

Discussion and Analysis on the Safety Management of Special Equipment in Colleges and Universities in the New Era

Xin Su^{1,*}

¹State Assets and Laboratory Management Office, Yancheng Teachers University, Yancheng, Jiangsu, 224007, China

*Corresponding author

Keywords: Colleges and Universities management, Laboratory Safety, Special Equipment

Abstract: Laboratory safety is an important guarantee for normal teaching and research activities in colleges and universities. As the key equipment of the laboratory, the safety management of special equipment runs through the whole process of laboratory safety construction and management. Due to the frequent safety accidents of special equipment, the safety of teachers and students is seriously threatened, and the safety management of special equipment becomes more and more urgent and important. Based on the main problems in the management of special equipment in colleges and universities in the new era, this paper discussed the countermeasures for the safety management of special equipment in laboratories from the aspects of system construction, supervision, training and education, file management and information technique. So as to reduce the risks of special equipment in laboratories and provide ideas and methods for the management of special equipment in laboratories.

1. Introduction

The safety of special equipment is an important part of national public safety and one of the key points of laboratory safety management in colleges and universities. Special equipment refers to the equipment that is more dangerous to personal and property safety. The special equipment commonly used in laboratories are mainly pressure vessels and pressure pipelines. These devices are prone to accidents due to their own performance and the influence of external factors. Once the safety accident occurred, it may cause loss of life and economic property to teachers and students. With the continuous development of higher education, in order to cultivate high-quality talents and meet the requirements of talent training, various types of special equipment for teaching and scientific research in university laboratories have been increasing, and the number and type of special equipment has also gradually increased ^[1-2]. The security issues of laboratory also follows. In order to maintain the safety and stability of the campus, combined with the current situation of the safety management of special equipment in colleges and universities in the new era, the problems existing in the management of special equipment in colleges and universities are deeply analyzed, and then the relevant safety management strategies are studied to reduce the potential

safety hazards of special equipment.

2. Analysis on the problems existing in the management of special laboratory equipment in colleges and universities

In the process of the laboratory safety management work in colleges and universities, the management of special equipment is characterized by many types of equipment, a wide range of secondary units involved, weak management awareness of managers, and high management requirements. These problems make the management of special equipment become more difficult. Be directed against these situations, specific analysis is made as follows.

2.1. The universality of the distribution of special equipment in university laboratories

In recent years, the state has paid more and more attention to higher education, the scale of colleges and universities has been expanding and scientific research tasks have been increasing year by year, which leading to the continuous increase of laboratory equipment and facilities. According to the needs of teaching and scientific research, special equipment is distributed in different laboratories. For example, chemical and biological laboratories often use pressure vessels such as high pressure reactor and high-pressure steam sterilization pot. Heavy machinery laboratory may use lifting machinery and motor vehicles on site (factory). The mechanical laboratory may use lifting machinery and special motor vehicles inside field (factory). Some Laboratories that require compressed gas have gas cylinders distributed ^[3].

For some reasons, such as the wide distribution of special equipment, scattered placement in the laboratory, complex equipment operation, large mobility of laboratory personnel, and the absence of fixed instrument users, the management of equipment belongs to each secondary unit or laboratory management, and even some secondary units have not been equipped with fixed equipment managers, resulting in confusion and difficulty in equipment management. Thus, safety accidents may occur due to insufficient attention paid by secondary units to the management of special equipment.

2.2. The unstrict examine and verify in the process of purchasing special laboratory equipment

Because of the high risk of special equipment, it is necessary to make safety demonstration before purchase. And only qualified equipment can be purchased ^[4]. However, in the actual situation, the special equipment used in the laboratory are purchased by the secondary colleges or laboratories. If the purchased equipment did not meet the requirements of the school for procurement certification, the college often lacked safety demonstration and audit in the procurement process. The site, environmental protection, personnel and other problems that cause inconformity with the use conditions of special equipment. At the same time, some secondary units or laboratories may purchase equipment from the enterprises which lacking corresponding qualification certificates. The purchased equipment did not meet the requirements of national standards and specifications in terms of design and manufacturing, and the safety of the equipment was questionable. These problems will become a major potential safety hazard of the laboratory.

2.3. The non standard use of special equipment

At present, the use of special equipment in colleges and universities is not standardized, the technology is not scientific, and the system is not clear, leading to frequent accelerated wear and

aging of equipment. Some staff members are not skilled in the operation process, technology and other knowledge of the equipment, especially for the operators who just contact the equipment, their professional quality and working ability are generally low, the failure to complete the maintenance of equipment operation and the implementation of the safe operation scheme has led to the equipment blindly entering the operation state without inspection and management. The unhealthy and unsafe working environment has accelerated the wear and aging of parts in the equipment, increasing the subsequent maintenance costs. Secondly, when the equipment has been used for more than a certain period of time, according to the relevant national regulations, a wide range of parts replacement, repair and maintenance work is required, resulting in low work efficiency of special equipment during this period of time. However, if the maintenance work at this stage is ignored, dangerous accidents will occur frequently, and more costs will be spent later to make up for the harm caused by this safety accident.

