Guidance on undertaking an Operator Monitoring Assessment

OMA

Industrial installations regulated under the Environmental Permitting Regulations

Discharges to Water

OMA Version 4
February 2013

Guidance on Operator Monitoring Assessment - Water

Contents

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1. Description of the Operator Monitoring Assessment scheme

We introduced Operator Monitoring Assessment (OMA) to strengthen our auditing of operators' self-monitoring arrangements, initially to the monitoring of emissions to air from industrial installations regulated under the Environmental Permitting Regulations (EPR). OMA has since been extended to discharges to controlled water (including public sewers and groundwater) from EPR installations. In the longer term we may extend OMA to other media and regulatory regimes.

We use the OMA scheme to:

- assess the quality and reliability of operators' self-monitoring (including monitoring undertaken on behalf of operators by contractors) as required by their permit
- identify monitoring shortfalls and potential areas for improvements
- Review the monitoring conditions in the permit.

An OMA report will be produced and a copy will be provided to the operator.

2. The purpose of the guidance

We will use this guidance when undertaking an OMA, to make an assessment of operators' self-monitoring arrangements in an objective and consistent manner. Although the OMA guidance is primarily intended for use by us, others may wish to use it, for example, when carrying out internal audits, or in preparation for the Environment Agency OMA

Detailed guidance on conducting an OMA is covered in Annex 1.

This guidance also explains the scoring system and how it is used to produce an overall OMA score for each EPR installation. If appropriate, an OMA will be undertaken for air and water and the scores recorded separately. A separate document has been prepared for air monitoring.

3. Structure of the OMA scheme

The OMA scheme is divided into four sections as follows:

OMA 1	Management of monitoring
OMA 2	Periodic monitoring and test laboratories
OMA 3	Continuous monitoring
OMA 4	Quality assurance

Each of the four OMA sections contains a series of elements, against which we will score the operator's monitoring arrangements and record explanatory comments. The next sub-section describes how OMA assessors determine scores for each section of OMA.

4. Scoring the four OMA sections and their elements

(i) Overview of the scoring system

Annex 1 covers the detailed guidance that enables the score for each element to be determined. Scores should be recorded using the OMA report template. The report should also record evidence gathered during the audit, reasons for the score for each element and details of identified actions to improve monitoring.

Each element will be scored 1, 2, 3, 4 or 5, with 1 being poor, 3 being acceptable and 5 being excellent. A score of 1 or 2 would usually require improvements to be made. “Not applicable” should only be used in exceptional circumstances and will require justification.

The guidance for each element is split into three sections indicating example scenarios where scores of 1, 3 or 5 are applicable. A score of 2 or 4 should be given in circumstances that fall between the 1, 3 or 5 guidelines. A best-fit pragmatic approach should be taken when deciding on the scores.

The four sections contain different numbers of elements. The overall OMA score is the sum of the scores for all elements expressed as a percentage of the maximum total possible score. To allow comparisons between sections (to aid the identification of areas of weakness) the score for each section is also calculated as a percentage of the maximum possible section score. All percentages are rounded up to the nearest whole number.

The following example explains the scoring system in more detail.

Assume the scores for the various elements of OMA 1 were as follows:

OMA 1 – Management of monitoring

Element	**Score 1 - 5**
A. Documentation of management system procedures for monitoring	1
B. Organisational structure for monitoring	5
C. Schedules and planning of monitoring, including contingencies	4
D. Monitoring records and use of monitoring data	3
E. Understanding the requirements of the permit and monitoring methods	2
TOTAL =	**15**

The OMA 1 score is calculated as:

actual score ÷ maximum possible score x 100%

OMA 1 has five elements. The maximum possible score is 5 (elements) x 5 (maximum score) = 25.

In this example the percentage score for OMA 1 is:

Actual score (15) ÷ maximum possible score (25) x 100.

OMA 1 score therefore = 60%.

The above process is repeated for each OMA section. The overall OMA score is then calculated as the sum of the scores for all elements expressed as a percentage of the maximum total possible score. For example:

Section	Total scores	Percentage scores
OMA 1	15/25	60%
OMA 2	10/35	29%
OMA 3	21/35	60%
OMA 4	12/30	40%
Overall OMA score	**58/125**	**46%**

It may be necessary for two or more different scores to be given for specific elements. Both scores should be recorded on the OMA report with explanatory comments. This procedure should be applied if the OMA includes, for example:

- a number of analysers
- more than one emission point
- a combination of in-house monitoring and contractor monitoring
- periodic or continuous and surrogate monitoring

(ii) Sections or elements that do not apply

If a section or element does not apply, then these elements and sections are excluded from the totals.

(iii) Changes in the scoring system

It should be noted as the structure of version 4 of OMA has changed significantly from version 3, the scores an operator achieves in version 4 cannot be meaningfully compared with previous scores in earlier versions.

5. Critical elements

All of the elements are important components of a monitoring regime. However, some of them are regarded as critical to monitoring with low scores indicating critical flaws in the monitoring arrangements. Should a score of 1 or 2 be given for any critical element, then appropriate action should be taken to ensure that the identified shortcomings are addressed as a matter of priority. The six critical elements cover:

- OMA 2A. Sampling provisions
- OMA 2C. Measurement methods and standards
- OMA 2D. Calibration methods
- OMA 3A. Provisions for monitoring and location of CWMs (continuous water monitor)
- OMA 3C. Measurement methods and standards
- OMA 3D. Calibration methods

6. Multiple release points

Some installations have multiple discharge points. These sites may need an initial assessment, using a risk-based approach, to determine what emission points are assessed, for example, those with the highest potential impact on the environment. This will be an installation based decision made by the Environment Agency.

Consideration should also be given to assessing a variety of discharges to controlled waters and public sewers, monitoring points and substances. If more than one discharge point is assessed then the lowest of the scores shall be applied. Scores shall not be averaged.

7. Health and safety

If issues are identified which could affect the health and safety of personnel, the operator should be informed immediately. If appropriate, the Health and Safety Executive should also be notified. In addition, relevant Environment Agency personnel should be informed.

