

## **Relationship between Radiological Environmental Impact Assessment and Environmental Impact Assessment and Suggestions of Improving REIA**

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**\*Keywords :** Environmental Impact Assessment, Radiological Environmental Impact Assessment, Nuclear Power plant, Follow-up survey of Environmental Impacts

### **1. Introduction**

Korea operates an Environmental Impact Assessment(EIA) system to minimize negative impacts on the environment by assessing the environmental impact of major projects before they are implemented [1]. This study discusses the environmental impact assessment required for the construction and operation of nuclear power plants. A company that plans to build and operate a nuclear power plant must conduct an environmental impact assessment under the Environmental Impact Assessment Act, and separately, a Radiological Environmental Impact Assessment (REIA) under the Nuclear Safety Act. As these two systems are based on separate legal bases and are managed by different government ministries, it may be questionable whether the Environmental Impact Assessment Act can be applied if the procedures stipulated in the same Act are not stipulated in the Acts related to REIA. In this regard, this study examines the legal relationship between EIA and REIA based on a comparison of the legal basis of each system and the operation of each system according to its corresponding Acts, and makes some suggestions for the institutional complement of REIA.

### **2. Changes in the EIA System for Nuclear Power Plants**

When nuclear power generation began in the 1970s, any environmental Acts did not stipulate that nuclear power plants were subject to EIA. In 1982, Article 11(2) of the revised Atomic Energy Act stipulated the obligation to attach an EIA report to the application for construction permission for nuclear facilities, initiating the first EIA requirement for nuclear power plants. Also once the "Guidelines for Preparing Environmental Impact Assessment report for Nuclear Power Plants" (the Ministry of Science and Technology Notification No. 84-8) was established and implemented, it covered both the assessment of the impact on the general environment, including the impact of hot water drainage from the plant, and the impact on the radiation environment.

Article 9 of the Framework Act on Environmental Policy of 1990 stipulated the government's obligation to

take measures to prevent environmental pollution by radioactive substances and delegated it to the Atomic Energy Act. Subsequently, the Environmental Impact Assessment Act of 1993 included nuclear power plants in its boundary, and the Atomic Energy Act of 1996 stipulated REIA separately. Thereby, REIA and EIA have been implemented under separate laws until now [2][3].

### **3. Differences between the current EIA and REIA in terms of the underlying laws and system operation**

#### *3.1 Applicable Law and Responsible Authority*

A person who plans to build and operate a nuclear power plant may apply to the Minister of Trade, Industry and Energy for the designation of the predetermined zones for electric source development project in accordance with the Basic Plan on Electricity Demand and Supply, and must conduct a Strategic Environmental impact Assessment(SEA) pursuant to Article 9 of the Environmental Impact Assessment Act (which includes a preliminary site survey) and attach a draft of the assessment report.

Upon receipt of the application, the Minister of Trade Industry and Energy, after consulting with the relevant government organization, approves the planned site for the power plant by designating the predetermined zones and notifying the Ministry of Trade, Industry and Energy after deliberation by the Executive Committee for Electric Power Source Development Project.

Subsequently, during the detailed planning stage of power plant construction, the project operator shall conduct an EIA in accordance with Article 22, Paragraph 1, Subparagraph 3. of the Environmental Impact Assessment Act and Article 31, Paragraph 2 (Appendix 3) of the Enforcement Decree of the same Act.

Prior to the approval of the implementation plan pursuant to Article 5, Paragraph 1 of the Electric Power Source Development Promotion Act, the project operator shall submit EIA report to the Minister of Trade, Industry and Energy, the head of the approval agency, who shall consult with the Minister of Environment.

On the other hand, REIA are conducted in accordance with the Nuclear Safety Act and should be approved by the Nuclear Safety and Security Commission(NSSC). In accordance with Articles 10 and 20 of the Nuclear Safety Act, operators are required to conduct the REIA and attach the assessment report when applying for a permission to construct and operate a nuclear power plant or predetermined zones approval, which is a requirement for a license to construct and operate a nuclear power plant.

