



# SCOTTISH EXECUTIVE

## Environment Group

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Dear Geoff

### Information Letter 5 /2006

#### FURTHER GUIDANCE ON PROVISIONS TO ACHIEVE COMPLIANCE WITH LEAD STANDARD

1. The purpose of this letter is to provide further guidance to Scottish Water on how it is to achieve and maintain compliance with the standard for lead in drinking water set out in the Water Supply (Water Quality)(Scotland) Regulations 2001. The current standard is 25µg/l but this reduces to 10µg/l in 2013.

#### Background

2. With the reduction of the lead standard in 2013 it is necessary to ensure that any further work needed to meet this standard is identified in time for the regulatory investment review for the second half of Quality and Standards 3.

3. Scottish Water has been working for a number of years to install plumbosolvency dosing at sites where data indicates this is required to achieve compliance with the standard at consumer taps. Random daytime sample surveys undertaken in 2001 identified sites where dosing was necessary. There remain a significant number of sites on this list where the installation of plumbosolvency dosing has not yet been completed. Scottish Water's original programme had stated that dosing would be operational at all the required sites by the end of October 2006. It is now apparent that 29 sites will still not have dosing installed by this date.

4. At other sites, plumbosolvency dosing has been operational for some time. Proving surveys have been undertaken to verify that existing equipment is capable of delivering the required dose and that associated pH correction can maintain optimal values within regulatory standards. Progress to optimise dosing is variable, and in most cases has only recently commenced. Lead test rigs are to be used to demonstrate optimisation of plumbosolvency dosing. At least one lead test rig will be used for each supply where dosing is required, although supplies which have extended networks may require additional rigs. All rigs will be installed by the end of October 2006. Where there are rigs already in place work to optimise the dose should commence without delay so that any issues are highlighted as soon as possible.



## Summary of Timetable

5. The main milestones in order to achieve compliance with the 10µg/l standard are shown below:

*Installation and stabilisation of plumbosolvency dosing at WTW*

*Installation and commissioning of lead test rigs in distribution*

*Optimisation of plumbosolvency dosing*

*Study to determine zonal compliance with 10µg/l standard*

*Identification of any further work required to ensure compliance with 10µg/l standard*

*Second Draft Business Plan to WICS by March 2009*

6. Since it has become apparent that the installation of plumbosolvency dosing at some sites will not be complete by October 2006, in order to avoid delaying the completion of the programme, it will be necessary to treat sites individually when determining the milestone dates above. In particular, phasing of the lead survey will be necessary in order to identify all the additional investment requirements for the second half of Quality and Standards 3.

7. Scottish Ministers require Scottish Water to submit a completion date for each of the milestones above for every site where plumbosolvency dosing is installed or to be installed. All supply zones will need to be surveyed, whether or not a need for plumbosolvency dosing has previously been identified. Dates for the anticipated completion of surveys to determine zonal compliance with the 10µg/l standard for all zones should therefore be provided. It is expected that all surveys will be complete by 28 February 2009 so that any further work required to ensure compliance with the 10µg/l standard can be included in Scottish Water's second draft business plan to the Water Industry Commission. It is expected that the majority of the surveys will be complete before 31 December 2008 in order to provide time for investment requirements to be properly considered. The completed spreadsheet of milestone dates should be returned to Scottish Ministers no later than 15 November 2006.

## Requirement to Install Plumbosolvency Control Measures

8. Information Letter 4/2003 examined the risk that water at any given consumers' tap in a supply zone will contain lead in excess of the regulatory standard and set out how this was to be quantified and assessed. Action was required in supply zones where there is a 95% probability that the non-compliance rate with the 25µg/l standard was greater than 5%. Scottish Ministers will consider the appropriate criteria for assessing compliance with the 10µg/l standard and provide additional guidance on this by 31 December 2006.

9. Where a group of treatment works supply one or more supply zones which have been identified as requiring plumbosolvency dosing, dosing will require to be optimised at each works, even if it only operates intermittently throughout the year. This is to ensure that a consistent orthophosphate dose is maintained throughout the supply zones.



10. Regulation 26(1) requires that Scottish Water shall treat the water where there is a risk that the water at consumers' taps will contain lead in excess of 10µg/l, except where treatment is not reasonably practicable. Where a supply serves less than 400 properties, Information Letter 4/2003 recognises that plumbosolvency treatment may not be practical, and that Scottish Water may wish to consider other means of reducing or eliminating the risk of non-compliance with the standards after the water is supplied. Where Scottish Water chooses to replace any lead pipework which may be present in its communication pipes in such zones, it should also inform consumers of the risk presented by any lead present in that part of the service pipe owned by the consumer or in the property's plumbing and any steps consumers may wish to take to protect themselves from such a risk.

