

Consideration of Regulatory System for Fuel Cycle Facilities in Foreign Countries

Sang-Kyu AHN, Hyung-Joon AHN, Kyu-Myung OH, Hoon-Joo LEE
Korea Institute of Nuclear Safety, 19, GUSUNG-DONG YUSONG-GU, TAEJON
k052ask@kins.re.kr, k096ahj@kins.re.kr

1. Introduction

Three units of fuel fabrication plants are operating now in Korea. These fuel fabrication plants produce fuels for PWR, CANDU and HANARO research reactor, respectively.

To enhance our regulatory systems for fuel cycle facilities including fuel fabrication plants, the related system of foreign countries is surveyed. In this study, the overall regulatory systems of the United States of America, France, Germany, the United Kingdom and Japan are surveyed. The survey items consist of laws & regulations, regulatory organization, licensing procedure, documents to be submitted with a license application, regulatory inspection, and etc.

2. Regulatory System for Fuel Cycle Facilities in Foreign Countries

2.1 United States of America

The Atomic Energy Act of 1954 and the regulations in Title 10 of the Code of Federal Regulations (CFR) are applied to the fuel cycle facilities. For processing plants, 10 CFR 70, 76, 20, 40, 50 and 51 are applicable. For spent nuclear fuel, 10 CFR 50 and 72 are applicable. Among them, 10 CFR 70, "Domestic Licensing of Special Nuclear Material" is main regulation for most fuel cycle facilities. The U. S. Nuclear Regulatory Commission (NRC) is a regulatory organization for the fuel cycle facilities in the United States of America. Other agencies, such as the Occupational Safety and Health Administration, and Federal and State environmental protection agencies also have key oversight roles at these facilities.

Since the fatal accident at NRC licensed conversion facility in 1986, an overfilled cylinder of UF₆ ruptured, resulting in a major release of hydrogen fluoride that killed a worker, the NRC/nuclear industry's awareness of need for integrated safety approach at nuclear facilities was raised. 10 CFR 70 was revised on September 18, 2000. The revised rule includes a requirement that certain licensees/applicants subject to 10 CFR 70 should conduct an ISA (Integrated Safety Analysis). The ISA is a systematic examination of a facility's processes, equipment, structures, and personnel activities to ensure that all relevant hazards that could result in unacceptable consequences have been adequately evaluated and appropriate protective measures have been identified. In addition to ISA, risk-informed, performance based approach and plant/chemical hazards were included in the revised rule.

The licensing process for fuel cycle facilities consists of construction approval with design bases and operating license application with ISA summary. In addition, licensing actions include license renewal, amendment, and decommissioning. Documents to be submitted with a license application are an environmental report, installation information, program for control and accounting of special

nuclear materials (for an uranium enrichment facility), a description and safety assessment of the design bases of the facility (for a plutonium processing and fuel fabrication plant), a description of the physical protection plan, a physical security plan, an emergency plan, a description of the safety program, ISA summary, and etc. NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility" describes the acceptance criteria for reviewing the health, safety, and environmental protection aspects of applications for licenses to produce nuclear reactor fuel. This guidance also applies to the review and evaluation of proposed amendments and license renewal applications for nuclear fuel cycle facilities.

Approximately 8 to 10 times per year NRC inspections are conducted at each fuel facility, from one of NRC's four regional offices or from its headquarters in Rockville, Maryland. NRC's inspections focus on those areas that are most important to safety and security, using objective measures of performance. In general, inspections may cover activities such as nuclear criticality control, chemical process, emergency preparedness, fire safety, and radiation safety. For those facilities that store or process higher enriched nuclear material, the NRC requires certain safeguards to protect such material from loss, theft, or diversion. Inspection reports, correspondence, and other information about the performance of fuel cycle facilities are available to the public, both on the agency's document management system and at its Public Document Room in Rockville, Maryland.

The license term of fuel cycle facilities is 10 years. The operation period can be extended by the issuance of license renewal.

2.2 France

In France, fuel cycle facilities are subject to be regulated under the decree 63-1228 of 11 December 1963 which is applied to power reactors, as Basic Nuclear Installations (BNI). The decree 63-1228 is the basis of the licensing and authorization procedures. In addition, there are the decree 95-540 of 4 May 1995 which stipulates the authorization procedure for liquid and gaseous effluent release and water intake for BNIs, and the decree of 10 August 1984, which stipulates the general rules of quality assurance.

DGSNR (General Directorate for Nuclear Safety and Radioprotection) is in charge of regulating all the nuclear activities in France for both safety and radioprotection. The three ministers of Industry, Environment and Health supervise DGSNR. IRSN, created in 2002, is in charge of the technical support of the DGSNR. The licensing process for fuel cycle facilities consists of plant authorization decree (creation decree), operating license, and license for liquid and gaseous effluent release and water intake. Application of a plant authorization decree shall be accompanied with a preliminary safety assessment report

(PSAR), an environmental impact statement (EIS) & a risk assessment report for public inquiry and expert review, and a detailed quality assurance (QA) program. A provisional and final safety report, a complete documentation on QA implementation during the construction phase, an emergency plan, and the General Operating Rules shall be submitted to the DGSNR for reviewing of the authorization request for commissioning. The Nuclear Safety Authority (ASN) issues Basic Safety Rules (RFS) which provide technical guides concerned to seismic, fire protection, nuclear criticality, control of solid wastes from fuel production, and etc.

