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ADDRESSEE: CHRМ Gregory Jaczko

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INSTITUT
DE RADIOPROTECTION
ET DE SÛRETÉ NUCLÉAIRE

Fontenay-aux-Roses, 16 May 2012

Director General

IRSN/DIR/2012-345

Sir Gregory B. JACZKO

USNRC - NUCLEAR REGULATORY COMMISSION

Chairman

Commission Washington

Mail Stop O-16G4

WASHINGTON - DC 20555-0001

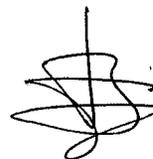
UNITED STATES OF AMERICA

Re: Diffusion de "IRSN Updates no. 16"

Dear Sir JACZKO,

I am pleased to enclose a copy of IRSN Updates No. 16, which illustrates yet again how much enhancing nuclear safety and radiation protection depends on international cooperation. Whether to acquire new experimental data or to consolidate databases and models for replication in computer software for risk analysis, international networks and joint or shared projects are essential. IRSN is thankful to its partner organizations across the world for these most productive scientific and technical exchanges, and to the international organizations which actively foster such cooperation and create conditions conducive to information exchange and the much-appreciated consolidation of global approaches to nuclear safety, security and radiation protection. I wish you pleasant reading,

Sincerely,



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Enhancing radiation protection

Contributing to the protection of man and the environment against ionizing radiation is a key mission of IRSN. The Institute is conducting research in many areas and contributes actively to leading international organizations dedicated to this field. On April 19th, on the occasion of the meeting of ICRP's Main Commission in Versailles, IRSN organized a one-day scientific seminar aimed at presenting IRSN's current research projects. The series of ten presentations highlighted the value of IRSN's work for the radiation protection community, whether it pertains to the medical management of severe radiation injuries, radiation-induced lens opacities or radiation-induced vascular effects. Among other things, the numerical tools developed for internal dosimetry and the research activities recently implemented to gain a better understanding of the adverse secondary effects of radiation therapy protocols prompted stimulating discussions between IRSN scientists and the ICRP members in charge of making recommendations for an optimized radiation protection system. The seminar was also the opportunity to introduce young IRSN researchers to the ICRP community, in the hopes that some of them may later join the organization's task groups or committees.

Jacques Repussard,
Director General
Institut de radioprotection
et de sûreté nucléaire

[Research] Fukushima: ASTEC simulation consistent with TEPCO records

IRSN has begun preliminary simulations of the Fukushima Daiichi accident using its ASTEC software, designed to simulate core meltdown accidents. These simulations aim for an understanding of the various phases of the accident in terms of hydrogen production, fuel damage, fission product releases and corium progression. The data will also be useful for safety assessments of French reactors.

Given the lack of any direct detailed observation of damage to the reactor cores at the Japanese plant, the only way to reconstruct the various phases of the accident is with simulation tools that use currently available data on core meltdown accidents. After collecting data relating to plant configuration and the accident sequence, the ASTEC software program developed jointly by IRSN and GRS was used in conjunction with a simplified model of the reactor. Preliminary results for unit 2 of the Fukushima Daiichi plant were found to be consistent with pressure changes recorded by TEPCO, the plant operator. They also provided data on hydrogen production and core damage that are consistent with data collected by other teams. Based on these initial results, development work specific to boiling water reactors will continue to refine the simulation capabilities of ASTEC (initially developed for pressurized water reactors) and make it a standard reference for severe accident simulations.

■ Learn more: www.irsn.fr/astec/

[Safety] ATMEA1 reactor: IRSN's critical review of safety options leads to favourable opinion by ASN

ATMEA1 is a new 1000 MWe pressurized water reactor designed for a service life of 60 years by ATMEA, a joint subsidiary of AREVA and Mitsubishi Heavy Industries. In 2010 and 2011, IRSN undertook a detailed critical review of the safety options for this reactor, based on French safety requirements.

IRSN's conclusions, consolidated during five meetings of the ASN's Advisory Committee for Nuclear Reactors (GPR), show that the safety targets proposed by ATMEA are consistent with the technical guidelines for the EPR and that the design of the instrumentation and control system is satisfactory, as is the general approach to designing the containment. Furthermore, the concept of diversifying cooling water sources is considered positive and the proposed method for factoring in damage and events – taking into consideration lessons learned from the Fukushima Daiichi accident – appears to be satisfactory. Based on this review, ASN approved the safety options for this reactor in January 2012. The expertise acquired in this area by IRSN will enable it to support safety authorities and TSOs in countries interested in building an ATMEA1 reactor.

■ Learn more: www.irsn.fr/atmea/

[Research] Boosting safety research in Europe: key role for IRSN in NUGENIA

Pooling research means fostering closer collaboration among excellence networks dedicated to research on Generation II and III reactors in Europe. This is the aim of NUGENIA, a new European association that brings together more than fifty partners, including industrial players, research centres, TSOs and safety authorities. IRSN has been actively involved in NUGENIA's activities since its inception.

Since its official launch on March 21st in Brussels, NUGENIA has been providing methods aimed at facilitating the establishment and alignment of research projects pertaining to Generation II and III reactors in Europe.

The association's technical activities are split into seven research areas: Plant Safety and Risk Assessment, Severe Accidents, Core and Reactor performance, Integrity Assessment and Ageing of Systems, Structures and Components, Fuel, Waste Management (excluding geological disposal) and Dismantling, Innovative Generation III Design, and Harmonization. NUGENIA's first working session, held at the end of March in Budapest, served to set up roadmaps and designate leads for each area. IRSN took the lead in two areas – Severe Accidents and Harmonization – and is contributing to the remaining ones. The Institute is a member of NUGENIA's Executive Committee and hosts the association's secretariat.

