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# *The ANS Globe*

*...e-news from the ANS International Committee*

## **From the editors**

*The ANS Globe* is the Bulletin of the American Nuclear Society's International Committee. *The ANS Globe* has as its mandate the dissemination of news of international interest to International Committee members and to others.

We would like to keep *The ANS Globe* current and relevant. Please send us your letters, articles, news and/or comments for consideration towards the next issue.

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## From the Chair



More than 130 international guests from 22 countries registered for the 2014 ANS Annual Meeting. This includes more than 40 from Korea, 17 from China, 14 from Canada, 12 from Japan, and 10 from France. ANS should be proud to draw so many international participants. At the same time, from other parts of the world ANS has only 1 registrant from India, 1 from South America, and none from Africa or Russia. There are certainly areas where ANS is very relevant internationally, and areas where we have room to improve our outreach.

One way ANS can increase our relevance internationally is for our members to participate in more meetings of other nuclear societies. I recently attended the Korean and Chinese Nuclear Society meetings, which coincidentally were scheduled for the same week in April. In Busan the KNS meeting, which featured English translation, saw only a handful of ANS members in attendance. The CNS sponsored Nuclear Industry Congress (NIC) in Beijing featured one of the world's largest nuclear expositions, certainly the largest I have ever attended, and again ANS participation was scant. I encourage IC members to look for ways to promote greater ANS participation in the meetings of other nuclear societies, and in return we should expect to see greater participation in our own meetings.

ANS President Don Hoffman asked the International Committee for suggestions on how we can support his goal for ANS to increase our international influence, especially in China and Korea. IC recommendations from the 2013 Winter Meeting were submitted to him along with the recommendation that a special committee be formed to specifically address his initiative and its goals. Don has in turn formed the ANS President's Special Committee on International Influence (PSCII) to prepare a report for the ANS Board to consider recommendations to enhance the global relevance of ANS. I ask that all IC members please provide feedback to the PSCII when it is formed to ensure that its recommendations are well founded and comprehensive.

Best Regards,  
Corey McDaniel

ANS IC Chair McDaniel  
at the Chinese Nuclear  
Society's public  
exhibition on nuclear  
science and technology,  
part of the Nuclear  
Industry Congress in  
Beijing in April 2014.



## **The ANS International Committee's Web Page**

Visit the enhanced ANS International Committee's Section on the ANS website, located at <http://www.ans.org/const/international>. It includes:

- Background information about the ANS International Committee
- Connections to ANS International Local Sections
- An overview of Society alliances with international organizations (INEA, INSC, and PNC), along with contact information
- Connections to 30 ANS Agreement Societies/Organizations, and
- Current/back issues of *The ANS Globe*, which features ANS International Committee activities and related items.

## **News from Sister Societies and International News**

### • **Communications Relayed by International Committee Members**

IC member [Arkady Serikov](#) sent the following notes about major upcoming international meetings:

Current progress in R&D of nuclear fusion systems worldwide and prominent works on construction of the ITER tokamak in Cadarache, France ([www.iter.org](http://www.iter.org)) encourage us to present adequately the situation with nuclear safety and radiation protection of such fusion facilities. That was the subject of several special sessions, the last one was organized at the ANS National Meeting in Washington DC, USA in November 2013, and the next is planned to be held at the ANS Topical Meeting of the Radiation Protection & Shielding Division (RPSD-2014) in Knoxville, TN, USA, September 14-18. In addition, issues of fusion neutronics were always in the scope of regular Fusion Conferences. This year, two of them could draw the attention of the ANS International Committee:

- 28<sup>th</sup> Symposium on Fusion Technology (SOFT-2014) to be held in San Sebastian, Spain, September 29th - October 3rd 2014: <http://www.soft2014.eu/>
- 25<sup>th</sup> IAEA Fusion Energy Conference (FEC 2014), a conference organized by IAEA, to be held in Saint Petersburg, Russia, October 13 -18, 2014: <http://www-pub.iaea.org/iaeameetings/46091/25th-Fusion-Energy-Conference-FEC-2014>

Fusion neutronics issues which could be interesting for nuclear experts usually are addressed in topics of fusion technology, particularly the subjects of design development of nuclear fusion facilities. For this reason, the SOFT-2014 conference attracts more nuclear specialists working for R&D in fusion. The FEC-2014 conference organized by IAEA is a high-rank event with a scope much broader than mere technology issues. Representatives from many countries attend the FEC series, mostly for policy making and drawing the strategy for fusion development. Overviews of advances in plasma fusion theory, experiments, technology, engineering, safety and socio-economics are reporting on the IAEA FEC conferences.

- 2014 September 14-18: Topical Meeting of the ANS Radiation Protection and Shielding Division (RPSD 2014) to be held in Knoxville, TN, USA, <http://www.rpsd2014.org>.

**RPSD-2014** is one of the major international conferences devoted to the radiation shielding aspects of different nuclear applications in radiation medicine, dosimetry, energy systems, accelerator facilities, space and other radiation environments. The RPSD-2014 Technical Program covers a broad area of topics including the following:

- Medical Physics, Health Physics, Methods & Data, Shielding & Other Applications

Among the great variety of interesting subjects to be presented and discussed at RPSD-2014, let me focus your attention on one of the Sessions in Topic of Shielding/Other Applications. This Session is about Fusion Facility Shielding, and it aims on sharing and exchanging the experience of computational analysis and methodology developments in area of fusion neutronics. Challenging computational problems are encountering in providing radiation shielding and activation analyses for fusion devices as part of fusion neutronics. The specifics of fusion neutronics in application for large tokamaks (ITER, DEMO) consist in phenomena of deep-penetrated radiation in their shield (blanket, vacuum vessel, bioshield) and collimated streaming inside the gaps and channels from the D-T volumetric 14 MeV neutron source. The issues of nuclear safety and materials activation are also the subjects of this Session. The importance of nuclear fusion development was recognised by the RPSD-2014 committees and the Plenary Session features a talk by Michael Loughlin from ITER Organization discussing neutronic analysis of the ITER tokamak currently under construction in Cadarache, France.

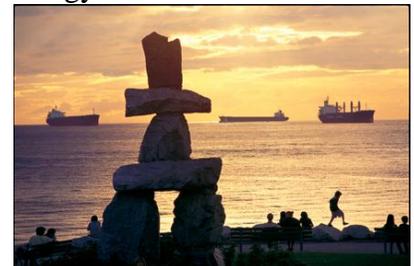
- [Canadian Nuclear Society \(CNS\)](http://www.cns-snc.ca) (<http://www.cns-snc.ca>)

The Canadian Nuclear Society, the Canadian Nuclear Association, and Natural Resources Canada are proud to host the 19th Pacific Basin Nuclear Conference (PBNC-2014) in Vancouver, British Columbia, Canada, under the aegis of the Pacific Nuclear Council!



The theme of PBNC-2014 is “Fulfilling the Promise of Nuclear Technology around the Pacific Basin in the 21st Century”.

PBNC 2014 will: showcase the advancement of nuclear technology in power generation, health science, and environmental stewardship; discuss challenges facing nuclear technology; and highlight future developments.



The PBNC 2014 Organizing Committees have essentially completed their plans and are well positioned with continuing help from all committee members, nationally and internationally, to have an exceptional conference.

- 1) The Technical Program posted on the PBNC 2014 website [www.pbnc2014.org](http://www.pbnc2014.org) has 300 papers from 20 countries.

