

# Discharge Consents Monitoring, Compliance and Pollution Load

1997

Discharge Consents 1997

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ENVIRONMENT AGENCY



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## SUMMARY

The Environment Agency is a public body whose job is to protect the environment, and one of the Agency's aims is to improve the quality of waters by controlling the risk of pollution. For discharges of wastewater this is achieved by setting emission standards in discharge Consents. Dischargers who fail to meet these standards can be prosecuted.

This report summarises the monitoring and performance of consented continuous point source discharges, both on a regional basis and for the whole of England and Wales, for 1997.

Nationally, approximately 30% of all consented discharges have numeric conditions that limit the amount of substances allowed in the effluent, with most of these discharges made either by the Water Companies or by Industry. 70% of consented discharges, including Combined Sewer Overflows (CSOs), are controlled by descriptive (non-numeric) conditions. These may specify the type of equipment which must be deployed to control the quality of the discharge and its impact on the environment. Consent conditions may also include an equipment maintenance programme which can be an effective method of preventing pollution.

Discharges from sewage treatment works (STWs) operated by the Water Companies have generally maintained or continued to improve in compliance with numeric consent conditions, but declined in compliance where subject only to descriptive conditions.

- Approximately 4000 STW discharges have Consents with Numeric Standards. 98.0% of these were monitored and 96.9% of the sampled discharges complied with all the conditions in their Consents. The compliance was 97% in 1995 and 96.6% in 1996.
- Approximately 1700 STW discharges are small enough to warrant Descriptive Conditions. All sites were inspected and 77.3% of the inspected discharges complied. In 1996 93.0% of the inspected discharges complied.

A small decline in overall compliance was recorded for discharges made by Industry:

- Approximately 4800 industrial effluent discharges have Consents with Numeric Standards, and are classified as Significant discharges because of their size. 69.3% of these were sampled and 68.8% of the sampled discharges complied with their Consents. In 1996 these figures were 69.9% and 74.1% respectively.

## **CONTENTS**

### **SUMMARY**

<b>1</b>	<b>INTRODUCTION</b>	<b>1</b>
<b>2</b>	<b>CONSENTS</b>	<b>2</b>
<b>3</b>	<b>TYPES OF DISCHARGES</b>	<b>3</b>
<b>4</b>	<b>TYPES OF CONSENTS</b>	<b>4</b>
<b>5</b>	<b>CONSENTED DISCHARGES AND MONITORING</b>	<b>5</b>
5.1	<i>Numeric Consents</i>	5
5.2	<i>Descriptive (Non-numeric) Consents</i>	6
<b>6</b>	<b>COMPLIANCE</b>	<b>7</b>
6.1	<i>Numeric Consents</i>	7
6.2	<i>Descriptive (Non-numeric) Consents</i>	9
6.3	<i>Changes Since 1996</i>	10
<b>7</b>	<b>ENFORCEMENT</b>	<b>14</b>
7.1	<i>Absolute Limits and Upper-tiers</i>	14
7.2	<i>95-percentile Standards</i>	14

### **GLOSSARY**

### **APPENDIX A: ASSESSMENT OF COMPLIANCE**

### **APPENDIX B: REGIONAL CONSENTS DATA**

## 1 INTRODUCTION

The Environment Agency is a public body whose job is to protect the Environment. It operates through eight Regions (covering twenty-six Areas) in England and Wales, with the aim of protecting and improving the quality of air, land and water by controlling the risk of pollution. (The Agency also has duties for water resources, flood defence, freshwater fisheries, conservation and navigation).

Most discharges of sewage and trade effluent to coastal or inland waters require a consent from the Environment Agency, under the Water Resources Act 1991. Others, which are not considered in this report, may be subject to different legal provisions such as IPC Authorisations or Waste Management Licences, or may be subject to specified exemption, eg certain abandoned mines.

The Environment Agency performs its function as a regulator by issuing appropriate discharge consents which are environmentally protective. In setting each consent, the Environment Agency aims to achieve local and European targets for water quality. It is the dischargers responsibility to achieve compliance and to make any necessary financial investment to improve the quality of the discharge. The Environment Agency has powers to prosecute dischargers who operate outside their consent conditions or are found responsible for incidents that cause serious damage to the environment.

To check that the discharges are meeting their consent requirements, the Agency carries out effluent and water quality monitoring programmes. Most discharges are small and innocuous, and not monitored directly as they have very little potential to cause pollution. The impact of groups of these small discharges is assessed by checking the quality of the receiving waters. Most of the Agency's monitoring is directed at discharges that have the greatest potential for impact. The results of analysis of samples from the the monitoring programmes are available for inspection on the Public Register, available at the Agency's Regional offices.

The purpose of regular reporting of discharge compliance data is to provide a 'snapshot' of the current position and for comparison against earlier data. This ensures that an assessment of the relative performance of dischargers in meeting their consents can be made. This assessment can be made at both Regional and National level.

Although the figures may vary from quarter to quarter or year to year, compliance assessment at any particular site is indicative of how the dischargers are performing in relation to their consent conditions.

## 2 CONSENTS

It is an offence in England and Wales (with certain exceptions) to allow any polluting matter, or sewage or trade effluent, to enter controlled waters (Sections 85 and 86, Water Resources Act 1991). A defence against this general offence is for the discharger to possess, and be compliant with, the conditions of a discharge consent issued by the Environment Agency (Section 88, Water Resources Act 1991, as amended by the Environment Act 1995).

A Consent is a legal document that sanctions the discharge of effluent to water. It states the amount of wastewater that can be discharged, and may set limits on its composition.

This report is a summary for the calendar year 1997, and gives Regional and National numbers of each main type of discharge and discusses how they are monitored. It also describes the performance of discharges against their current consents. Consents are reviewed from time to time for various reasons, and compliance is assessed against current consent conditions. During the year, discharge consents may be issued, varied or revoked, and volumes of effluent discharged may vary, all of which can affect the monitoring regime.

The majority of discharges are small and harmless, with little potential to adversely affect the receiving water. Because of their nature it would be difficult to control them by means of specific numeric values. As a result such discharges are not sampled directly, but are monitored by checking the quality of the receiving waters or by routine inspection of operations.

Most of the Agency's monitoring programmes are directed at those discharges that have the greatest potential for impact. Historically the majority of these discharges have been made by the Water Companies and by industry. In 1993 standard methods for the reporting and classifying of discharges were adopted by the Agency's predecessor, the National Rivers Authority. These generated data with consistent format and compliance definitions so that more accurate and useful summary statistics could be produced.

