



## **Nickel – Guidance for Local Authorities**

### **Description and Background**

Nickel occurs widely in the environment as it has high mobility. There are a number of naturally occurring ores, primarily oxides and sulphides, including chalcopyrite and pyrrhotite. It often occurs with other metals such as iron and manganese.

In Scotland, Nickel ores have been mined historically in Argyll and Bute (near Inverary), Dumfries and Galloway and West Lothian.

Nickel is not usually found in native form in nature. Man-made sources of nickel are mainly focussed on smelting, refining and steel production. It is often used to make alloys with other metals and in plating.

Kettles, and nickel or chromium plated plumbing fittings may all contribute significant quantities of nickel into water where corrosive conditions exist.

### **Health Significance**

Nickel is not thought to be acutely toxic, but chronic exposure may cause heart and liver damage. Some individuals may become sensitised to nickel, causing dermatitis. The WHO sets a health-based guideline value of 70 microgrammes per litre, and the regulatory standard in private water supplies is 20 microgrammes per litre.

High concentrations of nickel may give the water a metallic taste.

### **Risk Assessment and Monitoring**

It is possible for nickel to be present naturally in a source where the correct geological conditions exist. The presence of mines or known mineral deposits, especially for copper, cobalt, manganese and iron increase the likelihood of nickel being present. Industrial waste, especially old batteries and buried metal waste can be point sources of contamination .

### **What if it fails?**

By far the most likely source of nickel is leaching from plumbing fittings, as many metal fittings contain significant quantities of nickel. This source should be considered first when trying to locate a reason for a private water supply sample failure, unless there are other indications of source contamination. Poor (or absent) pH correction of the

water and newly installed metal fittings increase the likelihood of the source of any nickel being within the internal plumbing system.

If there is a local source, the Nickel concentration may vary from tap to tap (depending on the fittings present). Flushed samples may contain lower concentrations. A uniform concentration of nickel at all locations and regardless of flushing times points towards a source of nickel in the catchment.

Nickel leaching can also occur from metal well casings and pipework.

**Check the following:**

- Resample from several points and properties in the supply to eliminate the source and try to identify fittings containing nickel.
- Have new plumbing fittings been installed recently?
- Are the water fittings WRAS approved?
- Could metal borehole casings, pumps or pipework be a source?
- If there is evidence that nickel may be in the source water for the PWS (e.g. known mineral deposits, industrial pollution ?

**Options for resolving at source**

If nickel is present at source, the remediation of any point source contamination could be attempted. If it is naturally occurring, an alternative source could be considered where this is feasible – blending of high nickel waters may be possible, but this needs to be carefully controlled.

**Treatment**

Where fittings are the source of the nickel, these should be replaced with WRAS approved ones.

Various adsorption technologies, including GAC and metal oxide media are probably the simplest treatment method available and have been reported to be effective, but they need very careful monitoring to ensure they are replaced before they become exhausted.

Ion exchange technologies may also be available.