

29 July – 2 August 2013, IAEA Headquarters, Vienna, Austria

## Participant Briefing Handout

### DISCUSSION GROUP 5:

#### *Public Participation in SMR Licensing Process*

	Name	Affiliation
<b>Topic Lead/Co-Lead:</b>	Muhammad Rawi	Malaysian Nuclear Agency
<b>Topic Co-Lead/Lead:</b>	Muhammad Ali	Bangladesh Atomic Energy Commission
<b>Facilitator:</b>	P.H. Park	IAEA
<b>Technical Facilitator</b>	1. Jean-Rene RUBIN 2. Peter Rickwood	IAEA IAEA
<b>Rapporteur</b>	TBD	

29 July – 2 August 2013, IAEA Headquarters, Vienna, Austria

### 1. Background Information

Figure 1 and Figure 2 show the Licensing Process of Nuclear Power Plant in Canada [1] and in the United State of America [2] respectively; These figures indicate the examples of public involvement in the licensing process implemented in these countries.

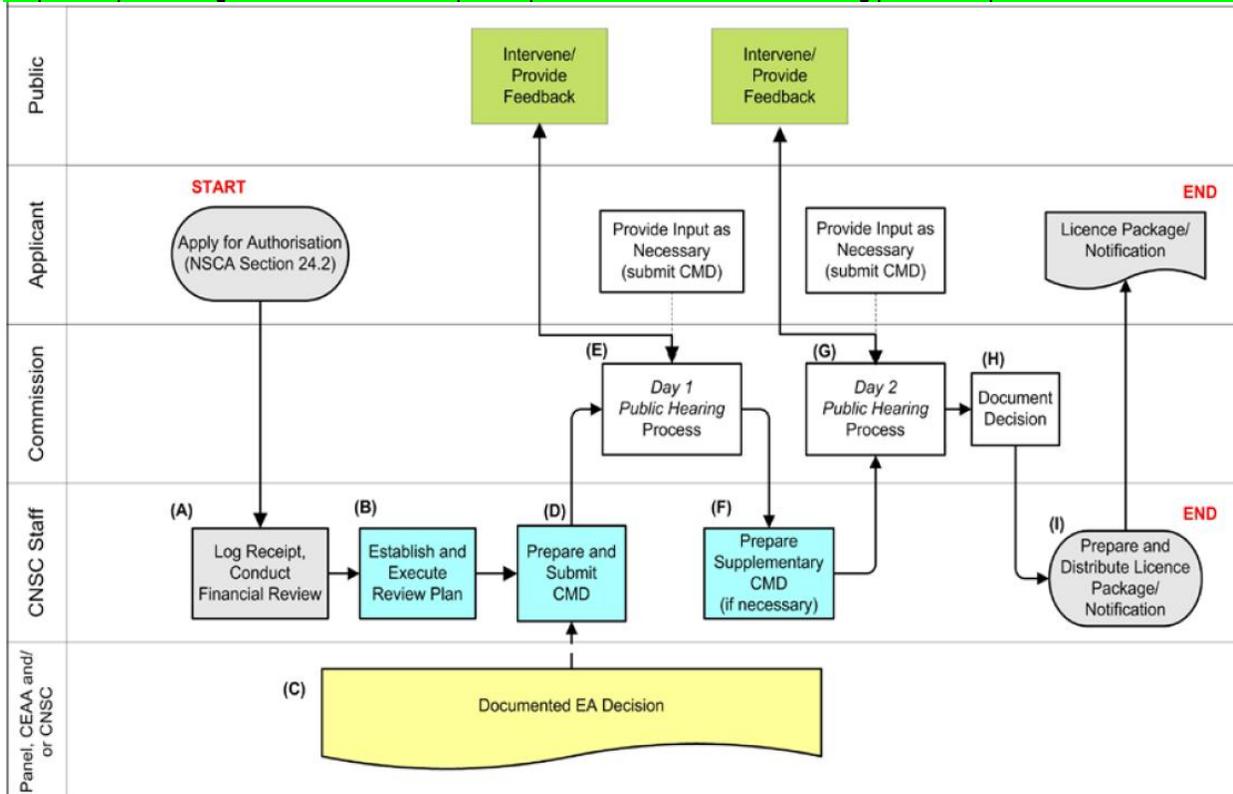


Figure 1: Schematic shows the people of public in Canada involved in the licensing process for nuclear power plant construction.