Article 105 of the Act establishes the obligation of installers and operators of power reactors to conduct REIA and its surveys, and operators seeking a modification permit for continued operation after the expiration of the Planned Design Life are also obligated to prepare and submit an REIA report in accordance with Article 20 of the Nuclear Safety Act. In addition, when conducting the Periodic Safety Reviews(PSR) under Article 23 of the Act, the operator shall evaluate the things related radiological environmental impacts in accordance with Article 37, Paragraph 1, Subparagraph 14 of the Enforcement Decree. However, PSRs and REIAs have different scopes of accidents to be evaluated and different objectives for evaluating accidents[4]. Furthermore, NSSC does not have the legal authority to review and evaluate PSR and take any action. So this does not mean that a REIA be updated officially.

### *3.2 Citizen participation process*

Regarding the Citizen participation process, both the Environmental Impact Assessment Act and the Nuclear Safety Act stipulate the obligation to publish and make the draft assessment report available to the general public, hold briefings and public hearings, and include the results of public input. Both laws delegate details to subordinate laws, and the overall procedural requirements, such as the public notice period, do not differ. However, in the case of the Environmental Impact Assessment Act, until the relevant ministries are notified of the contents of the consultation, if important changes are made to the assessment, such as changes to the project subject to EIA, the draft assessment must be redrafted and public opinions must be collected again (Article 26). However, there is no such provision in the Nuclear Safety Act. In addition, the Enforcement Decree of the Environmental Impact Assessment Act establishes a procedure for the head of an approval organization to take over the process if the head of a local government fails to make a public announcement without special circumstances, but there is no such provision in the Enforcement Decree of the Nuclear Safety Act.

### *3.3 Follow-up*

The Environmental Impact Assessment Act contains provisions for post-assessment follow-up. First of all, the project operator is obligated to implement the agreement, and the head of the approval organization must check, manage, and supervise the implementation until the completion inspection (Articles 35, 39). After construction of the project, the project operator shall investigate the impact of the project on the surrounding environment and notify the Minister of the Environment and the head of the approval organization of the results (Article 36, follow-up survey of Environmental Impacts). If project severely affects the surrounding environment as a consequence of a cause or event unforeseen as at the time of a consultation on EIA, and it is impracticable to formulate a plan for environmental conservation merely by taking measures or by issuing an order to take measures, or an EIA report, etc. and materials used as its basis are falsely prepared, a reassessment may be conducted even after the project is completed(Article 41).

The Nuclear Safety Act does not explicitly provide for such a follow-up system. The Nuclear Safety Commission is obligated to monitor and evaluate radiation and radioactivity nationwide, and may conduct a review if there are any unusual circumstances(Article 105), but there is no provision for a review of the assessment report made at the time of the construction and operation permit. Even if a significant change in radiation impact occurs, such as the construction of a new reactor next to an existing operating reactor, the operator is not obligated to conduct a new REIA for the existing reactor.

## **4. Whether the EIA includes the REIA**

The Environmental Impact Assessment Act and the Nuclear Safety Act do not regulate the relationship between each other. However, the Framework Act on Environmental Policy, a basic law in the environmental field, defines radioactive pollution as one of the environmental pollution (Article 3, paragraph 4 of the Framework Act on Environmental Policy), stipulates the government's duty to prevent harm from radioactive pollution (Article 34), and delegates the measures to the Nuclear Safety Act (Article 34, paragraph 2). Therefore, it is clear that environmental impacts caused by radiation are included in the broader meaning of environmental impacts, and therefore, REIA is included in the broader meaning of EIA. In many countries, including the United States, EIA for nuclear power plants include radiation environmental impacts.

However, given the unique risks of radiological disasters and the specialized expertise required to assess radiological environmental impacts, it is not always possible for REIA to be fully institutionally embedded in EIA.

## **5. Characteristics of REIA**

In the case of EIA, the most important consideration of the project on the surrounding environment is during the construction process, followed by the maintenance and operation process. On the other hand, the environmental impact of radiation from nuclear power plants can be meaningfully evaluated during the operation of the plant from the time the plant is constructed and nuclear fuel is transported into the plant not in the construction process. Also, it can change rapidly due to foreseeable changes such as the establishment of new facilities that generate radiation in the vicinity.

