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To cite this article: Mengyu Xu *et al* 2021 *IOP Conf. Ser.: Earth Environ. Sci.* **859** 012089

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Research on Safety Cut-off Technology of Gas Leakage Based on Gas Leak Alarm

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Abstract: Gas is an important energy source for urban development and operation, and it is directly related to the daily lives of urban residents. In order to build a complete gas pipeline network, it is necessary to optimize the energy structure and strengthen the safety of gas use through a variety of technical means. According to data surveys, there is still a widespread phenomenon of gas leakage, threatening the physical and mental safety of the people. For this reason, the gas pipeline construction department can use the alarm device and relevant technical means to cut off the gas leakage in a timely manner to ensure the safe management of gas use.

Keywords: Gas leakage; Cut-off technology; Alarm.

1. Introduction

At this stage, due to the gradual improvement of living standards, the use of gas has become widespread. However, considering the particularity of gas, gas leakage accidents have occurred frequently in recent years, and gas safety management has also become a key topic of increasing public concern. In order to ensure the safety performance of city gas, it is necessary to fully understand the basic characteristics of gas, understand the basic cause of leakage, and set up a delay alarm, use the linkage system to cut off the power circuit in time, control the path of gas leakage, and realize real-time sensing and safe cut-off.

2. Analysis of influencing factors of gas leakage

2.1. *Due to the aging of the pipeline, the possibility of gas leakage has been increased*

Actual investigations show that the aging and penetration of pipelines is one of the basic causes of gas leakage. In the construction of urban gas pipelines, cast iron pipes or titanium alloy pipes are used in most areas. These two materials have high corrosion resistance and pressure resistance, and can ensure the transportation of gas channels. However, it also has certain problems. The stability of the pipe construction materials is relatively weak, the resistance to some major objects is relatively low, and the manufacturing process is relatively complicated, which has a certain degree of difficulty. In the process of laying gas pipelines in urban areas, if the area of the pipeline is not considered, excessive use of machinery and increased pressure will lead to fracture and damage of the gas pipeline to a large extent, which will lead to gas leakage. If the gas company fails to carry out emergency repairs promptly and quickly, it will cause more serious gas accidents and threaten the lives of residents around the city. Due to the particularity of the pipeline materials, the maintenance of the leakage points of the gas pipelines



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by the technical maintenance personnel will increase the difficulty of the maintenance to a certain extent and increase the load of the staff.

2.2. Excessive pressure on the top of the gas pipeline

In the environment of rapid urban development, the regional space of the city is also showing a trend of expansion and extension in the four weeks. In the process of deepening the transformation and construction of urban areas, it undoubtedly increased the pressure on the underground pipeline network. In addition, some illegal buildings did not comply with the specific regulations for gas construction. The illegal operation caused the leakage of gas pipelines, which threatened the safety of the entire city. If the problem of gas leakage is not accurately detected and resolved, a series of safety accidents will occur, which will have a huge negative impact on the entire city.

2.3. Irregular operation methods lead to failure of gas equipment.

Among them, in the construction of gas pipelines, due to construction problems, it will also cause leakage of gas during later use. At present, due to numerous gas leaks, this is closely related to the construction of gas pipelines. In the actual gas pipeline laying and construction, due to the unbalanced operation level of the construction technicians and the lack of specific supervision work, various safety hazards have been buried in the gas pipeline laying, such as pipeline blockage and surge tank overload. These indirect factors can cause uneven pressure among households and even gas leakage. In addition, if the gas valve is not tightened, the vent pipe is worn out, and the pressure regulator fails, it will directly cause rapid gas leakage, which will not only affect the normal operation and supply of gas, but also threaten the lives and property safety of surrounding residents.

2.4. The user has not standardized the use of gas, resulting in gas leakage

According to the data survey, the main targets of gas are industrial and urban residents. Among them, a large amount of gas is used in industrial production, but they have a complete system of safety guarantee system, and the response measures are relatively standardized, and the number of safety accidents is relatively small. , The safety factor is higher. Urban residents use relatively little gas, but they have not established safety awareness, nor have they mastered some basic knowledge and methods of gas protection. Currently, only a small number of residential users have installed gas leak alarms and protection devices, which has enhanced the safety factor to a certain extent. However, some residents did not fully realize the dangers of gas, and they arbitrarily modified gas pipelines according to their own needs, and even some criminals who embezzled gas appeared. These phenomena indicate that the people lack knowledge of gas safety, and this is also the cause of gas leakage. One of the root causes is the frequent occurrence of safety accidents.

