RD 23/01

TO THE REGULATORY DIRECTORS OF ALL WATER AND SEWERAGE COMPANIES AND WATER COMPANIES

20 December 2001

Dear Regulatory Director

PROPOSED OFWAT SECURITY OF SUPPLY INDEX

Since 1996, when the DG1 measure of water resource availability was removed from our Levels of Service report, we have not sought to report on the security of supplies in a comparable way across the industry. This has been a significant gap.

Clearly maintaining the security of water supplies is central to your functions as undertakers, and a fundamental dimension of the level of service provided to water customers. We believe it important, therefore, that we should seek to measure and report on this aspect of customer service.

In its report on Leakage and Water Efficiency (December 2000), the National Audit Office recommended that:

> *'Ofwat should, with the Environment Agency, consider whether the information now available on security of supply is sufficiently robust to enable Ofwat to regulate companies' achievement of the security of supply objective directly..'.*

Our view is that the key underlying information requirements are now available to support a robust indicator. Such a measure will also help to place water resource and leakage issues within a wider security of supply context.

From 2002, therefore, we propose to include a new security of supply index in June returns. This index will be based upon water resource zone data that you already report to the Environment Agency in your annual water resource plan updates. We have designed the index so that a score of 100 represents a company that meets target headroom requirements in all its zones. Progressively lower scores (which may be negative) reflect the extent of headroom deficits and the proportion of population affected.

…/…

We will expect you to use data calculated on a 'dry year' basis, and to report the index according to both your planned level of service, and a reference level of service. We have adopted a reference level of service that was used in the Environment Agency's 1997 *Reassessment of Water Company Yields,* so most of the data should already be available on this basis. You should also set out the details of your calculations in your June return commentary, including the basis for 'dry year' adjustments of out-turn distribution input data and demand forecasts.

Full details of the methodology, together with a number of worked examples, are provided in the attached annexes. Our intention is to finalise these details before the end of February 2002. We will include an analysis and commentary on the data in the 2002 report on Leakage and Water Efficiency.

You are therefore invited to respond to our detailed proposals by 1 February 2002. Please send your comments to:

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Yours sincerely

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ANNEX A: CALCULATION OF PROPOSED OFWAT SECURITY OF SUPPLY INDEX

The role of headroom

In their 1999 water resource plans and strategic business plans, companies used a common concept of supply 'headroom' for the first time. Headroom is the difference between the amount of water a company has available to supply under specified planning conditions, and its distribution input under those specified conditions. Companies commonly use dry year annual average daily demand in preparing water resource plans, but also may calculate headroom on a critical (or 'peak') period planning scenario. As part of their plans, companies estimated the amount of 'target headroom' they would need in each of their resource zones to cope with future uncertainties surrounding supply and demand. To estimate this many companies used the *Converting uncertainty into headroom* methodology developed by UKWIR.

Given this, the proposed security of supply index seeks to capture by resource zone:

- the magnitude of any deficit in headroom against the company's estimate of target headroom; and
- the proportion of customers exposed to a headroom deficit.

The proposed security of supply index

We propose to monitor your security of supply in the June Returns. The index should highlight companies whose security of supply falls short of planned levels of service, or a reference level of service. It should not allow surpluses in one part of a company's area to counter-balance deficits elsewhere.

Water Resource Zones

Because you plan headroom on a water resource zone basis we cannot simply use the difference between total distribution input and company wide water available for use (WAFU). To provide a complete understanding of security of supply across a company's area, we propose an index based on the proportion of that company's population in zones in headroom deficit and the size of that deficit.

Dry year demand

For water resource planning purposes, headroom is the difference between WAFU and distribution input in a specified planning scenario. We propose that you report the security of supply index by applying a dry year adjustment factor to the recorded distribution input. You should base the dry year adjustment on a combination of observed dry year demand in the past and the adjustment that you use for demand forecasting. Your commentary should

set out the basis for the dry year adjustment used. We propose to adopt the definition of dry year annual average demand used by the Environment Agency in its 1999 Water Resources Planning Guidelines. That is:

> *The level of demand which is just equal to the maximum annual average which can be met without the introduction of demand restrictions at any time during the year. The dry year demand should be expressed as the total demand in the year divided by the number of days in the year.*

We would expect your dry year demand to be greater than normal year demand. A constraint should be applied such that the dry year-adjusted distribution input cannot be lower than the pre-Maximum Likelihood Estimate (MLE) out-turn distribution input as reported in table 10 of your June Return.

Levels of service

The levels of service that you adopt will affect your available supplies. For example, it is possible that a company that plans on the basis of 'no hosepipe bans' could reduce or remove a headroom deficit if it were to plan on the basis of, say, 'hosepipe bans no more than 1 year in 10'. Therefore we propose to collect two indices through the June Returns:

- a security of supply index using your chosen levels of service; and
- a security of supply index using a defined reference level of service.

A common reference level of service will allow us to compare security of supply between companies using consistent planning assumptions. A similar exercise was carried out by the Environment Agency in the *1997 Reassessment of Water Company Yields*. We propose that you calculate WAFU for the same reference levels of service as used in that 1997 exercise. This means that you will already have calculated deployable output from most sources on this basis.