Approximately 8 to 10 times per year DGSNR inspections are conducted at each fuel facility, and about 50 times per year for reprocessing plants. A periodic safety reassessment is performed periodically (typically every 10 years). This periodic safety reassessment is not a part of the legislation itself but a part of the implementing practices and procedures defined and managed by the DGSNR. The observed level of safety is assessed and compared to the updated state of the art. The comparison takes into account the lessons learned from operating period, the progress in relevant R&D and the safety standards that would be applied to a new project.

2.3 Germany

In Germany, the Atomic Energy Act (AtG), Nuclear Licensing Procedure Ordinance (AtVfV), Radiation Protection Ordinance (StrlSchV), General Administrative Regulations & Guidelines, Recommendations of RSK, SSK and KTA Rules, BMU Safety Requirement, and DIN Standards are applied to fuel cycle facilities.

BMU, Federal States, and Bfs are regulatory and supervisory authorities for fuel cycle facilities. The execution of the administrative tasks is performed by the Federal States, as agents of the Federal Government (BMU).

The licensing process for fuel cycle facilities consists of separate licenses for construction, installation of plant equipment, commissioning involving radioactive material, and decommissioning. Application, safety report, and etc are laid out for 2 months in the public and submitted for comments from other related authorities. Public hearing will be held in the licensing process for a fuel enrichment facility. Documents to be submitted with a license application are a safety report, an environmental impacts assessment report, and other additional documents to fulfill the requirements of the AtG and other Public Laws. For many supervisory and inspection programs, independent experts are assigned by Federal States.

Approximately 74 to 78 times per year inspections are conducted at each fuel facility. A periodic safety reassessment for fuel cycle facilities is performed periodically (typically every 10years) according to the AtG.

2.4 The United Kingdom

In the United Kingdom (UK), the Health and Safety at Work Act (1974), the Nuclear Installation Act (1965), the Ionising Radiations Regulations (IRR99) and License Conditions (LC) are applied to fuel cycle facilities.

The Health and Safety Executive (the Executive) is the licensing authority for nuclear installations, including fuel cycle facilities. The Nuclear Installations Inspectorate (NII) is employed as part of the Health and Safety Executive

(HSE) to regulate the safety of nuclear installations in the UK.

A nuclear site license is granted for an indefinite period. A new license (re-licensing) will be required to accommodate certain changes to the basis on which the existing license was granted. Major submissions to apply a nuclear site license may include a reference design, a preliminary safety report, a pre-construction safety report, proposed research and development work in support of the safety case, proposals for quality assurance, and a contract design. After completion of construction, pre-commissioning report and an operational safety report will be submitted to the HSE/NII.

Approximately 16 to 27 times per year NII inspections are conducted at each fuel facility, and about 590 times (2 year frequency) for reprocessing plants. A periodic safety reassessment for fuel cycle facilities is performed periodically (typically every 10years) according to the LC 15.

2.5 Japan

Under the scope of the Law for the Regulations of Nuclear Source Material, Nuclear Fuel Material and Reactors, specific regulatory terms are stipulated in the Enforcement Ordinance for the Regulations of Nuclear Source Material, Nuclear Fuel Material and Reactors and the business rules for each case.

The Nuclear and Industry Safety Agency (NISA), which is under the Ministry of Economy, Trade and Industry (METI), takes charge of the safety regulation for fuel cycle.

The licensing process for fuel cycle facilities consists of establishment license, approval of design and construction methods, and approval of operational rules. Each application documents will be submitted to the NISA at each licensing stages. The Safety Examination Guidelines issued by the Nuclear Safety Commission are used for the review of establishment license applications.

5 times per year NISA inspections are conducted at each fuel facility. A periodic safety reassessment is legally performed periodically (typically every 10 years).

3. Conclusion

The regulatory systems for fuel cycle facilities of the United States of America, France, Germany, the United Kingdom and Japan are surveyed. Various different features of licensing process, regulatory requirements and regulatory inspections are found. One of common feature of foreign regulatory systems is a periodic safety review (PSR), except the USA in which the term of license is 10 years. In the USA, implementation of an ISA is required to licensees and applicants. The result of this study will be useful to enhance our regulatory system for fuel cycle facilities. Specially, it would be valuable to consider introducing of ISA and PSR into our licensing review system.

REFERENCES

- [1] Review of the Structure, Use and Implementation of Safety Case by Regulators and Nuclear Site Operators and Nuclear Site Operators on Fuel Cycle Facilities in NEA Member Countries, State-of-the-Art Report, OECD/NEA/CSNI, 2005.
- [2] Inspection of Fuel Cycle Facilities in NEA Member Countries, NEA/CNRA/R(2003)3, 2003. 3
- [3] Overview of U.S. Nuclear Fuel Cycle, USNRC, 2006. 7