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Editorial

Dear readers of the WISE/NIRS Nuclear Monitor,

In this issue of the Monitor:

- editor Jim Green writes about the nuclear dimensions of the Ukraine political crisis;
- J.W. Storm van Leeuwen summarises a detailed report on nuclear security concerns; and
- Jim Green writes about the unending pattern of accidents and apologies at TEPCO's Fukushima plant, and debunks claims that the disaster was "deathless".

The Nuclear News section has reports on the third anniversary of the Fukushima disaste; radiation contamination at the WIPP nuclear waste dump in New Mexico; and we mark the passing of peace and anti-nuclear campaigner Sheila Oakes. Feel free to contact us if you have feedback on this issue of the Monitor, or if there are topics you would like to see covered in future issues.

Regards from the editorial team.

Email: monitor@wiseinternational.org

Monitored this issue:

Nuclear dimensions of the Ukraine political crisis

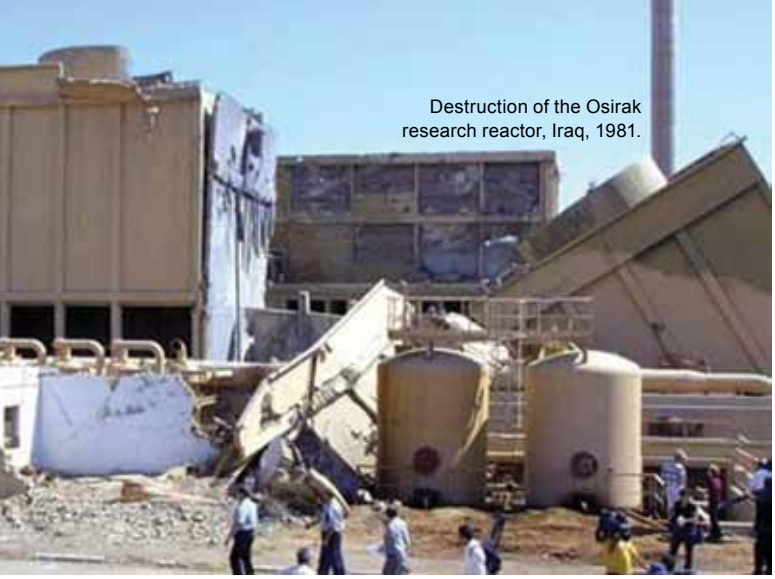
Author - Nuclear Monitor editor Jim Green.

At the time of writing is seems likely that Ukraine's nuclear power reactors will continue operating throughout the unfolding political crisis; that there will be no infiltration of or attacks on Ukraine's nuclear plants despite acknowledged security concerns and reported threats; and that it is highly unlikely that the crisis will escalate to the use of nuclear weapons.

Nonetheless the crisis has wide-ranging nuclear dimensions and ramifications. Perhaps the most important is that it draws attention to a question that will, sooner or later, seal the fate of nuclear power: what happens when nuclear-powered nations go to war? Continue operating power reactors and hope that they will not be attacked? Or shut down reactors to allow for the decay of short-lived radionuclides and possibly to move nuclear fuel to a more secure location?

There is no history of national military attacks on operational nuclear power plants but it can only be a matter of time. There is a history of conventional military strikes on ostensibly peaceful nuclear facilities in the Middle East, driven by proliferation fears. Examples include the destruction of research reactors in Iraq by Israel and the US; Iran's attempts to strike nuclear facilities in Iraq during the 1980−88 war (and vice versa); Iraq's attempted strikes on Israel's nuclear facilities; and, most recently, Israel's bombing of a suspected nuclear reactor site in Syria in 2007.[1] Most of those attacks were directed at 'research' reactors capable of producing plutonium for weapons, while Iraq attacked the partially-built Bushehr nuclear power plant in 1987.[2]

Protesters seized the headquarters of Ukraine's energy ministry on January 25, but left several hours later.



Destruction of the Osirak research reactor, Iraq, 1981.

Eduard Stavitskiy, who was at the time Ukraine's energy minister, reportedly said that all the country's nuclear power facilities were put on high alert after the seizure.[3]

In late January, Ukraine's Security Service reported "anonymous threats to blow up hydropower and nuclear power plants, damage to which may have unforeseen and extremely serious consequences for the population of Ukraine and neighbouring states." [4] On March 2, Ukraine's parliament called for international assistance to protect its nuclear power plants.[5]

Ukraine's Prime Minister Arseniy Yatsenyuk said his nation was preparing to mobilise armed forces to protect strategic locations including nuclear power facilities.[6] Ukraine's envoy to the IAEA, Ihor Prokopchuk, said in a letter to IAEA Director General Yukiya Amano in early March: "Illegal actions of the Russian armed forces on Ukrainian territory and the threat of use of force amount to a grave threat to security of Ukraine with its potential consequences for its nuclear power infrastructure. ... Under these circumstances, the competent authorities of Ukraine make every effort to ensure physical security, including reinforced physical protection of 15 power units in operation at four sites of Ukrainian [nuclear power plants]." Prokopchuk urged Amano to "urgently raise the issue of nuclear security with the authorities of the Russian Federation." [7]

Parliamentarian Hryhoriy Nemyria said the assembly appealed to signatories of the 1994 Budapest Memorandum − in particular the US and UK − to provide assistance securing Ukraine's nuclear plants.[8] The Budapest Memorandum, negotiated around the time that Ukraine surrendered control of 1,900 Soviet-era nuclear weapons, includes commitments to respect Ukraine's independence, sovereignty and existing borders; and to refrain from the threat or use of force against Ukraine's territorial integrity and independence. A former US ambassador to Ukraine, who helped negotiate the Budapest Memorandum, said Russia's military occupation of Ukrainian territory constitutes a blatant violation of the commitments that Moscow undertook in the Budapest Memorandum.[9]