- 2) The Plenary and Keynote Speaker program is complete with 40 key speakers engaged from Australia, Canada, China, Japan, Mexico, Taiwan, the US, Vietnam and Europe, as noted in the Conference summary on the website. The speaker bios and pictures may be viewed at the PBNC 2014 website, [www.pbnc2014.org](http://www.pbnc2014.org)
- 3) The Student Conference Program is complete with 50 poster papers being presented.
- 4) The guest and entertainment program has been established and a wonderful experience awaits all, including a local native show at Wednesday's banquet. There will be a number of luncheons, honors and awards presentations. Various cultural, sightseeing and technical tours are being offered as posted on the web, which complete the PBNC-2014 experience and will make it an event to remember.

All Programs are posted on the PBNC 2014 website [www.pbnc2014.org](http://www.pbnc2014.org). The CNS intends PBNC-2014 to be remembered in the same positive image as the PBNC held in Banff, Canada, in 1998 and the last one held in Busan, Korea in 2012. The CNS looks forward to welcoming you to Vancouver in August. Please visit the PBNC-2014 website at <http://www.pbnc2014.org> for information on the exciting developing program and to register!

The CNS is also planning several other major conferences scheduled for the next 2 years:

- 2015 May 31-June 3: 36<sup>th</sup> Annual Conference of the Canadian Nuclear Society and 39<sup>th</sup> CNS-CNA Student Conference, Saint John, NB, Canada, <http://www.cns-snc.ca>
- 7-16 August 2015: 17<sup>th</sup> International Conference on Environmental Degradation of Materials in Nuclear Power Plants, Ottawa, Ontario, Canada, <http://www.cns-snc.ca>
- 1-5 November 2015: 8<sup>th</sup> International Steam Generator, Heat Exchanger, and Reactor Components Conference, Mississauga, Ontario, Canada, <http://www.cns-snc.ca>

- **India**

**R.K. Singh**, Head, Media Relations & Public Awareness Section, BARC, and Treasurer of the Indian Nuclear Society reported that **President of India Pranab Mukherjee** graced the Graduation Day Celebration at BARC Mumbai and delivered an inspirational speech. On this occasion **Dr. R.K. Sinha**, Chairman of AEC, gave the welcoming address. A few photographs of the event are reproduced here.





- [Kazakhstan](#)

[Natalya Zhdanova](#), Executive Director of the Nuclear Society of Kazakhstan, sent the following two interesting articles written by colleagues of hers in Kazakhstan:

[Second Life of Semipalatinsk Test Site](#)

In 2013 specialists from Institute of Radiation Safety and Ecology National Nuclear Center of the Republic of Kazakhstan continued their investigations at so called "experimental farm", organized at the territory of "Experimental field", where surface and in air tests of nuclear weapons have been conducted. Within the frame of these investigations, natural experiments are conducted with farm livestock to study parameters of transition of basic artificial radionuclides  $^3\text{H}$ ,  $^{90}\text{Sr}$ ,  $^{137}\text{Cs}$ ,  $^{239+240}\text{Pu}$   $^{241}\text{Am}$  into cattle breeding products. In 2013 our attention was mainly concentrated on live-stock animals and birds typical for this region and also on the production obtained from them (mutton, beef, horse meat, chicken, pork, by-products, cow milk, mare's milk, hen's eggs, hen's floss, wool, leather).

Results of investigations support existing data on the character of  $^{90}\text{Sr}$  and  $^{137}\text{Cs}$  radionuclides' metabolism character in animal organism. However, according to obtained results, transition factors ( $T_f$ ) at individual sites of Semipalatinsk Test Site (hereinafter, Semipalatinsk Test Site) can be an order less than, average value of  $T_f$ , given in IAEA's materials.

Data on transuranium radionuclides, obtained at Semipalatinsk Test Site is unique itself. This data can be hardly found in world literature. Results show, that transuranium radionuclides, received with soil, get less digested than those received with feed. In case of longtime annual intake of  $^{239+240}\text{Pu}$  by animal organism with different environmental components, accumulation process can be observed only in hepar, other organs and tissues do not accumulate this radionuclide.

There have been found peculiarities of radionuclides' transfer in organs and tissues of animals and birds, received with hay, water and soil. According to results,  $T_f$  can vary up

to one order. Dependence of the radionuclides' distribution between organs and tissues has been found, that makes it possible to determine concentration of radionuclides in whole organism by a single organ or even without killing an animal, when using it's wool to give a preliminary estimation of concentration of radionuclide in animal organism.

According to results of conducted investigations, independently of season and type of  $^3\text{H}$  intake in sheep organism, it gets equally distributed in organs and muscular tissue. In case of inhalational intake and per oral intake with feed,  $^3\text{H}$  gets transferred more intensively in eggs of chicken, than in muscular tissue of these birds. It was found, that for aviculture products, bioavailability of  $^3\text{H}$ , entered with feed is more than of  $^3\text{H}$  entered with air and water.

Transfer of  $^3\text{H}$  in cow and horse milk is better in case of inhalation intake, than when it comes in peroral with feed and water. Decrease of  $^3\text{H}$  activity in milk whey after longtime intake of  $^3\text{H}$  with feed is twice slower, than after intake with water. Obtained results are used to develop recommendation for cattle breeding under conditions of radioactive contamination, and also for estimation of radiation doses for population in case of transfer of Semipalatinsk Test Site lands for agricultural use.

These investigations have been continued within the frame of another branch of agricultural radioecology. It is study of peculiarities of radionuclides' accumulation by agricultural plants. As experimental types of agricultural plants there have been chosen the cultures, production of those plays leading part in Kazakhstan, and those are cultivated not only by economic entities, but also by local population. These cultures are: wheat, barley, pumpkin, watermelon, cucumbers, potatoes, eggplants, pepper and tomato, sunflower, onions, carrot and cabbage. Works in this direction have been conducted since 2010. That time first experimental data have been obtained on character of accumulation of radionuclides (including  $^{241}\text{Am}$  and  $^{239+240}\text{Pu}$  transuranium elements) by different types of agricultural plants. In 2011-2012 an impact of accessory factors on processes of transfer and accumulation of these radionuclides in plants was studied. In 2013 these investigations have been continued.

In general, we can stand out the following organs of plants, collecting radionuclides to a greater degree: for  $^{239+240}\text{Pu}$  - roots, for  $^{90}\text{Sr}$  - aboveground part of the plant (leaves and stalks), for  $^{241}\text{Am}$  and  $^{137}\text{Cs}$  - in one case it is roots (tomato, cabbage), and in another case it is leaves and stalks (potatoes, eggplant, watermelon), i.e. it's all according to the type of plant. Minimal accumulation of radionuclides can be noticed in fruits, seeds, bulbs of plants, that satisfies us as consumers of vegetative products. However, the eggplant, fruits of which accumulate more  $^{239+240}\text{Pu}$ , than all the other parts of the plant (leaves, stalks, leaves) does not comply with general rules, that maximal accumulation of radionuclides is typical for roots.

It should be noted that accumulation of radionuclides depends on method of planting. So for onions, planted in different ways (with seeds or with bulbs) different results have been obtained. Leaves of onion, planted by seeds accumulate one order more  $^{241}\text{Am}$  and  $^{137}\text{Cs}$  than leaves of onion, planted by bulbs.

Fertilizer dressing affects intake of  $^{137}\text{Cs}$  by plants. Application of a half of the dose of

phosphoric and potassic fertilizers recommended in agriculture increases intake of  $^{137}\text{Cs}$ , however use of recommended and increased doses of fertilizers, in reverse, decreases it several times.

It is pointed out in international sources, that  $^{241}\text{Am}$  is better accumulated in plants than  $^{239+240}\text{Pu}$ , however, in our case, opposite data has been obtained. This points to the fact that accumulation of radionuclides by definite types of plants depends on many factors, those change level of radionuclides transfer from soil to plants.

