

Research on Problems and Countermeasures of Urban Secondary Water Supply Supervision

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Abstract:

The social conflicts caused by urban secondary water supply are public in nature, and strengthening the safety supervision of urban secondary water supply is an effective way to reduce such discordant factors. This paper adopts the literature research and field research method to summarize the facilities and equipment, water quality, price and supervision of secondary water supply in Chengdu city, dig deep into the main problems in safety supervision, and propose effective measures such as establishing an integrated supervision system for secondary water supply, improving the community supervision system, strengthening the law enforcement system, and raising the awareness of secondary water supply safety supervision, in order to realize that the governmental departments are not lacking in the safety supervision of secondary water supply.

Keywords: Secondary water supply, Regulation; Problems, Countermeasures.

I. INTRODUCTION

In the context of rapid socio-economic development, the pace of urbanization is gradually accelerating, and more and more high-rise residential areas are being built. Due to historical and practical reasons, the secondary water supply generally has many main bodies, inconsistent management level, old facilities, unstable water pressure and other problems, resulting in some

residents' basic domestic water needs are not guaranteed, thus giving rise to some social conflicts. The supervision of secondary water supply is an administrative enforcement action carried out by the supervisory department relying on relevant laws and regulations. It mainly includes engineering quality and safety, water quality and sanitation safety and facilities and equipment safety supervision, and secondary water supply supervision is intended to provide the people with better and more assured drinking water, so it has a certain social character.

Chengdu, Sichuan Province is an important central city in western China as determined by the approval of the State Council, with a built-up area of 949.6 square kilometers in 2019, a resident population of 16,581,000 and an urban population of 12,337,900. In June 2019, the Standing Committee of the Chengdu Municipal People's Congress amended the "Chengdu Urban Water Supply Management Regulations" to carry out sanitary supervision and management of secondary water supply, and gradually implemented the health permit holding rate of 80% to achieve full coverage of secondary water supply sanitary supervision. However, in the actual supervision process, there are still inadequacies in institutional settings, law enforcement efforts, effective restraint, and safety awareness and so on. The purpose of this paper is to summarize some of the problems and safety hazards found in the daily supervision process, strengthen the study of urban secondary water supply problems, and propose corresponding countermeasures to improve water quality, prevent pollution, and protect people's health.

II. MATERIALS AND METHODS

2.1 Literature Research Method

2.1.1 Foreign Related Research

From an economic point of view, foreign theoretical descriptions of government regulation can be traced back to the end of the nineteenth century. In 1890, the U.S. Congress promulgated the first anti-monopoly law in U.S. history, prohibiting monopoly agreements and exclusive behavior, and enacted relevant laws and regulations for government supervision. With the development of monopolistic competition theory and imperfect competition economy, the "monopolistic competition theory" has been formed [1]. Correspondingly, some theories have emerged, advocating that the government should play the role of "filling up the vacancies" in the market. That is, when the market can be freely regulated, the government does not need to control it. If the market cannot regulate (cannot do) things, the government should manage

them. This is a principle in which market regulation is the primary focus and government intervention is secondary. The public interest motive for regulation is just an idealistic concept, and its real motive is the combination of the "supply" of regulation by politicians and the "demand" of regulation by the industrial sector in order to seek their own interests [2]. In other words, regulation is the behavior of social public institutions to regulate corporate activities in accordance with certain rules [3]. At the end of the last century, it was proposed to replace the bureaucratic government produced and adapted to the industrial society with an entrepreneurial government, and the provision of public goods is one of the government's innate rights [4].

2.1.2 Domestic Related Research

Regarding the research on the management of secondary water supply, professional management of secondary water supply is considered a big problem nationwide [5]. The inconsistency of the property rights and management rights of the secondary water supply facilities has caused the problem of secondary water supply to become increasingly prominent. The best solution is to transfer the property rights of the secondary water supply facilities to the water supply company through the government's leadership [6]. To improve the efficiency of secondary water supply safety management, a comprehensive reform should be carried out in terms of system, technology, and methods, mainly from the two main bodies of government departments and management units [7]. The level of secondary water supply management will directly affect the quality of residents' drinking water, and the quality of drinking water is closely related to the health of residents [8].

