0.05
Nickel (total)	µg/l		<10	<10	<10	50	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Nickel (dissolved)	µg/l	30	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Barium (total)	mg/l		0.01	0.01	0.01	<0.01	<0.01	0.02	0.01	0.01	<0.01	0.01	0.02	0.01	<0.01	<0.01	<0.01
Barium (dissolved)	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium (total)	mg/l		0.04	0.02	0.01	0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium (dissolved)	mg/l	0.015	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Exceeds UK EQS	
Below Analysis Detection Limit	

Middlehaven Dock Reclamation
Table 3/2 - Analysis of Environmental Water Quality Testing Results
October 2002 to December 2005

ANALYTE	Units	UK Estuarine EQS Values	October 2002 - Post Works			Jan 2003 - Post Works			April 2003 - Post Works			May 2003 - Post Works			July 2003 - Post Works		
			1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River
Individual PCB Congeners (28, 52, 101, 118, 138, 153, 180)	µg/l		all <1.0	all <1.0	all <1.0	all <1	all <1	all <1	all <0.05	all <0.05	all <0.05	all <0.05	all <0.05	all <0.05	all <0.05	all <0.05	
Total PCB's (7 congeners)	µg/l		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Benzo (ghi) perylene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Benzo (b) fluoranthene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Benzo (k) fluoranthene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Indeno (1,2,3-cd) pyrene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Benzo (a) pyrene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Fluoranthene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Naphthalene	µg/l	5 (80)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Acenaphthylene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Acenaphthene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Fluorene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Phenanthrene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Anthracene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Pyrene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Benzo (a) anthracene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Chrysene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Dibenz (ah) anthracene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Total PAH's (EPA 16)	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Fenitrothion (dissolved)	mg/l	0.00001 (0.00025)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Aldrin	mg/l	0.00001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
HCH - Hexachlorocyclohexane	mg/l	0.00002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Dichlorvos	mg/l	0.00004	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Dieldrin	mg/l	0.00001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Malathion	mg/l	0.00002 (0.0005)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
DDT (all isomers)	mg/l	0.000025	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
DDT(para para)	mg/l	0.00001	<0.01	<0.01	<0.01												
Endrin	mg/l	0.000005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Endosulphan Alpha	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Endosulphan Beta	mg/l	0.000003	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Hexachlorobenzene	mg/l	0.00003	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
1,2 Dichloroethane	µg/l	10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Chloroform	µg/l	12	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Pentachlorophenol	mg/l	0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Hexachlorobutadiene	mg/l	0.0001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Organotin (total)	mg/l	0.00001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Trifluralin	mg/l	0.0001 (0.02)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Atrazine (alone & + Simazine)	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Simazine (alone & + Atrazine)	mg/l	0.002 (0.01)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Azinphos-methyl	mg/l	0.00001 (0.00004)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Trichlorobenzene	µg/l	0.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Carbon Tetrachloride	µg/l	12	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Tetrachloroethylene	µg/l	10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Trichloroethylene	µg/l	10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	

Middlehaven Dock Reclamation
 Table 3/2 - Analysis of Environmental Water Quality Testing Results
 October 2002 to December 2005

ANALYTE	Units	UK Estuarine EQS Values	August 2003 - Post Works			September 2003 - Post Works			November 2004 - Post Works			December 2004 - Post Works			February 2005 - Post Works		
			1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River
Ammoniacal Nitrogen as N	mg/l		<0.1	<0.1	<0.1	0.4	0.3	0.4	1.1	0.7	1.0	0.1	0.3	0.4	2.7	2.6	1.1
Ammonium NH4-N	mg/l	0.6	<0.5	<0.5	<0.5	<0.5	1.7	2.2	1.4	0.9	1.2	<0.5	<0.5	0.5	3.5	3.3	1.4
COD total	mg/l		768	882	1224	2358	2460	1884	1716	2526	2460	1320	1404	342	240	852	558
BOD	mg/l	4	522.0	589.5	855	1602	1704	1122	237	190.5	43.9	274.5	498.0	63.4	35.6	136.5	65.3
Chlorophyll a	µg/l		16.4	16.0	0.7	0.8	<0.5	<0.5									
Suspended Solids	mg/l	25	177	104	74	80	79	133	39	34	22	102	83	57	38	43	43
pH	units	<6, 8.5<	9.0	9.0	7.8	7.6	7.7	7.6	7.9	7.9	7.6	7.7	7.7	7.6	7.5	7.5	7.9
Dissolved Oxygen O2	mg/l	<6 SEPA	8.8	8.9	10.5	9.2	9.3	10.7	11.1	11.3	10.2	10.2	10.0	9.1	8.1	9.3	8.7
Dissolved O2 Saturation (%)	%	<70															
Secchi Extinction Depth	metre																
Salinity (ppt(1000))	g/l		23.9	23.84	25.01	7.1	7.06	6.64	22.78	22.88	17.02	25.72	25.59	16.86	10.32	10.27	7.3
Nitrate	mg/l	30	<1.0	<1.0	<1.0	<1.0	<1.0	36.1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	7.3	7.6	9.8
Phenol Total Monohydride	mg/l	0.03				0.04	0.15	0.24	0.03	<0.01	0.01	0.01	0.06	0.07	0.01	<0.01	0.01
Sulphide	mg/l		0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mineral Oil	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mercury (total)	µg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mercury (dissolved)	µg/l	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic (total)	µg/l		<1.0	<1.0	2.0	2.0	2.8	3.3	1.1	1.1	1.0	1.8	1.4	1.0	1.0	<1.0	<1.0
Arsenic (dissolved)	µg/l	25	<0.01	<0.01	1.6	1.6	1.8	3.5	1.3	1.4	1.2	1.3	1.4	<1.0	<1.0	1.2	<1.0
Selenium (total)	µg/l		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Selenium (dissolved)	µg/l		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Lead (total)	µg/l		<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0
Lead (dissolved)	µg/l	25	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0
Copper (total)	µg/l		20	20	30	10	10	10	<10	20	20	50	50	50	30	30	50
Copper (dissolved)	µg/l	5	10	10	10	10	10	10	30	10	30	40	40	50	50	50	60
Zinc (total)	mg/l		0.03	0.11	0.12	0.06	0.06	0.06	0.21	0.20	0.18	0.19	0.19	0.16	0.04	0.06	0.02
Zinc (dissolved)	mg/l	0.04	<0.01	0.06	0.06	0.05	0.05	0.05	0.17	0.18	0.15	0.13	0.15	0.09	0.04	0.04	0.03
Cadmium (total)	µg/l		0.4	0.3	0.2	<0.1	<0.1	<0.1	0.2	<0.1	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium (dissolved)	µg/l	5	0.4	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese (total)	mg/l		0.02	0.04	0.05	0.01	0.03	0.03	0.1	<0.01	0.03	0.04	0.03	0.04	0.05	0.05	0.03
Manganese (dissolved)	mg/l		<0.01	0.02	0.04	0.01	0.03	0.03	<0.01	<0.01	0.02	0.02	0.02	0.03	0.04	0.04	0.04
Nickel (total)	µg/l		10	<10	<10	<10	<10	<10	20	20	30	<10	<10	10	<10	<10	<10
Nickel (dissolved)	µg/l	30	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Barium (total)	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.02	<0.01	<0.01	0.01	0.04	0.03	0.04
Barium (dissolved)	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	0.04	0.03	0.04
Chromium (total)	mg/l		<0.01	0.03	0.04	<0.01	<0.01	<0.01	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium (dissolved)	mg/l	0.015	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Exceeds UK EQS	
Below Analysis Detection Limit	

Middlehaven Dock Reclamation
 Table 3/2 - Analysis of Environmental Water Quality Testing Results
 October 2002 to December 2005

ANALYTE	Units	UK Estuarine EQS Values	August 2003 - Post Works			September 2003 - Post Works			Nov 2004 - Post Works			Dec 2004 - Post Works			Feb 2005 - Post Works		
			1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River
Individual PCB Congeners (28, 52, 101, 118, 138, 153, 180)	µg/l		All <0.05	All <0.05	All <0.05	All <0.05	All <0.05	All <0.05	all <1.0	all <1.0	all <1.0	all <1.0	all <1.0	all <1.0	all <1.0	all <1.0	
Total PCB's (7 congeners)	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Benzo (ghi) perylene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Benzo (b) fluoranthene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Benzo (k) fluoranthene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Indeno (1,2,3-cd) pyrene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Benzo (a) pyrene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Fluoranthene	µg/l		<0.05	<0.05	<0.05	0.21	0.13	0.29	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Naphthalene	µg/l	5 (80)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Acenaphthylene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Acenaphthene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Fluorene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.11	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Phenanthrene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Anthracene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Pyrene	µg/l		<0.05	<0.05	<0.05	0.26	0.15	0.26	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Benzo (a) anthracene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Chrysene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Dibenz (ah) anthracene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Total PAH's (EPA 16)	µg/l		<0.05	<0.05	<0.05	0.47	0.28	0.55	0.26	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Fenitrothion (dissolved)	mg/l	0.00001 (0.00025)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Aldrin	mg/l	0.00001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
HCH - Hexachlorocyclohexane	mg/l	0.00002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Dichlorvos	mg/l	0.00004	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Dieldrin	mg/l	0.00001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Malathion	mg/l	0.00002 (0.0005)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
DDT (all isomers)	mg/l	0.000025	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
DDT(para para)	mg/l	0.00001															
Endrin	mg/l	0.000005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Endosulphan Alpha	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Endosulphan Beta	mg/l	0.000003	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Hexachlorobenzene	mg/l	0.00003	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
1,2 Dichloroethane	µg/l	10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Chloroform	µg/l	12	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Pentachlorophenol	mg/l	0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Hexachlorobutadiene	mg/l	0.0001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
Organotin (total)	mg/l	0.00001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Trifluralin	mg/l	0.0001 (0.02)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Atrazine (alone & + Simazine)	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Simazine (alone & + Atrazine)	mg/l	0.002 (0.01)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Azinphos-methyl	mg/l	0.00001 (0.00004)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Trichlorobenzene	µg/l	0.4	<1.0	<1.0	<1.0	4	3	<1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Carbon Tetrachloride	µg/l	12	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Tetrachloroethylene	µg/l	10	<1.0	<1.0	<1.0	1	1	<1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Trichloroethylene	µg/l	10				1	<1	<1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	