Different accumulation of radionuclides in plants' organs suggests that vegetative part of plants (leaves and roots) can be used for the purpose of estimation of quality of agricultural production. In this case, there is no need to wait for ripening of the harvest, no possibility to obtain unreliable results, process of vegetative samples' preparation for spectrometric and radiochemical analysis gets simplified and that is economically profitable.

Data obtained from the Semipalatinsk Test Site allows for better understanding of radionuclides' behavior in food chains, and for developments of countermeasures designed to obtain safe agricultural products.

**Andrey Panitskiy, Zhanat Baigazinov, Timur Kozhahanov**  
**Institute of Radiation Safety and Ecology**  
**National Nuclear Center of the Republic of Kazakhstan**

### **Test Trials Are Going On**

Experts are feeling concern about enough energy to power humanity, on account of intensive development of industry and technology and increased power consumption in everyday life. According to analyst opinion such sources as organic utilities, nuclear fuel and solar energy alone can solve the looming problem with energy shortage. Nevertheless given the expected depletion of organic sources in the near future and well-known limits in the use of solar energy it should be noted the important role of nuclear energy in sustainable development of the countries. Its use minimizes climate change and helps to reduce emission of harmful gases into the atmosphere.

Although the construction of nuclear power plants is very expensive, it is possible to significantly improve the efficiency of nuclear power plants and thus fairly quickly recoup the cost of their construction. That is to make nuclear power more economically attractive. This calls for enhancing the service life of nuclear fuel or burnup fraction, use the vernacular of nuclear scientists.

Currently nuclear fuel is used in the reactor from three to five years burnup fraction is 45-50 MWd/kgU. It is not due to lack of fissile element uranium-235. That is the pellet content. Uranium dioxide is cracked and failed after this time due to the radiation-thermal effects and accumulation of fission gas release (FGR). Its thermal conductivity is significantly reduced herewith and this is one of the main indicators of nuclear fuels that followed by growing heatup and affect the metal fuel rod jacket. Its further operation becomes impossible afterwards because it leads to severe accidents which serious

consequences have been already known our humanity, unfortunately.

Since early 2000s the Central Research Laboratory of JSC Ulba Metallurgical Plant (hereinafter UMP) has been engaging in activities on advanced fuel pellets to improve their performance. Efforts of the plant scientists allowed developing and putting into operation under the semi-release conditions some advanced fuel pellets of uranium dioxide differing from standard pellets with enhanced thermomechanical properties. Publication of the results obtained in international scientific journals and presentations at the conferences attracted attention of foreign fuel producers. This has resulted in entering Kazakhstan represented by JSC NAC Kazatomprom and UMP the international project Halden Reactor (HRP, Norway).

Since January 2010 within the framework of the Project, two types of UMP advanced fuel pellets are being tested at Halden Boiling Heavy Water Research Reactor. These are Uranium dioxide pellets with a large grain size (~ 40-50 microns) and compound uranium-beryllium fuel (UBF) pellets.

Special mention should be made of the first such reactor investigations of the UBF the HRP reactor in the world. In this experiment, the composite is considered as one of the most promising fuels with additives which can significantly improve its thermal conductivity, reduce FGR and yield that is the main factor that reduces the service life of nuclear fuel.

Currently burnup fraction of tested fuel exceeded 20 MWd/kgU. The following basic fuel performance as radiation- thermal stability, temperature, power density and FGR yield are being monitored. According to the reactor test results uranium-beryllium fuel own the best properties by these characteristics. The temperature of the fuel is less than a third of standard UO<sub>2</sub> fuel. According to experts, they are the high indicators allowing making good predictions about the promising UBF. Full-scale UMP fuel tests are scheduled to be completed at the end of 2014.

Keeping the geometric dimensions of composed UBF pellets, without FGR yield (compared to standard UO<sub>2</sub> fuel) at higher burnup and a number of other advantages could provide a truly revolutionary breakthrough in improving the economy of LWR nuclear fuel cycle. Moreover use of UBF pellets will significantly extend the age of nuclear power based on this type of reactors.

Demand of composed UBF at the world market is particularly relevant for UMP because it is the only uranium and beryllium producer in the world. This makes it possible to establish a unique industrial UBF producer in Kazakhstan. Therefore we are closely watching the progress of the tests and visiting Norway regularly.

In September 2013, HRP managers visited JSC “NAC” Kazatomprom. At a meeting the company's management discussed results of ongoing trials of a promising reactor fuel, further steps towards cooperation in the reactor investigations aimed at the development of efficient and safe nuclear power.

**Yury Russin**  
**UMP**

- [OECD Nuclear Energy Agency \(http://www.nea.fr\)](http://www.nea.fr)

### Enhancing global nuclear safety

On 8 April 2014, the NEA in co-operation with the Nuclear Regulation Authority (NRA) of Japan held an international conference on global nuclear safety enhancement in Tokyo, Japan. High-level experts from nuclear regulatory authorities in France, Japan, Korea, Russia and the United States reviewed international developments in nuclear safety since the Fukushima Daiichi nuclear power plant accident in March 2011, as the international community works to strengthen nuclear safety at the global level. At the conference, OECD Secretary-General Angel Gurría spoke about sound energy policies for economic and social development and insisted on very high levels of safety as the first condition for using nuclear power. NRA Chairman, Dr. Shunichi Tanaka also stressed the importance of the independence, technical capability and transparency of the regulatory authorities, as well as a strong safety culture. See the conference [press release](#).



### Making progress on medical radioisotopes

On 21-23 January 2014, the NEA High-level Group on the Security of Supply of Medical Radioisotopes (HLG-MR) began its third mandate looking at progress on the timely and universal implementation of full-cost recovery and reserve capacity, the conversion to low-enriched uranium targets for irradiations, and the appropriate reimbursement for medical diagnostic procedures related to technetium 99-m ( $^{99m}\text{Tc}$ ). Around 70 people from 17 countries and 5 international agencies attended the two-day session. The meeting reviewed an NEA preliminary forecast for molybdenum-99 ( $^{99}\text{Mo}$ )/ $^{99m}\text{Tc}$  supply capacity over 2015-2020, a period in which two major reactors will cease  $^{99}\text{Mo}$  irradiations. The final forecast is expected to be released in the spring. In addition, the HLG-MR gave its support to a more extensive assessment of progress by the global  $^{99}\text{Mo}/^{99m}\text{Tc}$  supply chain, which will be launched in the coming months. More information on the NEA's activities related to medical radioisotopes is available [here](#).



### Committee on the Safety of Nuclear Installations

During its 4-5 December 2013 meeting, the NEA Committee on the Safety of Nuclear Installations (CSNI) reviewed progress on eight safety analysis tasks undertaken to address high-priority issues identified following the Fukushima Daiichi nuclear power plant accident. Good progress is being made with deliverables scheduled for 2014. The CSNI also approved seven new safety analysis tasks and the release of seven technical reports. In addition, the committee agreed mandates for two new groups: the Senior Expert Group on Safety Research Opportunities Post-Fukushima (SAREF), which will identify safety research opportunities related to Fukushima Daiichi decommissioning

activities, and the Task Group on Natural External Events (TGNEV), which will review the regulatory and technical approaches to ensuring adequate protection of nuclear facilities against natural external events, beginning with severe weather events.

### **NEA initiates new series of international nuclear emergency exercises**

A new International Nuclear Emergency Exercise (INEX), one of the flagship activities of the NEA Working Party on Nuclear Emergency Matters (WPNEM), was initiated on 4-5 December 2013 following the finalisation of INEX-4 in May 2013. The WPNEM agreed on a road map for the technical development, approval and conduct of the exercise and targeted a time frame of 2015-2016. INEX-5 will be built upon the experiences and lessons learnt from past nuclear accidents/incidents and the successes of previous INEX exercises. INEX-5 will test the mechanisms for decision making at the national level, particularly in uncertain circumstances or in the absence of data; test the arrangements for international co-operation and co-ordination of data and information exchange among countries; test the arrangements for practical support and assistance between groups of countries or geographical regions; and investigate the longer-term issues beyond the urgent response phase. The exercise documents will be available by October 2014. INEX-5 will be open to all countries, including NEA member and non-member countries, and relevant international organizations.