With regard to the research on the government's strengthening the safety supervision of secondary water supply, through the analysis of the pilot project of secondary water supply in Changping District of Beijing (the second supply point of implementing the unified construction and management mode of water supply enterprises), it is beneficial for the government to directly manage water to the household by water supply enterprises, and ensure that the quality of secondary water supply is more safe and stable [9]. This paper analyzes and compares Beijing's secondary water supply methods from the aspects of process, system composition, and safety, and believes that the supervision of secondary water supply should be strengthened from four aspects: system standards, linkage mechanism, management mechanism, and supporting policies to promote the safer and more stable operation of the secondary water supply [10]. Through the exploration of the "Internet + secondary water supply management" dynamic evaluation system established by Xi'an, the government should give full play to the guiding role in the construction and management of secondary water supply [11]. Through the analysis of the reform of the secondary water supply management system, it is

proposed that in order to ensure the safety of the residents' secondary water supply, the secondary water supply management system should be improved, management efforts should be strengthened, and the entire process of supervision of the new construction, transformation, operation and maintenance of secondary water supply facilities and equipment should be done [12]. At this stage, the secondary water supply in cities in my country generally has backward facilities and insufficient supervision coverage. We should gradually improve the supervision system from five aspects: perfecting the urban secondary water supply supervision system and enhancing the supervision of secondary water supply supervision institutions (departments), so as to improve the quality of residents' drinking water and promote the harmonious and stable development of society [13].

2.2 Inductive Analysis

As a person directly engaged in water supply work in the water system, they can effectively obtain first-hand data. This paper summarizes and analyzes the water-related complaints received in Chengdu in the past three years and some measures taken in the secondary water supply, lists relevant data, and proposes targeted government supervision countermeasures.

2.3 Observation Method

The author makes use of the advantages of working in the water supply administrative department, and observes and analyzes the existing problems of the urban secondary water supply safety supervision by participating in the secondary water supply management practice and experience summary.

III. RESULTS

3.1 Status of Secondary Water Supply in Chengdu

3.1.1 Secondary Water Supply Facilities and Equipment

Secondary water supply facilities and equipment refer to related facilities and equipment that ensure the normal operation of secondary water supply through methods such as storage, disinfection, and transportation of drinking water. Water storage equipment includes various types of water tanks and reservoirs. Water treatment equipment includes filtration, purification, and disinfection equipment. Water supply pipelines include water transmission (distribution) pipelines, faucets, valves, etc. If secondary water supply facilities and equipment are set up to ensure normal water pressure for high-level users, their facilities and equipment shall be

selected, constructed, operated, inspected, maintained, repaired, etc. in accordance with regulations. The on-site inspection list of secondary water supply facilities of Chengdu Water Affairs Bureau is shown in TABLE I.

TABLE I. On-site inspection form of secondary water supply facilities of Chengdu Water Affairs Bureau (sample form)

Inspected unit	Inspection unit	Time of inspection
Inspection items and safety requirements		On-site inspection
1	System establishment and implementation (facility operation, maintenance, cleaning	
2	Water quality inspection report and	
3	Inspection, maintenance and emergency	
4	Inspection, maintenance and repair records	
5	Inspection records of measurement	
6	Cleaning and disinfection	
7	Information disclosure about water supply	
8	Hygienic conditions within 2m around the	
9	Security implementation	
10	Fire-fighting facilities, electrical	
11	Safety hazard investigation and	
12	Other conditions on site	
Rectification		
Remarks		
Signature of inspector		Signature of the inspected

3.1.2 Water Quality of Secondary Water Supply

The raw water for the secondary water supply in Chengdu mainly comes from the Sixth Water Plant and the Seventh Water Plant, and the quality of the factory water is excellent.

However, compared with the direct water supply from the municipal pipe network, the secondary water supply needs to pass through the secondary water supply facilities (water tanks, pipes, pumps, etc.). If these secondary water supply facilities are not cleaned and disinfected regularly, the quality of the secondary water supply will be easily polluted. First, the quality of the secondary water supply is related to the form of the secondary water supply. Frequency conversion constant pressure water supply equipment is usually difficult to be completely enclosed, and the quality of the secondary water supply is easily polluted. The steady flow tank of the non-negative pressure variable frequency water supply equipment is made of food sanitation grade stainless steel and operates in a fully enclosed manner. There is no pool or tank, and the water quality is basically free of pollution. Secondly, the quality of the secondary water supply is related to daily maintenance and operation management. Most property pipes are unable to clean and disinfect water storage facilities once and conduct water quality testing according to standard procedures. This makes the originally good tap water more likely to be contaminated after the second pressurization, and the quality of water supply is difficult to guarantee.

