

CASE REPORT

Pollution of the water supply in Mersey and Clwyd—a cause for concern?

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Summary

A major episode involving pollution of the public water supply in the North West of England with phenol is described. The circumstances of the episode and the way in which it was managed have raised important questions about the public health aspects of water supply in contemporary Britain. In addition the technical aspects relating to standards, and to the monitoring of those standards, require closer examination. The lack of public accountability of non-elected members of Water Authorities and the restriction of access by the media to Water Authority meetings are a cause for concern. A case is made for an independent Environmental Protection Agency.

Since the episode described nothing has occurred to mitigate the anxieties aroused by the original events.

THE EPISODE

On Friday 27 January 1984, 2 million people living in Merseyside, Cheshire and North Wales awoke to find that their drinking water tasted like the antiseptic trichlorophenol (TCP). Rapidly, the rumour spread throughout the region that the supply had been sabotaged by the Welsh Nationalists.irate consumers jammed the switchboards of the North West Water and Welsh Water Authorities and the local media. Initially there was no information as to the nature of the pollution and no advice to consumers as to what they should do. Environmental Health Officers and Community Physicians were as much in the dark as the general public.

The first official explanation to be given by the Water Authorities was that because supplies had been affected by thawing snow, extra chlorine had been added at the water treatment works. By the Saturday and with public concern growing North West Water had changed their story and revealed that the River Dee which supplements the water taken from the mountain lakes of North Wales had been polluted by phenol from an as yet unidentified source. The public was told that it was harmless but that the taste might take two days to clear from the supply. This failed to relieve the anxieties of many people, particularly those concerned with nursing infants. The Royal Liverpool Hospital had to call in a tanker with 400 gallons of pure water to use for patients on renal dialysis; food companies suspended production. It was reported on Merseyside that off-licences had sold out of mineral water.

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Throughout the weekend the picture remained unclear. Amid sporadic reports of people feeling unwell, the official advice from the Water Authorities was that the contaminated supplies presented no threat to public health. The emerging public response to this advice was one of growing scepticism and alarm.

By the Monday, with no information forthcoming from the Water Authorities, anxieties about the water's safety were dismissed by the Authorities as 'speculation beyond your wildest dreams'. On the same day three Merseyside members of Parliament tabled questions in the House of Commons and called for a public inquiry.

On the Tuesday the story appeared for the first time as an item in a national paper. This report was very short and was to be one of the very few national reports of the episode; locally there was a growing concern at what was seen as being very tight 'News management' by the Water Authorities.

On the Tuesday evening it was revealed that the pollution had actually occurred at the beginning of the previous week, that is several days before it was detected and before there was a response to prevent contaminated water from reaching consumers. The nature of the pollutant was revealed as 200 gallons of pure phenol and the response had been to add chlorine thereby converting phenol to trichlorophenol.

Over the following days the unpleasant taste gradually left the water, the North West Water Authority and the Welsh Water Authority decided to investigate their management of the episode and the Communicable Disease Surveillance Centre at Colindale became involved with Clwyd Health Authority in an investigation of the effects of the pollution on the health of the people of the area.

THE WATER AUTHORITY REPORT

On 29 February 1984, one month after the pollution episode, the Welsh Water Authority and the North West Water Authority published their report (WWA and NWWA, 1984).¹ This report included a description of the River Dee System, a diary of events and the actions taken in the response to the pollution, together with discussions of the public health and scientific aspects of the episode. Specific reference was made to the role of the media and communications in events of this kind and recommendations were made for action to prevent a possible recurrence.

The report contained a good deal of important information which threw light on the failure of the Water Authorities both to prevent the pollution and to respond in the most appropriate way. There are a number of lessons to be learnt, but unfortunately they were not particularly highlighted in the report—rather it is a question of reading between the lines.

The report concluded that the episode of pollution occurred on the Tuesday or possibly even the Monday prior to the Friday when it became apparent to the public. The first detection of the chlorphenolic taste was found by the Wrexham and East Denbighshire Water Company on the Wednesday afternoon and was then discussed by them with the Welsh Water Authority. The Welsh Water Authority decided that the taste was evidence of an 'historic' pollution incident and that there was no point in notifying Chester and North West Water who are supplied by the Welsh Water Authority, of a possible incident that had already passed. It was further assumed that if there was indeed a problem the Water Authority workers at the Bretton pumping station would detect the taste in their tea before contaminated water reached the public—this proved in the event to be an erroneous assumption, the public already having begun to complain about the water before the Bretton workers noticed it! The Authorities admitted that the taste and odour tests at the frequency used failed to detect the contamination which survived through the treatment process.

