

Is Tap Water in China Safe to Drink? A Water Quality Inspector's Perspectives

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Access to safe and clean water is essential to human health. However, public concern over drinking water safety has risen sharply in recent years following a number of water pollution incidents. The pollution incidents have left people wonder if it is really safe to drink from the tap. Where does tap water come from? Has the water been treated? Is it clean? What can ordinary citizens do to improve the safety of their tap water?

A day in the life of a water quality inspector

11:30 PM I put on my uniform, picked up my toolkit, and walked towards the the central control room where I started my day of work. When I got there, my supervisor said to me, “The water today is a bit tricky. You may have to increase the dosages. Do what you need!” When I looked up the water quality on our monitoring system, I found that the values of dissolved oxygen in both today’s and previous days’ records were a little bit low at midnight yet oxygen consumption was on the rise during the same period . I think I knew what was going on. I increased the dosage of chlorine and coagulant and tested the values of ammonia nitrogen, nitrite nitrogen, oxygen consumption, turbidity, pH value, chlorine residue, etc. Everything seemed fine. According to the result, I modified the dosages slightly and logged the results in the report.

1:00 AM I was overwhelmed by the loud noise of the pumping station. This is the place where our tap water comes from. I went downstairs to check the electric cabinet and the performance coefficient of an operating pump's outlet pressure. Everything was normal.

2:30 AM Back to the central control room. I put on my coat, grabbed a torch, and went on to patrol the water purification system.

My first stop was the flocculation tank. As I increased the quantity of the coagulant, I checked to make sure that the coagulation was satisfactory and that the alum flocs were well-formed. Walking along the hallway, I arrived at my second stop, the horizontal-flow sedimentation tank. I checked if the water in the sump was clear enough for better filtration. My final stop was the filtering tanks. I inspected and recorded the backwash process of one of the filtering tanks. I also took time to observe the water colour and the sand surface of other filtering tanks. Following an inspection of the water purification infrastructure, I moved on to examine other facilities.

During each night shift, I had to patrol twice and complete an hourly water quality check. I also logged my activity report of the previous day during my shift.

8:00 AM Finished work and went home.

Is Tap Water Clean?

I have worked in a water plant in a southern Chinese city for six years. I know the public has lost confidence in the quality of tap water following a number of water pollution incidents. Many households have installed water filters or shifted to bottled water entirely. Some even use tap water just for flushing. When people heard that I worked in a water plant, the first thing they asked was, "Is tap water safe to drink?" "Yes," I said, "I drink boiled tap water at work and at home." Their concerns are understandable. They worry because they do not know how water is treated and monitored in the water plant. Fear springs from ignorance, as the saying goes.

Today's water purification techniques have hundreds of years of history. It is a process that involves coagulation, precipitation, disinfection and filtration. The purification techniques are mainly used to treat "Grade II waterbody" as defined by the *Environmental Quality Standards for Surface Water* (GB3838-2002). After a series of physical, chemical and biological treatments, the treated water should meet the national standards of China (*Standards for Drinking Water Quality* (GB5749-2006)).

But as China's economy grows and the population expands, natural waterbodies have been badly affected by environmental pollution. New pollutants, such as organic matters and heavy metals, are more complex and more difficult to treat. Nowadays, water plants in big cities like Guangzhou, Shanghai and Shenzhen are equipped with new water purification technologies to remove these pollutants that couldn't be effectively removed by conventional water purification techniques (e.g., biological pre-treatment, ozone-activated carbon filtration). In particular, the ozone-activated carbon filtration, a new water purification technique, is effective in removing organic materials and controlling the regrowth of microorganism. Unlike conventional water treatment process that could produce carcinogenic by-products (most of these substances are still within the safety

limit outlined in *Standards for Drinking Water Quality* (GB5749-2006)), ozone-activated carbon filtration prevents the generation of carcinogenic halogenated by-products when chlorine – a disinfectant – interacts with organic matters in the water.

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However, state-of-the-art water purification technologies are not a panacea for water pollution. For example, if the level of ammonia nitrogen exceeds 4 mg/L, the biological pre-treatment will not be as efficacious. As pollution worsens, many water plants have to change their water sources. We see cities are sourcing water from other cities, even provinces. As we know, the massive South–North Water Transfer Project aims to channel water from the Yangtze River in Southern China to the more arid north. **Although this kind of transfer enables cities to access better water sources, since cities can now rely on outside supply, they no longer take their environmental problems seriously.** Take Hangzhou and Guangzhou as examples. Situated in the river networks of the Yangtze Delta and the Zhujiang Delta respectively, both cities have an abundant supply of water. In spite of this, Hangzhou and Guangzhou are spending huge amounts of money on water diversion infrastructures because they do not have not clean water sources in their immediate environment. Apparently, this is not a long-term solution. We must treat the root cause and make an effort to protect our water sources.

How is the tap water monitored in China?

Tap water quality is closely monitored following the *Standards for Drinking Water Quality* (GB5749-2006) since 1 July 2012. On top of that, the government's water departments, health and epidemic prevention departments and housing construction departments also run regular tests on drinking water. In the water plant where I used to work, samples are collected and tested once a month by the water department; once a quarter by the health and epidemic prevention department, and once every half year by the housing construction department. However, what and how each of them inspected was not clear to everyone. It is also hard to determine how consistently the *Standards for Drinking Water Quality* (GB5749-2006) are complied, as not all the cities voluntarily release their tap water quality data. Even if they do, their results are not comparable as the ways they disclose their data and information are not the same. In January 2015, *Oriental Outlook* published a report on the public information about tap water quality (between June and December, 2014) in 29 Chinese cities. According to the report, more than 70% of the 29 cities have enforced relevant water management regulations and requirements about information disclosure requirements. However, there are large differences in the publication cycle. Among them, 15 cities including Xi'an, Nanjing, Shanghai, Guangzhou, Urumqi, Hangzhou and Chongqing published their water quality information once a month, accounting for 52% of the total number of cities; Jinan, Qingdao and Wuxi once a week; Ningbo, Shaoyang and Suzhou once everyday. In addition, Hefei published its water quality information every 10 days, while the capital Beijing does so quarterly; Wuhan does not publish regularly; Shenyang, Loudi, Zhangzhou, Changchun and Harbin does not disclose any water quality public information. At present, my city Guangzhou publishes 42 routine inspection indicators every month and 106 inspection indicators every six months.

Information transparency for peace of mind

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Purification and monitoring are certainly important. However, to truly give citizens a peace of mind about tap water, the government needs more effort. **Most importantly, the government needs to make information about our tap water more readily available, accessible, and understandable.** When the information is inconsistent, citizens have no way to discern the quality of the tap water they are drinking. At the moment, water plants' response to citizens' complaint about water anomalies was cursory. They'd say something like "the water quality is up to standard upon examination." For instance, recently in Lanzhou, citizens have reported changes in the taste of their drinking water. In response, the local water department simply released the data of ammonia nitrogen level in the water, insisting that the water was clean and safe to drink. Such simplistic responses would only undermine the authority's credibility. Only by pulling the wraps off the tap water condition can the public's mind be put at ease. Water is the source of life, whatever our position in the society, we should do our best to protect our water sources.

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