

Consultation on operator self-monitoring of liquid effluent flow for nuclear sites

Purpose of consultation

We already have a Monitoring Certification Scheme (MCERTS) for operator self-monitoring of liquid effluent flow. We are now proposing to extend the scheme to nuclear sites.

Our proposals:

- All nuclear sites would need a MCERTS inspection of their arrangements for monitoring liquid effluent flow. This inspection would need to be completed by the end of December 2009. It would determine whether the sites are complying with the MCERTS performance standard.
- The arrangements inspected would be those used for calculating the liquid effluent discharges reported under the Radioactive Substances Act 1993. Based on our case study, inspection costs will be about £5,000 per site.
- Following the inspection, the operator would have to make any improvements required to meet the MCERTS performance standard.

Why are we proposing this change?

The new approach would give others confidence both in the ability of operators to monitor the discharges and in the standard of that monitoring. It would also allow the Environment Agency to regulate this area with a lighter touch and could improve water usage.

Options

There are several options for implementing the MCERTS scheme. When we were developing our proposals, we shared our ideas with a number of relevant parties inside and outside the Environment Agency. Our preferred option – for a staged approach – takes account of much of the feedback we received.

We would like your views on this proposal. In particular:

- Do you support our preferred option? If not, please explain why.
- Do you support our timescale for implementation? If not, please explain why.

Please send your comments to Ray Pemberton, at the address below, by Friday 14th November 2008.

Ray Pemberton
Environment Agency
Lutra House
Dodd Way
Off Seedlee Road
Walton Summit Industrial Estate
Bamber Bridge
Preston
PR5 8BX
ray.pemberton@environment-agency.gov.uk

1. Introduction

- 1.1. The Environment Agency has a Monitoring Certification Scheme (MCERTS) for air, water and soil monitoring. The scheme requires environmental measurements to be of a high quality. Within MCERTS is a scheme for operators to monitor liquid effluent flow [Ref 1]. This is referred to as 'operator self-monitoring of liquid effluent flow'.
- 1.2. In 2007 [Ref 2], the Environment Agency decided that this self-monitoring should apply to:
 - industrial sites regulated under the Pollution Prevention and Control (PPC) Regulations 2000;
 - water companies regulated under the Water Resources Act 1991 (as amended under the Environment Act 1995);
 - nuclear sites regulated under the Radioactive Substances Act 1993 (RSA93).

Our policy does not apply to non-nuclear sites regulated under RSA93. This is because their liquid discharges are calculated from known quantities of radioactive substances that are used on the sites.

- 1.3. The MCERTS scheme for operator self-monitoring of liquid effluent flow started on 1 January 2004. It has already been applied to water companies regulated under the Water Resources Act 1991. By the end of 2008, all PPC installations with an effluent flow requirement in their permit will have been inspected. The management system of these PPC installations will also have been audited.

In total, some 4,000 installations will have been inspected under the MCERTS scheme by the end of this year. These installations will include a number of nuclear sites with PPC permits.

- 1.4. After we decided that operators at nuclear sites should monitor their liquid effluent flow, we carried out the relevant Regulatory Impact Assessments (RIA) – looking at the scale of the MCERTS scheme and the speed at which it should be implemented.
- 1.5. This paper:
 - summarises the MCERTS scheme for operator self-monitoring of liquid effluent flow;
 - describes the benefits, costs and risks of the different options at nuclear sites – the Regulatory Impact Assessment;
 - explains our preferred option;
 - uses a real-life example to demonstrate how the MCERTS scheme would work on a nuclear site.

2. Environment Agency's perspective

- 2.1. In the UK, most of the monitoring of liquid effluent flow is carried out by operators. Over the last ten years we have found the quality of operators' monitoring data to be extremely variable: some is good but some is poor or very poor. Our view has been confirmed by the MCERTS inspections already made.
- 2.2. If the arrangements for operator self-monitoring are to be successful, we need a system that is fit for purpose and meets minimum recognised standards.
- 2.3. MCERTS provides a framework of monitoring standards and give us statistical confidence in the resulting data. MCERTS standards should be considered a minimum for new plant. Existing plant should adopt the standards so far as is reasonably practicable.

