解説記事

規制動向

韓国原子力規制の動向

Trends of Nuclear Regulations in Korea

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本稿は、ここ 30 年間に目覚しい発展を遂げた韓国の原子力発電での規制の役割、特に最近 10 年間の安全性向上に関する規制の取組みについてまとめたもので、韓国原子力安全技術院の Park 氏と Yun 氏に解説記事を寄稿いただきました。原文は英文ですが、各章の終わりに和文要約を加えた形で掲載いたしました。

（編集委員会）

Abstract –*During the past three decades, Korea has strived to catch up with the advanced nuclear countries and filled up wide blank areas in nuclear technology with consistent national nuclear development programs. The regulation has been playing a major role in making today's achievement in the nuclear arena by setting up appropriate codes and standards and also by introducing updated regulatory requirements. Especially, over the past decade, there has been a lot of improvement in nuclear safety through regulatory initiatives in response to safety issues coming from domestic or foreign nuclear incidents. Safety inspection activities came to cover both the primary and the secondary sides to get more coherent regulation and to reduce the unscheduled shutdown resulted from secondary side. The risk insight was also more and more brought up into regulation, such as in risk-based inspection. As many of nuclear power plants are getting older, PSR as a comprehensive evaluation system, has been introduced and a complete set of rules for continued operation has been in effect from 2005. This paper will present how the Korean regulation addresses these challenges.*

概要和訳：ここ 30 年の間、韓国は原子力先進諸国に追いつこうとする努力を続け、政府の一貫した原子力開発計画の下で大きな技術的空白を埋めてきた。今日における原子力界の業績に規制が果たしてきた役割は大変大きく、それは適切な指標・指針を制定し、改善された規制要件を導入するなどによるものであった。特に、ここ 10 年では国内外プラントでの事象発生に端を発する安全上の問題への対応で、規制主導で多くの原子力の安全性向上が見られた。安全に関する検査活動には一次系側・二次系側の両方が対象に含まれることとなり、これによって一貫した規制を行い易くするとともに、二次系側に起因する計画外停止回数を減少させることができた。リスクベース検査のように、リスク概念が益々規制に取り入れられてきた。多くの原子力発電所で高経年化が進むにつれ、包括的評価のシステムとして PSR（定期安全レビュー）の導入が行われており、また運転期間延長に関する規程類が完備され 2005 年から施行されている。本稿では、これらのことに対し韓国規制がどのように取り組んでいるかを述べる。

I. INTRODUCTION

During the past three decades, Korea has continuously promoted nuclear power development projects as part of a national energy plan to meet the ever increasing energy demand. Under the national plan, the construction of nuclear power plants continued and the development of nuclear power technology was carried out to meet the national objectives - achievement of self-reliance on energy supply. That would also provide for the protection against unstable overseas oil market and eventual shortage of fossil fuel on earth, and potential environmental consequences due to greenhouse effects. As a result of this national endeavor, Korea stands out these days as one of the most dynamic and successful nuclear power programs in the world. At the present time, 20 nuclear power plants are in operation and 6 units under construction, and 2 more units will be built by the year 2015. By that time, the nuclear share will be 33% in terms of installation capacity and 44.5% in terms of electricity generation.

To achieve this successful path, maintaining high level of safety is essential. Continuous safety improvements could be made by regulatory initiatives, such as design review,

safety inspection, operating experience feedback, and preventive measures against aging degradation of nuclear components. As a whole, Korean regulation is mainly developed based on the American system. However, recently new regulatory approaches have been incorporated into legal framework, such as periodic safety review of IAEA's international standard and the risk-based-inspection developed by KINS using risk insight and periodic safety inspection experiences of KINS staff.