3.1.3 Price of Secondary Water Supply

Secondary water supply belongs to the category of urban water supply. The price of secondary water supply in Chengdu is also implemented in accordance with the water price standard of the municipal water company. The secondary water supply community generally uses total meter water supply, that is, combined water supply. The charging standard is 3.03 Yuan/m³, including the tap water fee of 2.08 Yuan/m³ and the sewage treatment fee of 0.95 Yuan/m³. In the secondary water supply community, most of the residents' water fees are collected by the property management system. The property management meter reads the meter to the household. The residents pay the fee according to the household meter. The property management unit pays the water fee to the water supply company.

3.1.4 Secondary Water Supply Supervision

3.1.4.1 Regulatory Authority

According to the "Measures for the Sanitary Supervision and Administration of Drinking Water in Sichuan Province", the Municipal Health Bureau is responsible for the sanitary supervision and administration of the secondary water supply and drinking water. The Water Affairs Bureau is responsible for the secondary water supply sanitation management in the administrative area, implements unified supervision and management of the urban secondary

water supply (including facility sanitation and safety, emergency protection, etc.), and regularly or irregularly inspects the secondary water supply facilities and equipment. Relevant charging schemes for secondary water supply should be reported to the local municipal water supply administrative department (Water Affairs Bureau) for approval, and the secondary water supply price should be approved by the local people's government price administrative department (Development and Reform Bureau).

3.1.4.2 Supervision Objects and Measures

(1) Water supply companies: The Municipal Water Affairs Bureau requires water supply companies to submit water quality reports and testing data on a regular basis. For users who report water cuts or insufficient water pressure, the Water Affairs Bureau requires water supply companies to immediately investigate and verify whether water cuts have been implemented to the corresponding communities or whether the nearby water pressure is normal. The Water Affairs Bureau evaluates the water supply companies every year based on their service efficiency. A good evaluation result will promote a virtuous cycle of water supply companies.

(2) Secondary water supply construction unit: the developer or property owner. In terms of planning and design, the Bureau of Regulations supervises whether the developer's secondary water supply project planning is reasonable by verifying whether the project submitted by the developer for completion acceptance is constructed in accordance with the requirements of planning approval. In terms of engineering construction, the Bureau of Housing and Urban-Rural Development oversee developers mainly through on-site acceptance after the completion of the project to confirm whether the secondary water supply project is qualified.

(3) Secondary water supply management unit: mainly property management. The Health and Health Bureau conducts water quality and hygiene supervision in accordance with the "Measures for the Sanitation Supervision and Administration of Drinking Water in Sichuan Province" and the "Measures for the Sanitation Supervision and Administration of Drinking Water in Sichuan Province". The Water Affairs Bureau conducts regular daily supervision of the secondary water supply management units in terms of facility operation, management, administrative filing, cleaning and disinfection.

As the industry competent authority of water supply enterprises, the Water Affairs Bureau is relatively benign to supervise the secondary water supply of water supply enterprises. Under the long-term effective supervision of the Water Affairs Bureau, the water supply company regularly inspects and maintains the peripheral municipal pipeline network to ensure the stable operation of water pressure and water quality before the trade settlement water meter. Such supervision measures can ensure the sanitation and safety of the drinking water quality at the

water end of the secondary water supply meter, and the water supply pressure is basically stable. When the water pressure is unstable, users can improve the supervision of the service quality of water supply enterprises through an effective chain of custody (as shown in Fig 1):