8. MCERTS

We introduced our Monitoring Certification Scheme (MCERTS) to deliver quality environmental measurements. The scheme provides for the product certification of instruments, the competence certification of personnel and the accreditation of test house laboratories. In conjunction with SIRA Test and Certification Ltd (http://www.siracertification.com/), we have established a register of certified systems. This includes details of equipment and test laboratories that meet the MCERTS standards. Details can be found via: www.mcerts.net .

We have also applied MCERTS to the sampling and analysis of effluents by developing a scheme for these activities, based on ISO/IEC 17025. The performance requirements are described in *Performance Standard for Organisations Undertaking Sampling and Chemical Testing of Water Part 1 - Sampling and chemical testing of untreated sewage, treated sewage effluents and trade effluents.* Accreditation to this standard should give us the highest confidence that sampling and analysis is performed to our requirements.

We have also applied MCERTS for the self-monitoring of effluent flow, through another specific scheme**.** If the operator holds a valid MCERTS site-conformity Inspection certificate for effluent flow monitoring, an OMA can still include a review of this MCERTS certificate and instrumentation in use. However, a detailed assessment of the certificate and the accompanying report are not normally necessary.

9. OMA review

An OMA will be carried out at least once every four years. This frequency may be increased using a risk-based approach. Significant changes to the monitoring arrangements will require an OMA review to be carried out. Deficiencies requiring improvement, identified during an OMA, should be reviewed on an ongoing basis. Any deficiencies in monitoring with reference to the permit should be assessed according to the Environment Agency Compliance Classification Scheme.

10. Assessing documented procedures that apply the management system

Permits require the operator to have a documented management system; this means having documented procedures and work instructions which describe the processes to apply the permit conditions. This means, therefore, that the operator must have documented procedures and work instructions for all aspects of monitoring. When assessing these procedures, determine whether the operator has included all the “W”s, the *what*, *when*, *who*, *where*, and *how* of monitoring.

11. Environment Agency contacts

If you have any questions regarding your OMA please contact your local Environment Agency contact or our Customer Contact Centre (0370 506 506). If you would like further information on the OMA scheme please contact:

Environment Agency
National Operations
Monitoring Certification Team
PO BOX 519
Preston
PR5 8GD

Tel: 01772 714369
Email : richard.gould@environment-agency.gov.uk .

Or visit our web site at www.mcerts.net for the latest documents.

Annex 1: Detailed OMA Guidance – Discharges to Water

The following detailed guidance should be used when undertaking an OMA of discharges to controlled water from EPR-regulated installations. The scope of the OMA should be clearly stated in the report, so that a systematic approach can be maintained for any OMA carried out in the future. For example, if the site is complex and has multiple processes, then the report must state exactly which processes were assessed.

OMA 1 - Management of monitoring

OMA 1 is intended to ensure appropriate commitment by the operator in providing adequate resources for monitoring. This commitment should be demonstrated across every level of the operator's activities, from policies produced at director level and the resources available to the understanding of the personnel responsible for monitoring and producing environmental data.

OMA 1 contains the following elements:

A. Documentation of management-system procedures for monitoring
B. Organisational structure for monitoring
C. Schedules and planning of monitoring, including contingencies
D. Monitoring records and use of monitoring data
E. Understanding the requirements of the permit and monitoring methods

Element	Qualification for OMA scoring	OMA score
Water OMA 1A **Documentation of management-system procedures for monitoring**	The operator and/or contractors have no, or poorly written, monitoring procedures. Procedures are not readily available to all relevant staff.	**1**
	The operator and/or contractors have effective and generally well written monitoring procedures. Procedures are readily available to all relevant staff.	**3**
	The operator and/or contractors have fully controlled, documented, comprehensive and up-to-date monitoring procedures. Documented procedures are formally issued to all relevant personnel and are controlled in an appropriate management system.	**5**

Scope
This element includes all of the operator's monitoring arrangements. Procedures should cover continuous monitors, periodic monitoring equipment, laboratory methods, surrogate methods, storage/transit of samples and treatment to prevent deterioration/changes to determinands.

Content of procedures
Procedures should describe activities in detail and how they are to be carried out, for example, proper cleaning of equipment and sample inlets being kept free from fouling/blockage. Procedures should cover maintenance and calibration of equipment in detail a simple checklist is not sufficient by itself.

Contracts
If samples are subcontracted to a third party for analysis, then the operator should specify the analysis that is to be performed. For contractors coming on site to carry out sampling and analysis, a detailed method statement would be expected.

UKAS(United Kingdom Accreditation Service) /MCERTS laboratory accreditation
UKAS/ MCERTS accreditation for the determinand would indicate a score of 5 for procedures entirely carried out by laboratory. In all other cases, it is the responsibility of the operator to provide documentary evidence that this requirement is being met. A score of 1 will apply in the absence of documentary evidence.

Element	Qualification for OMA scoring	OMA score
Water OMA 1B **Organisational structure for monitoring**	There is a poorly defined management structure for monitoring issues. Posts are not clearly identified as having responsibility for monitoring issues. There are inadequate resources available for monitoring.	**1**
	There is an acceptable management structure for monitoring issues. Monitoring is the responsibility of defined personnel. This is not documented in detail. Sufficient resources are normally available for monitoring.	**3**
	There is a well-defined and formally documented management structure for monitoring issues. Posts are clearly and formally identified as having responsibility for monitoring issues. Sufficient resources are always available for monitoring.	**5**

Documentation
A well-defined management structure may be demonstrated by:

- an overview procedure for compliance monitoring, including an organogram focused on monitoring and identifying roles and responsibilities for monitoring tasks
- provision for dealing with live monitoring issues
- inclusion in the management system of all staff involved in monitoring issues, for example, those involved in sampling, calibration and maintenance

As an example, we could expect to see a structure defining roles and responsibilities describing which staff are responsible for each task. Then we could expect procedures and work instructions to go into more detail, describing how the responsible person would perform a specific, defined activity. The format for this can be left up to the operator – the structure is sometimes perfectly well documented in a list of job titles and roles

Provision of a deputy
Operators should provide for business continuity when defining roles and responsibilities for monitoring; we need assurance that the operator will always have someone to fill a critical role. The provision of an appropriate “deputy” to take responsibility for the management of monitoring issues would be expected for a score of 3 or above.