In October 1996, Schedule 23 of the Environment Act 1995 was introduced. This required the registration of discharge consent holders. This put the legal onus on the current holder of the discharge consent to inform the Environment Agency of any change in holder of the discharge consent, or of responsibility for the discharge. This has contributed to a reduction in the number of consents being held, as, for example, it has encouraged the consent holder to apply for revocation for a consent which is no longer required.

### 3 TYPES OF DISCHARGES

Consents cannot be applied to all discharges. For example it is not an offence to discharge into controlled waters from abandoned coal and metal mines until 1999 (Section 60, Environment Act, 1995). Similarly, discharges to receiving waters from processes covered by Integrated Pollution Control are covered by an Authorisation. These discharges are therefore not covered in this report.

This report deals only with continuous discharges from fixed points i.e. point source continuous discharges, as only these discharges can be controlled by a consent. In this report the term *discharge* means *point source continuous discharge*. The operation and impact of intermittent discharges, such as Combined Sewer Overflows (CSO's), is not routinely reported. Typically, CSO consents are based on sewer design criteria, to operate only when sewer flow exceeds a threshold, and may include requirements for regular inspection and maintenance.

Discharges operated by the Water Companies<sup>1</sup> are differentiated by the Agency from those operated by all other bodies due to their different consent requirements. The conditions applied to most sewage treatment works owned by the Water Companies are different to other forms of discharge because the quality of the incoming sewage is not under the control of the operator. Such discharges are typically controlled by numeric limits which have to be met for at least 95% of the time within any 12 month period.

Discharges made by Industry, Trades and Commerce are given the collective name of trade discharges. Many of the most important discharges from this sector are covered by Integrated Pollution Control Authorisations issued by the Environment Agency under the Environment Protection Act 1990. Some trade effluents are discharged to sewer, the control of which is the responsibility of the Water Company as specified in the Water Industry Act 1991. The Environment Agency sets discharge consents only for trade discharges that are made directly to receiving waters. These discharges are subject to absolute numeric limits on conditions. In this report, all references to trade discharges cover only those consented discharges which enter a water body directly.

Definitions of types of discharge within the broad categories discussed above are given in the glossary. The numbers of discharges within each category are given in Table B1, Appendix B.

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<sup>1</sup>

*By this we mean the ten private Water Services Public limited companies set up in 1989.*

## 4 TYPES OF CONSENTS

The approximate number of consents which are monitored for each type of discharge, for each Region in England and Wales is set out in Table B1, Appendix B.

Consents are issued to prevent pollution and detailed compliance assessment only covers a proportion of the total consents held. The Agency monitors those that pose the greatest risk to the environment.

As a result of changes in legislation and procedures over recent years, a number of different types of discharge consent exist. Consents fall into 2 main types: numeric and descriptive (non-numeric). Discharges that have the largest potential to affect the environment have numeric limits attached to their consents. The limits may be applied to individual elements or to groups of substances within the discharge. There are approximately 10,000 numeric consents in England and Wales that are routinely monitored by the Agency.

Significant discharges are discharges with a volume greater than 5 m<sup>3</sup>/day (although in some cases, whilst the volume of the discharge may be smaller, its type and location may be sufficiently important to require numeric conditions).

Descriptive (non-numeric) consents are used where the control required of the discharge cannot easily or usefully be defined with a numerical standard on effluent quality. Such consents are usually set for overflows from sewers that also receive rainfall that runs off from land (CSOs). The consent will set the conditions, such as sewer flow, under which a discharge to water is permitted. Descriptive consents for continuous discharges are normally restricted to small discharges where minimal impact is caused. Descriptive conditions can also be included within numeric consents to cover operational performance measures, for example the reporting of routine operational data back to the Environment Agency. A numeric consent may include a clause stating that, as far as reasonably practical, the treatment works must be operated in a manner such that any matter in the discharge does not harm fish or the food of fish.

## 5 CONSENTED DISCHARGES AND MONITORING

The frequency of sampling of a discharge reflects its potential impact. For some types of discharge (e.g. sewage) the volume of the discharge is generally proportional to its impact. For sewage treatment works the size of the discharge is often expressed in terms of the population which can be said to be served by the works; for other discharges it is expressed in terms of volume of effluent per day. Table 1 provides an overview of sampling arrangements for sewage and other discharges. All the results of monitoring of discharges and receiving waters are held on Public Registers which are available for inspection at the Environment Agency's Regional Offices.

**Table 1: Frequency of sampling sewage and other discharges**

Type of discharge		Sampling frequency
Sewage Treatment Works with Numeric Consents (Equivalent Population*)	Other Discharges Consented Flow (m <sup>3</sup> / day)	Number of samples per year
less than 20	less than 5	at Region's discretion
20 to 250	5 to 100	4
250 to 20000	100 to 10000	12
20000 to 100000	10000 to 50000	24
more than 100000	more than 50000	48

\* see Glossary

### 5.1 Numeric Consents

A numeric consent is defined as a consent for a discharge in which numerical limits are set on the concentration or load of any substance, and/or on the effluent flow.

Most discharges with numeric consents are sampled directly. For a variety of reasons the sampling rate of discharges may be greater than indicated in Table 1, in cases where the receiving waters are particularly sensitive to a discharge or subject to a management plan.

Details of the number of numerical consents, the number monitored and their compliance is given in Section 6.



## 5.2 Descriptive (Non-numeric) Consents

Discharges with descriptive (non-numeric) consents are inspected by the Agency at a frequency, generally quarterly, dependent on the potential they have to affect the environment. The Agency may use biological monitoring of the receiving waters where necessary to assess the impact of any discharge, and to indicate which discharges require more frequent inspection.

Details of the compliance with descriptive (non-numeric) consents, with the number of discharges listed, and the number monitored are given in Section 6.

## 6 COMPLIANCE

Consenting procedures have been historically different in the previous National Rivers Authority Regions, and to some extent this may still be the case in the Environment Agency. In order to ensure consistency of approach the Agency is developing and undertaking an audit of Regional practice.

Compliance for descriptive discharge consents is reported for those discharges inspected. Not all descriptive consents are monitored in any one calendar year. The Agency is developing a policy to address consistency across the Regions in the inspection and compliance assessment for descriptive consents.

