

Reporting guidance – Unplanned

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Objective

The guidance seeks to enable all companies to report on outages for the defined year with confidence and at a reasonable level of accuracy and with a common approach. Companies shall apply consistent and robust methods and common assumptions. This will facilitate the comparison of performance across companies by customers, regulators and other companies with reasonable confidence.

Key Principles

There are several key principles applied in the compilation of the guidance:

- Reporting of annual outage forms part of each company's assurance process applied to all measures reported annually by companies;
- A company needs to have a written methodology or procedure in place for reporting outage. This procedure is reviewed annually and updated as required;
- The reporting guidance for annual outage reporting is set out as a consistent good practice baseline for the industry which companies should achieve now or in the short and medium term; and
- Where a company is not able to meet any part of the good practice methods then it is required to explain any shortfalls and its plans to address this.

Measure Definition

This measure is to be used as a means of assessing asset health (primarily for non-infrastructure – above ground assets), for water abstraction and water treatment activities. It is defined as the annualised unavailable flow, based on the peak week production capacity (or PWPC), for each company. This measure is proportionate to

¹ We have made some changes to the guidance as included in the March 2018 report for Ofwat and Water UK: "Targeted review of common performance commitments". These were to clarify that the metric relates to unplanned outage, not all outage and the metric relates to peak week production capacity, not dry year peak week production capacity.

both the frequency of asset failure as well as the criticality and scale of the assets that are causing an outage.

It is important to understand planned and unplanned outage as they both reflect on asset health. The actual unplanned outage should be reported as the temporary loss of peak week production capacity in the reporting year weighted by the duration of the loss (in days). Outages arising from planned works should be recorded separately to outages arising from unplanned causes, such as asset failure.

The proposed calculation for both figures is:

$$\frac{\text{Reduction in peak week production capacity} \times \text{Duration in days}}{365}$$

Unplanned outage for each water production site is calculated separately and then summed over the reporting year to give a total actual unplanned outage for the water resource zone.

The company water resource zone weighted outage can then be summed (MI/d) and normalised based on overall company peak week production capacity to be reported as a percentage.

A calculation example is as follows:

For a single source works:

A source works has a peak week production capacity of 30 MI/d

For 15 days the maximum production capacity is reduced to 15MI/d due to a temporary unplanned outage (pump failure). This is a loss of peak week production capacity of 15 MI/d for 15 days.

The weighted unplanned outage for this source works = $15 \times (15 / 365) = 0.62$ MI/d

Each weighted unplanned outage is then summed over the reporting year to give a total unplanned outage for the water resource zone.

For a water resource zone:

First source works in zone – weighted unplanned outage = 0.62 MI/d

Second source works in zone – weighted unplanned outage = 2.58 MI/d

Third source works in zone – weighted unplanned outage = 3.67 MI/d

Zonal weighted outage = 6.87 MI/d

The company water resource zone weighted unplanned outage can then be summed and normalised based on overall company peak week production capacity.

Company normalising:

