

THE INFLUENCE OF PREVENTIVE MAINTENANCE OF THE CITY WATER SUPPLY NETWORK ON THE SAFE PERFORMANCE OF CITIZENS WORK ACTIVITIES IN THE CONDITIONS OF THE COVID-19 VIRUS PANDEMIC - CASE STUDY

Aleksandar Zunjic

University of Belgrade, Faculty of Mechanical Engineering, Belgrade, Serbia

azunjic@mas.bg.ac.rs

Abstract This paper aims to point out a significant safety omission that may occur if no additional risk assessment is conducted related to the interruption of water supply in a certain part of the city for a long period of time, in the conditions of a Covid-19 pandemic. A case study is presented which indicates the possible consequences of inadequate planning of works on the maintenance of the water supply system in the conditions of a pandemic. The necessity of cooperation between companies that perform the function of supplying the population with water and maintaining the city's water supply network with experts in the field of health and ergonomics was emphasized, in order to prevent the spread of Coronavirus. Measures that can be taken to reduce the risk of pandemic spread in cases of realization of the preventive maintenance of the water supply network are presented.

Keywords: Covid-19; watter supply network; preventive maintenance; safety.

1. INTRODUCTION

Regular or planned works on the maintenance of the city water supply network are nothing new. They are carried out according to a certain plan, in order to prevent breakdowns in the system. In that way, the occurrence of more serious breakdowns is prevented, while the water quality is maintained in accordance with the regulations. Examples of preventive maintenance can include servicing of equipment, inspecting of equipment for wear and tear and replacing as necessary, greasing and cleaning of moving parts of equipment, and replacing items that have a limited lifespan. Preventive maintenance is important because it assures that the equipment fulfills its service life. It also prevents costly repairs (in terms of time and money) from being needed.

In most cases, regular maintenance work on the city's water supply network does not require to turn off the water to consumers. However, certain planned works on regular maintenance require that the water supply at the part of the water supply network be switched off. Such a situation arises in the case when it is necessary to replace a part due to wear and tear or to prepare the water supply network for the winter period. In most cases (although there are exceptions), if the works on preventive maintenance are well organized, they last shorter at a certain location than works on corrective maintenance (when it is also necessary to turn off the water supply in part of the system).

2. THE PROBLEM OF PREVENTIVE MAINTENANCE OF THE WATER SUPPLY NETWORK IN THE CONDITIONS OF A PANDEMIC

If the regular maintenance of a part of the city's water supply network is well planned, taking into account environmental factors such as, for example, weather conditions, it does not last long on

average. Preventive work is usually completed in a few hours at a specific network location, rarely lasting longer than 8 hours. However, the problem with preventive maintenance of the city water supply network can arise when the works are not well planned, in the sense:

1. Of extended time for completion of works with the necessity of continuous disconnection of water to consumers
2. Of too large an area of the city network that is at the same time affected by maintenance works.

The two problems mentioned above become significantly greater in a pandemic. If the duration of water disconnection due to the planned maintenance of the water supply network lasts too long, and/or if the water disconnection encompasses a large urban area, it is not only endangered the work of certain professions, but it causes a safety issue, due to the inability to maintain adequate hygiene. Hand washing is one of the basic defenses in a pandemic. If this is disabled, a situation of increased risk of spreading the infection arises.

3. CASE STUDY

Belgrade is the capital of Serbia with about 1,374 million inhabitants. The company that is in charge of supplying the city with water and maintaining the city's water supply network is "Belgrade Waterworks and Sewerage". In accordance with Article 63 of the Statute of this company [1], its employees are obliged to carry out activities in a way that does not endanger the health and safety of people. The quality and safety of water are monitored on a daily basis, and according to official reports, this company delivered drinking water to the citizens, which is safe for human health.

Throughout 2020, the mentioned company performed the planned works on the maintenance of the water supply network. During the execution of these works, parts of the city were left without water, with occasional interruptions or continuously. In the case of a continuous interruption of water supply, in most cases, the interruption of water supply was in the period from 8 to 24 hours (ie it lasted for 16 hours, or even shorter). However, in several cases, according to the plan of this company, the cessation of water supply lasted 22 hours, and in one case 24 hours.

However, in the case of one intervention related to the planned maintenance in 2020, the disconnection of water lasted about 32 hours instead of the planned 16 hours. The reason for the extension was, as stated in the company, "extremely bad weather conditions". However, on that day when the works started, it was rainy in Belgrade in one part of the day, with the maximum temperature being 22 °C (which cannot be considered extremely bad weather conditions). An additional problem is that the cease of the supply encompassed a large urban area with about 20,000 inhabitants.