1．序

【和文要約】エネルギーの自給自足を目指す韓国の方針に従い、石油に代わるエネルギー源として、さらに環境対策として原子力発電は発展してきた。現在 20 基が運転中、6 基が建設中、2015 年には 2 基が追加される予定であり、原子力発電は韓国総発電設備の 33%を、発電量の 44.5%を占めている。

この高水準を達成するために、規制当局は安全性向上を指導してきた。その方法は初期の段階ではアメリカのやり方に習っていたが、最近は IAEA 等の PSR（定期安全レビュー）標準及び KINS（Korea Institute of Nuclear Safety: 韓国原子力安全技術院）開発のリスクベース検査を取り入れている。

II. Safety improvements in design

2.1 Historical review on design safety improvements

In the beginning stage of the nuclear power development program, from 1971 to 1978, the first commercial NPP project was implemented on a turnkey contract basis. At that time, contractors assumed the overall responsibility for the construction schedule, inspection, startup and performance of the plants. Since applicable domestic laws and regulations were not available at that time, those of supplier countries were applied, i.e., 10CFR, Reg. Guide and Standard Review Plan of USNRC. As for the CANDU plant, the application of Canadian laws and regulatory requirements were mandatory.

From the early 1980s, six NPPs (Kori 3&4, Yonggwang 1&2, Ulchin 1&2) were constructed by employing a component approach with foreign contractors. Contracts were separately awarded for major components of the plant, thus enabling more domestic industries to participate in the projects as subcontractors. On the regulatory and licensing side, the Nuclear Safety Center was established in December 1981 as a regulatory expert organization, which was the predecessor of today's Korea Institute of Nuclear Safety (KINS). A two-step licensing system, Construction Permit(CP) and Operating License(OL), was formally incorporated into the law. However, the majority of important codes and standards applicable in the vendor countries (U.S. and France) were still applied to the licensing of the six NPPs with only minor modifications. As for CANDU plant, Final Safety Analysis Report (FSAR) of Wolsong unit 1 was submitted by Korea Electric Power Corp. (nowaday's KHNP) in 1982 in accordance with the newly amended law, and the FSAR was reviewed by NSC to confirm the design safety again.

Starting with Yonggwang units 3&4 contracts in 1987, the overall localization of nuclear technology has been accelerated as part of a national strategy and the main role has been taken by KEPCO. In selecting foreign vendors and suppliers, the overriding condition was based on how much technology transfer they offered. In such contractual arrangement, domestic firms were chosen as prime contractors, while several foreign companies were selected as subcontractors accordingly. The same strategy was applied to the contract of Ulchin units 3&4, too. In licensing Yonggwang units 3&4, some difficulties emerged due to the scale-down design from the reference plant, i.e., Palo Verde units, the System-80 of Combustion Engineering Inc. Intensive and in-depth reviews have been made by KINS and, in addition, technical consultations from international organizations, such as the USNRC and the IAEA, were actively utilized to independently verify the design safety of Yonggwang units 3&4. As a result of the regulatory review, a safety depressurization system was additionally installed and a leak-before-break concept has been newly granted for the first time for four major piping systems; primary coolant piping, pressurizer surge line, safety shutdown line, and safety injection line[1].

The Korea Standard Nuclear Plant (KSNP), now called by OPR-1000, was developed in 1992 and the first fleet was for Ulchin units 3 and 4 which has virtually the same design features as Yonggwang units 3&4 but has improved design features, such as mid-loop operation, hydrogen igniter, and use of In-690 for reactor vessel head sleeves. Some additional safety enhancements were made through licensing review of CP for Yonggwang units 5&6; level control in CVCS, digitalization of the process control system, human factors in the remote shutdown system, PSA for low power and shutdown operation, the filtered vent system, etc. Ulchin units 5&6 have special design features such as digital plant

protection system and engineered safety feature (ESF) actuation system. They used Inconel 690 for steam generator tube material and the application of domestic industrial codes and standards (KEPIC) for the first time in Korea[2].

The licensing review for CP for Shin-Kori units 1&2 and Shin-Wolsong units 1&2 were completed in 2005 and 2006, respectively and is underway for Shin-Kori units 3&4. All these six plants are improved version in the OPR-1000 series. Especially, the last two units are APR-1400 that is the improved in safety by incorporating the passive safety features, such as a refueling water storage tank inside the containment(IRWST).