29 July – 2 August 2013, IAEA Headquarters, Vienna, Austria

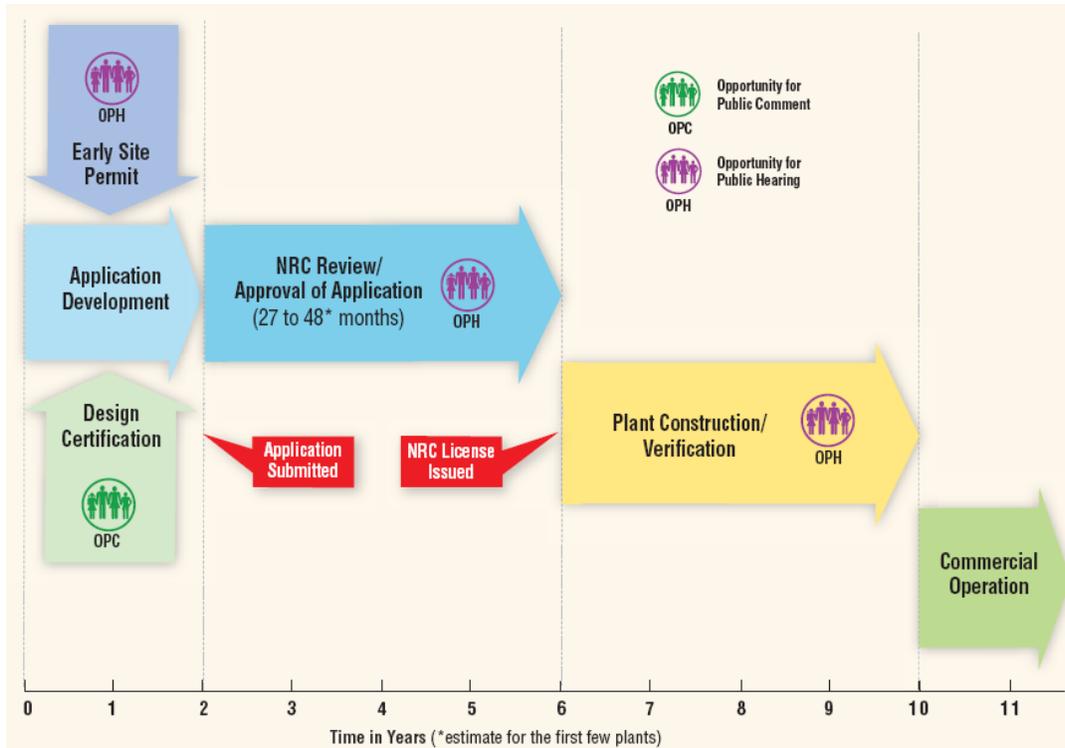


Figure 2 : The public allowed to participate at multiple stages of the nuclear reactor licensing process in the U.S.A [2].

Eventhough these Figures clearly demonstrate the people of public can participate in the licensing process of nuclear installation. Yet in reality nuclear is still a scary word to the majority people out there. On the hand, it is a very familiar word to those who are daily working in Nuclear Sectors, whether for R&D or Electric Power Generation. It still scares the public and makes them phobia of nuclear even though strictly regulated throughout the whole process of implementation. Outcome from the fears, people of public usually against any planning related with the development of nuclear facility with creating issues, particularly related with safety and health as well the impact on environment.

Innovative step taken by the IAEA and some countries to get the public involve in every step of implementation are a crucial aspect of success. In this case, the IAEA has produced a generic guide line on participation of public in Licensing Process of Nuclear Installations [3]. In brief, the points highlights in guidelines are;

- 1.1 The public (inter-regions/intra-regions) should have an opportunity to present their views during certain steps of the licensing process, where appropriate.
- 1.2 The process for public participation should allow individuals or societal groups to challenge the issuing of a license or authorization if it appears to jeopardize health or safety.
- 1.3 The public participation process should be open, transparent, well described and balanced, and should ensure that security sensitivities and commercial proprietary information are respected.
- 1.4 A process for consideration and resolution of concerns should be established in national regulations and guides.

## Licensing and Safety Issues for Small and Medium-sized Reactors (SMRs)

29 July – 2 August 2013, IAEA Headquarters, Vienna, Austria

Recently, very much interest on Small Medium Reactor which bring in new nuclear technology that may creates new issues to the Regulatory Body as well to the public and open space for discussion regarding the public participation in SMR licensing process. In principle the issues shall be discussed within the context of Law and Regulation. From Consultation meeting held last year. The possible issues may arise from the public views of nuclear installation licensing process have been identified based on five situations as follow:

- A. New nuclear fuel issues (e.g. uranium nitride)
- B. Environmental impact (Cross geographical border public participations)
- C. Safety culture (Cross geographical border and ethnic public participations)
- D. Transportation of fuelled-NPPs (modules) – (Cross geographical border public participations)
- E. Spent fuel management

It may require an expert in public communication with the knowledge of laws should be involved with the public throughout licensing processes, so that the issue raise could be tackled step by step systematically. Technical aspects issue raise also need to be answered wisely. Therefore guidelines is crucial regardless the type of nuclear installations but equally important to address the issues which usually rises by the public. Therefore, the issues of public participation in the SMR's licensing process are presented in the following section.

### Reference Material :

- [1]. Licensing Process for New Nuclear Power Plants in Canada, INPRO-0756 (Revision 1). ISBN 978-0-662-48658-9, May 2008.
- [2]. The NRC's Key Licensing Steps in Building First New Reactors. [http://www.nei.org/filefolder/Key\\_Licensing\\_Steps.pdf](http://www.nei.org/filefolder/Key_Licensing_Steps.pdf), 29/6/2013
- [3]. IAEA Safety Standards, Licensing Process for Nuclear Installations, No. SSG-12, Specific Safety Guide, IAEA, 2010.