Ukraine's nuclear plants and fuel supply

According to the IAEA, there are 31 nuclear-related facilities in Ukraine that are subject to monitoring by the IAEA. They include 15 reactors located at four plants (not including the Chernobyl plant with four reactors which have been permanently shut down).[7] The 15 operational power reactors are all Russian VVER pressurised water reactors, and most of Ukraine's nuclear services and nuclear fuel come from Russia.[10] Nuclear power accounted for 44% of Ukraine's electricity generation last year.[11] That heavy dependence on nuclear power may explain the decision to continue to operate reactors despite security concerns.

Energoatom, the utility that operates all 15 power reactors in Ukraine, said that nuclear fuel supply has been secured for the "near future" and that it expects existing fuel supply contracts to be fulfilled. Russian nuclear fuel manufacturer TVEL has received advanced payments for four batches of nuclear fuel scheduled to be delivered to Ukraine over the coming months. World Nuclear News noted in a March 6 report that "deliveries may be disrupted as a result of a ban that has reportedly been imposed on the transportation of nuclear fuel across Ukraine" [12] but the ban was lifted on the same day.

Westinghouse supplied nuclear fuel assemblies for trial use at the South Ukraine plant between 2005 and 2009, but the trials were deemed unsuccessful, with Energoatom blaming Westinghouse and Westinghouse blaming Energoatom.[12]

According to Rosatom, on January 28 the government of now-deposed President Viktor Yanukovich initiated a ban on nuclear fuel shipments to Europe via Ukraine but it was lifted on March 6 and shipments were expected to resume the following week. Rosatom said that if there were any further issues with rail transport through Ukraine, deliveries would be made by air by Rosatom subsidiary TVEL.[13] Rosatom/TVEL provide fuel for nuclear plants in Bulgaria, Hungary and Slovakia.[12]

Other civil nuclear issues

There are uncertainties about the future of Russian involvement in Ukraine's nuclear industry, including projects such as nuclear fuel plant production under construction.

There are also reports that Russian involvement in building nuclear power plants in other countries might be jeopardised; for example Russia's involvement in a Finnish nuclear power project has been raised. Russian involvement in nuclear projects in the Czech Republic is in doubt. A consortium that includes Russia's Atomstroyexport is bidding on a contract to expand the Czech Republic's Temelin nuclear power plant near the Austrian border.[14]

Czech defense minister Martin Stropnicky said: "Russia has disappeared from the group of predictable democratic states. What it is doing is not acceptable." Czech minister for human rights Jiri Dienstbier said: "I personally cannot imagine that the Russians would continue to participate in the tender to expand Temelin." However Czech Prime Minister Bohuslav Sobotka said he was deeply concerned by the developments in Ukraine but didn't want to suddenly break off all business ties with Moscow.[15]

The Ukraine situation has negatively impacted uranium market sentiment, due to uncertainty about the ongoing operation of Ukraine's 15 nuclear reactors and the possible

implications of the (now lifted) ban on transport of nuclear fuel from Russia to European customers via Ukraine.[16]

Nuclear weapons

Ukraine held the world's third-largest nuclear arsenal (1,900 weapons) after the dissolution of the Soviet Union. But Kiev in 1994 agreed to transfer all its nuclear weapons to Russia, and joined the Nuclear Non-proliferation Treaty as a non-nuclear state.[18]

"We gave up nuclear weapons because of this [Budapest Memorandum] agreement," said Pavlo Rizanenko, a member of the Ukrainian parliament. "Now there's a strong sentiment in Ukraine that we made a big mistake. If you have nuclear weapons, people don't invade you." [19]

Mikhail Golovko from Ukraine's ultra-right 'Svoboda' (Liberty) party recently said "Russia can not win in this situation, it is a violation of all international norms and guarantees. If they are violated, we reserve the right to recover a nuclear weapon. ... We'll regain our status as a nuclear power and that'll change the conversation. Ukraine has all the technological means needed to create a nuclear arsenal – which would take us about three to six months." [17]

Without overstating the significance of ultra-right sabre-rattling, Ukraine's nuclear weapons potential warrants consideration. Ukraine has no uranium enrichment facilities. All highly enriched uranium was removed from Ukraine in 2012 − 234 kgs were sent to Russia.[28] An attempt was made in the 1990s in Ukraine to set up a complete suite of fuel cycle facilities other than enrichment, but this failed "for political and financial reasons" according to the World Nuclear Association.[10]

Ukraine has no large reprocessing plants; spent fuel is stored then sent to Russia for reprocessing. However there may be some limited capacity for plutonium separation associated with its research reactors − in particular, the 10 MW research reactor at the Institute for Nuclear Research in Kiev has associated hot cells.[29] Ukraine has three operational research reactors, another under construction and another planned.[30] Reactor-grade (but weapons-useable) plutonium could potentially be separated from stored spent fuel. Power reactors could potentially be used to produce weapon-grade plutonium, as could the largest (10 MW) of the three operational research reactors.