### **International School of Nuclear Law**

The next session of the International School of Nuclear Law (ISNL) will take place on 25 August-5 September 2014 in Montpellier, France. The program, now in its 14th year, is jointly sponsored by the NEA and the University of Montpellier 1. The program brings together leading experts in nuclear safety, security, non-proliferation and safeguards to provide an in-depth exploration of the legal aspects of the use and oversight of nuclear energy. Since its inception, the ISNL has provided a unique educational opportunity to more than 650 graduate students and professionals from around the world. The summer 2013 session brought together nearly 60 participants from 30 NEA member and non-member countries, from academic, professional and governmental backgrounds. The deadline for applications for the 2014 session is 31 March 2014. Additional information, including on applications, is available on the ISNL [web page](#).

- **Romania**

**Constantin Milu**, President of the Romanian Society for Radiological Protection, sent the following article on a visit he made to Fukushima.

*A short scientific visit to Fukushima Daiichi NPP, Japan  
by Constantin MILU, Ph.D.*

*President of the Romanian Society on Radiological Protection, [office@srrp.ro](mailto:office@srrp.ro)*

Following kind support from Chiyoda Technol Corporation (TECHNOL) Tokyo, Japan, from 29 November to 4 December 2013, I performed a scientific visit to Japan, including

participating in the 9<sup>th</sup> International Workshop on Ionizing Radiation Monitoring in Oarai/Ibaraki and a site visit to Fukushima Daiichi Nuclear Power Plant.

The Workshop took place in the HOSODA HALL of the new Technol Convention Center, which was inaugurated in November 2013, and, according to the official invitation, I presented a special lecture on *New developments of the radiation protection legislation in Europe*, based on the 2007 International Recommendations of the International Commission on Radiological Protection (ICRP Report 103). Meantime, in 17 January 2014, the European Basic Safety Standards were published in the Official Journal of the European Union, as Council Directive 2013/59/EURATOM of 5 December 2013.

The most exciting and interesting part of this scientific visit was a short site-visit to Fukushima Daiichi NPP, on the 2<sup>nd</sup> of December 2013, performed by all 36 foreign experts from 21 countries, who also participated to the above mentioned Workshop. The whole site visit was carefully prepared, starting with a detailed explanation by TEPCO (Tokyo Electric Power Company, Ltd.), in the room Alpine Rose of J-Village, the National Training Center, and then the facility 40 minutes tour itself, in an isolated bus and with protecting tools. We saw all affected Units (4, 3, 2 and then 1), with detailed view of Reactor 4, regarding the extraordinary efforts for removal of fuel from the spent-fuel pool. For this purpose, a special structure of external walls and ceiling panels was installed, with the aim of supporting the fuel taking facility, so that the work can be carried out without applying the weight of the facility onto the reactor building (Figure).

Other present outstanding achievements to Fukushima NPP are: a Multi-nuclide Removal Equipment, an Emergency Response Facility, with seismic isolated structure and in a better location (on a hill), an Enhancement of Monitoring Plan at East Side of Unit 1-4 Turbine Buildings and in the Port, and the setting-up of several tanks for contaminated water. Outside the Plant, coming to the NPP, I observed the special storage of the contaminated soil. All actions are parts of a Mid-and-Long-Term Roadmap towards the Decommissioning of TEPCO's Fukushima Daiichi Nuclear Power Station Units 1-4. It is doubtless that all objectives can be achieved only by harmonized efforts of TEPCO and the Government of Japan.

The basic principle for mid-and-long-term initiatives is placing as top priority on the safety of local citizens and workers, in correlation with maintaining transparent communications. The distribution of D-Shuttle dosimeters for monitoring of the general public in the affected area is part of these aims.

“D-SHUTTLE” is a monitoring system for general public, developed by Chiyoda Technol Corporation jointly with the National Institute of Advanced Industrial Science and Technology (AIST). Designed to detect gamma-ray, the dosimeter is calibrated at OARAI RESEARCH CENTER, Chiyoda Technol Corporation. The total dose is easily read by the holder with the use of a simple indicator. A management system with PC allows to acquire detailed dose information and to show dose data graphically. This system is very new, valuable and practical. For the specific target group, the population around the Fukushima NPP, the system not only can control the population dose, but also

has an important role to settle down the population, which is an essential psycho-social effect, in any post-accident period.

During the whole very interesting and useful site-visit, we were individually monitored. The well-known Japanese hospitality was once again demonstrated too.

Figure: Removal of Fuel from the Spent-Fuel Pool of Reactor 4.



- [Slovakia](#)

[Dr. Vladimír Slugen](#), of the Slovak Nuclear Society (SNS), contributed the following article on the importance of using the experience of nuclear veterans, which the SNS tries to support. The article was written by [Juraj Kmošena](#) of “Seniors in Nuclear” of the Slovak Nuclear Society

#### [Nuclear veterans - old, but still active](#)

The Slovak Nuclear Society (SNUS) section “Seniors in Nuclear” showed its creative potential.

Though in higher age, retired veterans of nuclear power and industry are still active and are a precious source of know-how. Their knowledge and experience has been (and

should be) part of nuclear society that assures continuity in safe and reliable exploitation of nuclear energy.

Thus, veterans of nuclear power and nuclear industry in Central and Eastern Europe (CEE) formed in May 2010 International Union of Veterans of Nuclear Energy and Industry (IUVNEI, in Russian MSVAEP). The Union unites national and corporate organizations of nuclear veteran from CEE countries with nuclear program. Membership in IUVNEI is voluntary, IUVNEI headquarters is in Moscow (Russian Federation). The largest number of IUVNEI members is from Russia - 8 veteran organizations in total, with 12 thousand individual members. According to IUVNEI statute, in Russia every person who had worked a certain number of years in nuclear power or industry became a veteran.

So far, the following countries also joined the IUVNEI: Armenia, Bulgaria, Hungary, Finland, the Czech Republic, Slovakia and Ukraine. All these countries have VVER units in operation, however, much less members than Russian Federation.

The IUVNEI Chairman is Mr Oleg Sarayev, former director of Beloyarskaya NPP and former Rosenergoatom Director. The representative of Slovak Nuclear Society (which is one of the IUVNEI founding members), and at the same time IUVNEI Vice-Chairman, is Mr Jozef Valovič, the previous SNUS Secretary General.

In 2013, October 21-23, the IUVNEI Central Committee met in Slovakia, in Trnava and Bratislava. It was the ninth IUVNEI meeting since its foundation in 2010, and the second in Slovakia. At this meeting also the Slovak Nuclear Forum, the representative institution of Slovak nuclear industry, became an IUVNEI member, and its president Mr. Tibor Mikuš got the membership decree. The participants discussed activities of national and corporate members since the previous meeting and plans for the Union activities in future. Common aspects of veteran organizations from different countries include preservation of experience and know-how from historical times of nuclear power, providing it to incoming generations of nuclear professionals and avoiding repeating mistakes from the “pioneer era” of nuclear development. Important also is the cooperation between IUVNEI and the WANO Moscow Centre, in the framework of which veteran experts from Slovakia participated in Peer review missions at Smolenskaya NPP, Rostovskaya NPP and Kurskaya NPP JE. Through these activities IUVNEI seeks its place and role in broad field of nuclear veterans’ lives.