Such a long disconnection of the water supply network under normal conditions would not be a big problem. However, in the conditions of a pandemic caused by the Covid-19 virus, such a long-term shutdown of water represents an increased health risk. Although several water cisterns were engaged in those parts of the city at the time of the water cut-off, which enabled citizens to pour water into bottles and containers, it was certainly not enough in most cases, even for basic hygiene needs.

In the conditions of the described long-term disconnection of water, certain professions were especially endangered, as well as the work of certain institutions. The relatively low health risk is the

closure of shops (services) that cannot function without water, such as car washes. However, a much bigger problem is the operation of those facilities whose functioning in the conditions of water supply interruption is possible, but represents a health risk. Such objects include:

- restaurants
- cafes
- health institutions
- schools
- preschool institutions
- bakeries
- certain grocery stores.

It should be mentioned that none of the previously listed facilities stopped working at the time of the water shutdown in the observed territory.

Any interaction of an infected person with unwashed hands is a potential risk for transmitting the virus. This risk for transmission does not remain isolated only in the part of the territory where the water shutdown occurred. In public transport vehicles, there is also a risk of contamination through persons who have not been able to disinfect their hands in the usual way.

As a consequence of long-term water outages, an unwanted spread of infection can occur during the pandemic. Particularly at risk are groups of people who are not sufficiently aware of the possibilities of transmitting the Covid-19 virus, as well as in the part of the population that denies that there is any danger of the disease.

The data show the following. On the day of the water shutdown, 121 people in Serbia were infected with the Coronavirus within 24 hours (which is in fact an increase in the number of infected in relation to previous daily sampling). Seven days later, according to the same source, 245 people became ill with the Coronavirus in Serbia in one day. Thus, in the interval of 7 days, a jump of over 100% of newly infected persons was recorded (on a daily level). Most of the infected were from the territory of Belgrade. Although it is difficult to formally attribute such a jump to the described water outage, there are certainly serious indications for such a claim.

4. CONCLUSION AND RECOMMENDATIONS

The analysis conducted in this paper is not intended to blame anyone for failures in the organization of water supply in a pandemic, or to suggest sanctions against a particular person. Such omissions are possible in any part of the planet. There is still not enough awareness that every working procedure in a pandemic should be reconsidered, in terms of the possibility of increasing of spreading the infection. It is necessary to change the attitude and way of thinking even when it comes to simple work operations. Certainly, if a large number of people are affected by a certain work operation, such as preventive maintenance of the water supply network, such a reexamination must become mandatory. In connection with the described case study, it is necessary to point out that there is no official information that indicates that a risk analysis due to the existence of a pandemic was performed before the water was turned off. Also, even the team of health experts in charge of pandemic control did not react in this case. All this indicates that consultations with experts in the field of ergonomics are necessary in cases of a pandemic. Their knowledge in the field of human -

machine (object) - environment interaction can be a valuable source of information that can contribute to preventing the spread of a pandemic.

In the case of interventions that require a change in the water supply regime, it is necessary to conduct a risk analysis in the conditions of a pandemic before each such activity. This analysis should include consultations with health and ergonomics experts, who should give authorization of such activities. Given the above, some of the measures that can be taken to prevent the spread of the pandemic in connection with the change of the water supply regime of the population include:

- mandatory risk assessment of changes in the water supply regime
- detailed planning of activities and time that is necessary for their ending
- conducting consultations with experts in the field of health and ergonomics regarding the activities that need to be carried out
- additional analysis of the necessity of carrying out works on preventive maintenance and consideration of possibilities for their postponement
- limiting the time of continuous water shutdown on the part of the network where the works are performed
- consideration of possibilities for realization of works during the night (when the use of the network is reduced)
- additional informing the population about the risks related to the situation with the water supply interruption
- additional education of children regarding the risks posed by the situation of water supply interruption
- prescribing additional binding measures for the population during the interruption of water supply (for example, prescribing mandatory wearing of gloves outside the living space)
- enactment of regulations that would regulate the operation of restaurants and similar facilities (and other facilities of importance) during the interruption of water supply.

The goal of all these measures is to reduce the possibility of transmitting the Covid-19 virus in a pandemic. Although restrictive measures are not popular, in a pandemic they are a necessity. Only by respecting this fact, conditions are created for a better tomorrow.

References

- [1] JKP Beogradski vodovod i kanalizacija, 2018, Statut (in Serbian), www.bvk.rs/wp-content/uploads/2020/01/statut-bvk-min.pdf