2.4. Incomplete management system and mechanism of special equipment

The management of special equipment specialty in some universities is not clear. Generally, the laboratory safety management department is responsible for the safety management of university laboratories. But there is no clear management department for the safety management of special equipment, let alone the prediction work and the system safety evaluation before the accident. The main work of each department is to deal with the faults and accidents that have occurred.

In some colleges and universities, the responsibilities of the responsible person, manager and user of special equipment are not clear. As a special equipment management unit of the school, the department cannot really control all the special equipment of the school. The concept of responsible person, manager and user is vague and confused. As the competent department of the school, there is no accountability system for the safety accidents of special equipment. The user units have not cooperated with the competent department of the school to clarify the responsibilities of the responsible person and the user.

The characteristics of special equipment determine that the management is different from that of general equipment. The management of special equipment must have a clear set of operating procedures. Only in this way can we ensure that, minimize unnecessary misoperation and loss, and improve the service life of the equipment. This is exactly the place that is easy to be ignored in the management of special equipment in colleges and universities. Although some universities also attach importance to the safety management of special equipment. However, there is a lack of a set of operating procedures formulated according to the requirements of the safety technical specifications for special equipment and the safe operation of each post. As a result, safety accidents caused by misoperation and other factors occur frequently.

The prevention and emergency response mechanism is not perfect at present. The management of special equipment focuses on the early prevention and supervision. Many experiences and lessons from safety accidents warn us, it is imperative to establish a set of beforehand prevention and supervision mechanism. Another aspect, when a safety accident has occurred, many colleges and universities lack emergency response mechanism. Due to the lack of such processing mechanism, many minor safety faults eventually turn into major safety accidents.

2.5. Lack of safety education for special equipment

Due to the universal existence of special equipment in colleges and universities, the lack of professional knowledge of managers, and managers have weak management awareness of special equipment, which lead to the managerial approach of special equipment is managed as common equipment. Because the management of special equipment is not paid more attention to, so the

management part often ignores the safety education and publicity work for teachers, students and users. Some users used special equipment without taking part in special equipment training and obtaining special equipment operation certificate. The management personnel did not obtain special equipment management certificate. The user has not received professional training. It will lead to nonstandard use and management of special equipment^[5]. Special equipment may have potential safety hazards, which may easily lead to laboratory safety accidents, cause loss of life and property, and affect normal teaching and research work.

3. Measures to improve the safety management of laboratory special equipment

3.1. Establishment on management system and implementation of supervision responsibility

The administrative departments of colleges and universities should strengthen the system design of special equipment. On the basis of implementing the *Regulations on Safety Supervision of Special Equipment*, they should also establish and improve the safety technical operation standards, rules and regulations of special equipment, including purchase, use, scrapping, inspection and daily management to strengthen the supervision of the whole process, and improve the safety management level of special equipment in colleges and universities. Colleges and universities should define the responsibilities of schools, colleges, laboratories and teachers at all levels according to the actual situation, and implement the safety responsibility system for special equipment.

All departments at all levels of colleges and universities should also clarify the corresponding management and supervision responsibilities, do a good job in supervision, and establish a sound supervision system^[6]. The school management department shall establish an inspection system according to the actual use of special equipment of each secondary college, regularly check the use and maintenance of special equipment of the college, and randomly check whether the users have qualification certificates, whether the equipment files are complete and whether the special equipment is used overtime, etc. Formulate the emergency plan for special equipment of the school, establish the accident handling system, and define the accident handling process. The management department of the secondary college shall supervise the whole life cycle of special equipment from procurement, use, maintenance to scrapping, and complete the risk assessment of laboratory special equipment and the formulation of emergency plan. The laboratory management personnel shall regularly carry out the laboratory safety self inspection, complete the troubleshooting of hidden dangers, and avoid the occurrence of special equipment accidents. Do a good job in the maintenance of special equipment and regularly check the safety valves, pressure gauges and other safety accessories of special equipment as required, and timely replace the accessories that cannot be used. The safety valve shall be checked at least once a year as required, and the general pressure gauge shall be checked at least once a half year as required. If special equipment needs to be used after reaching the designed service life, it can only be used after passing the inspection by the inspection and testing agency.