3. Scientifically deal with gas leakage to ensure the safety of gas users

Gas safety awareness is particularly important in daily life, and relevant workers need to strengthen communication with users, or conduct safety education activities through networked publicity methods to strengthen users' use. Judging from the current statistics of safety accidents, gas leakage still accounts for a significant proportion. With a complete technical system, energy companies can develop new blocking technologies, manufacture special gas leak alarm devices, provide users with transfer services, and set up special technical channels to solve users' basic problems and ensure the safety of gas use . Secondly, it is also necessary to strengthen the management of gas pipelines. In order to avoid the occurrence of gas leakage problems, relevant municipal departments should consider and analyze from multiple levels, comprehensively control the transportation and deployment of gas, and formulate complete preventive measures to improve gas pipelines. The safety performance minimizes the probability of leakage.

For example, for gas and natural gas leaks, the main components of the two are carbon monoxide and hydrogen, which are highly toxic. In the era of technological diversification, gas companies can use the LQFP44 as the main chip of the alarm, and then use the STC single chip as the medium to establish

a gas detection system and install it in the gas use area. The user can use the mobile phone as the interactive body to view the components of the regional gas in real time. If a gas leak occurs, the central system will automatically alarm and close the centrally controlled gas pipeline in time. In addition, the set sensor will automatically close the valve and send out an audible and visual alarm. Finally, the remote gas delivery system will also automatically alarm and close all gas passages in an urban area to block the spread of gas, thereby providing technical repair personnel with time to solve the gas leakage problem.

4. Scientifically respond to gas leakage and implement orderly barriers

In response to the problem of gas leakage, major gas companies need to continuously explore new types of maintenance methods, scientifically and rationally cut off gas safely, and control the spread of leaked gas. In order, in the process of gas leakage, carbon monoxide sensing devices can be used and a set of circuit control systems can be constructed, which is mainly used to detect the degree of gas leakage and formulate solutions. If the detected harmful gas exceeds the normal value, the circuit control system will automatically close the gas pipeline and feedback the alarm information to the microcontroller; then, the fan block will evacuate the harmful gas according to the set circuit.

In addition, the buzzer and LED need to be integrated. When the system detects a gas leak, the online controller will give an alarm and remind the user that there is a danger of gas leaks, and measures must be taken. In the context of information technology, the remote control system can perform self-sealing treatment on gas pipeline valves. The staff needs to analyze the on-site situation, disassemble the valve brackets one by one, and after confirming that the valve stem has not changed, they begin to remove the valve frame, and check the pressure plate and valve. The gap of the body is welded and polished to achieve the effect of gas barrier. Alternatively, the injection-type under-pressure sealing technology can be adopted, mainly targeting the leakage site, injecting a suitable agent to form a sealed cavity inside the pipeline, and timely repairing each leakage point to balance the pressure of each pipeline. Effectively seal the leaking gas. When dealing with gas leakage problems, it is necessary to prepare complete tools, such as hydraulic oil pumps, leaking flanges, repair agents, etc., to ensure that one-time repair is completed.

5. Design gas control devices to enhance the safety of gas use

Gas is an essential energy source in daily life and occupies an important position in the development of the entire city. At the same time, fuel gas is also flammable and explosive, and has the risk of leakage, which is likely to cause human body poisoning and various safety accidents. At present, from the statistical analysis charts, most household gas control devices are only limited to gas leakage alarms and have a single function. Although they have alarm functions, they cannot control gas safety, and their use effects are average. In response to this situation, major gas companies can design special gas control devices to effectively adjust the dual electric valves through the controller. In the event of gas leakage, it can be controlled regularly to avoid secondary gas leakage. Moreover, the additional alarm system will issue instructions and automatically record the specific situation of the gas leakage and send it to the user's mobile phone. In the whole device, a small rotating exhaust pipe can also be fixed to eliminate the leaking gas in time and ensure the safe use of the gas.

The gas control device consists of gas sensors, alarms, solenoid valves, ceramic pipes and other components, which are highly efficient and agile in detecting gas, and are relatively stable in use. Once gas leakage occurs, the voltage of the home circuit will change and output level signals. Adjust the resistance value to avoid explosion of the instrument around the gas pipeline. Secondly, you can set up multiple solenoid valves and mark their serial numbers. When a gas leak alarms, each electronic valve will automatically close, cut off the gas passage, and drain the accumulated gas within the set time. In addition, the intelligent control screen can also be used to block and record the gas channel. When the gas leaks, the intelligent control console will display a new alarm high in alternate red and green. The user needs to manually control, press the corresponding button to turn on aisle. Through these measures, the safety factor of gas use can be enhanced and the frequency of gas leakage accidents can be reduced.

6. Conclusion

Although gas brings great convenience to the daily life of urban residents, it also has some drawbacks. If it is improperly operated, it will cause serious losses. In order to improve the economic efficiency of gas companies and protect the lives of users, gas construction companies must establish a complete safety system and install circulating alarm devices to monitor the safe use of gas users. In addition, the staff also need to deeply analyze the cause of the leakage and propose targeted measures to deal with various emergencies scientifically. Only in this mode can the effective control of gas pipeline leakage be ensured.

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