2. 設計における安全性向上

2.1 安全性向上の歴史

【和文要約】1971 年～1978 年は黎明期であり、プラントはフルターンキイで建設され、基準も国内に無く、NRC 等の海外基準を採用した。

1980 年代前半、古里(コリ)3&4 号機等の 6 基の建設において、国産化を開始した。また、KINS（Korea Institute of Nuclear Safety: 韓国原子力安全技術院）の前身の Nuclear Safety Center(原子力安全センター)が設立された。規制体系としては建設認可と運転認可の二段階方式を採用したが、実際にはベンダー企業の属するアメリカ、カナダの基準をマイナーチェンジして適用された。

1987 年の霊光(ヨングァン)3&4 号機では完全国産化を国策として加速することとし、国内企業を主契約者とした。霊光では参照した米国のパイロットプラントからのスケールダウン設計の妥当性が問題として指摘されたが、NRC および IAEA と共同して対策を検討し、安全減圧系（Safety depressurization system）を追加設置するとともに、LBB 概念を適用することとした。

1992 年に韓国標準プラント（KSNP: Korea Standard Nuclear Plant、OPR-1000）を開発し、蔚珍(ウルチン)3&4 号機に採用した。蔚珍 5&6 号機は、デジタル系を全面的に採用した最新設計となっており、また、インコネル 690 も使われ、国内規格（KEPIC）が最初に適用された。

新古里(シンコリ)1&2 号機及び新月城(シンウォルソン)1&2 号機の建設認可審査は 2005 年、2006 年に終了し、現在新古里 3&4 号機の審査を行っている。新古里の 2 基は APR-1400 タイプであり、燃料交換プールを格納容器内に入れる等パッシブ方式の安全系を採用し、安全性の向上を図っている。

2.2 Control of total risk of nuclear power plant deployment

The increase of total risk as expected by the continuous construction of nuclear power plants in Korea could be minimized by regulators' proactive attitudes in coming up with higher safety requirements on one hand and by utility's voluntarily continuous evolution of the plant designs in terms of safety, operating performance, and economy on the other. In this sense, the OPR-1000 is standardized but not freezed in design and rather evolves as construction repeats. One of the most important factors that contribute to minimizing the total risk increase is measures against severe accident. The severe accident policy was announced by the