## 2. List of consolidated issues for this topic

Major list of consolidated issues:

1. New nuclear fuel issues (e.g. uranium nitride)
2. Environmental impact (Cross geographical border public participations)
3. Safety culture (Cross geographical border and ethnic public participations)
4. Transportation of fuelled-NPPs (modules) – (Cross geographical border public participations)
5. Spent fuel management

## 2. Brief description of each issue

A. <b>Name of issue:</b> New Nuclear fuel issues
B. <b>Brief description</b>

## Licensing and Safety Issues for Small and Medium-sized Reactors (SMRs)

29 July – 2 August 2013, IAEA Headquarters, Vienna, Austria

### Concept and background

Nuclear fuel is a material that can be 'burned' by nuclear fission or fusion to derive nuclear energy. Nuclear fuel can refer to the fuel itself, or to physical objects (for example bundles composed of fuel rods) composed of the fuel material, mixed with structural, neutron moderating, or neutron reflecting materials.

Most nuclear fuels contain heavy fissile elements that are capable of nuclear fission. The most common fissile nuclear fuels are uranium-235 ( $^{235}\text{U}$ ) and plutonium-239 ( $^{239}\text{Pu}$ ).

Type of fuel material:

- Oxide fuel, eg UOX, MOX
- Metal fuel, eg TRIGA fuel, Actinide fuel
- Ceramic fuel, eg Uranium Nitride and Uranium Carbide
- Liquid fuel, eg molten salt, Aqueous solutions of uranyl salts

Beside that new nuclear fuel has been developed by related parties which may have their own advantages and disadvantages. This may create some issues to the public, need to be highlighted and discussed in the forum.

### Specific sub-issues and concerns to be discussed and addressed

#### 2.1. Proliferation: mainly because SMR could be deployed in:

- Remote areas; and / or small countries; and /or countries that are 'new comers' in nuclear industry, and/or
- for specific applications (potable water production, district heat, process heat, ...)

Options for non-proliferation:

#### [1] Operation for **extended periods without refuelling**: long life core or sealed core

- Safety issues:
  - ✓ Large reactivity excess;
  - ✓ Needs to design in service inspection systems / device to avoid open access;
  - ✓ High burnup fuel design;
  - ✓ Large inventory of Nuclear Materials (NM)
- Licensing issues: certification

#### [2] A fuel design that **reduces material or fuel attractiveness**: Pu-238 production by using re-enriched uranium coming from reprocess or introducing Np-237 in the fresh fuel

- Safety issues: handling of high Pu-238 bearing fuels
- Other issues: cost

#### [3] A **safeguard by design** approach that ease the safeguardability of the reactor:

- Safety issues: Potential conflict between Safety-Security-Safeguardability: multiple personal

## Licensing and Safety Issues for Small and Medium-sized Reactors (SMRs)

29 July – 2 August 2013, IAEA Headquarters, Vienna, Austria

access / egress in emergency response situations

- Interference of safeguard provisions with process control / safety systems

[4] A fuel cycle that **avoids** the operation of any fuel cycle **facility** in the **territory** where SMRs are deployed (including long term storage of spent fuels): out of country fuel cycle facilities

- Take back arrangements for spent fuels: consent of host country must be accompanied by guarantees of fuel supplies and appropriate arrangements for the management of spent fuels
- International transport of nuclear materials: route
- Remote monitoring and control of fuel cycle facilities

### 2.2. Technical characteristics: New fuel needs to be extensively tested and characterized

[1] Fuels design features and qualification:

- Qualify thermo mechanical properties;
- Develop and evaluate reactivity worth and coefficient measurements;
- Inherent safety features: using low-enriched fuel; withstand extreme temperatures without loss of the fuel's integrity;
- Evaluate fuel behaviour under irradiation;
- Negative temperature coefficient so that it shuts down at high temperatures;
- Hydrogen buildup issues;
- Evaluate and examine fuel degradation phenomena;
- Quality and reliability assurance

[2] Vulnerability and integrity testing during normal and abnormal condition: accident analysis

[3] Radioactive waste:

- Radiotoxicity of the residual;
- Large production of C-14

### 2.3. Fast Reactors fuel:

- [1] Resolve higher levels of enrichment, from 9-19% U-235;
- [2] Develop or qualify advanced alloys for new cladding to allow greater burnup
- [3] Resolve metallic fuel qualification issues to assess alternate existing fuel systems
- [4] Develop and qualify advanced fuels (e.g., nitrides) for improved safety & economics
- [5] Evaluate use of getters for fission gases to reduce plenum pressures & allow higher burnup

## Licensing and Safety Issues for Small and Medium-sized Reactors (SMRs)

29 July – 2 August 2013, IAEA Headquarters, Vienna, Austria

### 2.4. HTGR fuel:

- [1] Establish TRISO fuel performance beyond conventional burnup levels to assess longer operating cycles, economics, and safety
- [2] Evaluate existing TRISO fuel forms and compacting methods for AHTR applications