Use of civil nuclear infrastructure for weapons production would invite conventional military strikes on nuclear plants suspected of involvement in weapons production. It would also breach the Ukraine/IAEA safeguards agreement − the matter would then be referred to the UN Security Council. One of the many complications is that IAEA safeguards inspections have been suspended or deferred in a number of countries over the decades as a result of domestic or international political turmoil or military conflict. There is no information on the IAEA website as to whether any safeguards inspections have been carried out in Ukraine in recent months, or whether any planned inspections have been deferred.

On March 13, interim Ukrainian Prime Minister Arseniy Yatsenyuk told the UN Security Council that Russia's actions have sent a harmful nuclear nonproliferation message to the world: "The way our Russian neighbours acted undermines the entire global security and nuclear non-proliferation program. After these actions, it will be very difficult to convince anyone in the globe not to have nuclear weapons." [20]

Baltic states Lithuania, Latvia and Estonia have been shaken by Russia's invasion of Crimea and have responded by considering moves to boost their own military capabilities. On March 13, Lithuanian Prime Minister Algirdas Butkevičius hinted that his government might decide to acquire Patriot missile defense systems in response to the Crimea crisis. "Let's be clear about the missiles: if the national defense minister and the chief of defense say they must be purchased, nobody will stand in their way," he said.[20]

Russian−NATO conflict

In a throwback to Cold War rhetoric, a Russian television anchor handpicked by President Vladimir Putin made a clear nuclear threat following the March 16 vote in Crimea. "Russia is the only country in the world that is realistically capable of turning the United States into radioactive ash." [27]

Steven Starr from the Nuclear Age Peace Foundation and Physicians for Social Responsibility discussed the potential for military escalation leading to Russian−NATO nuclear warfare[21]:

"Thus there are now multiple pathways that can lead to civil war and international conflict in Ukraine. ... In a NATO-Russian conventional conflict, in which Russian forces were prevailing, NATO would have the choice of withdrawing, calling for a ceasefire, or using its nuclear weapons against Russian forces. ... Even if NATO could manage to use its conventional forces to defeat Russian conventional forces, Russia would not allow such a defeat upon its very border. Russia would certainly use nuclear weapons to stop NATO. ...

"In a NATO-Russian conflict, in which Russia introduced nuclear weapons, NATO would be fully capable of responding in a tit-for-tat fashion. This would be the same pattern as was seen in the NATO war games of the Cold War. Once the nuclear "firebreak" is crossed, once nuclear weapons are introduced into a military conflict in which both sides have nuclear weapons, there would likely be an almost inevitable escalation of conflict, a progressive use of nuclear weapons by both sides, with progressively larger targets being taken out.

"Peer-reviewed scientific studies predict that a war fought with hundreds or thousands of US and Russian strategic nuclear weapons would ignite nuclear firestorms over tens of thousands of square miles. ... In a matter of weeks or months, a global stratospheric smoke layer would form, which would block up to 70% of warming sunlight, quickly producing Ice Age weather conditions in the Northern Hemisphere. ... Nuclear war is suicide for the human race."

The prospect of nuclear warfare − however remote − has generated discussion about how to maximise the chances of surviving a nuclear blast: whether to take shelter, flee, etc. Since there's no good option: "The best

advice for surviving a nuclear bomb is to be somewhere else when it goes off." [22]

Arms control treaties and nuclear security initiatives

The Ukraine crisis has raised concerns that US−Russian cooperation on nuclear weapons and security issues will be affected. Over the March 8−9 weekend, the Russian state news agency reported that a senior defense ministry official was threatening to suspend New START arms-control verification inspections because of the Crimean Peninsula dispute.[23] The New START treaty between Russia and the US, signed in 2010, provides for 18 on-site inspections per year as part of a verification regime for a treaty that envisages significant cuts in missiles and nuclear warheads on both sides.[24]

The Russian official reportedly said: "The unfounded threats towards Russia from the United States and NATO over its policy on Ukraine are seen by us as an unfriendly gesture that allows the declaration of force majeure circumstances. We are ready to take this step in response to the announcement by the Pentagon about stopping cooperation between the defence institutions of Russia and the United States. Inasmuch as these inspections are a matter of trust, then in a situation where the United States has de facto declared the imposition of sanctions then there cannot be normal, bilateral contacts on observing agreements.[24]

Elizabeth Sherwood-Randall, White House coordinator for defense policy, said: "We see no reason that the tensions that exist over Ukraine should in any way obstruct the path toward fulfilling the commitments that we have made with the Russians to reduce nuclear weapons on both sides." [25]

Harvard University's Matthew Bunn said he feared that soured relations between the US and Russia could have negative implications for nuclear security collaboration. Bunn cited multilateral talks over Iran's nuclear program, and joint US−Russian nuclear security work inside Russia.[25]

US Energy Department efforts to secure nuclear materials within Russia had stalled prior to the Ukraine crisis, and that the delay could be exacerbated by the dispute. Work conducted under the Cooperative Threat Reduction umbrella agreement, also known as the Nunn-Lugar agreement, expired in June 2013 and the two countries have struggled to finalise details of a replacement pact.[25]

Bunn described "a feeling in both Moscow and Washington that I think is wrong, that the work is done on nuclear security in Russia and that there's nothing left to do there anymore it's not. There's a huge problem of sustainability, there are problems of security culture, there's still weaknesses in insider protection and we still need to be working together." [25]

Anne Harrington, from the US Energy Department's semi-autonomous National Nuclear Security Administration, said the Ukraine crisis may further delay initiatives to secure vulnerable nuclear materials in Russia.[26]

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Nuclear Security: *in cauda venenum*

This is a summary of a February 2014 report written by J.W. Storm van Leeuwen and published by the World Information Service on Energy (WISE). The full report is posted at: www.wiseinternational.org/node/4052

'In cauda venenum' − the sting is in the tail.

