

Policy Proposal

Toward Optimization of Nuclear Safety Regulation

**- Prospecting the Amendment of
Reactor Regulation Act -**

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Introduction

In the environment of rapidly growing mistrust for nuclear technologies, corporate governance of operating organizations of nuclear power plants (hereinafter referred to as “operators”) and the Government’s nuclear policy in general following the accident at the Fukushima Daiichi Nuclear Power Station (hereinafter referred to as the “Fukushima Daiichi NPS”) of Tokyo Electric Power Co., Inc. (hereinafter referred to as “Tokyo Electric Company”), efforts are gradually being undertaken to restore the public confidence in nuclear power, including a wide range of activities including reconstruction of operators’ safety culture, reassessment of the Government’s nuclear policies and reform of the administrative organizations as well as the activities on and around the Fukushima Daiichi NPS site such as rebuilding of neighboring communities which were suffered from nuclear damages, decommissioning of the reactor facilities which caused the accident and confinement and processing of contaminated water.

As part of such efforts, the former Government organizations who were responsible for safety regulation of the nuclear energy related activities were separated from the organizations responsible for promotion of nuclear energy use and the Nuclear Regulation Authority (hereinafter referred to as “NRA”) and its secretariat organization (NRA Secretariat) were established as highly independent administrative organizations responsible for nuclear safety regulation under Article 3 of the National Government Organization Act. This organizational reform was intended to make the check-and-balance mechanism function properly on both promotional and regulatory sides. On the other hand, operators are expected to take the causes of the Fukushima Daiichi NPS accident, the Tokyo Electric Company’s efforts for preventing the spread of damages and the efforts toward resolution of situations resulted from the accident as their own matters, and to work seriously on the improvement of their organizational culture and corporate governance.

Such efforts by the Government and operators can become really effective only when sound and constructive relations are established between operators (licensees) and the regulator (licenser) on the basis of mutual respect and trust. It is certainly difficult to establish such matured relations at this moment only three years after the Fukushima Daiichi NPS accident. It is quite natural for the NRA as a regulatory agency to take a stern attitude to operators as licensees, in order to

rebuild the public confidence in nuclear technologies, facilities, plants and activities which are subject to its regulation and consequently to receive high acclaim from the third parties. It also makes sense for the organizations promoting nuclear energy as their organizational role to keep a cautious attitude to the actions which might cause misunderstanding that they are impeding independency of safety regulation or intervening in regulatory activities or decision making processes.

On the other hand, operators seem to be bewildered by the change of administrative agency's attitude. The procedural practices and precedents which had been shared between operators and regulatory bodies before the establishment of the NRA became completely not useful and both sides are required to go through fully new license application and review processes. So called "predictability", that is, prepare for the next step according to practices, was lost in such situation. In addition, operators' minds are filled with "impatience" for plant restart, under the situation where financial conditions are going down due to increased purchase of fossil fuels.

Current relations between operators and regulatory body may be temporary. But if such relations should be structuralized and should be continued for a long time, only mistrust and suspiciousness would prevail among all parties concerned, and that could bring concern that "true improvement of safety", which is a common aim of all concerned parties, becomes difficult to achieve.

Based on such understanding of the current issues, this policy recommendation document identifies the recent problems of regulatory activities and discusses what is expected for the NRA regulatory activities, what is expected for operators and what institutional actions are required to make the proposals actually effective (e.g. amendment to the "Act for the Regulation of Nuclear Source Materials, Nuclear Fuel Materials and Reactors" [hereinafter referred to as the "Reactor Regulation Act"])

This policy recommendation document does not intend to address detailed technical issues of safety regulation, but mainly focuses on the expected discipline/norms, procedures and management of regulatory activities.

Finally the author expresses its gratitude to Accenture Japan Ltd. for the considerable assistance in the investigation of regulatory matters in foreign countries and regulatory-review-related example cases in Japan.

* This report is a research result of the 21st Century Public Policy Institute, and does not show the view of the Keidanren.

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Chapter 1 Issues of current regulatory activities by the Nuclear Regulation Authority

The Nuclear Regulation Authority (NRA) is now in the process of reviewing conformity of nuclear power plant designs to the new regulatory requirements established following the Fukushima Daiichi NPS accident in response to operators' applications for review. This review (conformity review) is being carried out for reactor establishment license (amendment), approval of construction plan and approval of operational safety program as a combined set in order to effectively conduct the review for restart of plant operation.

The following gives an overview of the current problems arising from such new regulatory activities.

As is the case for safety regulation of other technologies, nuclear safety regulation is generally based on the idea that fundamentally any "technology" has potential risks and therefore precaution has to be taken to minimize the probability of actualization of potential risks and to minimize possible damages in case the risks are actualized. Therefore the concept of "safety" is not absolute, but relative. Such idea has been the basis of safety regulation before the Fukushima Daiichi NPS accident.

However, instead of explaining such idea, the Government as well as operators repeated explanations suggestive of absolute safety as a reality ("zero-risk argument") and finally they themselves got entrapped in believing such argument ("myth of safety"). This was because accurate explanation was thought to passively encourage local community to require absolute safety and impede the continuity of their claims in ongoing nuclear power generation lawsuits (if continuous safety improvement is required, that might be taken as "safety" as the basis of the past licensing is doubtful). That was the actual situation before the Fukushima Daiichi NPS accident. Under such situation, the risk-informed regulatory framework to minimize accident probability and possible damages in case of an accident could not be generally accepted.

In light of the lessons learned from the Fukushima Daiichi NPS accident, safety regulation after the accident fully incorporated the idea that the possibility of accident is not zero, and it is tried to provide "necessary conditions" for operating nuclear plants. This approach requires operators to take necessary actions and measures to minimize the possibility of accident and the NRA to review the conformity of those actions and measures to conditions it provided. Thus establishment of such conditions and confirmation of conformity of operators' actions and measures to those conditions became a major function of the NRA.

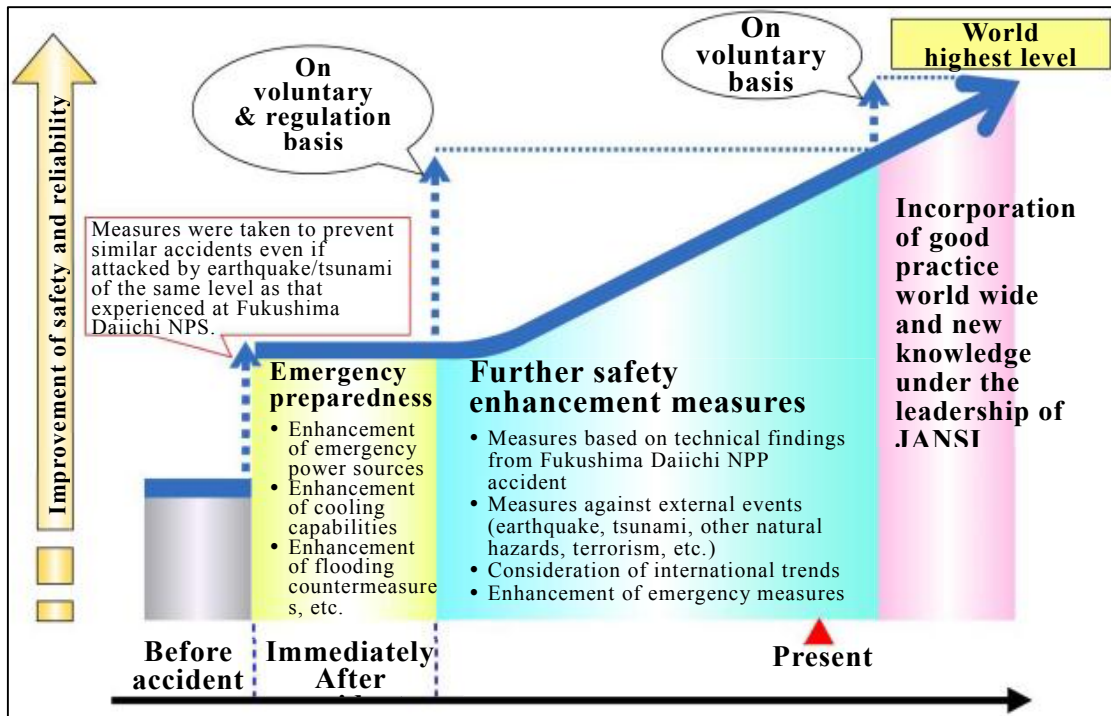


Figure 1 Efforts toward enhanced nuclear safety

Then, what comes next is a question whether safety is really ensured by meeting those necessary conditions. Compliance with the necessary conditions is a matter of course and in addition operators have to take a responsibility for developing and implementing the measures to continuously improve plant safety. The primary responsibility for plant safety lies on operators. That is a global standard. The Nuclear Damage Compensation Act requires operators to assume no-fault liability. From this viewpoint also, it is clear that operators cannot escape their liability for loss of safety or actualization of potential risks, i.e. accidents, even if they have taken all the actions necessary for meeting the regulatory requirements required by regulatory body. This also suggests how it is irrelevant that claims are often raised by local authorities and others requiring the parties other than operators, such as the NRA or other government agencies, to “ensure safety.”

In the above context, it would be an expected practice for the NRA to focus on necessary conditions and for operators to independently implement self-imposed safety enhancement measures of different quality in different dimension. But reality is not like that. As shown in Fig. 1, operators themselves still have misunderstanding to take safety measures on an extended line same as that in the regulator’s dimension. That would still lead to misunderstanding to think that zero-risk world really exists. Operators’ voluntary safety enhancement efforts should include not only those to be performed on the extended line of regulatory requirements, but

also comprehensive safety measures which incorporate the issues out of regulatory scope and site-specific conditions.

The Fukui district court granted the caveat against the Kansai Electric Power's Ohi Power Station the other day.

The summary of judgment says that "the point of judgment was whether there is, by any chance, any specific risk to cause such situation (like Fukushima Daiichi NPS accident)" and added that "if there is any such possibility, the caveat should be granted as a matter of course." In other words, the judge took a stance of zero-risk requirement, not to accept non-zero-risk situation.

The NRA showed no specific reaction to this court decision. But the NRA as an administrative agency has to pay attention to judicial judgment even if it was a lower court decision. In addition, situations are becoming somewhat realistic where the NRA has to be prepared for an administrative lawsuit brought by anti-nuclear groups. Furthermore, since increasing number of caveats against nuclear power plants are being filed across the country, possibility of assisting intervention under Article 42 of the Code of Civil Procedure should be considered.

Then the NRA will have to explain to the public (and to the court) about the relative nature of the basis for safety regulation. In that case, it is doubtful whether the NRA can convince the public by explaining only about necessary conditions. It is easy to imagine that the NRA may feel anxiety for being required to provide something like sufficient conditions. The anti-nuclear groups, which have been insisting so far that there is no zero-risk technology in this world, have now changed their argument and begun to claim that restart of a nuclear power plant should not be permitted unless it is shown that the plant involves no risk (though this claim is self-contradictory in itself). Under such circumstances, the NRA seems to be afraid that it could be subject to bitter criticisms if it tries to understand operators' opinions, and that if it tries to enhance preliminary review to streamline its review process, then it could be accused of doing things in secrecy. As a result of such mounting concern, the NRA's attitude toward operators has become awkward and moreover it seems that strange misunderstanding is prevailing within the NRA that taking stubborn approach is no other than showing its independence. That may be the current situation in the NRA.

As for "transparency" of review process, some criticize that the NRA has a misconception that "transparency" is synonymous with live broadcasting of meeting on the internet. But, transparency should be to publicly explain decision making process including the data, judging criteria and reasoning applied to the decision. It is not enough for achieving accountability only with line-broadcasting meetings between the regulator and operators (sometimes it is unclear what they are talking about at meetings). Sometimes we encounter the scenes where they seem to be "acting", knowing that they are being broadcasted. As will be discussed later, approach to achieving "transparency" should be thoroughly reconsidered.

It is hardly possible to provide sufficient conditions for safety

measures without establishing normal communication with operators who know best about detailed conditions of plants. Technical information also cannot be kept updated without communication with operators and manufactures. Lack of communication could result in request for additional information, because the NRA cannot determine with confidence whether data received from operators or manufactures for a certain review item are sufficient or not. Even when requesting additional information, the NRA itself is sometimes not aware of what type and level of data would be sufficient for regulatory review. That is a root cause, in many cases, of the situation where operators are accused of not providing sufficient data and are obliged to take responsibilities for everything.

(Example 1) The NRA Expert Meeting on the Crush Zone on Tsuruga Power Station Site discussed the draft report "Evaluation of Crush Zone on Tsuruga Power Station Site of the Japan Atomic Power Company"¹ on May 15, 2013. This report mainly insists that the data submitted by the operator are insufficient to rule out the possibility of the concerned crush zone being an active fault, without showing the basis for the NRA's argument to consider the crush zones as active faults. In this report, the NRA uses reference 4, "Guide for Reviewing Seismic Safety of Nuclear Power Reactor Facilities" (December 20, 2010, Nuclear Safety Commission)², as a basis for its judgment. The clause (5) of "1.3 Identification of Active Fault to be Considered in Seismic Design" of this Guide prescribes that "in identifying an active fault to be considered in seismic design, the method, basis and reliability of information supporting the basis should be shown". Obviously the report does not meet this requirement, and that means the NRA expert meeting has not achieved its accountability.

(Example 2) "Evaluation Meeting on the Current Status of the Kansai Electric Power Company's Ohi Power Station Units 3 and 4" was held on June 20, 2013. The discussion at this meeting is an example of the case where the NRA excluded an evaluation method other than that described in the relevant NRA's guide. The reason for excluding other method was not clearly explained, although the guide only provides "an example". This case is an example where possibility for applying different method was foreclosed because the necessary conditions for properly demonstrating adequacy of an alternative method have not been clearly defined.

The NRA's "Guide for Evaluating the Impact of Internal Flooding at Nuclear Power Plants"³ describes that "a piping damage should be assumed to occur at a location where leakage is expected to have the largest impact on the safety functions of the plant. As for leakage amount, when the maximum leakage from water inventory can be specifically estimated considering the factors such as

¹ Japan Atomic Power Company, "Evaluation of Crush Zone on Tsuruga Power Station Site", http://www.nsr.go.jp/committee/kisei/h25fy/data/007_02.pdf

² Guide for Reviewing Seismic Safety of Nuclear Power Reactor Facilities , http://www.nsr.go.jp/archive/nsc/shinsashishin/pdf/1/101220_1.pdf

³ Guide for Evaluating the Impact of Internal Flooding at Nuclear Power Plants , http://www.nsr.go.jp/nra/kettei/data/20130628_jitsuyouissui.pdf

pipings height and route, the amount of flooding water may be calculated assuming such upper bound of water leakage (details of flooding due to damage of fluid-containing piping are given in Annex A)". Pipe rupture need not be assumed for those pipes which meet a certain criterion. This Guide requires detailed stress evaluation in assuming a pipe damage and refers, in its appendix, to "the U.S. NRC's Standard Review Plan (SRP) Branch Technical Position (BTP) 3-4 'Postulated Rupture Locations in Fluid System Piping Inside and Outside Containment' and the Standards for Nuclear Power Generation Facilities of Japan Society of Mechanical Engineers "Piping Damage Protection Design Code (JSME S NDI-2002)" as "examples" of the methods applicable to such evaluation.

In addition, the Guide allows use of alternative evaluation methods by describing, in its appendix, that "use of any evaluation method other than those referred to in this guide is not hindered if adequacy of such method is properly demonstrated." Accordingly the Kansai Electric Power Company performed stress evaluation using an alternative evaluation method other than those given in the Guide as examples in order to get approval for applying the exemption provision, which is applicable to pipe damage assumption for general portions of high energy piping, to a part called terminal end. The Kansai Electric Power showed that same design philosophy was applied to both general portions of high energy piping and terminal ends and then showed the results of stress analysis results for each piping subject to evaluation⁴. The NRA did not accept the evaluation using this alternative method. Instead it pointed out the necessity for establishing a whole system of evaluation encompassing from evaluation method to judging criteria⁵. The status assessment report compiled later by the NRA describes its comment as "the NRA confirmed the conditions of the systems and components which are installed in the zones harboring high energy piping and are to be protected against flooding, and pointed out that the Kansai Electric Power's method was not adequate for evaluation of flooding prevention measures"⁶.

In this Kansai Electric Power's case, the NRA made a judgment to deny adequacy of an alternative method, without any clear explanation of specific criteria or technical basis for accepting (or not accepting) alternative methods, both in the Guide and at the assessment meetings, although the Guide generally allows use of alternative methods. The reason for not accepting the Kansai Electric Power's alternative method has not been presented either at the review meetings. This example represents the current situation where operators will have to grope their way to find how to apply alternative methods, even in the future.

⁴ The Kansai Electric Power Company, "Strategy for Evaluating Impact of Internal Flooding", (May 30, 2013, supplemental material for "Meeting on Assessment of Current Status of Ohi Power Station Units 3 and 4"), https://www.nsr.go.jp/committee/youshikisha/ooi_genjyou/data/0008_04.pdf

⁵ Nuclear Regulation Authority, June 13, 2013, "Minutes of the 12th Meeting on Assessment of Current Status of Ohi Power Station Units 3 and 4", https://www.nsr.go.jp/committee/youshikisha/ooi_genjyou/data/20130613-ooi.pdf

⁶ Nuclear Regulation Authority, June 20, 2013, "Report on Current Status of the Kansai Electric Power Company's Ohi Power Station Units 3 and 4", https://www.nsr.go.jp/committee/youshikisya/ooi_genjyou/data/0013_01.pdf

Looking at such response of the NRA, operators would get suspicious about what judgment the NRA makes with what amount of data and would often hesitate to provide data and materials. As will be presented later with another examples, it becomes difficult for operators to determine how much money they should invest in safety measures, if regulatory judgment changes inconsistently or interpretation of review criteria is unstable. That would result in uncertainty in cost estimation and have a significant impact on the business conditions of operators. On the other hand, the NRA casts blame on operators by criticizing their bit-by-bit provision of information and takes organizationally defensive attitude insisting that it is not to blame for prolonged review.

Operators, who will suffer significant damages to their management if they cannot restart their plants, have no other choice but to finally follow the insistence of the NRA, who only seeks for ensuring safety through its review without any consideration of managerial issues. So operators would feel there is no other way but to show their “will to submit” and make it their sole short-term target to get through the NRA’s review. That might lead to operators’ mind to think there is nothing more to do if they passed the review, and finally to collapse of the fundamental safety improvement mechanism on which basis operators assume primary responsibility for plant safety and pursue continuous safety enhancement on a autonomous basis. Such concern is now growing.

The NRA has to re-recognize that its role is not “to stop” nuclear power plants, but “to safely operate” the plants. What the NRA has to do now is to operate its organization keeping in mind what regulatory requirements it should develop and how it should verify operators’ actions for meeting the requirements, in order to make effective use of the economical asset so far invested on the public burden. If the NRA has such recognition that it has to be the “last defense line” for stopping nuclear power plant operation or for leaving the plants stopped, then that is none other than lack of fundamental understanding of its own organizational role.

The recent amendment to the Reactor Regulation Act was made under administration of the Democratic Party. It is hard to say that this amendment is based on sufficient discussion on expectation for and role of nuclear safety regulation, since there was no consensus at that time even within the administration as well as in the ruling party concerning the extent to which nuclear power generation should be maintained in the future including restart of existing plants. Restart strategy has finally been acknowledged in the “Basic Energy Plan” adopted recently at a Cabinet meeting. It has become clear that quantitative discussion will be made about the extent to which nuclear power generation should be maintained in the future. Under such situation, it is required to make it clearer that an objective of the Reactor Regulation Act is “to safely operate” nuclear power plants.

○ Example of delayed review process

An example is the delay of review process for the Japan Atomic Power

Company's Tsuruga Power Station outlined below. On May 15, 2013, the 5th expert meeting (official name: Expert Meeting on the Investigation of the Crush Zone on Tsuruga Power Station Site) made evaluation and concluded that "fault K is likely to extend further to southern direction. Faults K and G and crush zone D-1 are likely to compose a series of geological structure". After about two months, on July 11, the Japan Atomic Power Company submitted to the NRA a report titled "Report on the Investigation of the Crush Zone on Tsuruga Power Station Site" to demonstrate more clearly that the crush zone is not an "active fault to be considered in seismic design"⁷. Upon receiving this report, the NRA held several times of hearings and one review meeting, but after those meetings the expert meeting was not held for about a year without any clear reason until additional investigation meeting started in April, 2014. This is an example of problem cases that brought significant delay to review process.

○ Examples of unstable interpretation of review criteria

(Example 1) Maximum wind velocity of design basis tornado

In taking necessary measures against tornados, the Kansai Electric Power Company defined the maximum wind velocity (V_B) of the design basis tornado in accordance with the "Guide for Evaluating Impacts of Tornados at Nuclear Power Plants" developed by the NRA.

This Guide requires that "the maximum velocity (V_B) be 'the maximum wind velocity of the tornados experienced in the past (V_{B1})' or 'the maximum wind velocity obtained from the maximum tornado hazard curve (V_{B2})', whichever is higher". In addition, while the Guide requires operators to define V_{B1} considering the maximum tornado wind velocity ever experienced in the past in Japan as a general rule, at the same time it prescribes that "Japan' can be read as 'tornado impact assessment areas' (the area where the nuclear power plant is sited and those other areas which have similar meteorological conditions from the viewpoint of tornado phenomena) if sufficiently reliable data are available for the evaluation."⁸

In performing tornado impact assessment as a part of status assessment for Ohi Units 3 and 4, the Kansai Electric Power Company defined and used tornado impact assessment area. The Guide provides the following basic consideration for defining a tornado impact assessment area:

For defining a tornado impact assessment area, an IAEA standard (reference 31) can be consulted. The IAEA standard recommends about 100,000 km² of area for which tornado records should be investigated when assessing annual frequency of tornado exceeding a certain level of wind velocity. Using this IAEA's standard as a reference, an area of 100,000 km² around a nuclear power plant is defined as a candidate for tornado impact assessment area. However, meteorological conditions may vary significantly within a relatively small area in Japan. For example, meteorological

⁷ Japan Atomic Power Company, "Submission of the Report on the Investigation of the Crush Zone on Tsuruga Power Station Site", <http://www.japc.co.jp/news/press/2013/pdf/250711.pdf>

⁸ Nuclear Regulation Authority, "Guide for Evaluating Impacts of Tornados at Nuclear Power Plants", http://www.nsr.go.jp/nra/kettei/data/20130628_jitsuyoutatsumaki.pdf

conditions are significantly different between the Sea of Japan side and Pacific Ocean side. Therefore, irrespective of this 100,000 km², the basic method for defining a tornado impact assessment area should be based on investigation for the areas where meteorological conditions are similar, from the viewpoint of tornado phenomena, to those in the area where the nuclear power plant is sited.