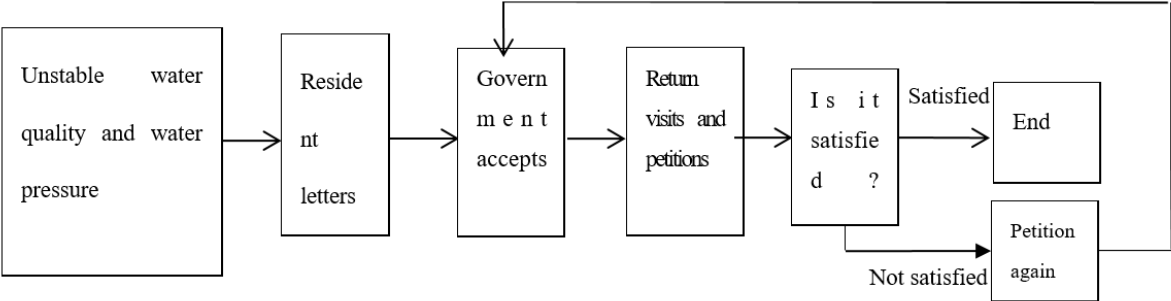


Fig 1: Service quality chain of custody of water supply enterprises in Chengdu

Source: Draw according to the process of handling complaints or complaints from Chengdu's water supply

3.2 Problems and Cause Analysis of Supervision

3.2.1 Irregular Setting of Management Institutions

Secondary water supply management is an inter-departmental work. The main body of secondary water supply safety supervision in Chengdu includes multiple functional units such as the Housing Construction Bureau, Water Affairs Bureau, Health Bureau, and Development and Reform Bureau. There are problems of overlapping functions, difficulty in law enforcement, and difficulty in management. Nor does it have an authoritative regulatory agency. As far as the current situation of the supervision of the secondary water supply industry is concerned, it is mainly the supervision of water quality and sanitation carried out by the Water Affairs Bureau and the Health Bureau. Regarding the planning and design of the secondary water supply project in the early stage, the mid-term construction, and the later operation and maintenance management supervision work is lacking. The lack of management in these links will directly affect the water quality and health safety of the secondary water supply. Once a link is lacking in supervision, it is likely to cause water safety problems.

3.2.2 Weak Law Enforcement

In the process of daily supervision, the main responsibility of the water bureau is to do a good job in the management of secondary water supply, do a good job in the operation and management of facilities, cleaning and disinfection and other aspects of the secondary water supply management unit for regular daily supervision, the secondary water supply law enforcement is relatively weak. Provincial and municipal urban water supply regulations indicate that the water quality of the city's secondary water supply should comply with national health standards, but does not specify what legal liability should be borne by the operation and management of the secondary water supply units of water quality health failure. Therefore, the Water Affairs Bureau in the daily management, even if the secondary water supply operators are not found on a regular basis to clean the water storage facilities, disinfection (or cleaning time interval greater than six months), the secondary water supply operators failed water quality test reports (or did not regularly test the water quality) and so on these acts, the subordinate administrative law enforcement agencies Water Administration Enforcement Brigade has no clear legal basis or policy on the operators of administrative penalties, only when the problem is found to order the operators to change in a timely manner.

3.2.3 Lack of Effective Constraints

Secondary water supply is a new industry, which exposes some specific problems from the bottom up. The problems at these points have not caused a very serious social impact, so the top-down management measures have not kept up in time. In the daily management process, most of the regulatory agencies carried out little or no management of secondary water supply, and did not fully cover the supervision of secondary water supply in urban areas. There is no clear mechanism for non-performing supervisory departments to restrain their inaction, and there is a lack of accountability for the supervisory department's negligence in the supervision of secondary water supply. The lack of binding force of the supervisory department is prone to inadequate supervision, resulting in inadequate supervision of secondary water supply safety. According to the analysis of the water supply complaint data of the Chengdu Water Affairs Bureau from 2017 to 2019, it can be seen that the complaint rate of secondary water supply is relatively high, and it is increasing year by year. Proportion of secondary water supply complaints, in 2017, 22.12%. Proportion of secondary water supply complaints, in 2018, 35.26%. Proportion of secondary water supply complaints, in 2019, 46.65%. Complaints about tap water (pieces), complaints about secondary water supply (pieces), proportion of complaints about secondary water supply (pieces). Source: Drawing based on the water supply petitions or complaints received in Chengdu from 2017 to 2019. This shows that the contradiction in the

secondary water supply has become increasingly prominent, and more and more people are beginning to pay attention to the safety of the secondary water supply.

