

THE IMPROVEMENT OF NUCLEAR SAFETY REGULATION: AMERICAN, EUROPEAN, JAPANESE, AND SOUTH KOREAN EXPERIENCES

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Key concepts in South Korean nuclear safety regulation are safety and risk. Nuclear regulation in South Korea has required reactor designs and safeguards that reduce the risk of a major accident to less than one in a million reactor-years—a risk supposedly low enough to be acceptable. To date, in South Korean nuclear safety regulation has involved the establishment of many technical standards to enable administration enforcement. In scientific lawsuits in which the legal issue is the validity of specialized technical standards that are used for judge whether a particular nuclear power plant is to be licensed, the concept of *uncertainty law* is often raised with regard to what extent the examination and judgment by the judicial power affects a discretion made by the administrative office. In other words, the safety standards for nuclear power plants has been adapted as a form of the scientific technical standards widely under the idea of uncertainty law. Thus, the improvement of nuclear safety regulation in South Korea seems to depend on the rational lawmaking and a reasonable, judicial examination of the scientific standards on nuclear safety.

KEYWORDS : Nuclear Safety Regulation, Nuclear Safety Assessment, Concept of Safety and Risk, Scientific Lawsuits, Validity of Specialized Technical Standards, Concept of Uncertainty Law, Safety Standards, Ikeda Case, Kalkar Case, Theory of Substituting Substantial Judgment, Theory of Accepting Professionals' Opinions Which Have Been Expressed in Advance, Theory of Supporting the Administrative Judgment

1. INTRODUCTION

Most serious nuclear accident to date occurred at the Chernobyl Nuclear Power Plant. After the far less serious accident at the Three Mile Island facility, in Pennsylvania, nuclear plants worldwide were already being shut down and restarted more frequently for safety checks. Safe operation of nuclear power plants has become one of the most important goals for governments all over the world. Korean, Japanese, European, and American governments have all tried to improve risk management regarding the safe use of the nuclear energy.

In South Korea, nuclear-related activities are planned and carried out by various organizations, such as the Atomic Energy Commission (AEC), the Nuclear Safety Commission (NSC), the Ministry of Science and Technology (MOST), and the Ministry of Commerce, Industry and Energy (MOCIE). First, under the Atomic Energy Act, the AEC is the highest decision-making body on policy

issues and utilization of nuclear energy. The AEC is composed of nine to eleven members representing various sectors of the government, academy, and industry. The chairman of the AEC is the South Korean Prime Minister. Second, the MOST has overall responsibility for the nation's nuclear research and development, as well as regulatory and licensing duties. To promote nuclear safety and to deal with all important issues relating nuclear safety, the NSC was recently established under the MOST. The NSC consists of five to seven members, including the Minister of Science and Technology as its chairman. Third, the MOCIE is responsible for the construction and operation of nuclear power plants, the nuclear fuel supply, and the management of low- and medium-level radioactive waste. The Atomic Energy Act was established for the peaceful use and development of nuclear energy in 1958. This legislation was enacted to facilitate the development and utilization of nuclear energy and to secure the safety of nuclear

facilities and radiation protection. The atomic energy laws comprise four parts: the Atomic Energy Act, the Enforcement Decree of the act, the Enforcement Regulation of the act, and the Notice of Minister of MOST.

The Atomic Energy Act includes provisions for the Atomic Energy Commission, the Nuclear Safety Commission, nuclear energy promotion programs, nuclear installation construction permits and operation licenses, and various other provisions. The Enforcement Decree of the act, as a presidential decree, is necessary for the enforcement of the main act, and it describes the technical standards imposed by the act. The Enforcement Regulation of the act provides detailed procedures and document forms mandated by the act and the decree. The Notice of the Minister of MOST prescribes specific issues, including regulatory requirements and technical standards imposed by the Atomic Energy Act,[1] the Enforcement Decree and the Enforcement Regulation. The industrial standards applicable to nuclear activities are endorsed by MOST and then applied to the design and operation of nuclear installations. The Korea Institute of Nuclear Safety (KINS), an expert organization for nuclear safety regulation, developing the guidelines for safety reviews and regulatory inspections.[2]