Zone 1 weighted unplanned outage = 6.87 MI/d

Zone 2 weighted unplanned outage = 7.95 MI/d

Company weighted unplanned outage = 14.82 MI/d

Company peak week production capacity = 120 MI/d

Unplanned outage proportion = 12.4%

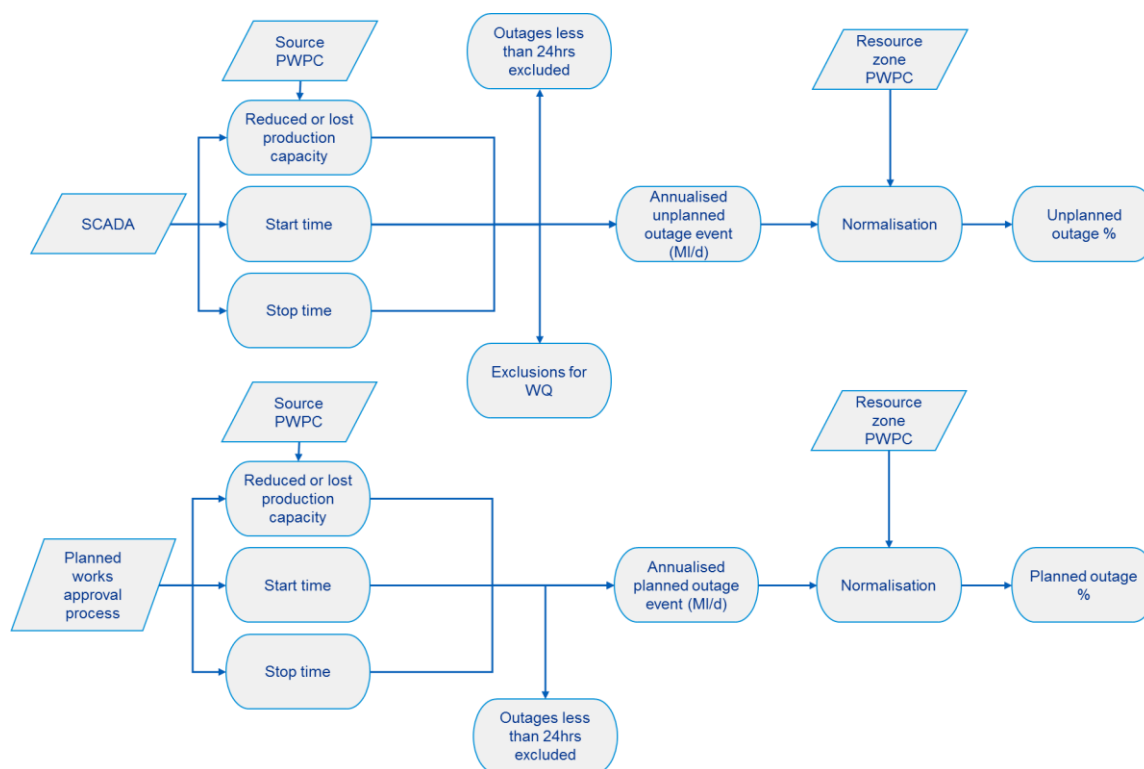
Exclusions for managing raw water quality and other matters are permitted and described in Section 5.6. Exclusions should be reported alongside the planned and unplanned outage figures.

Reporting Process

The guidance is structured in the way that outage is normally estimated and components of outage are described in Section 5.

The process for deriving planned and unplanned outage is shown in the following diagram.

Deriving planned and unplanned outage



A company is required to report against this definition and:

- Disclose where its methodology does not comply with this guidance using the checklist in Annex A;
- Explain the reasons for any non-compliance;
- Set out its plans and programme to comply with the guidance; and
- Disclose any other factors which have an impact on the methodology for reporting outage.

Components of Unplanned Outage Calculation

Peak Week Production Capacity

A company should define its peak week production capacity (PWPC) for each water production site or source works included in its water resources management plan (WRMP). PWPC for this measure is not expected to be the same number as reported for dry year peak week production capacity (although it is possible that it may be the same).

For this measure, PWPC is equivalent to the maximum volume of water which can be put into supply and sustained over a period of one week measured in Ml/d. This should be at least as great as the highest historic performance that has been sustained for any seven-day period in the last five years (unless a change to assets or process can be evidenced) but could be higher. This should be supported by physical tests to demonstrate capability undertaken at least once every five years. It is expected that this value should be reviewed annually and as modifications to assets and processes are completed which impact capacity.

It is expected that PWPC would be a fixed value for each production site each year unless a change to assets or process can be evidenced.

Peak week production capacity does not account for seasonal changes in yield (most commonly observed at groundwater sources) and allowed abstraction volumes (most commonly observed at river sources) which are weather dependent and not an indicator of asset health.

A company is expected to:

- Define PWPC for each water production site.
- Review PWPC annually.
- Support PWPC with evidence of actual output or of capacity tests undertaken on a rolling programme each five years. This should be based on a risk-based approach for each works and the duration of testing does not need to extend to seven days.
- Support revisions to PWPC with evidence of changes to assets or processes.

Asset Failure / Unplanned Outage

The failure or deterioration of any asset which impacts on the ability to produce the peak week production capacity should be recorded as an unplanned outage. This may be a failure which impacts part or all of the production plant which contributes to peak week production capacity.

This can include:

- source abstraction assets (e.g. abstraction pumps, screens, boreholes);
- raw water transport assets (e.g. pumping plant and mains);
- raw water storage assets (e.g. balancing reservoirs);
- water treatment assets;
- treated water storage assets (e.g. contact tanks, pre-distribution storage); and

- treated water distribution assets before distribution input meter (e.g. treated water pumping).

In some circumstances the failure of assets upstream of the treated water distribution assets may not impact on the peak week production capacity. For example, where a river abstraction is pumped to bankside storage and then stored water is pumped onto treatment works, the failure of an abstraction pump may not impact peak week production capacity as water onto the treatment works can be maintained from the raw water storage. The length of time that this asset is unavailable will determine whether the peak week production capacity is reduced and therefore contributes to unplanned outage.