Middlehaven Dock Reclamation
 Table 3/2 - Analysis of Environmental Water Quality Testing Results
 October 2002 to December 2005

ANALYTE	Units	UK Estuarine EQS Values	April 2005 - Post Works			May 2005 - Post Works			July 2005 - Post Works			August 2005 - Post Works			September 2005 - Post Works		
			1A Dock	1B Dock	1C River	19.5.05		24.5.05	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River
						1A Dock	1B Dock	1C River									
Ammoniacal Nitrogen as N	mg/l		1.7	1.4	1.5	0.4	0.6	1.1	1.2	0.8	0.8	0.7	1.4	1.5	0.5	2.1	2.5
Ammonium NH4-N	mg/l	0.6	2.0	1.8	1.8	<0.5	0.8	1.4	1.4	1	1	0.8	1.8	1.9	0.6	2.7	3.2
COD total	mg/l		108	96	72	550	1550	1725	1210	<20	21	3150	1920	1530	980	940	840
BOD	mg/l	4	20.8	15.2	16.7	69	222	303	19.5	<2	<2	816	414	450	16.5	22.5	43.5
Chlorophyll a	µg/l																
Suspended Solids	mg/l	25	6	6	11	73	66	88	24	54	24	10	10	41	54	32	38
pH	units	<6, 8.5<	8.8	8.8	7.9	8.9	8.9	7.9	8.8	8.8	8.9	8.5	8.5	7.5	8.3	8.1	7.6
Dissolved Oxygen O2	mg/l	<6 SEPA	9.5	9.2	9.9	9.1	8.8	9.4	7.3	7.8	8.2	8.9	9.4	9.8	10.7	10.8	10.4
Dissolved O2 Saturation (%)	%	<70															
Secchi Extinction Depth	metre																
Salinity (ppt(1000))	g/l		10.61	10.64	10.64	15.71	15.72	21.51	24.63	24.55	24.63	22.72	22.59	20.59	24.46	23.81	21.37
Nitrate	mg/l	30	13.2	13.5	11.5	91.2	92.4	119.3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	74.0	67.0	54.2
Phenol Total Monohydride	mg/l	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.02	<0.02	<0.02
Sulphide	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mineral Oil	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mercury (total)	µg/l		<0.1	<0.1	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.2	<0.1
Mercury (dissolved)	µg/l	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1
Arsenic (total)	µg/l		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.2	1.4	1.2
Arsenic (dissolved)	µg/l	25	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.9	2.0	1.7	1.5
Selenium (total)	µg/l		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Selenium (dissolved)	µg/l		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Lead (total)	µg/l		<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0
Lead (dissolved)	µg/l	25	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0
Copper (total)	µg/l		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	80	80	80
Copper (dissolved)	µg/l	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	<10	10	60	70	80
Zinc (total)	mg/l		<0.01	<0.01	<0.01	0.36	0.12	0.15	<0.01	<0.01	<0.01	0.61	0.54	0.46	0.23	0.17	0.13
Zinc (dissolved)	mg/l	0.04	<0.01	<0.01	<0.01	0.06	0.06	0.12	<0.01	<0.01	<0.01	0.5	0.5	0.45	0.19	0.17	0.13
Cadmium (total)	µg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1
Cadmium (dissolved)	µg/l	5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese (total)	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese (dissolved)	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel (total)	µg/l		<10	<10	<10	<0.01	<0.01	<0.01	<10	<10	<10	<10	<10	<10	<10	<10	<10
Nickel (dissolved)	µg/l	30	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Barium (total)	mg/l		<0.01	<0.01	<0.01	0.03	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01
Barium (dissolved)	mg/l		<0.01	<0.01	<0.01	0.03	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01
Chromium (total)	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium (dissolved)	mg/l	0.015	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Exceeds UK EQS

Below Analysis Detection Limit

Middlehaven Dock Reclamation
 Table 3/2 - Analysis of Environmental Water Quality Testing Results
 October 2002 to December 2005

ANALYTE	Units	UK Estuarine EQS Values	April 2005 - Post Works			May 2005 - Post Works			July 2005 - Post Works			August 2005 - Post Works			September 2005 - Post Works		
			1A Dock	1B Dock	1C River	19.5.05		24.5.05	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River
						1A Dock	1B Dock	1C River									
Individual PCB Congeners (28, 52, 101, 118, 138, 153, 180)	µg/l		all <1.0	all <1.0	all <1.0	all <1.0	all <1.0	all <1.0				All <0.005	All <0.005	All <0.005	All <0.005	All <0.005	
Total PCB's (7 congeners)	µg/l		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.01	<0.01	<0.01						
Benzo (ghi) perylene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<10	<10	<10	<0.05	<0.05	
Benzo (b) fluoranthene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<10	<10	<10	<0.05	<0.05	
Benzo (k) fluoranthene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<10	<10	<10	<0.05	<0.05	
Indeno (1,2,3-cd) pyrene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<10	<10	<10	<0.05	<0.05	
Benzo (a) pyrene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<10	<10	<10	<0.05	<0.05	
Fluoranthene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<10	<10	<10	<0.05	<0.05	
Naphthalene	µg/l	5 (80)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<10	<10	<10	<0.05	<0.05	
Acenaphthylene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<10	<10	<10	<0.05	<0.05	
Acenaphthene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<10	<10	<10	<0.05	<0.05	
Fluorene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<10	<10	<10	<0.05	<0.05	
Phenanthrene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<10	<10	<10	<0.05	<0.05	
Anthracene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<10	<10	<10	<0.05	<0.05	
Pyrene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<10	<10	<10	<0.05	<0.05	
Benzo (a) anthracene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<10	<10	<10	<0.05	<0.05	
Chrysene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<10	<10	<10	<0.05	<0.05	
Dibenz (ah) anthracene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<10	<10	<10	<0.05	<0.05	
Total PAH's (EPA 16)	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<10	<10	<10	<0.05	<0.05	
Fenitrothion (dissolved)	mg/l	0.00001 (0.00025)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	
Aldrin	mg/l	0.00001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	
HCH - Hexachlorocyclohexane	mg/l	0.00002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	
Dichlorvos	mg/l	0.00004	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	
Dieldrin	mg/l	0.00001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	
Malathion	mg/l	0.00002 (0.0005)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	
DDT (all isomers)	mg/l	0.000025	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	
DDT(para para)	mg/l	0.00001															
Endrin	mg/l	0.000005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	
Endosulphan Alpha	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	
Endosulphan Beta	mg/l	0.000003	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	
Hexachlorobenzene	mg/l	0.00003	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	
1,2 Dichloroethane	µg/l	10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Chloroform	µg/l	12	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Pentachlorophenol	mg/l	0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.02	<0.001	<0.001	<0.001	<0.01	<0.01	
Hexachlorobutadiene	mg/l	0.0001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	
Organotin (total)	mg/l	0.00001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.00001	<0.00001	<0.00001	<0.00005	<0.00005	<0.00005	0.00003	0.00005	
Trifluralin	mg/l	0.0001 (0.02)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.00001	<0.00001	<0.00001	<0.001	<0.001	<0.001	<0.0001	<0.0001	
Atrazine (alone & + Simazine)	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	
Simazine (alone & + Atrazine)	mg/l	0.002 (0.01)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	
Azinphos-methyl	mg/l	0.00001 (0.00004)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	
Trichlorobenzene	µg/l	0.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Carbon Tetrachloride	µg/l	12	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Tetrachloroethylene	µg/l	10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Trichloroethylene	µg/l	10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	

Middlehaven Dock Reclamation
Table 3/2 - Analysis of Environmental Water Quality Testing Results
October 2002 to December 2005