In addition, in terms of nuclear safety, it is very special that the impact of radiation on the environment must be evaluated not only under normal operation of the plant but also under the assumption of an accident. There are conflicting opinions as to whether the REIA should include only design basis accidents or critical accidents. However, even if it is assumed that only design basis accidents are included, the degree of radiation impact that can be caused by an accident is very different depending on the cause of the accident, whether immediate and appropriate measures were taken, and whether safety devices were operated in a timely manner. In particular, the radiation environmental impact of an accident can be evaluated and predicted only by scientifically designed models, but it is difficult to determine the adequacy of the actual evaluation through a status survey even after the approval of the relevant license. Therefore, the review and examination of the REIA report requires expertise in the field of radiation, which is different from EIA.

These specificities must be fully considered in the design and operation of policies and systems. Therefore, the Nuclear Safety Act imposes the obligation to conduct a REIA on the operator as well as the applicant, and the Nuclear Safety and Security Commission(NSSC) is obligated to continuously monitor radiation environmental impacts. Nuclear power plants are required to evaluate safety, including environmental impacts from radiation, in their Periodic Safety Reviews(PSR) conducted every 10 years, and probabilistic analysis methods are used to evaluate accidents. Unlike EIA, which are reviewed by agencies under the Ministry of Environment, such as the Korea Environment Institute(KEI), the National Institute of Environmental Research(NIER), the National Institute of Ecology(NIE), and the Korea Environment Corporation(KECO), REIA is reviewed by the NSSC and its specialized safety regulatory agency, the Korea Institute of Nuclear Safety(KINS).

#### **6. Justification for separate operation of the REIA system and the need to supplement it**

Although REIA is conceptually included in EIA in a broad sense, as mentioned above, it is difficult to be institutionally included in the Environmental Impact Assessment Act due to its specificity, risk, and need for specialized management, which are distinct from other environmental impacts. As a result, there are administrative difficulties in uniform management, but in terms of nuclear safety and radiation safety management, it is appropriate to implement a separate system based on the Nuclear Safety Act rather than the Environmental Impact Assessment Act as it is currently. However, the Nuclear Safety Act does not specifically stipulate REIA, so most of the contents are delegated to subordinate laws or resolved through administrative rules, and the regulatory contents of the subordinate laws are not sufficient, causing problems in the operation of the system. Another problem is that the radiation effects of rapidly changing environments after the permit is granted are not immediately considered and appropriate measures are not taken. There is a critical need to eliminate procedural gaps and maximize functionality by complementing these issues through the revision of laws and regulations.

#### **7. Conclusion - Recommendations to improve the REIA system**

First, it is necessary to clarify the legal basis by explicitly stipulating that a person who intends to construct or operate a nuclear reactor is obligated to conduct a REIA, rather than requiring the submission of a REIA as one of the permit documents as in the current law. This will balance the regulatory system of the Environmental Impact Assessment Act and systematically organize the projects, operators, methods and procedures subject to REIA, centering on the mandatory regulations.

Second, it is necessary to strengthen the legal basis by directly stipulating important matters such as evaluation items, scope, methodology, and procedures for consultation with relevant organizations in the law, rather than leaving them to be stipulated in subordinate laws and administrative rules. Even if technical and specialized matters are stipulated in subordinate laws and notices, it is appropriate to stipulate them directly in the law to increase the predictability of those who are subject to the law and secure the credibility of the system.

Third, it is necessary to establish explicit provisions at the legislative level to ensure that the procedures of the Environmental Impact Assessment Act are followed where necessary in relation to deficiencies. This would overcome the problem of having weak grounds to legally enforce action to those not followed due procedures.

Fourth, there is a need to strengthen the follow-up system and managing licensing documents. For example, when additional reactors are constructed and operated at a site, the baseline value assuming 'multiple reactors' is applied to the new reactors, while changes in the radiation environmental impact of the existing reactors are not reflected in the REIA, which is the license document for the existing reactors. Although the PSR is conducted every 10 years to review the radiation environmental impact, the NSSC does not have the legal authority to evaluate the results of the PSR and make any administrative measure, and it is a system aimed at voluntary safety enhancement by operators. In addition, despite the existence of REIA report(RER), if the contents of the radiation environmental impact are dispersed and managed in SARs and PSRs, it becomes difficult to manage documents coherently. In conclusion there is a need to reorganize the legal basis for REIA implementation and procedures to eliminate controversies in the interpretation of the law and to enhance public confidence in radiation safety at nuclear power plants.

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