3.2. Strictly control special equipment safety access and carry out safety education and training

Special equipment has been widely used in college experiments, but there are still some college teachers and students who lack relevant knowledge about the use of special equipment. Increasing the training and assessment system of special equipment safety related personnel is the premise of establishing special equipment accident prevention measures. When the unit using special equipment fully implements the training and assessment system for personnel related to special

equipment, the safety of special equipment can be initially guaranteed. Starting from the safety management personnel and operators of special equipment, relevant training and assessment shall be carried out before the full management personnel and operators formally take up their posts. Only the safety management personnel and operators obtain the corresponding qualification certificates can take up their posts. All safety management rules and regulations shall be strictly implemented. The unit using special equipment shall regularly carry out safety training, continuing education and accident case analysis for safety management personnel and special equipment operators, find out their own shortcomings and key points to eliminate potential safety hazards in combination with accident cases, constantly improve various rules and regulations, constantly enhance the safety management awareness of special equipment, and eliminate the root causes of accidents. In order to eliminate potential safety hazards, it is necessary to strengthen the publicity and education on the management specifications of special equipment for teachers and students, popularize relevant management knowledge, and make teachers and students realize the importance of standardized use and management.

At the same time, the publicity and education methods of safety management should be diversified ^[7]. For example, posters can be put up in the experimental building, publicity panels can be placed in the corridor, experts can be invited to give safety lectures, safety knowledge can be pushed through "wechat official account", special equipment safety knowledge competitions can be held, and special equipment safety education can be carried out in the school to comprehensively popularize special equipment management norms.

3.3. Strengthen the review of the purchase, installation and acceptance process of special equipment

The purchase of special equipment in colleges and universities is the source of safety management. Before applying for the purchase of special equipment in colleges and universities, the user should first carry out research and technical demonstration on the equipment to be purchased, carry out risk assessment on the laboratory, and purchase from the manufacturer of production equipment with corresponding qualifications. When purchasing imported special equipment, it should report to the safety supervision department of the country of origin. When clearing customs, it should go through inspection and quarantine procedures, and the purchased special equipment must also comply with China's safety technical specifications and pass the inspection.

When the special equipment arrives, the user must check whether the supplier has provided the design documents required by the safety technical specifications, product quality certificates, installation and use instructions and other relevant technical data and documents, and check whether the product nameplate, safety warning signs and other relevant instructions are posted at the prominent positions of the special equipment. Technicians shall strictly abide by the installation specifications to achieve standardized installation and ensure the complete and correct installation of special equipment in the laboratory. They shall not install the equipment without permission or invite personnel who are unfamiliar with the equipment to install it. After the equipment is installed, they must contact the professional testing organization and relevant departments of the university to organize the acceptance work. The acceptance work shall be recorded in the whole process, including the acceptance details, supervision contents and equipment testing qualification records. The unqualified equipment shall not be accepted for use.

3.4. Strengthen archives management

After the purchase of special equipment, schools and secondary institutions shall assign full-time

management personnel to manage the special equipment uniformly ^[8-9]. The person in charge of the equipment shall carefully clear, register and keep the accompanying documents and data, establish the technical archives of the equipment. The basic contents shall include the list of archive documents, the accompanying technical documents of the equipment and components when they leave the factory, the contract and technical data for installation, maintenance, overhaul and transformation, the registration card of special equipment, the use registration certificate, the inspection report, the safe use operation procedures, the use records, the fault and accident records, the daily inspection records and registration of operators, etc. In addition, he should handle the accounting procedures for state-owned assets in a timely manner, organize the installation, maintenance and servicing of equipment, organize the daily inspection and regular inspection. And the corresponding management system shall be formulated for the special equipment in charge. The secondary college shall report the increase or decrease of its special equipment to the school level management department once a year. It is expressly prohibited to use special equipment that has not been inspected, registered, scrapped, inspected and found unqualified, and failed but not eliminated.

3.5. Realize the information management of special equipment

With the rapid development of the information age, we can organically combine the information technology with the professional management of special equipment. Using big data analysis methods to collect, store, analyze and use the content and data of each management link of special equipment ^[10-11]. Thus, forming a life-cycle database of special equipment. The establishment of special equipment information system can realize a more intelligent and convenient management mode to solve the problem of difficult management of special equipment. Information management of special equipment can effectively improve the management level of special equipment, ensure the safe operation of special equipment, and realize the new mode of "intelligent supervision" of special equipment.

4. Conclusion

As a constant and unremitting management, the safety management of special equipment in colleges and universities has a long way to go. The management of special equipment is difficult because of its large number, variety and wide distribution. By strengthening the system construction and compacting the responsibility layer by layer, the blind spots in the management of special equipment are eliminated and the potential safety hazards are reduced. By strengthening education and training, and strengthening publicity and guidance, the basic literacy of special equipment users can be improved. The management level of special equipment safety technology can be improved by strengthening the management of special equipment technical archives. Realize the full cycle supervision of special equipment by means of informatization. Only by constantly improving the safety management level of special equipment in university laboratories can we promote the healthy and stable development of campus teaching and scientific research.

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