11. It has been notified to Scottish Ministers that a small number of water treatment works are dosing a blended polyphosphate compound for control of hardness and iron discolouration and that Scottish Water considers this dosing to be incompatible with additional phosphate dosing for plumbosolvency. If Scottish Water is able to demonstrate, by means of the study to determine zonal compliance with the 10µg/l standard, that the zones supplied by such a treatment works are compliant with the 10µg/l standard, then there will be no requirement to install plumbosolvency dosing. Where action is required and where plumbosolvency treatment is considered incompatible with existing controls for hardness and iron, then Scottish Water must replace all lead communication pipes in the supply zones concerned and inform customers as outlined in Information 4/2003.

### **Plumbosolvency Control at Treatment Works**

12. It is anticipated that dosing will be of a suitably approved phosphate compound such as orthophosphoric acid or monosodium phosphate. If Scottish Water considers that plumbosolvency control is better achieved by dosing of an alternative compound at a specific site, they are first required to provide details of such plans to Scottish Ministers and demonstrate that the alternative approach will be effective.

13. Scottish Water is expected to determine and document the optimum orthophosphate dose and pH for every site where dosing is required. These target values are to be recorded in on-site QA documentation. Actual pH and Phosphate concentrations must be measured at sites with plumbosolvency dosing at a suitable point in the treatment process after all chemical dosing and mixing has taken place.

14. Ideally, in-line monitors would be used to provide a continuous record of phosphate and pH, however where these are not available, bench tests are acceptable provided they are undertaken by trained staff using appropriate instruments which are periodically maintained and calibrated in accordance with manufacturer's instructions. Measurements of both parameters must be made on every scheduled visit to the works and no less than twice-weekly. Results must be recorded in a suitable way using Works Scheduling or an alternative, with data either kept on-site or held centrally. In this way, each works will have a record of plumbosolvency dosing in final waters at every site where dosing with orthophosphoric acid or monosodium phosphate is carried out. Data should be checked against laboratory analysed samples at least four times per year and any discrepancies between the two means of measurement investigated. Site data will be required as part of the evidence necessary to demonstrate optimisation.

15. In order to be effective, it is vital that plumbosolvency dosing is consistent, and Scottish Ministers require evidence that this is the case at each site. To demonstrate that the phosphate dose is stable therefore, Scottish Water will, as part of the evidence required for optimisation, provide data to show that the dose has been consistent over a period of not less than one month. Suitable data would include direct



measurements from a calibrated and maintained in-line phosphate monitor or indirect measurements such as flow trends of water and phosphate solution, provided the concentration of the dosed phosphate solution is known through periodic measurement. Other methods of verifying dosing consistency may be acceptable, but must be agreed with Scottish Ministers prior to use.

16. It is expected that Scottish Water will make every effort to ensure that interruptions to dosing are minimised and of short duration. Where dosing is not operational for a period in excess of one week at any site, Scottish Water is required to inform Scottish Ministers of the reason and agree an appropriate dose at which to resume dosing.

17. All plumbosolvency dosing rigs are to be connected to Scottish Water's telemetry system, where this is available on site. As a minimum this will record whether or not the plant is operational and have alarms which have been assigned an appropriate priority to ensure any malfunction triggers an operational response within 24 hours.

### **Optimisation of Plumbosolvency Control**

18. Once dosing has been installed and stabilised, Scottish Water should commence optimisation of plumbosolvency control without delay. Scottish Water will present evidence of optimisation at each site to Scottish Ministers on or before the agreed date.

19. Before assessing whether optimisation has been achieved at a particular dose, it is important to ensure that a stable trend has been obtained. This will require at least 8 sets of test rig results taken over a period of at least three months. Phosphate concentrations should have been within 10% of the target dose and pH within the target range as defined by Scottish Water for that particular water type.

20. Scottish Water has chosen to optimise plumbosolvency dosing by using lead test rigs sited at water treatment works and at appropriate points in the distribution system. By changing the phosphate dose at the works and monitoring the effect on lead concentration in samples taken from the test rig it is possible to demonstrate that dosing has been optimised for a particular supply.

