

Scottish New Homes Lead Survey

A survey of lead levels in the tap water of new houses in Scotland funded by the Scottish Executive Health Department

Summary

The Scottish Executive Health Department commissioned a survey across Scotland to determine what proportion of recently constructed houses had evidence of lead solder having been used on the domestic drinking water plumbing system. Water lead levels were selected as an indicator of lead solder use, on the basis that drinking water in new houses should have a minimal lead content. The decision to conduct a survey resulted from the discovery that lead solder had been used on the domestic copper plumbing system of a number of new houses in the west of Scotland, in contravention of the Water Bylaws.

A random sample of 661 houses was successfully recruited for the survey.

Samples of water were taken from the kitchen cold-water tap, a bathroom cold tap and a bathroom hot tap. All the samples were analysed for lead content using standard accredited laboratory methodology. A threshold value of 5 microgrammes of lead per litre ($\mu\text{g/l}$) of water was set as the level indicating that lead solder was likely to be present, on the basis that the lead level of water in a new house would normally be expected to be below this level unless there was an extraneous source of lead.

A single excess lead level was considered sufficient to denote the presence of lead solder. Of the 661 houses tested, 99 (15%; 95% CI: 12.4%-18%) yielded at least one sample with an excess lead content indicating the presence of lead solder.

The total number of samples with excess lead from the 99 houses was 148. Of these samples, 41 were taken from a kitchen tap, 6.2% of houses tested (95% CI: 4.5%-8.4%); 54 were taken from a cold bathroom tap, 8.2% of houses sampled (95% CI: 6.3%-10.6%) and 53 were taken from a hot bathroom tap, 8.0% of houses sampled (95% CI: 6.1%-10.4%).

Three houses (0.4%) had a cold kitchen tap sample which exceeded the current regulatory water lead limit (50 $\mu\text{g/l}$), 6 houses (0.9%) had a bathroom cold tap which exceeded this limit and 6 houses (0.9%) had a hot bathroom tap exceeding this limit.

More importantly, of all the houses sampled, 16 kitchen taps (2.4%) and 36 cold bathroom taps (5.5%) had a lead level above 10 $\mu\text{g/l}$, the proposed new regulatory standard. The relatively higher proportion of cold bathroom

supplies with excess lead is particularly relevant for water consumption by children. Twenty-seven houses (4.1%) had a hot water sample exceeding the 10 µg/l value.

The figure of 15% of new houses completed after January 1997 with an excessive lead level represents an average figure. There was a significant variation in the proportion of houses within the sample with excess lead, depending on the age of the property. The failure rates by year of house completion varied from 10% (95% confidence limits 6.4%-15.2%) for 1997 to 31.4% (95% confidence limits 17.4%-49.4%) for houses built in 2000. This may reflect either an increase in the use of lead solder in recent years or more probably, may indicate a progressive reduction in detectable lead derived from lead solder as time passes.

Ad-hoc surveys of new houses carried out by Local Authorities in Scotland since summer 1999, though not standardised, gave an average of 38% having excess water lead levels, using the same criteria as the present study. This provides evidence to support the estimated upper limit of 31.4% found in the present study, for houses built in 2000.

There was also a trend for a higher rate of excess lead levels in larger houses with more bedrooms, with a three fold difference in rate between one bedroom properties (8.8%) compared to those with four or more bedrooms (27.2% failures).

The size of house-building firms (in terms of total number of houses built and sampled) also appeared to be related to the probability of excess lead levels being found. The results were analysed by builder based on the total number of properties sampled which had been built by a particular firm. Firms that built only a single house within the sample, had the lowest failure rate at 12.8%. Where more than 11 houses sampled were built by a particular firm, the failure rate was 15%. The highest rate (32.8%) of failures occurred with firms that built between 2 and 10 of the houses sampled.

The failure rate of houses and hence evidence for lead solder use, was comparable in all the three public Water Authority supply areas across Scotland. This confirms that the misuse of lead solder is not a localised problem involving particular areas but that it is widespread. There was wide variation in the fail rate across Local Authority (council) areas, however this was probably due to the relatively small sample size within individual council localities.

The Water Bylaw banning lead use was introduced in 1987. An average of 20000 new houses were completed in Scotland each year since 1987 according to data supplied by the Scottish Executive Development Department. Extrapolation of the average estimate of 15% of new homes having lead solder present, to all new houses completed since the introduction of the Water Bylaw, would suggest that at the very least 36000 new houses may have been affected since 1987. However, applying the estimate of 31.4% found for houses built in 2000, (the most recently

completed houses) yields an estimate of up to 75,360 houses built since 1987 having lead solder present, although it may no longer be detectable in all of them.

The results of the survey confirms the need to provide advice to occupants of new houses (particularly pregnant women and young children) throughout Scotland, on the safe use of tap water for human consumption, in order to minimise their potential exposure to lead. The survey results also confirms the need to take further steps to prevent the continued misuse of lead solder in order to eliminate this source of preventable environmental lead contamination and to protect future generations of Scottish children from unnecessary lead exposure, with its associated adverse health effects.

Dr. Colin N. Ramsay
Consultant Epidemiologist (Environmental Health)
Scottish Centre for Infection and Environmental Health
Clifton House
Clifton Place
Glasgow G3 7LN
Scotland
UK

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