Element	Qualification for OMA scoring	OMA score
Water OMA 1C **Schedules and planning of monitoring, including contingencies**	Monitoring schedules/plans are not produced, or are not adhered to. Rescheduling of missed samples does not take place Monitoring is not representative.	**1**
	Monitoring schedules/plans are produced for most aspects and they are adhered to. Invalid samples, missed samples and lost samples due to equipment failure are usually rescheduled in an appropriate manner. Monitoring is representative but the planning is reactive rather than proactive.	**3**
	Monitoring schedules/plans are produced for all aspects and they are adhered to. Invalid samples, missed samples and lost samples due to equipment failures are always rescheduled in an appropriate manner. There is a systematic and risk-based procedure to provide for representative monitoring and contingencies.	**5**

Schedule details

- A monitoring schedule should contain relevant information such as location, duration, frequency and date/time of monitoring.
- Schedules should be available for calibration and maintenance of monitoring equipment.
- The schedule should account for site-specific considerations that may affect monitoring, such as batch processes and intermittent conditions.
- For a high score to be achieved the operator should be able to demonstrate that the schedules are available to relevant staff.
- A schedule may be very simple, for example, 'one sample every Wednesday'. If this is the case it will require little examination.

Batch processes

In circumstances where small-scale batch processes are production led it may not be practicable to precisely schedule monitoring in advance. However, there should be evidence that the operator has an effective means of ensuring the required number and frequency of monitoring over the course of the year.

Intermittent conditions

Schedules may be flexible to account for intermittent or weather-dependent samples. The reason for not taking or rescheduling samples should be recorded.

Element	Qualification for OMA scoring	OMA score
Water OMA 1D **Monitoring records and use of monitoring data**	Monitoring results are not reviewed with a view to making improvements (for example, in process operation) to minimise emissions and environmental impact; or monitoring results are reviewed, but the operator does not act upon them.	**1**
	There are documented procedures for review. Monitoring results are reviewed and acted upon but the findings are not fully documented.	**3**
	There are documented procedures for review, with provisions for tracking trends, for example through control charts Documentary evidence shows that monitoring results are reviewed and acted upon with a view to making improvements (for example, in process operation) to minimise emissions and environmental impact.	**5**

Examples of good practice

- The use of trend-plot analysis (such as control charts) to influence process operation.
- A review of results and compliance with permitted emission limits as a standing item on the agenda of appropriate operator management meetings.
- CWM (continuous water monitoring) readings displayed in real time at the relevant reporting conditions specified in the permit. These readings should be displayed in an area visible to relevant staff, such as those involved in controlling the process.
- Installation of “approach to limit” alarms on CWM systems.
- Automated effluent diversion systems connected to “approach to limit” alarms.

Note: We would expect operators to have provisions for validating the data before it is reviewed, so that only validated data is reviewed. OMA 4B covers the requirements for data validation.

Element	Qualification for OMA scoring	OMA score
Water OMA 1E **Understanding the requirements of the permit and monitoring methods**	The operator's personnel responsible for implementing monitoring are unable to demonstrate understanding of monitoring requirements or methods. Monitoring requirements are not implemented.	**1**
	The operator's personnel responsible for implementing monitoring are able to demonstrate understanding of monitoring requirements and methods. Monitoring requirements are implemented.	**3**
	The operator's personnel responsible for implementing monitoring are able to demonstrate comprehensive understanding of monitoring requirements and methods. There are training plans and assessments for the required competencies and capabilities, strengthened by periodic reviews. Monitoring requirements are fully implemented.	**5**

Understanding of monitoring

- The score should reflect the practical understanding and experience demonstrated, for example, the importance of MCERTS, representative sampling, sample preservation, maintaining an audit trail, reasons behind monitoring and implications of discharges to watercourses.
- Attendance at relevant training courses and training records may be regarded as evidence.
- Personnel responsible for monitoring should demonstrate an understanding of how the process may impact on the environment.
- Guidance detailing the monitoring knowledge expected of personnel responsible for monitoring is available at: www.mcerts.net

Contractors

The operator must understand monitoring requirements even if a contractor carries out all monitoring.

OMA 2 - Periodic monitoring and laboratory methods

This section covers:

- Periodic monitoring equipment and surrogate methods.
- Sampling and automatic samplers.
- Sample storage and transportation.
- Laboratory methods and analytical equipment.

The assessment should include all other relevant factors that may influence the final result, for example: data loggers, cool boxes, refrigerators (vehicles/fixed), manual sampling devices.

To obtain good quality monitoring data the sampling provisions, measurement method, equipment and techniques must be appropriate. Processes may have specific considerations that could impact on the fitness for purpose of the most robust method. Therefore, a degree of process-specific selection is required.

OMA 2 contains the following elements:

A Sampling provisions *(Critical element)*
B Certification of equipment
C Measurement methods and standards *(Critical element)*
D Calibration methods *(Critical element)*
E Frequency of maintenance and calibration
F Reliability of equipment (data availability)
G Breakdown response
H Traceability

Surrogate methods
In some cases it may be appropriate to use surrogate methods in place of determinand-specific monitoring of discharges. Examples of surrogate methods include:

- Calculation of COD emissions by analysing materials for soluble organics.
- Using an emission factor (for example, kilograms of pollutants such as heavy metals per tonne of raw material based on supplier's assay).
- Calculation of mass emission rates using mass balances of production and waste figures. For example mercury/cadmium present in raw materials linked to annual usage.

Surrogates may be used where the operator can demonstrate that they are based on proven principles and backed up by empirical evidence, for example, comparison with a recognised method. Surrogate methods should be subjected to the same level of scrutiny under the OMA scheme as determinand-specific methods.