2.4. Other considerations:

- It is important that all the companies which measure the flow of liquid waste are working towards the same standard. This creates a level playing field in a competitive market.
- Measuring the flow of liquid waste helps to produce reliable information for regulatory purposes and improves understanding of the water control process.
- The MCERTS performance standard raises the professional reputations of the staff and organisations which measure the flow of liquid waste.

3. Scope

3.1 This consultation covers:

- nuclear sites that are not regulated under PPC and from which there are authorised discharges of liquid radioactive wastes to the environment;
- the disposal of liquid wastes by transfer between nuclear sites or between tenant operators and a nuclear site's licence holder;
- how operators account for radioactive discharges or disposals as liquids where volume discharge is part of the accounting process
- volume flow – this is either measured directly or assessed by determining the volume discharged when emptying tanks.

4. Issues for nuclear sites

4.1 The key issues for nuclear sites will be to ensure that:

- the costs are proportionate to the benefits;
- the scheme is implemented consistently across the nuclear industry;
- the standards applied via the MCERTS scheme are the same as those applied to other industries;
- the requirements and deadlines are set out clearly.

4.2 At many nuclear sites, flow is measured in the effluent stream at what are referred to as accountancy points. However, some nuclear sites assess discharge quantities by emptying bulk storage/delay tanks that are of known volume. The MCERTS scheme would allow for both approaches to be used.

4.3 Some nuclear sites that measure flow dispose of liquid wastes by transferring them to another site. In some cases, tenants on nuclear sites also transfer liquid wastes for disposal to the company holding the site's licence. The MCERTS scheme would cover flow measurement where a flow measurement system is used to assess transfer quantity.

5. MCERTS operator self-monitoring of liquid effluent flow

5.1 The key elements of the MCERTS scheme are:

- Operators place a contract with a company that employs MCERTS inspectors. There are several of these companies, which operate in a commercially competitive market. These companies are appointed by Sira Certification Services, which runs the scheme on behalf of the Environment Agency.
- The Environment Agency has set a performance standard for liquid effluent flow monitoring systems [Ref 1]. This includes a daily volume target of better than $\pm 8\%$ uncertainty (confidence level of 95%). We have set this performance standard using the feedback received from wider industry. The target is regarded as being reasonable to achieve. During the inspection, the MCERTS inspector will determine whether the accountancy arrangements in place can meet this standard.

- The first stage is an MCERTS inspection of the arrangements for monitoring flow. This should cost between about £1000 to £2000 for each flow measurement point. The inspector's report will show whether the flow monitoring arrangements comply with MCERTS. There will be an assessment of the type of devices used to measure flow. The inspector will report on any emptying of bulk storage/delay tanks of known volume.
- The management system (for effluent flow monitoring) also needs to be assessed. This is done by a certification body that UKAS has accredited for carrying out MCERTS for flow. This body could be the operator's existing ISO 14001/9000 auditors or Sira. The management system should ensure that calibration and maintenance are carried out at appropriate intervals.
- Sira checks the MCERTS inspector's report and the management system auditor's report. If the MCERTS requirements are met, Sira will issue an MCERTS site condition inspection certificate. This is valid for 5 years.
- If the existing monitoring arrangements do not meet the MCERTS standards, the MCERTS inspector will provide guidance on the improvements or modifications that are required. The management system auditor will also identify where improvements are needed.
- If improvements or modifications are required, the Environment Agency will specify improvement conditions. Our regulatory officer will agree with the operator the timescale for making the improvements. Any new or replacement flow monitoring arrangements covered by the permit must meet MCERTS standards when they are put into effect.
- Once modified, the flow arrangements must be re-inspected. This is to ensure that the new arrangements meet the requirements of the MCERTS scheme. The costs of re-inspection should be lower.

5.2 Some sites may fail to comply with MCERTS standards in a relatively minor way that is not important in regulatory terms, but where the cost of immediate rectification is high. In these cases, operators can apply to the Environment Agency for dispensation not to make that improvement. This will require a cost/benefit business case to be produced.