ANALYTE	Units	UK Estuarine EQS Values	October 2005 - Post Works			November 2005 - Post Works			December 2005 - Post Works		
			1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River
Ammoniacal Nitrogen as N	mg/l		0.5	0.5	0.1	0.9	0.4	0.7	0.5	0.6	0.5
Ammonium NH4-N	mg/l	0.6	0.7	0.6	<0.5	1.2	0.5	0.8	0.6	0.7	0.6
COD total	mg/l		360	510	150	1560	1050	1080	690	500	500
BOD	mg/l	4	90.8	85.5	25.9	135	36	48	119.3	122.3	117.8
Chlorophyll a	µg/l										
Suspended Solids	mg/l	25	43	75	39	85	79	83	73	37	83
pH	units	<6, 8.5<	8.2	8.3	7.8	8.5	8.3	8.6	7.9	8.1	7.9
Dissolved Oxygen O2	mg/l	<6 SEPA	10.1	8.8	10.3	10.8	9.5	10.5	10.4	10.8	10.9
Dissolved O2 Saturation (%)	%	<70									
Secchi Extinction Depth	metre										
Salinity (ppt(1000))	g/l		23.19	23.19	25.75	23.21	22.94	23.57	22.80	22.90	23.10
Nitrate	mg/l	30	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.7
Phenol Total Monohydride	mg/l	0.03	0.04	0.04	0.06	<0.02	<0.02	0.02	<0.02	<0.02	0.03
Sulphide	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mineral Oil	mg/l		<0.01	<0.01	<0.01	<0.01	5.52	<0.01	<0.01	<0.01	<0.01
Mercury (total)	µg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1
Mercury (dissolved)	µg/l	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic (total)	µg/l		<1.0	<1.0	1.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Arsenic (dissolved)	µg/l	25	<1.0	<1.0	1.7	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Selenium (total)	µg/l		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Selenium (dissolved)	µg/l		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Lead (total)	µg/l		<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0
Lead (dissolved)	µg/l	25	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0
Copper (total)	µg/l		70	70	90	70	70	70	<10	<10	<10
Copper (dissolved)	µg/l	5	60	70	70	70	60	60	<10	<10	<10
Zinc (total)	mg/l		0.07	0.1	0.08	0.05	0.05	0.06	0.25	0.23	0.24
Zinc (dissolved)	mg/l	0.04	0.07	0.07	0.08	0.03	0.03	0.04	0.14	0.14	0.14
Cadmium (total)	µg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium (dissolved)	µg/l	5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese (total)	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese (dissolved)	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel (total)	µg/l		<10	<10	<10	<10	<10	<10	<10	<10	<10
Nickel (dissolved)	µg/l	30	<10	<10	<10	<10	<10	<10	<10	<10	<10
Barium (total)	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Barium (dissolved)	mg/l		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium (total)	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01
Chromium (dissolved)	mg/l	0.015	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Exceeds UK EQS	
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Below Analysis Detection Limit	
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Middlehaven Dock Reclamation
Table 3/2 - Analysis of Environmental Water Quality Testing Results
October 2002 to December 2005

ANALYTE	Units	UK Estuarine EQS Values	October 2005 - Post Works			November 2005 - Post Works			December 2005 - Post Works		
			1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River
Individual PCB Congeners (28, 52, 101, 118, 138, 153, 180)	µg/l		All <0.005	All <0.005	All <0.005	*****	All <0.005	All <0.005	All <0.005	All <0.005	All <0.005
Total PCB's (7 congeners)	µg/l					*****	<0.005	<0.005	<0.005	<0.005	<0.005
Benzo (ghi) perylene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	*****	<0.1	<0.1
Benzo (b) fluoranthene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	*****	<0.1	<0.1
Benzo (k) fluoranthene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	*****	<0.1	<0.1
Indeno (1,2,3-cd) pyrene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	*****	<0.1	<0.1
Benzo (a) pyrene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	*****	<0.1	<0.1
Fluoranthene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	*****	<0.1	<0.1
Naphthalene	µg/l	5 (80)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	*****	<0.1	<0.1
Acenaphthylene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	*****	<0.1	<0.1
Acenaphthene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	*****	<0.1	<0.1
Fluorene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	*****	<0.1	<0.1
Phenanthrene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	*****	<0.1	<0.1
Anthracene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	*****	<0.1	<0.1
Pyrene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	*****	<0.1	<0.1
Benzo (a) anthracene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	*****	<0.1	<0.1
Chrysene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	*****	<0.1	<0.1
Dibenz (ah) anthracene	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	*****	<0.1	<0.1
Total PAH's (EPA 16)	µg/l		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	*****	<0.1	<0.1
Fenithrothion (dissolved)	mg/l	0.00001 (0.00025)	<0.00001	<0.00001	<0.00001	*****	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Aldrin	mg/l	0.00001	<0.00001	<0.00001	<0.00001	*****	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
HCH - Hexachlorocyclohexane	mg/l	0.00002	<0.00001	<0.00001	<0.00001	*****	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Dichlorvos	mg/l	0.00004	<0.00001	<0.00001	<0.00001	*****	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Dieldrin	mg/l	0.00001	<0.00001	<0.00001	<0.00001	*****	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Malathion	mg/l	0.00002 (0.0005)	<0.00001	<0.00001	<0.00001	*****	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
DDT (all isomers)	mg/l	0.000025	<0.00001	<0.00001	<0.00001	*****	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
DDT(para para)	mg/l	0.00001									
Endrin	mg/l	0.000005	<0.00001	<0.00001	<0.00001	*****	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Endosulphan Alpha	mg/l		<0.00001	<0.00001	<0.00001	*****	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Endosulphan Beta	mg/l	0.000003	<0.00001	<0.00001	<0.00001	*****	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Hexachlorobenzene	mg/l	0.00003	<0.00001	<0.00001	<0.00001	*****	<0.00001	<0.00005*	<0.00001	<0.00001	<0.00001
1,2 Dichloroethane	µg/l	10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroform	µg/l	12	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Pentachlorophenol	mg/l	0.002	<0.01	<0.01	<0.01	*****	<0.001	<0.005*	<0.01	<0.01	<0.01
Hexachlorobutadiene	mg/l	0.0001	<0.001	<0.001	<0.001	*****	<0.001	<0.001	<0.001	<0.001	<0.001
Organotin (total)	mg/l	0.00001	<0.00005	<0.00005	<0.00005	*****	<0.001*	<0.00005	<0.00005	<0.00005	<0.00005
Trifluralin	mg/l	0.0001 (0.02)	<0.0001	<0.0001	<0.0001	*****	<0.0001	<0.0001	<0.00001	<0.00001	<0.00001
Atrazine (alone & + Simazine)	mg/l		<0.00001	<0.00001	<0.00001	*****	<0.0001	<0.0001	<0.00001	<0.00001	<0.00001
Simazine (alone & + Atrazine)	mg/l	0.002 (0.01)	<0.00001	<0.00001	<0.00001	*****	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Azinphos-methyl	mg/l	0.00001 (0.00004)	<0.00001	<0.00001	<0.00001	*****	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Trichlorobenzene	µg/l	0.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon Tetrachloride	µg/l	12	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	µg/l	10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene	µg/l	10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

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Table 4

**Recreational Water Sports
Water Quality Chemical Assessment**

December 2005

Table 4

**Recreational Water Sports
Water Quality Chemical Assessment**

December 2005

The table shows in "**BLUE TEXT**" the relevant recreational water quality assessment criteria used in this report for assessing the chemical test results. Those water quality test results that exceed the relevant assessment criteria are highlighted as follows:

- a) "**PINK**" for **whole body water contact water sports** as exceeding the **WBWCWS Threshold Value** (i.e. Bathing Water and/or 1x Drinking Water),
- b) "**RED**" for **whole body water contact water sports** as exceeding **WBWCWS Action Value** and **incidental body water contact water sports** as exceeding the **IBWCWS Threshold Value** (i.e. Bathing Water and/or 10x Drinking Water),
- c) "**PURPLE**" for **incidental body water contact water sports** as exceeding **IBWCWS Action Value** (i.e. Bathing Water and/or 100x Drinking Water)

The table shows in "**BOLD**" text the dock water test results that are more elevated than the River Tees water quality at the time of sampling.

The table shows highlighted "**YELLOW**" the test results that did not exceed the chemical analysis minimum detection limit.

Table 4/1 - Assessment of Recreational Water Quality
UK and EU Bathing Water Standards
Middlehaven Dock Reclamation
Chemical Test Results Pre-Works to October 2001

ANALYTE	Units	UK Bathing Water	UK Drinking Water	WHO Drinking Water	Pre-Works Dock Water Bottom	Pre-Works Dock Water Surface	Pre-Works River Tees Water	Oct 99 6B Dock Water	Oct 99 6T Dock Water	January 2001 - Works					Oct 01 Works Dock		
										1	2	3	4	5			
Ammoniacal Nitrogen as N	mg/l				0.5	0.3	0.66										
Ammonium NH4	mg/l		1.5 EU	1.5 Odour 35 Taste	0.55	0.39	0.66										1.2
COD total	mg/l		30		201.60	171.4	39.0										
BOD	mg/l		3 EU		2.00-5.90	4.40-8.00	2.8										
Chlorophyll a	µg/l				18.1	69.7	0.084										
Suspended Solids	mg/l				46.25-57.5	43.5-64.75	63.63										
pH	Units	<6, 9<	<6.5, 10<		7.74-8.35	8.15-8.49	7.80										
Dissolved Oxygen	mg/l				5.35-12.10	11.75-12.60	10.85										
O2 Saturation	%				60.70-130.24	126.11-135.24	119.2										
Secchi Extinction Depth (m)	metre				n/a	0.80 - 1.20	1.45										
Salinity (ppt(1000))	g/l				30.10-32.50	26.90-29.40	36.05										
Nitrate	mg/l		50.0	50.0	all <0.50	all <0.50	0.58										
Phenol Total Monohydride	mg/l	0.05	0.0005		all <0.05	all <0.05	all <0.05										
Sulphide	mg/l				all <0.1	all <0.1	all <0.1										
Mineral Oil	mg/l		0.05		mostly <0.2	<0.02	<0.20										
Mercury (total)	µg/l		1	1	all <0.02	all <0.02		<0.02	<0.02								
Mercury (dissolved)	µg/l				all <0.02	all <0.02											
Arsenic (total)	µg/l		10	10	<5.0	<5.0											
Arsenic (dissolved)	µg/l				<5.0	<5.0											
Selenium (total)	µg/l		10	10	all 1.00	all 1.00											
Selenium (dissolved)	µg/l				all 1.00	all 1.00											
Lead (total)	µg/l		25	10	<50	<50	<50										
Lead (dissolved)	µg/l				<50	<50	<50										
Copper (total)	µg/l		2000	2000	141	140	160										
Copper (dissolved)	µg/l				143.72	135.5	150										
Zinc (total)	mg/l		3	3	<0.04	<0.04	<0.04										
Zinc (dissolved)	mg/l				<0.04	<0.04	<0.04										
Cadmium (total)	µg/l		5	3	<3	6.75	<3										
Cadmium (dissolved)	µg/l				<3	<3	<3										
Manganese (total)	mg/l		0.05	0.5	all <1.0	<1.0											
Manganese (dissolved)	mg/l				all <1.0	all <1.1											
Nickel (total)	µg/l		20	20	<30	<30	<30										
Nickel (dissolved)	µg/l				<30	<30	<30										
Barium (total)	mg/l		0.1	0.7	all <1.0	all <1.0											
Barium (dissolved)	mg/l				all <1.1	all <1.1											
Chromium (total)	mg/l		0.05	0.05	<1.0	<1.0		<0.70	<0.70								
Chromium (dissolved)	mg/l				<1.0	<1.0											

