

ENHANCING OF THE YOGYAKARTA NUCLEAR FACILITIES SAFETY AND SECURITY SYSTEM, BY IMPLEMENTING THE SIRESS DIGITAL APPLICATION

Gede Sutresna Wijaya
Center for Accelerator Science and Technology-BATAN
Yogyakarta, Indonesia
Email: gedews@batan.go.id

Rahmat Jauhari
Center for Accelerator Science and Technology-BATAN
Yogyakarta, Indonesia

Isman Mulyadi Triatmoko
Center for Accelerator Science and Technology-BATAN
Yogyakarta, Indonesia

Abstract

Every activity related to the utilization of nuclear power must pay attention to the security, peace, welfare, safety and health of workers and community members, as well as protection of the environment. Further provisions relating to safety and security are regulated in Government Regulation (PP) No. 33 of 2007 concerning Safety of Ionizing Radiation and Security of Radioactive Sources and Government Regulation No. 54 of 2012 concerning Safety and Security of Nuclear Installations. The regulatory body also issued a regulation chairman of Bapeten No. 1 of 2009 concerning the provisions of a physical protection system, which regulates the physical protection of nuclear facilities. The Center for Accelerator Science and Technology (PSTA) as one of the work units at the National Nuclear Energy Agency (BATAN) has the main tasks and functions of research and development in the field of particle physics, process technology and research reactor utilization. As a nuclear center in Yogyakarta, every year PSTA is visited by more than 2000 people to conduct research or conduct study visits and other services. Guests who visit PSTA come from all over Indonesia and even from abroad, such as experts from the IAEA. The large number of visitors who come to PSTA has the potential to become a security threat if it is not managed properly. In order to improve the security level of nuclear facilities, a digital application has been built to register guests online. The project entitled "Register Safety and Security Information System (SIRESS)" is an important breakthrough in order to improve the safety and security of nuclear facilities as one of the vital objects that must be safeguarded for safety and security from the past. This SIRESS application is also a demand of the industrial revolution, which utilizes information technology in facilitating and streamlining the resources of both funds and humans. In terms of security, all visitors can register online from anywhere and at any time. All visitor data is digitally managed, so it's easy to track. Guests or visitors who will come to PSTA can first register online through the SIRESS application on a smartphone or on a portable computer. Visitors register by filling in the personal data needed and also photos. Visitors who have registered online will get a QR code, and will be validated by security officers when they come to PSTA. Safety side tie, the SIRESS application also provides tests on work safety and radiation protection for students or students who conduct research at PSTA. This test is intended to measure students' understanding of occupational safety and radiation protection. With the SIRESS application it is expected that the safety and security of PSTA nuclear facilities can be further improved.

1. INTRODUCTION

Republic of Indonesia Law No. 10 of 1997 concerning nuclear energy, regulates that the national nuclear energy agency (BATAN) as the implementing body is tasked with carrying out the use of nuclear energy, through nuclear science and technology research and development activities. Article 16 states that all activities relating to the use of nuclear energy must pay attention to safety, security and peace, the health of workers and members of the community, and protection of the environment. Government Regulation (PP) No. 33 of 2007 concerning the safety of ionizing radiation and the security of radioactive sources aims to guarantee the safety of workers and members of the public, protection of the environment, and security of radioactive sources. Radiation safety requirements include: management requirements; radiation protection requirements; technical requirements; and safety verification.

Government Regulation No. 54 of 2012 regulates Nuclear Installation Safety and Security. The safety of nuclear installations is aimed at: preventing deviations from the use of nuclear materials from peaceful purposes; and prevent, detect, assess, delay, and respond to unauthorized transfers of nuclear material and sabotage of nuclear installations and materials. In terms of the regulatory body (BAPETEN) also issued Regulation No. 1 of 2009 concerning Provisions for Physical Protection Systems.