2. SOUTH KOREAN NUCLEAR SAFETY REGULATION FROM A COMPARATIVE APPROACH

2.1 Safety and Risk

Key concepts in South Korean nuclear safety regulation are safety and risk. Public opposition to nuclear power is rooted in its fears about reactor safety, and the safety of nuclear power is not demonstrable given the particular nature of the risk presented by a potential nuclear accident. More than forty reactor-years of operation in South Korea without a single public fatality is a remarkably good safety record, but it does not prove that an accident with the catastrophic consequences of a Chernobyl-like accident cannot happen here. The public demands such proof and both the industry and the government have attempted to satisfy this demand with assurances that nuclear regulation in South Korea has required reactor designs and safeguards that reduce the risk of a major accident to less than one in a million reactor-years—a risk supposedly low enough to be acceptable. These assurances have aimed to shift the focus of public opposition to nuclear power from concerns about reactor safety per se to concerns about the integrity of reactor regulation. Reviving public confidence in nuclear safety thus requires the establishment of public confidence in nuclear regulation, and the history of nuclear regulation in South Korea teaches that such confidence cannot be gained if safety technical standards are excluded from the licensing process.

Any effort to facilitate and develop the nuclear power energy without public confidence in nuclear safety will likely prove to be a costly mistake. Public acceptance of nuclear power energy cannot be gained without first restoring public confidence in nuclear regulation, and this cannot happen while the safety standards that could provide the public with confidence remain cloudy, in other words, as far as it is next to impossible for the public to participate in the formation of nuclear safety standards. Without public acceptance of nuclear power, an accident will give rise to a public clamor for the closure of existing plants that will be politically impossible to ignore, whatever the economic costs. An accident-free nuclear future is, of course, fervently to be wished for, but it is a future that even an overly optimistic nuclear industry cannot and does not promise. These circumstances and trends marked the completion of the shift in the focus of the nuclear power controversy from substantive issues of nuclear safety to procedural issues of public participation in nuclear regulation.

2.2 Uncertainty Law and Limits of Judicial Review

To date, in South Korean nuclear safety regulation has involved the establishment of many technical standards to enable administration enforcement. These standards, which regulate the safe operation of nuclear power plants, are in the form of laws and regulations. The laws and regulations include statute, presidential orders, ministerial ordinances, announcements, and circulars.

In scientific lawsuits in which the legal issue is the validity of specialized technical standards that are used for judge whether a particular nuclear power plant is to be licensed, the concept of *uncertainty law* is often raised with regard to what extent the examination and judgment by the judicial power affects a discretion made by the administrative office.[3] This idea originated in Germany [4]: there, the principles of essential theory have functioned, according to which the German Federal Parliament shall make decisions regarding essential matters and shall not entrust the administrative power with such decisions. It is a basic principle that essential matters should be decided merely by the legislative power, not by the administrative power, though in the technical or scientific fields essential matters of regulations have been dealt by the administrative power because of its specific knowledge and enforcement practices. Under these circumstances, when a legislator is, regarding the comprehensive standards stipulated by the Atomic Energy Act, forced either to introduce an invalid law or to totally abandon discipline, it is difficult from the viewpoint of legislative procedures to dare to make such a forced condition effective by law. Because of this, the idea of uncertainty law has become accepted. (Regarding the theory of technical standards, the great concern is what examination rights the court is afforded under the idea of uncertainty law when the court examines

a discretion made by the administrative office for specialized technology. Academy addresses its primary theme of introducing and reviewing several theories, e.g. “theory of accepting professionals’ opinions which have been expressed in advance,” which restricts the court’s right to an overall examination of the technical standards issued by the administrative bureau in Germany.)[5]

Various discussions have ensued to determine, under the idea of uncertainty law, if the court’s judgment can affect the discretion made by the administrative office for specialized technology. The following theories, among others, have been proposed:

- (1) *a theory of substituting substantial judgment* according to which the court is allowed to conduct a complete examination to the extent of affecting or even substituting the administrative judgment;
- (2) *a theory of accepting professionals’ opinions which have been expressed in advance*, which was proposed in conjunction with subsequent installation of scientific facilities; and
- (3) *a theory of supporting the administrative judgment*, which provides the basis for the administrative power authority to make a final judgment. To make above proposed theories clear, we need an exact examination. A comparative examination of the academic views that already proposed in many countries, in my opinion, reveals two representative theories, as described below.[6]