PINK	Exceeds Bathing Water and/or 1x UK Drinking Water
RED	Exceeds Bathing Water and/or 10x UK Drinking Water
PURPLE	Exceeds Bathing Water and/or 100x UK Drinking Water
YELLOW	Below Analysis Detection Limit

Table 4/1 - Assessment of Recreational Water Quality
UK and EU Bathing Water Standards
Middlehaven Dock Reclamation
Chemical Test Results Pre-Works to October 2001

ANALYTE	Units	UK Bathing Water	UK Drinking Water	WHO Drinking Water	Pre-Works Dock Water Bottom	Pre-Works Dock Water Surface	Pre-Works River Tees Water	Oct 99 6B Dock Water	Oct 99 6T Dock Water	January 2001 - Works					Oct 01 Works
										1	2	3	4	5	
Individual PCB Congeners (28, 52, 101, 118, 138, 153, 180)	µg/l				<1.0	<0.01	<0.01			all <1.0	all <1.0	all <1.0	all <1.0	all <1.0	all <1.0
Total PCB's (7 congeners)	µg/l			US EPA 0.5				<0.14	<0.14	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzo (ghi) perylene	µg/l		Total Sum 0.1		<0.10	<0.01	<0.01			<0.05	<0.05	<0.05	<0.05	<0.05	0.06
Benzo (b) fluoranthene	µg/l				<0.10	<0.10	<0.10			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo (k) fluoranthene	µg/l				<0.10	<1.0	<0.10			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno (1,2,3-cd) pyrene	µg/l				<0.10	<0.10	<0.10			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo (a) pyrene	µg/l		0.01	0.7	<0.10	<0.01	<0.01			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	µg/l			4.0	<0.10	<0.10	<0.10			<0.05	<0.05	<0.05	<0.05	<0.05	0.1
Naphthalene	µg/l				<0.10	<0.10	<0.10			<0.05	<0.05	<0.05	<0.05	<0.05	0.05
Acenaphthylene	µg/l				<0.10	<0.10	<0.10			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthene	µg/l				<0.10	<0.10	<0.10			<0.05	0.14	0.17	0.14	0.14	0.06
Fluorene	µg/l				<0.10	<0.10	<0.10			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Phenanthrene	µg/l				<0.10	<0.10	<0.10			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Anthracene	µg/l				<0.10	<0.10	<0.10			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Pyrene	µg/l				<0.10	<0.10	<0.10			<0.05	<0.05	<0.05	<0.05	<0.05	0.06
Benzo (a) anthracene	µg/l				<0.10	<0.10	<0.10			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chrysene	µg/l				<0.10	<0.10	<0.10			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dibenz (ah) anthracene	µg/l				<0.13	<0.13	<0.10			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total PAH's (EPA 16)	µg/l				<0.10	<0.10	<0.10			<0.05	0.14	0.17	0.14	0.14	0.57
Fenitrothion (dissolved)	mg/l		Total 0.0001					<0.04	<0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001
Aldrin	mg/l		0.00003					<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001
HCH - Gamma	mg/l		0.0001					<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001
Dichlorvos	mg/l		0.0001					<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001
Dieldrin	mg/l		0.00003					<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001
Malathion	mg/l		0.0001					<0.03	<0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001
DDT (op)	mg/l		0.0001	0.002				<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001
DDT (pp)	mg/l		0.0001					<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001
Endrin	mg/l		0.0001					<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001
Endosulphan Alpha	mg/l		0.0001					<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001
Endosulphan Beta	mg/l							<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001
Hexachlorobenzene	mg/l		0.0001	0.001				<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001
1,2 Dichlorethane	µg/l			30				<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroform	µg/l			200				<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Pentachlorophenol	mg/l		0.001	0.009				<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001
Hexachlorobutadiene	mg/l			0.0006				<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001
Organotin (total)	mg/l			0.002				<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001
Trifluralin	mg/l		0.0001	0.02				<0.03	<0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001
Atrazine	mg/l		0.0001	0.002				<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001
Simazine	mg/l		0.0001	0.002				<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001
Azinphos-methyl	mg/l		0.0001					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001
Trichlorobenzene	µg/l			20				<20.0	<20.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon Tetrachloride	µg/l			2				<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	µg/l			10.0				<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene	µg/l			30.0				<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Middlehaven Dock Post Reclamation
Table 4/2 Assessment of UK and EU Bathing Water Quality
Chemical Test Results October 2002 to December 2005

ANALYTE	Units	UK Bathing Water	EU Bathing Water	UK - EU Drinking Water	WHO Drinking Water	October 2002 - Post Works			Jan 2003 - Post Works			April 2003 - Post Works			May 2003 - Post Works			July 2003 - Post Works			
						1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	
UK BATHING WATER MANDATORY PARAMETERS																					
pH	Unit	<6, 9<	<6, 9<	<6.5, 10<		7.9	8.3	8.3	7.9	8.0	8.0	8.8	8.9	7.7	8.0	8.1	7.7	9.4	9.1	7.9	
Colour	No abnormal Change																				
Mineral Oil	mg/l	No Film	0.3	0.05		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Surface-active substances reacting with Methylene Blue	mg/l	No Lasting Foam	0.3																		
Phenol Total Monohydride	mg/l	0.05 0.075	0.005	0.0005		0.02	0.02	<0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.01	0.01	0.01	
Transparency Secchi's Disc	metre	1	2																		
ADDITIONAL EU BATHING WATER GUIDELINE PARAMETERS																					
Floating Detritus			None Present																		
Dissolved Oxygen	mg/l					10.3	10.4	10.3	10.5	9.7	10.0	9.7	10	9.4	5.3	6.0	7.1	11.1	****	****	
Temperature	Deg. C																				
Salinity	gm/l					26.36	25.28	25.36	11.9	11.56	8.91	3.74	3.39	3.22	2.94	2.78	2.77	7.07	6.55	6.57	
Dissolved Oxygen Saturation	%		80 to 120																		
Nitrogen Kjeldahl as N	mg/l		NVS	2 EU																	
Ammoniacal Nitrogen as N	mg/l					4.1	4.4	2.3	2.3	2.2	1.9	3.5	4.3	1.6	5.9	5.6	4.1	<0.1	<0.1	****	
Ammonium NH4-N	mg/l		NVS	1.5 EU	35 Taste	1.1	1.1	0.6	2.9	2.9	2.4	4.4	5.3	5.2	7.6	1.5	5.4	<0.5	<0.5	****	
Parathion	mg/l		NVS	0.0001																	
HCH - Gamma	mg/l		NVS	0.0001		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Dieldrin	mg/l		NVS	0.00003		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Arsenic (total)	µg/l		NVS	10	10	1.9	1.7	1.5	1.9	2.0	1.1	1.4	1.2	2.6	1.5	1.4	1.6	<1.0	<1.0	****	
Cadmium (total)	µg/l		NVS	5	3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	0.3	0.5	0.1	0.3	0.4	1.1	1.4	****	
Chromium (total)	mg/l		NVS Cr/V	0.05	0.05	0.04	0.02	0.01	0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Lead (total)	µg/l		NVS	25	10	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	
Mercury (total)	µg/l		NVS	1	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	****	
Cyanide	mg/l		NVS	0.05																	
Nitrates NO3	mg/l		NVS	50.0	50.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.4	9.3	12.4	11.7	11.9	<1.0	<1.0	<1.0	
Phosphate PO4	mg/l		NVS	0.7 EU																	
NON UK OR EU BATHING WATER PARAMETERS																					
COD total	mg/l			30		505	411	400	492	496	484	1325	1550	3375	1700	2475	1500	****	****	****	
BOD	mg/l			3 EU		2	4	4	40	30	38	1380	1560	3600	1200	1680	1020	2640	2580	2640	
Chlorophyll a	µg/l					<0.5	27	<0.5	<0.5	<0.5	0.6	6.9	3.1	1.4	4.8	4.3	0.6	2.8	13.4	<0.5	
Suspended Solids	mg/l					270	237	286	<5	8	6	57	44	60	146	165	160	99	99	83	
Sulphide	mg/l					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	****	
METALS																					
Mercury (dissolved)	µg/l					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	0.2	0.1	<0.1	<0.1	****	
Arsenic (dissolved)	µg/l					1.6	1.6	1.4	2.2	2.0	<1.0	<1.0	<1.0	2.1	1.2	1.3	1.6	<1.0	<1.0	****	
Selenium (total)	µg/l			10	10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	****	
Selenium (dissolved)	µg/l					<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	****	
Lead (dissolved)	µg/l					<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	
Copper (total)	µg/l			2000	2000	20	20	20	10	10	<10	20	20	30	20	10	20	20	20	20	
Copper (dissolved)	µg/l					<10	20	20	<10	<10	<10	20	20	20	10	10	10	10	20	10	
Zinc (total)	mg/l			3	3	0.22	0.25	0.2	0.54	0.47	0.36	0.24	0.19	0.24	0.09	0.11	0.09	0.15	0.18	0.33	
Zinc (dissolved)	mg/l					0.19	0.18	0.16	0.39	0.4	0.27	0.05	0.05	0.06	0.04	0.05	0.06	0.07	0.07	0.08	
Cadmium (dissolved)	µg/l					0.4	<0.1	<0.1	<0.1	<0.1	<0.1	0.6	0.5	0.6	0.8	<0.1	0.2	1.2	1.3	****	
Manganese (total)	mg/l			0.05	0.5	<0.01	<0.01	<0.01	0.05	0.49	0.02	0.01	0.01	0.03	0.02	0.02	0.03	0.01	0.03	0.06	
Manganese (dissolved)	mg/l					<0.01	<0.01	<0.01	0.05	0.05	0.01	<0.01	<0.01	0.02	<0.01	<0.01	0.02	<0.01	<0.01	0.05	
Nickel (total)	µg/l			20	20	<10	<10	<10	50	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	
Nickel (dissolved)	µg/l					<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	
Barium (total)	mg/l			0.1	0.7	0.01	0.01	0.01	<0.01	<0.01	0.02	0.01	0.01	<0.01	0.01	0.02	0.01	<0.01	<0.01	<0.01	
Barium (dissolved)	mg/l					<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Chromium (dissolved)	mg/l					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	