### 6.1 Numeric Consents

During 1997 of the total number of significant discharges, 98.0% of the 4059 sewage treatment works operated by the Water Companies, 81.5% of the 3116 other sewage works and 69.3% of the 4801 trade discharges were sampled (Appendix B, Table B2). This is a higher sampling proportion than in the previous year (1996) when 97.7% of the Water Company operated sewage treatment works, 81.6% of the other sewage works and 69.9% of the trade discharges were sampled. Table 2 summarises national compliance of the main types of discharges that are monitored and which have numeric consents.

Of all the discharges monitored, 76.0% complied with their consents in 1997 (Table 2). In 1996 this figure was 78.0% while in 1995 it was 77.0%. Tables B4 and B7, Appendix B details the regional compliance of discharges with Numeric Consents.

Table 2 also indicates that the performance of the sewage treatment works operated by the Water Companies is much better than that of other discharges and other types of discharger. Appendix A explains that the methods of assessing compliance vary for different types of discharger. Nonetheless, when account is taken of these differences, the performance of the sewage treatment works operated by the Water Companies remains better than that of other types of discharger.

**Table 2: Compliance of discharges with numeric consents**

Category of significant discharges with numeric consents	Total Number	Number Monitored	Number Compliant	% Compliant of those monitored
1. Sewage Treatment Works operated by the Water Companies	4059	3978	3856	96.9%
2. Sewage Treatment Works not operated by the Water Companies	3116	2540	1340	52.8%
3. Trade Discharges	4801	3325	2286	68.8%
Total	11976	9843	7482	76.0%

Table 3 further illustrates the regional performance of sewage treatment works operated by Water Companies. It covers only the 95-percentile standards - standards well placed to provide useful summary statistics because compliance is not so sensitive either to differences in sampling rate, or to the number of consents that also have absolute limits.

Table 3 shows that 98.8% of discharges monitored comply with their 95-percentile (look-up table) standards. In 1996 this figure was 97.9% and 97.8% in 1995.

#### *Limitations of Assessing Performance*

The compliance figures provide a good summary of the performance in 1997, but they do not necessarily provide a sound basis for showing annual change. Additionally the compliance figures are not a good basis for comparing different types of discharger, as the figures include performance against both percentile and absolute limits (see Appendix A). Compliance with absolute limits is a function of sampling effort - the more sampling, the larger the probability of sample failures and, hence, of failed discharges within the reporting period.

**Table 3: Compliance with 95-percentile standards of Sewage Treatment Works operated by the Water Companies**

Region	Total Number	Number Monitored	Number Compliant	% of Monitored that Comply
Anglian	686	686	680	99.1%
Midlands	753	746	745	99.9%
North East	501	455	444	97.6%
North West	345	345	342	99.1%
Southern	262	258	257	99.6%
South West	517	517	501	97.0%
Thames	358	356	354	99.4%
Welsh	590	576	570	99.0%
England and Wales	4012	3939	3893	98.8%

## 6.2 Descriptive (Non-numeric) Consents

Table 4 deals with discharges with descriptive (non-numeric) consents. Appendix B gives details on a Regional basis. However this table is missing the data for South West Region, as the Quarter 4 (October to December) descriptive consent data has not been reported.

Of the descriptive (non-numeric) consents, about 49% relate to other discharges not operated by the Water Companies. There were, however 1683 discharges with descriptive consents from sewage treatment works operated by the Water Companies. All of these sites were inspected during the year. 75.9% of the monitored sewage treatment works operated by the Water Companies complied, and 91.8% of other discharges complied.

**Table 4: Compliance with Descriptive (Non-numeric) Consents**

Category of discharges with descriptive (non-numeric) consents	Number of Discharges	Number Monitored	Compliant Discharges	
			Number	% of Monitored
1. Sewage Treatment Works operated by the Water Companies	1683	1751	1329	75.9
2. Other Discharges	1395	465	427	91.8
Total	3078	2216	1756	79.2

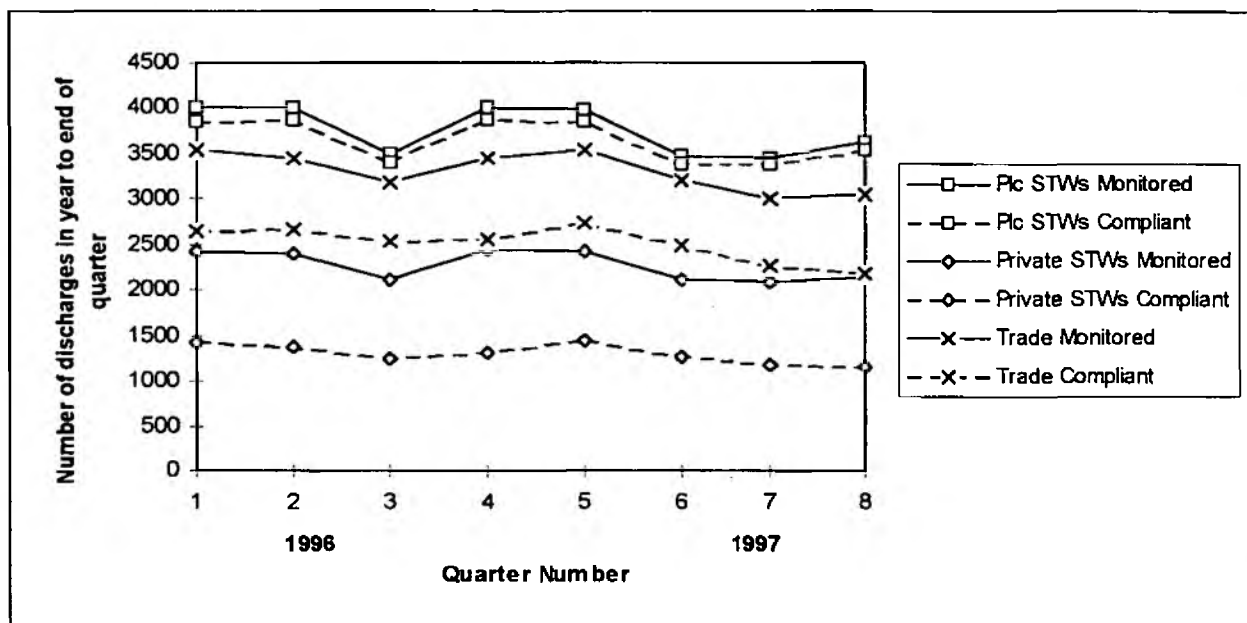
Note: Midlands Region have monitored 188 sewage treatment works operated by Water Companies and 169 other discharges. However, as the compliance data is not available the numbers monitored have not been included in the calculations.