Pioneers laying the foundations of nuclear power in (at that time) Czechoslovakia, Mr. Juraj Kmošena and Mr. Jozef Keher were awarded commemorative medals of Rosatom. Among the events organized in the framework of the veterans’ meeting were an exhibition of paintings of contemporary artists from the nuclear area in Trnava, and a concert of the 60-member Nikolay Nekrasov Academic orchestra of national instruments of Russian radio and television in Bratislava. The event, which received an enthusiastic response, was sponsored by Russian state-owned nuclear corporation Rosatom.

IUVNEI is open to all nuclear veterans. You can find more information on how to join us via: Поройков Сергеевич <poroykov-vs@rosenergoatom.ru> or Jozef Valovic <jozef7@yahoo.com>



Participants of 9<sup>th</sup> IUVNEI Central Committee meeting at residency of the Head of Trnava County and President of the Slovak Nuclear Forum Tibor Mikuš in Trnava



President of the Slovak Nuclear Forum Tibor Mikuš greeting the Central Committee meeting participants (from left Yuri Saraev, Tibor Mikuš, Jozef Valovič, Evgeniy Akimov)

- [Slovenia](#)

[Prof. Dr. Marko Cepin](#), President of Nuclear Society of Slovenia, sent the following article. [Prof. Cepin](#) reports that Slovenia is the world's smallest nuclear country, with 2 million people and 1 nuclear power plant (a Westinghouse 2-loop plant).



In 2014, the Nuclear Society of Slovenia will organize the 23<sup>rd</sup> International Conference “Nuclear Energy for New Europe”. The conference will be held in the attractive maritime resort of Portorož, Slovenia, 2014 September 8-11.

The conference of the Nuclear Society of Slovenia is an international annual meeting of professionals dealing with different aspects of nuclear energy from all around Europe and worldwide. The primary objective of the meeting is to foster international cooperation amongst professionals active in nuclear research and educational institutions, nuclear vendors, utilities and regulatory bodies.

It attracts around 200 participants from more than 20 countries. The topics discussed are general and include reactor physics, radiation and environmental protection, thermal hydraulics, probabilistic safety assessment, severe accidents, nuclear fusion, nuclear power plant operation, nuclear materials, waste management, decommissioning and sustainability of nuclear energy.

The conference website URL is [www.nss.si/nene2014/](http://www.nss.si/nene2014/). For more information contact Mrs. Saša Bobič (email: [sasa.bobic@ijs.si](mailto:sasa.bobic@ijs.si), phone: +386 1 588 53 02).



## **News from ANS Divisions**

To further the implementation of the Joint Protocol between the IC and the Professional Divisions Committee, we are pleased to include in the Globe some newsworthy Division items. While some items can be gleaned from the Divisions' web pages, please send us your most up-to-date and timely news to post in the *ANS Globe*!

### **Fusion Energy Division (FED)**

#### **Plans for the 21st Topical Meeting on the Technology of Fusion Energy (TOFE)**

**Brian D. Wirth**, University of Tennessee, Knoxville, TN.

The 21st TOFE meeting will be held during the week of 9-13 November 2014, as an embedded topical meeting at the 2014 ANS Winter meeting in Anaheim, CA. The conference proceedings will be published as two special issues of the Fusion Science and Technology journal, as in past TOFE meetings. There are plans to offer a tutorial on fusion materials, including plasma surface interactions and plasma facing component materials issues. A second tutorial on inertial fusion energy is also being discussed. Special sessions planned for the 21st TOFE meeting include the perspectives on a potential fusion nuclear science facility (FNSF) – an interim facility between ITER and DEMO, and the safety and environmental impact of fusion. These special sessions will be in addition to regular thematic sessions around the progress of major facilities, including the NSTX upgrade, power plant studies, plasma engineering and plasma materials interactions. In summary, I look forward to a successful meeting with the fusion energy community in Anaheim. If you are interested in volunteering to participate in the organization of the meeting, please let me know by email ([bdwirth@utk.edu](mailto:bdwirth@utk.edu)).

### **Reactor Physics Division (RPD)**

The Reactor Physics Division is very eagerly looking forward to two upcoming Topical Meetings:

- 2014 Sept. 28 – Oct. 3: Physics of Reactors 2014 (PHYSOR-2014), Kyoto, Japan – <http://www.physor2014.org>
- 2014 March 29 – April 1: Advances in Nuclear Fuel Management V, Hilton Head, SC, USA - <http://www.ans.org/meetings>

### **Human Factors, Instrumentation & Controls Division (HFICD, <http://hfcd.ans.org/>)**

HFICD is planning the 9th International Conference on Nuclear Plant Instrumentation, Control, and Human–Machine Interface Technologies (NPIC & HMIT 2015, to be held February 21–26, 2015, in Charlotte, NC - <http://www.npic-hmit2015.org/>).

Plenary sessions will feature nuclear utility executives and senior managers, top government officials, and high-level executives of vendor organizations. Break-out sessions will cover a range of I&C and HMIT topics. There will be more than 250 scientific and technical presentations presented by utilities, academia, and suppliers. A special two-day training course on the fundamentals of nuclear plant instrumentation will be offered on the weekend preceding the conference.

## Highlights from the 2013 November Meeting in Washington, DC

ANS President Don Hoffman made a presentation on ANS Vision Initiatives. His presentation is reproduced here.

### Initiative Nine



#### International influence

- Visited numerous countries and spoke to nuclear industry and government leaders and leaders of nuclear societies to set up collaborative relationships
  - Mexico, UK, Saudi Arabia, United Arab Emirates, Turkey, Thailand, Malaysia, Vietnam, India, South Korea, China, Austria, France, Canada, Argentina, South Africa, Poland, Czech Republic, Kazakhstan, Indonesia, Russia
- Met with and presented to following International ANS local sections:
  - Latin American local section
  - Austria local section
  - French local section
  - India local section
  - Japan local section
  - Korea local section
- Met with Presidents and Executive Directors of National Academy of Science and National Academy of Engineering to establish more collaborative relationships and coordination of activities

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### Initiative Nine (cont.)



#### International influence (cont.)

- New International Local Sections in Malaysia, Indonesia, UAE, South Africa
- New stronger relationships – South Korea, China and Russia
- Evaluating all International collaborations
- Presentation to all IAEA member states and NGOs
- Met with incoming President of Health Physics Society to establish more collaborative relationships and coordination of activities in the US and internationally
- Working with NRC and National Labs through Standards Board to improve the ANS Standards Development Organization (SDO) status in the US and internationally
  - Standards Board has provided detailed implementation plan for improving all Standards activities
  - Working on implementation plan

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### ANS and the International Community



#### Goals

1. Establish ANS as a global leader in NS&T and professional society leadership
  - Learn from each other
  - Strengthen our global voice for the advancement of nuclear science and technology
  - Influence the environment in which we all work
    - To continue research and development
    - To gain the public trust
    - To cultivate a more favorable environment for nuclear collectively
  - Increasing international agreements and collaborations
2. Interface with international media/public regarding NS&T



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### ANS and the International Community



3. Facilitate individual/corporate engagement with international counterparts
  - Consider the value of corporate and individual members
4. Support the actions of 810 and 123 agreements
  - Be the vehicle for interface with government, industry and community
5. Interface with international young professionals



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## UPDATE ON CHINA'S NUCLEAR POWER PROGRAM

Dr. Wei-Wu Chao, of the Nuclear Energy Society Taipei, made a presentation on the status of the Nuclear Power Program in Taiwan. The presentation is reproduced below.