Where asset failures occur at water production sites with standby assets this may also not impact peak week production capacity. For example, a groundwater site with a peak week production capacity of 10MI/d may have three boreholes on site, all with capacity of 5MI/d. Under normal circumstances boreholes 1 and 2 may be operated to provide the site output of 10MI/d. If the pump in borehole 1 fails then borehole 3 is switched on to replace the lost capacity. Providing borehole 3 is switched on within 24 hours to replace the failed asset in borehole 1 there would be no unplanned outage recorded. There may need to be an outage at a later stage to repair or replace the failed pump. Whilst this can be scheduled and planned for a convenient time the reason for the need to make the repair is an unforeseen failure of an asset and therefore the outage for the scheduled repair or replacement should also be classified as unplanned.

Planned Outages

Where assets are taken out of supply or made unavailable for supply to enable planned maintenance or capital works to be completed then these should be recorded as planned outages. The same principles for work on standby assets apply here as for unplanned outages.

It is expected that a company will have a process whereby planned works on production assets are approved and scheduled. This may be the basis of evidence to demonstrate that the outage is planned.

Where planned work results from an asset failure any resulting outage should also be recorded as unplanned.

Duration

Only outage events which exceed 24 hours in duration should be included in this measure. Outage duration should be recorded to the nearest whole day with normal rounding rules applied. For the avoidance of doubt, all outages below 24 hours are excluded and rounding does not apply. The duration may span a calendar day.

By way of an example of rounding, an unplanned outage of 79 hours would be 3 days whereas an unplanned outage of 115 hours would be 5 days.

A company should identify the start of an outage period using telemetry data wherever possible. If a company uses another source of data to indicate the start of an outage period it should specify the data source and demonstrate auditable record keeping.

The end of the unplanned outage period should be recorded as the time when the asset was returned to a state meaning the availability of peak week production capacity is restored. For the avoidance of doubt this should not be when the individual asset is repaired or planned work completed but when the recommissioning process is completed, except when there is no immediate requirement to put an asset back into service.

In this case the repair time is taken as the end of the unplanned outage period. If when the asset is next required to be put into service, it operates in a way that would count as an unplanned outage, the start time for the reported unplanned outage should be that of the original outage.

For example, if a borehole pump is replaced due to an unexpected failure or planned works the end of the unplanned outage is not when the pump replacement is completed but when any subsequent pumping to waste and water quality testing is finished and full peak week production capacity is restored, if the pump is required in service immediately.

If the pump is not required in service immediately, then repair or replacement time is taken as the end of the unplanned outage. When the pump is next required to be put into service, should it operate in a way that would count as an unplanned outage, the start time for the reported unplanned outage should be that of the original outage.

Where planned work exceeds the duration of the scheduled outage any extension is to be included within the planned outage figure.

Where a company chooses not to respond immediately to an unplanned outage such as a failure at the weekend for which alternative water can be deployed the duration may be longer than it might otherwise have been. A company should make no adjustment for this in the measurement of the duration of the unplanned outage. This may result in reporting higher unplanned outage figures but given that alternative sources are available it is unlikely that the unplanned outage in this example would be contributing a large amount to the overall company peak week production capacity and so would therefore have a relatively small impact on the overall measure. This is something that could be reviewed as the definition of this measure is further developed.

Repeated unplanned outages at the same water production site should be treated as separate events with independent start and finish times unless the initial outage repair and recommissioning was not concluded and there was not full restoration of available peak week production capacity.

A company is expected to:

- Record unplanned outages over 24 hours in duration.
- Record unplanned outages as unplanned even if they result in a programmed outage later.
- Measure duration to the nearest whole day.
- Record the start and end time of an outage using telemetry data.
- Record the end of an unplanned outage as when recommissioning is completed and peak week production capacity is fully restored except when there is no immediate requirement to put an asset back into supply. In this instance the repair time is taken as the end of the unplanned outage and when the asset is next required to be put into service, if it operates in a way that would count as an unplanned outage, the start time for the reported unplanned outage should be that of the original outage
- Make no adjustment for over-running planned outages.
- Make no adjustment for unplanned outages which are not responded to immediately.
- Justify use of data sources other than telemetry.