Nuclear security

A unique feature of applied nuclear technology is the generation of fissile materials and massive amounts of human-made radioactivity. As a result civil nuclear technology raises unique hazards and security issues, encompassing a number of pathways along which severe damage can be inflicted to the political, economic and societal stability on a regional, national or even global scale:

- Terroristic use of nuclear explosives.
- Proliferation of critical nuclear technology to politically unstable countries.
- Armed conflicts involving nuclear installations and materials.
- Terroristic attacks with conventional weapons on nuclear installations containing fissile materials and large amounts of highly radioactive materials: nuclear power plants, spent fuel cooling pools and reprocessing plants.
- Severe accidents involving one of the above mentioned installations.

The consequences of the last two potential events are indistinguishable: both cause large-scale dispersion of massive amounts of human-made radioactivity over vast regions, affecting millions of people.

Scope

Military issues are not addressed here, although military and civil nuclear technology are inextricably intertwined. The report discusses three aspects of nuclear security:

- The origin of artificial fissile materials and human-made radioactivity from civil nuclear power reactors, and how these materials could play a role in terroristic actions and the equivalent impacts of accidental on-site events.
- The role of computer models in the perception of nuclear security. and the role of natural phenomena which make inherently safe nuclear systems impossible. Further it addresses the mechanisms of Chernobyl-class disasters and their increasing likelihood.
- The strained relationship between nuclear security on the other hand, and on the other, the economic paradigm, the culture of the nuclear industry and the entanglement of interests.

Terroristic nuclear explosives

In principle there are five different fissile materials which can be used for atomic bombs: highly enriched uranium (HEU), uranium-233, plutonium, neptunium and americium. Except HEU these materials become available in separated form by reprocessing of spent nuclear fuel. By theft terrorists could acquire sufficient materials to fabricate a crude nuclear bomb. Without reprocessing the only way to obtain bomb material is enrichment of uranium to a high U-235 assay (HEU).

Safeguards of fissile materials in a reprocessing plant cannot be perfect: 1−5% of the materials are unaccounted for due to unavoidable, and often unnoticed, process losses. The risks of plutonium theft are high due to the frequent transports of separated plutonium and the MOX fuel that is made from uranium and plutonium for use in conventional power reactors.

There are reasons of concern regarding the security of the stockpiles of uranium-233. Neptunium and americium are not safeguarded internationally.

Illicit trafficking and theft

Another cause for concern is illegal trade and smuggling of nuclear materials. Transports of radioactive materials can be difficult to detect and this problem increases with time due to increasing amounts of radioactive materials and declining inspections. One of the consequences is the uncontrolled release of radioactive materials into the public domain and insidious exposure of a growing number of people to radionuclides. Serious accidents and terroristic actions cannot be ruled out. Political instability, for whatever reason, increases the risks of illicit nuclear transports with malicious intent.

Chernobyl-class disasters

Serious disruption of political, economical and societal stability could result from a large-scale release of radioactive materials caused by a terroristic attack with conventional explosives on a nuclear power plant, spent fuel cooling pool, or reprocessing plant. The consequences of such an attack could develop into a Chernobyl-class disaster.

Spent nuclear fuel has to be actively cooled for many years after discharge from the reactor due to its residual heat generation. Interruption of the cooling before the required period of time, and depending on the age of the spent fuel, will inevitably lead to meltdown of the fuel elements. A number of mechanisms are conceivable − some of which have actually occurred − which could cause a fuel meltdown. At high temperatures the cladding of the nuclear fuel reacts with water, generating hydrogen.

Violent steam and hydrogen explosions coupled with the dispersion of tremendous amounts of human-made radioactivity into the environment are unavoidable. The contaminated areas could cover 100,000−200,000 square kilometres and millions of people might be affected, as happened in the Chernobyl and Fukushima disasters.

Installations vulnerable to the above scenario are nuclear reactors and on-site and off-site spent fuel cooling pools. Each year an operating nuclear reactor

generates about 1,000 nuclear bomb equivalents of human-made radioactivity, a spent fuel cooling pond contains an even greater amount. A reprocessing plant may contain 0.1 to 1 million nuclear bomb equivalents, distributed over thousands of tonnes of conditioned and unconditioned, liquid and solid wastes, and spent fuel in cooling pools awaiting reprocessing. Violent explosions and meltdown of fuel are also possible in reprocessing plants. Possible triggers of such a scenario are accidents, natural disasters, human failures and terroristic actions.

Reprocessing of spent fuel

Assessing the whole chain of processes and activities related to nuclear power and the security issues they raise, one component of the chain stands out: the reprocessing of spent fuel. By reprocessing bomb-usable fissile materials, plutonium, neptunium and americium, are separated from spent fuel and become in principle available to terrorists for making nuclear explosives. In the sequence of reprocessing the highly radioactive fission products are dispersed over large volumes of solid, liquid and gaseous wastes, and the radioactive gases are released into the environment. The bulk of the remaining radioactive waste is stored in the reprocessing plants in an easily dispersible form. Due to accumulation over decades these amounts of dangerous highly radioactive reprocessing wastes are immense and the risks of dispersion into the environment are growing over time.

In spent fuel the fissile materials and fission products are in the most condensed condition and in the least accessible form for malicious actions. Each operation which breaks the integrity of the fuel elements enhances the security risks and renders safe definitive disposal of the extremely radioactive material much more expensive.