### 6.3 Changes Since 1996

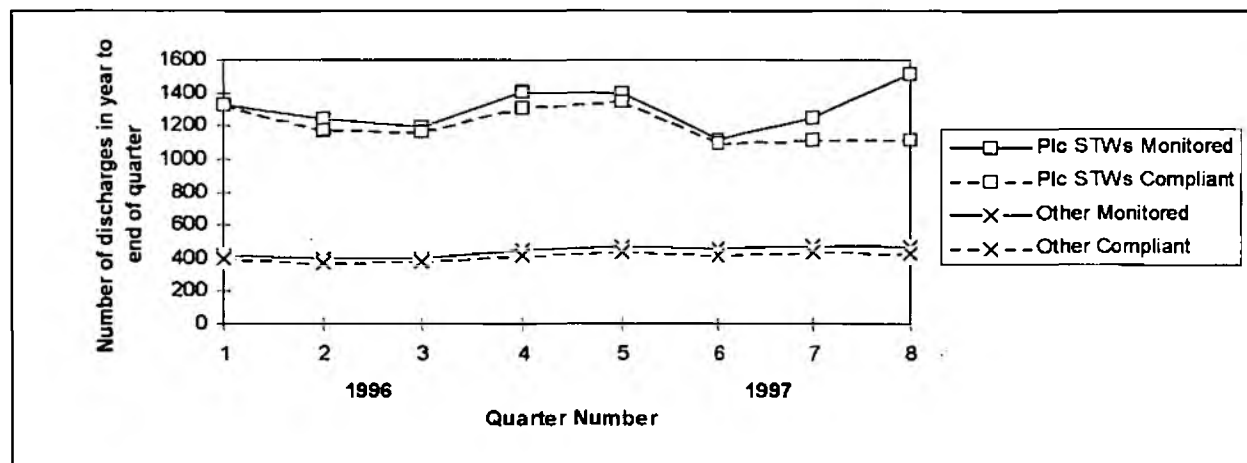
The introduction of Schedule 23 in October 1996 (see Section 2) resulted in the legal responsibility for each discharge being placed on a named individual.

Figures 1 and 2 profile the number of discharges sampled and compliance achieved against numeric and descriptive consents on a quarterly rolling basis over 1996 and 1997. The data for Figures 1 and 2 is taken from *Table B 5: 1996 and 1997 Profile for Monitoring and Compliance of Numeric and Descriptive Consents*, Appendix B.

**Figure 1: 1996 & 1997 Numeric consents profile for monitoring and compliance**



**Figure 2: 1996 & 1997 Descriptive consents profile for monitoring and compliance**



Note: Figure 2 does not include the consents figures for South West Region which are currently unavailable

In 1993, a more tightly defined reporting standard for the assessment of compliance was introduced. The resultant new method for compliance reporting and classifying discharges conceals a significant reduction in the amount of pollution actually discharged. Because consents have been tightened the year-on-year improvement in compliance underestimates the true change in quality of the discharges.

Table 5 details the annual compliance of numeric consenting standards of Sewage Treatment Works operated by the Water Companies.

**Table 5: Compliance of Sewage Treatment Works Operated by Water Companies with all Numeric Standards (1993 to 1997)**

Region	% of Sewage Treatment Works Monitored that Comply				
	1993	1994	1995	1996	1997
Anglian	96.1	96.9	97.8	98.1	98.3
Midlands	96.4	98.9	98.2	97.9	96.9
North East	95.3	95.5	95.9	94.4	97.6
North West	97.2	97.5	97.8	98.3	98.3
Southern	97.7	98.9	98.9	97.8	98.9
South West	84.4	89	89.7	93.8	92.0
Thames	95.1	95.1	97.8	96.7	98.9
Welsh	93.1	93.7	97.1	95.6	96.4
England and Wales	94.2	95.6	96.6	96.6	96.9

The assessment of annual compliance results is sensitive to the numbers of discharges that have upper-tier consents. Compliance against upper-tier consents depends on the sampling rate - the more samples, the greater the number of failed discharges within the reporting period.

A better indication of the true trend is given by compliance against 95-percentile standards. These improved from 97.8% in 1995, to 97.9% in 1996, and to 98.8% in 1997. This data is presented in Table 6.

**Table 6: Compliance of Sewage Treatment Works Operated by the Water Companies with 95-percentile Standards (1995-1997)**

Region	1995 (%)	1996 (%)	1997 (%)
Anglian	98.3	98.5	99.1
Midlands	96.8	100	99.9
North East	99.2	95.9	97.6
North West	99.7	99.7	99.1
Southern	98.8	97.7	99.6
South West	92.4	94.5	97.0
Thames	98.6	97.5	99.4
Welsh	98.5	98.4	99.0
England and Wales	97.8	97.9	98.8

Similar data are presented for trade discharges in Table 7. Following a gradual improvement from 1992 - 1996, there was an apparent decline in most Regions in 1997.

**Table 7: Compliance of Trade Discharges with Numeric Consents (1992-1997)**

Region	% of Monitored that Comply					
	1992	1993	1994	1995	1996	1997
Anglian	41	59	66	68.9	68.5	74.1
Midlands	72	72	77	79.2	81.9	77.2
North East	69	84	76	74.5	80.5	62.5
North West	71	74	75	79.0	81.4	80.2
Southern	42	48	42	55.6	48.4	53.3
South West	53	61	41	42.0	51.2	41.0
Thames	73	76	72	77.1	82.6	80.4
Welsh	41	50	56	59.1	63.1	60.2
England and Wales	67	71	69	71.0	74.1	68.8



## **7 ENFORCEMENT**

Routine monitoring results are used to decide cases where it is appropriate to issue warnings to dischargers or to take legal action through the courts. Care is taken to consider the underlying statistical principles of monitoring and sample analysis programmes when making these decisions to minimise the risk of prosecuting compliant discharges that have been wrongly reported as failures by routine monitoring, or by results affected by statistical errors in chemical analysis.

A failure of consent that is sufficiently severe to cause a pollution incident leading to a complaint or a fish kill, is handled by special procedures and policy. These are described elsewhere<sup>2</sup>. Other failures are treated as evidence of heightened risk of damage to the environment, as set out below.

### **7.1 Absolute Limits and Upper-tiers**

When a routine sample indicates a clear breach of consent, supported within the errors of chemical analysis, the next sample is taken with the additional formal procedures that are necessary to support legal action. If this next sample displays a clear breach, enforcement action will normally follow. Sampling on this basis then continues routinely until the discharge is found to again be compliant. This is usually judged to be when all the samples taken over a three month period have been shown to comply with the consent limits.