The PSTA organization consists of the particle physics division, the process technology division, the work safety and engineering division, the reactor division and the administration division. PSTA operates a 100 kWatt research reactor named Kartini, which is used for training and education. Kartini's research reactor is also developing an internet reactor laboratory where students outside the city of Yogyakarta can learn reactor physics and core physics from a distance. In addition to training and education, Kartini's research reactor was also used for the analysis of the activation of neutron samples from biota, the environment and mineral mines to determine the elemental levels in the sample. The particle physics division, operates the electron beam machine, plasma nitriding, ion sputtering and engineering and designing cyclotrons. The process technology division carries out the separation and refining of rare earth metals and zirconium.

Safety in PSTA is under the supervision of the division of work safety and engineering which carries out functions: the implementation of work safety and environmental monitoring, radiation protection, nuclear emergency response, and waste management; and conducting operations, maintenance and development of electromechanical and instrumentation research and development facilities for accelerator technology. Security in PSTA is controlled by the nuclear safety unit which has the task of securing nuclear installations, the environment and personnel in the form of monitoring, prevention and mitigation in the environment.

2. SIRESS DIGITAL APPLICATION

The Safety and Security Register Information System (SIRESS) is an important breakthrough in order to improve the safety and security of nuclear facilities as one of the vital objects that must be safeguarded from the future. Making this SIRESS application is also a demand of the industrial revolution, which utilizes information technology in facilitating and streamlining both financial and human resources. PSTA besides conducting research and development also plays a role and contributes services to the community, where existing facilities can be utilized by the wider community including students from schools or universities to carry out research and development of nuclear science and technology. On the other hand the use of nuclear science and technology also requires a high level of security and safety, which by regulation cannot be ignored. Security and safety aspects must remain the main prerequisites in the use of nuclear science and technology without neglecting the public service side.



Fig.1. SIRESS Menu

2.1. System security

PSTA is visited by more than 10,000 people every year in order to visit the facility or do activities such as research or following training, workshop or focus group discussion. Visitors who come must be recorded personal identity, such as name, address, identification, the purpose of arrival and others. But to manage large amounts of data will be difficult if you do not use information technology. Constraints will arise if the number of visitors comes in large numbers so that the visitor's data collection will take a long time and also sometimes not obtained complete visitor identity data

SIRESS for the initial phase can be opened at www.batanjogja.com through a personal computer or laptop connected to the internet network. SIRESS can also be accessed through the Android system on a mobile phone. If the SIRESS icon is opened there will be two submenus in it, namely the security and safety menu. If you enter the security submenu, there will be a form that must be filled in with the data of visitor personnel. SIRESS submenu will also activate the camera on the laptop or mobile phone that is used, to be able to take photos directly accessing SIRESS. After all data is filled in, it must be sent and a QR code will appear for later use or scanning when it comes to the PSTA nuclear installation.

2.1. System safety

SIRESS for the initial phase can be opened at www.batanjogja.com through a personal computer or laptop connected to the internet network. SIRESS can also be accessed through the Android system on a mobile phone. If the SIRESS icon is opened there will be two submenus in it, namely the security and safety menu. If you enter the security submenu, there will be a form that must be filled in with the data of visitor personnel. SIRESS submenu will also activate the camera on the laptop or mobile phone that is used, to be able to take photos directly accessing SIRESS. After all data is filled in, it must be sent and a QR code will appear for later use or scanning when it comes to the PSTA nuclear installation.

To improve safety aspects for students conducting research or practical work, they must be equipped with work safety and radiation protection knowledge. They were given knowledge about radiation safety and how to work using radioactive substances or how to work in radiation control areas. They are also given knowledge about work safety so that later students or students can conduct research activities safely. To find out the basic skills required they will be tested online in the SIRESS submenu. There are 40 multiple choice questions that appear randomly with a predetermined time to be solved. If success reaches the minimum value required, then a graduation mark will be printed. if it fails, given the opportunity three times to repeat.