(a) *A theory of procedural examination of substantiality*, according to which, “licensing installation of a nuclear reactor is characterized by a comprehensive judgment by assuming that there may exist in the future uncertain and probability-oriented events which are based on inference from knowledge and findings in highly advanced and specialized areas of technology, by taking into account various factors such as the utility of a nuclear reactor, and by evaluating all of these elements to determine what is really necessary for the future. Licensing installation of a nuclear reactor is a highly specialized technical judgment and at the same time, is regarded as a ‘political decision’ which will affect the formation of the future society. We have to accept that the licensing is not a purely legal judgment based on facts which are objectively established. Accordingly, when considering these discretionary elements that licensing installation of a nuclear reactor has, we can consider it reasonable that the Court avoided thorough examination of substantiality according to the theory of substituting substantial judgment. As a matter of course, if the juridical examination has these limitations, then strict considerations are necessary to prevent arbitrary judgment by the administrative power or self-righteous decision under the name of professional technology. When

looking at the safety examination for nuclear reactors, the current system is based on the absolute reliance on investigational examination and judgment from the viewpoint of specialized technology which is made by the MOST, and accordingly, whether or not actual examination performed was in accordance with the spirit of the law should be strictly examined by the juridical power.”

(b) *A theory of supporting the administrative judgment*, according to which, “the defendant shall be liable for positively proving the safety of the nuclear reactor and its proof of the reasonableness of exercising its discretionary power was not sufficiently enough. It is enough for the plaintiff to present doubts or anxiety about the nuclear reactor, and the defendant must present evidence or explanation sufficient to eliminate these doubts. However, since the court is not in a position of making a final judgment regarding the safety of the nuclear reactor on the basis of its own findings, the court should take a neutral position to examine if the defendant’s explanation is sufficient to eliminate the plaintiff’s doubts. If it is difficult to judge which is right, the defendant’s claim is accepted according to the German theory of supporting the administrative judgment.”[7]

It is understood that it would be a great burden to the court if it were required to make such a judgment and that elements affecting such a judgment would not only be objective technical matters in specialized areas but also policy-related matters.[8]

2.3 Lessons from the Ikeda Case in Japan and the Kalkar Case in Germany

(a) The Ikeda Case :

Uncertainty laws and limits of judicial review are discussed also in Japan. In Japan, the basis of these ideas is the judgment made by the Supreme Court regarding a law suit against Ikata Nuclear Power Plant[9] that expressed the following views:

- (1) the safety of nuclear reactor facility should be evaluated from many different perspectives and in a comprehensive manner, by taking into account the engineering safety of the nuclear reactor concerned, any other relevant social conditions, and the engineering competency of the entity that intends to install the nuclear reactor concerned;
- (2) when evaluating the nuclear reactor safety matters related to foreseeable future should also be considered, and it is therefore evident that the nuclear reactor safety evaluation requires an overall judgment based on most recent and updated and highly advanced scientific and technological knowledge and findings in diverse areas; considering the features

peculiar to nuclear reactor safety evaluation, it is reasonable that regarding determination if installation of a nuclear reactor conforms to specific standards, the Prime Minister's reasonable judgment is accepted since the judgment is made by respecting opinions of the Atomic Energy Commission, consisting of individuals of learning and experience in their own specialized areas, which result from scientific and technological knowledge and findings in specialized areas. The Japanese Supreme Court adjudicated as follows: "In the lawsuit filed to call for the cancellation of the granted nuclear reactor installation license and in which the legal issue is whether or not the judgment made regarding the safety of the nuclear reactor was correct, the examination and judgment by the court should be based on its determination of any unreasonable point in the judgment made by the administrative office, the defendant, on the basis of the investigation and judgment of the specialized technology by the Japanese Atomic Energy Commission and the Japanese Nuclear Reactor Safety Specialty Committee. If, in light of the currently available level of science and technology, any unreasonable points are found in the examination standards used for the aforementioned investigational examination, or errors or shortcomings which cannot be looked over are found in the process leading to the investigational examination and judgment made by the Japanese Atomic Energy Commission and the Japanese Nuclear Reactor Safety Specialty Committee that the nuclear reactor facility concerned conforms to the aforementioned specific standards, and the judgment made by the defendant administrative office was based on these inappropriate situations, it should be judged that the aforementioned judgment by the defendant administrative office has unreasonable points and accordingly, it should be interpreted that the disposition of granting license to installation of the nuclear reactor concerned on the basis of the unreasonable judgment is illegal" (refer to the judgment made by the Japanese Supreme Court on October 29, 1992). In other words, if there were no such unreasonable points, the discretionary judgment by the administrative office should be respected. As such, both the court's views and the academic views are currently against the theory of substituting substantial judgment by which the Court is allowed to conduct a complete examination to the extent of affecting the administrative judgment.