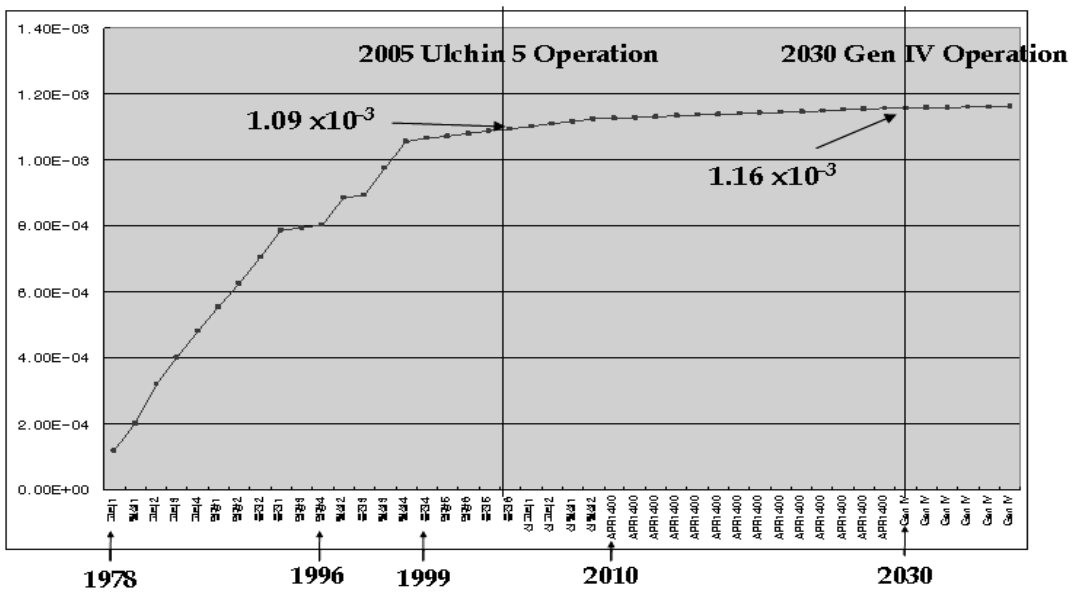

Fig. 1 Total cumulative CDF of Korean nuclear fleet deployment[4]

government in 2001 and the licensee is required to take measures to minimize its possibility and that the quantitative safety goals are to be established and implemented against severe accident. The risk to an average individual in the vicinity of a nuclear power plant of prompt fatalities that might result from reactor accidents should not exceed 0.1% of the sum of prompt fatality risks resulting from all other accidents. To achieve these safety goals and to implement severe accident policy, the licensee was required to do the followings[3];

- Perform Probabilistic Safety Assessment
- Improve Severe accident prevention and mitigation capability
- Prepare Severe accident management program

The total amount of risk considering the increase of operating nuclear power plants should be suppressed, as a global safety goal, in a way that the cumulated risk does not increase proportionally to the increase of nuclear power plants as shown in Fig. 1. The continuous improvement in the newly constructed nuclear power plants made this global safety goal possible as explained above.

2.2 原子力発電所展開によるリスク増加の抑制

【和文要約】原子力発電所が増えることによりトータルのリスクが大きくなることを最低に抑えるように規制と事業者が努力している。その一つとして OPR-1000 の標準化を進めた。トータルリスクを抑えるためのキーファクターはシビアアクシデント対策にあると認識し、PSA 実施、定量安全目標の設定、シビアアクシデントマネージメントプログラム導入で改良を図ってきた。その結果、リスクの増加を抑えることが出来た。

III. Remedial actions for Important Incidents during the past decade

The regulatory systems can not change swiftly in general. However, when the regulatory systems face with some serious challenges, such as an occurrence of unexpected incidents, their effectiveness could be judged by how are addressed such events. In Korea, during the past decade, two incidents, steam generator tube failure at Ulchin unit 4 and thermal sleeve detachment at YGN 5&6, could be selected as events drawing the most public attention.

3. 過去 10 年に発生した主要な事故の対策

【和文要約】規制体系を時宜を得て変更することは難しいが、大きな事故が起こった場合にはかなう場合がある。蔚珍 4 号機での蒸気発生器伝熱管の事故、及び、霊光 5&6 号機でのサーマルスリーブ脱落事故が一般の注目を集めた。これらを例にして規制の対応を示した。

3.1 Steam Generator Tube Failure at Ulchin unit 4[5]

There was a steam generator tube failure at Ulchin unit-4 nuclear power plant (UCN4) in Korea on April 5, 2002 when the reactor was shutdown and was in the course of cooldown in the borated condition for refueling outage. The UCN 4 tube failure was almost unique in the sense that it was not preceded by significant primary-secondary leakage which is normally expected for similar incidents. The investigation on the cause of failure was conducted in two approaches: the visual and metallurgical examination, and reevaluation of the eddy current records of the failed tube were performed. The failure shape is a “T” type that is a combination of normal fish-mouth opening in axial direction and circumferential severance. The rupture was caused mainly by SCC developed in the longitudinal direction from the top of tube sheet to the location of circumferential severance on the inside diameter of the tube.

The failed tube was subject to three previous eddy current examinations before the event and determined to be abnormal but not defective. The reevaluation of the same recording, done after tube failure, turned out that the amplitude of ECT signals were grown up, though it was difficult to read their changes.

Following this event, the regulatory body prepared the ‘Enhanced Steam Generator Tube Integrity Program’ for the overall improvements in the integrity of steam generator tube based on the defense-in-depth concept and required to implement this program to all steam generator tube inspection in Korea.