21. Scottish Ministers will consider dosing to be optimised when any further incremental decrease in phosphate dose yields a significant increase in the average lead concentration of samples taken from the test rig. For the purposes of optimisation, a significant increase is taken to be 20% or greater.

22. In order to demonstrate optimisation for a particular supply zone it will be necessary to supply the following information to Scottish Ministers:

- Names and asset reference codes of sites at which plumbosolvency dosing is operational;
- Target phosphate concentration and pH at which dosing is considered optimised at each site;
- Evidence that dosing at treatment works is consistent as described above;
- All test rig data collected during period of optimisation in tabular and graphical form;
- Evidence that the phosphate concentration is consistent throughout the zone.

### **Communication Pipe Replacement**

23. Information letter 4/2003 set out the requirements for lead communication pipe replacement. In summary, the circumstances requiring replacement are:

- in a zone where action is required but plumbosolvency dosing is not practical (this has hitherto been defined as those supply zones containing less than 400 properties);



- where any customer replaces their internal lead plumbing and lead supply pipe and requests that Scottish Water replace the corresponding lead communication pipe;
- any lead communication pipe encountered opportunistically as part of Scottish Water's mains rehabilitation programme;
- any lead communication pipe at a property where a regulatory monitoring sample has exceeded 25µg/l (as described in Regulation 26 of the 2001 Regulations).

24. It is vital that Scottish Water maintains accurate records of any communication pipe replacement that is undertaken. Information on the material from which the corresponding supply pipe is made should also be collected.

### **Failures of the Lead Standard**

25. Information Letter 4/2003 required that Scottish Water investigate any failure and replaces any lead communication pipe found that relates to the failure. In addition, Scottish Water will take a resample from each of the adjacent properties and make an assessment as to whether other properties in the area are likely to have lead communication pipes as a result of being of a similar age and construction to the failing property. The current status of plumbosolvency dosing in the zone will also be confirmed. This information is to be recorded by Scottish Water and reported to Scottish Ministers via outcome forms raised as part of the event reporting process.

26. If either of the resamples exceed the standard for lead, Scottish Water should notify residents of the nearest ten properties to the original failure by letter that there is a possibility their plumbing may contain lead and of the steps they may wish to take to protect themselves. The wording of this letter is to be agreed with Scottish Ministers by 15 November 2006.

### **Further Study to Assess Compliance with the Standard of 10µg/l**

27. Following optimisation of plumbosolvency dosing, it will be necessary to conduct a further study to assess compliance with the 10µg/l standard and to identify areas at risk of failure. It is imperative that Scottish Water completes the optimisation of plumbosolvency dosing within the agreed timescales in order for this study to be completed in time to inform Scottish Water's second draft business plan in early 2009. It is likely that this study will follow the same pattern as the 2001 study, with the same criteria of a 95% probability that the non-compliance rate with the 10µg/l standard is higher than 5%. It is expected that all Scottish Water supply zones will be surveyed, regardless of whether dosing has been installed. Further guidance will be provided on this matter.



## Lead Working Group

28. A Lead Working Group will be set up which will meet regularly in order that all parties can be fully updated on progress. It is expected that the Working Group will be made up of appropriate Scottish Water personnel, including those directly involved with the optimisation process. The group is intended to enable early reporting and resolution of problems as they arise in order to avoid any delay to the programme of optimisation. The Drinking Water Quality Regulator will advise on a suitable frequency for meetings, depending on progress and issues which arise.

## Strategy

29. Scottish Water will maintain an up to date lead strategy which will accurately reflect the approach to be taken in replacing communication pipes, installing and optimising plumbosolvency dosing and communicating with consumers. This strategy will be submitted to Scottish Ministers by 1 October 2006, and subsequently each time it is updated.

## Reporting

30. Scottish Water will submit written progress reports to Scottish Ministers every three months, commencing on 1 December 2006. These reports will contain details of progress with the installation of dosing, installation and sampling of test rigs and optimisation. The reports should also contain a summary of analytical data to date and highlight any issues which might lead to a delay in optimisation by the required date.

31. If you have any queries concerning this matter, please contact Matt Bower on 0131 244 0743. A copy of this letter will be sent to the Water Industry Commission for Scotland.

Yours sincerely,

Colin McLaren  
Drinking Water Quality Regulator for Scotland



*The Environment Group is part of the Scottish Executive Environment and Rural Affairs Department*