The environmental and security problems raised by reprocessing of spent fuel would increase even more if closed-cycle reactors (breeders) and partitioning and transmutation (P&T) systems were to come on line. With these systems massive amounts of plutonium and other fissile materials would be separated, shipped and spread amongst numerous vulnerable facilities. In addition the amounts of high-level radioactive waste, mainly in easily dispersible form, would greatly increase due to the repeated reprocessing of the spent fuel in these closed-cycle systems.

Fortunately breeders and P&T systems have proved to be technically unfeasible, due to facts the designers of these advanced systems did not account for. Conditio sine qua non of the breeder and P&T systems is the availability of perfect materials and the possibility of complete separation of a complex mixture of highly radioactive chemical species into pure fractions. Both conditions are impossible, as follows from the Second Law of thermodynamics.

Reprocessing turns out to be an exceedingly polluting and expensive technology which became essentially superfluous when the breeder and P&T systems proved to be unfeasible. The use of MOX fuel in conventional light-water reactors has a negative energy balance and raises serious security problems. Other purposes of reprocessing as proposed by the nuclear industry are based on fallacies, or are impractical for various reasons.

Reliance on computer models

Computer models are widely used in the nuclear world, not only to assess nuclear security issues, but also to estimate radiation doses for individuals and populations of areas contaminated by radioactive materials and to estimate the expected health effects of exposure to radioactivity.

Each computer model has its inherent limitations by definition, in addition to the limitations set by the choices of the variables incorporated into the model and the choices of the values of the model parameters. Generally the models are applied rigidly, incorporating little or no practical evidence even as this evidence becomes available as time goes by.

Inherent safe nuclear power is inherently impossible

Computer models, regulations and safeguards usually start from as-designed quality of nuclear installations and perfect supervision of quality and operations. According to the reactor safety model studies of the nuclear industry a large-scale accident could be expected once every 2,500 years. Empirical evidence proves this frequency to be once every 10-20 years, so the models have little practical application.

Nuclear installations are subject to the bathtub hazard function, like any technical construction and living organism. The bathtub hazard function implies that the failure rate rises exponentially during the wear-out phase. This phase follows an operational life during a number of years at a relatively low rate of failures. The rising failure rate is caused by unavoidable ageing processes governed by the Second Law of thermodynamics. In addition human behaviour is an unquantifiable and unpreventable risk factor. Therefore inherent safe nuclear reactors are inherently impossible, let alone inherently safe nuclear power. This includes the whole system of industrial activities needed to generate nuclear power (the nuclear fuel chain or fuel cycle).

Despite empirical evidence of the shortcomings the nuclear industry shows an unshakeable faith in its technical models and paper regulations, often ignoring the fact that not all relevant processes and phenomena are known and that not all factors are predictable and quantifiable. In proposed advanced technical concepts the nuclear industry does not show any notion of the implications of the Second Law of thermodynamics with respect to the feasibility of those concepts.

Radiation protection models

The official radiation protection models for assessment of health hazards posed by radioactive materials are based on a limited set of variables and parameters. Biological behaviour of any one kind of radionuclide inside the human body is not accounted for in the models, let alone the biological behaviour of a number of different kinds of radionuclides acting simultaneously. Chronic exposure to radionuclides, for example via food and drinking water in a contaminated area, is not included either.

Due to the long latency periods and anonymous character of stochastic health effects, it is rarely possible to attribute a certain disease of an individual to radioactive contamination. The relationship between exposure to radioactive contamination and its detrimental health effects can only be demonstrated in a statistical way by means of epidemiological studies involving very large numbers of people during many years.

The nuclear world recognizes only deterministic health effects as radiation-induced; these effects occur after exposure to very high radiation doses. Official nuclear institutes do not recognize non-cancer diseases as possibly radiation-induced and systematically attribute them to non-nuclear causes, without backing by scientific investigation.

Empirical evidence from previous events is not incorporated in the official assessments of health hazards of nuclear accidents. The applied exposure and effect models have a strong economic component and can easily be adapted to the political and economic needs of a given moment and/or place.

Economic principles play a dominant role in the recommendations of the International Commission on Radiological Protection (ICRP) for allowed exposure of the general public and individuals to nuclear radiation. These recommendations generally form the basis of the policy of governments on the subject of radioactivity.

The faith of the International Atomic Energy Agency and other official nuclear institutes in computer models can be so rigid that empirical observations that are not compatible with the radiation protection models are systematically dismissed as irrelevant, without any scientific evidence. This is found in, among others, the official reports on the health effects in the affected regions after the Chernobyl disaster.

Economic preferences and nuclear security

Economic preferences and commercial choices can greatly increase nuclear security risks. The numerous violations of the Non-Proliferation Treaty probably have an economic background. Hardly other than short-term economic motives can be conceived for reprocessing of spent fuel and the use of MOX fuel in conventional reactors.

Then there is the relaxation of the official standards for operational routine discharges of radionuclides into the environment by nuclear power plants and reprocessing plants. Due to ageing the frequency of leaks and spills will rise at an accelerated rate and so will the costs to repair the leaks and to prevent their occurrence. Raising allowable radioactive discharge limits for the nuclear operators keeps their costs down, while resulting in higher exposure standards for the general public, often by large factors, without scientific justification. Similar relaxation of exposure standards may be expected in case of a future nuclear accident, as occurred after the Fukushima disaster.

Another example is the relaxation of standards for clearance of radioactive construction materials for unrestricted use in the public domain. This will become a hot issue when heavily contaminated nuclear installations are dismantled; safe guardianship and disposal of the massive amounts of radioactive debris and scrap will be very expensive.