3.1 蔚珍発電所の蒸気発生器伝熱管の破損

【和文要約】2002 年 4 月 5 日に、シャットダウン後冷却中の蔚珍 4 号機で蒸気発生器伝熱管の破損が生じた。この伝熱管の破損形態は、T タイプ（軸方向には魚口型開口及び周方向には破断型の組み合わせ）であった。破損は、主に最上部の管板から周方向破断位置まで軸方向に SCC が進展したことによるものであった。事故前後の ECT 記録には大きな変化は認められず、事象発生前３回の当該伝熱管の ECT 記録は異常であったが欠陥ではなかった。同じ記録を伝熱管破損発生後再評価した結果、読み取り困難ではあるが ECT 信号の振幅が大きくなっていることが判明した。この事象発生後、

規制当局は蒸気発生器伝熱管健全性強化計画を制定し、検査に適用することを求めた。

3.2 Thermal Sleeve Detachment at Younggwang unit 5[6]

During the first refueling outage at Younggwang Unit 5 on April 3, 2003, three out of four thermal sleeves installed in four Low Head Safety Injection nozzles were found stuck at the bottom of the reactor vessel, near the core barrel flow skirt. The flow induced vibration of the detached sleeves, created indentations on the cladding of inner surface of the reactor vessel. Seven months later, Younggwang Unit 6 was also subjected to the first overhaul and all four thermal sleeves were found at the bottom of the reactor vessel.

The investigation of detached thermal sleeve showed that the impact of material change from In-600 to In-690 was not fully accounted for during the design and fabrication stage. A series of corrective actions have been taken. The first step was to improve the monitoring capability using Loose Parts Monitoring System(LPMS) for foreign material circulation in the loop and accordingly, the operating procedure has been modified to be able to pay more attention to LPMS and personnel in charge of this system were required for improving their signal analysis capability. Recommendations were made for quality assurance activities, including the inspection on each step of the manufacturing process. For plants under construction, such as Ulchin unit 5 & 6, the stoppers were installed with weld build-up to prevent the thermal sleeves from being out of place during operation. Despite the build-up stoppers, one T/S was broken off at Ulchin unit 5 which was in commissioning stage from October 2003. It was finally determined that all the T/S's at Ulchin unit 5 & 6 be eliminated. Instead, additional monitoring equipments were installed to monitor the integrity of the LPSI nozzles without T/S's. For plants under design, such as Shin-Kori unit 1 & 2, a new nozzle design was introduced to reduce the usage factor that could be caused by eliminating the thermal sleeves at the safety injection nozzle.

As the T/S detachment incidents occurred in series at different units, the public, especially the resident people, raised very strong concerns and expressed their distrust against decision making of nuclear regulation. This issue, though it was not a real safety issue, resulted in about more than 200 days of additional shutdown and ended up by an independent review of foreign experts chosen by the resident people. The regulators learned the important lessons that not only the technical judgment but public communication also is very important to make nuclear business go further.

3.2 霊光発電所でのサーマルスリーブの脱落

【和文要約】2003 年 4 月 3 日の第 1 回目の燃料取替時に、霊光 5 号機で 4 つの低圧安全注入系ノズルに設置されたサーマルスリーブのうち 3 つのサーマルスリーブが炉容器底部で見つかった。また、6 か月後に霊光 6 号機でも 4 つのサーマルスリーブが炉容器底部で見つかった。