PUBLIC HEALTH ASPECTS

The EEC directive relating to the Quality of Water for Human Consumption has a maximum admissible concentration standard for phenols of 0.0005 mg/l and a guideline value for organochlorine compounds of 0.001 mg/l. The United States Environmental Protection Agency has a standard of 0.001 mg/l for phenols. These standards for phenol concentrations are admitted by the Water Authorities to be standards to avoid taste problems associated with the chlorination of phenols during disinfection and are not based on protection of public health. The generally accepted taste threshold above which many people experience objectionable tastes is about 0.005 mg/l (five times the US standard).

During this episode of pollution levels of 1.5 mg/l were reached and it is possible that in some places there were much higher levels. These levels were many times higher than previously recorded (0.07 mg/l in 1975) and reliable information on the extent to which levels such as these pose a threat to people's health seems to be currently lacking, but nevertheless the Water Authorities felt able to reassure the general public. The Colindale investigators reopened this question in their recent report.²

In fact, although the pollution occurred at the beginning of the week and was detected mid-week, it was not until the Friday that medical advice was taken as to the threat posed to the public health. A second substance (later identified as 2-ethylhexanol, a plasticizer) was noted on the Friday and although its identity and its toxicological properties were not known until the following Tuesday the Water Authorities continued to reassure the public that there was no threat to health.

Despite the existence of agreed procedures for directly and personally informing at the earliest possible stage, the Environmental Health Officers (EHOs) and the Medical Officers for Environmental Health (MOsEH) in the affected areas, the EHOs were in fact notified of the episode *by letter, sent on the Monday one week after the pollution occurred*. These officers were therefore unable to respond effectively to requests for information from the public and the media.

The CDSC Investigation of Illness in Clywd

The Communicable Disease Surveillance Centre (CDSC) at Colindale has an expertise in investigating outbreaks of infectious disease. On this occasion that expertise was made available to Clywd Health Authority to survey the population exposed to the polluted Dee water.² A study was undertaken to assess whether there was an actual increase in illness rates during the period of pollution and, if so, if this increase was related to consumption of polluted water.

In a comparison between households in areas affected by contaminated water and those not affected it was found that there was a very great increase in the occurrence of gastrointestinal illness amongst those living in the affected areas. This increase could not be explained by biases in the study design or by a concurrent epidemic of gastrointestinal infection. In their discussion the Colindale workers point out that chlorination of phenol as occurred in this case, may actually result in the production of substances which are more toxic than the original phenol.

DISCUSSION

At a time identified by the World Health Organization as Pure Water Decade it is appropriate to take stock of how seriously we now consider the public health aspects of water supply in developed countries. Clearly the provision of safe water was a preoccupation of the first Medical Officers of Health. Influenced by the work of Snow and Duncan they increasingly recognized the importance of good sanitation and of the separation of waste disposal from

potable water in the avoidance of particular epidemic disease.^{3, 4} Certainly the microbiological aspects of public water supplies seem to have been taken seriously by public health practitioners, local councillors and Water Authorities alike.

The episode of pollution reported here suggests that risks of chemical contamination may not have been treated with the same gravity and that the concept of what constitutes a risk to the public health may well be due for reappraisal. In this incident the assumption seems to have been that a risk to the public health is one where there is a serious risk of death rather than illness and the response to pollution episodes by chlorination seems to be based on microbiological rather than chemical precedent.

In the event it transpired that there was a risk to the public of short-term illness; we have no knowledge of the long-term effects of low doses of phenolic compounds on the health of populations, nor in particular on developing fetuses. Judging from confidential phone calls received from Water Authority Staff during this episode it seems likely that this was not the first episode of its kind in recent years.