### Status of Nuclear Power Program in Taiwan

Dr. Wei-Wu Chao  
Nuclear Energy Society Taipei (NEST)  
November, 2013



### Contents

- Electric Power Generation in Taiwan
- Nuclear Power Plants Performance
- Post-Fukushima Safety Assessment of Nuclear Power Plants
- Stress Test
- Current Challenges
- Concluding Remarks



## Contents

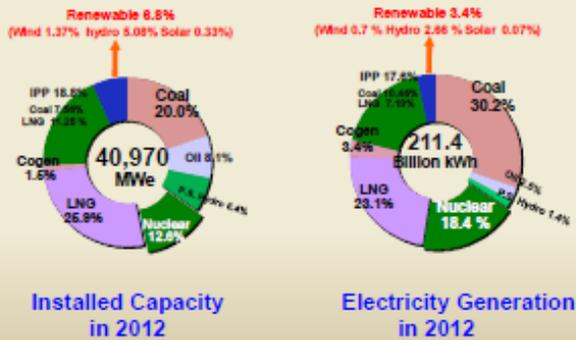
- [Electric Power Generation in Taiwan](#)
- Nuclear Power Plants Performance
- Post-Fukushima Safety Assessment of Nuclear Power Plants
- Stress Test
- Paradigm Shift
- Concluding Remarks



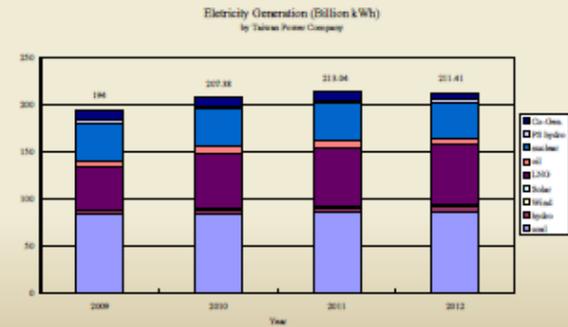
## Nuclear Power Plants in Taiwan



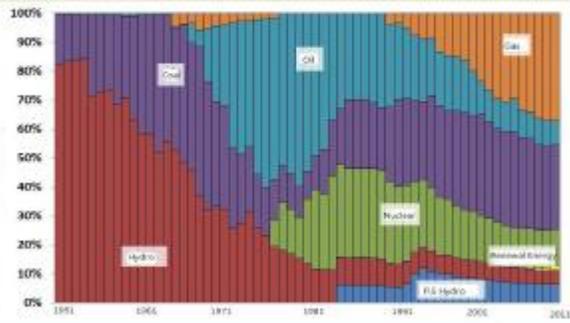
## Power Generation in 2012



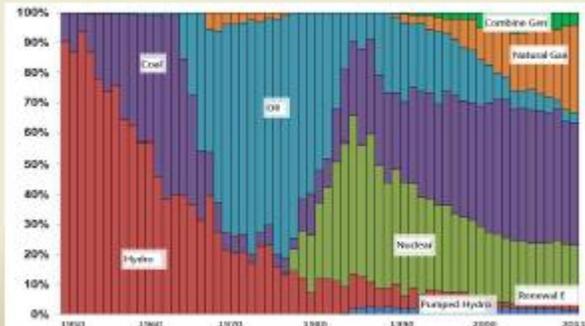
## 2009-2012 Power Generation (1/2)



## Installed Capacity via Energy



## Power Generation via Energy

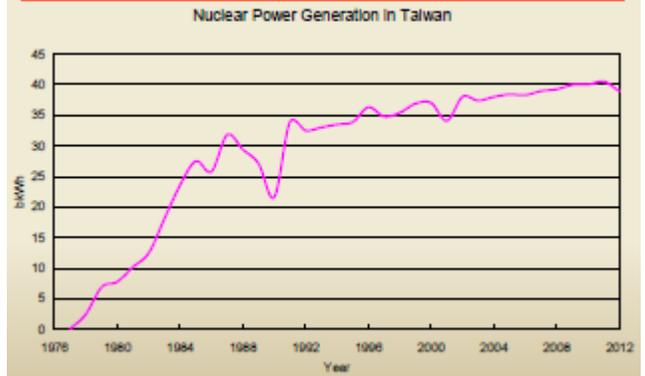


## Contents

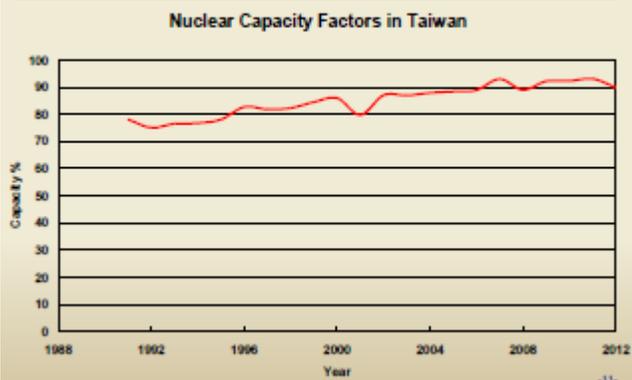
- Electric Power Generation in Taiwan
- [Nuclear Power Plants Performance](#)
- [Post-Fukushima Safety Assessment of Nuclear Power Plants](#)
- [Stress Test](#)
- [Current Challenges](#)
- [Concluding Remarks](#)



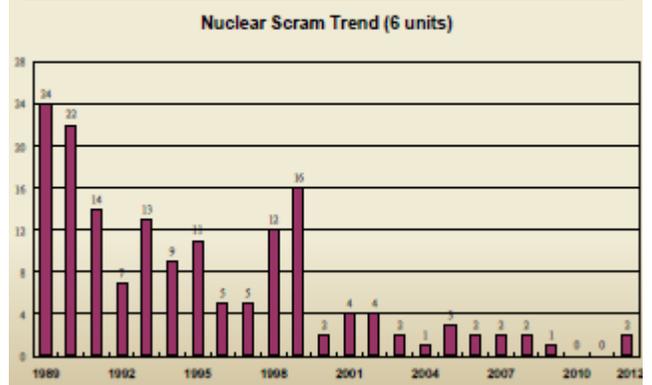
## Nuclear Performance in 2012 (1/3)



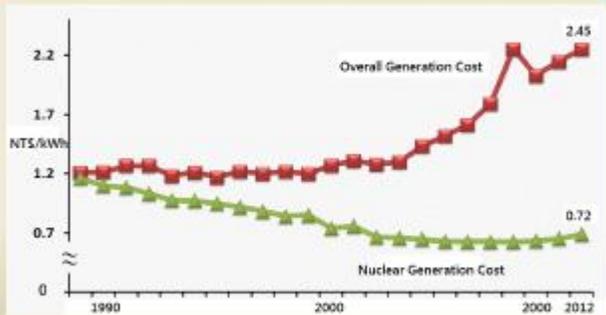
## Nuclear Performance in 2012 (2/3)



## Nuclear Performance in 2012 (3/3)



## Cost Analysis (1989-2012)



## Contents

- Electric Power Generation in Taiwan
- Nuclear Power Plants Performance
- [Post-Fukushima Safety Assessment of Nuclear Power Plants](#)
- [Stress Test](#)
- [Current Challenges](#)
- [Concluding Remarks](#)



## Safety Re-evaluation of NPPs (1/2)

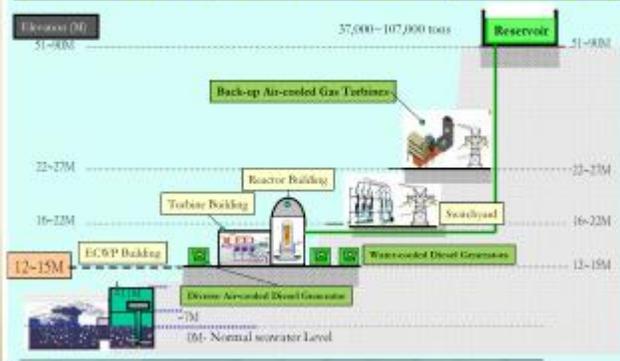
- After Japan's Fukushima Daiichi accident occurred in March, 2011, Atomic Energy Council (AEC) asked Taiwan's Nuclear Power Plant operator (TPC) to re-evaluate its capability to cope with extreme natural disasters, including earthquake, tsunami.
- The re-evaluation comprises following parts
  - Nuclear Safety
  - Radiation Protection
  - Emergency Response Preparedness