原因、対策等の検討の結果、蔚珍 5&6 号機ではサーマルスリーブを撤去し、ノズルの健全性をルーズパー

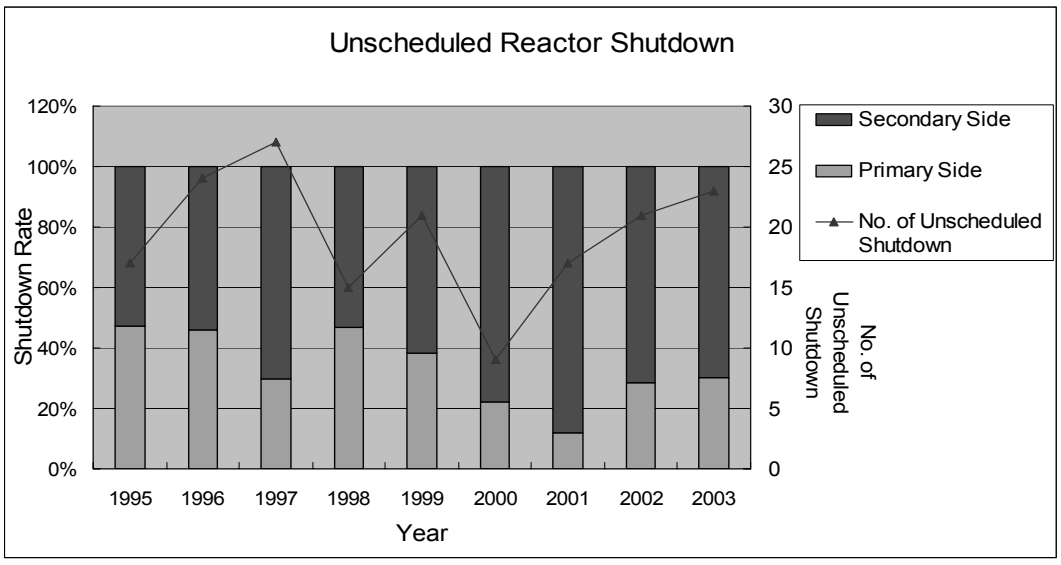

Fig. 2 Unscheduled Reactor Shutdown caused by 1ry and 2ry side.

ツモニターで監視する、新しいプラントではサーマルスリーブが無くても疲労強度が下がらない構造とする、ことが決められた。

IV. Improvement in Safety Inspection

4.1 Expansion of Periodic Inspection Area to cover Secondary system

The nuclear power plants has been regulated by two different rules; Atomic Energy Acts for the primary side and Electricity Business Acts for the secondary side. Since the primary side can not be decoupled completely from the secondary, such separate regulation has been in question whenever reactor trip caused by secondary systems or transmission line troubles occurred. As the number of NPPs increases, the necessity of integrated regulation has been in demand, not only by the Licensee to minimize some duplicated regulation from both sides but also by the regulator to streamline the regulatory activities and to conduct coherent regulation covering the entire nuclear power plant.

During the past decade, about 70% of the unscheduled reactor trip attributes to the events occurred in the balance of a plant(BOP) as shown in Fig. 2[7]. Even though the BOP is not directly related to nuclear safety, may cause undesirable public concerns as in the case of steam pipe explosion at Mihama in Japan. After long discussions between the two ministries, the Ministry of Science and Technology(MOST) and the Ministry of Commerce and Industry and Energy(MOCIE), it was decided that the reduction of the reactor shutdown triggered by the BOP events should be given high priority not only to get public confidence but to improve regulatory efficiency. Both Ministries made an agreement that the MOST would take responsibility of regulation for the primary as well as the secondary side of nuclear power plants from June 1st, 2005. As a result, KINS reviewed the secondary systems and selected the components and systems that could impact more on the reactor safety among the entire secondary sides. The items selected by this process were included in the periodic safety inspection list.

4．検査の改良

4.1 二次系もカバーするように定期検査範囲を拡大

【和文要約】原子力発電所は、一次側と二次側に分けて二つの規則が適用されていた。しかし現場では両者を明確に区分することが難しい場面がある。特に二次系が起因となって原子炉がトリップした場合等には難しい。発電所の数が増えるに従い規則を統合する要求が事業者側のみならず、規制側からも強くなった。

MOST（Ministry of Science and Technology: 科学技術省）とMOCIE（Ministry of Commerce, Industry and Energy: 産業資源部）が協議した結果、2005年6月に、MOSTが一次系及び二次系の規制の責任を負うことが決まった。その結果KINSは二次系も審査することとなった。

4.2 Use of PSA insight in Periodic Inspection

The Korean government released the ‘Policy Statement on Nuclear Safety’ in 1994, which emphasized ‘Regulation Based on Risk Information’. Since then, research programs have continued to develop the regulatory framework for the use of risk information. In parallel, investigations by regulatory staff have continued to identify areas of applicability. In 1999, KINS launched a preliminary implementation program for the regulatory use of risk information in current regulatory activities to enhance safety and regulatory effectiveness.