The Japanese Supreme Court explained its rational for using uncertainty law as follows: "as far as the evaluation or examination...should require an overall judgment based on recent and highly advanced scientific and technological knowledge and findings in diverse areas

and, because of continuous progress and advancement in science and technology, stipulating by law specific and detailed safety standards for nuclear reactor facilities by legislative means is not only difficult but also inappropriate, since such standards cannot immediately address any recent technological changes." [10]

(b) The Kalkar Case :

In Germany also, two situations called attention to the difficulty of stipulating technical standards via legislation:

- (1) when the subject of regulation rapidly changes and
- (2) when details understanding of the relevant technology is required. However, when regulating science and technology itself, as discussed below, it is possible that standards other than a society's established scientific and technological standards may be used, and it is necessary to investigate to what extent the court is allowed to examine the administrative discretion using novel approaches. In the Kalkar case, the German Federal Constitutional Court stated: "By referring to existing scientific knowledge and technology, the law forces the administrative power to observe the principle of providing the best possible protection against dangers and risks. The legislature was not bound, however, to define with precision the possible kinds and factors of risk. The assessment of risks associated with a nuclear power plant installation depends upon a multitude of circumstances, many of which are constantly evolving.... In the interest of promoting a flexible policy of life and property protection, the executive must assess and constantly adjust safety measures - a task the administrative power is better equipped to perform than the legislature is. The unavoidable degree of uncertainty in assessing such risks resides in the nature of human knowledge." [11]

In recent years, scientific standards have been formulated by considering not only safety but also ethics and social validity. Under these circumstances, standards are established after listening to both professionals specialized in relevant areas and to the ordinary citizens. Therefore, in the future, the formulation of further standards will depend on the level of involvement by the administrative power (e.g., conducting surveys of public opinion, holding public hearings or symposiums, and setting up opportunities to hear from the ordinary citizen prior to formulation of standards).

This is neither the accumulation of expertise in private areas nor the monopolized expertise by the administrative power described by academics. The standards formulated in the manner above may be considered to be legally effective as social norms since the court hardly presents these standards merely by collecting scientific reports

and making own judgment from the collected information.

Furthermore, assume that the conventional technology standards (1) have been expressly stated on the presumption that these standards are established as the common views of society (e.g. already standardized medical care among professional care individuals" according to the concept of the available level of medical care), (2) contain elements constituting political judgment which incorporates expertise, and (3) monopolized by the administrative power. If the preceding assumptions are true, then new scientific standards that are required in the future, e.g., those for the application of cloning technology, should have the following aspects: (1) these standards are applicable to all scientific and technological activities, including uncertain and undefined scientific knowledge and findings (which may have little documented); (2) these standards strongly indicate the existence of ethical judgment based on specialized knowledge; and (3) because of the characteristics described above, these standards can be formulated by the administrative power that mediates between professionals specialized in specific areas, researchers and citizens to confirm the social order. In terms of character, the conventional standards contrasts strikingly with the new standards. Differences between the two types of standards in their contents will inevitably give new aspects to the social disciplinary character of standards.[12]

In light of the concepts that propose limiting the range of examination and judgment by the court on the basis of the idea of uncertainty law as indicated by the aforementioned judgments made by the Japanese Supreme Court and the academic views in South Korea, Japan, and Germany, we might learn from this judgment that behind the judgment: the court considers the existence of some norms (e.g. public policy or good morals, standards for medical care acts) that should be taken into account during a trial, and these norms might correspond to legal norms that contain the idea of uncertainty law.