### 2.5. LWR (iPWR) fuel:

- [1] Evaluate operating data models and benchmarks for and identify departures from existing LWR conditions & data to evaluate potentials for oxidation and crud buildup

### Other reference matters

**3.1. Proliferation issues related to the deployment of SMRs; Dominique Greneche; Forum on SMRs; Berkeley (CA); June 18-19, 2010**

**3.2. SMR Workshop: SMR Materials, Fuels and Fabrication Methods; DOE; June 29-30, 2010**

## C. List of potential experts to be invited on that issue

- i. Natraj Iyer, Ph.D  
*Director*  
Material Science and Technology  
Savannah River National Laboratory  
Building 773-41A  
USA  
Email: natraj.iyer@srnl.doe.gov,

**3A. Name of issue:** Environmental impact

### 3B. Brief description

#### Concept and background

An environmental impact is possible adverse effects, positive or negative impact that a SMR project may have on the environment, consisting of the environmental, social and economic aspects. Although SMR has distinct advantages, in terms of fuel consumed, pollutants emitted and waste produced, a further reduction in environmental concerns and impact can positively influence public attitudes. Issues on environmental impact related to SMR need to be highlighted and discussed in this forum

## Licensing and Safety Issues for Small and Medium-sized Reactors (SMRs)

29 July – 2 August 2013, IAEA Headquarters, Vienna, Austria

### Specific sub-issues and concerns to be discussed and addressed

#### 2.1 Site suitability

- [1] Population density: human health, radiation protection;
- [2] Use of the site environs: land use, including proximity to man-hazards;
- [3] Physical characteristics of the site: seismology, meteorology, geology, and hydrology (water use, water quality, quality, surface and groundwater, aquatic ecology, terrestrial ecology);
  - Establishment of other new requirements to incorporate advancements of earth science and earthquake engineering for use in evaluation of the site suitability for some SMR designs.
- [4] Archaeology and cultural resources.

#### 2.2 Source Term Analysis

- [1] Appropriate source-term issues: associated with the multi-module aspect of SMRs where modules share SSCs. For example, determination when it would be appropriate to base the bounding source term on an accident in a single module and when could possible sharing of SSCs require the evaluation of core damage in and potential releases from more than one module. Issues related to source term and risk evaluations for multimodule facilities may relate to policy and therefore, this issue requires consideration;
- [2] As input for Level 2 Probability Safety Assessment: the assessment of the effectiveness of the containment and plant mitigation features, site suitability, and emergency planning.

#### 2.3 Offsite Emergency Planning Requirements

- [1] In order to ensure that, in the event of radioactivity releases from SMR, general public and environment are not adversely affected, the area around SMR is zoning accordingly;
- [2] Site boundary dose acceptance criteria and associated dose calculations for use in evaluation of site suitability and emergency planning;
- [3] Preparation of site emergency plans.

### Other reference matters

3.1. Feasibility of Small Modular Nuclear Reactors for Ireland; Keith Brazill; Department of Engineering, Waterfront Institute of Technology, Waterfront, Ireland

3.2.

3C. List of potential experts to be invited on that issue

## Licensing and Safety Issues for Small and Medium-sized Reactors (SMRs)

29 July – 2 August 2013, IAEA Headquarters, Vienna, Austria

i. Jong Yi MOON, Ph.D  
*Principal Researcher*  
Department of Radiation Safety Evaluation  
Korea Institute of Nuclear Safety (KINS)  
Tel.:  
E-mail: k082mjy@kins.re.kr

ii. Kang-Ryong CHOI, Ph.D  
*Principal Researcher*  
Korea Institute of Nuclear Safety (KINS)  
Tel.: 868-0171, 010-5455-4413  
E-mail: ckr@kins.re.kr

iii. Kun Woo CHO  
*Principal Researcher*  
Korea Institute of Nuclear Safety (KINS)  
Tel.:  
E-mail: kwcho@kins.re.kr

iv. Hyun Woo LEE  
*Principal Researcher*  
Korea Institute of Nuclear Safety (KINS)  
Tel.:  
E-mail: heanu@kins.re.kr

#### 4A. Name of issue: Safety culture

#### 4B. Brief description

##### 1) Concept and background

Safety culture refers to attitude, behavior and conditions that affect the performances often arises in discussion following incident at nuclear power plant. A good safety culture is a reflection of the values, which are shared throughout all levels of the organization and which are based on the belief that safety is important and that it is everyone's responsibility. As it involve both operational and a management issue, safety culture is a sensitive topic to the public which need to be managed carefully. Concepts of safety culture need to be discussed in depth in the forum.

##### 2) Specific sub-issues and concerns to be discussed and addressed

###### 2.1 Commitment

Commitment to safety and to the strengthening of safety culture at the top of an organization is the first and vital ingredient in achieving excellent safety performance. Top management must demonstrate their commitment in their behavior, attitude to safety, and in the allocation of resources, including the time spent on safety issues particularly in the time spent on efforts to improve safety.