The Kansai Electric Power Company defined a tornado impact assessment area by reference to 100,000 km² recommended in the IAEA document “SSG-18” which is referred to in the NRA Guide. Specifically, the Kansai Electric Power selected the overlapped area of “the area within 180 km from Ohi Power Station (about 100,000 km²) and the area within 5 km on both sides (sea-side and mountain-side) of the coastline (5,321 km²)” as the tornado impact assessment area. Using the Japan Meteorological Agency’s “Gust and Tornado Database” 41 tornados were identified to have occurred in the specified tornado impact assessment area in a period from 1961 to June 2012. The largest tornado was of class F1, which corresponds to 33 - 49 m/s of wind velocity. So the Kansai Electric Power adopted 49 m/s as the maximum wind velocity of the tornados experienced in the past (V_{B1}). The wind velocity V_{B2} was statistically evaluated using a hazard curve prepared for the tornado impact assessment area and 69 m/s, which corresponds to the wind velocity of 10⁻⁵ annual exceedance probability, was selected as V_{B2} value. Therefore, the maximum wind velocity V_B was set at 69 m/s, the larger value of V_{B1} and V_{B2} ⁹.

However, at a subsequent status assessment meeting the NRA commented that “the tornado impact assessment area need not necessarily be a circular zone” and suggested to “expand the coverage of investigation to wider areas along the Sea of Japan which have similar conditions.”¹⁰ Receiving such comments, the Kansai Electric Power redefined the tornado impact assessment area by adding the areas “geographically and meteorologically similar” to the plant site within 5 km on both sides of the coastline from Hokkaido to Honshu Island. For this new tornado impact assessment area, 69 m/s was derived as the value of V_{B1} and V_{B2} and the maximum wind velocity V_B was set at 69 m/s.¹¹

Upon receiving the evaluation results from the Kansai Electric Power Company, the NRA commented, in the “Report on the Current Status of the Kansai Electric Power Company’s Ohi Units 3 and 4”¹² (July 3, 2013), that “it has confirmed that the design basis tornado was properly defined based on necessary investigation judging from the fact that the operator evaluated the structural integrity against 100 m/s of wind velocity”, and added that “in the review after

⁹ The Kansai Electric Power Company, “Strategy for Tornado Impact Assessment” (May 30, 2013), https://www.nsr.go.jp/committee/yuushikisya/ooi_genjyou/data/0008_03.pdf

¹⁰ The Kansai Electric Power Company “Minutes of the 8th Evaluation Meeting on Current Status of Ohi Power Station Units 3 and 4” (May 30, 2013), https://www.nsr.go.jp/committee/yuushikisya/ooi_genjyou/data/20130530-ooi.pdf

¹¹ The Kansai Electric Power Company, “Response to Comment on Tornado and Results of Impact Evaluation” (June 11, 2013), https://www.nsr.go.jp/committee/yuushikisya/ooi_genjyou/data/0011_11.pdf

¹² Nuclear Regulation Authority, “Report on the Current Status of the Kansai Electric Power Company’s Ohi Units 3 and 4”, July 3 2013, https://www.nsr.go.jp/committee/kisei/h25fy/data/0013_01.pdf

the new regulatory requirements are put into force, further investigation will be needed to take into account regional characteristics and to collect more data for defining a design basis tornado to be used as a design basis.¹³ However, the NRA showed neither its criterion for determining “the areas which have similar meteorological conditions from the viewpoint of tornado phenomena” mentioned in the Guide, nor its idea concerning how to judge sufficiency and reliability of the tornado data.

The regulatory requirement allows licensees to read “Japan” as “the tornado impact assessment area” under the condition of availability of sufficiently reliable data. But adequacy of this condition has become a point of argument in the course of regulatory review involving multiple operators. Immediately after the start of review of conformity to new regulatory requirements (conformity review), applications for the review were filed for Sendai Nuclear Power Plant unit 1 and 2 of the Kyushu Electric Power Company, Tomari Power Station of the Hokkaido Electric Power Company, and Ikata Power Station unit 3 of the Shikoku Electric Power Company. The NRA notified these plants of the focuses of the conformity review taking into account the contents of amendments to reactor establishment licenses which were confirmed through the first review meetings and subsequent hearings¹⁴. One of the focuses identified in conjunction with assessment of tornado impacts was a request for explanation on “credibility of defined design basis tornados and adequacy of the protective measures against missiles¹⁵.” The Shikoku Electric Power Company initially defined a design basis tornado by reading “Japan” as “tornado impact assessment area”, but withdrew the original approach at the review meeting held in November of the same year and proposed to take a whole “Japan” approach. During that time the NRA repeatedly requested the Shikoku Electric Power Company at hearings to show adequacy of the basis and reasoning of using tornado impact assessment area, for example, by saying “explanation should be provided on the relevance of defining V_{B1} on the basis of tornados experienced in the tornado impact assessment area rather than those experience in whole Japan” or “clean-cut reasons should be shown for not

¹³ In the Current Status Assessment Report (draft), the NRA evaluated the results of tornado impact assessment focusing only on the design basis tornado (V_D) (100 m/s) necessary for design basis missile evaluation without mentioning the tornado impact assessment area. The NRA’s evaluation states as follows: “Although Ohi site is surrounded by mountains on three sides and may have little chance of tornado attacked, the units were designed against a design basis tornado of the same velocity level as that used in the United States and in addition structural integrity was confirmed against 100 m/s of wind velocity. Therefore, the NRA concluded that the reference tornado was properly defined based on necessary investigation.”

¹⁴ Minutes of the 2nd Review Meeting on the Conformity of Nuclear Power Plants to New Regulatory Requirements (July 23, 2013), <http://www.nsr.go.jp/activity/regulation/tekigousei/data/20120723.pdf>

¹⁵ For detailed information, see the documents distributed at the 2nd Review Meeting on the Conformity of Nuclear Power Plants to New Regulatory Requirements (major review points for Sendai Nuclear Power Plant unit 1 and 2 of the Kyushu Electric Power Company, major review points for Tomari Power Station of the Hokkaido Electric Power Company, major review points for Ikata Power Station unit 3 of the Shikoku Electric Power Company and major review points for Takahama Power Station Units 3 and 4 of the Kansai Electric Power Company), <http://www.nsr.go.jp/activity/regulation/tekigousei/20130723.html>

considering the maximum tornado experienced in Japan¹⁶”.

Getting back to the case of the Kansai Electric Power Company, while hearing to other operators were being repeatedly held about the NRA’s inquiry for more explanation on the adequacy of “reading ‘Japan’ as ‘tornado impact assessment area’”, the NRA’s review of Ohi Power Station Units 3 and 4 was interrupted until the expert meeting on the investigation of the crush zone on the site reached its conclusion¹⁷. In the meantime the Kansai Electric Power Company set the maximum wind velocity of the reference tornado at 92 m/s considering the largest tornado ever experienced in Japan, without “reading ‘Japan’ as ‘tornado impact assessment area’.”¹⁸ The new evaluation results were submitted to the NRA, as a reference material for safety review of Ohi Power Station, at an operator hearing held prior to resuming of the review¹⁹. In more detail, in defining V_B (92 m/s), the Kansai Electric Company estimated V_{B2} using “tornado impact assessment area” defined as “the Sea of Japan side of Hokkaido and Honshu Island and the area within 5 km on both sides of the coastline to the west of Erimo Cape, and estimated V_{B1} without reading “Japan” as “tornado impact assessment area.” This approach is thought of having passed the review in effect, because no more discussion has been made on this topic at subsequent review meetings.

However this case poses the following problem. At operator hearings, the NRA pointed out acceptability of small number of tornados actually experienced as a reason for the argument on the tornado impact assessment area. But, on the other hand, the NRA has not shown any clear notion about under what conditions site-specific maximum wind velocity is accepted (i.e. under what conditions “Japan” can be read as “tornado impact assessment area” and with what method and how conservatively the assessment should be performed if sufficient amount

¹⁶ For detailed information, see the following meeting summary of “Operator Hearing for the Review of Conformity to New Regulatory Requirements for Ikata Power Station Unit 3”: Operator Hearing 16 (July 29, 2013), Operator Hearing 22 (August 13, 2013), Operator Hearing 40 (August 30, 2013), Operator Hearing 42 (September 3, 2013), Operator Hearing 75 (October 11, 2013), <http://www.nsr.go.jp/activity/regulation/tekigousei/shinsa/ikata3.html>

¹⁷ The NRA’s review of the Kansai Electric Power’s Ohi Power Station Units 3 and 4 was kept under suspension during a period from the 2nd Review Meeting on July 23, 2013 to the 20th Review Meeting on September 17 due to the NRA’s decision which said “the review will be resumed after the NRA reaches a certain conclusion about ongoing evaluation of the crush zone.” Major review points of the contents of the application for review of the Kansai Electric Power Company’s Ohi Power Station Units 3 and 4, http://www.nsr.go.jp/activity/regulation/tekigousei/data/0002_06.pdf

¹⁸ The NRA’s review of Ohi Power Station Units 3 and 4 was interrupted during a period from the 2nd review meeting on July 23, 2013 to the 20th review meeting on September 17 according to the NRA’s decision that “the review will be resumed after the NRA reaches a certain conclusion about ongoing evaluation of the crush zone.” During that time, as noted in the text, hearing to other operators were repeatedly conducted on the NRA’s inquiry about reading Japan as tornado impact assessment area.

¹⁹ Meeting summary of “Operator Hearing 47 for the Review of Conformity to New Regulatory Requirements for Ohi Power Station Units 3 and 4” held on November 14, 2013, and reference material submitted by the Kansai Electric Power Company “Reference Material for Safety Review for Ohi Power Station – Assessment of Tornado Impacts for Ohi Units 3 and 4”, <http://www.nsr.go.jp/activity/regulation/tekigousei/shinsa/ooi34.html>

of data is unavailable²⁰. Therefore operators have no other choice but to grope a means for defining the maximum wind velocity.

(Example 2) Design basis earthquake ground motion

In connection with the design basis earthquake ground motion, interpretation of review criteria based on the NRA's guide has become a major issue. The regulatory criteria for the design basis earthquake ground motion is provided in the "Review Guide for Design Basis Earthquake Ground Motion." "3.3.2 Evaluation of Ground Motion Using the Methods Based on Fault Model" of "I. Evaluation of Ground Motion" of the Guide requires that geological structures such as inclination of stratum, faults, and fold structure be evaluated in modeling the subsurface structures and "it be confirmed that the subsurface structures such as depth of upper boundary of seismogenic layer, locations and shapes of seismic basement and free surface of base stratum, three-dimensional irregularity of subsurface structure and seismic velocity structure as well as attenuation characteristics of the ground have been adequately evaluated."²¹

In the review of the Kansai Electric Power Company's Ohi Units 3 and 4, the "depth of upper and lower boundaries of a seismogenic layer became a point of argument²². The above-mentioned Guide describes that "dominant parameters significantly influencing the evaluation of ground motion on the site should be analyzed and reflected on the evaluation, when considering the uncertainties of seismic source model (length of earthquake source fault, depth of upper and lower boundaries of a seismogenic layer, inclination angle of fault, location and size of asperity, stress drop, uncertainty of hypocenter, and uncertainties associated with difference in interpretation and handling of those parameters)."

Evaluation of ground motion admits of various interpretations, because no clear guidance is available for handling uncertainties of parameters and combining those uncertainties. In respect to the uncertainties of the earthquake source model, the Guide describes that "it should be confirmed that the uncertainties of the model are properly taken into account for example by combining the uncertainties, as appropriate." However, no clear guidance is available about what kind of combination of uncertainties is required in what case. The Guide also describes that "it should be confirmed that factors of uncertainties are properly analyzed by grouping them into random and epistemological uncertainties." But again there is no clear statement about what kind of combination of grouped uncertainties is required in the evaluation of

²⁰ As for conservatism, the Kansai Electric Power Company showed a clear approach by proposing that "considering potential for large bias in annual frequency on tornados in the tornado impact assessment area, a conservative expected value should be used as the maximum wind velocity." But the NRA responded to this proposal by saying "the proposed value could not be conservative enough unless additional conservatism is taken into account" or "considerable conservatism should be taken into account." Both sides have not yet reached any consensus. (Source: minutes of 8th Evaluation Meeting on Ohi Units 3 and 4), http://www.nsr.go.jp/committee/youshikisya/ooi_genjyou/data/20130530.pdf

²¹ Review Guide for Design Basis Earthquake Ground Motion and Seismic Design Principle, http://www.nsr.go.jp/nra/kettei/data/20130628_jitsuyoutaishin.pdf

²² Minutes of the 18th Review Meeting on December 18, 2013, <http://www.nsr.go.jp/activity/regulation/tekigousei/data/20121218.pdf>

ground motion. In the review of Ohi unit 3 and 4, the NRA, including a “personal opinion” of a Commissioner, suggested an idea to incorporate the uncertainties, such as those associated with coupled movement of faults and depth of upper boundary of seismogenic layer, one by one into the basic case (see Fig. 2). But since no clear guidance has been shown yet about handling of uncertainties of parameters and combination of uncertainties, the evaluation of design basis earthquake ground motion admits of a wide range of interpretation.

○ Examples of changed regulatory judgment

The Kansai Electric Power Company thought it possible to extinguish a fire inside reactor building (except for certain parts) using stationary fire hydrant and hoses installed in accordance with the requirement of the “Regulations for Establishment and Operation of Commercial Power Reactors” and to be used according to the “Review Criteria for Fire Protection of Commercial Power Reactors and Associated Facilities.” (Use by on-site fire-fighting team was assumed.) At the Ohi Units 3 and 4 status assessment meeting on June 11, 2013, the locations difficult of fire extinction were identified based on the list²³ prepared by the Kansai Electric Power Company which showed a plan to install automatic fire extinguishing system and manually-operated stationary fire extinguishing equipment for the locations difficult of fire extinction. The NRA expressed its view saying that “we have got a general impression that acceptable level of measures will be taken.” In addition, the Ohi Units 3 and 4 status assessment report described an affirmative assessment result that said “according to evaluation which considers the measures to be taken at this moment, no immediate safety-significant problem is anticipated as far as fire events are concerned.”²⁴ However, at the hearing meeting prior to the review of conformity to new regulatory requirements for Ohi Power Station Units 3 and 4, the NRA expressed its position saying “though the Kansai Electric Power has a plan to manually extinguish a fire from the planned fire-extinguishing operation bases, which approach is unpractical and automatic fire extinction system should be in place instead of the current plan.”²⁵

This position of the NRA considers the whole area inside reactor building as an area difficult of fire extinguishing operation. Therefore it does not accept manual fire extinguishing operation with stationary fire hydrant and hoses and requires the operator to install automatic fire extinguishing system for the whole area inside reactor building. This is an example case where a new position of the NRA was added in the course of review.

²³ The Kansai Electric Power Company, “Comments and Responses on Internal Fire and the Results of Fire Impact Assessment” (Material submitted to the 11th Ohi Units 3 and 4 Current Status Assessment Meeting), https://www.nsr.go.jp/committee/youshikisya/ooi_genjyou/data/0011_08.pdf

²⁴ The Nuclear Regulation Authority, “Report of Current Status of Kansai Electric Power Company’s Ohi Power Station Units 3 and 4”, https://www.nsr.go.jp/committee/youshikisya/ooi_genjyou/data/0013_01.pdf

²⁵ Nuclear Regulation Authority, “Operator Hearing 61 for the Review of Conformity of Ohi Power Station Units 3 and 4 to New Regulatory Requirements”, http://www.nsr.go.jp/activity/regulation/tekigousei/shinsa/data/ooi34/mendan/20131128_02giji.pdf

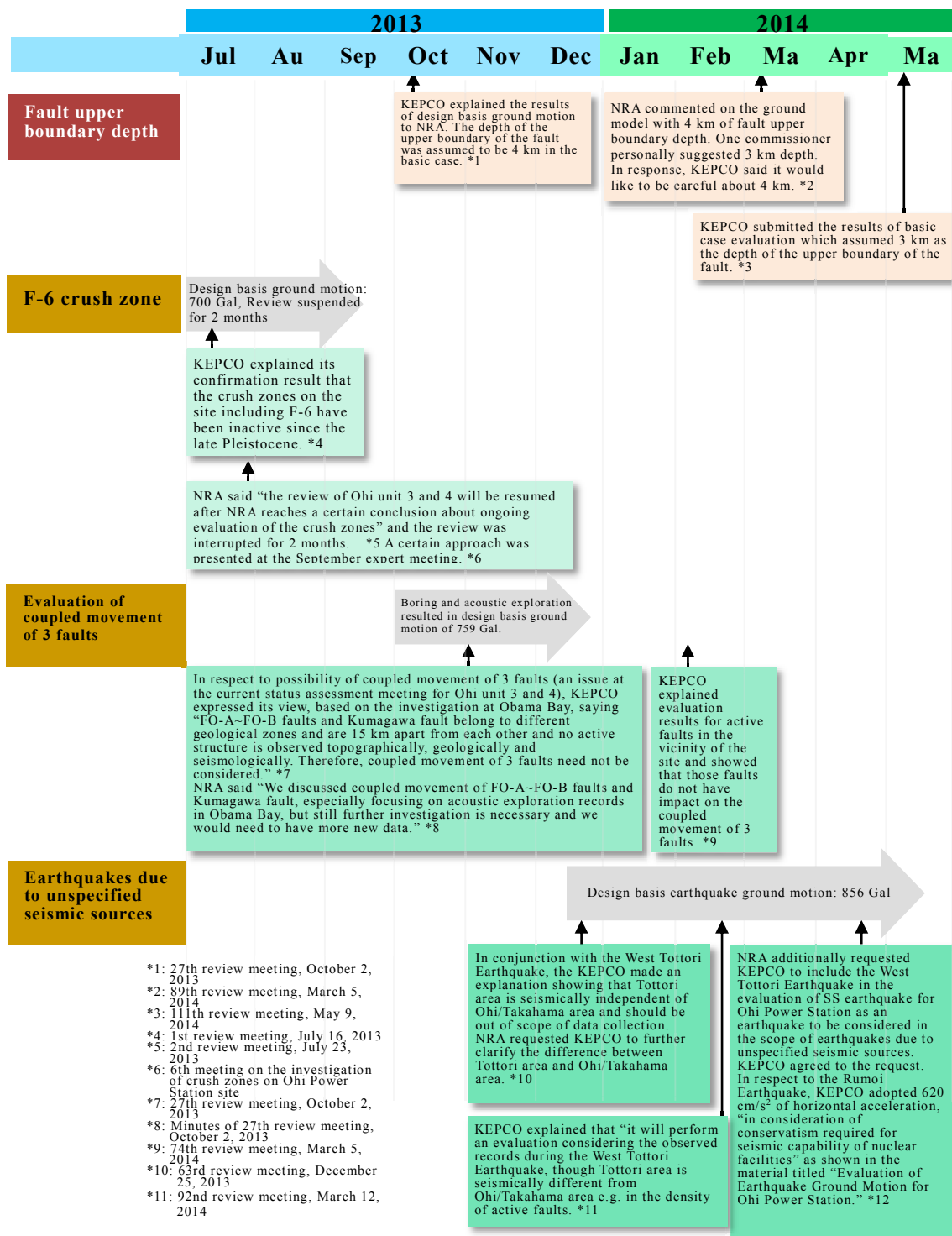


Figure 2 Chronology of Review Meetings on Design Basis Earthquake Ground Motion (in the case of the Kansai Electric Power Company)

Summing up, it can be said that regulatory activities have run into a negative spiral shown in the following Figure. We have to go back to the

starting point to think of how the nuclear safety regulation should be, by cutting off such negative spiral and the NRA’s privileged relationship with operators, and by getting back normal communication between the NRA and operators. Through such efforts, we have to reconstruct an institutional environment under which each of the involved parties can be fully committed to the activities to enhance nuclear safety. The following chapters discuss the recipes for such challenge.