Economic reasons push the trend of lifetime extension for of nuclear power stations beyond the designed lifetime of 40 years. It is not clear how the owners of the plants and the supervisory institutes incorporate the unavoidable ageing and the bathtub function in their security assessments, or how independent or how thorough the inspections are.

Entanglement of interests

Information to the general public on nuclear matters is dominated by the International Atomic Energy Agency (IAEA), often called the ‘nuclear watchdog’. The IAEA has the promotion of nuclear power in its mission statement and its official publications have to be approved by all its member states. For these reasons it is a misconception to view the IAEA as an independent scientific institute. Besides dominating the public relations of the nuclear industry, the IAEA dominates also the publications of the International Commission on Radiological Protection (ICRP) and United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR). The views of the World Nuclear Association (WNA) and Nuclear Energy Agency (OECD-NEA) rely heavily on the IAEA. The World Health Organization (WHO) cannot operate and publish independently of the IAEA on nuclear matters. For that reason statements of the WHO on nuclear matters do not deviate from the IAEA statements.

The long latency periods and the non-specific character give the nuclear industry ample opportunity to play down the health effects of radioactive contamination.

Après nous le déluge: heading for a future disaster

The chances of nuclear terrorism and of Chernobyl-class nuclear accidents are greatly increasing as long as the nuclear industry upholds in its current frame of mind, characterized by a short time horizon, living on credit and an après nous le déluge attitude. Nuclear security problems and associated health hazards are growing with time and will persist for the next century, even were the world’s nuclear power stations to all be closed down today.

Even if the last nuclear power plant could be shut down today, the economy would have to sustain a nuclear workforce to perform the demanding task of decommissioning and dismantling far beyond the year 2100. This workforce does not contribute to any improvement of the energy supply. Its sole task is to prevent the many disastrous consequences of the nuclear legacy. One might wonder if enough young people would opt for the required rigorous education and training, and if a free market-oriented economy would be able to support such a workforce for such a long period with no return on investments. What are the prospects of that in times of a declining economy? Serious nuclear security problems and large-scale disasters seem inevitable.

Fukushima apologies and apologists

Author - Nuclear Monitor editor Jim Green.

It has been a sad and sorry year in Japan's Fukushima Prefecture. Three years after the March 2011 nuclear disaster and Japan is nowhere near recovering.

Australian journalist Mark Willacy neatly described the recurring pattern: "At first TEPCO denies there's a problem at the crippled Fukushima plant. Then it becomes obvious to everyone that there is a problem, so the company then acknowledges the problem and makes it public. And finally one of its hapless officials is sent out to apologise to the cameras." [1]

In February 2013, TEPCO president Naomi Hirose apologised for false information which led a parliamentary panel to cancel an on-site inspection of the Fukushima plant.[2] TEPCO even managed to lie in its website apology, according to the Asahi Shimun newspaper.[3]

In March 2013, a rat found its way into an electrical switchbox resulting in a power outage that left 8800 nuclear fuel assemblies without fresh cooling water for 21-29 hours. TEPCO delayed notifying the Nuclear Regulation Authority and local municipal officials about the incident. "We sincerely apologise. We are deeply regretful over the delay in reporting the incident and for causing anxiety to residents," said TEPCO representative Yoshiyuki Ishizaki.[4]

TEPCO belatedly takes responsibility for the disaster

On March 29, TEPCO belatedly acknowledged that the company's failings were responsible for the Fukushima disaster. Hirose apologised: "Our safety culture, skills, and ability were all insufficient. We must humbly accept our failure to prevent the accident, which we should have avoided by using our wisdom and human resources to be better prepared." [5]

In April, TEPCO discovered that at least three of seven underground storage pools were seeping thousands of litres of radioactive water into the soil. Hirose travelled to Fukushima to apologise for the leaks.[6]

TEPCO acknowledged a further five leaks and spills of contaminated water in April, including a spill of around 110,000 litres from a polyethylene-lined tank (TEPCO waited two days before informing the Nuclear Regulation Authority about this spill).[7] Some of the leaks were continuing because TEPCO was unable to locate their source. Hirose apologised for the fiasco: "We have been causing tremendous trouble. We are very sorry." [8]

After finding high levels of tritium and strontium in an observation well in June, TEPCO withheld the information for nearly three weeks. TEPCO executive Akio Komori visited the Fukushima prefectural government office on June 19 to apologise.[9]

"We've been trying to reform, but ..."

In July, it was revealed that TEPCO knew about radioactive groundwater leaks into the ocean a month before it publicly disclosed the problem. TEPCO's general manager Masayuki Ono apologised: "We would like to offer our deep apology for causing grave worries for many people, especially for people in Fukushima." [10] TEPCO president Hirose also apologised: "We've been trying to reform, but we repeated the same mistake. Obviously, our effort is not enough. We are really sorry." [11]

Also in July, Hirose apologised to two local mayors for seeking permission from the Nuclear Regulation Agency to restart reactors at the Kashiwazaki-Kariwa nuclear plant without first consulting local officials: "We sincerely apologise for your having had cause to criticise us for making hasty and sloppy decisions without giving considerations to local opinions." [12] In October, Niigata Prefecture governor Hirohiko Izumida − who effectively holds a veto over reactor restarts at Kashiwazaki-Kariwa − said TEPCO must address its "institutionalised lying" before it can expect to restart reactors.[13]

In early August, TEPCO apologised to residents in Fukushima Prefecture, the surrounding region and the larger public for causing inconveniences, worries and trouble arising from contaminated water leaks.[14]

