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15 August 2008

Mr Kelvin Thompson
Chair
Joint Standing Committee on Treaties
Parliament House
Canberra ACT 2600

Dear Mr Thompson,

Re: Questions on Notice re Agreement with the Russian Federation on Cooperation in the Use of Nuclear Energy for Peaceful Purposes

Below please find my responses to the Committee's questions on notice.

1. What is ICAN's Position on Nuclear Power, in general terms?

ICAN is a broad, community based organisation which has hundreds of organisational partners internationally and over 40 diverse organisational partners in Australia, including the largest environmental organisations, major churches, the UN Association, trade unions, professional associations, local government, peace and social justice organisations. Analogous to the International Campaign to Ban Landmines, ICAN exists to promote the urgent abolition of nuclear weapons through a comprehensive treaty – a Nuclear Weapons Convention. It does this through both advocacy with governments and through mobilisation of informed and engaged public opinion. ICAN is hosted by International Physicians for the Prevention of Nuclear War (Nobel Peace Prize 1985) internationally, and by the Medical Association for Prevention of War in Australia.

ICAN's priorities, as outlined on our website (www.icanw.org) are:

1. Negotiate nuclear weapons abolition

The abolition of nuclear weapons is achievable through a **Nuclear Weapons Convention (NWC)**. The majority of UN Member States call for immediate negotiation of such a treaty, which would prohibit the development, production, testing, deployment, stockpiling, transfer, threat, or use of nuclear weapons.

The NWC would provide for the elimination of nuclear weapons in much the same way comparable treaties have banned landmines and chemical and biological weapons.

2. No new nuclear weapons

The nuclear weapon states must immediately stop upgrading, modernizing, and testing new nuclear weapons.

Producing new nuclear weapons undermines the goal of non-proliferation, and violates the legal obligations of the nuclear weapon states under the nuclear Non-Proliferation Treaty (NPT) to negotiate disarmament in good faith.

The five original nuclear weapon states made an "unequivocal undertaking" at the NPT Review Conference in 2000 to "accomplish the total elimination of their nuclear arsenals leading to nuclear disarmament."

The hypocritical claim that nuclear weapons are valuable instruments of policy and power projection in some hands but are intolerable threats when owned by others must be abandoned.

3. Reduce the likelihood of nuclear weapons use

Nuclear weapons must be taken off high alert. This would greatly decrease the chance of accidental use. Every nuclear weapon state should commit itself to a "No First Use" policy – a pledge never to initiate a nuclear exchange – as an interim step toward abolition and to reduce the stimulus to nuclear proliferation.

Nuclear Weapon-Free Zones, which shrink the geographical space in which nuclear weapons can play a role, should be expanded globally.

In Australia, ICAN's additional priorities are:

4. Adopt a nuclear free defence posture

Australia's diplomatic efforts towards nuclear disarmament, some of which are commendable, are compromised by our continued sheltering under the US nuclear umbrella. Rejecting the use of nuclear weapons in our defence will help de-legitimise these genocidal weapons and the military policies that support them.

5. Cease producing bomb fuel

Australia should terminate its role in the production of nuclear bomb fuel by ceasing uranium mining and export, above all to any nation that has nuclear weapons or is not a signatory to the nuclear Non-Proliferation Treaty (NPT).

ICAN's considered position is that the challenging but achievable goal of a world free of nuclear weapons will be more readily achieved and sustained in a world in which nuclear power generation is being or has been phased out. This is because the material and capacity to produce nuclear power *intrinsically* involves the capacity to produce fissile material usable for nuclear weapons.

Our hosting and partner organisations are also deeply concerned about other aspects of nuclear power, which both in nature and magnitude pose unique risks not associated in any other means of producing electricity – the risk of accidents and terrorist attack resulting in widespread and long-term radioactive contamination; the challenges of keeping huge quantities of highly radioactive waste safe from terrorists and isolated from the environment for hundreds of thousands of years; the exponential increase in environmental and proliferation dangers associated with reprocessing of spent fuel and use of plutonium in reactor fuel; high costs, including those associated with long-term management of contaminated facilities, areas and waste; quite limited and slow benefits re greenhouse gas emission mitigation; and the non-renewable nature of uranium. They concur with many authoritative bodies and a number of governments, including those of New Zealand, Austria, Germany, Ireland, Italy, Latvia and Norway, supported by Luxembourg and Iceland, that nuclear power is unsustainable, and that investments in nuclear power retard the scale and speed of the massive investments urgently needed to a build sustainable energy future. While ICAN acknowledges these additional concerns, they are beyond the scope of ICAN's work.