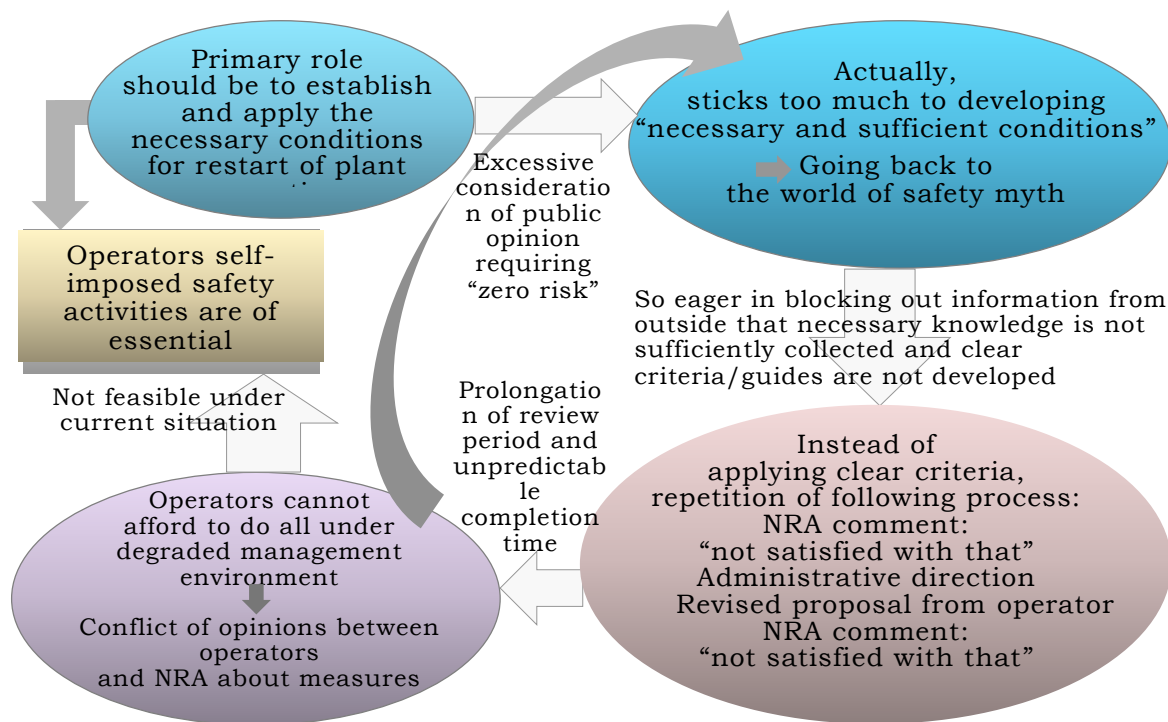


Figure 3 Current negative spiral of regulatory activities

Chapter 2 Approach required for future regulatory activities - Policy recommendations -

In order to carry out effective and efficient regulatory activities and to enhance safety of nuclear facilities, system development and efforts of both regulatory body and operators are required, and complementary functions for regulatory activities by intermediate and neutral organizations are expected. In addition, when the regulatory body considers specific political measures, it is appropriate to distinguish the part related to the operation method of the regulatory organization, NRA from the part related to the structure of regulation enactment system.

1. Approach required to the regulatory body

The safety regulation for nuclear power exists assuming that operators carry on nuclear power generation business that uses technologies to prevent the risk from adverse effect on the public safety and the environmental preservation. Therefore, if the safety regulation cannot remove the uncertainty when operators carry on the business and increases the uncertainty on the contrary, it is completely illogical. If the nuclear energy business and the technologies are not socially accepted in terms of safety and/or other reasons, and it is not allowed to use them as the business or a mean of business, the nuclear energy business should be abolished by democratic decision making (e.g. establishing the "Act for Abolishment of Nuclear Power Generation"), not by safety regulation.

Therefore, the common principle required as the role of safety regulation is "predictability". The predictability is a broad concept. In respect of the process from license application to disposition, the order of license procedure, places, members and time period of the license examination, and other items are included in the concept, and in terms of content, it is included in the concept that license approval criteria and interpretations are uniform within a certain range and not different among examiners. In order to improve the predictability, this document discusses how the current operation and regulatory activities of the NRA should be improved.

(1) Reconstruction of the fundamental principles of regulatory activities

First of all, the principles of U.S. Nuclear Regulatory Commission (NRC) are shown in the next table. NRC has determined independence, openness, efficiency, clarity and reliability as the basic elements of attitude related to regulatory activities, and has defined the concept at such a specified level to be able to use as the determination criteria for

making good technical judgment. It is considered that transparent and consistent public administration of nuclear safety has been developed by the regulatory principles in the U.S.

| | |
|---------------|--|
| Independence: | Nothing but the highest possible standards of ethical performance and professionalism should influence regulation. However, independence does not imply isolation. All available facts and opinions must be sought openly from licensees and other interested members of the public. The many and possibly conflicting public interests involved must be considered. Final decisions must be based on objective, unbiased assessments of all information, and must be documented with reasons explicitly stated. |
| Openness*: | Nuclear regulation is the public's business, and it must be transacted publicly and candidly. The public must be informed about and have the opportunity to participate in the regulatory processes as required by law. Open channels of communication must be maintained with Congress, other government agencies, licensees, and the public, as well as with the international nuclear community. |
| Efficiency: | The American taxpayer, the rate-paying consumer, and licensees are all entitled to the best possible management and administration of regulatory activities. The highest technical and managerial competence is required, and must be a constant agency goal. NRC must establish means to evaluate and continually upgrade its regulatory capabilities. Regulatory activities should be consistent with the degree of risk reduction they achieve. Where several effective alternatives are available, the option which minimizes the use of resources should be adopted. Regulatory decisions should be made without undue delay. |
| Clarity: | Regulations should be coherent, logical, and practical. There should be a clear nexus between regulations and agency goals and objectives whether explicitly or implicitly stated. Agency positions should be readily understood and easily applied. |
| Reliability*: | Regulations should be based on the best available knowledge from research and operational experience. Systems interactions, technological uncertainties, and the diversity of licensees and regulatory activities must all be taken into account so that risks are maintained at an acceptably low level. Once established, regulation should be perceived to be reliable and not unjustifiably in a state of transition. Regulatory actions should always be fully consistent with written regulations and should be promptly, fairly, and decisively administered so as to lend stability to the nuclear operational and planning processes. |

(Source: "Current status of nuclear regulation organizations of major countries in the world - significance and requirements for regulatory staff -", Naoki Nishida, nuclear power group of the Institute of Energy Economics, Japan, general incorporated foundation, IEEJ August 2013 edition)

Table 1 NRC's Principles of Good Regulation

On the other hand, how is the NRA of Japan? The following principles for activities are presented in the NRA's Core Values and Principles in the home page²⁶ :

Guiding Principles for Activities

We in the NRA and its supporting Secretariat shall perform our duties diligently acting in accordance with the following principles.

(1) Independent Decision Making

We shall make decisions independently, based on the latest scientific and technological information, free from any outside pressure or bias.

(2) Effective Actions

We shall discard the previous ineffective approach to regulatory work and stress the importance of a field-oriented approach to achieve genuinely effective regulations.

(3) Open and Transparent Organization

We shall ensure transparency and appropriate information disclosure on regulations, including the decision making process.

We shall be open to all opinions and advices from Japan and the international communities and avoid both self-isolation and self-righteousness.

(4) Improvement and Commitment

We shall be assiduous in learning and absorbing the latest regulatory know-how and best practices, enhancing individual capacities, and performing our duties, mindful of the highest ethical standards, a sense of mission, and rightful pride.

(5) Emergency Response

We shall be ready to swiftly respond to all emergency situations while ensuring that in 'normal' times a fully effective response system is always in place.

The difference between the U.S. and Japan is quite obvious. The principles for activities of the NRA of Japan are "philosophical" compared to the concrete NRC's principles for activities and do not have concreteness to be able to use as references for regulatory decision making. Since it is

²⁶ NRA's Core Values and Principles, <Principles of Activities>, NRA
<http://www.nsr.go.jp/nra/idea.html>

highly independent Article-Three Committee, self-discipline is required. This does not make it possible to predict what kind of judgment is made and what kind of principles for activities is applied to the judgment in practical regulatory activities.

The example of discussions and judgment made in accordance with the principles for activities by NRC is shown below. Three improvement activities were recommended by the NRC commission secretariat to the commission at the end of 2013²⁷. All of them are recommended as the improvement activities in accordance with Recommendation 1 of "Near Term Task Force (NTTF) Report", which is a short-term approach recommendation report prepared by the Task Force established by the NRC in response to the Fukushima Daiichi NPS accident. The content of the recommendation is as follows:

Improvement Activity 1: Establish a design-basis extension category of events and associated regulatory requirements

Improvement Activity 2: Establish commission expectations for defense-in-depth

Improvement Activity 3: Clarify the role of voluntary industry initiatives in the NRC regulatory process

However, the Commission made judgments of "reevaluation for Improvement Activities 1 and 2 and partial approval for Improvement Activity 3" in May 2014, which is "rejection" to the recommendation practically. The Commission mentioned the reason, that is, "the secretariat needs to explain the relationship with the risk informed policy under execution by the NRC in the document of the RMTF (Risk Management Task Force), so as to surely organize, plan effectively and introduce the corrective actions."²⁸

The conclusion made by the Commission that the relationship with the activity under execution should be clarified in the long-term regulatory framework in order to carry out new corrective actions means the following: the requirement that "once established, regulation should be perceived to be reliable and not unjustifiably in a state of transition" concerning "Reliability", which is one of the above-mentioned NRC's principles for activities, served as the determination criteria.

With regard to this recommendation case, there is another point to be noted. It is that when the NRC determines important matters related to safety administration based on the council system, each member attends

²⁷ U.S. Nuclear Regulatory Commission Staff Recommendation

²⁸ Staff Requirements SECY13-0132 - U.S. Nuclear Regulatory Commission Staff Recommendation for the Disposition of Recommendation 1 of the Near-Term Task Force Report

the meeting after documenting his/her own opinions. As an example of such a document having 5 to 6 pages of A4 format, a part of two documents prepared by the Chairman Macfarlane and the Commissioner Apostolakis is respectively provided below.

The Chairman Macfarlane, who is one of the members of the Task Force, cast a pro vote stating "Recommendation 1 of the NTTF (Near-Term-Task-Force) is related to the establishment of a logical, systematic, and coherent regulatory framework for adequate protection that appropriately balances defense-in-depth and risk considerations. In response to this complex recommendation, the staff developed three proposed improvement activities." Describing that "I approve the staff's proposed activities, with edits, as indicated in my comments below", he casted a positive vote. On the other hand, the Commissioner Apostolakis cast a negative vote stating "the NRC has the responsibility to ensure that the risks from the operation of power reactors are acceptably low. Consequently, methods to quantify this risk and identify its major contributors (an essential element of risk management) should be more systematically integrated into the regulatory system. I am disappointed that the staff has proposed a much more limited set of actions in SECY-13-0132 that, in my view, do not come close to what the NTTF envisioned". (See next table)

| | Approved | Disapproved | Abstain | Not Participating | Comment | Date |
|-----------------------------|----------|-------------|---------|-------------------|---------|---------|
| Chairman MACFARLANE | X | | | | X | 3/6/14 |
| Commissioner SVINICKI | | X | | | X | 4/8/14 |
| Commissioner APOSTOLAKIS | X | X | | | X | 1/22/14 |
| Commissioner MAGWOOD | X | X | | | X | 2/14/14 |
| Commissioner OSTENDORFF | X | | | | X | 2/14/14 |

Made by the writer based on the STAFF REQUIREMENTS, SECY-13-0132.

Table 2 Voting results of the task force

The Commission concludes as follows:

For Improvement Activity 1: Establish a Design-Basis Extension Category of Events and associated Regulatory Requirements and Improvement Activity 2: Establish Commission Expectations for Defense-In-Depth, reconsideration is required, and for Improvement Activity 3, the whole recommendation is denied though part of the recommendation can

be accepted (the items shown in the "For" column of the table).

For the NRA of Japan, there is no such example that the Commissioners document and expresses their opinions. Furthermore, it is one of the big differences with the U.S. NRC that the council system such as "voting after expressing independent opinions" is not adopted by the NRA of Japan.

In addition, the difference in the content is also important. What the NRC's principles for activities have, but the NRA's principles do not have is "Efficiency" and "Reliability".

First of all, the "Efficiency" is the principles for activities including the following factors, but not limited only thereto:

- Regulatory activities should correspond to the degree of the risk reduction achieved by them.
- When there are several effective alternatives, the one minimizing consumption of the resource should be adopted.
- The determination of the regulation must not be delayed without a justifiable reason. Though this principle is established on the basis of the natural values that the stakeholders on regulation such as taxpayers, consumers, and operators have the right to request the maximum efficiency for the regulatory activities carried out by governmental organizations, such principle is not established in Japan, probably because the people do not really realize that such administrative costs are charged upon the people. Though there may be social context in Japan that any review processes are accepted (for some cases, the more time and manpower are wasted, the more positively they are accepted) if their purposes are related to safety, this point should be improved.

Because the risk is not zero and the measures require costs, the NRA should actively explain it so that the principle, which determines the necessity of measures by comparison, can be also accepted in Japan. In the U.S., regulatory requirements are made without carrying out such comparison for the measures immediately required for public safety, and the principle of efficiency should be applied in relation to the regulatory requirements in the other cases. In that sense, it should be considered in Japan to prioritize importance to the measures and apply the principle in accordance with the content of regulatory requirements.

In addition, it should be noted that the regulation corresponding to the degree of risk reduction has the following meaning: in the case the degree of risk reduction is very small; on the contrary, the disadvantages including the safety being damaged are greater because requesting a regulatory requirement may lead to inconsistency with other requirements. Since measures require new equipment or procedures, an error of design

and maintenance of equipment, related human error, unknown common cause failure or secondary effect may be generated.

It is considered that the importance of these principles for activities will increase with development of the "Probabilistic Risk Assessment (PRA)"²⁹, which is under consideration to be introduced in the near future in Japan.

Secondly, "Reliability" is also important. There are many cases where slack of the self-discipline is recognized due to lack of "Reliability" as follows: whether or not the NRA has really determined in consideration of all the knowledge that can be used (for example, the experts who have been engaged in the safety review until that time were excluded in the expert meeting for incorporating the external knowledge on the earthquake and fault issues); whether or not a regulatory decision established once has been simply reversed; or whether or not regulatory activities conform to the documented regulations. Examples are shown in the following:

(Example 1) Uncertainty of regulatory standards

The regulatory standard for cables and accessories is an example that regulation was reinforced in the new regulatory standards after inauguration of the NRA. In 1980, the "Review Guide for Fire Protection of Light Water Nuclear Power Reactor Facilities"³⁰ was introduced by the former Nuclear Safety Commission of Japan, and it was required that incombustible and fire-resistant materials should be used for the cables and accessories. For the plants constructed before instruction of the guideline, however, it was accepted to use the cables with a spreading fire prevention agent applied as an alternative of incombustible and fire-resistant cables^{31, 32}.

After inauguration of the NRA, an operator is required to use fire-resistant cables in its plant in the "Review standard concerning fire protection of commercial power reactors and their auxiliary facilities" prepared by the NRA. However, the guide states as follows:

²⁹ "Recommendations toward independent and continuous safety enhancement of nuclear energy" (Advisory Committee for Energy and Resources, electric and gas enterprise subcommittee, nuclear subcommittee, working group on independent safety enhancement of nuclear energy)
http://www.meti.go.jp/committee/sougouenergy/denryoku_gas/genshiryoku/anzen_wg/repot_02.html

³⁰ "Review Guide for Fire Protection of Light Water Nuclear Power Reactor Facilities" by the Nuclear Safety Councils

³¹ "Considerations on design against fire", the material of the team for studying the new safety standard for light water nuclear power reactors
https://www.go.jp/committee/yuushikisya/shin_anzenkijyun/data/a_0004_01.pdf

³² The non-fire-resistant cables were confirmed from a viewpoint of equivalence in the Periodic Safety Review (PSR) carried out by the NISA as the Operational Safety Inspection.

"When the cable is the one which has a performance better than incombustible or fire-resistant materials (hereinafter referred to as "alternative materials"), or when it is technically difficult to use the alternative materials to ensure the functions of the structure, system and component, and measures are taken to prevent a breakout of fire on the structure, system and component having safety functions due to the fire on the structure, system and component, this shall not be applied to."

Therefore, the alternative materials having a performance better than incombustible or fire-resistant materials are only acceptable^{33,34}. However, since the requirement for "having a performance better than incombustible or fire-resistant materials" is not provided specifically, individual judgments are required.

As a specific case, the 122nd review meeting of July 4, 2013 for the Tokai Daini Power Plant of the Japan Atomic Power Company Co., Ltd., is mentioned. "For a non-fire-resistant cable with fire-resistive paint coated, (i) equivalence to the fire-resistant cable, (ii) workability and manageability, (iii) durability, (iv) adverse consequence due to coating of fire-resistive paint, and (v) inspectability must be explained" were raised as main points for discussion at the meeting. The Commissioners requested the Japan Atomic Power Company Co., Ltd., to explain in detail if the measures have the similar performance to the fire-resistant materials. The Japan Atomic Power Company Co., Ltd. will show that the performance is equivalent using the results of the UL vertical flame test and the IEEE code 383 flame test, which are shown as examples of demonstration test in the guide, and the data will be reviewed from now on.

This is an example of which the "Reliability" and "Clarity" that "regulatory actions should always be fully consistent with written regulations" is being questioned, and which also shows "it is difficult to document the regulatory requirements in detail ".The U.S. NRC has incorporated the lessons learned from the fire accident of the Browns Ferry NPP into the regulation and has made efforts to improve the regulation, and it is accepted to use cables meeting the criteria. It is stipulated in the REGULATORY GUIDE 1.189 ³⁵ that the criteria must meet the requirements of the Institute of Electrical Electronics Engineers (IEEE) Standard 383 (IEEE Standard for Qualifying Class 1E Electric Cables and

³³ Review criteria for fire protection of commercial power reactors and their auxiliary facilities
https://www.nsr.go.jp/nra/kettei/data/20130628_jitsuyounaiki03.pdf

³⁴ Main point at issue in the framework proposal of the new Safety Standards (design basis) and the matters to be confirmed
https://www.nsr.go.jp/committee/youshikisya/shin_anzenkiyun/data/0007_04.pdf

³⁵ NRC Regulatory Guide 1.189 Fire Protection for Nuclear Power Plants

Field Splices for Nuclear Power Generating Stations, type test of cables and other materials for NPPs) or the IEEE Standard 1202 (IEEE 1202 flame testing of cables for use in cable tray, the IEEE criteria for cable flame tests for industrial and commercial facilities), and it is clearly shown there that what kind of tests must be accepted in order to use them. In addition, considering some plants are actually incompatible with the regulatory requirements on fire protection, the NRC has conducted evaluations based on the features of individual NPPs³⁶ in addition to the evaluations based on the regulatory standards common to NPPs, and has documented the reasons for the change of the plant licensing basis based on the study results as a report called "Safety Evaluation Report"³⁷, which can be referred to for general regulatory activities.

(Example 2) Though multiplexing of the piping of the "containment spray", which has functions of depressurization and cooling down of the containment vessel, is requested for the Unit 3, Tomari PS of Hokkaido Electric Power Co., Inc. at the 77th review meeting on February 4, 2014, it lacks the reliability of regulation that "regulatory decisions established once should not be simply reversed".

At the time of construction, Article 9, "Consideration of Reliability in Design" of the Review Guide for Safety Design for Nuclear Power Facilities by the former Nuclear Safety Commission of Japan required for the single failure of passive components that generates by the frequency that should be taken into consideration to meet the guideline requirements assuming a leakage from the flange, since a rupture or crack cannot be easily assumed, since intended safety functions are required to be achieved even though a single failure is assumed considering each failure mode and probability. Even after the change to the new regulatory standards, descriptions of the guide are not changed. And the "Interpretation of the Regulations for Standards of Locations, Structures and Equipment of Commercial Power Reactors and their Auxiliary Facilities" explains that for the single failure of passive components of systems of high significance including the containment spray system, the diversity requirement is not applied "when the possibility of a single failure occurrence can be explained to be very small rationally, or when it is confirmed by a safety analysis or other methods that the safety function of a system can be substituted by other system even

³⁶ NRC Appendix A to Part 50 – General Design Criteria for Nuclear Power Plants

³⁷ "Report on Fact-Finding of the Regulatory System, and the Standards and Criteria in Western Countries (investigation of the concrete process, etc., of the US design review)" by Incorporated Administrative Agency, Japan Nuclear Energy Safety Organization, 2005

when the function is lost by assuming a single failure³⁸." Therefore, the Hokkaido Electric Power Co., Inc. confirmed the adequacy of the design concerning the single failure of passive components, and showed the high reliability of the containment-spray piping. However, at the review meeting, the position is shown that "there are two cases of assuming and not assuming a single failure considering the reliability of passive components, and the guide has supposed the loss of function for the case of assuming a single failure. The guide decides the assuming or not assuming by generation of a failure, and it is not accepted to decide the assuming or not assuming by the frequency. The loss of function of this piping is a break of flow path." Then, the multiplexing became necessary³⁹.

The NRA is a regulatory body with very strong independence based on Article 3 of the National Government Organization Law. For that reason, it is not allowed to make approaches from the outside to the regulatory activities and the review process of the NRA so as to put some "pressure" on them. In that case, it is very important that the NRA imposes firm norms on it and restrains itself in accordance with the norms. If hiding behind the system ensuring the independence cuts off the NRA's communication with the outside or refuses for the NRA to listen to different technical knowledge, the attitude may be interpreted as an expression to show a lack of trust for its own determinations and activities. Though it is often said that independence is different from isolation, "independence without self-discipline" is a big problem.

Before it reaches that stage, it is required that the current principles for activities is fundamentally reviewed again referring to the principles for activities established by the U.S. NRC to obtain practical basic policies of regulatory activities. In addition, when the principles are newly established in such a way, the incorporation of the principles into the Reactor Regulation Act or the Act for Establishment of the NRA should be considered.

The NRA is in a position to comment on the operators' governance for improvement. But if the NRA remains in such an abstraction level of principles for activities, which shows its organizational governance, it could lose operators' reliability in the NRA activities and the judgment. Though operators are sure to take measures as required by the NRA since the Reactor Regulation Act is enforced, operator's responses may be only superficial observance of laws and regulations when the reliability is lost.

³⁸ Interpretation of the Regulations for Standards of Locations, Structures and Equipment of Commercial Power Reactors and their Auxiliary Facilities
<https://www.nsr.go.jp/nra/kettei/data/20130628/jitsuyounaiki01.pdf>

³⁹ 77th review meeting on February 4, 2014
<http://www.nsr.go.jp/activity/regulation/tekigousei/data/20140204-2.pdf>

However, if the operators basically have respect for or trust in the determination by the NRA, operators will be motivated to promote further for safety improvement. It is important to avoid falling into the state called "pretending to obey but secretly betraying".

In addition, at the same time, deep and wide discussions should be initiated about how to approach ensuring safety ("risk-informed performance-based" in the case of the NRC) as a basis of such a new principles for activities from technical and methodological viewpoints. The NRA will not have resources for such a discussion at this moment since conformity review of individual plants is the top priority, but it is about the time to launch an essential discussion about the role of regulatory administration.