At an August 21 media conference, TEPCO executive Zengo Aizawa apologised for the latest tank leak and said: "The problem of contaminated water is the largest crisis facing management and we will place priority on dealing with the issue." [15] At an August 26 media conference, Hirose apologised: "Contaminated water has been leaking from tanks. What should never happen, has been happening, and we deeply apologise for the repeated worries that we have caused. We are very sorry." [16]

On August 29, Hirose apologised to fishermen whose livelihoods have been affected by radioactive pollution from the Fukushima plant. But Hiroshi Kishi, head of a federation of more than 1000 fisheries cooperatives nationwide, said his members had no faith in TEPCO's ability to fix the mess it had created. "We think your company's management of contaminated water has collapsed," he said. "We are extremely worried as it's creating an immeasurable impact on our country's fishing industry and will continue to do so in the future." [17]

In September, Hirose offered a blanket apology: "We deeply apologise for the greater anxiety caused by the accident at Fukushima Daiichi nuclear power station." [18]

"You don't know what you are doing"

Also in September, Dale Klein, former head of the US Nuclear Regulatory Commission and current chair of TEPCO's 'Nuclear Reform Monitoring Committee', told

TEPCO that it was stumbling from "crisis to crisis" and that: "It appears that you are not keeping the people of Japan informed. These actions indicate that you don't know what you are doing ... you do not have a plan and that you are not doing all you can to protect the environment and the people." [19] Hirose apologised: "I apologise for not being able to live up to your expectations." [20]

In October, Hirose apologised to the Nuclear Regulation Authority for sloppy standards at Fukushima, as yet another problem with radiation-polluted water emerged. "The problems have been caused by a lack of basic checks," NRA secretary general Katsuhiko Ikeda told Hirose. "I can't help but say that standards of on-site management are extremely low at Fukushima Daiichi." [21]

In November, Hirose apologised to the estimated 150,000 local residents who have been forced to leave their homes due to radiation levels, and may in some cases never be able to return: "I have visited Fukushima many times, met the evacuees, the fishing union, the farmers, many people whose businesses have been damaged very much. I feel very sorry for them." [22]

In December, secretary-general of the ruling Liberal Democratic Party Shigeru Ishiba apologised after describing citizens participating in anti-nuclear protests outside the Japanese parliament as "engaging in an act of terrorism by causing excessive noise".[23] People were protesting against disgraceful new secrecy legislation which will deter nuclear whistleblowers from coming forward and deter journalists from reporting such information.[24]

In December, another blanket apology from Hirose: "We deeply apologise to all residents around the Fukushima Daiichi Nuclear Power Station, as well as the broader society, for the concern and anxiety that has arisen on account of the accident at the power station." [25]

A happy new year?

Hirose began 2014 with a New Year's speech in which he acknowledged that TEPCO was incapable of adequately dealing with problems in 2013, and was continually responding late to issues as they arose.[26]

Hirose said TEPCO will do its best "not to have any problems" in 2014. Fat chance.

Already in 2014[27]:

- The much-troubled Advanced Liquid Processing System, designed to remove radioactive contaminants from water at Fukushima, has broken down yet again after break-downs in June, July, September, October and December 2013;
- A black sea bream, caught 37 kms from the Fukushima plant, registered 12,400 becquerels/kg of radioactive caesium − 124 times the safety standard for foodstuffs;
- TEPCO is re-analysing 164 water samples collected last year because previous readings "significantly undercounted" radiation levels;
- TEPCO temporarily suspended the removal of spent nuclear fuel rods from reactor #4 after a cooling system failed;
- TEPCO said water samples from an observation well contained the highest levels of radioactive caesium detected so far in groundwater at the site; and
- A storage tank overflowed, spilling about 100,000 litres of contaminated water. "We are deeply embarrassed that this sort of unacceptable event would occur," said TEPCO executive vice-president Zengo Aizawa.

Nuclear apologists

Sadly, nuclear apologists have been slow to apologise for peddling misinformation. For example, Australian nuclear advocate and conspiracy theorist Geoff Russell[28]and Adelaide University's Barry Brook[29] insist that the Fukushima disaster was "deathless" [30] despite a growing number of scientific studies giving the lie to that claim. And British commentator Mark Lynas asserts that "very little or no illness or death" will arise from the Fukushima disaster.[31]

Last year the World Health Organisation released a report which concluded that for people in the most contaminated areas in Fukushima Prefecture, the estimated increased risk for all solid cancers will be around 4% in females exposed as infants; a 6% increased risk of breast cancer for females exposed as infants; a 7% increased risk of leukaemia for males exposed as infants; and for thyroid cancer among females exposed as infants, an increased risk of up to 70% (from a 0.75% lifetime risk up to 1.25%).[32]

Estimates of the long-term cancer death toll include:

- a Stanford University study that estimates "an additional 130 (15-1100) cancer-related mortalities and 180 (24-1800) cancer-related morbidities" [33];
- an estimate of 1000-3000 cancer deaths by physicist Ed Lyman (based on an estimated collective whole-body radiation dose of 3.2 million person-rem to the population of Japan)[34]; and
- an estimate of around 3000 cancer deaths, from radiation biologist and independent consultant Dr Ian Fairlie.[35]