3. CONCLUSIONS

Nuclear power in South Korea is at a crossroads. Without fundamental changes in both the administrative practice of nuclear safety regulation and in the judicial review on nuclear safety standards, there will exist a potential for the failure of risk management and this may ultimately obstruct the entrenchment of the safety use of nuclear energy.

According to South Korean nuclear safety regulations, the safety assessment of during construction, commissioning and essential modifications of a nuclear power plant is performed within the licensing process. Continuous safety evaluation during nuclear power plant operation is performed within the scope of regulatory supervision.

However, the safety standards for nuclear power plants has been adapted as a form of the scientific technical standards widely under the idea of uncertainty law.

Reviving public confidence in nuclear safety thus requires the restoration of public confidence in nuclear regulation, and this comparative approach on nuclear regulation in South Korea, Japan, and Germany teaches that such confidence cannot be obtained if the judicial review is excluded from the licensing process based on the concept of uncertainty law.

Thus, the improvement of nuclear safety regulation in South Korea seems to depend on the rational lawmaking and a reasonable, judicial examination of the scientific standards on nuclear safety.

REFERENCES

- [1] Law was fully amended on April 1, 1982 (Law No. 3549).
- [2] On the legal structure of nuclear safety regulation in Korea in detail, Cho, Byung-Sun, "Legislation for the Countermeasures on Special Issues of Nuclear Safety Regulation," KINS/HR-527, Korea Institute of Nuclear Safety, Daejeon (1998); Cha, Cheol-Soon, "Improvement of Nuclear Safety Regulation," *Bobjo*, 458, 5-34.
- [3] See Cho, Byung-Sun (Fn. 2), pp. 13.
- [4] On the legal scientific discussions generally, Klopfer, Michael, *Umweltrecht*, C.H. Beck, Muenchen (1989), pp. 56.
- [5] Klopfer, Michael (Fn. 4), pp. 56.
- [6] I agree with an examination from a comparative point of view: Kubifuji/Murada, *Case Materials on Environmental Pollution Vol. 5: Nuclear Power, Biohazard*, Shunposha, Tokyo (2001), pp. 93.
- [7] See Klopfer, Michael (Fn. 4), pp. 56.
- [8] See Jarass, Hans D., "Das untergesetzliche Regelwerk im Bereich des Atom- und Strahlenschutzrechts," in: Lukes, Rudolf ed., *Reformueberlegungen zum Atomrecht*, Carl Heymann, Koeln, Berlin, Bonn, Muenchen (1991), pp. 367.
- [9] Judgment of Japanese Supreme Court of Oct 29, 1992, Minshu Vol. 46 No. 7, pp. 1174.
- [10] In detail see Kubifuji/Murada (Fn. 6), pp. 96.
- [11] Judgment of German Federal Constitutional Court of 1978, 49 BVerfGE 89.
- [12] See Jarass, Hans D. (Fn. 8), pp. 367; Kubifuji/Murada (Fn. 6), pp. 96.
- Cho, Byung-Sun, *Legislation for the Countermeasures on Special Issues of Nuclear Safety Regulation*, KINS/ HR-527, Korea Institute of Nuclear Safety, Daejeon (1998).
- Cha, Cheol-Soon, "Improvement of Nuclear Safety Regulation," *Bobjo* 458, 5 (2002).
- Klopfer, Michael, *Umweltrecht*, 3rd ed., C.H. Beck, Muenchen (1989).
- Kubifuji/Murada, *Case Materials on Environmental Pollution*, Vol. 5: Nuclear Power, Biohazard, Shunposha, Tokyo (2001),

- Jarass, Hans D., “Das untergesetzliche Regelwerk im Bereich des Atom- und Strahlenschutzrechts,” in: Lukes, Rudolf ed., *Reformueberlegungen zum Atomrecht*, Carl Heymann, Koeln, Berlin, Bonn, Muenchen (1991), pp. 367.