At the discussion, it is important to consider the PRA. When the "interpretation" of regulation or "arbitrariness" of judgment becomes an issue as mentioned above, incorporation of the quantitative safety goal into the regulatory operation and utilization of PRA become effective measures to judge the ambiguity. In 1995, NRC issued the "policy statement of PRA utilization" and made public the following policy:

"The NRC aims to expand utilization of the PRA for efficiently utilizing regulatory resources under the following policies:

- (i) To expand and improve the method of deterministic analysis and utilize it in a manner consistent with the concept of traditional defense in depth,
- (ii) To utilize the sensitivity analysis and uncertainty analysis of the PRA in order to exclude unnecessary conservatism,
- (iii) To utilize the realistic PRA under the review by a third party,
- (iv) To utilize for connecting the safety goal and the regulatory operation, and
- (v) To utilize for regulatory determination of necessity of backfit

Operators and the NRA are expected to initiate serious discussions concerning utilization of the PRA in order to exclude the arbitrariness of regulation and to enhance the predictability in Japan as well. If the both do not seem to cope with the PRA positively, it is also considerable to incorporate the philosophy into the Reactor Regulation Act instead of issuing the "policy statement."

(2) Establishment of regulatory processes and procedures

The measures to drastically improve predictability are to document regulatory processes and procedures, and in addition, where appropriate, to require the documentation by legislations. The NRA states as follows

in the “Policy on Ensuring Operational Transparency of the NRA ⁴⁰.”

"3. Thorough administration by documents

Dispositions, instructions, guidance, requests, and responses related to interpretation of regulation to the people subject to regulation, which are necessary for appropriately executing laws and regulations are documented. Instructions and requests made orally in unavoidable circumstances such as an emergency are also documented afterwards."

Despite this provision, however, as shown by the above-mentioned cases, this policy has not been completely applied in practices. Because this is the point affecting the predictability most, if self-discipline by internal rules does not work and it continues to be regarded that they do not have the will to function it in the future too, it is required to employ a due process, that is, a democratic procedure control by using laws and regulations. Backfit procedures, and comments and interpretation of the regulatory body at the time of review meetings and prior hearings are given as the important examples.

i) Backfit procedure

This licensing process for alteration of the establishment and other permits related to the backfit was presented at first as a private plan of Mr. Tanaka, NRA Chairman (“Basic Policy toward New Regulation Enforcement for Nuclear Power Plants (private plan)”, March 19, 2013), and it was considered that the plan was accepted by the NRA (this was the NRA annual report presented to the Diet on June 4, 2013, which was confirmed as a fact). However, it has not been formally documented up to now. Though the NRA shows the operation guideline, its legal basis is not clear. Originally, it should be established as a formal legal procedure in the form entrusting the matters as a government ordinance based on the Reactor Regulation Act. Three specific issues are pointed out below.

First of all, the Units 3 and 4 of Ohi NPS have started the operated before the new regulatory standards enforced in July 2013. The conformity of the “plants that started operation before the enforcement of new regulation” with measures taken for the new regulation is reviewed quickly after the content of the new regulatory standards are settled” (NRA’s annual report). The Units 3 and 4 of Ohi NPS were judged that there is no problem, and the continuous operation was accepted as a “special case” at that time. If this procedure is acceptable, other plants might be

⁴⁰ Policy on Ensuring Operational Transparency of the NRA
http://www.nsr.go.jp/disclosure/data/securing_transparency.pdf

permitted to restart before enforcement of the new regulatory standards and the continuous operation of those plants might be judged through the confirmation by the NRA that there is no problem. Then, it is difficult to understand why the review approach for the Units 3 and 4 of Ohi NPS was “special case” instead of general approach applicable to other plants.

Of course, possibly, there is an opposing opinion that the legal validity of the Units 3 and 4 of Ohi NPS was admitted on a provisional basis since the operation was authorized under the former regulation, and that the review process for the alteration of establishment license is required after next periodic inspection. However, since the NRA itself proved that the safety for plants in operation can be confirmed by this special approach, it is basically possible to admit the approach to review the conformity to new standards of plants in operation when new backfit is required from now on. The backfit clause of the Reactor Regulation Act (Article 43-3-23) stipulates only that the NRA “can order to take necessary measures when the NRA acknowledges incompatibility with standards.” Since the clause can be also interpreted as that NRA's confirmation of the actual state of conformance to the standard is presupposed to enter the licensing procedure for the alteration of establishment and other permits, it was legally possible to make the case of the Units 3 and 4 of Ohi NPS as a general approach, not making as a special case. If this point is accepted as an approach established by legislation, the communication like a war of nerves, which is described in Chapter 1, will not occur between the NRA and operators any more. As the result, the environment will be improved so that operators can make constructive discussions with the NRA and this improvement contributes to consider safety measures which can really reduce the accident risk and eventually improve the safety and enhance the effectiveness.

Secondly, the problem arising in many plants is related to the backfit of the reference earthquake ground motion. Since the reference earthquake ground motion is the information for plant design, it is not rational to backfit a new reference earthquake ground motion to plants that are constructed and in operation. In the past, when the Seismic Guide was revised, operators studied (back checked) the effect of the revision to confirm the safety under the new reference earthquake ground motion, and it was accepted to use the actual proof strength of the equipment and structures for judgment.

Since the backfit, not the back check, judges the “conformity with the new technical standards”, the judging criteria must have an allowance of the proof strength of the equipment and structures. It is rational to apply judging criteria having an allowance (allowance of several times) to plants

newly designed and constructed, but it is not rational to apply the same criteria to plants already constructed, and it is enough only to confirm whether it can withstand against the assumed earthquake ground motion. There is an essential cause of problem in the manner that they are trying to apply the new earthquake ground motion to existing plant equipment and structures as the “technical standards to be applied.”

Judging from the current status of earthquake-related review by the NRA, it cannot be said that the above-mentioned principle is well understood. Because this point is a problem which is applicable to nuclear fuel cycle facilities as well as nuclear power plants and is sure to affect the operation of them very significantly in the future, a drastic consideration is required.

Thirdly, there is a problem related to the application timing of backfit regulations. With regard to this point, as mentioned above, the NRC requires a quick backfit without considering the cost for cases where the “adequate public security” is affected, and the Code of Federal Regulation⁴¹ stipulates that the necessity of backfit should be judged on the basis of comparison of the costs due to modification and additional facility investment and the merits of safety improvement, for other cases. Furthermore, in either case, when the backfit is ordered, responses of whether or not the operator can observe the order and the implementation plan are required to submit at the same time, and the suspended period is set in consideration of the period necessary for carrying out the measures, and the backfit procedure is promoted not stopping the operation of plants or facilities. In contrast, the process for deciding the “construction period” (suspended period) is unclear and the predictability is little in the private plan of Mr. Tanaka, NRA Chairman.

In this way, it is an important issue to sort what is important to apply immediately and what requires the suspended period to some extent in light of the "Efficiency" which is one of the principles for activities. In sorting the measures, the following are required:

- To apply the concept of risk and benefit, and establish the objective judging criteria by quantifying the necessity of immediate response; and
- To establish a scheme for deciding the suspended period for application of measures and the timing of application by using the similar method.

⁴¹ 10 CFR 50.109 Backfit

ii) Documentation of views of the regulatory body shown in review process

The detailed consideration concerning the safety standard for the NRC's safety review is specified for each review process. The interpretation of the regulatory staff on the safety standard which has been clarified through the review process has been documented as the formal guide or guideline issued by the NRC (See Figure 4). Not having the legal binding force, the guidelines etc. issued by the NRC are important means for securing the reliability and continuity of the review, interpretation, and determination related to safety standards which are independent of the individuals in charge. The Standard Review Plan (SRP) and the Regulatory Guide (RG) are given as typical ones among these.

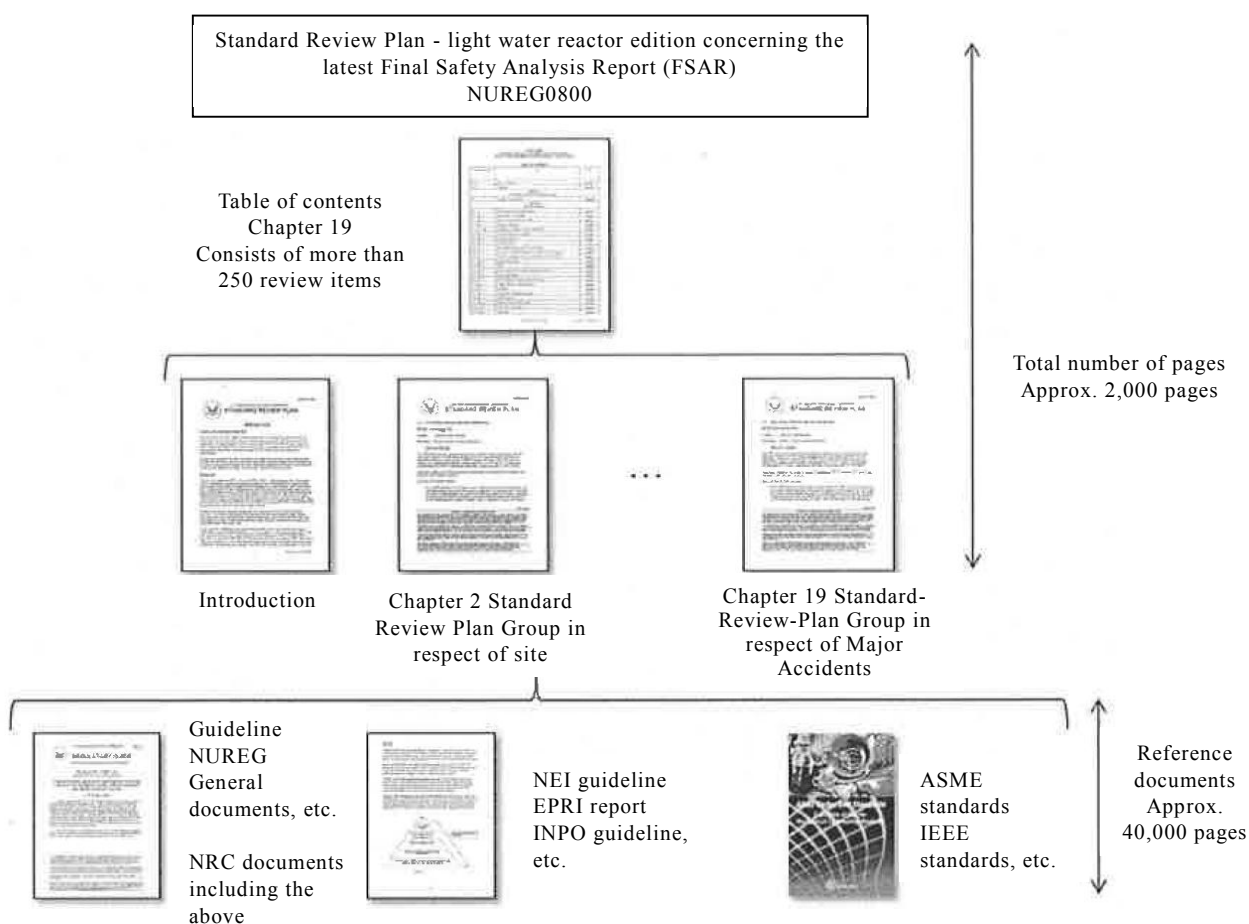


Figure 4 U.S. Standard Review Plans and guidelines

On the other hand, how is it in Japan? In the current review process

of alteration of establishment and other permits, the regulatory body (it is not clear which of the NRA and the Nuclear Regulation Agency is the regulatory body) requirements are shown to operators at review meetings or prior hearings, but, it is not clear whether they are explained as standards determined by regulatory body or just requests, and it is difficult to believe that the records are systematically accumulated as documents. Also the Internet relay of many cases of exchange between the NRA and operators, it is not clear what was decided on what kind of basis or what kinds of assignments were given. As the result, there is a question mark on the reliability and transparency of the determination by the regulatory body in the review. Though the ambiguous licensing basis and review standards have been gradually made clear through the communication between the NRA and operators at hearings and review meetings over several months after the start of reviews to date, the presented determination of the standard has not been standardized as referable standards yet. It is desirable that such a situation should be improved in light of Article 5 of the Administrative Procedure Act shown in the following.

**Article 5 of the Administrative Procedure Act
(Review standard)**

Article 5

- (1) Administrative agencies shall establish review standards.
- (2) Administrative agencies, in establishing review standards, shall make them as concrete as possible in light of the nature of the particular permission, etc. in question.

(Example) In the reviews newly started in June 2014, the NRA questioned to operators only whether their considerations were based on the contents of review for plants for which review meetings were initiated in advance⁴². However, with regard to the review contents of the plants subjected to reviews performed in advance, it is not clear what are specific contents and what are general contents to the plant reviewed in advance. Operators are required to interpret by themselves the review contents that are not clear how to refer and to reflect the contents on their applications. As of August 20, applications of 20 plants have been submitted to the NRA since the start of review and the NRA has to perform the review process one by one. The NRA may say that such a question cannot be avoided to effectively perform the reviews since the time is limited. However, it should be noted that if the reviews are performed in such a way from now on, the situation where the predictability of the review process and the determination by

⁴² The 119th review meeting on conformity to the new regulatory standards of nuclear power plants, the NRA
<http://www.nsr.go.jp/activity/regulation/tekigousei/h26fy/data/20140617.pdf>

the regulatory body are unclear will go worse and worse.

In order to ensure reliability and transparency for future reviews, all the information including interpretations and determinations by the regulatory body on the regulatory standards shown in the review processes should be documented and accumulated in a systematic manner. By establishing the scheme such that they are continuously accumulated as referable documents, differences of interpretation by the NRA on measures provided by operators, and the basis for the case where the NRA determined the measure is unsatisfactory are recorded and converted into case examples. As the result, utilization of previous determinations as standards for future review becomes possible, the regulatory body can perform effective and high-quality reviews, and operators do not have to make unnecessary preparations. By this approach, the entire review process becomes efficient.

Furthermore, it becomes possible to clarify whether or not the similar interpretation of standards is applicable to subsequent reviews or what are the difference from the precedents when different conclusions are derived, which will contribute to improvement of the regulatory standards. Though there is a story that such documentation is not realistic since it requires a lot of human resources. But it is clear that the documentation fully meets the human investment, because efficient documentation is possible by taking advantage of IT technologies, and the productivity of the review process itself is improved after once documented. Though a budget and securing personnel are important issues, it is vital to clarify the principle of documentation in the Reactor Regulation Act in order to give such consciousness to the regulatory body and ensure the effectiveness.

As a matter of course, disclosure of information and ensuring transparency are important principles. However, it originally means to be responsible for explaining to the public by what kind of logic and value judgment the decision making was made, and through what kind of discussions it was made, which does not mean only to show various meetings on the Internet. As a result of transparency placing various meetings in public, the regulatory body will behave to show the strict stance and speaking stubbornly, and on the other hand, operators will give the first priority to showing a humble attitude or making them look like they are expressing their obedience. In this way, the environment allowing free and vigorous discussions cannot be established, and negative effects will be greater than positive merits. In addition, the secret communication between the regulatory body and operators may be criticized as a “closet consultation”, “conspiracy” or not transparent, which is completely illogical.

Making documentation as a principle also contributes to changing

such a “theater type regulatory activity” into the regulatory activity pursuing reasonable regulatory determination on the basis of the logicity with repeated calm discussions. The future review should not be the exchange such as an event or a show by the Internet relay, but should take the way that the reviewer examines thoroughly written applications and questions operators the issues or the points to be clarified in written forms, and the applicant responds in writing⁴³. This approach should be applied regardless of enacting legislations for documentation.

(3) Issues of incorporation of external knowledge and decision making process

As indicated in the principles of "Reliability" of the U.S. NRC and "Improvement and Commitment" of the NRA, regulation body is always required to make efforts to formulate regulatory standards aiming at the best safety with continuous learning and digesting of latest knowledge. However, there are considerable criticisms on the attitude of the present NRA which seems to reject the input from the outside.

For example, at the expert meeting on the fault issues, there is a restriction that experts who performed safety reviews in the past cannot be the member of the expert meeting. From this fact, it must be judged that the NRA is in the self-contradictory state in the light of the above principle on organizational activity that decisions must be made after discussion collecting all the professional knowledge of related fields.

Examples of issues which are generated in various areas are shown below. Major issues on the introduction of external knowledge and processes of decision making for such issues on 40-year operation period restriction, way of conducting highly technical discussions on the earthquake and fault, and the unification of risk assessment and risk management function are reviewed.

(Example) For making decisions on the nuclear safety regulation, the NRA established "requirements for ensuring the transparency and neutrality in hearing opinions from external experts" on October 10, 2012 for the NRA. The document stipulates to ensure the openness and transparency of discussions and specifies how to open the information on the relation between external experts and operators which may raise a conflict of interests⁴⁴. However, there is no article how to select external experts, and the NRA does not show the policy of selection requirements. For example, the expert members for the survey of site

⁴³ In addition, Power Point is only a reference material to facilitate understanding. If this is used instead of a formal review material from now on, it is caused to prepare again the document eventually to be required though it takes a lot of labor. Both the regulatory body and operators should have this common understanding.

⁴⁴ Gen-Ki-Gi-Hatsu No.121010001 Decision of NRA
http://www.nsr.go.jp/committee/youshikisya/data/sinkoku_youken.pdf

crush zones were selected based on recommendations from four related societies: "Japanese Society for Active Fault Studies", " Geological Society of Japan", "Japan Association for Quaternary Research", and "Seismological Society of Japan", but the reason why the four societies were selected is not shown though there are other related societies.

And, the NRA disqualified the person who had participated in past reviews of the concerned plant site as a member of expert meeting, though the person who participated in past reviews of other plant site is not necessarily be disqualified. The NRA itself limits collection and consolidation of scientific knowledge.

Although the reason is for expecting fairness, the NRA should show the alternative way to collect information of scientific knowledge which may be missing due to the above rule on qualification. The reason that simply the other alternate expert researchers were selected is insufficient.

On the other hand, U.S. NRC has documented procedures to implement all kinds of expert meetings.⁴⁵ For example, for the ACRS (Advisory Committee on Reactor Safeguards) which consists of experts functioning as the Commission's advisory body, members are selected by specialized selection team called the "Screening Panel" based on the recognition that the committee's decision varies largely depending upon the opinion of experts⁴⁶. The Panel reports to the committee the selected best experts after reviewing not only specialized knowledge required to candidates but also the experiences in the past, and other knowledge and competence scored.

i) Issue on 40-year operation period restriction

There is a procedural problem in the new provision of Reactor Regulation Act to limit operation period of nuclear power station to 40 years in general. The provision is shown below. It stipulates that the period of operation of the nuclear power plant in general is 40 years from the date of passing the pre-service inspection, and the operation period can be extended for 20 years or less only when the NRA permits.

(Operation period, etc.)

Article 43-3-31

- (1) The nuclear power reactor establisher may operate the nuclear power reactor established by the establisher for the period of 40 years since the date on which the inspection of construction of the power reactor installation concerned of paragraph 1 of Article 43-3-11 passed.

⁴⁵ 10 CFR Part 7 - Advisory Committees

<http://www.nrc.gov/reading-rm/doc-collections/cfr/part007/full-text.html#part007-0001>

⁴⁶ Procedures for Obtaining Nominations for NRC's Advisory Committees

<http://www.nrc.gov/about-nrc/policy-making/icp-appendix-1-2011.pdf>

- (2) The period set forth in the preceding paragraph can be extended only once on the occasion of the expiration by approval of the NRA.
- (3) The extended period pursuant to the provision of the preceding paragraph cannot exceed the period defined by the cabinet order not exceeding 20 years.
- (4) The nuclear power reactor establisher who intends to receive the approval defined in paragraph (2) must apply approval of the NRA as required by the provision of Nuclear Regulation Authority regulation.
- (5) For the nuclear power reactor applied for the approval set forth in the preceding paragraph, the NRA can approve the application only when the NRA decides it satisfies the criteria established by the Nuclear Regulation Authority regulation as the criteria to ensure safety in the period to be extended in accordance with the provision of paragraph (2) based on the status of deterioration of reactor and other equipment caused by the long operation period.

This issue has a large impact on management of the NPS and the electricity rate. Because nuclear power plants can be operated with only the variable cost after completion of depreciation of the large initial fixed investment, the operation of long period becomes economically advantageous so far as the safety is ensured. As of July, 2013, among fifty NPP units in Japan, there are seventeen units that exceed 30 years of operation and ten units exceed 35 years of operation (three of them have been operated over 40 years). Therefore, reactor operators have to make decision to apply or not for approval of the life extension of these aged reactors in the near future. Moreover, operators have to decide whether the extension should be applied or not about two years before 40 years as the decision at the 40th year is too late. In order to make this decision, it must be confirmed how much additional investment for safety measures is needed to obtain the approval, and what conditions are required to make the funding arrangement. Furthermore, such decision is very difficult under the situation that the approvable period of extension cannot be predicted even when the extension is possible to be approved.

Although the Reactor Regulation Act that stipulates the operation period restriction was enacted by the Diet, this fact is completely forgotten at present. As a result, it is considered that the NRA, one of the member of the Government (although it is Article-Three Committee), shall enforce literally this Reactor Regulation Act. However, the legislation was proposed by the Diet, and explanation of purpose of the Act and questions and answers were made among Diet members and parties in the Diet, and the Diet members as the proponents of the bill express their intention as

proponents and legislators during discussion. The Government did not interpret the primary meaning of the Act.

That is, the Government interpretation is secondary. Now, the intention of the proponents about the 40 year issue is reviewed from the Diet record as follows (hereinafter, all underlines are drawn by the author):

- Mr. Shuichi Kato: ...Considering the tragic accident of 3.11, I think the **period of 40 years** which came out at the beginning **should be treated carefully...**
- Mr. Kazunori Tanaka, Member of the House of Representatives: Regarding the talk of Mr. Kato, **the period of 40 years is accepted tentatively in this bill when we proposed it.** However, as I have been saying, **I think the setting of the figure of 40 years is somewhat political and not determined only based on scientific knowledge** as you may know well. In this circumstance, we include the figure of 40 years into this text of the bill, respecting the period of 40 years tentatively, but **when a new organization is chosen in the Diet, established and started, the way of thinking of the new committee and agency should be respected.** I would say about this again.