There is a worrying cost-saving background to this episode which deserves to be made explicit. Until the early 1970s the North West Water Authority took its supplies direct from the Welsh mountain lakes. Augmentation with Dee Water was a response to projected increases in demand by the Mersey conurbation up to the end of the century. At the time of deciding on the policy of using the River Dee both for transporting water and as an additional source of supply, fears were expressed by some Water Authority members as to the security aspects. It seems that the present solution was agreed upon with particular reference to the cost implications of a fully piped supply. More recently, economies within the Water Authorities have apparently reduced the technical expertise available within these organizations and if technical staff who contacted the Department of Community Health at Liverpool University during the pollution episode are to be believed there are problems of morale and concern for standards within the Authorities. In addition, concern has been expressed by some members of Water Authorities that the meetings of these Authorities are now closed to the public and the media; the local media experienced great difficulties in obtaining the information that they wanted in reporting the phenol episode. The combined report of the Welsh Water Authority and the North West Water Authority makes it clear that their own agreed procedures were not adhered to and the local EHOs and MOsEH were placed in a very difficult position as a result.

This episode opened up many questions locally among them those relating to standards and the monitoring of those standards, to the accountability of Water Authorities (currently constituted as quasi-non-governmental organization with a nominated membership), to the sources of advice available to them and the lines of communication between the providers of water and the consumers of it.

Paragraph 31 of Schedule 3 of the Water Act 1945 imposed a duty on the Water Authorities to supply wholesome water for domestic purposes in the following terms:

'The undertakers shall provide in their mains and communication pipes a supply of wholesome water sufficient for the domestic purposes of all owners and occupiers of premises within the limits of supply who under the special Act are entitled to demand a supply for those purposes.

The duty to provide pure and wholesome water for domestic purposes was considered in *Read v Croydon Corporation* (1938) 4 All E.R. 631. It was held that the duty was not absolute but that it required the Corporation to exercise a high degree of care and skill to maintain the standard required by the statute. Having failed to do this, the Corporation were liable for breach of statutory duty to an occupier entitled to demand a supply. They were also liable for breach of their common law duty of care to his daughter who had contracted typhoid from the water.

To date there is no indication as to whether any member of the public who experienced ill-

health during the phenol pollution intends to bring an action against one of the Water Authorities concerned. The outcome of such an action would in any case be problematic. However, it is clear that the present situation where the Water Authorities are both gamekeeper and poacher is most unsatisfactory; an independent environmental monitoring body such as the United States Environmental Protection Agency would go some of the way to answering the growing public disquiet at the apparently cavalier way in which concern over environmental pollution is now treated in this country.

FOOTNOTES

1. A 'Public Health Forum' was organized by the Liverpool University Department of Community Health to provide an opportunity for an informed discussion of the issues raised by the phenol episode. At this meeting on 23 May 1984 the Colindale Group presented their findings and the Water Authorities participated in a general discussion in which the media were represented. At the close of that meeting the news broke of the explosion at the North West Water Authority plant at Abbeystead in Lancashire which had killed 16 people.
2. On 9 January 1985 the North West Water Authority shut off water supplies from the River Dee following pollution by aniline from an old mine used for dumping chemicals in the area of the Delph open cast mine site. As the details emerged it became clear that the Dee faces continuing pollution from such sources.
3. In January 1985 Ferro (GB) Ltd agreed to pay £22000 compensation to the Welsh Water Authority towards the cost of emergency action taken to clean out water systems and trace the source of the phenol pollution in January 1984 while not admitting liability.
4. On Monday 20 February 1984 Mr Stan Thorne, Member of Parliament for Preston South tabled the following question to the Secretary of State for the Environment in the House of Commons.
'... Whether he is satisfied that the North West Water Authority are able to supply pure water free of contamination to the people of the North West?'
Mr William Waldgrave—'Yes'. 2065/83/83 (13)
5. According to the Health and Safety Executive's report of their investigation into the Abbeystead disaster, nobody is to blame. This conclusion has been contested by the professional news magazine *The Engineer* which has commented 'The HSE has ignored the evidence that Abbeystead should not have happened in the first place. The evidence did point specifically to the shortcomings in the recording and recalling of accidents and disasters from the past' *The Guardian*, 1 February 1985.
6. Earlier this year St Helens MP Gerry Bermingham failed in his attempt by Private Members Bill to open up Water Authority meetings to public scrutiny.
7. On 11 April 1985 it was reported in the *Liverpool Daily Post* that a Plant Operator at the Welsh Water Authority plant at Bretton, faces the sack for refusing to taste River Dee water as part of his job and as part of the sampling procedure.

REFERENCES

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