### **7.2 95-percentile Standards**

Whenever a breach of Consent in any sequence of twelve consecutive months occurs, all subsequent routine samples are taken with a view to prosecution. This continues until either sufficient data has been collected for prosecution, or results for the following twelve months again comply.

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<sup>2</sup>

*Water Pollution Incidents in England and Wales - 1995 Environment Agency*

## GLOSSARY

**ABSOLUTE LIMIT:** A numerical standard that must never be exceeded. The term is usually applied to all determinands in the consents for discharges not operated by the Water Companies and to the non-sanitary determinands for the sewage treatment works operated by the Water Companies. Sanitary determinands for the sewage treatment works operated by the Water Companies are controlled by percentile standards although absolute limits (as upper-tier limits) may also be applied with the percentiles.

**AMMONIA:** A chemical found in water often as a result of pollution by sewage effluents. Ammonia affects fisheries and abstractions for potable water supply.

**BIOCHEMICAL OXYGEN DEMAND (BOD):** A measure of the amount of oxygen consumed in water, usually by organic pollution. Oxygen is vital for life and so measurement of the BOD tests whether pollution could affect aquatic animals.

**COMBINED SEWER OVERFLOWS (CSO):** Most sewers receive flows of sewage and flows of rainfall that run off from roads and paved areas. After heavy rainfall, the flows in the sewer may exceed the capacity of the sewers or the capacity of sewage treatment works. Combined sewer overflows allow the dilute and excess flow to discharge to a receiving water. The conditions under which flows may overflow into receiving waters are specified in the consent.

**COMPLIANT:** Conforming with type of conditions specified in consent. Tested through assessment to determine whether a confirmed failure has occurred.

**CONFIRMED AS FAILING:** On the basis of assessment of results of analysis of samples or other relevant tests or on the basis of assessment of inspection reports.

Where there is no chemical analysis or test which demonstrates failure to conform with specified limits or no inspection report which records failure to conform with a specified condition, failure cannot be confirmed.

**CONTROLLED WATER:** Waters for which the Agency is responsible: including all rivers, canals, lakes, groundwaters, estuaries and coastal waters to a distance of 3 miles offshore.

**DESCRIPTIVE (NON-NUMERIC) CONSENT:** A consent for a discharge in which conditions are specified about various features of the discharge facility, its operation and maintenance as major controls, whether or not limits on flow are also included.

**DETERMINAND:** A general name for a characteristic or aspect of water quality. Usually a feature which can be described numerically as a result of scientific measurement.

**DISCHARGE:** An individual entry into controlled waters of an effluent which is subject to consent conditions. For compliance reporting purposes discharges must be subject to a programme of routine monitoring. This specifically excludes:

- (i) weather dependent intermittent discharges such as storm overflows and surface water sewers;
- (ii) operational failure intermittent discharges such as emergency overflows.

**EMERGENCY OVERFLOWS:** The sewerage system contains items like pumping stations which could sometimes be subject to an emergency such as mechanical failure. The conditions under which flows may be diverted into receiving waters are controlled by Consent.

**ENVIRONMENTAL QUALITY STANDARD:** A summary statistic, like a mean, percentile or maximum, that specifies the concentration of a determinand in a receiving water that should not be exceeded if a specified use or attribute of that water is to be maintained.

**INTERMITTENT DISCHARGES:** Discharges of sewage that are made intermittently as a result of rainfall (combined sewer overflow, storm tank discharge), or following an emergency such as power failure at a sewage pumping station.

**INSPECTED DISCHARGES:** Discharges, usually with descriptive consents, that are subject to pre-planned visits to assess compliance. The inspections may include checks on the receiving water.

**LOOK-UP TABLE:** Table listing the maximum allowed numbers of exceedances, per annum, of a 95-percentile standard for various total numbers of samples; the test procedures in use in England and Wales since 1985 for assessing sewage effluent compliance. A truncated version is shown below:

The Look-up Table	
Number of Samples	Permitted Number of Failed Samples
4 - 7	1
8 - 16	2
17 - 28	3
29 - 40	4
41 - 53	5
	etc

**MONITORED DISCHARGE:** A monitored discharge is subject to routine inspection or sampling of the receiving water or the discharge itself.

**NON-SANITARY DETERMINANDS:** Determinands which are not generally associated with sewage treatment. They include nutrients as well as metals and other dangerous substances. Consent standards are almost always expressed as absolute limits. In many cases, non-sanitary determinands in sewage effluents are the result of trade discharges to the sewer.

**NON TIME-LIMITED UPPER-TIER LIMIT:** An absolute limited (generally based on a multiplication of the 95-percentile exceedance value) set on post September 1989 consents. In practice this type of limit has been applied to Water Company's sewage works but could be applied to private sewage works or appropriate industrial discharges.

**NON-WATER COMPANY DISCHARGES:** All point source discharges not made by the Water Companies. The discharges made by all other traders and private individuals. Most of these discharges are made from small sewage works and small trade premises and these tend to have descriptive consents.

**NUMERIC CONSENT:** A consent for a discharge in which numerical limits are set (as absolutes or percentiles) on the concentration or load of any substance, and on the effluent flow, and these form a major part of any compliance testing.

**ORGANIC POLLUTION:** A term used to describe the type of pollution which through the action of bacteria consumes the oxygen dissolved in rivers. It applies to the effects of sewage, treated sewage effluents, farm wastes and the waste from many types of industry like dairies, breweries and abattoirs.

**OTHER DISCHARGES (DESCRIPTIVE):** Includes all non-sewage, non-weather dependent, non operational failure discharges subject to descriptive consent conditions.

**PERCENTILE LIMIT:** A numeric limit that must be achieved or bettered for at least some stated percentage of time over a specified assessment period. For example, a 95-percentile limit must be met for at least 95% of a specified time period, for example, 1 year (see Look-up Table).

**POINT SOURCE DISCHARGE:** Discharges from a fixed point - a pipe, for example. It is these discharges that can be controlled by Consent.

**POPULATION EQUIVALENT (pe):** A measure of the load of organic pollution. It is an estimate of the population served by the sewage treatment works plus an allowance for trade discharges to the sewer. The latter is expressed in terms of the number of extra people that would produce a load of pollution that is equivalent to the trade discharge. The Urban Waste Water Treatment Regulations definition of pe is an organic biodegradable load with a 5 day biochemical oxygen demand (BOD) of 60g of oxygen (O<sub>2</sub>) per day. There are alternative methods of calculation, such as the OFWAT Level of Service.