(Committee on Environment of House of Councilors, June 18, 2012)

That is, the operation period restriction of 40 years is a tentative value, and was planned to perform fundamental review on the adequacy of the period by conducting scientific analysis after the NRA started.

- Mr. Kenichi Mizuno: Then, **can it be understood that it is neutral text of the law** so that **the period of 40 years is probable to change to, for example, 60 years** or 20 years **based on the view of the committee as experts?**
- Mr. Kazunori Tanaka, Member of the House of Representatives: **That's exactly right.**

(Committee on Environment of House of Councilors June 19, 2012)

As shown above, it is clear that the legislator expected that fundamental review would be performed when the NRA is established by trusting the good sense and the specialty of the committee.

And, the House of Councilors Incidental Resolution shown below describes that "it must be consistent with the existing measures for aging management." In Japan the "comprehensive safety reevaluation (periodic safety review) has already been periodically performed including aged degradation review" required by IAEA for the plants of 30 year or more operation. On this point, the Atomic Energy Society of Japan has

addressed in its Statement entitled "Recommendation toward the Diet deliberations concerning the nuclear safety regulation" issued on June 7, 2012, and it concluded that it has already taken the measure severer than the restriction of operation period to 40 years from a viewpoint of continuous enhancement of safety in Japan, and "for introducing '40-year-operational-restriction', regulatory body has to have rational and scientific discussion in the open manner from viewpoint of purely safety, and also rational and scientific explanation must be possible about application system of this restriction."

Article 97 of Supplementary Provisions of Act for Establishment of Nuclear Regulation Authority

About provisions after amendment under the provisions of Articles 17 and 18 of the Supplementary Provisions, the review shall be promptly performed taking the status of the enforcement into consideration, and when it is considered to be necessary, required measures shall be taken based on the results.

House of Councilors Incidental Resolution

22 ... And, concerning the provision for restriction of operation period of power reactor of 40 years, while making consistency with the existing measures for aging management etc. because about half of existing reactors have passed 30 years of operation, compile the measures of the Government promptly on disposal of the nuclear facilities, nuclear fuel materials, etc. relating to decommissioning of which the number will be expected to increase from now on.

23 ... In review of revised Reactor Regulation Act based on Supplementary Provisions of this Act, the Regulation System consistent to international criteria and trend shall be established by performing prompt reviews based on latest scientific and technical knowledge to improve effectiveness of nuclear safety regulations.

How did the NRA respond to the above situation? Mr. Tanaka, NRA Chairman, answered at the press briefing immediately after inauguration of the NRA as follows:

"And, there was a question at the Diet whether decommissioning before the period of 40 years is determined a priori or not. I answered that the 40 years is fairly moderate length as a lifetime of one technical product. Most of people who developed and made it at the beginning have retired. Then, from viewpoint of the NRA, backfit will become very important in the future. Looking carefully at reactors of 40 years ago, the design of

40 years ago is not necessarily enough in some part when seen from the criteria which we will establish now. Under the situation of the existing issue of how this backfit is applied to the plant from now on, I think extension for 20 years or more exceeding 40 years may be considerably difficult, though I cannot judge now whether the operator will apply these extension or not. I don't think it is right to leave the rest to the NRA after such political statement. But I have the basic idea said above, although it may be not necessary to say that." (September 19, 2012)

This remark of Chairman Tanaka: "I don't think it is right to" is his erroneous recognition. The legislator expected that scientific survey and analysis on the issue of 40 years will be conducted after functioning of the NRA by selecting reliable specialists as members of the NRA. But the NRA declared that the NRA does not perform the activity responding to the above expectation without carrying out any such a study may endanger the administration by legislation, i.e. legalism. In the following remarks of Tanaka, NRA Chairman, he expressed that he has no intention to perform the review on the adequacy of the period of 40 years and thinks the role of the NRA is simply performing review of condition of operation extension:

"As a general rule, the 40th year is the time to terminate the operation. Since it is written that the operation is also extensible depending on the situation, the NRA is in the midst of having discussion now what conditions are required to the extension. When the result is obtained and the operators are responded to it, we have to consider again. General rule is 40 years, and that is as you pointed out." (December 12, 2012)

Following is the interpretation of the briefing in a favorable way. When the above briefing was made, the NRA planned to impose unprecedented severe technical requirements in the form of new regulatory standard, and the NRA or the Chairman of NRA may think that severer or other standards is unnecessary and what is necessary is just to satisfy the newly established severe regulatory standards (but investment which clears them will be probably difficult as management decision). In addition to these reason, it seems that he wanted to avoid the impression of being backward-looking to the 40 year operational restriction decided politically those days. However, it is difficult to grasp such an intention from his remarks of this briefing.

It is not clear whether such circumstance is the cause or not, but the NRA has never taken any action for collecting external knowledge and try

to analyze and discuss on the external knowledge obtained to decide whether the operational restriction of 40 years is rational or not. Although the issue on the operational restriction of 40 years is very important issue, the NRA never try to use, for example, the Reactor Safety Examination Committee or equivalent meeting. Even though the above-mentioned favorable interpretation is taken, the legal interpretation is left ambiguous if such inaction continues.

The role of Reactor Safety Examination Committee is provided in Article 14 of the Act for Establishment of the Nuclear Regulation Authority. Article 14 states that "when directed by the NRA." Therefore, if the NRA has intention to perform technical expert review about the above-mentioned issue of 40-year operation period restriction, the direction should have already been made. The fact that it has not been performed is unsuitable inaction of the administrative organization that ignores the legislative intent. However, since it is highly independent Article-Three Committee, such situation will be likely to happen and means to admonish the inaction is limited.

(Reactor Safety Examination Committee)

Article 14: The Reactor Safety Examination Committee will examine and review the reactor safety when directed by the Nuclear Regulation Authority.

(Example) The volcanic impact assessment on the Sendai NPS of Kyushu Electric Power Co., Inc. is a case with an indefinite attitude of the NRA about forecast of volcanic activity, which is an issue of insufficient scientific information at present.

The Guide for Assessment of Volcanic Impact on Nuclear Power Plants⁴⁷ was prepared for showing an example of appropriate volcanic impact assessment on NPPs based on the knowledge of the "Technical Guideline for Assessment of Volcanic Impact on Nuclear Power Plants (JEAG4625)" issued in 2009 by the Japan Electric Association that was used for the safety review of the Spent Fuel Interim Storage Facility and the IAEA Safety Standard "Volcanic Hazards in Site Evaluation for Nuclear Installations (No. SSG-21)" issued in 2012.

The NRA states that "the biggest problem of the volcanic impact assessment is insufficiency of present science for very large caldera volcanic activity in the past which human beings have never seen." The volcanic impact assessment is a concern for the judgment of conformity to the review standard in the field where the scientific knowledge as well as the knowledge on reviews in the past is limited.

The first review meeting for the volcanic impact assessment was held for the

⁴⁷ Guide for Assessment of Volcano Impact on Nuclear Power Plants
http://www.nsr.go.jp/nra/kettei/data/20130628_jitsuyoukazan.pdf

Sendai NPS of Kyushu Electric Power Co., Inc. In the guide, the operator is required "to perform reactor shutdown and shipping-out of nuclear fuels appropriately by monitoring and detecting the precursory phenomena" based on the assumption that large scale volcanic activities are possible to predict. And at the review meeting of the Sendai NPS of Kyushu Electric Power Co., Inc., although the necessity of study of pyroclastic flow simulation was pointed out by a NRA Commissioner, the volcanic impact assessment of the Kyushu Electric Power Co., Inc. was substantially authorized since the point of issue, i.e. "observation methods (observation of crustal movement etc.) for detecting the precursory phenomena of all large-scale volcanic activities that are subject to the monitoring", is cleared as shown in the NRA Commissioner's remarks: "I understand this impact assessment has come to an end on the whole although some items are left to study".

However, some experts criticize that prediction of occurrence of volcano activity in some decades of operation period of NPPs is beyond the current science level. Among major items of criticism, first one is the question on adequacy and effectiveness of monitoring methodology, that is, whether a large scale volcano activity can be foreseen or predicted by monitoring. And the second one is the matter anxious about the safety myth that is caused by the NRA, who is apt to take the attitude to prove the plant safety by sticking to the effectiveness of monitoring methodology.

The plan for priority policies toward the request of FY2015 budget and request of organization and the number of NRA staffs is planned to incorporate "the complete research system in connection with volcanic impact assessment" as if responding to the criticism mentioned above. On the other hand, in order to improve the predictability of review in the future, clear policy should be established on the attitude of the NRA and the way of conducting discussion to deal with ambiguity which is unavoidable in evaluation standard because the present scientific knowledge level on natural events such as large scale volcano activities is insufficient.

When discussing such highly scientific and technical issues, the NRA should clarify the attitude to adopt directly and positively the discussion based on the various viewpoints of experts of the Reactor Safety Examination Committee and Nuclear Fuel Safety Examination by adopting expert panels using the method of integration of discussion as shown in the next section or by performing as the U.S. ACRS (Advisory Committee on Reactor Safeguards) which suggests NRC directly.

ii) Approach for advanced engineering discussion on earthquake and fault issues

The issue concerning roles of the Reactor Safety Examination

Committee and Nuclear Fuel Safety Examination Committee that are referred at the end of preceding section is important. The Reactor Safety Examination Committee was established in 1961 in accordance with the incidental resolution of the Diet in May, 1960 as a legal examination committee performing the safety review referring to the U. S. ACRS. The establishment of the Reactor Safety Examination Committee is also required in the current Act for Establishment of Nuclear Regulation Authority.




However, the NRA limits the role of the Reactor Safety Examination Committee to "perform survey and examination to judge the necessity of measures based on the collected and analyzed information of accidents and troubles occurred in and outside of Japan and of trends of regulations in foreign countries and to report the results including advices", explaining that the role of the Reactor Safety Examination Committee which has previously performed the review of construction permit is changed⁴⁸. On the other hand, the NRA uses ad hoc expert meetings of which legal position is unclear for formulation of regulatory standards or for review of adaptability of standards. However, the NRA obligates itself to formulate regulatory standards, which largely exceeds its capability. As the result, constructive discussion on regulatory standards is impaired.

The NRA must discuss with operators who have more and broad technical information on substantial evidences of nuclear safety regulations which are highly technical safety measures when new technologies appeared by technical innovations in the world are to be applied. Therefore, it is necessary to reconstruct the function to advise the NRA from the impartial position based on scientific and technical knowledge. That is, redefinition of the position of the Reactor Safety Examination Committee defined in the Act for Establishment of Nuclear Regulation Authority as an advisory body of the NRA and clear stipulation of its position and legal role should be examined.

And then, the Reactor Safety Examination Committee becomes possible to perform timely collection and analysis of the latest knowledge by communication with technology consulting organization (Four-Pole Advisory Committee Meeting) which advises regulatory organizations of various countries with scientific and technical viewpoint as a position of third-party such as U.S. ACRS, GPE (Permanent Expert Group) of France and RSK (Reactor Safety Committee) of Germany.

⁴⁸ Gen-Ki-Gi-Hatsu No.1405121

http://www.nsr.go.jp/committee/roanshin_kakunen/h26fy/data/0001_05.pdf

|  USA |  France |  Germany |
|--|---|--|
| <p>■ Advisory Committee on Reactor Safeguards (ACRS)</p> | <p>■ Permanent Expert Group (GPE: Groupe Permanent d'Experts)</p> | <p>■ Reactor Safety Commission (Reaktor-Sicherheitskommission, RSK)</p> |
| <p>The organization aiming at performing advice directly to committee mainly concerning on review of applications for license and their renewal, hazards of nuclear facilities, or adequacy of proposal of regulatory standard.</p> <p>Consisting of external expert members from wide range of technical fields. The term of office is four years (regularly up to three consecutive terms)</p> | <p>The organization which consists of five groups performing analysis of technical issues on nuclear reactors and two groups performing advice from view point of radiation protection. Its research report will be referred by Nuclear Safety Regulation Office when it presents its view.</p> <p>Members are selected from the fields of educational institutions, associations, and operators, etc. considering technical capability and experience of the candidates. The term of office is four years.</p> | <p>The organization which advises Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMU: Bundesministerium für Umwelt, Naturschutz, und Reactorsicherheit) about items related to safety of nuclear facilities, security and waste disposal</p> <p>Members are selected from wide range of technical fields and the term of office is three years.</p> |

Prepared by Author with referring to “On the Establishment of Reactor Safety Examination Committee and Nuclear Fuel Safety Examination Committee” (issued by the NRA) dated January 15, 2014

Figure 5 Technology Consulting Organizations in Western Countries

Among various regulatory standards on technology, there are very many criticisms especially on the way to conduct discussion about the earthquake and fault issue in the NRA.

For example,

- 1) Legal and procedural position of the "expert meeting" is unclear, and it is unknown how the conclusion of meeting is positioned in the decision making process of the NRA.
- 2) Though the NRA take group-decision-making system, its meeting is carried out as if each committee member has his business in charge and specialty.
- 3) The person engaged in the past safety review is intentionally disqualified as a member of expert meeting. (This item is restated)
- 4) The discipline of specialized field of the member of expert meeting is biased (especially tectonic geomorphology).
- 5) The regulatory body does not show sufficient instruction about the detail degree of data or explanations required to the operators for which the regulatory body think it is enough for decision by reviewing.

These are typical criticisms.

Each of the above criticisms pointed out the right point, and it is certain to be improved individually. However, the author does not repeat the above criticisms, but requires fundamental reformation of review process in the NRA by showing examples of U.S. good practices. This example is also referred in the "Review Guide concerning the Survey of Geology and Geological Structure of the Site and the Peripheral Area" issued by the NRA. But the context and purpose of the example is "for operators to ensure the reliability of the survey and evaluation results based on survey, it is desirable to perform the survey and evaluation open to the public to ensure the transparency as shown in the following." That is, it is not intended for the NRA to perform the review process by referring to this good practice. However, the NRA itself should incorporate this process, and such a process should be established under the Nuclear Regulation Authority regulation to improve the predictability of the entire review process.

The example of U.S. good practices is shown in the report (NUREG/CR-6372) where how the opinions should be integrated for appropriate regulatory decision making in the field where large variation of opinions and views of experts exists (in this case, it is the analysis of tsunami and earthquake hazard) is described. Unlike the NRA of Japan, the NRC commissioners do not play a part of Chairman of expert panels. The procedure of optimal integration of expert opinions recommended in the report is shown in the following.

- 1) To determine significance of facilities and technical difficulty of issues (see Figure 6.), and then determine degree of use of experts in accordance with the significance and the difficulty.
- 2) When it is determined that technical difficulty is high, Technical Facilitator/integrator (TFI) is assigned. TFI organizes panel of experts and derives conclusion or direction of action by impartial integration considering distribution of the experts of the area.
- 3) About selection of TFI and experts who form the panel, TFI should have expertise on the target technical subject and also on method of extraction of opinions. Experts are required to be scientific neutrality as well as to have expertise on target subject.
- 4) Although TFI and the experts have responsibility to their own opinion, they do not have responsibility for the evaluation result.

The committee reviewed this method (Senior Seismic Hazard Analysis Committee, SSHAC) concluded in the proposal of PSHA (Probabilistic Seismic Hazard Analysis) that the divergence of the result of PSHA is largely caused by means of procedural differences rather than technical differences.⁴⁹ And the following items are pointed out as important points for the procedure.

⁴⁹ Recommendations for Probabilistic Seismic Hazard Analysis: Guidance on Uncertainty and Use of Experts: Main Report (NUREG/CR-6372, Volume 1) Abstract

Explanation 36 Table 1 Study level of logic tree

| Study Level | Degree of Issue | Study Approach |
|-------------|---|---|
| Level 1 | Insignificant degree of incidence to hazard | TI evaluates model based on literature review and experience, and estimates community distribution. |
| Level 2 | Significant degree of incidence to hazard, and controversial opinions | TI interacts with model proponents and relevant experts to hear their interpretations and/or bases, and estimates community distribution. |
| Level 3 | Highly significant degree of incidence to hazard, highly contentious opinions, and highly complex situation | TI brings together model proponents and relevant experts to debate to perform improvement of proposals and their screening, and estimates community distribution. |
| Level 4 | Ditto (see note) | TFI organizes panel of experts and focuses discussions, obtains each evaluator's estimate of the community's distribution and integrates them. |

TFI: Technical Facilitator/Integrator. Preview is required for approaches by TI (Note) This is the case implemented in more systematically. [Main body 6.5.2] References

[Appendix SH6.5-1.1]

Senior Seismic Hazard Analysis Committee (SSHAC), *"Recommendations for Probabilistic Seismic Hazard Analysis: Guidance on Uncertainty and Use of Experts"* (NUREG/CR-6372, SSHAC, April 1997)

[Appendix SH6.5-1.2]

J. Carl Step, et al. *"Probabilistic Seismic Hazard Analysis for Ground Motions and Fault Displacement at Yucca Mountain Nevada"* Earthquake Spectra, Vol. 17, No. 1, February 2001

[Appendix SH6.5-1.3]

N. Abrahamson, et al. *"PAGASOS-A Comprehensive Probabilistic Seismic Hazard Assessment for Nuclear Power Plants in Switzerland"* 12th European Conference on Earthquake Engineering, 2002.

From supplementary document of *"Standard of Implementation of Earthquake PRA"* issued by Atomic Energy Society of Japan

Figure 6 Study level of logic tree in PSHA

(The study approach of PSHA is differentiated by the degree of issue.)

- 1) SSHAC identifies and describes several different roles for experts based on its conclusion that confusion about the various roles is a common source of difficulty, in executing the aspect of PSHA involving the use of experts. The roles for which SSHAC provides the most extensive guidance include the expert as proponent of a specific technical position, as an evaluator of the various positions in the

technical community, and as a technical integrator.

- 2) SSHAC identifies four different types of consensus, and then concludes that one key source of difficulty is failure to recognize that 1). there is not likely to be "consensus" (as the word is commonly understood) among the various experts and 2) no single interpretation concerning a complex earth-sciences issue is the "correct" one. Rather, SSHAC believes that the following should be sought in a properly executed PSHA project for a given difficult technical issue: (1) a representation of the legitimate range of technically supportable interpretations among the entire informed technical community, and (2) the relative importance or credibility that should be given to the differing hypotheses across that range. As SSHAC has framed the methodology, this information is what the PSHA practitioner is charged to seek out, and seeking it out and evaluating it is what SSHAC defines as technical integration.
- 3) SSHAC identifies a hierarchy of complexity for technical issues, consisting of four levels (representing increasing levels of participation by technical experts in the development of the desired results), and then concentrates much of its guidance on the most complex level (level 4) in which a panel of experts is formally constituted and the panel's interpretations of the technical information relevant to the issues are formally elicited. To deal with such complex issues, SSHAC defines an entity that it calls the Technical Facilitator/Integrator (TFI), which is differentiated from a similar entity for dealing with issues at the other three less-complex levels, which SSHAC calls the Technical Integrator (TI). Much of SSHAC's procedural guidance involves how the TI and TFI functions should be structured and implemented.
- 4) The role of technical integration is common to the TI and TFI roles. What is special about the TFI role, in SSHAC's formulation, is the facilitation aspect, when an issue is judged to be complex enough that the views of a panel of several experts must be elicited. SSHAC's guidance dwells on that aspect extensively, in part because SSHAC believes that this is where some of the most difficult procedural pitfalls are encountered. In fact, the main report identifies a number of problems that have arisen in past PSHAs and discusses how the TFI function explicitly overcomes each of them.
- 5) For most technical issues that arise in a typical PSHA, the issue's complexity does not warrant a panel of experts and hence the establishment of a TFI role. Technical integration for these issues can be accomplished-indeed, is usually best accomplished-by a TI.
- 6) One special element of the TFI process is SSHAC's guidance on sequentially using the panel of experts in different roles. Heavy emphasis is placed on assuring constructive give-and-take

interactions among the panelists throughout the process.

- 7) The TFI's integrator role should be viewed not as that of a "super-expert" who has the final say on the weighting of the relative merits of either specific technical interpretations or the various experts' interpretations of them; rather, the TFI role should be seen as charged with characterizing both the commonality and the diversity in a set of panel estimates, each representing a weighted combination of different expert positions. SSHAC thus sees the TFI as performing an integration assisted by a group of experts who provide integration advice.
- 8) Thus, the TFI as facilitator structures interaction among the experts to create conditions under which the TFI's job as integrator will be simplified (e.g., either a consensus representation is formed or it is appropriate to weight equally the experts' evaluations of the knowledge of the technical community at large).
- 9) The SSHAC guidance gives special emphasis to the importance of an independent peer review. We distinguish between a participatory peer review and a late-stage peer review, and we also distinguish between a peer review of the process aspects and of the technical aspects for the more complex issues. We strongly recommend a participatory peer review, especially for the process aspects for the more complex issues. This paper details the pitfalls of an inadequate peer review⁵⁰.

It seems that the present NRA regards operators as the "conflict-of-interest entities", and the NRA is not in the situation to listen to the technical and methodical proposals from operators. However, since operators are actually operating their plants and have primary responsibility on the safety, it is natural to think that they have constantly brushed up their technical knowledge for safety improvement. If the NRA rejects such operators' proposals because of the NRA's lack of confidence of evaluation capability, it is not the attitude to meet the profit of people who benefits most from the safety improvement. The NRA should stop such intentional attitude as opposing to operators by escaping from the illusion or preconception of "not trusting because of proposals from operators themselves, and as shown in the following example, should perform sincere technical study work with operators, research organizations and other third parties when a proposal is considered that it may lead to enhancement of safety, ".