As part of the severe accident policy statement in 2001, the licensee should implement the program to perform PSA and submit PSA results in two ways: submit the PSA results in conjunction with licensing submission for new plants or submit the PSA report as an independent process for already operating plants. As the safety review of KINS on the PSA results is coming to an end, the safety improvement by use of PSA insight may be one of the important regulatory initiatives since the government recognized that the appropriate use of risk information would be of great benefit to safety enhancement as well as regulatory effectiveness.

As part of risk informed regulation, the first pilot Risk-Based-Inspection was conducted in January 2005 for Younggwang unit 6 independently from periodic safety inspection(PSI). After revision of the guidelines for PSI incorporating the insight of the first pilot application, the second pilot RBI followed in June 2005 for Ulchin unit 4 as part of the periodic safety inspection. These two applications would result in setting up the PSI guidelines that is actually used for the periodic safety inspection for all the operating nuclear power plants[8]. By nature of risk information, the improvement of the PSI guidelines using PSA insight is a continuous process rather than freezed.

4.2 定期検査へのPSAの適用

【和文要約】韓国政府は1994年発行の「原子力安全政

策声明」において、リスク情報に基づく規制を強化する方針を明らかにした。その後この方面の研究が精力的に行われ、KINS は 1999 年に規制にリスク情報を取り入れるプログラムを公表した。

2005 年 1 月、霊光 6 号機で初めてリスクに基づく検査が試験的に行われた。引続き 2005 年 6 月には蔚珍 1 号機にも適用された。今後は全ての定期検査に適用されるようにガイドライン等の整備を図っている。

V. Regulatory Initiatives to Cope with Aging

5.1 Periodic Safety Review

Aging is the main concern as nuclear power plants are getting older. Even though old NPPs in Korea have been managed well, the safety concerns became a growing issue as results of a series of nuclear incidents, such as the JCO incident in Japan in 1998 and the leakage of heavy water at Wolsong unit 3 in 1999. The government decided in 2000 to introduce periodic safety review (PSR) into already operating NPPs first with a view to confirm whether the NPPs in Korea maintain the appropriate safety level and the aging phenomena are managed in a good way.

In 2000, the stipulation of the PSR has been incorporated into the Atomic Energy Acts(AEA) and the first pilot application of the PSR was conducted in 2002 by KHNP for Kori unit 1. The safety review on the PSR of Kori unit completed by KINS in 2003 was made with the conclusion that Kori unit 1 was maintaining high level of safety. However, the aging phenomena are likely to increase as the operating time elapses. The NSC recommended 40 safety improvement items based upon KINS' safety review results, which would be deemed important for long term safety in the light of plant aging[9].

The important arguments in the rulemaking process of PSR were the legal status of PSR and technical codes and standards to be applied. Since all the operating nuclear power plants are licensed for the operation without any time limitation, the operating licenses are still effective irrespective of PSR. Therefore, the PSR itself should be a confirmatory process for regulators to verify whether the nuclear power plants are in compliance with applicable requirements rather than another licensing process that overrides the existing license.