Element	Qualification for OMA scoring	OMA score
Water OMA 2A **Sampling provisions** **Critical Element: A score of less than 3 needs corrective action**	The sampling facilities are inappropriate and do not comply with Environment Agency requirements and do not provide representative samples. The sampling facilities are unsafe.	**1**
	Environment Agency requirements may not be met in all respects but the locations are technically the best available and provide representative samples. The sampling facilities are safe.	**3**
	The sampling facilities fully comply with Environment Agency requirements. The sampling facilities are demonstrably safe	**5**

Environment Agency requirements
Guidance on sampling facilities is available in Environment Agency Technical Guidance Note *M18 – Monitoring of discharges to water and sewer* available at: www.mcerts.net

Importance of sampling facilities
Sample locations that do not comply with TGN M18 may result in reduced quality of the monitoring and affect the score of element 2C. Considerations should include:

- location of the sampling points as agreed
- labelling of the sampling points
- distance from the surface
- distance from the bottom or side of the channel
- sampling channels kept free from fouling/blockage
- sediment contamination
- interference from contaminants such as oil
- ensuring that the sample is representative over all operating conditions
- poor access, for example, in an inaccessible culvert or requiring heavy lifting gear

Auto-samplers
Checks should be made to ensure that appropriate:

- positioning of the sample probe to ensure representative sampling
- condition and cleanliness of sampling lines
- cooling of the sample takes place
- time or flow proportional sampling has taken place

Storage and transport
Any time lag between sampling and analysis will also have a bearing on whether the appropriate determinand is being measured. Many compounds degrade during storage and the operator should have considered storage conditions and transit times before analysis. Consideration should be given to the materials used in containers for sampling, storage and transportation of samples. The use of suitable preservatives should be considered; for example:

- Some heavy metal-compounds can precipitate whilst in storage and transit, so the samples must typically be acidified (such as by the addition of dilute nitric acid) to minimise the chances of this happening.
- Samples for analysis of chlorine must be analysed immediately.
- Samples containing biodegradable substances must either be analysed without delay, or preserved through cooling to a temperature below 5^{o}C.

Guidance can be found in ISO 5667-3 and TGN M18.

Element	Qualification for OMA scoring	OMA score
Water OMA 2B **Certification of equipment**	No monitoring equipment (portable monitors and autosamplers) has MCERTS certification for the relevant determinands and ranges.	**1**
	Some of the monitoring equipment (portable monitors and autosamplers) has no MCERTS certification for the relevant determinands and ranges even though such equipment is available.	**3**
	Monitoring equipment (portable monitors and autosamplers) has MCERTS certification for the relevant determinands and ranges.	**5**

Applicability
If portable monitors and autosamplers are not used this element should be scored as not applicable. It does not apply to fixed laboratory equipment.

MCERTS certification
MCERTS applies to both portable monitoring equipment and automatic samplers, but does not apply to laboratory equipment. MCERTS performance standards and information on MCERTS-certified equipment is available at www.mcerts.net .

When no MCERTS certification is available for the equipment a maximum score of 3 may be given.

A score of 5 is applicable for MCERTS certified equipment with an appropriate operating range. If the equipment is not MCERTS certified the performance characteristics must be demonstrated.

Additional considerations
Assessment of the monitoring equipment should include all relevant factors that influence the result, for example, condition/position of sampling lines, storage and retrieval of data.

Periodic monitoring equipment
Periodic monitoring equipment includes portable pH meters and hand held chlorine meters.

Element	Qualification for OMA scoring	OMA score
Water OMA 2C **Measurement methods and standards** **Critical Element: A score of less than 3 needs corrective action**	The operator has methods for the parameters measured but they are not validated. There are significant deviations from the relevant method. The monitoring techniques are not specific to the determinand of interest. There is significant interference from other species or process parameters. The operator has no internal review process.	**1**
	The operator has methods for the parameters measured; method validation needs to be improved. There are some minor deviations from the relevant methods. The monitoring techniques are suitably specific to the determinand of interest. The level of interference from other species and sensitivity to any process parameter is acceptable. The operator has an informal internal review process.	**3**
	The operator has methods for the parameters measured and they are fully validated. The relevant methods are complied with in full. The monitoring techniques are specific to the determinand of interest with no significant interference from other species or sensitivity to any process parameter. The operator has a formal review process.	**5**

Methods should be:

- as listed in the permit
- approved methods as listed in Environment Agency Technical Guidance Note *M18- Monitoring of discharges to water and sewer*
- other in-house or non-standard methods agreed in writing with the Agency.

Test kits

These should only be used if treated as conventional methods in terms of calibration and QA/QC.

Review process

A procedure to check for updates and changes to standard methods should be in force. Major change, for example, a new instrument, should trigger a review.

Method validation

The operator shall provide evidence that the methods are appropriate for the matrix they are employed in, for example, suspended solids in high salt content effluents.

UKAS/MCERTS accreditation

If there is accreditation for all the required determinands and methods a score of 5 would be indicated.

Permit requirements

Checks should be made to establish that the correct determinand is being measured as specified within the permit, for example, total nitrogen and/or nitrates, total and/or free chlorine, TOC, COD, BOD and/or individual species, total ammonia and/or un-ionised ammonia.

The meaning of a formal review

The operator should have a systematic and documented process which demonstrates a review of monitoring methods and standards, and records the decision. This can take the form of:

- a documented procedure or process within a manual, work instruction or procedure
- allocated responsibilities; who does what, when and how
- documented actions that are required
- records of the review and decision, for example in minutes of meetings, on a template, or through emails

Whilst formal reviews may imply planned meetings with agenda and subsequent minutes, this may not be appropriate due to the nature of the task; for example, reviewing a permit or a contractor's proposed plan of monitoring against the standards in TGN M18 may be carried out by an individual or group of people when required, without holding a formal meeting, as long as the process is consistent, robust and documented.

Element	Qualification for OMA scoring	OMA score
Water OMA 2D **Calibration methods** **Critical Element: A score of less than 3 needs corrective action**	Sampling and analytical equipment (periodic, laboratory and surrogate methods) are not calibrated to a minimum standard.	**1**
	Sampling and analytical equipment (periodic, laboratory and surrogate methods) are calibrated using a satisfactory calibration method, but there is some room for improvement.	**3**
	Sampling and analytical equipment (periodic, laboratory and surrogate methods) are calibrated to a high standard. This means some form of verification, and stability checks performed in a pro-active manner. There is a much higher degree of monitoring and control of the instrumentation.	**5**

Surrogate methods
An example of calibration of a surrogate method to a high standard would be:

- BOD discharges are estimated by applying a factor to the production figures.
- Measurements of BOD are carried out periodically by a UKAS accredited laboratory.
- The results are compared to the surrogate method estimate.
- Adjustments are subsequently made to the factor as necessary.