■ Learn more: www.nugenia.org

[Safety] Loss of coolant accidents (LOCA): Franco-American cooperation

To open up prospects for collaboration to upgrade safety baselines in France and the United States as regards reactor accidents and to present views shared by the international commu-

PICTURE OF THE MONTH



IRSN Director General addressing the press at the IAEA international meeting held from March 19th to 22nd in Vienna, where 250 experts met to discuss approaches for enhancing reactor and spent fuel safety in light of the Fukushima Daiichi accident.

JUST PUBLISHED

Nuclear Safety in Light Water Reactors – Severe Accident Phenomenology

This 740-page book written by 45 contributors from the SARNET Network of Excellence, co-ordinated by IRSN, and edited by Prof. B. R. Sehgal is the first to bring together the results of 30 years of research on severe accidents, in particular research conducted as part of the European Commission's Framework Programs 6 and 7.

■ Publisher: www.elsevier.com

Safety of laboratories, plants, facilities undergoing dismantling, waste processing, interim storage and disposal facilities: Lessons learned from events reported in 2009 and 2010

A compendium of IRSN's crosscutting analyses of events occurring in 2009 and 2010.

■ Download the document at: www.irsn.fr/LUDD2012

(1) United Nations Scientific Committee on the Effects of Atomic Radiation.

(2) Epidemiological study to quantify risks for paediatric computerized tomography and to optimize doses.

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nity in this area: these were the goals of a seminar that brought IRSN and the US Nuclear Regulatory Commission (NRC) together in Rockville, Maryland in mid-March.

At the seminar, IRSN and NRC exchanged views on the behaviour of nuclear fuel in a loss of coolant accident (LOCA) or a cooling pool dewatering accident. The two organizations discussed in particular upgrades to the corresponding safety baselines in France and the United States to reflect the state of the art in terms of knowledge of the phenomenology of this type of accident and the need to find out more about certain physical phenomena. They also reported on their ongoing LOCA research programs – IRSN's CYCLADES program and NRC's STUDEVIK tests – and their simulation tools, and they identified opportunities for collaboration in their national programs and their participation in international LOCA programs.

This Franco-American seminar was an occasion for both organizations to build consensus on views to be presented to the international community at the workshop devoted to loss of coolant accidents organized by the Nuclear Energy Agency (NEA) in April.

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[Radiation protection] IRSN contributes expertise to the UNSCEAR report on the radiological consequences of the Fukushima Daiichi accident

Listing scientific information available on radiological protection and publishing a survey of the state of the art that can be used by scientists interested in radiation protection is the principle behind the reports published by UNSCEAR⁽¹⁾. IRSN is providing support for the production of the report, decided upon in the wake of the Fukushima Daiichi accident.

UNSCEAR is a United Nations committee whose role is to produce reports, essentially by peer review of publications available on a particular subject, having examined and verified the scientific quality of each publication. Producing these reference documents requires the input of experts recommended by UN member countries who, among other things, have been producing this type of literature survey on the Chernobyl accident since 1986.

At its annual session in May 2011, UNSCEAR launched a new report on the radiological situation in the Fukushima region. It deals with workers at the plant and the populations exposed to radiation in the atmosphere and in the environment. Five experts from IRSN are members of the working groups responsible for this survey, which will be presented in two stages: an interim report at the May 2012 session of UNSCEAR, followed by the final report, to be published by the end of 2013.

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[Health] IRSN's *Enfant Scanner* cohort joins European EPI-CT project

The average annual dose received by children during radiological examinations, estimated at 0.15 to 0.35 mSv/year in the IRSN-InVS report, may be a misleading indicator of dose distribution for the prevention of the long-term radiation-induced cancer risk arising from CT scans, which deliver much higher doses.

In collaboration with the French society for paediatric and prenatal imaging, IRSN established in 2009 a cohort named *Enfant Scanner* consisting of more than 60,000 children born in France after January 1st, 1995, and exposed to their first CT scan between 2000 and 2013. The French cohort and those of several other EU member states have just been consolidated in the European EPI-CT⁽²⁾ project, launched in 2011, which will ultimately monitor more than a million children. By the end of 2013, there should be nearly 90,000 children in the French cohort, who will receive long-term monitoring to study the risk of radiation-induced cancer. The analysis of the French cohort will be performed in 2012, and the first results of the European study should be available by the end of 2015.

■ Learn more: www.iarc.fr

[AT A GLANCE]

IRSN and the Finnish TSO, VTT, strengthen their cooperation. A specialist from VTT has come to work with IRSN for six months to adapt the SCANAIR software developed by the Institute so that it can process reactivity accidents in reactors such as those at the Olkiluoto site in Finland. Marking a new stage in the cooperation between VTT and IRSN, this initiative will extend the software's application, enabling it to be more widely used internationally.

IRSN contributed to the international conference on scientific and technical support to nuclear safety and radiation protection authorities held in Kiev on March 22nd at the initiative of the State Scientific Technical Centre (SSTC), the leading TSO in the Ukraine, to mark the 20th anniversary of its founding. IRSN's permanent representative in the Ukraine spoke on the topic of nuclear safety in the 21st century and the role of TSOs.

IRSN attended the seminar on severe accidents organized by the Japan Atomic Energy Agency (JAEA) in Tokai-mura, Japan, from March 27th to 30th. IRSN presented the progress made in this field in the past ten years to feed into JAEA's critical assessment of its research orientations aimed at meeting the challenges of dismantling the damaged Fukushima Daiichi reactors.

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IRSN is a public institution under the joint supervision of the French Ministers of Defense, Environment, Health, Industry and Research.

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