6. Options for implementing the MCERTS scheme

6.1 These are the options for implementing the MCERTS scheme at nuclear sites not regulated under PPC:

- **Option 1 – Do nothing.** Do not proceed with MCERTS certification for operator self-monitoring of liquid effluent flow at nuclear sites where there are no PPC permits.
- **Option 2 – Full implementation** of MCERTS certification for operator self-monitoring of liquid effluent flow at all nuclear sites. Nuclear sites would require MCERTS inspections of their flow monitoring arrangements. Operators would then have to make any necessary improvements in the timescales agreed with their Environment Agency Nuclear Regulator.
- **Option 3 – Staged approach.** Nuclear site operators would need to have MCERTS inspections of their liquid flow monitoring arrangements by a specified date. The Environment Agency would then review any improvements required to comply with the MCERTS performance standard for flow monitoring. We would also look at the associated costs. We would then specify improvement conditions in a consistent manner across all nuclear sites.

6.2 The MCERTS scheme would cover those monitoring arrangements that are used to calculate the liquid effluent discharges reported under RSA 93.

7. Costs, benefits and risks

7.1 Table 1 provides information on benefits, costs and risks.

7.2 There are three key benefits. Firstly, the new approach will give others confidence both in the ability of operators to monitor the discharges and in the standard of that monitoring. Secondly, it will allow the Environment Agency to regulate this area with a lighter touch. Thirdly, it could improve water usage.

7.3 The costs of implementation will include the MCERTS inspection and one-off costs for improvements and modifications. The cost of a MCERTS inspection will depend on the number of flow measurement points. It is relatively modest. It should be between £1,000 and £10,000, depending on the complexity and number of flow measurements. These MCERTS inspections will be repeated once every five years.

The audit of the management system will probably cost about £1,000. If the audit report indicates that corrective actions are required, further audits will take place every year – until all the actions have been dealt with. If no corrective actions are required, there will be a further audit once every five years.

7.4 There may be one-off costs for bringing flow monitoring arrangements into line with the MCERTS performance standard. Based on the capital works undertaken at water company sites, we expect these costs to range from £10,000 to £100,000 per site. Appendix 1 provides a case study of the work undertaken by Springfields Fuel Limited. Their budget for improvements is currently £25,000.

7.5 In a few cases, costs may be higher. Nuclear site operators may ask for dispensation not to make some improvements. Such requests will be considered by the Environment Agency's Nuclear Regulator, who will look at:

- how far the uncertainty is outside of the $\pm 8\%$ criterion – and the resulting impact on the reporting of discharges;
- the cost savings from better flow control;
- the cost of improvements;
- the dose to the public from discharges;
- the health and safety considerations, including dose to workers;
- the lifetime of plant.

8. Preferred option

8.1 The Environment Agency's preferred option is Option 3 – the staged approach. This will provide information at a relatively modest cost on the standards of arrangements for monitoring liquid effluent flow at nuclear sites.

8.2 We can then require improvements with greater knowledge of the costs involved. We would want to ensure that the costs are proportionate to the benefits we wish to see. A clear picture of compliance will allow us to ask for improvements in a consistent manner across all nuclear sites.

8.3 All nuclear sites would need to have an MCERTS inspection of their liquid effluent flow monitoring arrangements by the end of December 2009.

9. References

1. Environment Agency (2007). Minimum Requirements for the Self-Monitoring of Effluent Flow. MCERTS. Version 3.2 February 2008. Available at www.mcerts.net
2. Environment Agency (2007). Cross-functional environment protection policy on flow measurement of aqueous point-source releases using the monitoring certification scheme (MCERTS). 184_07, Version 1, 25/06/07.

Table 1 – Costs, benefits and risks

Options	Estimated one-off costs	Estimated routine / on-going costs	Benefits	Risks
Option 1 – Do nothing	Nil	Nil	Nil	<ul style="list-style-type: none"> We won't see the benefits from ensuring the credibility of monitoring, improved water control and lighter-touch regulation
Option 2 – Full implementation of MCERTS operator self-monitoring of liquid effluent flow	<p>£5,000 per site – enhance QMS^a arrangements</p> <p>£10,000-£100,000 per site^b – capital costs/purchases to meet MCERTS performance standard</p> <p>30 nuclear sites –</p> <p>£150,000-£1 million</p>	<p>£5,000 per site for MCERTS inspection every 5 years</p> <p>£5,000 per site for QMS audit every 5 years</p> <p>£200 per site for certification every 5 years</p> <p>30 nuclear sites – £61,000 a year</p>	<ul style="list-style-type: none"> Ensure credibility of operators' self-monitoring of discharges Lighter-touch regulation Better information on discharges Satisfies Environment Agency policy for operator self-monitoring and ensures consistency with other business sectors Potential to secure savings in the longer term – through better control of water usage 	<ul style="list-style-type: none"> The data on the extent of compliance of the nuclear industry with the MCERTS scheme is not complete. This could compromise the assessment of costs, benefits and risks Costs could be prohibitive and benefits not realised
Option 3 – Staged approach to implementation of MCERTS operator self-monitoring of liquid effluent flow	Potentially as for Option 2	Same as Option 2.	<p>As for Option 2 plus:</p> <ul style="list-style-type: none"> Better information on the costs of improvements. This will improve consistency in requiring improvements and ensure benefits are realised at a proportionate cost 	