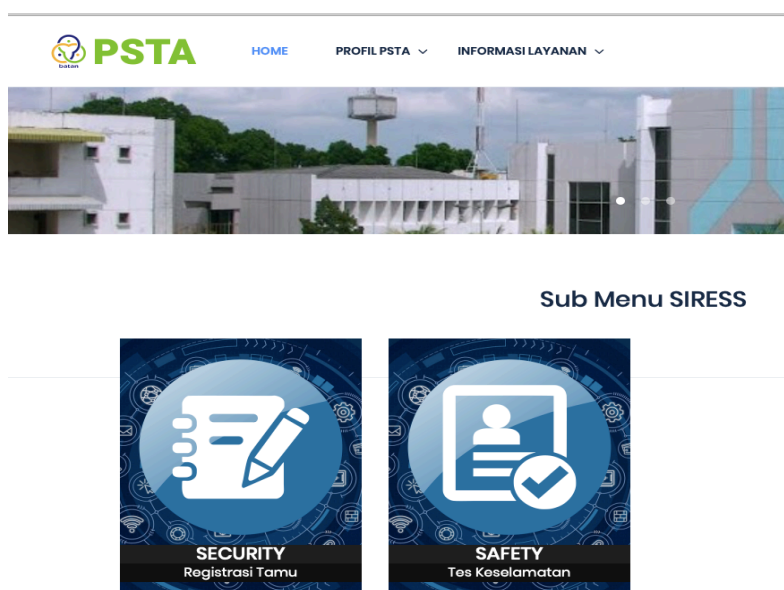


Fig.2. SIRESS sub menu

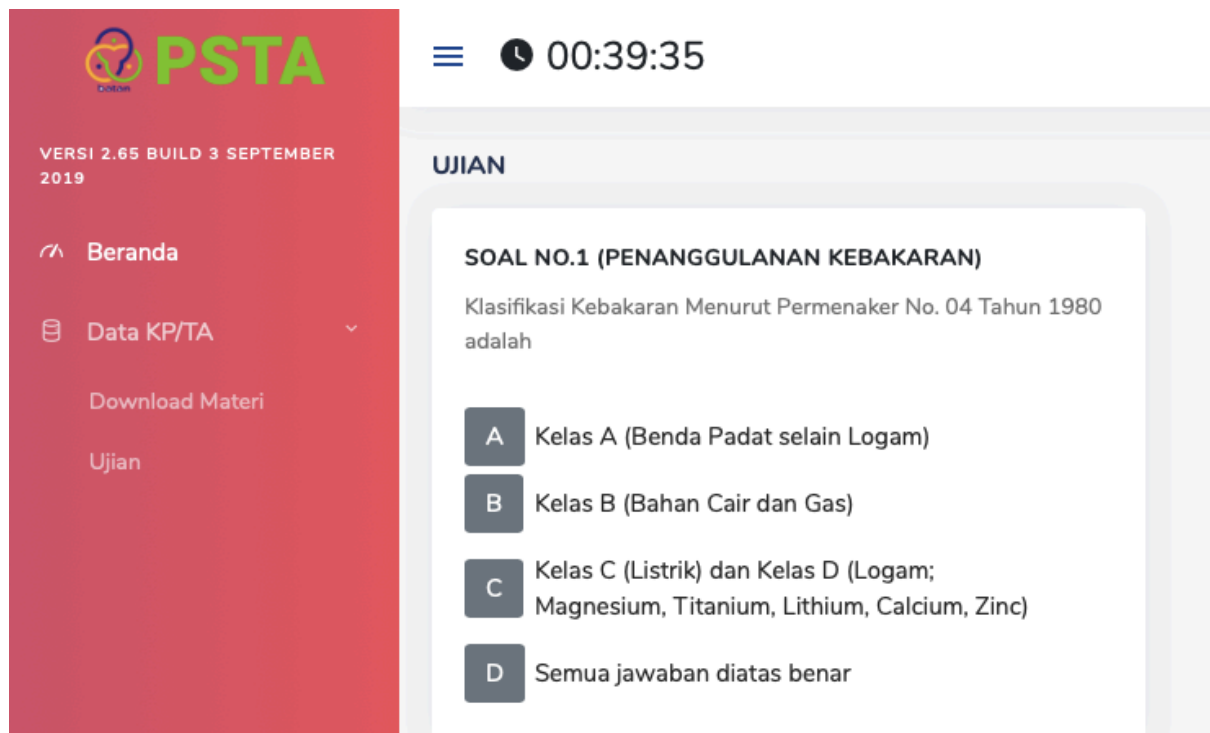


Fig. 3. Examination model in Radiation Protection and Work Safety

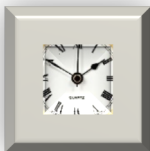

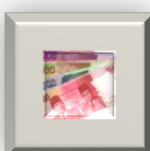


3. RESULT AND DISCUSSION

The type of change targeted at this innovation is to improve organizational governance by making changes to the use of information technology. SIRESS application will help a lot of time, energy and cost efficiency. Implementation of this digital application, at the same time it will improve PSTA public services to other stakeholders such as regulatory body, universities, other government agencies, private company, the third party such as supplier or contractor, IAEA (International Atomic Energy Agency) who will conduct visits or research activities in PSTA.

The "SIRESS" Safety and Security Register Information System is a new innovation that did not previously exist in the BATAN environment. With this system the expected condition is the establishment of a safety and security register information system at the nuclear facility of PSTA as a vital object that is orderly in administration and complies with regulations. This application refers to the regulations: PP 54/2012 concerning the Safety and Security of nuclear installations, PP 33/2007 concerning the Safety of Ionizing Radiation and the Safety of Radioactive Sources. Chairman of Bapeten regulation 1/2009 concerning Provisions for the physical protection system for nuclear material installations.

In summary, the benefits to be gained by both internal parties and external stakeholder by implementing SIRESS are: for the security officer in the field, there is no need to do repeated documentation and there are no unregistered guests. For management it is easier to monitor visitor / guest data and the number of students doing practical work and research in PSTA. BATAN as an institution can adopt this system to be implemented in other work units. For regulatory body, it is easier to supervise one of the implementation forms of the physical protection system of Chairman Bapeten regulatuin No. 1 of 2009. For people who will visit BATAN, or will utilize equipment and laboratory at nuclear installation, will minimize the time and cost for registration, and makes it easy to take an exam related to radiation protection.

Tabel 1. Before and after condition of SIRESS digital application implementation.

Before SIRESS	Inovasi SIRESS	After SIRESS
