

The results of the sanitary inspection of 485 water treatment plants

10:30 AM, Tue, Aug. 16, 2022, Director-General of Integrated Water Policy Bureau of the Ministry of Environment

Hello. My name is Park Jae-hyun and I am the Director General of Integrated Water Policy Bureau of the Ministry of Environment.

Today, I will provide you with the results of the sanitary inspection of 485 water treatment plants across the country.

We conducted a special sanitary inspection because larvae were found in Changwon and Suwon's tap water. We conducted sanitary inspections of 485 water treatment plants from July 19 to August 8.

We formed a joint inspection team consisting of seven river basin environmental offices, including the Hangang River Environment Office, regional environmental offices, River Basin Waterworks Support Center of K-water, and external experts to visit each plant with officials from local governments and collect samples from a water source such rivers and dams.

We thoroughly examined the whole water treatment process from a water source to filtration.

Let me tell you what we found during the inspections.

The inspection showed that one midge larva was found at only one Ssangyong water treatment plant in Yeongwol-gun, Gangwon-do. It was found at the water reservoir after the filtration process.

Furthermore, larvae were discovered in 26 water treatment plants during the source water treatment process, and larvae were no longer found in these plants once the water was treated. For your reference, the water source of the Ssangyong Water treatment plant is the Pyeongchanggang River.

As a result of our investigation, the Ssangyong Plant installed a fine net at the entrance of the clear water reservoir and urgently cleaned the plant and reservoir to block the larva's spread to households. Currently, we didn't get any reports on the larvae in the area.

Let me tell you more details about the 26 water treatment plants mentioned. Those 26 water treatment plants where larvae were found consist of eleven from the water source, two from the settling basin, and thirteen from the filtration and active carbon stage.

The picture above shows the water treatment process. The standard water treatment process starts by taking water from the sources. It passes through the receiving well, flocculation, sedimentation, and filtration, and finally goes to households.

Advanced water treatment processes are indicated in red dots on the diagram above. Ozonization and active carbon filtration process are added.

Once again, we have inspected the regular operation of the water treatment process for plants where larvae were detected only in the source and sedimentation stages. Also, we are continuously monitoring each water treatment stage.

Next, larvae were detected in the filtration and active carbon stage at thirteen water treatment plants. Here we strengthened the facility's water treatment processes, reducing the backwashing cycle, increasing flocculant injection, and so on.

We also took emergency measures such as installing a fine net on the entryway to block the larvae from entering the receptor to prevent the outflow of Chironomidae larvae outside of the purification plants.

For your reference, we removed Chironomidae larvae that flow in from the source water or water treatment process through normal operation of the water treatment process such as sedimentation and filtration.

Now I will tell you the epidemiological survey results for the larvae detected in households in Changwon and Suwon.

Both cities received complaints of Chironomidae larvae detection in household tap water in July.

Therefore, a detailed epidemiological survey team consisting of river basin environmental offices, River Basin Waterworks Support Center, and the National Institute of Biological Resources was dispatched to the two areas.

They conducted a detailed epidemiological survey based on genetic and process inspection of the larvae.

Let me begin with the findings in Changwon.

To identify the cause and inflow route of the Chironomidae larvae, the epidemiological survey team analyzed the genes of a total of 165 larvae discovered.

Of these 165 larvae, two were from the water source, or the Nakdonggang River, 149 were from the water treatment process, and 14 were discovered near the water purification plant.

We found a total of 16 types of Chironomidae larvae during the analysis.

One of the two larvae found in the water source was *Chironomus kiiensis*, while the other was a species not recorded in Korea.

The 149 larvae detected during water purification in the plant were 16 species, including *Chironomus kiiensis* and *Chironomus samoensis edwardsi*. Simply said, a wide variety of species was found during the water treatment process.

The 14 larvae detected around the treatment plant were confirmed to be three species, including *Chironomus kiiensis* and *Chironomus samoensis edwardsi*.

These are the same species that were found during the 2020 Incheon larvae incident.

The most frequently discovered species is *Chironomus kiiensis* at 57 units, followed by *Chironomus samoensis edwardsi* at 48 units.

If you see where the larvae were discovered, *Chironomus kiiensis* was discovered in both the water source and nearby the water purification plant.

Chironomus samoensis edwardsi, on the other hand, was not found in the water source but inside and nearby the water treatment plant.

Considering the fact that the same species located nearby the water purification plant were distributed across the water treatment process and the damaged and loose bug repelling net in the filtration building, our inspection team figured out that grown Chironomidae larvae entered because of lacking bug prevention facilities. On the other hand, the receiving well and sedimentation process are always open. It is another reason why the larvae entered the receiving well and sedimentation process.

There is a possibility *Chironomus kiiensis* came from the water source as they were discovered in both the source water and throughout the water treatment process.

However, after continuous monitoring since the incident, we found no larvae except for one *Chironomus kiiensis*. Considering the Bansong Water Purification Plant that uses the same water source did not detect any larvae, it was deemed unlikely to reproduce and move all the way to households.

Furthermore, it is presumed that the outflow of Chironomidae larvae was caused by not injecting sufficient pretreatment chemicals, which resulted in the larvae not being activated or destroyed and continuing to reproduce and grow until they reach households.

To give you more information, among the three ozone generators in the Seokdong Water Purification Plant, only one was under operation, while others showed failure or deterioration.

Finally, these are the results of the epidemiological survey in Suwon.

We did not conduct gene analysis for Suwon. The larvae were only detected in active carbon filtration among many water treatment processes. After transitioning from the advanced water treatment process to the standard process and strengthening surveillance for each process on July 12, no larvae were found in all processes, which limited our samples for analysis.

After analyzing the process, the lack of bug prevention facilities like the Seokdong Water Purification Plant allowed Chironomidae larvae to pass through the filtration building. Also, during the heavy rainfall on June 30, the Suwon water treatment plant collected 80% of its water from Paldang Dam and 20% from the Gwanggyo reservoir. It uses a mix of different water sources.

It is assumed the larvae entered the plant due to the inflow of high turbidity to the water

source in the Gwanggyo reservoir.

The detailed survey team pointed out the poor sealing of the entrances and ventilators and some loose bug repelling nets allowing high probabilities of larvae influx and the non-detection of larvae after stopping the operation of active carbon filtration and collecting water only from the Paldang water source.

Also, the Chironomidae larvae moved all the way to households is likely due to the larvae surviving the active carbon filtration stage due to reasons like the failure of ozone generators, allowing them to make their way through water pipes to households.

I will talk about our future countermeasures.

The Ministry of Environment is distributing a larvae response manual, establishing and operating the River Basin Waterworks Support Center of K-water, and implementing a comprehensive sanitation management plan through the sanitation management improvement project without delay. However, some insufficiencies are planned to be reinforced through sanitation management measures.

Furthermore, while strengthening larvae surveillance, we will take additional measures to prevent the outflow of larvae from the purification plants to households.

First, larvae are not included in the items for water quality monitoring. However, we will now consider larvae as an item to be monitored for drinking water quality and conduct daily inspections to secure the safety of drinking water.

Also, we will take additional sanitary management measures, such as introducing an outflow prevention device similar to the fine filtration device during the final filtration stage, so larvae in the water treatment plant do not enter the household areas.

The Ministry of Environment will constantly prevent Chironomidae in water purification plants and distribute larvae prevention and response guidelines to counteract when it occurs.

Aside from these, we will carry out technology analyses and consulting with professional institutions such as the River Basin Waterworks Support Center and Korean Water and Wastewater Association to try our best to operate and manage water purification plants optimally.

It concludes my briefing for today.