**PROCESS EFFLUENT:** Types of trade discharge. The liquid waste from industrial and commercial processes as distinct from the drainage from sites.

**PUBLIC REGISTERS:** Records of consents and analysis of effluents and waters that are available for inspection by any member of the public. The registers are located at the Agency's regional offices.

**RECEIVING WATER:** Water to which effluents discharge. This covers all controlled waters : rivers, canals, lakes, groundwaters, estuaries and coastal waters to a distance of 3 miles offshore.

**SANITARY DETERMINANDS:** The pollutants commonly associated with sewage treatment. These are suspended solids, biochemical oxygen demand (BOD) and ammonia.

**SEPTIC TANKS:** Septic tanks are small sewage treatment facilities which normally serve individual domestic premises.

**SIGNIFICANT DISCHARGES:** The term "significant" is applied to point source discharges that are consented for more than 5 m<sup>3</sup>/day, but also includes some smaller discharges where the type of discharge and location of the discharge make it important enough to require monitoring. They are subject to numeric consents.

**SITE DRAINAGE:** Drainage from sites used for industrial, commercial or domestic purposes. This may be collected in surface water sewers or drains that discharge to a receiving water.

**STORM SEWAGE:** The high flows of sewage that can reach the sewerage system or the sewage treatment works at times of heavy rainfall.

**STORM TANKS:** Sewage treatment works are designed to treat a specific flow of sewage. High flows in excess of this level, caused usually by storms, are passed into storm tanks. The aim is to pass the stored volumes to the sewage treatment works when the flows have receded.

**STORM TANK OVERFLOWS:** If the Storm Tanks are not big enough to take all the storm sewage, perhaps because the storm is particularly severe, the surplus flow may spill over into a receiving water. The conditions under which this can happen are specified in the consent. Storm tank discharges consist of dilute sewage, after some settlement of suspended, potentially polluting, material.

**SURFACE WATER DISCHARGES:** In this report, the run-off from roads, buildings and land. This may be subject to consent where it enters watercourses. (Not to be confused with the term surface water which is sometimes used for any controlled water which is not groundwater).

**SUSPENDED SOLIDS:** Solid organic or inorganic material maintained in suspension by the turbulence of effluent or receiving water flow. These solids may settle when the flow velocity drops, possibly smothering bottom dwelling aquatic organisms or creating a localised oxygen demand.

**TIME-LIMITED UPPER-TIER LIMIT:** An absolute (generally based on a multiplication of the 95-percentile exceedance value) that is added to a number of time-limited numeric consents for Water Company's sewage works discharges, where, on privatisation in 1989, the percentile limits were relaxed for a specified time period whilst work necessary to improve performance was to be undertaken.

**TRADE EFFLUENT:** Includes all trade effluent discharges  $> 5 \text{ m}^3/\text{day}$  (or requiring monitoring) and subject to numeric consent conditions. This category includes water treatment works effluent.

**TRI-PARTITE SAMPLE:** A sample taken in the presence of a witness and split into three parts. One part is analysed by the Agency, one is given formally to the discharger and one is kept aside to allow an independent check. This type of sample is generally the only type of official or regulatory sample formally admissible as legal evidence.

**UPPER-TIER CONSENT:** An absolute limit, generally a multiple of the 95-percentile limit, that may be included with the 95-percentile in the numeric consents for sewage treatment works operated by the Water Companies.

**WATER COMPANY DISCHARGES:** Point source discharges made by the Water Service public limited companies (water and sewerage undertakers) in England and Wales.

## **APPENDIX A**



## **APPENDIX A: ASSESSMENT OF COMPLIANCE**

A discharge is reported as compliant when the Environment Agency's monitoring programme shows that it conforms fully with the limits set in its Consent.

### **A.1 Discharges from Sewage Treatment Works Operated by the Water Companies**

Numeric Consents for these generally contain 95-percentile standards for sanitary determinands. They may also include upper-tier standards for sanitary determinands and absolute limits for non-sanitary determinands.

To be declared compliant in this report, the discharge must not fail any of the standards in its consent.

#### 95-Percentile Standards

These standards must be met for 95% of a 12 month period. A certain number of sample results may exceed the limit in any period of 12 complete months. The number of permitted failures is laid down in a look-up table. This is referred to in the consent. If the number of failed samples is more than the number permitted by the look-up-table, then it is 95% certain that the failure is not due to chance. The discharge is then reported as having failed its 95-percentile standard.

These are the only types of standards for which the rules for assessing compliance follow statistical principles. For this reason performance against 95-percentile standards has a special role in showing trends.

#### Descriptive Consents

A discharge with a Descriptive Consent is judged by Inspections, as opposed to the analysis of chemical samples. The discharge is recorded as compliant if it passes its set of inspections in the reporting period.

### **B.1 Discharges not Operated by the Water Companies**

The numeric consents have absolute limits whether for sanitary or non-sanitary determinands. 95-percentiles are hardly ever used. Absolute limits may not be exceeded in any sample.

In most cases the numbers set in these discharge standards start out as values calculated as 95-percentiles, but they appear in the Consent as Absolute Limits. For this reason, the performance of these discharges will always appear worse than those of the Water Companies.

## **APPENDIX B**

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## NUMBERS OF DISCHARGES

**Table B 1: Numbers of Discharges with Numeric and Descriptive Consents**

Region	Numeric								Descriptive						Numeric & Descriptive
	Total		Sewage Treatment Works Operated by Water Companies		Other Sewage Treatment Works		Trade Discharges		Total		Sewage Treatment Works Operated by Water Companies		Other Discharges		Total
	Number of consents	% of total Regional consents	Number of consents	% of total Regional consents	Number of consents	% of total Regional consents	Number of consents	% of total Regional consents	Number of consents	% of total Regional consents	Number of consents	% of total Regional consents	Number of consents	% of total Regional consents	
Anglian	1333	63.9%	686	32.9%	339	16.2%	308	14.8%	754	36.1%	354	17.0%	400	19.2%	2087
Midlands	2651	82.6%	753	23.5%	625	19.5%	1273	39.7%	558	17.4%	229	7.1%	329	10.3%	3209
North East	2065	85.2%	501	20.7%	436	18.0%	1128	46.6%	358	14.8%	298	12.3%	60	2.5%	2423
North West	1032	82.3%	350	27.9%	139	11.1%	543	43.3%	222	17.7%	222	17.7%	0	0%	1254
Southern	909	66.7%	281	20.6%	447	32.8%	181	13.3%	453	33.3%	100	7.3%	353	25.9%	1362
South West <sup>1</sup>	1353	85%	525	33%	468	30.0%	360	22.0%	240	15%	240	15%	0	0%	1593
Thames	1047	100%	358	34.2%	411	39.3%	278	26.6%	0	0%	0	0%	0	0%	1047
Welsh	1586	76.3%	605	29.1%	251	12.1%	730	35.1%	493	23.7%	240	11.5%	253	12.2%	2079
England and Wales	11976	79.6%	4059	27.0%	3116	20.7%	4801	31.9%	3078	20.4%	1683	11.2%	1395	9.3%	15054

For the purpose of reporting a "snapshot" of the figures on the register for quarter 4 (October - December) have been used.