Visitor / guest registration for security purposes and radiation protection understanding tests for safety purposes can only be done during office hours.		Visitor / guest registration for security purposes and radiation protection understanding tests for safety purposes can be done not only during office hours.
Registration of visits and radiation protection understanding tests can only be done at the PSTA office.		Registration of visits and radiation protection understanding test can be done from anywhere.
Registration and understanding of radiation protection tests require a high transportation cost, especially for students who will conduct research and practical work and come from outside the city of Yogyakarta.		Registration and understanding of radiation protection tests require a lower transportation cost, especially for students who will conduct research and practical work and come from outside the city of Yogyakarta.
Data accountability is not good, guests who come individually are recorded, but if the group is only a registered representative, it causes potential danger.		Data accountability is better, all guests who come individually and in groups will be recorded, because the registration is done personally.
The use of notebooks causes the management of visitor data and students who take the test radiation protection is not well documented		The use of digital application causes the management of visitor data and students who take the test radiation protection is well documented

4. CONCLUSION

Implementation of SIRESS digital application it is expected that the safety and security of PSTA nuclear facilities can be further improved, besides being able to save time, money and energy for visitors and users of facilities or laboratories in PSTA.

ACKNOWLEDGEMENTS

The author would like to thank the government for financial support to develop the SIRESS digital application through the 2019 budget of center of excellence for science and technology (PUI), so that this digital application can be realized. This application is expected to be able to improve the security and safety system

through accountable guest data collection and increase safety knowledge for students conducting research activities at the PSTA nuclear installation.

REFERENCES

- [1] Republic of Indonesia Law No. 10 of 1997 concerning nuclear energy, 1997
- [2] Government Regulation (PP) No. 33 of 2007 concerning the safety of ionizing radiation and the security of radioactive sources, 2007.
- [3] Government Regulation No. 54 of 2012 concerning Nuclear Installation Safety and Security, 2012.
- [4] Chairman Bapeten Regulation No. 1 of 2009 concerning Provisions for Physical Protection Systems.