###### 2.2 Compliance with Regulations and Procedures

This is of obvious importance for safety. Procedures should state what to do in the event of the unexpected, which may not be covered by the existing regulations or procedures. Violation of regulations and procedures is a clear sign that safety culture is weak.

###### 2.3 Relationship to Regulators and other External Groups

There should be mutual respect between members of an operating organization and regulators or other external

## Licensing and Safety Issues for Small and Medium-sized Reactors (SMRs)

29 July – 2 August 2013, IAEA Headquarters, Vienna, Austria

groups. Sharing of longer term plans with regulators can help increase confidence and allow the regulator to prepare more effectively for future work demands. The relationship should be characterized by mutual trust and openness in communication.

### 2.4 A Reporting Culture

Failures and 'near misses' are considered by organizations with good safety cultures as lessons which can be used to avoid more serious events. There is thus a strong drive to ensure that all events which have the potential to be instructive are reported and investigated to discover the root causes, and that timely feedback is given on the findings and remedial actions, both to the work groups involved and to others in the organization or industry who might experience the same problem.

### 2.5 Self-Assessment

The purpose of self-assessment is to promote improved safety performance through the direct involvement of people in the critical examination and improvement of their own work activities and work results. Potential weaknesses can be detected and often resolved well before they reduce any margin of safe operation. A strong commitment to the self-assessment process can motivate employees to seek continuous improvement in safety performance.

### 2.6 Openness and Communications

**Good communications are necessary in an organization if employees are to perform effectively. Employees must be confident that they can be trusted with knowledge, and also have the opportunity to communicate their concerns, either as a group or individually. Organizations can use a multiplicity of communication channels to reach their employees and also to the public. An organization will continually encourage openness among its employees if it subscribes to this value.**

### 3) Other reference matters

**6.1. Key Practical Issues in Strengthening Safety Culture, INSAG-15, IAEA 2002**

**6.2. IAEA-TECDOC-1329, Safety Culture In Nuclear Installations**

### 4C. List of potential experts to be invited on that issue

- i. Kun Woo CHO  
*Principal Researcher*  
Korea Institute of Nuclear Safety (KINS)  
Tel.:  
E-mail: kwcho@kins.re.kr

## Licensing and Safety Issues for Small and Medium-sized Reactors (SMRs)

29 July – 2 August 2013, IAEA Headquarters, Vienna, Austria

### 5A. Name of issue: Transportation of fuelled-NPPs (modules)

### 5B. Brief description

#### 1) Concept and background

The principal assurance of safety in the transport of nuclear materials is the design of the packaging, which must allow for foreseeable accidents. The consignor bears primary responsibility for this. Many different nuclear materials are transported and the degree of potential hazard from these materials varies considerably. Different packaging standards have been developed according to the potential hazard posed by the material.

In some cases the SMR module is manufactured and fueled in the factory, and shipped to the site as a sealed unit. Different types of SMR require different types of fuel assembly, so when the fuel assemblies are transported from the fuel fabrication facility to the nuclear reactor, the contents of the shipment will vary with the type of SMR receiving it. The precision-made fuel assemblies are transported in packages specially constructed to protect them from damage during transport. Fuel assemblies contain fissile material and criticality is prevented by the design of the package, (including the arrangement of the fuel assemblies within it, and limitations on the amount of material contained within the package), and on the number of packages carried in one shipment.

Emphasis on transportation security must also be considered and must follow some aspects such as:

- Follow only approved routes;
- Provide armed escorts for heavily populated areas;
- Use immobilization devices;
- Provide monitoring and redundant communications;
- Coordinate with law enforcement agencies before shipments; and
- Notify in advance the States through which the shipments will pass.

If an accident occurs, state and local governments are responsible for overseeing the response of the carrier, shipper and others and for taking any actions deemed necessary to protect the public health and safety.

Issues of fuel transportation need to be addressed in this forum.

#### 2) Specific sub-issues and concerns to be discussed and addressed

##### 2.1 Transportation of fresh fuel assembly to remote site

##### 2.2 Transportation for refueling

##### 2.3 Lack of supporting infrastructures for supplying fuel for each of the SMRs. Depending on the fuel type, suitable fuel fabrication facilities may not currently exist, and would need to be constructed and qualified.

## Licensing and Safety Issues for Small and Medium-sized Reactors (SMRs)

29 July – 2 August 2013, IAEA Headquarters, Vienna, Austria

### 2.4 Accident scenarios

- containment of radioactive contents;
- control of external radiation levels;
- prevention of criticality; and
- prevention of damage caused by heat.

### 2.5 Fuel transfer cask: ensuring the integrity of the fuel remained even under severe accident

### 2.6 Terrorist attacks

3) Other reference matters

### 3.1 IAEA-TECDOC-1532, Operation and Maintenance of Spent Fuel Storage and Transportation Casks/ Container

### 5C. List of potential experts to be invited on that issue

### 6A. Name of issue: Spent fuel management

### 6B. Brief description

1) Concept and background

The primary aim of the spent fuel management is to ensure that spent fuel waste are safely, properly and efficiently managed and disposed of, so as to protect human health and the environment, now and in the future, and to minimise the risk and resource burden that may inevitably be imposed upon future generations in relation to the management and disposal of those waste.