(Examples) Two U.S. examples of proposals by operators accepted by the NRC are shown below. The first example is about the re-start after an earthquake. On August 23, 2014, two units of North Anna NPS located at the U.S. east coast were

⁵⁰ Recommendations for Probabilistic Seismic Hazard Analysis: Guidance on Uncertainty and Use of Experts Main Report (NUREG/CR-6372, Volume 1, Executive Summary)

shut down by the loss of outside power caused by the Virginia Earthquake. The units re-started on December 20, 2011 after the survey that the plants satisfy re-start conditions, which was only 4 months after the shutdown.

One of the reasons which the Plant was able to re-start at the early time is performing evaluation of seismic ground motion applying Cumulative Absolute Velocity (CAV). CAV is the methodology developed in 1991, proposed and standardized in TR-100082 of the Electric Power Research Institute (EPRI) which is civilian organization, and adopted as NRC's "Regulatory Guide 1.166: Pre-earthquake Planning and Immediate Nuclear Power Plant Operator Post Earthquake Actions" in 1997. ⁵¹

One more example is that NRC endorsed the Appendix of "Design Bases Program Guidelines" prepared by Nuclear Energy Institute (NEI) that is the private nonprofit institutions on nuclear technology and public information. Originally, the Nuclear Utility Management and Resources Council (NUMARC), the former body of NEI, published Design Basis Program Guideline (NUMARC 90-12) in 1990.

In 1996, NRC staff requested to operators to show that plants are operated and maintained within design bases after deficiencies on design and equipment composition were found by plant inspection in some plants. At first, it is concluded that "the definition of design bases should be clarified". In 1998, NRC directed NRC Staff to develop guidance regarding design bases issues such as the type of information to be considered as design bases information.

In 1997, NEI submitted to NRC Appendix to NEI 97-04 "Design Bases Program Guidelines" which is the updated version of NUMARC 9012. The guideline gave additional examples of design bases information. This submission started letters and public meetings that led to the NRC deciding to endorse Appendix to the NEI's proposal.

Conclusion of NRC:

"The staff finds that Appendix B to NEI 97-04, 'Guidance and Examples for identifying 10 CFR 50.2 Design Bases' provides guidance and examples that are acceptable to the staff for providing a clearer understanding of what constitute design bases information. Therefore, RG 1.186 ⁵² endorses this version of

⁵¹ In Regulatory Guide 1.166, seismic-monitor data are taken into consideration for decision of necessity of reactor shutdown. In the case the reactor shutdown criteria are not exceeded, reactor shutdown is not required. And when reactor shutdown is caused by earthquake, re-start depends on judgment made after the reactor shutdown. The evaluation within four hours after occurrence of earthquake on whether OBE (Operating Basis Earthquake) is exceeded or not by confirming response spectrum and CAV and the inspection by walk-down within 8 hours after occurrence of earthquake to find damages are required to perform.

⁵² NRC Regulatory Guide 1.186 - Guidance and Examples for Identifying 10 CFR 50.2 Design Bases.

Appendix B to NEI 97-04 without exception or clarification.”⁵³

iii) Issue of unification of the risk assessment and risk management function

In the system based on the existing law, the regulation is enforced to manage risks after the NRA itself assesses risks of accident etc. However, if such a system is adopted to risk assessment, the assessment which should be objectively performed may be influenced by various elements at the stage of risk management and may be politically distorted when there is high possibility of being influenced by political elements in enforcing regulation and when the regulatory body itself have positive or negative tendency towards introduction of regulation. In order to respond to such concern, the structure of enforcement of regulation for food safety is adopted as follows: Minister of Health, Labor and Welfare as regulator does not perform risk assessment by itself but organizes the food safety commission as risk assessment organization and listens to the view of the committee to enforce regulation (item (1), paragraph (1), Article 24 of the Food Safety Basic Act, paragraph (1), Article 7 of the Food Sanitation Act).

In the field of nuclear safety regulation, as hazard identification and risk assessment are performed at early stage of enforcement of regulation, if such assessment is implemented by the regulator itself in accordance with the way of administration, it will be virtually impossible for regulated body to state opinions on the risk assessment process itself, though the risk assessment performed at early stage will have large impact on the actual contents of enforced regulation. Because regulated body cannot legally oppose without involving the administrative disposition about enforcement of regulation, even if a risk assessment is performed irrationally, unless the legal process in which risk assessment function and organization are clearly separated is established.

Various issues on the crush-zone of Tsuruga PS of The Japan Atomic Power Company and on Ohi PS of The Kansai Electric Power Company, Inc. arose due to such an organizational structure problem as unclear relations between the expert meeting organized by the NRA and the NRA itself. The neutrality of safety regulation administration itself might be suspected unless considering measure not to impair objectivity of risk assessment such that the expert meeting which actually perform risk assessment at present (and other meetings with similar function) is clearly separated from the NRA and is operated as third party organization.⁵⁴

⁵³ William D. Travers/RA/Executive Director for Operations, SECY 00-0212 Policy Issue "Regulatory guide providing guidance and examples for identifying 10 CFR 50.2 design bases"

⁵⁴ For details about this issue, refer to "Principles on Administrative Implementation of Nuclear Safety Regulations : Case Study of the Investigation Framework by Nuclear Regulation Authority on the Shatter Zones at the Tsuruga Power Station" by Tomoyuki

It is required that the quantitative safety goal is firmly positioned in the basis of nuclear risk assessment. The quantitative safety goal should be determined by comparison and balance between merits and risks of use of nuclear energy. (NRC establishes safety target based on that the additional risks of nuclear origin is suppressed to one thousands or less of risks on general social lives other than nuclear origin.⁵⁵)

The attitude of the present NRA seems that the NRA thinks it is the NRA's duty for the NRA to negatively respond to "utilization" of nuclear energy, therefore it is impossible that the NRA establishes a quantitative safety goal determined by the above mentioned comparison and balance. It is required to enforce regulation based on the quantitative safety goal decided at the council which is established, for example, in Cabinet Secretariat for incorporating the views of various field of society not limited to inside of framework of the NRA through the process to define suitable level of the quantitative safety goal. Of course, the NRA Chairman can be a member of the council. By doing so, the basis for introducing the principle of "Efficiency" into the safety regulation administration of Japan will be established. For example, when the necessity of backfit is to be assessed, the degree of effectiveness of the measure is clarified by comparing with the quantitative safety goal by utilizing PRA method. About the correlation between process for establishing quantitative safety goal and the regulation enforcement of the goal (especially about backfit), legal incorporation by amendment of Reactor Regulation Act should be investigated.

2. Efforts required to power plant operators

The NRA is said to pursue the regulation of the best in the world. But the risk is different by external events, accident progression, and site's characteristics. Therefore, even if the regulation is the best in the world and all the related regulation items are cleared, it does not mean that the safety of the entire site is ensured. It is unavoidable for operators to be criticized that the Fukushima Daiichi NPS accident is not sufficiently reflected, if operators apply safety measures only for the purpose of complying with the regulation established by the NRA and passing the conformity examination without recognition of the safety risk.

Operators should take the prime responsibility for safety as stated in the International Atomic Energy Agency (IAEA) fundamental safety principles. And operators should not expect to obtain the proof of safety

Tanabe (Central Research Institute of Electric Power Industry)
<http://criepi.denken.or.jp/jp/kenkikaku/report/download/IscBfw1Mr6hU6kQXtc1qc8mYBq85EIzl/report.pdf>

⁵⁵ NRC Safety Goals for the Operation of Nuclear Power Plant, Policy Statement 1986

from the NRA who certifies the compliance by submitting the required documents, but should perform self-controlled safety improvement activities continually to attain sufficient safety. "Relief" of local residents and local governments' staff is obtained by the reliability on operators, who perform routine operations without a trouble or an incident at sites and act promptly and effectively at the front line under a dangerous situation to restore the safety when an accident occurs.

Moreover, in order to wipe out the distrust over the nuclear technologies and operators' governance and organizational culture which have spread among the public, operators should make more efforts for safety earnestly than the NRA does without being bewildered by the conflict with the NRA. When operators will continue such attitudes over a long period hereafter, it is expected that negative image to nuclear power will be faded out gradually. On the contrary, the recovery way to the confidence of nuclear power will turn into a thorny way if operators do not recognize that the prime responsibility for safety rests on them and if it is perceived that they have unreasonable dissatisfaction with the NRA, or local governments, the movement against NPPs, and others.

The approach of voluntary safety enhancement by operators is detailed in the report of the "WG on Voluntary Efforts & Continuous Improvement of Nuclear Safety" under the "Nuclear Energy Subcommittee" of the "Electricity and Gas Industry Committee" of the "Advisory Committee for Natural Resources and Energy" issued on May 30, 2014⁵⁶. Suggestions described in the report, such as full utilization of probabilistic risk assessment, governance reorganization by operators, and construction of close relationships with manufacturers, related groups, and operators are pertinent and agreeable.

In this section, operation of the safety improvement evaluation system, design of appropriate peer review systems, and communication with stakeholders are proposed including some supplementary points.

(1) Effective operation of the "evaluation of safety improvement" system

In the world of Japanese nuclear safety regulation, the regulation by the regulatory body has ruled the nuclear and operators' voluntary safety rules has been historically treated as independent measures. The changes are roughly explained as follows;

In June 1992, the administrative directive document of the Agency of

⁵⁶ Report of the WG on Voluntary Efforts & Continuous Improvement of Nuclear Safety
http://www.meti.go.jp/committee/sougouenergy/denryoku_gas/genshiryoku/anzen_wg/repourt_02.html

Natural Resources and Energy required operators to perform the periodic safety review (PSR), which "comprehensively reevaluates the safety of nuclear power station according to the latest technical knowledge in each tenth year aiming at the safety improvement of existing nuclear power plants".

At the task group concerning the inspection (held on July 30, 2003) of the 10th Nuclear and Industrial Safety Subcommittee of the Advisory Committee for Energy and Resources, the PSR was defined as "the approach to obtain the prospect that safe operation can be continued by maintaining the safety of high level equivalent to the newest nuclear power plants by reevaluating the safety preservation activities that have been performed since commissioning in each tenth year and adding effective measures for safety enhancement, as necessary, by electric utilities."

Therefore, in October 2003, the Rules for the Installation, Operation etc. of Commercial Power Reactors (hereinafter referred to as the "Rules for Commercial Power Reactors") was amended to make the PSR as a legal claim of the operational safety program (mandating), and the Government decided to check the contents of PSR as one of items of the Operational Safety Inspection.

Moreover, the aging technical evaluation and the development of long-term maintenance program based on the evaluation results had been performed as part of the periodic safety review. Besides, the probabilistic safety assessment (called "probabilistic risk assessment" later) was decided not a legal claim since adequate technical knowledge had not been obtained, but an arbitrary requirement.

After the accident of Fukushima Daiichi NPS, the amendment of the Reactor Regulation Law in 2011 introduced the "safety improvement evaluation" as an operator's voluntary effort, and the amendment of Rules for Commercial Power Reactors in 2013 abolished the periodic safety review. The legal base is the following articles.

(Evaluation for safety improvement of nuclear power reactor facilities)

Article 43-3-29

- (1) Nuclear power reactor establishers must, pursuant to the provisions of the Nuclear Regulation Authority regulation, evaluate the safety of the nuclear power reactor facilities at each time specified by the relevant NRA regulation in order to improve the safety of their nuclear power reactor facilities. However, this shall not apply to the case of power reactor where the approval set forth in paragraph (2) of Article 43-3-33 has been obtained, unless otherwise provided for by the Nuclear Regulation Authority regulation.
- (2) The evaluation set forth in the preceding paragraph must be performed by investigating and analyzing the following matters,

taking these investigations and analyzing results into consideration, and comprehensively evaluating the safety of the whole nuclear power reactor facilities concerned.

- (i) Matters related to the measures for prevention of occurrence and spread of accidents anticipated in the nuclear power reactor facilities ("prevention of accident occurrence and spread", hereinafter the same shall apply in this item) specified in the following and the effect of prevention of accident occurrence and spread by the measures when the measures are taken.
 - (a) The equipment or components that contribute to prevention of accident occurrence and spread other than those specified to be installed by the technical standards of Article 43-3-14 must be installed.
 - (b) The structure to perform complete prevention of accident occurrence and spread must be established by staff reinforcement and safety preservation education for ensuring the safety.
 - (ii) Matters related to the events that may result in the occurrence of severe accidents in spite of having taken the measures listed in the preceding paragraphs (a) and (b).
- (3) When the evaluation of Paragraph (1) is performed, the Nuclear power reactor establisher concerned must, pursuant to the provisions of the Nuclear Regulation Authority regulation, notify to the Nuclear Regulation Authority the results and methods of investigation, analysis and evaluation of the evaluation concerned and the matters specified by the relevant Nuclear Regulation Authority regulation (hereinafter referred to as "results of the evaluation and other matters", in paragraph (5)). However, this shall not apply to the case of power reactor where the approval set forth in paragraph (2) of Article 43-3-33 has been obtained, unless otherwise provided for by the Nuclear Regulation Authority regulation.
 - (4) When any of the methods of investigation, analysis and evaluation of the evaluation concerned among the matters notified by the provision set forth in the preceding paragraph does not conform to the method specified by the Nuclear Regulation Authority regulation, the Nuclear Regulation Authority can order the notified nuclear power reactor establisher to change the method of investigation, analysis or evaluation.
 - (5) When the nuclear power reactor establisher notified the evaluation results and other matters according to the provision of paragraph (3), pursuant to the provisions of the Nuclear Regulation Authority regulation, the notified evaluation results and other matters shall be released.

Moreover, concerning the examination by the NRA, the periodic safety

review is regarded unnecessary to be examined since the safety improvement evaluation covers the scope of the periodic safety review or more. Moreover, the safety improvement evaluation is compared with the IAEA safety standard "Periodic Safety Review of Nuclear Power Plants" (SSG-25), and concluded that IAEA's purpose and confirmation matters are covered by the safety improvement evaluation⁵⁷.

Although such an institutional structure is "voluntary" initiative, it is legally obligated (administrative minor penalty to keep order and discipline is imposed on the penalty for an inaction), which is a more regulatory matter as compared with other countries (refer to Figure 7).

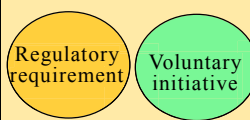
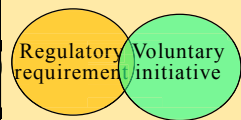
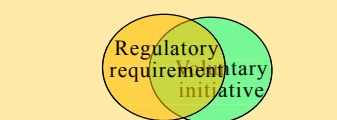
Actually, when an operator notifies the safety improvement evaluation and it does not conform to the Nuclear Regulation Authority regulation, the order to change the method can be initiated (refer to paragraph (5) of the above-mentioned article). The quality requirement of the evaluation results and statutory regulation are imposed to voluntary initiatives, so that actions, such as supervision and instruction, by the regulatory body is possible in order to standardize the methodology to make it possible to compare operators' initiatives, which cannot be generally considered irrational.

But, from the present relationship between the NRA and operators, operators couldn't help be suspicion and fear that, when operators propose a quantitative addition of safety measures and/or qualitative addition reflecting new ideas or technologies voluntarily, the NRA will make the proposal as regulatory matters or will make conformity criteria on the new and/or additional proposal for the examination. Such an approach does not foster the incentive to make voluntary efforts but foster the reverse incentive to treat the voluntary safety improvement just for formality. If such a situation is caused for the important method, such as the probabilistic risk assessment, which will influence the future safety regulation, the desired expectation comes to nothing.

Under the present confrontational structure and mutual distrust between them, common understanding that evaluation results, data and other information concerning the voluntary initiatives including the probabilistic risk assessment do not become regulatory requirements directly is necessary, at least. The memorandum of understanding that describes the common understanding should be concluded, or more formal revision of legislation should be studied. In that case, it is appropriate to refer to good practices in U.S.

⁵⁷ Abolition of the periodic safety review according to the implementation of safety improvement evaluation of commercial power reactor facilities

https://www.nsr.go.jp/committee/youshikisya/shin_seidoseibi/data/0011_01.pdf

| | United States | France | Japan |
|--|--|--|---|
| Legal position and extent of statutory regulation | <ul style="list-style-type: none"> PSR is not legally stipulated since operators' independency is respected. | <ul style="list-style-type: none"> Since the operation period is not determined, PSR at every tenth year or shorter time is obligated as an aging management measure. | <ul style="list-style-type: none"> The Reactor Regulation Law obligates to implement the voluntary safety evaluation according to the regulation stipulated by the NRA. The guide of NRA defines voluntary safety evaluation and notification of the results within six months after execution of the periodical inspection. |
| Operators' voluntary initiative for safety improvement | <ul style="list-style-type: none"> Promotion of operators' voluntary safety improvement initiative by operators association (INPO) Research and implementation of the probabilistic risk assessment by EPRI and NEI who support the initiative of voluntary safety improvement | <ul style="list-style-type: none"> The PSR is performed reflecting the knowledge obtained in the ten years. | <ul style="list-style-type: none"> Matters that have been performed in the past are apt to be reviewed as the voluntary safety evaluation for the examination since there is no mechanism of pointing out new matters. Since the criteria to review the reflection of new technologies are ambiguous, it is judged in many cases that the voluntary safety evaluation is performed appropriately. |
| Relationship with regulatory requirements (image) |  |  |  |

Reference: "Notification timing of the 1st safety improvement evaluation of nuclear power reactor facilities"; NRA, "Current status and issues of the PSR implementation standard study"; Atomic Energy Society of Japan, and "Legal system in respect of the safety regulation for nuclear power stations in foreign countries"; JELI

Figure 7 Relationship between the voluntary initiative and statutory regulation of individual country

Under the premise of such guarantee, it is very important for operators to use this system to the utmost and to maintain the intention and capability to achieve the safety of nuclear facilities considering that it is a good opportunity to show the recognition that the primary responsibility is taken by operators.

(Example) Redefinition of voluntary safety enhancement policy of nuclear industry by the NRC's guideline and the task force in 2012

U.S. NRC defines the guideline for treatment of initiatives performed by the

nuclear industry⁵⁸.

"Industry initiatives are typically actions performed by operators that form the bases for either continued compliance with the regulations or obviate the need for new regulations. It must be clear to the public that substituting industry initiatives for NRC regulatory action can provide effective and efficient resolution of issues, will in no way compromise plant safety, and does not represent a reduction in the NRC's commitment to safety and sound regulation. The NRC and the industry are jointly responsible for the long-term success of using industry initiatives as substitutes for NRC regulatory action. Operators must effectively manage and implement their commitments associated with these industry initiatives and the NRC must provide a credible and predictable regulatory response if operators fail to satisfy these commitments." (NRC Regulatory Analysis Guidelines of the U.S. NRC; NUREG- BR-0058)

Furthermore, U.S. NRC established the Near-Term Task Force⁵⁹, as the upper-level organization to evaluate the regulation and process, to study additional needs for regulatory system improvement and to recommend policies in July 2011, and twelve (12) recommendations for reactor-safety enhancement are summarized⁶⁰. The recommendations show the view (refer to the last paragraph) on the voluntary safety enhancement of the industry described in the Regulatory Analysis Guidelines (NUREG/BR-0058, Revision 4). And, the recommendations describe concerning the relationship between the voluntary safety enhancement of the industry and the regulation, that the voluntary safety enhancement is not an alternative of the regulatory requirement, but a mechanism which promotes implementation and standardization, which contributes to effective realization of regulatory requirements.

(2) Design of appropriate peer review system

The 21st Century Public Policy Institute has released the report entitled "Toward a Comprehensive Solution for Nuclear Policy and Business Challenges" in November 2013, and proposed a new nuclear damage compensation system⁶¹. The Fukushima Daiichi NPS accident revealed the defects of current nuclear damage compensation system. The current system (1) cannot cope with the problem of entire community collapse when an accident occurs, (2) obliges nuclear operators to burden limitless debts including the damage compensation, decontamination and

⁵⁸ NRC, Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission: NUREG- BR-0058

⁵⁹ NRC, Recommendations for Enhancing Reactor Safety in the 21st Century, the New Term Task Force Review of Insights from the Fukushima Daiichi accident

⁶⁰ Secretariat of the Nuclear Safety Council, "Recommendation for the Reactor Safety Enhancement in the 21st Century by the U.S. Nuclear Regulatory Commission Task Force (Study Results of the Near-Term Task Force on the Fukushima Daiichi NPS Accident) " (Introduction of Recommendation Outline)

⁶¹ The 21st Century Public Policy Institute. "Toward a Comprehensive Solution for Nuclear Policy and Business Challenges."

decommissioning, which causes a risk that stable supply of electricity cannot be maintained, and (3) does not incorporate the system to foster incentives for nuclear operators to perform self-controlled competition for enhancement of safety. Therefore, it is proposed to change the current nuclear emergency preparedness system to the three stratum structures (refer to Figure 8).

