

Licensing Procedures for Sodium Experiment Facility using Safety Control of Dangerous Substances Act

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1. Introduction

The long-term advanced SFR(Sodium-cooled Fast Reactor) development plan was authorized by KAEC (Korea Atomic Energy Commission) in 2008 and updated in 2011, which will be carried out toward the construction of an advanced SFR prototype plant by 2028.

Sodium used as a coolant in the SFR is utilized in various fields and yet there has been no record of handling and storing sodium exceeding designated quantity, which is a quantity that serves as the lowest level permitted for construction. The difficulty in achieving the license for sodium experiment facilities and equipment has been the main issue since the first time of sodium-related plan.

Sodium is under regulation of four kinds of laws (Fig. 1) including the Safety Control of Dangerous Substances Act and it is under categorized as Class 3(pyrophoric material & water-prohibiting substance). The objective of this study is to investigate the procedure of installing a sodium-related facility and achieving the license from the fire agency of government.

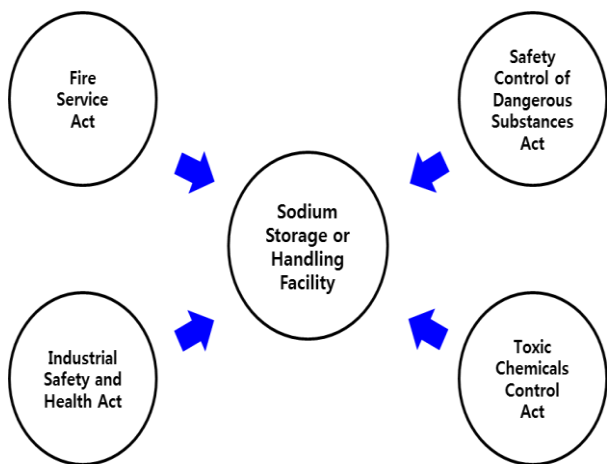


Fig. 1 Four kinds of laws applied to sodium storage or handling facility

2. Law, Code and Regulation

To receive the license for sodium experimental facility, the code and regulation must be satisfied in the Safety Control of Dangerous Substance Act. The main contents of the act are shown in Table 1 and the classification of

dangerous substances is listed in Table 2.

Table 1 Contents of the Safety Control of Dangerous Substances Act

Chapter	Contents
1	General prosafety control of dangerous substances act visions
2	Construction of facilities for dangerous substances and alteration thereof
3	Safety control of facilities for dangerous substances
4	Transport, etc. of dangerous substances
5	Supervision and orders to take measures
6	Supplementary provisions
7	Penal provisions

Table 2 Classification of dangerous substances by the Safety Control of Dangerous Substances Act

Class	Official title
1	Oxidizing Solid
2	Flammable Solid
3	Pyrophoric Material & Water-prohibiting Substance
4	Flammable Liquid
5	Self-reactive Substance
6	Oxidizing Liquid

Sodium is in category of Class 3 and its designated quantity – quantity of license requirement – is 10 kg. The following is the list of facilities classified by the Act.

1. Inside storage room
2. General reserve room
3. Inside storage tank facility
4. Outside storage tank facility
5. Underground storage tank facility

3. Licensing Procedure

The process for receiving a certificate for examination of completion is shown in the flow chart in Fig. 2 and it must be preceded before dealing with dangerous substances exceeding the designated quantity.

Sodium reacts easily with most elements due to its high reactivity. If sodium at high temperature sodium leaks outside of a system boundary and makes contact with oxygen, it starts to burn and toxic aerosols are produced. In addition, it generates flammable hydrogen gas

through a reaction with water. Hydrogen gas can be explosive within the range of 4–75 vol%. Therefore, the use of water is prohibited for sodium fire extinguishment. Only special extinguishing agents among the D-Class agents are applicable to sodium fire. The fire extinguishing equipment in the sodium experiment facility takes a pre-test by the fire safety regulatory body before the examination of completion.

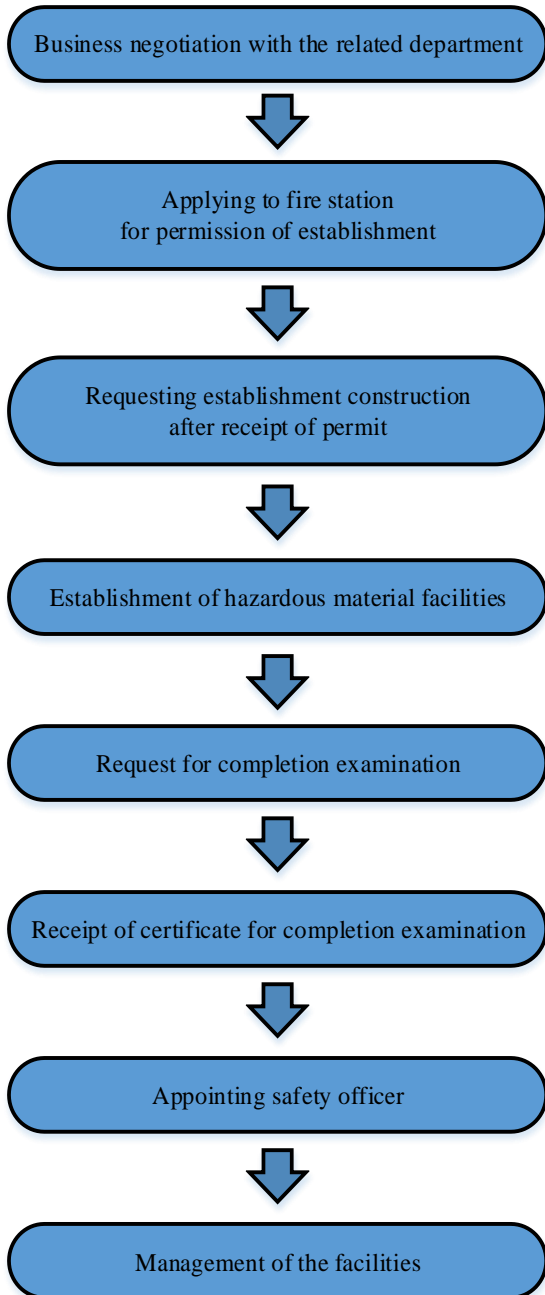


Fig. 2 Flow chart for the licensing of a sodium experiment facility

Furthermore, it is necessary to submit the prevention code for dangerous substances in the experimental facility and to appoint a safety supervisor who has the qualification of the followings.

Qualifications for Safety Supervisor

- Master craftsman hazardous material
- Industrial engineer hazardous material
- Craftsman hazardous material

4. Conclusions

In this work, the licensing procedure for a sodium experiment facility was investigated under the Safety Control of Dangerous Substances Act. For the construction of the PGSFR (Prototype Gen-IV Sodium-cooled Fast Reactor), the described procedure should be reviewed and prepared carefully in accordance with the fire safety regulatory body.

ACKNOWLEDGMENTS

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REFERENCES

- [1] The Safety Control of Dangerous Substances Act, Law No.11690, (Promulgation date: 23 Mar 2013)