The safe, economic management of the increasing inventories of spent fuel has a significant stake in the future of nuclear energy use due to its implications on economics, non-proliferation, nuclear safety and security, the environment, and other issues, which are, in fact, the criteria addressed in recent

## Licensing and Safety Issues for Small and Medium-sized Reactors (SMRs)

29 July – 2 August 2013, IAEA Headquarters, Vienna, Austria

international initiatives for technical innovation.

In the last few decades, spent fuel management policies have shown diverging tendencies among the nuclear power producing countries. Today, three major policy options for the management of spent fuel discharged from nuclear reactors have evolved as follows:

- The closed cycle, i.e. the reprocessing of the spent fuel for recycling of the separated plutonium and uranium as mixed oxide (MOX) fuel, and disposal of the treated wastes from the reprocessing operations;
- The open (once-through) cycle, i.e. the direct disposal of the spent fuel in a geologic repository with a perception of the spent fuel as a waste;
- The deferral of decision, i.e. 'wait and see' approach, with decisions postponed to a future time in anticipation of a better solution

### 2) Specific sub-issues and concerns to be discussed and addressed

- 2.1 Features and basic processes of SMR spent fuel management
- 2.2 Current state and prospects of spent fuel management from SMR
- 2.3 Technologies for spent fuel storage
- 2.4 Technical requirement for spent fuel storage and transportation containers
- 2.5 Packaging: common requirement, choices of package type, and package classification on the nuclear safety level.
- 2.6 Transport categories.
- 2.7 Technology for spent fuel reprocessing
- 2.8 Emergency response to radiological emergency situations
- 2.9** Spent fuel management for SMRs would be more complex, and therefore more expensive, because the waste would be located in many more sites.

### 3) Other reference matters

#### 3.1. IAEA Nuclear Energy Series; Costing of Spent Nuclear Fuel Storage No. NF-T-3.5

### 6C. List of potential experts to be invited on that issue

- |   |  |
|---|--|
| <p>i. Seung-Young JEONG, Ph.D<br/><i>Principal Researcher</i><br/>Korea Institute of Nuclear Safety (KINS)<br/>Tel.:<br/>E-mail: <a href="mailto:k504jsy@kins.re.kr">k504jsy@kins.re.kr</a></p> | <p>ii. Jee Hak CHEONG, Ph.D<br/><i>Principal Researcher</i><br/>Radioactive Waste Safety Evaluation Dept<br/>Korea Institute of Nuclear Safety (KINS)<br/>Tel.:<br/>E-mail: <a href="mailto:k504jsy@kins.re.kr">k504jsy@kins.re.kr</a></p> |
|---|--|

## Licensing and Safety Issues for Small and Medium-sized Reactors (SMRs)

29 July – 2 August 2013, IAEA Headquarters, Vienna, Austria

### Breakout Session Organization

#### 4 Format of Session:

Topic Lead, Co-Lead, IAEA staff member in role as facilitators. If less than 20 attendees, the discussion will be in a single group, otherwise multiple groups of no less than 5 people.

#### 4.1 List of Necessary Session Materials:

4.1.2. Final report on survey of licensing procedures for new nuclear installations in EU countries, By Philippe & Partners, Brussels, 17 February 2012. Particularly Subsection 3.4.6 - Involvement of public in the licensing procedure (Page 68/146) and Annex 4 (Table 3.4.2) page 3/146

[http://ec.europa.eu/energy/nuclear/forum/opportunities/doc/legal\\_roadmap/20120907\\_final\\_report\\_licensing\\_survey.pdf](http://ec.europa.eu/energy/nuclear/forum/opportunities/doc/legal_roadmap/20120907_final_report_licensing_survey.pdf), 20/6/2013.

4.1.3. IAEA Safety Standards, Licensing Process for Nuclear Installations, No. SSG-12, Specific Safety Guide, IAEA, 2010., [http://www-pub.iaea.org/MTCD/publications/PDF/Pub1468\\_web.pdf](http://www-pub.iaea.org/MTCD/publications/PDF/Pub1468_web.pdf), 25/6/2013

4.1.4. The NRC's Key Licensing Steps in Building First New Reactors. [http://www.nei.org/filefolder/Key\\_Licensing\\_Steps.pdf](http://www.nei.org/filefolder/Key_Licensing_Steps.pdf), 29/6/2013

4.1.5. New nuclear power stations Generic Design Assessment, Guidance to Requesting Parties, Health and Safety Executive, Version 3, August 2008, <http://www.hse.gov.uk/newreactors/ngn03.pdf>, 29/6/2013

4.1.6. Good Practices Guide on Transparency for nuclear projects in the European Union, [http://ec.europa.eu/energy/nuclear/forum/transparency/doc/guide\\_on\\_good\\_practices.pdf](http://ec.europa.eu/energy/nuclear/forum/transparency/doc/guide_on_good_practices.pdf), 3/7/2013