1: South West consents register data for 12 month period ending March 1998

## **MONITORING OF CONSENTS**

**Table B 2: Monitoring of Numeric Consents**

Region	Numeric Consents								
	Sewage Treatment Works Operated by Water Companies			Trade Discharges			Sewage Treatment Works not Operated by Water Companies		
	Number	Number Monitored	% Monitored	Number	Number Monitored	% Monitored	Number	Number Monitored	% Monitored
Anglian	686	686	100.0%	308	286	92.9%	339	316	93.2%
Midlands	753	746	99.1%	1273	958	75.3%	625	563	90.1%
North East	501	455	90.8%	1128	384	34.0%	436	144	33.0%
North West	350	350	100.0%	543	470	86.6%	139	102	73.4%
Southern	281	277	98.6%	181	120	66.3%	447	352	78.8%
South West <sup>1</sup>	525	525	100.0%	360	360	100.0%	468	468	100.0%
Thames	358	356	99.4%	278	270	97.1%	411	398	96.8%
Welsh	605	583	96.4%	730	477	65.3%	251	197	78.5%
England and Wales	4059	3978	98.0%	4801	3325	69.3%	3116	2540	81.5%

Number monitored is for a rolling year (period of 4 consecutive quarters ending in the quarter reported), whereas the number of consents on the register is for quarter 4.

1: South West consents register data for 12 month period ending March 1998

**Table B 3: Monitoring of Descriptive Consents**

Region	Descriptive					
	Sewage Treatment Works Operated by Water Companies			Sewage Treatment Works not Operated by Water Companies		
	Number	Number Monitored	% Monitored	Number	Number Monitored	% Monitored
Anglian	354	315	89.0%	400	276	69.0%
Midlands	229	188	82.1%	329	169	52.4%
North East <sup>1</sup>	298	741	248.7%	60	41	68.3%
North West	222	165	74.3%	0	-	-
Southern	100	75	75.0%	353	0	0.0%
South West <sup>2</sup>	240	207	86.0%	0	-	-
Thames	0	-	-	0	-	-
Welsh	240	215	89.6%	253	148	58.5%
England and Wales	1683	1906	113.2%	1395	634	45.5%

Number monitored is for a rolling year (period of 4 consecutive quarters ending in the quarter reported), whereas the number of consents on the register is for quarter 4.

1: Quarterly variation of the number of consents on the register has led to a % monitored of greater than 100%.

2: South West consents register data for 12 month period ending March 1998

## **COMPLIANCE OF CONSENTS**

**Table B 4: Compliance for Discharges from Water Companies Sewage Treatment Works**

<b>Percentage Compliance of monitored discharges</b>									
<b>Region</b>	<b>All Discharges</b>			<b>Numeric Consents</b>			<b>Descriptive Consents</b>		
	<b>Number Monitored</b>	<b>Number Compliant</b>	<b>% Compliant</b>	<b>Number Monitored</b>	<b>Number Compliant</b>	<b>% Compliant</b>	<b>Number Monitored</b>	<b>Number Compliant</b>	<b>% Compliant</b>
Anglian	1001	985	98.4%	686	674	98.3%	315	311	98.7%
Midlands <sup>1</sup>	746	723	96.9%	746	723	96.9%	-	-	-
North East	1196	801	67.0%	455	444	97.6%	741	357	48.2%
North West	515	505	98.1%	350	344	98.3%	165	161	97.6%
Southern <sup>2</sup>	352	344	97.7%	277	274	98.9%	75	70	93.3%
South West <sup>3</sup>	765	700	91.5%	525	483	92.0%	240	217	90%
Thames	356	352	98.9%	356	352	98.9%	0	0	-
Welsh	798	775	97.1%	583	562	96.4%	215	213	99.1%
England and Wales	5729	5185	90.5%	3978	3856	96.9%	1751	1329	75.9%

Number monitored and compliant is for a rolling year (period of 4 consecutive quarters ending in the quarter reported).

- 1: Midlands have monitored 188 sewage treatment works operated by Water Companies. However, as the compliance data is not available the numbers monitored have not been included in the calculations.
- 2: Southern counts non-sampled sites as compliant - 5 failed out of 100 on register therefore 95 reported as compliant. However, for the purposes of these calculations, the number compliant was related only to those sites sampled (i.e. 70 passes out of 75 sampled).
- 3: South West consents register data for 12 month period ending March 1998

**Table B 5: 1996 and 1997 Profile for Monitoring and Compliance of Numeric and Descriptive Consents**

Quarter Number	Year (months)	Numeric						Descriptive			
		Sewage Treatment Works Operated by the Water Companies		Other Sewage Treatment Works		Trade Discharges		Sewage Treatment Works Operated by the Water Companies		Other Discharges	
		Number Monitored	Number Compliant	Number Monitored	Number Compliant	Number Monitored	Number Compliant	Number Monitored <sup>1</sup>	Number Compliant	Number Monitored <sup>1</sup>	Number Compliant
Quarter 1	1996 (Jan-Mar)	4009	3848	2422	1431	3549	2643	1328	1327	421	393
Quarter 2	1996 (Apr-June)	4003	3874	2400	1380	3455	2676	1244	1176	399	368
Quarter 3	1996 (Jul-Sept)	3504	3399	2116	1254	3186	2540	1194	1163	400	375
Quarter 4	1996 (Oct-Dec)	4016	3878	2459	1310	3449	2555	1409	1311	450	421
Quarter 5	1997 (Jan-Mar)	3994	3847	2420	1442	3546	2735	1399	1348	467	435
Quarter 6	1997 (Apr-June)	3470	3387	2115	1260	3212	2493	1114	1093	453	415
Quarter 7	1997 (Jul-Sept)	3456	3378	2104	1187	3014	2263	1255	1115	472	437
Quarter 8	1997 (Oct-Dec)	3632	3544	2146	1156	3042	2174	1511	1112	465	427

Number monitored and compliant is for a rolling year (period of 4 consecutive quarters ending in the quarter reported).