^aQMS stands for Quality Management System.

^bThis is an estimate based on the water industry's experience of meeting the MCERTS performance standard.

Appendix 1 – Case study: Springfields Fuels Limited

Background

Early in 2007, Springfields Fuels Limited started to review its flow measurement of aqueous point-source releases at the Springfields site.

The site's aqueous discharge points are covered by a PPC permit. One of the conditions is that the measurement of flow should meet the requirements of the MCERTS scheme for operator self-monitoring of liquid effluent flow. The review looked at flow measurements and the process within the effluent handling complex.

Effluent handling complex

The effluent handling complex has two separate systems:

1. The trade effluent handling system:

Trade effluent enters the section where flow is evaluated and discharges accounted for via a single open channel. The effluent then passes through a narrow, open flume channel. Here the flow of effluent is measured and the effluent is sampled by one of two automatic sampling units. The effluent then overflows a small weir and enters an open, rectangular, concrete balance tank with a capacity of approximately 450 m³. The trade effluent handling system carries the majority of the radioactive discharges as liquid from the site.

2. The storm water handling system:

Storm water enters via two separate, open, concrete channels. The first contains the combined storm water from the southern side of the installation; the other contains the combined storm water from the northern side. These two channels meet at the north end of the effluent handling complex. They then form a single, open, concrete channel where the flow of storm water is measured and the storm water is sampled by one of two automatic sampling units.

Phase 1

Before the MCERTS inspection, Springfields carried out its own investigation and assessment. The MCERTS scheme requires the overall uncertainty in flow measurement to be within $\pm 8\%$. The company's own assessment was that, under certain low flow conditions, the uncertainty in flow accountancy for the trade effluent was up to $\pm 11\%$. There were several reasons for this: the shape of the flume weir, turbulence in flow and the siting of the depth measurement dip pipes upstream of the flume weir. The storm drainage flow measurement also had minor deficiencies, which related to the siting of depth measurement equipment. This was causing turbulence in the flow through the weir.

The company then arranged for an organisation that employs accredited MCERTS inspectors to report on the effectiveness and efficiency of the flow measurement systems. Their report highlighted similar issues to those that the company had found in its self-assessment. The inspector recommended that the company bring each contributing uncertainty into line with the MCERTS tolerances. This would have involved significant modifications in several areas involved in measuring trade effluent flow.

Springfields opted for a second opinion and commissioned another report via a different MCERTS inspector.

Phase 2

The second Inspector came to a similar view of the uncertainty in the measurement arrangements. However a more pragmatic approach to amending measurement of flow was proposed. This was

aimed at ensuring that the overall uncertainty under all flow conditions met the $\pm 8\%$ criterion. Having received confirmation from the inspector that it would be acceptable to make the changes, the company is now considering how to do this in the most reliable and cost-effective way.

This case shows that where improvement costs appear to be high, it may be sensible to consider alternative approaches.

Phase 3

The company has agreed to make the changes needed to meet the MCERTS performance standard. It has also set up a task group under the direction of a project manager. It is currently looking at three options for the trade effluent system:

1. Remove the existing flume and replace with a trapezoidal flume.
2. Use a floating device in the channel – ultrasonic beam technology.
3. Remove the flume and replace with a dual-level weir plate.

Costs

So far, the company has paid for two MCERTS inspections (approximately £1,500 each). They are still working out the detailed costs in the three options for modifying the measurements systems. However the company is budgeting £25,000 for the main works to modify the flume weir for the trade effluent flow.

Timescales

To meet PPC requirements, the company was required to have had an MCERTS assessment of its flow measurement by December 2008. There are no formal timescales for making the improvements to the measurement systems. These are agreed locally, on a case-by-case basis.