4.1.7. Good Practices Guide on Transparency for nuclear projects in the European Union, Finland, [http://ec.europa.eu/energy/nuclear/forum/meetings/doc/2012\\_05\\_14/good\\_practices\\_guide\\_on\\_transparency\\_for\\_nuclear\\_projects\\_-\\_the\\_fennovoima\\_case.pdf](http://ec.europa.eu/energy/nuclear/forum/meetings/doc/2012_05_14/good_practices_guide_on_transparency_for_nuclear_projects_-_the_fennovoima_case.pdf), 3/7/2013

4.1.8. Good Practices Guide on Transparency for nuclear projects in the European Union, Questionnaire, <http://ec.europa.eu/energy/nuclear/forum/transparency/doc/questionnaire.pdf>, 3/7/2013.

#### 4.2 Discussion Process Outline

Background presentations (e.g., by topic Lead, IAEA staff, invited experts, etc)

1). Presentation 1 (Group lead) – Brief on how the discussion will be conducted.

2). Presentation 2 (Mr. Jean-Rene RUBIN, IAEA) – presentation on public communication and consultation as part of the regulatory licensing process in the beginning of the session 5 (Tuesday 30 July at 11:00). This presentation will be based on the IAEA Safety Standards and may touch upon, inter alia the following aspects:

## Licensing and Safety Issues for Small and Medium-sized Reactors (SMRs)

29 July – 2 August 2013, IAEA Headquarters, Vienna, Austria

- Safety fundamentals on public and other interested parties information and consultation and relevant safety requirements
  - IAEA Safety Guidance on communication in licensing process for nuclear installations, including for countries embarking on nuclear power
  - Introduction of tentative draft safety guide on communication and consultation with interested parties
- Through this presentation, I will explain the role and objective of the regulatory body when communicating/consulting with the public and other interested parties.

2). Presentation 3 (Representative from Russia) - "Placing a Floating Nuclear Power Plants: The experience of Forming Public Opinion."

3). Presentation 4 (Peter Rickwood of MTPI, IAEA) - Public communications

### 4.3 Case Studies for use in the Group Discussions

Firstly discussion is based on the generic questionnaire given below:

1. Is there any an international policy/national policy that require the public to participate in the Licensing of SMR?
2. Who should responsible to assure the public involvement in the Licensing Process of SMR?
3. Who and where the public are allowed to participate in the siting, design, construction and comisioning of SMR?
4. What are the mechanisms for implementing the public participations at every level of SMR's Licensing process?
5. How the public in new comers countries can participate in the Licensing Process of SMR because the contractors are from foreign countries. The challenges and experianced of the countries that impleted the participation of public in the licensing process of nuclear installation is useful topic to share with new comer countries should also be discussed.

As a guideline a Good Practices Guide on Transparency for nuclear projects in the European Union outlines some common questions to be considered.

1. How were/are participants to the process selected (*e.g.* via sociological studies)?
2. Could you describe the participatory mechanism?
  - 2.1. What was/is the chosen form of the participatory mechanism?
    - Advisory council;
    - Local Information Commission;
    - Public Assembly;
    - Roundtable;
    - Forum;
    - Local partnerships;
    - Public enquiry or referendum;
    - Others (please specify)?
  - 2.2. Did/do you use indicators such as?
    - Number of participants;

## Licensing and Safety Issues for Small and Medium-sized Reactors (SMRs)

29 July – 2 August 2013, IAEA Headquarters, Vienna, Austria

- Type and proportions of groups represented;
- How long in advance were/are participants informed before the start of the process (please specify)?
- Regular feedback mechanism in place to those who contributed?
- Time given to participants to provide comments (please specify).

2.3. Financial issues: was/is there a mechanism to cover the participation costs if any (reimbursement of travel/accommodation expenses, etc.)?

3. Was/is the public participation evaluated throughout the process, and if it is the case in which way and by whom?

### Case Study #1.

In order to facilitate a discussion that may reflect the issues related with **transportation of nuclear fuel**, the removal of High Enrich Uranium (HEU) to Russia from Vietnam as reported in [http://www.world-nuclear-news.org/RS-HEU\\_flies\\_back\\_to\\_Russia-0407134.html](http://www.world-nuclear-news.org/RS-HEU_flies_back_to_Russia-0407134.html) is selected. There may involve a complex process because air routes to Russia should cross various international borders. There may be a **safety** and a security planning and action has taken place during the process. In addition, the design of fuel cask used for transporting the HEU should up to the standard and safety requirement. However, there may still various issues arise in the public point of views and should be a key considerations:

1. What role would industry, member states (government) and regulators play in engaging with their public on this kind of controversial topic?
2. Where are the best places to engage them? (seeing as most countries would have to develop or adopt codes and standards around such a concept)
3. In this case, what is the Nuclear Regulator's role in convincing the public that the transport aircraft is safe?
4. What would a reasonably knowledgeable public expect if they come to public process meetings armed with aircraft crash statistics?
5. How the licensing/certification process involved?