The reference scenario given in the *1997 Reassessment of Water Company Yields* was:

1 in 10 years:	5% demand reduction applied at any time of year for a minimum of 3 months and a maximum of 12 months.
1 in 40 years:	further 5% demand restriction, and drought orders/permits to authorise additional abstraction or reduce compensation discharges or prescribed flows, again for a minimum of 3 months and a maximum of 12 months

The deployable output is the constant rate of supply which can be sustained throughout the simulation (the value before the 5% and 10% demand restrictions are applied).

Deriving the index

You will need to follow a series of steps to calculate the index. These are set out below.

Step 1

Take the distribution input, available headroom and target headroom figures for each water resource zone as reported in the annual water resource plan (WRP) updates. Water available for use (WAFU) as reported in the WRP updates does not include bulk imports and exports. In order to meet Ofwat's definition of WAFU, you should add in the available bulk imports and deduct the bulk exports for each zone. These adjustments should be made for both raw water and treated water imports and exports.

	1	2	3	4	5	6	7	8
Company Name	**Water Resource Zone**	**WAFU - EA definition (Ml/d)**	**Bulk Imports (Ml/d)**	**Bulk Exports (Ml/d)**	**Dry Year Distribution Input (Ml/d)**	**Available Headroom (Ml/d)**	**Target Headroom (Ml/d)**	**Surplus/ Deficit (Ml/d)**
WaterCo	Zone A	300.00	70.00	50	325.00	-5.00	40.00	-45.00
	Zone B	200.00	40.00	50	180.00	10.00	15.00	-5.00
	Zone C	70.00	1.00	5	50.00	16.00	10.00	6.00
	Company Total							

Available headroom will therefore be calculated as the sum of column (2) and column (3), minus column (4) and minus column (5).

Step 2

The proposed index is based on the difference between the available headroom [column (6)] and the target headroom [column (7)] in each zone. This 'surplus/deficit' [column (8)] is then expressed in column (9) as a percentage of the sum of dry year distribution input and target headroom.

	1	6	7	8	9
Company Name	**Water Resource Zone**	**Available Headroom (Ml/d)**	**Target Headroom (Ml/d)**	**Surplus/ Deficit (Ml/d)**	**%age surplus/ deficit**
WaterCo	Zone A	-5.00	40.00	-45.00	-12%
	Zone B	10.00	15.00	-5.00	-3%
	Zone C	16.00	10.00	6.00	10%
	Company Total				

This, therefore, gives a measure of the size of the deficit/surplus in relation to the demand that you actually expect to meet during a dry year plus the headroom you believe is necessary. You should calculate the deficit/surplus for dry year annual average daily demand.

Step 3

Take the population figures for each zone [column (10)]. The population in each zone with a headroom deficit is expressed in column (11) as a percentage of the company total population. Where the zone is not in deficit, zero should be entered in column (11).

	1	10	11
Company Name	**Water Resource Zone**	**zonal population (000)**	**%age of total population with headroom deficit**
WaterCo	Zone A	2,100	58%
	Zone B	1,150	32%
	Zone C	350	0%
	Company Total	**3,600**	

Step 4

You should then derive zonal scores in column (12) by multiplying column (11) by the square of the deficit in column (9) for each zone. This means that the index is a function of the square of the deficit, so that large deficits affecting small zones weigh in the overall index. You should then multiply the product for each zone by 100, and sum to produce the overall company score.

	1	12
Company Name	**Water Resource Zone**	**Zonal Index (%age deficit^2 x % population affected x 100)**
WaterCo	Zone A	0.887
	Zone B	0.021
	Zone C	0.000
	Company Total	**0.908**

Step 5

The final company wide security of supply index is then calculated as:

(1 – overall total company score in column 12) x 100

The resulting score should be rounded down to the nearest whole number.

A company with all zones at or above target headroom will achieve a maximum score of 100. Negative scores are possible for companies with significant security of supply problems.

	1	13
Company Name	**Water Resource Zone**	**SoS Index**
WaterCo	Zone A Zone B Zone C **Company Total**	**9**

ANNEX B: ILLUSTRATIVE EXAMPLES OF THE SECURITY OF SUPPLY INDEX

The attached tables demonstrate the calculation of the index for a range of worked examples under different supply/demand balance circumstances.

Example 1 – Small overall company deficit

In this example the majority of the company's customers face a small headroom deficit. Even though there is a large proportion of customers affected, the small size of the deficit means that the overall company score is not very low.

Example 2 – Overall company surplus but with significant deficit in one zone

In this example, total water available for use is greater than the sum of total distribution input and target headroom. However, the overall company position masks the fact that one zone faces a significant deficit. Because a significant proportion of the company's customers live in this zone, the company receives a low overall score.

Example 3 – Overall company surplus but with a small deficit in one zone

In this example, total water available for use is again greater than the sum of total distribution input and target headroom. However, the overall company position masks the fact that one zone, in which there are a small amount of customers, faces a small headroom deficit. Because both the size of the deficit and the amount of customers affected are small, the overall company score is relatively high.

Example 4 – Overall company surplus but with a big deficit in one very small zone

This example is similar to example 3, but the size of the headroom deficit faced by the small zone is much greater. Because the headroom deficit is greater, the company received a much worse overall score than in example 3.

Example 5 – Surplus in every zone

In this example, headroom in every zone at least matches the target, and in some cases exceeds the necessary target. The company receives the maximum possible score.

ANNEX C: SUMMARY OF CALCULATION RULES