YELLOW Below Analysis Detection Limit

PINK Exceeds Bathing Water and/or 1x Drinking Water

RED Exceeds Bathing Water and/or 10x Drinking Water

PURPLE Exceeds Bathing Water and/or 100x Drinking Water

Middlehaven Dock Post Reclamation
Table 4/2 Assessment of UK and EU Bathing Water Quality
Chemical Test Results October 2002 to December 2005

ANALYTE	Units	UK Bathing Water	EU Bathing Water	UK Drinking Water	WHO Drinking Water	October 2002 - Post Works			Jan 2003 - Post Works			April 2003 - Post Works			May 2003 - Post Works			July 2003 - Post Works			
						1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	
POLYCHLORINATED BIPHENYLS																					
Individual PCB Congeners (28, 52, 101, 118, 138, 153, 180)	µg/l				US EPA 0.5	all <1.0	all <1.0	all <1.0	all <1	all <1	all <1	all <1	all <1	all <1	all <1	all <0.05	all <0.05	all <0.05	All <0.05	All <0.05	All <0.05
Total PCB's (7 congeners)	µg/l					<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
POLYAROMATIC HYDROCARBONS																					
Benzo (ghi) perylene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo (b) fluoranthene	µg/l				Total Sum 0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo (k) fluoranthene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno (1,2,3-cd) pyrene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo (a) pyrene	µg/l			0.01	0.7	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	µg/l				4.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Naphthalene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluorene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Phenanthrene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Anthracene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Pyrene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo (a) anthracene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chrysene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dibenz (ah) anthracene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total PAH's (EPA 16)	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
PESTICIDES																					
Fenithrothion (dissolved)	mg/l			Total 0.0001		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aldrin	mg/l			0.00003		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dichlorvos	mg/l			0.0001		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Malathion	mg/l			0.0001		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
DDT (op)	mg/l			0.0001	0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
DDT (pp)	mg/l			0.0001		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	mg/l			0.0001		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulphan Alpha	mg/l			0.0001		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulphan Beta	mg/l					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobenzene	mg/l			0.0001	0.001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pentachlorophenol	mg/l			0.001	0.009	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobutadiene	mg/l				0.0006	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001	<0.01	<0.01	<0.01
Organotin (total)	mg/l				0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Trifluralin	mg/l			0.0001	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Atrazine	mg/l			0.0001	0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Simazine	mg/l			0.0001	0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Azinphos-methyl	mg/l			0.0001		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
DISINFECTANTS																					
Chloroform	µg/l				200	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
CHLORINATED SOLVENTS																					
1,2 Dichloroethane	µg/l			3	30	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorobenzene	µg/l				20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon Tetrachloride	µg/l				2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	µg/l				40	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene	µg/l			10	70	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Middlehaven Dock Post Reclamation
Table 4/2 Assessment of UK and EU Bathing Water Quality
Chemical Test Results October 2002 to December 2005

ANALYTE	Units	UK Bathing Water	EU Bathing Water	UK - EU Drinking Water	WHO Drinking Water	August 2003 - Post Works			September 2003 - Post Works			Nov 2004 - Post Works			December 2004 - Post Works		
						1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River
UK BATHING WATER MANDATORY PARAMETERS																	
pH	Unit	<6, 9<	<6, 9<	<6.5, 10<		9.0	9.0	7.8	7.6	7.7	7.6	7.9	7.9	7.6	7.7	7.7	7.6
Colour	No abnormal Change																
Mineral Oil	mg/l	No Film	0.3	0.05		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Surface-active substances reacting with Methylene Blue	mg/l	No Lasting Foam	0.3														
Phenol Total Monohydride	mg/l	0.05	0.075	0.005	0.0005				0.04	0.15	0.24	0.03	<0.01	0.01	0.01	0.06	0.07
Transparency Secchi's Disc	metre	1	2														
ADDITIONAL EU BATHING WATER GUIDELINE PARAMETERS																	
Floating Detritus			None Present														
Dissolved Oxygen	mg/l					8.8	8.9	10.5	9.2	9.3	10.7	11.1	11.3	10.2	10.2	10.0	9.1
Temperature	Deg. C																
Salinity	gm/l					23.9	23.84	25.01	7.1	7.06	6.64	22.78	22.88	17.02	25.72	25.59	16.86
Dissolved Oxygen Saturation	%		80 to 120														
Nitrogen Kjeldahl as N	mg/l		NVS	2 EU													
Ammoniacal Nitrogen as N	mg/l					<0.1	<0.1	<0.1	0.4	0.3	0.4	1.1	0.7	1.0	0.1	0.3	0.4
Ammonium NH4-N	mg/l		NVS	1.5 EU	35 Taste	<0.5	<0.5	<0.5	<0.5	1.7	2.2	1.4	0.9	1.2	<0.5	<0.5	0.5
Parathion	mg/l		NVS	0.0001													
HCH - Gamma	mg/l		NVS	0.0001		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dieldrin	mg/l		NVS	0.00003		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic (total)	µg/l		NVS	10	10	<1.0	<1.0	2.0	2.0	2.8	3.3	1.1	1.1	1.0	1.8	1.4	1.0
Cadmium (total)	µg/l		NVS	5	3	0.4	0.3	0.2	<0.1	<0.1	<0.1	0.2	<0.1	0.1	0.1	<0.1	<0.1
Chromium (total)	mg/l		NVS CrIV	0.05	0.05	<0.01	0.03	0.04	<0.01	<0.01	<0.01	0.02	0.02	<0.01	<0.01	<0.01	<0.01
Lead (total)	µg/l		NVS	25	10	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0
Mercury (total)	µg/l		NVS	1	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cyanide	mg/l		NVS	0.05													
Nitrates NO3	mg/l		NVS	50.0	50.0	<1.0	<1.0	<1.0	<1.0	<1.0	36.1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Phosphate PO4	mg/l		NVS	0.7 EU													
NON UK OR EU BATHING WATER PARAMETERS																	
COD total	mg/l			30		788	882	1224	2358	2460	1884	1716	2526	2460	1320	1404	342
BOD	mg/l			3 EU		522.0	589.5	855	1602	1704	1122	237	190.5	43.9	274.5	498.0	63.4
Chlorophyll a	µg/l					16.4	16.0	0.7	0.8	<0.5	<0.5						
Suspended Solids	mg/l					177	104	74	80	79	133	39	34	22	102	83	57
Sulphide	mg/l					0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
METALS																	
Mercury (dissolved)	µg/l					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic (dissolved)	µg/l					<0.01	<0.01	1.6	1.6	1.8	3.5	1.3	1.4	1.2	1.3	1.4	<1.0
Selenium (total)	µg/l			10	10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Selenium (dissolved)	µg/l					<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Lead (dissolved)	µg/l					<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0
Copper (total)	µg/l			2000	2000	20	20	30	10	10	10	<10	20	20	50	50	50
Copper (dissolved)	µg/l					10	10	10	10	10	10	30	10	30	40	40	50
Zinc (total)	mg/l			3	3	0.03	0.11	0.12	0.06	0.06	0.06	0.21	0.20	0.18	0.19	0.19	0.16
Zinc (dissolved)	mg/l					<0.01	0.06	0.06	0.05	0.05	0.05	0.17	0.18	0.15	0.13	0.15	0.09
Cadmium (dissolved)	µg/l					0.4	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese (total)	mg/l			0.05	0.5	0.02	0.04	0.05	0.01	0.03	0.03	0.1	<0.1	0.03	0.04	0.03	0.04
Manganese (dissolved)	mg/l					<0.01	0.02	0.04	0.01	0.03	0.03	<0.1	<0.1	0.02	0.02	0.02	0.03
Nickel (total)	µg/l			20	20	10	<10	<10	<10	<10	<10	20	20	30	<10	<10	10
Nickel (dissolved)	µg/l					<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Barium (total)	mg/l			0.1	0.7	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.02	<0.01	<0.01	0.01
Barium (dissolved)	mg/l					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
Chromium (dissolved)	mg/l					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