South West data does not include descriptive consent figures for 1997

1: Number monitored does not include the figures for Midlands Region. This data has been excluded as the corresponding compliance data is not available.



**Table B 6: Compliance for discharges from Water Company Sewage Treatment Works**

Region	Percentage compliance of monitored discharges											
	With all Numeric Consents			With 95-percentile Standards			With Upper-tier Standards			With Non-sanitary Standards		
	Number Monitored	Number Compliant	% Compliant	Number Monitored	Number Compliant	% Compliant	Number Monitored	Number Compliant	% Compliant	Number Monitored	Number Compliant	% Compliant
Anglian	686	674	98.3%	686	680	99.1%	59	57	96.6%	39	35	89.7%
Midlands	746	723	96.9%	746	745	99.9%	150	145	96.7%	75	56	74.7%
North East	455	444	97.6%	455	444	97.6%	68	62	91.2%	20	15	75.0%
North West	350	344	98.3%	345	342	99.1%	45	43	95.6%	22	21	95.5%
Southern	277	274	98.9%	258	257	99.6%	45	44	97.8%	12	11	91.7%
South West <sup>1</sup>	525	483	92.0%	517	501	97.0%	128	120	94.0%	174	155	89.0%
Thames	356	352	98.9%	356	354	99.4%	8	7	87.5%	20	18	90.0%
Welsh	583	562	96.4%	576	570	99.0%	75	64	85.3%	130	124	95.4%
England and Wales	3978	3856	96.9%	3939	3893	98.8%	578	542	93.7%	492	435	88.4%

Number monitored and compliant is for a rolling year (period of 4 consecutive quarters ending in the quarter reported).

1: South West consents register data for 12 month period ending March 1998

**Table B 7: Compliance of discharges not made by the Water Companies**

Percentage compliance of those discharges monitored												
Region	Sewage Treatment Works with Numeric Standards			Trade Discharges with Numeric Standards			All Discharges with Descriptive Standards			All types of Discharge and Consents		
	Number Monitored	Number Compliant	% Compliant	Number Monitored	Number Compliant	% Compliant	Number Monitored	Number Compliant	% Compliant	Number Monitored	Number Compliant	% Compliant
Anglian	316	162	51.3%	286	212	74.1%	276	247	89.5%	878	621	70.7%
Midlands <sup>1</sup>	563	313	55.6%	958	740	77.2%	-	-	-	1521	1053	69.2%
North East	144	78	54.2%	384	240	62.5%	41	41	100.0%	569	359	63.1%
North West	102	62	60.8%	470	377	80.2%	0	-	-	572	439	76.8%
Southern	352	169	48.0%	120	64	53.3%	0	-	-	472	233	49.4%
South West <sup>2</sup>	468	218	47.0%	360	149	41.0%	0	-	-	828	367	44.3%
Thames	398	254	63.8%	270	217	80.4%	0	-	-	668	471	70.5%
Welsh	197	84	42.6%	477	287	60.2%	148	139	93.9%	822	510	62.0%
England and Wales	2540	1340	52.8%	3325	2286	68.8%	465	427	91.8%	6330	4053	64.0%

Number monitored and compliant is for a rolling year (period of 4 consecutive quarters ending in the quarter reported).

1: Midlands have monitored 169 of other discharges. However, as the compliance data is not available the numbers monitored have not been included in the calculations.

2: South West consents register data for 12 month period ending March 1998

**Table B 8: Non-Compliance for Discharges from Water Companies Sewage Treatment Works**

Percentage of monitored discharges failing consent												
Region	All Discharges				Numeric Consents				Descriptive Consents			
	Number on register	Number monitored	Number Failing	% Failing	Number on register	Number monitored	Number Failing	% Failing	Number on register	Number monitored	Number Failing	% Failing
Anglian	1040	1001	16	2	686	686	12	2	354	315	4	1
Midlands <sup>1</sup>	982	746	23	3	753	746	23	3	229	-	-	-
North East <sup>2</sup>	799	1196	395	33	501	455	11	2	298	741	384	52
North West	572	515	10	2	350	350	6	2	222	165	4	2
Southern <sup>3</sup>	381	352	8	2	281	277	3	1	100	75	5	7
South West <sup>4</sup>	765	765	65	8	525	525	42	8	240	240	23	10
Thames	358	356	4	1	358	356	4	1	0	-	-	-
Welsh	845	798	23	3	605	583	21	4	240	215	2	1
England and Wales	5742	5729	544	10	4059	3978	122	3	1683	1751	422	24

Number compliant is for a rolling year (period of 4 consecutive quarters ending in the quarter reported), whereas the number of consents on the register is for quarter 4.

- 1: Midlands have monitored 188 sewage treatment works operated by Water Companies with descriptive consents. However, as the compliance data is not available the numbers monitored have not been included in the calculations.
- 2: Quarterly variation of the number of descriptive consents on the register has led to a higher figure for monitored discharges than consents held on the register (i.e. number on register for Quarter 4 = 298, Number monitored (in rolling year)= 741 )
- 3: Variation of the number of descriptive consents on the register has led to a negative number of failings for descriptive consents. ( i.e. Number of discharges inspected to year end 75, Number of discharges complied to year end = 95 )
- 4: South West consents register data for 12 month period ending March 1998

**Table B 9: Non-Compliance for Discharges from Water Company Sewage Treatment Works (with 95-percentile standards)**

Percentage of monitored discharges failing consent				
Region	Number registered	Number monitored	Number Failing	% Failing of monitored
Anglian	686	686	6	0.9%
Midlands	753	746	8	1.1%
North East	501	455	57	12.5%
North West	345	345	3	0.9%
Southern	262	258	5	1.9%
South West <sup>1</sup>	517	517	16	3.1%
Thames	358	356	4	1.1%
Welsh	590	576	20	3.5%
England and Wales	4012	3939	119	3.0%

Number compliant is for a rolling year (period of 4 consecutive quarters ending in the quarter reported), whereas the number of consents on the register is for quarter 4.

1: South West consents register data for 12 month period ending March 1998