Permit limits
The OMA should establish that calibration is tailored to emission levels and the permit limits.

Laboratory methods
Laboratory balances, temperature control and volumetric glassware used in making calibration solutions are covered in 2H. Analytical grade reagents should be used for preparing standard solutions.

Calibration methods are usually method-specific. They need to be verified.

- For many laboratory methods, calibration with each batch of samples is required.
- For linear calibration, best practice would be for at least three standards and a blank to be measured to establish linearity. The range between lowest and highest standard should include the permit limit and typical levels.
- If a single point calibration and blank are used with each analytical batch then linearity should be checked at regular intervals (for example quarterly)by performing a full calibration.
- Check instrument manufacturers' calibration verification procedures are being followed where appropriate.

For colorimeters/spectrophotometers annual maintenance and calibration checks carried out by instrument manufacturer are acceptable as long as appropriate routine AQC is carried out. Calibration checks should include linearity, stray light, absorbance and wavelength accuracy.

UKAS/MCERTS accreditation
If the operator has UKAS/MCERTS accreditation for all the required determinands and methods a score of 5 would be indicated.

Element	Qualification for OMA scoring	OMA score
Water OMA 2E **Frequency of maintenance and calibration**	The frequency of maintenance or calibration is inadequate for the type of equipment and method.	**1**
	The frequency of maintenance and calibration is adequate for the type of equipment and method.	**3**
	The frequency of maintenance and calibration is demonstrated to give an added degree of confidence for the type of equipment and method.	**5**

Maintenance frequencies
The operator should have a schedule for maintenance for equipment, with the schedule defined by the supplier; the operator needs to provide evidence of this and adherence to the schedule. The operator also needs to have provisions for intermediate checks to ensure satisfactory continuing operation. These are the minimum requirements and will result in a score of 3. In order to get a higher score, the operator needs to demonstrate that preventative maintenance and checks are undertaken, and that statistical tools such as control charts are used to show that the equipment is still providing reliable data.

Accreditation
If the operator has UKAS/MCERTS accreditation for all the required determinands and methods a score of 5 may be indicated.

Records
Documentary records of the frequency of calibration and maintenance should be checked.

Contracts
Documentary evidence is required for maintenance contracts let out to third parties. A score of 1 will apply in the absence of documentary evidence.

Element	Qualification for OMA scoring	OMA score
Water OMA 2F **Reliability of equipment (data availability)**	The equipment is unreliable. Repeat analysis and/or rescheduling of samples due to equipment failures occurs regularly	**1**
	The equipment is reliable with 95% availability. Repeat analysis and/or rescheduling of samples due to equipment failures occurs at an acceptable rate, less than 5%.	**3**
	Methods and/or equipment are very reliable. The availability of data is greater than 95% Repeat analysis and/or rescheduling of samples due to equipment failures occurs rarely	**5**

Evidence
Evidence of method and equipment reliability can be provided by demonstrating that repeat sampling and analysis is rare.

If the operator cannot provide documentary evidence a score of 1 may be given.

Scope
The scope of this element includes laboratory equipment, portable analytical equipment, automatic samplers and sample storage equipment.

Element	Qualification for OMA scoring	OMA score
Water OMA 2G **Breakdown response**	No breakdown service is available. Spares are not readily available. The person(s) responsible for undertaking repairs is untrained and cannot demonstrate competence.	**1**
	A breakdown service will provide repairs within 48 hours. Spares are demonstrably available for delivery within 48 hours when the monitoring equipment is needed. The person(s) responsible for undertaking repairs is trained and competent, but training records are incomplete.	**3**
	A breakdown service will provide repairs within 24 hours. Spares are demonstrably available for delivery within 24 hours or equivalent duplicate equipment is available, when the monitoring equipment is needed. The person(s) responsible for undertaking repairs is trained and competent and training records are fully documented.	**5**

Contracts
This also applies to maintenance carried out by third parties under contract.

Competence
A competent person would be an individual with relevant training in the appropriate equipment. Documentary evidence should be provided.

Spares and spare equipment
Any spares and duplicate equipment must be maintained and ready for use without significant delay, i.e. available when required.

Element	Qualification for OMA scoring	OMA score
Water OMA 2H **Traceability**	No documentary evidence of traceability of calibrations is available.	**1**
	Some, but not all, calibration parameters are traceable. Documentary records need improvement.	**3**
	Full and complete records are available demonstrating the traceability of all measurements to national or international standards.	**5**

Reference materials
Materials used for calibration purposes should be traceable to appropriate national/international standards. This should cover all standards and reagents whether purchased or prepared in-house. Traceability of fundamental mass, temperature and volume measurements in a laboratory should be demonstrated. Guidance on traceability can be found in TGN M18, and also "*Meeting the traceability requirements of EN ISO/IEC 17025"* and "*EURACHEM/CITAG guide: Traceability in chemical measurement"* at www.nmschembio.org.uk .

Laboratory UKAS/MCERTS accreditation
For samples analysed in a laboratory, UKAS/MCERTS accreditation for.all the determinands would indicate a score of 5. In all other cases, it is the responsibility of the operator to provide documentary evidence that this requirement is being met. In the absence of documentary evidence a score of 1 will be given.

Laboratory balances (mass)
Laboratory balances should be housed in an area free of draughts, direct sunlight, heat sources and magnetic fields and should be supported on a surface that is not affected by vibration. They should have an annual maintenance by a third party organisation that includes calibration using certified weights traceable to the national standard.
For best practice, daily calibration checks should be carried out using secondary standards that have been checked against a certified weight. Certificates of calibration should be available for inspection.

Pipette and burette (volume)
Many laboratories use mechanical pipettes and dispensers; these require servicing on a regular basis and frequent calibration checks. Records should be kept; each pipette should be labelled with a unique identity and date of current and next calibration. Volumetric glassware should be of at least grade B and kept clean.