### Case Study #2 : Thorium test begins

Thorium nuclear fuel has been tested in Halden Research Reactor in Norway since April this year to simulate its operation in nuclear power applications as reported in [http://www.world-nuclear-news.org/ENF\\_Thorium\\_test\\_begins\\_2106131.html](http://www.world-nuclear-news.org/ENF_Thorium_test_begins_2106131.html). This newly developed reactor fuel is being tested for five years in order to be qualified its applications in nuclear reactor for electricity generation. It is reported that, other countries such as Canada, China and India will do research program of the potential of using Thorium for nuclear fuel. Once qualified, this material may be one of a nuclear fuel to be used for Small Medium Reactor. Its smaller size, better characteristic of safety concern and portability are among the advantages compared with the conventional fuels. This makes SMR could be deployed in remote areas or the countries or for specific applications such as process heat. Key considerations of the public are;

1. Who among the public allowed to comments of the design and testing procedure of new nuclear fuels?

## Licensing and Safety Issues for Small and Medium-sized Reactors (SMRs)

29 July – 2 August 2013, IAEA Headquarters, Vienna, Austria

2. Is there a standardized approach of testing new nuclear fuels?
3. When the licensing/certification processes of new nuclear fuel begin?
4. What are the limits of informations concerning the design, characterization and testing of nuclear fuel that can be opened to the public?
5. Is transporting nuclear fuel to a remote area that SMR will be deployed can be a difficult challenge because of inappropriate infrastructure and low education level of public.?

### Case Study #3.

The impact of nuclear reactor construction on the site will be a main concern of public. The criteria for the site selection usually concern various aspects such as population density, the soil structural integrity, historical values of the site, commercial areas, heavily constructed areas and etc. Data for each aspect determines the suitability of the site to be constructed a nuclear reactor. This becoming more complex because SMR's suitably used in rural and urban areas. The possible risk assessment analysis of surce term and its impact on the environment may be the interest if public. A main key consideration of the public including:

1. What are the criteria and policy for the site selections of nuclear power plants that should be opened to the public?
2. What are the possible impacts on the environment arise from the construction of nuclear power that should be exposed to the public involment? Is there an international and/or the national policy regarding the environment impact assesment that should the aware?
3. Whose parties should responsible and work together with the public during nuclear reactor licensing process?
4. Who in the public are allowed to review/evaluate risk assessment analyses of the impact of nuclear installation onto the environment?
5. Is there an emergency plans required the public surrounding nuclear installation should know? How to get them involved effectively and efficiently?

## Licensing and Safety Issues for Small and Medium-sized Reactors (SMRs)

29 July – 2 August 2013, IAEA Headquarters, Vienna, Austria

### Appendix A:

#### Original List of Identified Issues for Topic 5

1. New Nuclear fuel issues
  - 1.1. Operation for extended periods without refuelling.
  - 1.2. A fuel design that reduces material or fuel attractiveness.
  - 1.3. A safeguard by design approach that ease the safeguardability of the reactor.
  - 1.4. A fuel cycle that avoids the operation of any fuel cycle facility in the territory where SMRs are deployed.
  - 1.5. New fuel needs to be extensively tested and characterized.
2. Environmental impact
  - 2.1. Site suitability.
  - 2.2. Source Term Analysis.
  - 2.3. Offsite Emergency Planning Requirements.
3. Safety Culture
  - 3.1. Commitment.
  - 3.2. Compliance with Regulations and Procedures.
  - 3.3. Relationship to Regulators and other External Groups.
  - 3.4. Reporting Culture.
  - 3.5. Self-Assessment.
  - 3.6. Openness and Communications.
4. Transportation of fuelled-NPPs(module)
  - 4.1. Transportation of fresh fuel assembly to remote site
  - 4.2. Transportation for refueling
  - 4.3. Lack of supporting infrastructures for supplying fuel for each of the SMRs. Depending on the fuel type, suitable fuel fabrication facilities may not currently exist, and would need to be constructed and qualified..
  - 4.4. Accident scenarios.
  - 4.5. Fuel transfer cask: ensuring the integrity of the fuel remained even under severe accident
  - 4.6. Terrorist attacks.
5. Spent fuel management
  - 5.1. Features and basic processes of SMR spent fuel management
  - 5.2. Current state and prospects of spent fuel management from SMR
  - 5.3. Technologies for spent fuel storage
  - 5.4. Technical requirement for spent fuel storage and transportation containers
  - 5.5. Packaging: common requirement, choices of package type, and package classification on the nuclear safety level.
  - 5.6. Transport categories.
  - 5.7. Technology for spent fuel reprocessing
  - 5.8. Emergency response to radiological emergency situations
  - 5.9. Spent fuel management for SMRs would be more complex, and therefore more expensive, because the waste would be located in many more sites



**INPRO**  
International Project on  
Innovative Nuclear Reactors  
and Fuel Cycles

**INPRO Dialogue Forum on Global Nuclear Energy Sustainability:**

## **Licensing and Safety Issues for Small and Medium-sized Reactors (SMRs)**

---

*29 July – 2 August 2013, IAEA Headquarters, Vienna, Austria*