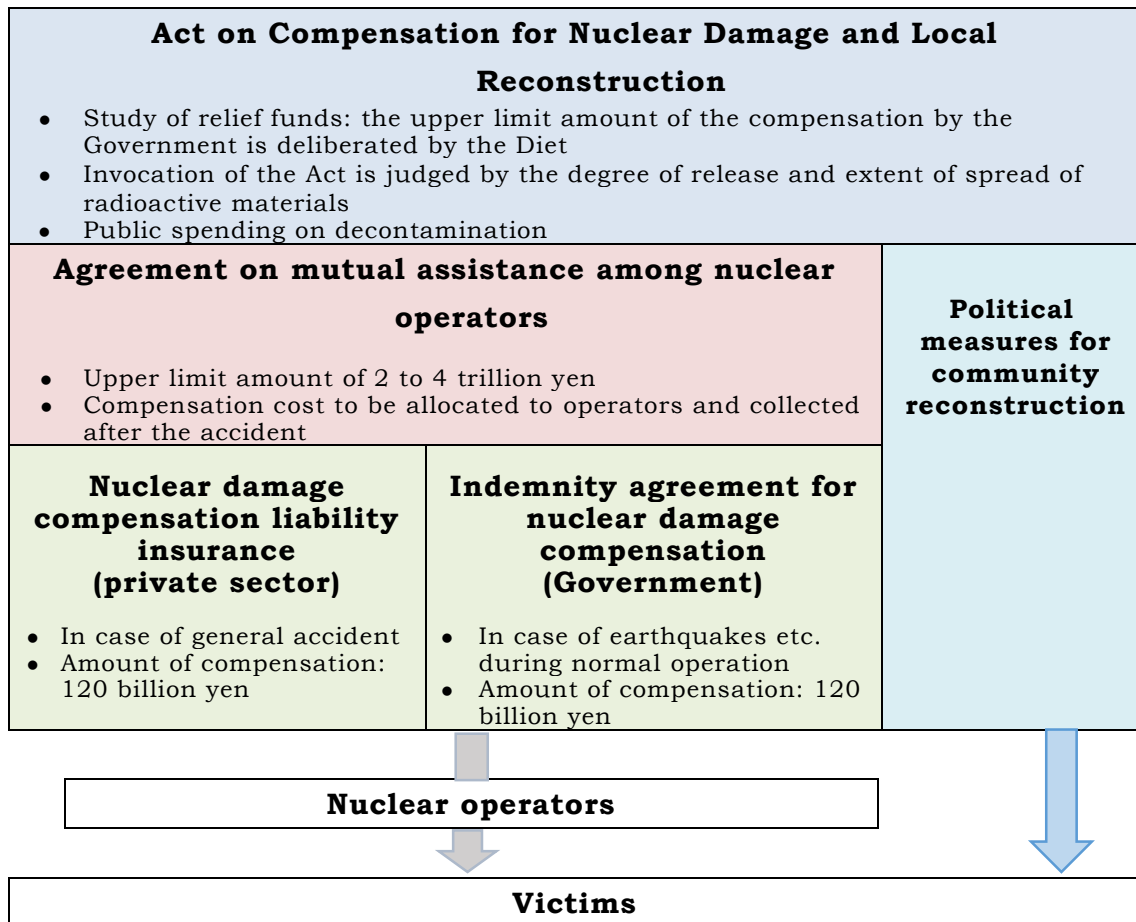


Figure 8 Nuclear emergency preparedness systems of three stratum structures

This system reconstruction proposal amends the Nuclear Damage Compensation Act, and also seeks comprehensive victim relief measures and distribution of damage costs. Please read the report in detail for establishment of the post-factum-collection-type mutual assistance system among nuclear operators to mitigate the uncertainty of nuclear operation by setting the upper limit to the damage compensation amount which is charged to the operator who caused the accident. This system

follows the Price-Anderson Act of U.S. and has the mechanism for entire operators to burden the damage caused by the accident. By this system, when an operator causes an accident that inflicts damage, other operators will immediately suffer significant impacts on corporate finances. That is, nuclear operators will share the common destiny in terms of safety operations.

Since the Fukushima Daiichi NPS accident has occurred, Japan Nuclear Safety Institute (JANSI) has established the process by which nuclear operators make mutual assessment (peer review) of the safety of nuclear power stations. The post-factum-collection-type mutual assistance system makes this process effective. There is a concern that setting of upper limit damage compensation amount to be paid by nuclear operators may constitute a moral hazard among the operators. But this concern will be dismissed with the simultaneous establishment of an effective mutual supervision scheme.

Moreover, construction of a scheme may be necessary, which penalizes nuclear operators who neglect to strive to improve safety levels (by imposing economic burden or weighted inspection), and on the other hand gives reward to those who achieve high performance in safety operation.

For example, similar to the U.S. Reactor Oversight Process (ROP), the NRA links performance indicators of reactors with weighted inspection and makes the findings available for the public. Also, reactors with high performance could be given the incentive of longer intervals between regular inspections. Furthermore, it deserves to study an idea that links the insurance premium (rates) under the Government-sponsored indemnity agreements for compensation of nuclear damage with performance indicators above-mentioned and insurance premiums (rates) of the nuclear damage compensation liability insurance of a private sector with performance indicators or other systems.

(3) Communication with stakeholders

Japanese nuclear regulatory system did not have relation with local residents. The Nuclear Regulation Act does not provide to adopt opinions of local governments. On the other hand, voluntary safety agreements have been concluded between each operator and related local governments. These agreements have been the only approach to reflect the opinion of local governments to regulate NPP operation.

However, the "Act for Final Disposition of Special Radioactive Wastes" provides to follow the opinion of local governments and local residents. And there is a proposal that such a provision to follow the opinion of local governments and local residents should be adapted not only to the Act for Final Disposition of Special Radioactive Wastes but also to other legislations, as adapted to other non-nuclear legislations. For example,

when the Minister of Economy, Trade and Industry gives permission for establishment of a bicycle racetrack, relevant governor's comments must be obtained, and the governor's comments must be subject to the public hearing to obtain opinions of stakeholders (paragraphs (2) and (3), Article 4 of the Bicycle Racing Act). Moreover, when the Minister of Land, Infrastructure and Transport examines the application of airport establishment license, the minister is obliged to hold public hearings and give stakeholders opportunities to state their opinions (paragraph (2), Article 39 of the Aviation Act). Furthermore, when the establishment license of commercial power reactor is granted, public hearings have been held by the Ministry of International Trade and Industry and the Nuclear Safety Commission. ("Rules on Public Hearings for Establishment of Nuclear Power Plants"⁶², Order by the Minister of Economy, Trade and Industry and "Tentative Policy of the Nuclear Safety Commission"⁶³, Nuclear Safety Commission)

The overseas example, IAEA Safety Standards⁶⁴ requires "building up of professional and constructive formal and informal system to talk with operators" and "establishment of appropriate measures for providing information to and negotiating with stakeholders and the public about the process and decision of a regulatory body."

Considering these circumstances, it is considerable to legally specify for the NRA to hold public hearings and other measures and prepare the mean for communication with local governments and local residents. However, the subjects which will be taken at public hearings includes the legally difficult matters itself, such as administrative matters subject to the public hearing (the establishment license only or plus amendments), simplification of procedures according to the importance of the subject, timing to perform the public hearings and so on. And further, there would be a political consideration that the subject which gives a negative impact to the actual relationship with local governments must be avoided because public hearings have been performed based on the safety agreement with local governments so far.

⁶² "Rules on Public Hearings for Establishment of Nuclear Power Plants", Order by the Minister of Economy, Trade and Industry
<http://www.meti.go.jp/press/2011/09/20110930007/20110930007-2.pdf>

⁶³ "Tentative Policy of the Nuclear Safety Commission", Nuclear Safety Commission
http://www.data.go.jp/data/dataset/cao_Ol_ds_l3112600041782/resource/4dd4735c-32db-4066-b254-637dd036beaf?inner_span=True

⁶⁴ IAEA Safety Standards
https://www.nsr.go.jp/disclosure/meeting_commissioner/data/20140129shiryō.pdf

Overseas example - Effective regulation of the International Atomic Energy Agency (IAEA)

- IAEA held the meeting on Effective Nuclear Regulatory Systems for the first time in 2006, and published the content as a report. In recent years, the 3rd meeting was held in 2013.
- The conclusion of the meeting held in 2013 for the first time after the Fukushima's accident.
 - Peer reviews must clearly include national action plans and follow-up missions to complete the process;
 - While regulators perform detailed assessments of regulatory requirements, systems and processes following significant operational events, they do not have a systematic way of collecting, analyzing and sharing regulatory experience, nor do they routinely assess less significant events and issues which would contribute toward continuously improving the regulatory process;
 - Spent fuel pool safety should be reviewed regarding obvious weaknesses in defense in depth and possible new mechanisms to eliminate as far as possible the possibility of serious accidents occurring;
 - Emphasizing the importance of communication, coordination and consistency in national and international responses to emergencies, regulators should ensure that national communication plans are developed, tested, implemented and improved well before any accident occurs;
 - Introducing a nuclear power program entails a wide range of long term safety and security infrastructure issues, including the establishment of an effective nuclear regulatory system, as well as responsibilities that go beyond national borders. Regulators should use the IAEA peer review process as early as possible, report the results openly and take the needed follow-up actions;
 - Projected growth in nuclear power combined with retiring experts will require a workforce with the skills necessary to face these challenges. A more consistent, international effort is still needed and the IAEA was called upon to take further actions on these issues;

These conclusions are written by the writer referring to the IAEA Conference on Regulatory Effectiveness Concludes, April 17, 2013.⁶⁵

Although it is difficult to create a common legal approach to all the processes at this moment, each organization needs to cooperate regarding the matters such as "to clarify the responsibility for safety" and evacuation program required by local residents at least, on which responsibilities have been ambiguous. It is necessary to clarify who plays the role of leader and what kind of roles other organizations should take. First, it is necessary to confirm how the authority and responsibility are legally shared among the Government, the NRA, and operators, and it is required to make solutions for the issues, such as necessary legal revisions if there is a defect or other written document if clarification by the legislation is not suitable. Especially, considering the position of each local government of

⁶⁵ IAEA Conference on Regulatory Effectiveness Concludes, April 17, 2013
<http://www.iaea.org/newscenter/news/2013/regeffectiveness.html>

the site of which NPPs are expected to re-start, such matters are subjects to be immediately handled and clarified⁶⁶.

In addition, even if operators do not have a legal obligation, they operate nuclear plants of which accident risk is not null, and recognizing that they are primarily responsible for the safety, the following cooperation is required even for off-site matters. If they are not willing to cooperate, legal imposition needs to be studied.

- 1) Preparation of the internal system for transportation of goods and evacuation of residents which may have some difficulties when an accident occurs (measures reflecting the fact that the evacuation and medical care in the hospital had not been performed smoothly since each of the main groups in charge hesitated to be engaged in such logistics, when the Fukushima Daiichi NPS accident occurred),
- 2) Cooperation for provision of the related information when local governments make evacuation programs, and
- 3) Daily training in cooperation with police, fire fighters, and Self-Defense Forces (assuming accident and terrorism)

⁶⁶ Regarding these matters, further investigation is expected together with the allocation of the roles and procedures for making effective evacuation program, while the nuclear power plants will increase in number which are expected to re-start operation following to Sendai NPS.

Chapter 3 Prospecting the amendment of Reactor Regulation Act - Example of bill outline -

This chapter proposes the amendment of Reactor Regulation Act in the form of articles based on the issues discussed above. Since the consistency of the Reactor Regulation Act as the whole becomes difficult to be kept if the patchwork amendments are continued, drastic amendment may be necessary. Hence, please understand that this proposal is not a complete form, but an interim proposal for detail discussion. Moreover, this amendment is limited to that of power reactors which have issues at present for discussion. In addition, from a view point of being at-a-glance readability, the old and new comparison table describes a part of articles that are not necessary to be amended.

Besides, when elements necessary for the future of the whole nuclear energy related activities are looked at in bird eye view, the Reactor Regulation Act has important other elements, not only the safety regulation elements discussed in this document. For example, the approach to foster the innovative nuclear technologies that is one of science and technology policies is also important as the way of the safety regulation. Considerably extensive points of argument exist; whether safety regulations of commercial power reactors and research and/or experimental reactors should be the same or not, how the regulatory system should be reconstructed to change the specification regulation to performance regulation. Since the Reactor Regulation Act in which the business regulation remains does not meet the latest concept to separate the promotion and regulation, there is an argument that business regulation elements should be completely eliminated to specialize in the safety regulation focused on the facility and the material.

Moreover, if the NRA cannot establish the self-standard and the regulatory administration runs recklessly and self-righteously, the right of administrative organizations that take charge of public protection and promotion will be violated as the result. How to adjust the NRA and the administrative organizations in such a case is a very important issue from a view of administration governance. It is actually impossible to bring in all issues to the official residence of the Prime Minister for resolution. Therefore, it may be one of methods to solve issues, such as positive utilization of the ministries and agencies adjustment process set forth in Article 15 of the National Government Organization Act, which was added in the amendment made by receiving the report ⁶⁷of the Administrative

⁶⁷ Final Report of the Administrative Reform Council
<http://www.kantei.go.jp/jp/gyokaku/report-final/>

Reform Council.

(National Government Organization Law)

Article 15 When ministers, committees, and secretary generals of agencies find adjustment of policies among administrative organizations is necessary, in order to accomplish their responsible functions, they may require director generals of relevant administrative organizations to submit necessary materials and to explain after clarifying the necessity, and state one's opinion related with policies of the relevant administrative organizations.

1. Outline of Amendment

(1) Explicit statement of the purpose of the Reactor Regulation Act

The purpose of the Reactor Regulation Act, that is, "to operate economical assets, nuclear power plants invested for stable supply of electricity, effectively" is clarified, and the system for rational regulatory activities is established to define basic policies for implementation of regulation.

(2) Introduction of quantitative safety goal and utilization of PRAs

In order to supplement and improve the old deterministic risk assessment, it is described for the NRA and operators to utilize the probabilistic risk assessments (PRAs) positively (it is not mandated since it is a complementary method). Moreover, in order to avoid the regulatory arbitrariness and to keep the risk and benefit balance in the examination, a council (tentative name: Nuclear Safety Goal Council) is newly established in the Cabinet Office to decide quantitative safety goals. Note that the expertise knowledge is not necessarily required as the members' qualification requirement since the safety goals should meet the social general sense.

(3) Clarification of backfit procedures

In order to supply cheap and stable electrical power by efficient nuclear power generation under rational regulation ensuring the public safety and to protect operator's predictability and property rights, the backfit provision, Article 43-3-23 of the Reactor Regulation Act, is revised, and the application timing is clarified by the Cabinet Order.

(4) Documentation and clarification of evaluation criteria and other matters

(i) Activity guideline and evaluation criteria

In order to encourage the NRA to perform regulatory activities according to clear criteria based on fundamental principles, the Act for Establishment of Nuclear Regulatory Authority is amended to mandate clarification of basic activity guidelines and general policies and criteria

concerning the safety assessment method.

(ii) Documentation and filing of correction

When the NRA request operators to correct, the request of correction should be documented and filed so that the accumulation of requests fosters the operators' predictability.

(iii) Development and filing of the written decision

Development and filing of the written decision is required to the NRA so that the accumulation of requests fosters the operators' predictability.

(5) Enhancement of the Reactor Safety Examination Committee

In order to position the Reactor Safety Examination Committee as the special advice organization for individual examination, the Reactor Safety Examination Committee shall be required for the opinion when the NRA examines licenses for reactor establishment and alteration and orders the operation suspension. Moreover, in order to position the Reactor Safety Examination Committee as the special advice organization concerning the whole safety regulation policy, the authorized limit of rights of the Reactor Safety Examination Committee should be specified (in this report, the proposal of amendment is not shown by articles, but the Reactor Safety Examination Committee should be amended similarly).

2. Drafted amendment bill

(1) Reactor Regulation Act; Comparison of old and new articles

| Amended article | Current article |
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| Chapter I General Provisions | |
| <p>(Objectives)</p> <p>Article 1 This Act, in accordance with the spirit of the Atomic Energy Basic Act (Act No. 186 of 1955), is enacted in order to ensure that the uses of nuclear source material, nuclear fuel material and reactors are limited to peaceful ones <u>and that those are used safely</u> for the purpose of providing necessary regulations on refining activities, fabricating and enrichment activities, interim storage activities, reprocessing activities and waste disposal activities, as well as on the installment and operation, etc. of reactors, assuming generation of massive natural disasters and terrorism and other criminal acts, and also for the purpose of providing necessary regulations on the uses of international controlled material to execute treaties or other international agreements concerning the research, development and use of atomic energy, and then to contribute to protection of lives, health and property of people, and environmental preservation, and to ensure national security by preventing hazards due to a release of radioactive materials when a serious accident occurs in the nuclear facility at an abnormal</p> | <p>(Objectives)</p> <p>Article 1 This Act, in accordance with the spirit of the Atomic Energy Basic Act (Act No. 186 of 1955), is enacted in order to ensure that the uses of nuclear source material, nuclear fuel material and reactors are limited to peaceful ones for the purpose of providing necessary regulations on refining activities, fabricating and enrichment activities, interim storage activities, reprocessing activities and waste disposal activities, as well as on the installment and operation, etc. of reactors, assuming generation of massive natural disasters and terrorism and other criminal acts, and also for the purpose of providing necessary regulations on the uses of international controlled material to execute treaties or other international agreements concerning the research, development and use of atomic energy, and then to contribute to protection of lives, health and property of people, and environmental preservation, and to ensure national security by preventing hazards due to a release of radioactive materials when a serious accident occurs in the nuclear facility at an abnormal level outside the factory or place</p> |

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| <p>level outside the factory or place of business where the nuclear facility is installed and other hazards due to use of these materials and reactors and protecting nuclear fuel material.</p> <p><u>(Quantities safety goal)</u> <u>Article 1-2 When the Nuclear Regulation Authority examines that licensees' technologies and measures, as well as the location, structure and equipment of the power reactor facilities, conform to the standards according to this Act, the quantitative safety goal must be below the socially acceptable criteria that are specified by the Nuclear Safety Goal Council taking the magnitude of damage into consideration pursuant to the provisions of the Cabinet Order.</u></p> <p><u>(Probabilistic assessment)</u> <u>Article 1-3 When the Nuclear Regulation Authority examines that licensees' technologies and measures, as well as the location, structure and equipment of the power reactor facilities, conform to the standards according to this Act, assuming accidents that may occur and their propagation processes as much as possible, methods to comprehensively consider the occurrence probability of causative events for accidents, probability that each event propagates to the following event, probability for specific equipment, structure, or other mechanisms to prevent the above-mentioned propagation and the</u></p> | <p>of business where the nuclear facility is installed and other hazards due to use of these materials and reactors and protecting nuclear fuel material.</p> |
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| <p><u>magnitude and other factors of the final damage must be used positively.</u></p> | |
| <p>Article 2 (Omitted)</p> <p>Chapters II and III (Omitted)</p> <p>Chapter IV Regulations concerning the Installment, Operation, Etc. of Reactors</p> <p>Section 1 (Omitted)</p> <p>Section 2 Regulations concerning the Installment, Operation, Etc. of Power Reactors</p> <p>(Installment license)</p> <p>Article 43-3-5</p> <p>(1) Any person who intends to install a reactor shall, pursuant to the provisions of the Cabinet Order, obtain the permission of the Nuclear Regulation Authority.</p> <p>(2) Any person who intends to obtain the permission set forth in the preceding paragraph shall submit an application form containing the following matters to the Nuclear Regulation Authority:</p> <ul style="list-style-type: none"> (i) the name and address of the applicant and, in the case of a juridical person, the name of its representative, (ii) the purpose for which the reactors are to be used, (iii) the type, thermal output and number of reactors, (iv) the name and address of the factory or place of activity where the reactors are to be installed, (v) the location, structure and equipment of the reactors and auxiliary facilities (hereinafter referred to as "reactor facilities"), (vi) the construction plan for reactor facilities, (vii) the type and amount scheduled for annual use of nuclear fuel material to be used as fuel for the reactors, (viii) the method for disposing of spent fuel, (ix) the matter concerning radiation control in the nuclear power reactor facility, and (x) the matter concerning preparation of the facility and system to cope with accidents that cause a significant damage of the core of power reactors or other consequences when such accident occur. | |

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| <p>(Criteria for the Permission) Article 43-3-6</p> <p>(1) In the case that an application for the permission set forth in the preceding paragraph is made, the Nuclear Regulation Authority shall not grant the permission in the said paragraph unless he/she finds that the application conforms with each of the following items:</p> <ul style="list-style-type: none"> (i) that the reactors will not be utilized for non-peaceful purposes, (ii) that the applicant has sufficient technical capability and financial basis necessary for establishment of the power reactor, (iii) that the applicant has sufficient technical capability required for taking necessary measures in an occurrence of severe accidents (significant core damage and other severe accidents of power reactors specified by the relevant Nuclear Regulation Authority regulation, the same for paragraph (1) of Article 43-3-22 and item (ii), paragraph (2) of Article 43-3-29) and for preventing a spread of severe accidents, and has sufficient other technical capability for operating the power reactors competently, and (iv) that the location, structure and equipment of the power reactor facilities are conform to the standards specified by the relevant Nuclear | <p>(Criteria for the Permission) Article 43-3-6</p> <p>(1) In the case that an application for the permission set forth in the preceding paragraph is made, the Nuclear Regulation Authority shall not grant the permission in the said paragraph unless he/she finds that the application conforms with each of the following items:</p> <ul style="list-style-type: none"> (i) that the reactors will not be utilized for non-peaceful purposes, (ii) that the applicant has sufficient technical capability and financial basis necessary for establishment of the power reactor, (iii) that the applicant has sufficient technical capability required for taking necessary measures in an occurrence of severe accidents (significant core damage and other severe accidents of power reactors specified by the relevant Nuclear Regulation Authority regulation, the same for paragraph (1) of Article 43-3-22 and item (ii), paragraph (2) of Article 43-3-29) and for preventing a spread of severe accidents, and has sufficient other technical capability for operating the power reactors competently, and (iv) that the location, structure and equipment of the power reactor facilities are conform to the standards specified by the relevant Nuclear |
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| <p>Regulation Authority regulation such that they will not hinder the prevention of disasters resulting from nuclear fuel material or material contaminated by nuclear fuel material or the power reactor.</p> <p>(2) and (3) (omitted)</p> <p>(4) <u>When the permission set forth in the preceding paragraph is granted, the Nuclear Regulation Authority shall hear the opinion of the Reactor Safety Examination Committee in advance concerning the application of standards set force in item (iv), paragraph (1).</u></p> | <p>Regulation Authority regulation such that they will not hinder the prevention of disasters resulting from nuclear fuel material or material contaminated by nuclear fuel material or the power reactor.</p> <p>(2) and (3) (omitted)</p> |
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Article 43-3-7 (omitted)

(1) When a person who has obtained the permission set forth in item (i) of Article 43-3-5 (hereinafter referred to as "nuclear power reactor establisher") intends to amend the matter listed in item (ii), paragraph (2) of the said article (hereafter, called "nuclear power reactor establisher") intends to change any matter provided for in items (ii) to (v), or items (viii) to (x) of the said article,, pursuant to the provisions of the Cabinet Order, he/she shall obtain the permission of the Nuclear Regulation Authority. However, this shall not apply to changing, from among the matters listed in item (iv) of the said paragraph, only the name of the factory or the place of activity, or from among the matters listed in item (v) of the said paragraph, the matters set force in Article 4 of Nuclear Regulation Authority regulation.