5．高経年化に対する規制側の取組み

5.1 定期安全レビュー（PSR)

【和文要約】韓国内外のトラブルを考慮し、韓国政府は韓国内の発電所が安全性を十分に維持しているか、高経年化対策が採られているかを知るために、PSR を実施することを 2000 年に決定し、法整備の後、2002 年古里 1 号機で実施され、KINS は 2003 年にその審査を終えた。

韓国では、運転認可には時間の制限が無く、PSR に関係なく運転認可は有効であるという事情があり、PSR の法律上の位置付けが検討された。

5.2 Continued Operation

The NSC recommended that the results of PSR be used as supporting material for the continued operation, that is operation beyond design life, because the most important factor in the PSR is the aging assessment. Since the PSR is a key regulatory instrument for maintaining the safety of plant operation in the long term, the MOST decided to stipulate the Continued Operation(CO) under the legal framework of PSR. The CO is, therefore, an extension of PSR with two rigorous requirements added: an aging management program including time-limited aging analysis and an assessment of radiological impacts on the environment. The legislation of the CO was completed in 2005 including supplement of Atomic Energy Acts, Enforcement Decree, Enforcement Regulation, and Safety review guidelines[10]. The continued operation is based on two key principles:

- Since the current licensing basis (CLB) provides an acceptable level of safety, the CLB should be maintained during the period of continued operation to ensure that the level of safety during continued operation term should be no less than before the expiration of design life time.
- The acceptance standards, taking recent safety research results and operating experiences into account, should be met in order to make sure that top level of safety is maintained even in the light of international technical standards.

The licensee who wants to operate a nuclear power plant beyond its design life should submit the PSR report consisting of three parts: the first part is the information about eleven safety factors, the second is the life evaluation of SSC, and the third is the radiological environmental impact assessment. As of August 1, 2007, the safety review on submission for Kori unit 1 CO is underway by KINS and the final decision will be made at the end of 2007.

5.2 運転期間延長

【和文要約】MOST は CO（Continued Operation:運転期

間延長）を PSR の体系の一部とし、法整備が行われた。

設計寿命を超えてプラントを運転するためには事業者は、次の 3 項を含む PSR 報告書を提出しなければならない。①安全に関する 7 項目の情報、②SSC(システム、ストラクチャ、コンポーネント)の寿命評価、③放射線の環境への影響評価。2007 年 8 月には古里 1 号機の CO が審査されている。

VI. Conclusion

Korea has to continuously develop nuclear power and to rely on it into the near future to meet still increasing electric energy demand by the continuing economic and industrial expansion, and also to improve the quality of life of the Korean people. Therefore, the Korean Government is making effort its national energy policy in which nuclear will play a major role. But the success of this national nuclear energy policy is achievable when nuclear safety is assured and public supports are obtained. The nuclear regulation is in the front line to attain these two targets.

The regulation sometimes challenged by safety issues of domestic or foreign incidents and by public concerns, and responded successfully in most of the time. The regulatory initiatives in Korea were the most important factor for continuously improving safety and for reaching ever high performance of nuclear power plants compared to the global average. Nevertheless, the recent survey shows that the public trust has not improved so much as nuclear volume increases. Therefore, more efforts from the regulatory side should be made to improve the public trust by developing and improving the communication with the public and by providing more relevant information regarding decision making process and safety issues.

So far, the great part of Korean regulatory requirements was based upon American ones. But, as the regulatory capability evolves, the regulation has begun to incorporate other international standards such as PSR, and new approaches using more our own experiences, though foreign or international information are still the main backbones. For instance, the continued operation rule is an integration of PSR of IAEA's standard and Licensing Renewal of the United States, and the risk-based inspection is an incorporation of PSA results into the periodic safety inspection.

In conclusion, the regulation should be evolved in a way to be more public acceptable, to be rooted on strong technical rationales, to be compatible with international standards, and to be based on more of our own experiences.

6. 結論

【和文要約】韓国のエネルギー要求を満たすためには原子力が大きな期待が寄せられているが、ひとえにプラントの安全性をいかに維持しているかにかかっており、規制に寄せられる要求は大きい。これまで幾度と無く、規制は試されてきたが、うまく対応してきた。原子力発電所の数が増えるに従い、一般との情報交換を頻繁に行い、信頼と安心を得るように努力する必要がある。

アメリカの基準に従ってきたのを IAEA 等の基準を採用するようになったのもその一つの活動の現れである。

今後も、一般に受け入れられる規制となるように努力する。

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