YELLOW Below Analysis Detection Limit

PINK Exceeds Bathing Water and/or 1x Drinking Water

RED Exceeds Bathing Water and/or 10x Drinking Water

PURPLE Exceeds Bathing Water and/or 100x Drinking Water

Middlehaven Dock Post Reclamation
Table 4/2 Assessment of UK and EU Bathing Water Quality
Chemical Test Results October 2002 to December 2005

ANALYTE	Units	UK Bathing Water	EU Bathing Water	UK Drinking Water	WHO Drinking Water	August 2003 - Post Works			September 2003 - Post Works			November 2004 - Post Works			Dec 2004 - Post Works		
						1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River
POLYCHLORINATED BIPHENYLS																	
Individual PCB Congeners (28, 52, 101, 118, 138, 153, 180)	µg/l				US EPA 0.5	All <0.05	All <0.05	All <0.05	All <0.05	All <0.05	All <0.05	all <0.05	all <0.05	all <0.05	all <1.0	all <1.0	all <1.0
Total PCB's (7 congeners)	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1.0	<1.0	<1.0
POLYAROMATIC HYDROCARBONS																	
Benzo (ghi) perylene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo (b) fluoranthene	µg/l				Total Sum 0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo (k) fluoranthene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno (1,2,3-cd) pyrene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo (a) pyrene	µg/l			0.01	0.7	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	µg/l				4.0	<0.05	<0.05	<0.05	0.21	0.13	0.29	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Naphthalene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluorene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.11	<0.05	<0.05	<0.05	<0.05	<0.05
Phenanthrene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.05	<0.05	<0.05	<0.05	<0.05
Anthracene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Pyrene	µg/l					<0.05	<0.05	<0.05	0.26	0.15	0.26	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo (a) anthracene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chrysene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dibenz (ah) anthracene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total PAH's (EPA 16)	µg/l					<0.05	<0.05	<0.05	0.47	0.28	0.55	0.26	<0.05	<0.05	<0.05	<0.05	<0.05
PESTICIDES																	
Fenithrothion (dissolved)	mg/l			Total 0.0001		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aldrin	mg/l			0.00003		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dichlorvos	mg/l			0.0001		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Malathion	mg/l			0.0001		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
DDT (op)	mg/l			0.0001	0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
DDT (pp)	mg/l			0.0001		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	mg/l			0.0001		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulphan Alpha	mg/l			0.0001		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulphan Beta	mg/l					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobenzene	mg/l			0.0001	0.001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pentachlorophenol	mg/l			0.001	0.009	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobutadiene	mg/l				0.0006	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Organotin (total)	mg/l				0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Trifluralin	mg/l			0.0001	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Atrazine	mg/l			0.0001	0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Simazine	mg/l			0.0001	0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Azinphos-methyl	mg/l			0.0001		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
DISINFECTANTS																	
Chloroform	µg/l				200	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
CHLORINATED SOLVENTS																	
1,2 Dichlorethane	µg/l			3	30	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorobenzene	µg/l				20	<1.0	<1.0	<1.0	4	3	<1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon Tetrachloride	µg/l				2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	µg/l				40	<1.0	<1.0	<1.0	1	1	<1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene	µg/l			10	70	<1.0	<1.0	<1.0	1	<1	<1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

ANALYTE	Units	UK Bathing Water	EU Bathing Water	UK - EU Drinking Water	WHO Drinking Water	February 2005 - Post Works			April 2005 - Post Works			May 2005 - Post Works			July 2005 - Post Works			August 2005 - Post Works		
						1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	19.5.05		24.5.05	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River
						1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River
UK BATHING WATER MANDATORY PARAMETERS																				
pH	Unit	<6, 9<	<6, 9<	<6.5, 10<		7.5	7.5	7.9	8.8	8.8	7.9	8.9	8.9	7.9	8.8	8.8	8.9	8.5	8.5	7.5
Colour	No abnormal Change																			
Mineral Oil	mg/l	No Film	0.3	0.05		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Surface-active substances reacting with Methylene Blue	mg/l	No Lasting Foam	0.3																	
Phenol Total Monohydride	mg/l	0.05	0.075	0.005	0.0005	0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02
Transparency Secchi's Disc	metre	1	2																	
ADDITIONAL EU BATHING WATER GUIDELINE PARAMETERS																				
Floating Detritus			None Present																	
Dissolved Oxygen	mg/l					8.1	9.3	8.7	9.5	9.2	9.9	9.1	8.8	9.4	7.3	7.8	8.2	8.9	9.4	9.8
Temperature	Deg. C																			
Salinity	gm/l					10.32	10.27	7.3	10.61	10.64	10.64	15.71	15.72	21.51	24.63	24.55	24.63	22.72	22.59	20.59
Dissolved Oxygen Saturation	%		80 to 120																	
Nitrogen Kjeldahl as N	mg/l		NVS	2 EU																
Ammoniacal Nitrogen as N	mg/l					2.7	2.6	1.1	1.7	1.4	1.5	0.4	0.6	1.1	1.2	0.8	0.8	0.7	1.4	1.5
Ammonium NH4-N	mg/l		NVS	1.5 EU	35 Taste	3.5	3.3	1.4	2.0	1.8	1.8	<0.5	0.8	1.4	1.4	1.0	1.0	0.8	1.8	1.9
Parathion	mg/l		NVS	0.0001																
HCH - Gamma	mg/l		NVS	0.0001		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Dieldrin	mg/l		NVS	0.00003		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Arsenic (total)	µg/l		NVS	10	10	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.7
Cadmium (total)	µg/l		NVS	5	3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium (total)	mg/l		NVS Cr/IV	0.05	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead (total)	µg/l		NVS	25	10	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0
Mercury (total)	µg/l		NVS	1	1	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cyanide	mg/l		NVS	0.05																
Nitrates NO3	mg/l		NVS	50.0	50.0	7.3	7.6	9.8	13.2	13.5	11.5	91.2	92.4	119.3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Phosphate PO4	mg/l		NVS	0.7 EU																
NON UK OR EU BATHING WATER PARAMETERS																				
COD total	mg/l			30		240	852	558	108	96	72	550	1550	1725	1210	<20	21	3150	1920	1530
BOD	mg/l			3 EU		35.6	136.5	65.3	20.8	15.2	16.7	69	222	303	19.5	<2.0	<2.0	816	414	450
Chlorophyll a	µg/l																			
Suspended Solids	mg/l					38	43	43	6	6	11	73	66	88	24	54	24	10	10	41
Sulphide	mg/l					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
METALS																				
Mercury (dissolved)	µg/l					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic (dissolved)	µg/l					<1.0	1.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.9
Selenium (total)	µg/l			10	10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Selenium (dissolved)	µg/l					<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Lead (dissolved)	µg/l					<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0
Copper (total)	µg/l			2000	2000	30	30	50	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10
Copper (dissolved)	µg/l					50	50	60	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10
Zinc (total)	mg/l			3	3	0.04	0.06	0.02	<0.01	<0.01	<0.01	0.36	0.12	0.15	<0.01	<0.01	<0.01	0.61	0.54	0.46
Zinc (dissolved)	mg/l					0.04	0.04	0.03	<0.01	<0.01	<0.01	0.06	0.06	0.12	<0.01	<0.01	<0.01	0.5	0.5	0.45
Cadmium (dissolved)	µg/l					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1
Manganese (total)	mg/l			0.05	0.5	0.05	0.05	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese (dissolved)	mg/l					0.04	0.04	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel (total)	µg/l			20	20	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Nickel (dissolved)	µg/l					<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Barium (total)	mg/l			0.1	0.7	0.04	0.03	0.04	<0.01	<0.01	<0.01	0.03	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Barium (dissolved)	mg/l					0.04	0.03	0.04	<0.01	<0.01	<0.01	0.03	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium (dissolved)	mg/l					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

YELLOW Below Analysis Detection Limit

PINK Exceeds Bathing Water and/or 1x Drinking Water

RED Exceeds Bathing Water and/or 10x Drinking Water

PURPLE Exceeds Bathing Water and/or 100x Drinking Water

Middlehaven Dock Post Reclamation
Table 4/2 Assessment of UK and EU Bathing Water Quality
Chemical Test Results October 2002 to December 2005