## Safety Re-evaluation of NPPs (2/2)

- The evaluation results show no imminent concerns for plant continuous safe operation, while some areas need improvement, such as water tightness of emergency cooling building, backup mobile diesel engine and air compressor, seismic re-assessment, revising emergency operation procedure, etc.
- Atomic Energy Council, Taiwan nuclear regulator, closely cooperate with USNRC in Japan lessons learned and taskforce recommendations

## Defense-in-depth Features of Taipower NPPs



## Contents

- Electric Power Generation in Taiwan
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- Current Challenges
- Concluding Remarks



## Stress Test (1/3)

- **Comply with the EU specifications**
  - Taiwan Power Company finished Final Report for operating NPPs by March, 2012
  - Taiwan Power Company finished Final Report for NPP under construction by April, 2012
  - National Report has been completed by September, 2012
- **Invite Peer Review by Domestic and International Experts**

## Stress Test (2/3)

- A six-member OECD/NEA team conducted a two-week independent peer review in March 2013.
- The team concludes that Taiwan's national report is consistent with the process according to the European Nuclear Safety Regulators Group (ENSREG) Criteria used in the EU.
- A few more issues may need to address for future technical evaluations.



### Stress Test (3/3)

- A nine-member EU team visited Taiwan and nuclear plants September 23 to October 3 for conducting on-site evaluation. They did review stress reports before visit.
- EU peer review report was published on November 7, 2013. The primary conclusion is that the stress tests in Taiwan were carried out by essentially following the specifications of the 2011/12 European stress tests and can thus be considered comparable with regard to the relevance of their results.
- *the standards of safety applied to Taiwanese NPPs seem to be generally high and to conform in most areas to international state-of-the-art practices.*



### Contents

- Electric Power Generation in Taiwan
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- Stress Test
- [Current Challenges](#)
- Concluding Remarks



### New Construction (1/2)

- Construction of the Lungmen ABWR Plant started in 1999. The project has encountered numerous difficulties as led by suspension in 2000, and followed by subsequent restart in 2001 and associated problems with rising price of construction materials, rehiring and interface of subcontractors, resulting in extended delays and requests for additional budget allocation. As of end of October 2013, Lungmen was 93.7% complete on construction.



### New Construction (2/2)

- A national referendum was proposed by current administration to decide the fate of the Lungmen plant.
- The proposal was debated at the Legislative Yuan during last legislative session for about six months without conclusion.
- Legislators prefer to resume the discussion of referendum proposal after Lungmen finishes pre-operation test, which might be occurred next June.
- public concerns over safety of the Lungmen plant escalated

### On-Site Dry Storage of Spent Nuclear Fuel

- For Chinshan NPP, the concrete pad was laid in 2012. The hot test with two loaded casks was held in September 2013. Operation License is expected to be issued in 2014.
- The local government is still quite against the operation of dry storage facility due to lack of long-term repository plan
- The spent fuel pool is reaching its full capacity



### Post-Fukushima Energy Policy

- Ensure nuclear safety, gradually reduce reliance on nuclear power, and create a green power and low-carbon environment to become a nuclear-free country step by step
- Not pursuing life extension of existing nuclear power plants
- Taiwan must develop alternative energy sources to ensure a stable power supply to ensure economy growth
- The target for greenhouse gas reduction is a global norm, but giving up nuclear power may actually impose more emission

### Concluding Remarks

- Nuclear power continues as an important role in Taiwan's energy portfolio
- Japan's Fukushima Dai-ichi accident does a great impact on Taiwan's nuclear energy policy, even though both safety evaluation and stress test results demonstrate no adverse effect
- Challenges remain as public opinions mixed about nuclear safety and energy security

*Thanks for Your Attention*

## Societies with Collaboration Agreements with ANS

The following is a list of nuclear societies with collaboration agreements with the ANS, along with the corresponding website addresses. The Table contains also a few other entries of interest to ANS International Committee members.

<b>Society</b>	<b>Website or E-Mail Address</b>
Asociación Argentina de Tecnología Nuclear	<a href="http://www.aatn.org.ar">www.aatn.org.ar</a>
Associação Brasileira de Energia Nuclear	<a href="http://www.aben.com.br">www.aben.com.br</a>
Association des Ingénieurs en génie atomique du Maroc	-
Atomic Energy Society of Japan	<a href="http://wwwsoc.nii.ac.jp/aesj/index-e.html">wwwsoc.nii.ac.jp/aesj/index-e.html</a>
Australian Nuclear Association	<a href="http://www.nuclearaustralia.org.au">www.nuclearaustralia.org.au</a>
Bangladesh Nuclear Society	-
Bulgarian Nuclear Society	<a href="http://www.bgns.bg">www.bgns.bg</a>
Canadian Nuclear Society	<a href="http://www.cns-snc.ca">www.cns-snc.ca</a>
Chinese Nuclear Society	<a href="http://www.ns.org.cn">www.ns.org.cn</a>
Croatian Nuclear Society	<a href="http://www.nuklearno-drustvo.hr/en/home.html">www.nuklearno-drustvo.hr/en/home.html</a>
Czech Nuclear Society	<a href="http://www.csvts.cz/cns">www.csvts.cz/cns</a>
European Nuclear Society	<a href="http://www.euronuclear.org">www.euronuclear.org</a>
Hungarian Nuclear Society	<a href="http://www.kfki.hu/~hnucsoc/hns.htm">www.kfki.hu/~hnucsoc/hns.htm</a>
Indian Nuclear Society	<a href="http://www.indian-nuclear-society.org.in">www.indian-nuclear-society.org.in</a>
Israel Nuclear Society	<a href="mailto:meins@tx.technion.ac.il">meins@tx.technion.ac.il</a>
Korean Nuclear Society	<a href="http://www.nuclear.or.kr/e_introduce.php">www.nuclear.or.kr/e_introduce.php</a>
Lithuanian Energy Institute	<a href="http://www.lei.lt">www.lei.lt</a>
Malaysian Nuclear Society	<a href="http://www.nuklearmalaysia.org/index.php?id=18mnu=1">www.nuklearmalaysia.org/index.php?id=18mnu=1</a>
Nuclear Energy Society of Kazakhstan	<a href="http://www.nuclear.kz">www.nuclear.kz</a>
Nuclear Energy Society of Russia	<a href="mailto:ns@kia.ru">ns@kia.ru</a>