Temperature measurement
Temperature control is important for many analytical procedures and needs to be monitored in ovens, incubators, fridges etc, with upper and lower limits.
Working temperature measuring devices should be checked at least annually against a standard thermometer traceable to a national standard. If calibration takes place in-house, a documented procedure should be used and results recorded. Where appropriate, corrections should be applied.

OMA 3 – Continuous monitoring

This section looks at sampling provisions, equipment certification, maintenance and calibration for continuous discharge monitoring, including flow monitoring.

This section also covers surveillance. Surveillance means a routine maintenance check of the concentration reading of CWMs.

OMA 3 contains the following elements:

A Provision for monitoring and location of CWMs *(Critical element)*
B Certification of CWMs
C Measurement methods and standards *(Critical element)*
D Calibration methods *(Critical element)*
E Frequency of maintenance and calibration
F Reliability of equipment (data availability)
G Breakdown response
H Traceability

Element	Qualification for OMA scoring	OMA score
Water OMA 3A **Provisions for monitoring and location of CWMs** **Critical Element: A score of less than 3 needs corrective action**	The sampling facilities are inappropriate and do not comply with Environment Agency requirements.	**1**
	Environment Agency requirements may not be met in all respects but the locations are technically the best available and provide representative samples.	**3**
	The sampling facilities fully comply with Environment Agency requirements.	**5**

Environment Agency requirements
Guidance on the sampling facilities is available in Environment Agency Technical Guidance Note *M18 – Monitoring of discharges to water and sewer* available at: www.mcerts.net .

Considerations should include:

- location of the sampling points as agreed
- labelling of the sampling points
- distance from the surface
- distance from the bottom and side of the channel
- sampling channels kept free from fouling/blockage
- sediment contamination
- interference from contaminants such as oil
- ensuring that the sample is representative over all operating conditions
- condition and position of sampling lines
- poor access, for example, in an inaccessible culvert or requiring heavy lifting gear

Importance of sampling facilities
Sample locations that do not comply with TGN M18 may result in reduced quality of the monitoring and affect the score of element 3C.

Flow monitoring
If no evidence of a site MCERTS conformity certificate (issued by Sira Test and Certification Ltd) is available and flow monitoring is in the permit a score of 1 should be given.

Element	Qualification for OMA scoring	OMA score
Water OMA 3B **Certification of CWMs**	No monitoring equipment (CWMs) has MCERTS certification for the relevant determinands and ranges even though such equipment is available.	**1**
	Some of the monitoring equipment (CWMs) has no MCERTS certification for the relevant determinands and ranges even though such equipment is available.	**3**
	Monitoring equipment (CWMs) has MCERTS certification for the relevant determinands and ranges.	**5**

Applicability
This element applies to continuous monitoring equipment and flowmeters.

MCERTS certification
MCERTS performance standards and information on MCERTS-certified equipment is available at www.mcerts.net .

When no MCERTS certification is available for the equipment a maximum score of 3 may be given.

A score of 5 is applicable for MCERTS-certified equipment with an appropriate operating range. If the equipment is not MCERTS-certified the performance characteristics must be demonstrated.

Additional considerations
Assessment of the monitoring equipment should include all relevant factors that influence the result, for example, storage and retrieval of data.

Additional considerations for flow monitoring
If flow monitoring is required by the permit, and the flowmeter used is not MCERTS-certified, then a review of the MCERTS site conformity inspection certificate and MCERTS-inspector's report on the management system is required to check instrument performance. A maximum score of 3 may be given.

Element	Qualification for OMA scoring	OMA score
Water OMA 3C **Measurement methods and standards** **Critical Element: A score of less than 3 needs corrective action**	The operator has methods for the parameters measured but they are not validated. There are significant deviations from the relevant method. The monitoring techniques are not specific to the determinand of interest. There is significant interference from other species or process parameters. The operator has no internal review process.	**1**
	The operator has methods for the parameters measured but their validation needs to be improved. There are some minor deviations from the relevant methods. The monitoring techniques are suitably specific to the determinand of interest. The level of interference from other species and sensitivity to any process parameter is acceptable. The operator has an informal internal review process.	**3**
	The operator has methods for the parameters measured and they are fully validated. The relevant methods are complied with in full. The monitoring techniques are specific to the determinand of interest with no significant interference from other species or sensitivity to any process parameter. The operator has a formal review process.	**5**

Methods should be:

- As listed in the permit or agreed in writing with the Environment Agency
- Appropriate for the matrix, for example, the salinity of the effluent.

Review process

A procedure to check for updates and changes to standard methods should be in force. Major change, for example, a new instrument, should trigger a review.

Permit requirements

Checks should be made to establish that the correct parameter is being measured as specified within the permit, for example, total nitrogen and/or nitrates, total and/or free chlorine, TOC and/or individual species, total phosphorus or orthophosphate.

Guidance

Environment Agency Technical Guidance Note *M18 – Monitoring of discharges to water and sewer* provides guidance and is available at www.mcerts.net .

The meaning of a formal review

The operator should have a systematic and documented process which demonstrates a review of monitoring methods and standards, and records the decision. This can take the form of:

- a documented procedure or process within a manual, work instruction or procedure
- allocated responsibilities; who does what, when and how
- documented actions that are required
- records of the review and decision, e.g. in minutes of meetings, on a template, or through emails

Whilst formal reviews may imply planned meetings with agenda and subsequent minutes, this may not be appropriate due to the nature of the task; for example, reviewing a permit or a contractor's proposed plan of monitoring against the standards in M18 may be carried out by an individual or group of people when required, without holding a formal meeting, as long as the process is consistent, robust and documented.

Element	Qualification for OMA scoring	OMA score
Water OMA 3D **Calibration methods** **Critical Element: A score of less than 3 needs corrective action**	Continuous water monitors (CWMs) are not calibrated to a minimum standard.	**1**
	CWMs are calibrated using a satisfactory calibration method, but there is some room for improvement.	**3**
	CWMs are calibrated to a high standard.	**5**

Permit limits
The OMA should establish that calibration is tailored to emission levels and the permit limits.

