The Environmental Protection Agency

EPA DRINKING WATER ADVICE NOTE
Advice Note No. 6: Restoring Public Water Supplies Affected by Flooding

epa
Office of Environmental Enforcement

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EPA GUIDANCE ON RESTORING PUBLIC WATER SUPPLIES AFFECTED BY FLOODING

THE National Emergency Coordination Committee has requested the Environmental Protection Agency to provide guidance to local authorities on water quality checks that should be undertaken as part of the process of restoring public water supplies affected by flooding. The advice primarily relates to monitoring of a Public Water Supply (PWS) prior to reinstatement. Local authorities are advised to consult with the Health Service Executive (HSE) prior to restoring a public water supply.

A comprehensive programme of monitoring both operations and treated water should accompany bringing a PWS supply back into service. The programme should follow good practice and be fully commensurate with the assessed risks and the nature of the water supply configuration. The sampling programme should follow a clear plan and require that water quality is measured at all key points (from source to tap) and for appropriate parameters.

In accordance with incident management procedures, the local authority should put in place a water quality team to support the incident management team.

RESTORING NORMAL OPERATIONS

Many factors should be considered before a local authority returns a plant to normal operation. These include:

Assess: Has a comprehensive assessment of damage and risks been completed at the plant and within the storage and distribution system?

Rehabilitate: Has the plant been repaired to the point that it can meet demand?

Test equipment: Has the local authority made a safety and operational inspection of all plant components?

Disinfection: Has the plant and distribution system been properly flushed, and disinfected?

Sample / Monitor: Has the water been adequately tested?
Does the water meet drinking water standards?

Verify controls: Is there adequate staff to operate and manage the plant?

Throughout the above phases:

Communication: Has the Health Service Executive (HSE) been consulted?
Has the local authority a plan to advise consumers and is the information accessible to the public (e.g. on the local authority website)?

WATER TREATMENT PLANT

Following repairs to electrical equipment, operations to start up the treatment plant should be considered.

Appropriate system elements of the drinking water supply system and treatment plant (storage tanks, filters, settlement tanks) should be sampled to determine if residual contamination exists. Electrical motors should be inspected for damage caused by silt, mud, and dirt getting into the equipment. Electrical motors should be repaired or replaced if damaged. Submerged motors should, where appropriate be washed with clean water and dried. All chemical storage facilities should be inspected. Chemical and fuel tanks that were filled with water should be pumped out and restocked with fresh materials. Appropriate handling protocols should be followed for all chemicals removed for disposal.

As is the case with the commissioning of a water treatment plant, the plan for restoring a PWS should be for gradual reinstatement of each of the processes (coagulation, sedimentation, filtration and disinfection) with regular quality checks at critical control points. Once stable treatment process conditions are obtained, flow can be increased and the plant can begin to feed treated water into supply.

The treated water storage and contact tanks on site should be emptied, cleaned and disinfected ready for use. A structural inspection of the plant and the internal infrastructure should be carried out.

Risk assessments should be undertaken for re-commissioning each stage of the treatment process. When the clarification and filtration processes are restarted, the water should be run to waste initially and then, once the quality is satisfactory (and the performance of the disinfection process established and verified), fully treated water can then be pumped to the contact tanks and reservoirs. Finally, the chlorine dosing rate should be initially increased such that the chlorine residual leaving the plant is twice the normal level.

DISTRIBUTION SYSTEM

It is important to note that the refilling of the water distribution system is a complex task. Indeed, the distribution system (mains and service reservoirs) may be empty, and as such water supplies to consumers can only be restored on a sequential, phased basis to safeguard against mains bursts or air locks, which, if these occur, will cause additional supply interruptions. Thus, an empty distribution system is not a straightforward procedure and can only proceed according to the engineering of the system.

If untreated or raw water has entered the distribution system then arrangements have to be put in place to clean out (flush) and disinfect the affected section of the distribution system. This may require the continuing of the boil water notice and in these circumstances and in relation to any public health matters the advice of the HSE should be sought. Where appropriate consumers should be advised to flush internal domestic systems.

MONITORING PLAN

The monitoring plan should be engineering led, designed on the principle of following the water through the system, and should consist of three phases.

Phase One should relate to the treatment works (raw water, in process water and treated water). Tests should be carried out to inform the re-commissioning of the plant and to verify that relevant drinking water quality standards are met from the time the water is first supplied from the plant and on an ongoing basis.

Phase Two should involve testing of the treated water at the reservoirs once they are filled to a level that enables operation of the sampling facilities. This will verify that there has not been any breach in the integrity of these parts of the distribution system and that emptying/refilling operations have been carried out in a way that has not caused significant disturbance of any reservoir sediments.

Phase Three should involve testing in the distribution network and at the taps of consumer premises.

The following tests should be considered:

***E.coli* and Entercocci:** Detection of any of these micro-organisms is a signal that the system is contaminated. Daily samples should be taken at the water treatment plant, following any treated water storage facilities and at representative taps in the network. A separate advice note on E.coli is available on the EPA website at the following link:

www.epa.ie/downloads/pubs/water/drinking

Chlorine Residual: In chlorinated systems, this test will indicate if materials introduced into the water have created a demand for the chlorine, leaving lower-than-normal or no residual present. Samples need to be taken at various locations including the end of the distribution system.

Conductivity and turbidity: The conductivity and turbidity of the raw and treated water should be monitored to determine the effectiveness of the treatment process and whether there has been significant ingress into the distribution network. A separate advice note on turbidity is available on the EPA website at the following link:

www.epa.ie/downloads/pubs/water/drinking

Cryptosporidium: Where E.coli has been detected and the turbidity levels are above the normal operating range for the plant then consideration should be given to the testing of the treated water for Cryptosporidium. In relation to the risk of cryptosporidium contamination of the supply the local authority should consult with the HSE in relation to the monitoring required and the results of any testing carried out.

Colour: A test that can be undertaken in the field to provide a visual indication of how scouring of pipelines is progressing. Turbidity is also useful test in this regard.

Iron and Manganese: A test to indicate whether pipelines are being cleared and scoured successfully.

Odour: an assessment that can be undertaken in the field to ensure free chlorine is present.

HEALTH SERVICE EXECUTIVE ADVICE

The Health Service Executive website has valuable advice on protecting your health during flooding and this advice is available on the HSE website at:

www.hse.ie/eng/services/news/Campaigns/Floods.html#protection

In addition, they point out that floodwater entering a property may cause illness and suggest that the public take a few simple precautions. These are again available on the website:

www.hse.ie/eng/services/publications/services/Environmentalhealth/Flooded_Homes.pdf