Reduction in Peak Week Production Capacity

For each unplanned outage the impact of the outage is recorded as the reduction in peak week production capacity. For asset failures or programmed work resulting in the total loss of water production from the site then the impact of the outage is recorded as the total peak week production capacity for the site. Some asset failures

or programmed work may result in a reduction of peak week production capacity. For example, a groundwater source with a peak week production capacity of 10MI/d may have three boreholes on site, all with capacity of 5MI/d. Under normal circumstances boreholes 1 and 2 may be operated to provide the site output of 10MI/d. If the pumps in boreholes 1 and 2 fail then borehole 3 is switched on but can only replace half the lost capacity. The lost peak week production capacity in this instance would be 5MI/d. The replacement of the failed pumps may require the whole output to cease for the period of the works. From the point at which the output is zero the lost capacity would increase to 10MI/d and would have a separate duration to the initial partial reduction in capacity.

Exclusions

Unplanned outage arising from changes in raw water quality beyond the normal water quality operating band shall be excluded as this is not a measure of asset health. Exclusions must be evidence based including evidence to show what the normal water quality operating band for that production site is. This exclusion applies to transient changes to raw water quality such as turbidity, algae, pollution, spikes in nitrate and pesticide. If a company chooses to manage variable raw water quality by proactively temporarily restricting water production then this should also be classed as an exclusion.

Long-term trend based changes in raw water quality which result in unplanned outages are not permitted as exclusions as a company should have the data to recognise a rising trend and foresee the need to plan for treatment etc.

Extreme weather can result in raw water quality events as described above. In addition to this they may present constraints on ability to resolve the unplanned outage e.g. a storm event may increase turbidity and cause a site failure and flooding of the immediate area. It may be difficult for operational staff to attend site to rectify the problem. In an example such as this the health and safety constraint on access should be allowed as a further exclusion, but would need to be well justified and assured. Extreme weather may also include heavy snowfall when access to remote sites can be difficult.

A company is expected to:

- Demonstrate based on evidence normal water quality operating bands for each water production site.
- Record raw water quality events outside of these bands and provide evidence of the exceedance.

- Provide evidence of extreme weather events such as storms and snowfalls which have presented hazards preventing access to sites.

Glossary

PWPC Peak week production capacity

WRMP Water resources management plan

MI/d Mega litres per day

Annex A: Compliance Checklist

A company is required to complete this checklist for submission with its value of annual unplanned outage performance commitment.

The elements of each component to be assessed separately based on the following rules:

Compliance for elements is reported against:

R	Not compliant with the guidance and having a material impact on reporting
A	Not compliant with the guidance and having no material impact on reporting.
G	Fully-compliant with the guidance

An overall RAG to be assigned for each component based on the following rules:

Compliance for overall components is reported against:

R	There are one or more red elements in the component or the combined effect of amber elements is considered to produce a material impact.
A	Half or more of the elements in the component are amber and the combined effect of the amber elements is considered not to produce a material impact.
G	More than half of the elements in the component are green

	Component	Compliant (R/A/G)	Reason for any non-compliant components	Confidence grade
1	PWPC			
a	Annual review			
c	PWPC by production site			
d	Water resource zone PWPC			
2	Asset failure / unplanned outage			
a	Source data			
3	Planned outages			
a	Source data - programme of works			
4	Duration			
a	Start time			
b	End time			
c	Rounding			
	Reduction in capacity			
a	Reduced capacity			
b	Total outage			
5	Exclusions			
a	Normal water quality operating band			
b	Evidence of WQ events			

For each component on the checklist, and for the overall performance measure, companies will report a confidence grade.

Confidence grades provide a reasoned basis for companies to qualify the reliability and accuracy of the data. Companies should employ a quality-assured approach in the methodology used to assign confidence grades, particularly if sampling techniques are in place.

The confidence grade combines elements of reliability and accuracy, for example:

- A2 Data based on sound records etc. (A, highly reliable) and estimated to be within +/- 5% (accuracy band 2)

Reliability and accuracy bands are shown in the tables below.

Reliability Band	Description
A	Sound textual records, procedures, investigations or analysis properly documented and recognised as the best method of assessment.
B	As A, but with minor shortcomings. Examples include old assessment, some missing documentation, some reliance on unconfirmed reports, some use of extrapolation.
C	Extrapolation from limited sample for which Grade A or B data is available.
D	Unconfirmed verbal reports, cursory inspections or analysis.

Accuracy band	Accuracy to or within +/-	But outside +/-
1	1%	-
2	5%	1%
3	10%	5%
4	25%	10%
5	50%	25%
6	100%	50%
X	Accuracy outside +/- 100 %, small numbers or otherwise incompatible (see table below)	