Documented evidence of calibrations should be available for inspection, including:

- any daily system-suitability checks, e.g. slope response for pH electrodes, detector responses
- calibration certificates
- maintenance schedules and reports

Manufacturers' recommendations should be available for inspection (in equipment manuals for example) and should be followed as a minimum.

Element	Qualification for OMA scoring	OMA score
Water OMA 3E **Frequency of maintenance and calibration**	The frequency of maintenance or calibration is inadequate for the type of equipment.	**1**
	The frequency of maintenance and calibration is adequate for the type of equipment.	**3**
	The frequency of maintenance and calibration gives an added degree of confidence for the type of equipment.	**5**

Calibration and maintenance frequency
Some monitoring equipment, for example, electromagnetic flow meters, may require relatively infrequent maintenance and calibration. The minimum frequency should be as specified in the manufacturers' instructions. However, the calibration frequency should be reviewed in light of the amount of drift observed.

A manufacturer's manual should describe all the necessary maintenance procedures, including scheduled services and checks. In order to get a score of 3, the operator needs to make sure that all the specified tasks in the manual are performed when required. In order to get a higher score, the operator needs to have additional preventative-maintenance procedures

Records
Documentary records of the frequency of calibration and maintenance should be checked.

Contracts
Documentary evidence is required for maintenance contracts let out to third parties. A score of 1 will apply in the absence of documentary evidence.

Element	Qualification for OMA scoring	OMA score
Water OMA 3F **Reliability of equipment (data availability)**	Equipment is unreliable. For continuous monitors, valid results are produced less than 80% of the available time.	**1**
	Equipment is reasonably reliable. For continuous monitors, valid results are produced for at least 95% of the available time.	**3**
	Equipment is very reliable. For continuous monitors, valid results are produced more than 98% of the available time.	**5**

Valid result
A measurement demonstrated to be within a specific uncertainty.

Evidence
In order to determine the reliability of CWMs, compare the data for continuous monitoring with the operational data for the site. if there are any gaps in data that cannot be explained by site-downtime, then ask for an explanation and then make a judgement on the reliability.

If an operator cannot provide documentary evidence a score of 1 should be given.

Element	Qualification for OMA scoring	OMA score
Water OMA 3G **Breakdown response**	No breakdown service is available. Spares are not readily available. The person(s) responsible for undertaking repairs is untrained and cannot demonstrate competence.	**1**
	A breakdown service will provide repairs within 48 hours. Spares are demonstrably available for delivery within 48 hours. The person(s) responsible for undertaking repairs is trained and competent, but training records are incomplete.	**3**
	A breakdown service will provide repairs within 24 hours. Spares are demonstrably available for delivery within 24 hours or equivalent duplicate equipment is available. The person(s) responsible for undertaking repairs is trained and competent and training records are fully documented.	**5**

CWMs
A parallel set of fully maintained and calibrated equipment would indicate a high score provided that a competent person(s) are available for installation.

Where the permit does not allow the process to operate if the CWM is non-operational this element can be regarded as non-applicable. Explanatory text should be included in the OMA report.

Contracts
This also applies to maintenance carried out by third parties under contract.

Competence
A competent person would be an individual with relevant training in the appropriate equipment. Documentary evidence should be provided.

Spares and spare equipment
Any spares and duplicate equipment must be maintained and ready for use without significant delay, that is available when required.

Element	Qualification for OMA scoring	OMA score
Water OMA 3H **Traceability**	The calibrations of CWMs cannot be demonstrated to be traceable. There are no documentary records of the calibration.	**1**
	Some, but not all, calibration parameters are traceable. Documentary records need improvement.	**3**
	The calibrations of CWMs are fully traceable to national or international standards. Full details of calibration are documented.	**5**

Traceability
Materials used for calibration purposes should be traceable to appropriate national/international standards. This should cover all standards and reagents whether purchased or prepared in-house. If prepared in-house, the traceability of fundemental mass, temperature and volume measurements in the laboratory should be demonstrated. See element 2H for details.

Guidance on traceability can be found in TGN M18, and also *Meeting the traceability requirements of EN ISO/IEC 17025 - An analysts guide* and *EURACHEM/CITAG Guide: Traceability in chemical measurement* at www.nmschembio.org.uk .

OMA 4 - Quality assurance

Quality assurance should include MCERTS accreditation and certification schemes, quality control (QC) schemes and auditing, complemented by an acceptable regime of reporting.

OMA 4 contains the following elements:

A. External quality control schemes
B. Internal data QC
C. Competence of monitoring personnel
D. Auditing of monitoring
E. Audit compliance
F. Reporting

Element	Qualification for OMA scoring	OMA score
Water OMA 4A **External quality control schemes**	The organisation carrying out sampling and analysis has no UKAS/MCERTS accreditation for any of the monitoring requirements. The organisation carrying out monitoring does not participate in any inter-laboratory proficiency testing scheme or carry out other external quality control activities. The operator's management system is not certified.	**1**
	The majority of sampling and analysis activities are UKAS/MCERTS accredited. The organisation carrying out monitoring participates in an inter-laboratory proficiency testing scheme and/or other relevant external quality control activities. The operator's management system is certified, e.g. to ISO 14001 and/or ISO 9001. Monitoring procedures are within the scope of the management system.	**3**
	All monitoring activities are UKAS/MCERTS accredited to EN ISO/IEC 17025 where appropriate. The organisation carrying out monitoring participates in a recognised inter-laboratory proficiency testing scheme and other comprehensive external quality control activities. The operator's internal laboratory is UKAS accredited to EN ISO/IEC 17025.	**5**

UKAS accreditation
It would be expected that any sample sent off site for analysis should be analysed by a laboratory with UKAS/MCERTS accreditation for the determinand.

In the absence of UKAS/MCERTS accreditation for samples sent off-site, any procedures used should be assessed. If they are acceptable then a maximum score of 3 may apply.

Accreditation schedules
Schedules of accreditation for accredited organisations are published on the UKAS web site. These list the methods for which the test laboratory is accredited, and should be checked to ensure that all relevant methods are included. All scopes of accreditation can be viewed at www.ukas.org .