ANALYTE	Units	UK Bathing Water	EU Bathing Water	UK Drinking Water	WHO Drinking Water	February 2005 - Post Works			April 2005 - Post Works			May 2005 - Post Works			July 2005 - Post Works			August 2005 - Post Works		
						1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	19.5.05		24.5.05	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River
												1A Dock	1B Dock	1C River						
POLYCHLORINATED BIPHENYLS																				
Individual PCB Congeners (28, 52, 101, 118, 138, 153, 180)	µg/l				US EPA 0.5	all <1.0	all <1.0	all <1.0	all <1.0	all <1.0	all <1.0	all <1.0	all <1.0	all <1.0	all <1.0	all <1.0	all <1.0	all <1.0	all <1.0	all <1.0
Total PCB's (7 congeners)	µg/l					<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
POLYAROMATIC HYDROCARBONS																				
Benzo (ghi) perylene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo (b) fluoranthene	µg/l				Total Sum 0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo (k) fluoranthene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Indeno (1,2,3-cd) pyrene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo (a) pyrene	µg/l			0.01	0.7	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	µg/l				4.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Naphthalene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluorene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Phenanthrene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Anthracene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Pyrene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo (a) anthracene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chrysene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dibenz (ah) anthracene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total PAH's (EPA 16)	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
PESTICIDES																				
Fenitrothion (dissolved)	mg/l			Total 0.0001		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aldrin	mg/l			0.00003		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dichlorvos	mg/l			0.0001		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Malathion	mg/l			0.0001		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
DDT (op)	mg/l			0.0001	0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
DDT (pp)	mg/l			0.0001																
Endrin	mg/l			0.0001		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulphan Alpha	mg/l			0.0001		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulphan Beta	mg/l					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobenzene	mg/l			0.0001	0.001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pentachlorophenol	mg/l			0.001	0.009	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobutadiene	mg/l				0.0006	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Organotin (total)	mg/l				0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Trifluralin	mg/l			0.0001	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Atrazine	mg/l			0.0001	0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Simazine	mg/l			0.0001	0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Azinphos-methyl	mg/l			0.0001		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
DISINFECTANTS																				
Chloroform	µg/l				200	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
CHLORINATED SOLVENTS																				
1,2 Dichloroethane	µg/l			3	30	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorobenzene	µg/l				20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon Tetrachloride	µg/l				2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	µg/l			10	40	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethylene	µg/l				70	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Middlehaven Dock Post Reclamation
Table 4/2 Assessment of UK and EU Bathing Water Quality
Chemical Test Results October 2002 to December 2005

ANALYTE	Units	UK Bathing Water	EU Bathing Water	UK - EU Drinking Water	WHO Drinking Water	September 2005 - Post Works			October 2005 - Post Works			November 2005 - Post Works			December 2005 - Post Works		
						1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River	1A Dock	1B Dock	1C River
UK BATHING WATER MANDATORY PARAMETERS																	
pH	Unit	<6, 9<	<6, 9<	<6.5, 10<		8.3	8.1	7.6	8.2	8.3	7.8	8.5	8.3	8.6	7.9	8.1	7.9
Colour	No abnormal Change																
Mineral Oil	mg/l	No Film	0.3	0.05		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	5.52	<0.01	<0.01	<0.01	<0.01
Surface-active substances reacting with Methylene Blue	mg/l	No Lasting Foam	0.3														
Phenol Total Monohydride	mg/l	0.05	0.005	0.0005		<0.02	<0.02	<0.02	0.04	0.04	0.06	<0.02	<0.02	0.02	<0.02	<0.02	0.03
Transparency Secchi's Disc	metre	1	2														
ADDITIONAL EU BATHING WATER GUIDELINE PARAMETERS																	
Floating Detritus			None Present														
Dissolved Oxygen	mg/l					10.7	10.8	10.4	10.1	8.8	10.3	10.8	9.5	10.5	10.4	10.8	10.9
Temperature	Deg. C																
Salinity	gm/l					24.46	23.81	21.37	23.19	23.19	25.75	23.21	22.94	23.57	22.80	22.90	23.10
Dissolved Oxygen Saturation	%		80 to 120														
Nitrogen Kjeldahl as N	mg/l		NVS	2 EU													
Ammoniacal Nitrogen as N	mg/l					0.5	2.1	2.5	0.5	0.5	0.1	0.9	0.4	0.7	0.5	0.6	0.5
Ammonium NH4-N	mg/l		NVS	1.5 EU	35 Taste	0.6	2.7	3.2	0.7	0.6	<0.5	1.2	0.5	0.6	0.6	0.7	0.6
Parathion	mg/l		NVS	0.0001													
HCH - Gamma	mg/l		NVS	0.0001		<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	*****	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Dieldrin	mg/l		NVS	0.00003		<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	*****	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Arsenic (total)	µg/l		NVS	10	10	1.2	1.4	1.2	<1.0	<1.0	1.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium (total)	µg/l		NVS	5	3	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium (total)	mg/l		NVS Cr/IV	0.05	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead (total)	µg/l		NVS	25	10	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0
Mercury (total)	µg/l		NVS	1	1	0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cyanide	mg/l		NVS	0.05													
Nitrates NO3	mg/l		NVS	50.0	50.0	74.0	67.0	54.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.7
Phosphate PO4	mg/l		NVS	0.7 EU													
NON UK OR EU BATHING WATER PARAMETERS																	
COD total	mg/l			30		980	940	840	360	510	150	1560	1050	1080	690	500	500
BOD	mg/l			3 EU		16.5	22.5	43.5	90.8	85.5	25.9	135	36	48	119.3	122.3	117.8
Chlorophyll a	µg/l																
Suspended Solids	mg/l					54	32	38	43	75	39	85	79	83	73	37	83
Sulphide	mg/l					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
METALS																	
Mercury (dissolved)	µg/l					0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Arsenic (dissolved)	µg/l					2.0	1.7	1.5	<1.0	<1.0	1.7	<1.0	<1.0	1.7	<1.0	<1.0	<1.0
Selenium (total)	µg/l			10	10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Selenium (dissolved)	µg/l					<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Lead (dissolved)	µg/l					<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0
Copper (total)	µg/l			2000	2000	80	80	80	70	70	90	70	70	70	<10	<10	<10
Copper (dissolved)	µg/l					60	70	80	60	70	70	70	60	60	<10	<10	<10
Zinc (total)	mg/l			3	3	0.23	0.17	0.13	0.07	0.1	0.08	0.05	0.05	0.06	0.25	0.23	0.24
Zinc (dissolved)	mg/l					0.19	0.17	0.13	0.07	0.07	0.08	0.03	0.03	0.04	0.14	0.14	0.14
Cadmium (dissolved)	µg/l					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese (total)	mg/l			0.05	0.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese (dissolved)	mg/l					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel (total)	µg/l			20	20	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Nickel (dissolved)	µg/l					<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Barium (total)	mg/l			0.1	0.7	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Barium (dissolved)	mg/l					0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium (dissolved)	mg/l					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

YELLOW Below Analysis Detection Limit

PINK Exceeds Bathing Water and/or 1x Drinking Water

RED Exceeds Bathing Water and/or 10x Drinking Water

PURPLE Exceeds Bathing Water and/or 100x Drinking Water

Middlehaven Dock Post Reclamation
Table 4/2 Assessment of UK and EU Bathing Water Quality
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POLYCHLORINATED BIPHENYLS																	
Individual PCB Congeners (28, 52, 101, 118, 138, 153, 180)	µg/l				US EPA 0.5	All <0.005	All <0.005	All <0.005	All <0.005	All <0.005	All <0.005	All <0.005	All <0.005	All <0.005	All <0.005		
Total PCB's (7 congeners)	µg/l																
POLYAROMATIC HYDROCARBONS																	
Benzo (ghi) perylene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1		
Benzo (b) fluoranthene	µg/l				Total Sum 0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1		
Benzo (k) fluoranthene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1		
Indeno (1,2,3-cd) pyrene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1		
Benzo (a) pyrene	µg/l			0.01	0.7	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1		
Fluoranthene	µg/l				4.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1		
Naphthalene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1		
Acenaphthylene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1		
Acenaphthene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1		
Fluorene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1		
Phenanthrene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1		
Anthracene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1		
Pyrene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1		
Benzo (a) anthracene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1		
Chrysene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1		
Dibenz (ah) anthracene	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1		
Total PAH's (EPA 16)	µg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1		
PESTICIDES																	
Fenithrothion (dissolved)	mg/l			Total 0.0001		<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001		
Aldrin	mg/l			0.00003		<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001		
Dichlorvos	mg/l			0.0001		<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001		
Malathion	mg/l			0.0001		<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001		
DDT (op)	mg/l			0.0001	0.002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001		
DDT (pp)	mg/l			0.0001		<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001		
Endrin	mg/l			0.0001		<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001		
Endosulphan Alpha	mg/l			0.0001		<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001		
Endosulphan Beta	mg/l					<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001		
Hexachlorobenzene	mg/l			0.0001	0.001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001		
Pentachlorophenol	mg/l			0.001	0.009	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Hexachlorobutadiene	mg/l				0.0006	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
Organotin (total)	mg/l				0.002	0.00003	0.00005	0.00004	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005		
Trifluralin	mg/l			0.0001	0.02	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		
Atrazine	mg/l			0.0001	0.002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001		
Simazine	mg/l			0.0001	0.002	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001		
Azinphos-methyl	mg/l			0.0001		<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001		
DISINFECTANTS																	
Chloroform	µg/l				200	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		
CHLORINATED SOLVENTS																	
1,2 Dichlorethane	µg/l			3	30	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		
Trichlorobenzene	µg/l				20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		
Carbon Tetrachloride	µg/l				2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		
Tetrachloroethylene	µg/l				40	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		
Trichloroethylene	µg/l			10	70	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		

E005241 Middlehaven Dock, Middlesbrough

Table 5

**Recreational Water Sports
Water Quality Microbiological Assessment**

December 2005

Table 5

Recreational Water Sports Water Quality Microbiological Assessment

For the individual microbiological test results the table shows:

- a) “**GREEN TEXT**” individual microbiological results that **PASS** the UK Bathing Water (Mandatory) standards
- b) “**BLUE TEXT**” individual microbiological results that **PASS** the EU Bathing Water (Blue Flag) standards
- c) “**RED TEXT**” individual microbiological results that **FAIL** either the UK Bathing Water standards and/or the EU Bathing Water standards

For the statistical assessment of all of the microbiological test results the table shows:

- 1) “**BLUE TEXT**” percentage of microbiological results that **PASS** the EU Bathing Water (Blue Flag) standards
- 2) “**GREEN TEXT**” percentage of microbiological results that **PASS** the UK Bathing Water (Mandatory) standards
- 3) “**RED TEXT**” percentage microbiological results that **FAIL** either the UK Bathing Water (Mandatory) standards and/or the EU Bathing Water (Blue Flag) standards

The microbiology test results are summarised as follows:

	Water body PASSES all the EU Bathing Water (Blue Flag) standards
	Water body PASSES all the UK Bathing Water (Mandatory) standards but FAILS one or more of the EU Bathing Water (Blue Flag) standards
	Water body FAILS one or more of both the UK Bathing Water (Mandatory) standards and the EU Bathing Water (Blue Flag) standards

Analysis of Recreational Water Quality Test Results
 Bathing Water Microbiology
 Table 5/1 Middlehaven Dock Reclamation

White Young Green E005241

Micro-organism	UK Bathing Water Standard		EU Bathing Water Standard	
	Mandatory or Legal Minimum		Guideline or Recommended	
	per 100 ml	Frequency Equal to or better than	per 100 ml	Frequency Equal to or better than
Total Coliforms	10,000	95%	500	80%
Faecal Coliforms	2,000	95%	100	80%
Faecal Streptococci	None Set	None Set	100	90%

Each year beginning 1st May and ending on 30th September the minimum testing frequency is fortnightly (i.e. every 2 weeks) - but may be reduced to 4 weekly testing if previous years monitoring show waters are of an appreciably higher standard than required for classification in question and the quality of the waters has not subsequently deteriorated and is unlikely to do so. Results can be disregarded if variation is the result of abnormal weather condition, floods, or other natural disasters.

The **Mandatory or Legal Minimum** standard has to be met for a Seaside Award at a resort or rural beach

Both the **Mandatory/Legal Minimum** and **Guideline/Recommended** standards have to be met for a Blue Flag at a resort beach

Middlehaven Dock Reclamation
Assessment of Recreational Water Quality
Table 5/2 UK and EU Bathing Water Microbiology Standards
Microbiological Testing 12 May 2005 to 13 December 2005

White Young Green E005241

DOCK WATER MICROBIOLOGICAL TESTING


Microbiological Parameter	UK Mandatory	EU Guideline	12/05/05		06/06/05		13/06/05		20/06/05		04/07/2005		18/07/2005		01/08/2005		16/08/2005		30/08/2005	
			A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Total Coliforms	10,000 95%	500 80%	201 100%	145 100%	2 100%	2 100%	NT	NT	3 100%	2 100%	2 100%	2 100%	0 100%	0 100%	210 100%	240 100%	0 100%	0 100%	0 100%	0 100%
Faecal Coliforms	2,000 95%	100 80%	5 100%	0 100%	2 100%	0 100%	NT	NT	3 100%	2 100%	1 100%	0 100%	0 100%	0 100%	21 100%	48 100%	0 100%	0 100%	0 100%	0 100%
Faecal Streptococci	None Set NS	100 90%	0 NS	0 100%	0 NS	0 100%	NT	NT	11 NS	220 83.3%	0 NS	25 87.5%	11 NS	0 90%	160 NS	240 75%	0 NS	0 78.6%	13 NS	1 81.25%
Bathing Water Standard																				

RIVER TEES MICROBIOLOGICAL TESTING

Microbiological Parameter	UK Mandatory	EU Guideline	12/05/05	06/06/05	13/06/05	20/06/05	04/07/05	18/07/05	01/08/05	16/08/05		30/08/2005	
			C	C	C	C	C	C	C	C	C	D	C
Total Coliforms	10,000 95%	500 80%	590 100%	>100 0%	380 100%	1,300 33%	76 100%	>90 50%	19,000 80%	250 85.7%	900 42.9%	19 88.9%	18 55.5%
Faecal Coliforms	2,000 95%	100 80%	80 100%	>90 100%	90 100%	900 67%	30 100%	>90 75%	19,000 80%	112 85.7%	270 42.9%	18 88.9%	200 44.5%
Faecal Streptococci	None Set NS	100 90%	24 NS	62 100%	26 NS	140 75%	17 NS	2 83.3%	280 NS	1 NS	8 77.8%	1 NS	0 81.8%
Bathing Water Standard													

 Sample meets EU Bathing Water Guideline Standard - Blue Flag

 Sample meets UK Bathing Water Mandatory Standard

 Sample exceeds UK Bathing Water Mandatory Standard

Middlehaven Dock Reclamation
Assessment of Recreational Water Quality
Table 5/2 UK and EU Bathing Water Microbiology Standards
Microbiological Testing 12 May 2005 to 13 December 2005

White Young Green E005241

DOCK WATER MICROBIOLOGICAL TESTING


Microbiological Parameter	UK Mandatory	EU Guideline	15/09/2005		26/09/2005		10/10/2005		24/10/2005		01/11/2005		28/11/2005		13/12/2005		04/01/2006	
			A	B	A	B	A	B	A	B	A	B	A	B	A	B		
Total Coliforms	10,000 95%	500 80%	17 100%	1260 94.5%	11 100%	580 90%	3 100%	11 91%	1500 100%	47 87.5%	240 100%	5200 84.6%	63 100%	42 85.7%	31 100%	53 86.7%	6 100%	22 87.5%
Faecal Coliforms	2,000 95%	100 80%	6 100%	1260 94.5%	2 100%	116 90%	0 100%	3 91%	600 100%	42 87.5%	216 100%	1040 80.8%	20 100%	31 82.1%	31 100%	48 83.3%	6 100%	22 84.4%
Faecal Streptococci	None Set NS	100 90%	9 NS	110 77.8%	730 NS	520 70%	0 NS	0 72.7%	240 NS	8 70.8%	2000 NS	150 65.4%	31 NS	55 67.85%	28 NS	27 70%	8 NS	14 71.9%
Bathing Water Standard																		

RIVER TEES MICROBIOLOGICAL TESTING

Microbiological Parameter	UK Mandatory	EU Guideline	15/09/2005	26/09/2005	10/10/2005	24-Oct-05	01/11/2005	28/11/2005	13/12/2005	04-Jan-06
			C	C	C	C	C	C	C	C
Total Coliforms	10,000 95%	500 80%	950,000 80%/50%	880 81.8%/45.5%	2100 83.3%/41.7%	4200 84.6%/38.5%	60 85.7%/42.8%	34000 80%/40%	189 81.3%/43.8%	2340 82.4%/41.2%
Faecal Coliforms	2,000 95%	100 80%	570,000 80%/40%	300 81.8%/36.4%	850 83.3%/33.3%	2900 76.9%/30.8%	0 78.6%/35.7%	7700 73.3%/33.3%	147 75%/31.3%	2340 70.6%/29.4%
Faecal Streptococci	None Set NS	100 90%	70,000 NS/75%	470 NS/69.2%	160 NS/64.3%	540 NS/60%	1 NS/62.5%	53 NS/64.7%	33 NS/66.7%	620 NS/63.2%
Bathing Water Standard										

 Sample meets EU Bathing Water Guideline Standard - Blue Flag

 Sample meets UK Bathing Water Mandatory Standard

 Sample exceeds UK Bathing Water Mandatory Standard

Middlehaven Dock Reclamation
 Assessment of Recreational Water Quality
 Table 5/2 UK and EU Bathing Water Microbiology Standards
 Microbiological Testing 12 May 2005 to 13 December 2005

White Young Green E005241

Middlehaven Dock Bathing Water Microbiology Statistics							
Microbiological Parameter	UK Mandatory	EU Guideline	Samples Tested	Samples UK<	PASS FAIL	Samples EU<	Pass Fail
Total Coliforms	10,000 95%	500 80%	32	0 100	PASS	4 87.50	PASS
Faecal Coliforms	2,000 95%	100 80%	32	0 100	PASS	5 84.38	PASS
Faecal Streptococci	None Set NS	100 90%	32	None Set NS	None Set NS	9 71.88	FAIL
Bathing Water Standard	PASS	PASS			PASS		FAIL

River Tees Bathing Water Microbiology Statistics							
Microbiological Parameter	UK Mandatory	EU Guideline	Samples Tested	Samples UK<	PASS FAIL	Samples EU<	PASS FAIL
Total Coliforms	10,000 95%	500 80%	17	3 82.35	FAIL	10 41.18	FAIL
Faecal Coliforms	2,000 95%	100 80%	17	5 70.59	FAIL	12 29.41	FAIL
Faecal Streptococci	None Set NS	100 90%	19	None Set NS	None Set NS	7 63.16	FAIL
Bathing Water Standard	PASS	PASS			FAIL		FAIL

Middlehaven Dock Reclamation
 Assessment of Recreational Water Quality
 Table 5/2 UK and EU Bathing Water Microbiology Standards
 Microbiological Testing 12 May 2005 to 13 December 2005

White Young Green E005241

Middlehaven Dock Bathing		
Microbiological Parameter	UK Mandatory	EU Guideline
Total Coliforms	10,000 95%	500 80%
Faecal Coliforms	2,000 95%	100 80%
Faecal Streptococci	None Set NS	100 90%
Bathing Water Standard	PASS	PASS

River Tees Bathing		
Microbiological Parameter	UK Mandatory	EU Guideline
Total Coliforms	10,000 95%	500 80%
Faecal Coliforms	2,000 95%	100 80%
Faecal Streptococci	None Set NS	100 90%
Bathing Water Standard	PASS	PASS