Nuclear Energy Society of Slovenia	<a href="http://www.drustvo-js.si">www.drustvo-js.si</a>
Nuclear Energy Society of Thailand	<a href="http://www.nst.or.th">www.nst.or.th</a>
OECD/Nuclear Energy Agency	<a href="http://www.nea.fr">www.nea.fr</a>
Polish Nuclear Society	<a href="http://www.ptn.nuclear.pl">www.ptn.nuclear.pl</a>
Romanian Nuclear Energy Association	<a href="http://www.aren.ro">www.aren.ro</a>
Romanian Society for Radiological Protection	<a href="http://www.srrp.ro">www.srrp.ro</a>
Slovak Nuclear Society	<a href="http://www.snus.sk">www.snus.sk</a>
Sociedad Nuclear Española (SNE)	<a href="http://www.sne.es">www.sne.es</a>
Sociedad Nuclear Mexicana	<a href="http://www.sociedadnuclear.org.mx">www.sociedadnuclear.org.mx</a>
Ukrainian Nuclear Society	<a href="http://www.ukrns.odessa.net">www.ukrns.odessa.net</a>
United Kingdom Nuclear Institute	<a href="http://www.nuclearinst.com/ibis/Nuclear%20Institute/Home">www.nuclearinst.com/ibis/Nuclear%20Institute/Home</a>
Women in Nuclear – Global	<a href="http://www.win-global.org">www.win-global.org</a>
<b>Affiliated National Societies</b>	<b>Website or E-Mail Address</b>
Belgian Nuclear Society	<a href="http://www.bns-org.be">www.bns-org.be</a>
<b>Associated Nuclear Organizations</b>	<b>Website or E-Mail Address</b>
International Nuclear Societies Council	<a href="http://insc.ans.org">http://insc.ans.org</a>
Pacific Nuclear Council	<a href="http://www.pacificnuclear.net/pnc/">http://www.pacificnuclear.net/pnc/</a>
<b>Non-U.S. Local Sections</b>	<b>Website or E-Mail Address</b>
Austrian Section	
French Section	<a href="http://local.ans.org/france/">http://local.ans.org/france/</a>
India Section	<a href="http://local.ans.org/india/">http://local.ans.org/india/</a>
Italian Section	
Japanese Section	
Latin American Section	<a href="http://www.las-ans.org.br">www.las-ans.org.br</a>
Korean Section	
Swiss Section	
Taiwan Section	<a href="mailto:u805301@taipower.com.tw">u805301@taipower.com.tw</a>

## **Calendar of Events**

Some Upcoming International Conferences on Nuclear and Related Topics  
(Please send us information about your upcoming conferences, for inclusion in this space.)

### **Legend:**

☀ **ANS Event**

□ **Non-ANS event co-sponsored by ANS**

○ **For all other conferences, ANS is NOT a sponsor, nor are these conferences endorsed by ANS.**

## 2014

- 15-19 June: ANS Annual Meeting, Reno, NV, USA – <http://www.ans.org/meetings> ☀
- 6-12 July: International Youth Nuclear Congress 2014 (IYNC-2014), Burgos, Spain – <http://www.iync.org>
- 24-28 August: 19<sup>th</sup> Pacific Basin Nuclear Conference (PBNC-2014), Vancouver, British Columbia, Canada (organised by Canadian Nuclear Society) - <http://www.pbnc2014.org> 
- 24-28 August: 8<sup>th</sup> International Conference on Isotopes (8ICI), Chicago, IL, USA – <http://ici.ans.org/> ☀
- 7-12 September: Plutonium Futures – The Science 2014, Las Vegas, NV, USA
- 8-11 September: 23<sup>rd</sup> International Conference “Nuclear Energy for New Europe”, Portorož, Slovenia – [www.nss.si/nene2014/](http://www.nss.si/nene2014/)
- 14-18 September: Topical Meeting of the ANS Radiation Protection and Shielding Division (RPSD 2014), Knoxville, TN, USA, <http://www.rpsd2014.org> ☀
- 28 September- 3 October: Physics of Reactors 2014 (PHYSOR-2014), Kyoto, Japan – <http://www.physor2014.org> □ 
- 28 September – 3 October: 28<sup>th</sup> Symposium on Fusion Technology (SOFT-2014), San Sebastian, Spain, <http://www.soft2014.eu/>
- 26-31 October: Nuclear Plant Chemistry Conference 2014 (NPC 2014), Sapporo, Japan – <http://www.npc2014.net>
- 9-13 November: ANS Winter Meeting, Anaheim, CA, USA – <http://www.ans.org/meetings> ☀

## 2015

- 1-4 February: Conference on Nuclear Training and Education (CONTE15), Jacksonville, FL, USA - <http://www.ans.org/meetings>

- 22-26 February: 9th International Topical Meeting on Nuclear Plant Instrumentation, Control, and Human Machine Interface Technologies (NPIC&HMIT 2015), Charlotte, NC, USA - <http://www.ans.org/meetings> ☀
- 23-26 February: Nuclear and Emerging Technologies for Space (NETS) 2015, Albuquerque, NM, USA – <http://www.ans.org/meetings> ☀
- 29 March - 1 April: Advances in Nuclear Fuel Management V, Hilton Head, SC, USA - <http://www.ans.org/meetings> ☀
- 12-16 April: International High-Lever Radioactive Waste Management Conference, Charleston, SC, USA - <http://www.ans.org/meetings> ☀
- 12-17 April: 10th International Conference on the Methods and Applications of Radioanalytical Chemistry (MARC X), Kaikua-Kona, HI, USA - <http://www.ans.org/meetings>
- 19-23 April: Mathematics and Computation 2015, Nashville, TN, USA - <http://www.ans.org/meetings>
- 26-30 April: 2015 International Topical meeting on Probabilistic Safety Assessment & Analysis (PSA 2015), Sun Valley, ID, USA – <http://www.new.ans.org/meetings/> ☀
- 3-6 May: ICAPP-2015, Nice, France
- May 31-June 3: 36<sup>th</sup> Annual Conference of the Canadian Nuclear Society and 39<sup>th</sup> CNS-CNA Student Conference, Saint John, NB, Canada – [www.cns-snc.ca](http://www.cns-snc.ca)
- 7-11 June: ANS Annual Meeting, San Antonio, TX, USA – <http://www.ans.org/meetings> ☀
- 9-13 August: 17<sup>th</sup> International Conference on Environmental Degradation of Materials in Nuclear Power Plants, Ottawa, Ontario, Canada, <http://www.cns-snc.ca>
- 30 August – 4 September: 16<sup>th</sup> International Topical Meeting on Nuclear Reactor Thermal Hydraulics (NURETH-16), Chicago, IL, USA - <http://www.ans.org/meetings>
- 13-17 September: International Conference on Nuclear Criticality Safety (ICNS2015), Charlotte, NC, USA - <http://www.ans.org/meetings>
- 13-17 September: International Meeting on Reactor Fuel Performance (TOPFUEL-2015), Zürich, Switzerland, <http://www.topfuel2015.org>

- 1-4 November 2015: 8<sup>th</sup> International Steam Generator, Heat Exchanger, and Reactor Components Conference (ENCC-2015), Mississauga, Ontario, Canada, <http://www.cns-snc.ca>
- 8-12 November: ANS Winter Meeting, Washington, DC, USA – <http://www.ans.org/meetings> 

## 2016

- 17-22 April, 11th International Conference on Tritium Science & Technology (TRITIUM 2016), Charleston, SC, USA
- 12-16 June: ANS Annual Meeting, New Orleans, LA, USA – <http://www.ans.org/meetings> 
- 6-10 November: ANS Winter Meeting, Las Vegas, NV, USA – <http://www.ans.org/meetings> 

## 2017

- 11-15 June: ANS Annual Meeting, San Francisco, CA, USA – <http://www.ans.org/meetings> 
- 29 October -2 November: ANS Winter Meeting, Washington, DC, USA – <http://www.ans.org/meetings> 

### **→ Contact ANS International Committee Members by E-mail:**

<b>Officers</b> Corey K. McDaniel Sue Aggarwal Hamad Alkaabi Atambir S. Rao	<b>Office</b> Chair Co-Vice-Chair Co-Vice-Chair Co-Vice-Chair	<b>e-mail</b> <a href="mailto:corey.mcdaniel@r-scc.com">corey.mcdaniel@r-scc.com</a> <a href="mailto:saggarwal@nmnuclear.com">saggarwal@nmnuclear.com</a> <a href="mailto:alkaabi@uae-iaea.org">alkaabi@uae-iaea.org</a> <a href="mailto:atamrao@hotmail.com">atamrao@hotmail.com</a>
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