Inter-laboratory proficiency schemes
Participation in Proficiency Testing (proficiency-testing) schemes such as Aquacheck is rarely employed in small industrial laboratories, although operators with multiple sites may circulate round-robin samples. Laboratories may send regular comparison samples to an accredited laboratory.

Information regarding the availability of proficiency-testing schemes can be found at:

http://www.lgc.co.uk/, http://www.nmschembio.org.uk/, http://www.eptis.bam.de/

Element	Qualification for OMA scoring	OMA score
Water OMA 4B **Internal data QC**	The organisation carrying out analysis has no records of AQC procedures or has inadequate assessment of AQC data.	**1**
	The organisation carries out AQC procedures where appropriate and records the results, but the assessment of AQC data could be more rigorous.	**3**
	The organisation can demonstrate a comprehensive analytical control system, including documented statistical controls and rules for rejection and acceptance of data, and investigations into failures.	**5**

UKAS accreditation
It would be expected that any sample sent off site for analysis should be analysed by a laboratory with UKAS/MCERTS accreditation for the determinand; if this is the case, then appropriate AQC procedures can be assumed.

AQC charts
As a minimum, laboratories should employ AQC charts for all analytical methods, and have a documented procedure for investigation of failures. Guidance can be found in TGN M18.

No internal AQC procedures
A score of 1 should be given

Guidance
Environment Agency Technical Guidance Note *M18 – Monitoring of discharges to water and sewer* provides guidance and is available at www.mcerts.net .

Element	Qualification for OMA scoring	OMA score
Water OMA 4C **Competence of monitoring personnel**	Sampling and analysis personnel have no relevant training, qualifications or experience. No training records are kept. There is no monitoring training plan or procedure.	**1**
	Sampling and analysis personnel have some relevant training, qualifications or experience. Training records are in place but could be improved. There is a basic monitoring training plan or procedure.	**3**
	Sampling and analysis personnel have the appropriate level of training, qualifications and experience. Training records are comprehensive. There is a comprehensive monitoring training plan or procedure.	**5**

Laboratory UKAS accreditation
A laboratory holding UKAS accreditation to ISO/IEC 17025 or MCERTS for relevant determinands will satisfy the personnel competency requirements for analysis. Such laboratories will have ensured their staff have received appropriate training and analysis is carried out under the supervision of a professional analytical chemist (for example, Chartered Chemist).

The methods that an organisation is accredited to use can be viewed at www.ukas.org .

Personnel competence
In the absence of a formal Environment Agency endorsed competency benchmark for personnel involved in sampling and analysis, assessors must use their judgement based on the evidence available, for example:

- Comprehensive training records that cover each analytical and sampling procedure employed.
- Instrument manufacturers training (CWMs and lab instruments).
- The existence of a suitable sampling manual and demonstration of compliance with it.

Guidance
Environment Agency Technical Guidance Note *M18 – Monitoring of discharges to water and sewer* provides guidance and is available at www.mcerts.net

Element	Qualification for OMA scoring	OMA score
Water OMA 4D **Auditing of monitoring**	No auditing procedures or audit plans are available, or the audit plan has not been complied with. No internal or external on-site audits have been carried out to check that the documented procedures are being followed by those conducting the monitoring	**1**
	Auditing procedures are available. The audit plan does not cover all monitoring activities (management and technical). The person responsible for managing audits and closing out corrective actions is identified. Internal or external on-site audits have been carried out to check that the documented procedures are being followed by those conducting the monitoring.	**3**
	Fully documented auditing procedures linked to the management system are available. The audit plan covers all monitoring activities (management and technical). The person responsible for managing audits and closing out corrective actions is identified. Internal and external on-site audits have been carried out to check that the documented procedures are being followed.	**5**

On-site auditing
On-site auditing refers specifically to assessing that the personnel carrying out monitoring do so in accordance with documented procedures and include the performance of the tests themselves. This element is not the routine audit of a management system during an ISO 9001 or ISO14001 audit.

Contractors
This should include contractors used for analysis and/or sampling.

Monitoring reports
Evidence of reviewing and auditing monitoring reports against the relevant standard would be expected for a high score.

Auditors
Auditors should be trained and qualified and independent of the activity being audited (independence may not be possible at small organisations).

Audit methods
The permit requires the operator to have a management system. Operators typically meet this requirement by having a certified management system. This has to include documented procedures for internal auditing, and the associated corrective and preventative actions. We expect the operator to apply their auditing procedures to their monitoring processes and procedures. The audits themselves may be compliance audits (e.g. 'tick boxes'), but preferably systems audits involving horizontal and vertical approaches.

Element	Qualification for OMA scoring	OMA score
Water OMA 4E **Audit compliance**	No audit records are available. Where audits show non-compliances, corrective actions have not been implemented.	**1**
	Audit records could be improved. Where audits show non-compliances, the reasons have been investigated and corrective actions have mostly been implemented.	**3**
	Audit records are comprehensive. Appropriate corrective actions have been completed in all cases. The effectiveness of the corrective actions has been investigated in all cases.	**5**

No audit carried out
If no audit has been carried out a score of 1 should be given.

Non-compliances
A simple numerical count of non-compliances and observations is a poor measure of overall compliance with procedures. The significance of the non-compliance is important and the OMA should consider whether they are major or minor, or just observations.

Element	Qualification for OMA scoring	OMA score
Water OMA 4F **Reporting**	The contents of the monitoring report fail to meet the permit requirements and acceptable reporting standards. Reporting of data fail to meet the permit requirements.	**1**
	The contents of the monitoring report meet the permit requirements and in the most part meet acceptable reporting standards but further improvements are possible. Reporting of data meets the permit requirements.	**3**
	The contents of the monitoring report meet the permit requirements in all aspects and are to an acceptable reporting standard. Reporting of data is to a high standard providing additional confidence. This could include measures to cover physical tampering, archiving and auditing.	**5**

CWM data requirements
This should include measures to cover data security, archiving and security.

Reporting
Reports should be forwarded to the Environment Agency as specified in the permit.