Indirect deaths must also be considered, especially those resulting from the failure of TEPCO and government authorities to develop and implement adequate emergency response procedures. A September 2012 editorial in Japan Times noted that 1632 deaths occurred during or after evacuation from the triple-disaster; and nearly half (160,000) of the 343,000 evacuees were dislocated specifically because of the nuclear disaster.[36] A January 2013 article in The Lancet notes that "the fact that 47 per cent of disaster-related deaths were recognised in Fukushima prefecture alone indicates that the earthquake-triggered nuclear crisis at the Fukushima power plant caused extreme hardship for local residents." [37]

In Fukushima Prefecture, 1656 people have died as a result of stress and other illnesses caused by the 2011 disaster according to information compiled by police and local governments and reported last month. That number exceeds the 1607 people in Fukushima Prefecture who were drowned by the tsunami or killed by the preceding earthquake.[38]

"The biggest problem is the fact that people have been living in temporary conditions for so long," said Hiroyuki Harada, a Fukushima official dealing with victim assistance, "People have gone through dramatic changes of their environment. As a result, people who would not have died are dying." [39]

Claims by Russell, Brook, Lynas and many other propagandists that Fukushima will result in few if any deaths have no basis in truth. They ought to take a leaf from Naomi Hirose's book, bow deeply and apologise.

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NUCLEAR NEWS

Fukushima Third Anniversary events

Thousands of events were held around the world to commemorate the third anniversary of Japan's March 2011 triple-disaster. Tens of thousands participated in an anti-nuclear protest in Tokyo on March 9, and 5,000 attended another protest on March 15.[1]

Around 100 workers involved in Fukushima clean-up operations protested outside the Tokyo headquarters of TEPCO on March 14, complaining they were forced to work for meagre pay in dangerous conditions, while other workers protested outside the offices of Maeda Corp, one of the contractors hired to clean up the plant and surrounding areas.[2]

The largest protests were in Taiwan − 50,000 people protested in Taipei on March 9, while 30,000 more took to the streets in smaller cities around the country.[3]

In Germany, more than 11,000 people participated in 240 vigils across the country.

Information on many of the anniversary events around the world are posted at these websites:

http://fukushimathirdanniversaryevents.blogspot.com.au/

www.nuclear-heritage.net/index.php/Fukushima_Disaster_Remembrance_2014

1. www.stripes.com/news/pacific/thousands-protest-ahead-of-fukushima-anniversary-1.272046
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New Mexico, USA:
WIPP waste dump contamination incident

Seventeen workers have so far tested positive for low levels of contamination following a radiological 'event' at the US Department of Energy's Waste Isolation Pilot Plant (WIPP) in New Mexico. On February 14, an underground monitor detected airborne radiation within the plant.[1] The leak came just nine days after a truck hauling salt in an underground section of WIPP caught fire, but officials say they are confident the incidents are unrelated.

Air monitors located approximately 100 metres away from the underground air exhaust point, and monitors just outside WIPP's fence-line a half-mile away, registered slight, temporary increases of radioactivity from plutonium and americium after the February 14 incident.[7]

According to World Nuclear News, filters on the underground plant's vents removed at least 99.87% of contaminants from the air following the 'event', but trace amounts of americium and plutonium were subsequently detected by an above-ground sampling station near the plant.[1]

The New Mexico Environment Department says it believes WIPP will be unable to resume normal activities for a "protracted period of time".[2]

DoE records shows that, before WIPP opened, it put the risk of such an accident at one chance in 10,000 to one in one million during any given year of WIPP operations.[2,4] WIPP, which was supposed to safely protect waste for 10,000 years, has been open just 15 years. At the current rate, there will be 670 radiological contamination incidents over a 10,000 year period.

A roof collapse leading to damaged drums seems the most likely explanation for the radiological release.[3] The statistical probability of such a roof collapse incident was calculated at one chance in a million during a given year of WIPP operations.[2,4] At the current rate, there will be not one but 67,000 roof collapse incidents over a one million year period.

Nuclear waste-filled containers have been accumulating above-ground at the WIPP facility since the February 14 incident. Waste storage is also growing at dozens of current and former nuclear weapon-related sites in the US. DoE said it could not forecast when the repository would be reopened.[5] The Los Alamos National Laboratory (LANL) has suspended waste transports to WIPP but has a backlog it must move by the end of June. A massive wildfire burned to within a few kilometres of radioactive waste drums at LANL in 2011, hence the pressure to move the waste.[6]

WIPP disposes of long-lived transuranic radioactive waste from the US military in an underground salt formation. Since opening, the plant has received more than 11,890 shipments, totalling more than 90,000 cubic metres of waste.

More information and updates: www.wipp.energy.gov

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Sheila Oakes

British peace and anti-nuclear campaigner Sheila Oakes died on January 21 at the age of 85. At various times she was involved in the National Peace Council, the Campaign for Nuclear Disarmament, the International Peace Bureau and the International Confederation for Disarmament and Peace, and she became particularly close to the Japanese peace movement. An obituary is posted at: http://tinyurl.com/Sheila-Oakes

WISE/NIRS Nuclear Monitor

The World Information Service on Energy (WISE) was founded in 1978 and is based in Amsterdam, the Netherlands.

The Nuclear Information & Resource Service (NIRS) was set up in the same year and is based in Washington D.C., US.

WISE and NIRS joined forces in the year 2000, creating a worldwide network of information and resource centers for citizens and environmental organizations concerned about nuclear power, radioactive waste, proliferation, uranium, and sustainable energy issues.

The WISE / NIRS Nuclear Monitor publishes information in English 20 times a year. The magazine can be obtained both on paper and as an email (pdf format) version. Old issues are (after 2 months) available through the WISE homepage: www.wiseinternational.org

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