3.2.4 Health Management Staff Has Poor Awareness of Drinking Water Safety

Almost all the secondary water supply sanitation managers in residential communities lack the awareness of drinking water safety, have a low awareness of drinking water-related laws and regulations and water supply sanitation knowledge, and think that their duty is to ensure normal water supply. This does not meet the qualification requirements of sanitation administrators, and is not conducive to the daily management of secondary water supply sanitation.

IV. CONCLUSIONS

There are mainly the following problems in the safety supervision of urban secondary water supply: (1) the secondary water supply management agency is not standardized, which is mainly reflected in the absence of the main body of secondary water supply supervision and the supervision loopholes caused by overlapping functions. Irregularities in the management agencies are extremely harmful to the safety of the residents' secondary water supply and drinking water. (2) Policies, regulations and systems for secondary water supply management are not systematic, and law enforcement is weak. (3) The inability of the secondary water supply industry to develop in a healthy and orderly manner is reflected in the low efficiency of coordination of secondary water supply issues and the lack of effective constraints on secondary water supply supervisory agencies. In response to the above problems, this paper proposes the following suggestions.

4.1 Establish an Integrated Supervision System for Secondary Water Supply

Coordinate the planning, construction, operation and management of the city's secondary water supply, deepen the reform of the secondary water supply system, clarify the leading responsibilities of the Water Affairs Bureau, and establish an integrated management system with proper supervision, effective operation, and guaranteed water quality, sanitation and safety with all relevant supervision departments and sub-district offices (town governments). Find out the basic situation of the city's secondary water supply community; strengthen the unification of secondary water supply planning and construction, the unification of water quality and sanitation management, and the unification of operation and management, strengthen the supervision of the entire process of secondary water supply facilities and equipment before,

during and after construction [14]. Each link of the management is responsible for the corresponding regulatory agencies, which are linked to each other and work together to ensure the rapid, stable and sustainable development of the secondary water supply industry.

4.2 Improve the Community Supervision System

Establish a management system under the unified leadership of the municipal government, with neighborhoods (towns) and community residents committees as the main body, and the participation of property management. Perform unified management of the secondary water supply within the city, and establish a statistical ledger for the location of secondary water supply facilities based on the street (town). Persist in the publicity and education of secondary water supply safety, and gradually establish a supervision mechanism to supervise bad behaviors that affect secondary water supply safety.

4.3 Strengthen the Construction of Law Enforcement System

In accordance with the "Measures for Sanitary Supervision and Administration of Drinking Water" and "Measures for the Sanitation Supervision and Administration of Drinking Water of Sichuan Province", further improve Chengdu's urban secondary water supply law enforcement system, strengthen the construction of law enforcement teams, and improve the comprehensive law enforcement level and administrative capacity of law enforcement teams. Establish a joint law enforcement system that is mainly composed of health law enforcement supervision and water administration law enforcement supervision, strengthen law enforcement, and deal with relevant violations of property service enterprises in accordance with the law. The property management unit that seriously violates the law can be listed on the blacklist of the construction system, so that property service companies cannot continue to carry out related property management work. Establish a social responsibility supervisor system, improve various reporting systems and reward systems for reporting, and improve administrative supervision and social public opinion supervision mechanisms.

4.4 Improve the Awareness of Secondary Water Supply Safety Supervision

First of all, it is necessary to raise awareness of the safety supervision of secondary water supply. Start to solve the problem of the outbreak, and then gradually cover the whole city in a comprehensive way to solve the problem of secondary water supply one by one. Perform their respective safety supervision responsibilities to ensure that the quality and pressure of the secondary water supply are normal, and the secondary supply facilities are operating stably. Secondly, make use of the existing relevant secondary water supply laws and regulations to

strengthen the propaganda of the objects of supervision. Various functional departments can unite with streets and territorial communities to popularize relevant laws and regulations and knowledge of secondary water supply safety management to supervised objects by printing and distributing leaflets and publicizing on publicity boards. Improve the legal awareness of the supervised objects and the safety awareness of the secondary water supply management, and allow the supervised objects to actively cooperate with the supervisory unit to carry out relevant supervision work, forming a virtuous circle of the whole process of the legal supervision and management of the secondary water supply.

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