(2) The provision of Article 43-3-6 shall apply mutatis mutandis to the permission set forth in in the preceding paragraph.

(3) to (8) (omitted)

Articles 43-3-9 to -13 (omitted)

(Maintenance of Nuclear Power Reactor Facilities)

Article 43-3-14 Nuclear power reactor establishers must maintain nuclear power reactor facilities to conform technical standards

prescribed by the Nuclear Regulation Authority regulation; provided, however, that this shall not apply to cases specified by the Nuclear Regulation Authority regulation for power reactors for which the approval of paragraph 2, Article 43-3-33 has been obtained.

Articles 43-3-15 to -21 (omitted)

(Measures To Be Taken for Safety and the Physical Protection of Specified Nuclear Fuel Material)

Article 43-3-22

(1) Any nuclear power reactor establisher shall, pursuant to the provision of the Nuclear Regulation Authority regulation, take necessary safety measures (including the matter concerning measures when severe accidents occur).

(i) maintenance etc. of power reactor facilities,

(ii) operation of power reactors, and

(iii) shipment, storage or disposal of nuclear fuel material or material contaminated by nuclear fuel material (shipment and disposal shall be limited to the factory or the place of activity where the reactor facilities have been installed; hereinafter the same shall apply to paragraph (1) of the following article).

(2) (omitted)

(Suspension, etc. of the Use of Facilities)

Article 43-3-23

(1) When the Nuclear Regulation Authority finds that location, structure and equipment of the power reactor facilities do not conform with the criteria set force in item (iv), paragraph (1) of Article 43-3-6, that the power reactor facilities do not conform with the technical standards set forth in Article 43-3-14, or that the measures pertaining to the maintenance etc. of the power reactor facilities, the operation of the power reactors, or that the shipment, storage or disposal of nuclear

(Suspension, etc. of the Use of Facilities)

Article 43-3-23

(1) When the Nuclear Regulation Authority finds that location, structure and equipment of the power reactor facilities do not conform with the criteria set force in item (iv), paragraph (1) of Article 43-3-6, that the power reactor facilities do not conform with the technical standards set forth in Article 43-3-14, or that the measures pertaining to the maintenance etc. of the power reactor facilities, the operation of the power reactors, or that the shipment, storage or disposal of nuclear

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| <p>fuel material or material contaminated by nuclear fuel material is in violation of the provision of the Nuclear Regulation Authority regulation pursuant to the provision of paragraph (1) of the preceding article, he/she may order, <u>pursuant to the provisions of the Cabinet Order</u>, any nuclear power reactor establisher to suspend use, remodel, repair or change the location of the power reactor facilities, designate a method for operating the power reactors or order the necessary safety measures to be taken.</p> <p>(2) (omitted)</p> <p>(3) <u>When the order to suspend the power reactor set forth in the paragraph (1) is made, the Nuclear Regulation Authority shall hear the opinion of the Reactor Safety Examination Committee in advance concerning the application of technical standards set force in item (iv), paragraph (1) of Article 43 and Article 43-3-14.</u></p> | <p>fuel material or material contaminated by nuclear fuel material is in violation of the provision of the Nuclear Regulation Authority regulation pursuant to the provision of paragraph (1) of the preceding article, he/she may order any nuclear power reactor establisher to suspend use, remodel, repair or change the location of the power reactor facilities, designate a method for operating the power reactors or order the necessary safety measures to be taken.</p> <p>(2) (omitted)</p> |
| <p>Articles 43-3-24 to -28 (omitted)</p> | |
| <p>(Evaluation for safety improvement of nuclear power reactor facilities) Article 43-3-29 (1) Nuclear power reactor establishers, pursuant to the provisions of the Nuclear</p> | <p>(Evaluation for safety improvement of nuclear power reactor facilities) Article 43-3-29 (1) Nuclear power reactor establishers, pursuant to the provisions of the Nuclear</p> |

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| <p>Regulatory Commission Regulation, must evaluate the safety of the concerned nuclear power reactor facilities at each time specified by the relevant Nuclear Regulation Authority regulation in order to improve the safety of nuclear power reactor facilities. However, this shall not apply to the case of power reactor where the approval set forth in paragraph (2) of Article 43-3-33 has been obtained, unless otherwise provided for by the Nuclear Regulation Authority regulation.</p> <p>(2) The evaluation set forth in the preceding paragraph must be performed by investigating and analyzing the following matters, taking these investigations and analyzing results into consideration, and comprehensively evaluating the safety of the whole nuclear power reactor facilities concerned.</p> <p>(i) Matters related to the measures for prevention of occurrence and spread of accidents anticipated in the nuclear power reactor facilities ("prevention of accident occurrence and spread", hereinafter the same shall apply in this item) specified in the following and the effect of prevention of accident occurrence and spread by the measures when the measures are taken.</p> | <p>Regulatory Commission Regulation, must evaluate the safety of the concerned nuclear power reactor facilities at each time specified by the relevant Nuclear Regulation Authority regulation in order to improve the safety of nuclear power reactor facilities. However, this shall not apply to the case of power reactor where the approval set forth in paragraph (2) of Article 43-3-33 has been obtained, unless otherwise provided for by the Nuclear Regulation Authority regulation.</p> <p>(2) The evaluation set forth in the preceding paragraph must be performed by investigating and analyzing the following matters, taking these investigations and analyzing results into consideration, and comprehensively evaluating the safety of the whole nuclear power reactor facilities concerned.</p> <p>(i) Matters related to the measures for prevention of occurrence and spread of accidents anticipated in the nuclear power reactor facilities ("prevention of accident occurrence and spread", hereinafter the same shall apply in this item) specified in the following and the effect of prevention of accident occurrence and spread by the measures when the measures are taken.</p> |
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| <p>(a) The equipment or components that contribute to prevention of accident occurrence and spread other than those specified to be installed by the technical standards of Article 43-3-14 must be installed.</p> <p>(b) The structure to perform complete prevention of accident occurrence and spread must be established by staff reinforcement and safety preservation education for ensuring the safety.</p> <p>(ii) Matters related to the events that may result in the occurrence of severe accidents in spite of having taken the measures listed in the preceding paragraphs (a) and (b).</p> <p>(3) <u>For the evaluation of paragraph (1), the methods listed in Article 1-2 must be used positively.</u></p> <p>(4) When the evaluation of paragraph (1) is performed, the Nuclear power reactor establisher concerned must, pursuant to the provisions of the Nuclear Regulation Authority regulation, notify to the Nuclear Regulation Authority the results and methods of investigation, analysis and evaluation of the evaluation concerned and the matters specified by the relevant Nuclear Regulation Authority regulation (hereinafter referred to as "results of the evaluation and other matters", in paragraph (5)).However, this shall not</p> | <p>(a) The equipment or components that contribute to prevention of accident occurrence and spread other than those specified to be installed by the technical standards of Article 43-3-14 must be installed.</p> <p>(b) The structure to perform complete prevention of accident occurrence and spread must be established by staff reinforcement and safety preservation education for ensuring the safety.</p> <p>(ii) Matters related to the events that may result in the occurrence of severe accidents in spite of having taken the measures listed in the preceding paragraphs (a) and (b).</p> <p>(3) When the evaluation of paragraph (1) is performed, the Nuclear power reactor establisher concerned must, pursuant to the provisions of the Nuclear Regulation Authority regulation, notify to the Nuclear Regulation Authority the results and methods of investigation, analysis and evaluation of the evaluation concerned and the matters specified by the relevant Nuclear Regulation Authority regulation (hereinafter referred to as "results of the evaluation and other matters", in paragraph (5)).However, this shall not</p> |
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| <p>apply to the case of power reactor where the approval set forth in paragraph (2) of Article 43-3-33 has been obtained, unless otherwise provided for by the Nuclear Regulation Authority regulation.</p> <p>(5) When any of the methods of investigation, analysis and evaluation of the evaluation concerned among the matters notified by the provision set forth in the preceding paragraph does not conform to the method specified by the Nuclear Regulation Authority regulation, the Nuclear Regulation Authority can order the notified nuclear power reactor establisher to change the method of investigation, analysis or evaluation.</p> <p>(6) When the nuclear power reactor establisher notified the evaluation results and other matters according to the provision of paragraph (3), pursuant to the provisions of the Nuclear Regulation Authority regulation, the notified evaluation results and other matters shall be released.</p> | <p>apply to the case of power reactor where the approval set forth in paragraph (2) of Article 43-3-33 has been obtained, unless otherwise provided for by the Nuclear Regulation Authority regulation.</p> <p>(4) When any of the methods of investigation, analysis and evaluation of the evaluation concerned among the matters notified by the provision set forth in the preceding paragraph does not conform to the method specified by the Nuclear Regulation Authority regulation, the Nuclear Regulation Authority can order the notified nuclear power reactor establisher to change the method of investigation, analysis or evaluation.</p> <p>(5) When the nuclear power reactor establisher notified the evaluation results and other matters according to the provision of paragraph (3), pursuant to the provisions of the Nuclear Regulation Authority regulation, the notified evaluation results and other matters shall be released.</p> |
| <p>Articles 43-3-30 to -34 (omitted)</p> <p>Chapter 4-2 to Chapter 9 and Supplementary Provisions (omitted)</p> | |

(2) Act for establishment of Nuclear Regulation Authority; Comparison of old and new articles

| Amended article | Current article |
|---|-----------------|
| Articles 1 to 10 (Omitted) | |
| <p><u>(Activity guideline, examination standard, etc.)</u> <u>Article 10-2</u> <u>(1) The Nuclear Regulation Authority shall prepare and make the public the document specifying the matters set forth in the following:</u> <u>(i) Basic guideline for activities</u> <u>(ii) General principles on safety assessment methods</u> <u>(iii) The relationship between the examination standard which was established pursuant to the provisions of paragraph (1) of Article 5 of the Administrative Procedure Act, and the guideline of the preceding item</u> <u>(iv) Other matters deemed to be effective in clarifying the standards of judgment made by the Nuclear Regulation Authority</u> <u>(2) The guideline of the item (i) of the preceding paragraph shall be made as concrete as possible.</u></p> <p><u>(Correction)</u> <u>Article 10-3</u> <u>(1) When the Nuclear Regulation Authority requests correction against the application made pursuant to the provisions of the Act on the Regulation of Nuclear Source Material, Nuclear Fuel</u></p> | |

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| <p><u>Material and Reactors, it shall be filed by submitting the document.</u></p> <p>(2) <u>The document set forth in the preceding paragraph shall state the reasons.</u></p> <p>(3) <u>The Nuclear Regulation Authority shall submit the document set forth in paragraph (1) for public inspection for 30 years from the date of the correction request.</u></p> <p>(Publication of written decision)</p> <p><u>Article 10-4</u></p> <p>(1) <u>When the Nuclear Regulation Authority disposes the application made pursuant to the provisions of the Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors, it shall be made by submitting a document.</u></p> <p>(2) <u>The Nuclear Regulation Authority shall submit the document set forth in the preceding paragraph for public inspection for 30 years from the date of the disposition.</u></p> | |
| <p>Article 11 to 13 (Omitted)</p> | |
| <p>(Reactor Safety Examination Committee)</p> <p>Article 14 The Reactor Safety Examination Committee <u>shall take charge of the following affairs:</u></p> <p>(i) <u>The Reactor Safety Examination Committee shall give opinions to the Nuclear Regulation Authority pursuant to the provisions of paragraph (4) of Article 43-3-6, (including the cases where it is applied mutatis mutandis.</u></p> | <p>(Reactor Safety Examination Committee)</p> <p>Article 14 The Reactor Safety Examination Committee <u>shall study and deliberate matters concerning nuclear reactor safety when the Committee has received the instructions from the Nuclear Regulation Authority.</u></p> |

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| <p><u>pursuant to the provisions of paragraph (2) of Article 43-3-8 of the said act), of the Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors.</u></p> <p><u>(ii) The Reactor Safety Examination Committee shall conduct surveys concerning the policy on regulation for ensuring safety in utilization of nuclear energy, make recommendations to the heads of relevant administrative organs through the Prime Minister when the Committee finds it necessary, and request them to report measures that are taken in accordance with the recommendations.</u></p> <p><u>(iii) The Reactor Safety Examination Committee shall conduct scientific research and study necessary to perform affairs cited in each preceding item.</u></p> | |
| <p>Article 15 to 31 and Supplementary Provisions (Omitted)</p> | |

(3) Drafted articles for the act for establishment of the Nuclear Safety Goal Council

(Establishment)

Article 1 The Nuclear Safety Goal Council (hereinafter referred to as the "Council") shall be established under the Cabinet Office.

(Affairs under the jurisdiction)

Article 2 The council shall consider the merits and demerits associated with nuclear energy utilization, and specify quantitative safety goals prescribed in Article 1-3 of the Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors (Act No. 166 of June 10, 1957).

(Organization)

Article 3 (Omitted)

(Appointment of the Chairperson and Members)

Article 4

- (1) The Chairperson and Members shall be appointed by the Prime Minister with the consent of both Houses of the Diet.
- (2) The Prime Minister may appoint the Chairman or Members notwithstanding the provisions set forth in the preceding paragraph, when the consent of both Houses of the Diet cannot be obtained due to the closing of the Diet or the dissolution of the House of Representatives in case the term of office of the Chairman or Members expires or a position is vacant.
- (3) In the case of the preceding paragraph, the Prime Minister shall obtain subsequent approval of both houses of Diet at the first Diet session after the relevant appointment. When the Prime Minister cannot obtain subsequent approval of both houses of Diet in such a case, the Prime Minister shall immediately dismiss the Chairman or Members.

(Term of office, dismissal, council, service description and remuneration)

(Omitted)

Supplement: Safety regulation and administrations of justice

The lawsuit for demand of an injunction based on moral rights, which was brought by the neighborhood of the Ohi Power Station against the Kansai Electric Power Co., Inc., was upheld at the Fukui district court on May 21, 2014. Because this report does not aim to propose the role of the administration of justice to the safety regulation, the matters are not specifically discussed in the text. However, having many opinions on the judgment, I contributed to several newspaper publishing companies. One of them is introduced here. For the contributions to other newspaper publishing companies, anyone may inspect them on the Internet (<http://ieei.or.jp/2014/08/sawa-akihiro-blog140801/#more-13983>). If you are interested in them, please see them.

(Reproduced from the morning edition of the Asahi newspaper, July 16, 2014)

In my opinion, the biggest problem on this judgment by the Fukui district court is that the judges do not understand the true nature of the safety regulation. While it is assumed that there is a risk of accident in nuclear power stations, the basic way of thinking for safety regulation is to take measures for minimizing the possibility of the risk becoming apparent and also holding back the spread of damage.

However, the judgment considers that "the subject of determination is whether or not by any chance there is a specific risk leading to such situation as the Fukushima Daiichi NPS accident" and "an injunction is naturally upheld in case there is such a risk". The opinion is that the risk has to be zero.

On the other hand, they examine whether each nuclear power station conforms to the new regulatory standard, which has been made strictly by the NRA based on self-examination of the Fukushima Daiichi NPS accident. If the judgment by the Fukui district court becomes final and binding, it means that the two regulatory standards, that is, the one of the NRA and the one of the Fukui district court, "whether or not by any chance of an accident", coexist for examining nuclear power stations.

In the past, the Supreme Court determined that the establishment licensing decision is illegal in the case where there have been errors or defects which cannot be overlooked in the study and deliberation or the determination by the Atomic Energy Commission, etc., based on the opinion that an examination of the court on nuclear power stations should be made from the viewpoint of whether there are any unreasonable points in the determination of the administrative agency which has been made

on the basis of the specialized and technical examination conducted by the Atomic Energy Commission, etc.

That means the role of administration of justice is to examine whether there have been any problems in the process of the examination of the Atomic Energy Commission or the administrative agency. In this case, two examination standards do not coexist. This way of thinking has been followed in the determination of many nuclear power station related lawsuits. However, considering that "the judgment by the court does not necessarily require high-level specialized and technical knowledge and expertise", the Fukui district court passed judgment on the safety by themselves without showing any reasons.

The determinations similar to the one made by the Fukui district court will not spread in the future. It is because many district courts examining the similar lawsuits for demand of an injunction of a nuclear power station are carefully making sure of the course of the examinations of the NRA. Though establishing a close logic is required to pass judgment prior to the judgment of the NRA, it is considered that there are few judges who want to go that far to pass judgment.

The judgment definitively states that "it is not legally allowed even to participate in the discussions in which the right related to existence of many people, the electricity cost, etc., are discussed together, and to decide about right or wrong". The judgment has not been made with enough imagination about the issue of coordination with public interests such as stable supply of electricity though the judgment might have won applause of public opinion. In my opinion, because the logic is too rough to lead the lawsuit to a grave decision of an injunction of a nuclear power station, the judgment will not be upheld in a higher court.

References

1. Examination terms related to safety

| Term | Description |
|--|---|
| <p>PSA (Periodic Safety Review)</p> | <p>The implementation items (evaluation of the status of safety preservation activities, status of reflecting the latest knowledge and PSA) were instructed and reviewed by the NISA. At present, some of them are used as the method for the Periodic Safety Management Review and some of them are the content of the safety improvement evaluation notification. At present, some of them are used as the method for the Periodic Safety Management Review and some of them are the content of the safety improvement evaluation notification.</p> |
| <p>Transitional arrangements PSA</p> | <p>This is the PSR used in the NISA age, which is used for the rule that the conventional PSR shall be used for a plant for which the restart of operation is not applied for. The PSR implementation standard of the Nuclear Society, 2009 edition is one of the methods.</p> |
| <p>SAR (Safety Analysis Report)</p> | <p>Used for an operator's independent safety assessment, this confirms that the plant is safe, based on the past and present review.</p> |
| <p>FSAR (Final Safety Analysis Report)</p> | <p>This is submitted by an operator after evaluation of the current safety of the facilities, etc., at the stage of determination by the NRC of the operation license in the US. It is obliged to update the FSAR to the UFSAR reflecting the latest status of the plant within 24 months.</p> |
| <p>PSA (Probabilistic Safety Assessment)</p> | <p>This is a method for clarifying the relative weakness as well as evaluating quantitatively the safety level of a facility, by periodically evaluating an occurrence frequency of an accident and the effect when it has occurred, for all accidents which may occur in nuclear facilities, etc.</p> |
| <p>PRA (Probabilistic Risk Assessment)</p> | <p>This is a method for considering the level of safety based on the level of risk determined by the quantitative evaluation using the probability theory, of the occurrence frequency of an accident and the effect when it has occurred, for all accidents which may occur in nuclear facilities, etc.</p> |

2. Safety regulation at the stage of design and construction

| Regulation name | Content of regulation | Review method | Legislation |
|--|---|---|---|
| Establishment license | Safety review of whether an Application for Reactor Establishment submitted by an operator conforms to the licensing basis determined by the Reactor Regulation Act is carried out, and a license to establish a reactor is determined by the NRA. | Submittal of an application form | Articles 43-3-5 and 43-3-8 of the Reactor Regulation Act |
| Approval of construction plan | After obtaining a license for changes of electric facilities and a license to establish a reactor, the content of the detailed design of the NPS has to be approved in order to initiate full-scale construction work such as component manufacturing and installation. | Supporting data | Articles 43-3-9 of the Reactor Regulation Act |
| Fuel assembly inspection | For the fuel assemblies used in the reactor (domestic fuel assemblies and imported fuel assemblies), conformity (only for domestic fuel assemblies) to the approved design and conformity to the technical standards are confirmed. | Witnessed inspection and records confirmation | Articles 43-3-12 of the Reactor Regulation Act |
| Pre-operational inspection | For the nuclear power reactor facilities whose approval or notification of construction plan has been made, conformity to the construction plan and conformity to the technical standards are confirmed. | Witnessed inspection and records confirmation | Paragraph (1) of Articles 43-3-11 of the Reactor Regulation Act |
| Approval of operational safety program | This stipulates the matters related to operation of a nuclear power reactor facility and is approved by the NRA Commissioner. The Operational Safety Inspection confirms that the Operational Safety Program is observed. | Submittal of an application form | Paragraph (1) of Articles 43-3-24 of the Reactor Regulation Act |

3. Safety regulation at the stage of operation

| Regulation name | Content of regulation | Review method | Legislation |
|---|---|---|---|
| Approval of operational safety program | At the time of operation start, the document (Operational Safety Program) specifying the matters to be observed for safety concerning nuclear facility operation is reviewed and approved by the NRA. | Application of Operational Safety Program | Paragraph (1) of Articles 43, etc., of the Reactor Regulation Act |
| Periodic facility inspection | For the facilities especially with high importance, periodic inspections conducted by an operator are witnessed or the records are confirmed. The results of examination are released. | Witnessed inspection and confirmation of an operator's examination results | Articles 43-3-15 of the Reactor Regulation Act |
| Periodic safety management inspection | An operator periodically carries out the licensee's inspection and records the results. And the implementation organization of the periodic operator's inspections is examined by the NRA. | Witnessed inspection and confirmation of an operator's results | Articles 43-3-16 of the Reactor Regulation Act |
| Operational Safety Inspection | Status of observance of the operational safety programs specifying the matters required for safety is periodically confirmed concerning operation of reactor facilities, The report of the examination is open to the public. | Access to facilities, document inspections and questioning to the relevant people | Paragraph (5) of Articles 37 of the Reactor Regulation Act |
| Evaluation for improving the safety of nuclear power reactor facilities | An operator itself comprehensively evaluates the safety related to the entire reactor facilities and submits the results to the NRA. The operator's independent approach is evaluated. The notified content is released. | Submittal of an application form | Articles 43-3-29 of the Reactor Regulation Act |

**Toward Optimization of
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- Prospecting the amendment of
Reactor Regulation Act -**

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