ICAN however acknowledges the diversity of views on nuclear power, and in our focus on the pressing urgency and magnitude of the danger posed by nuclear weapons, we are pleased to collaborate with individuals and organisations committed to the eradication of nuclear weapons, but with divergent views on nuclear power. For example Gareth Evans and Hans Blix have provided valuable support and advice for ICAN, while holding a different view regarding nuclear power.

In addition, ICAN advocates measures to reduce the associated proliferation dangers for as long as nuclear power is used around the world. It is abundantly clear that achieving and sustaining a world free of nuclear weapons will require the nuclear fuel chain to be managed very differently from the current situation.

Fissile materials – highly-enriched uranium (HEU) and plutonium - are the key ingredients in nuclear weapons, and their control is critical to nuclear disarmament, halting the proliferation of nuclear weapons and ensuring that non-state organisations do not acquire nuclear weapons.

The most proliferation sensitive parts of the nuclear fuel chain are uranium enrichment and reprocessing of spent reactor fuel. Any government which has the material, facilities and expertise to enrich uranium to reactor-grade has everything it needs to enrich uranium further to weapons grade. This is the basis for current concerns about Iran's nuclear program. Reprocessing of spent reactor fuel to extract plutonium is the second potential source of fissile material.

Production of and access to fissile materials must be phased out – the NPT Article IV 'inalienable right' of states to pursue essentially all aspects of the nuclear fuel chain short of building weapons is not compatible with a nuclear weapons free world. ICAN therefore advocates:

- All uranium enrichment capacity – whether existing or new - should be multilaterally controlled under UN auspices, most appropriately by the IAEA, with equitable access to low-enriched uranium (LEU).
- HEU should be phased out of civilian (including in research reactors and radiopharmaceutical production) and military use.
- Reprocessing of spent fuel to separate plutonium should be stopped and outlawed. Australia should withdraw participation from the US Global Nuclear Energy Partnership, which envisages extensive spent fuel reprocessing; and separation, transport and use of vastly increased amounts of plutonium.

- Stocks of fissile materials should be placed under international control and where possible eliminated (such as by conversion of HEU to LEU).
- IAEA safeguards should be strengthened (including by reduction of significant quantities and time periods on which they are based) and more consistently applied across all nuclear facilities in nuclear weapon and non-nuclear weapon states. The resources available to the IAEA should be increased.
- The IAEA's inherent conflict of interest should be removed by removal of promotion of nuclear power from the its mandate.
- Countries should have access to technical assistance with renewable energy and energy efficiency through an International Renewable Energy Agency, such as proposed by Germany.

Recommendations for consistent Australian nuclear policy

ICAN recommends increased consistency in Australia's nuclear policies, which we believe would greatly enhance their effectiveness and credibility, particularly in the context of a welcome strengthened commitment to abolition of nuclear weapons, and the recent establishment of the International Nuclear Non-proliferation and Disarmament Commission. Greater policy consistency would also move Australia away from potentially exacerbating nuclear dangers through proliferation-sensitive uranium exports and towards contributing more unequivocally to solutions to the dangers posed by the most uniquely hazardous technology ever invented.

ICAN would in addition to the above measures recommend:

- Australia should explore ways to denuclearise its military alliances and not provide facilities or personnel for, or otherwise be complicit in, any possible use of nuclear weapons. This would greatly strengthen Australia's credibility in nuclear disarmament, and policy consistency and integrity, by concretely reducing the role of nuclear weapons in our 'own shop'. It would apply the most effective possible political pressure on the US and other nuclear armed states, and reduce the incentive for nuclear weapons to be targeted at Australia.
- Australia should withdraw from participation in missile defence, which is destabilising, technically unfeasible, able to be circumvented, and fuels vertical proliferation.
- Strengthening of the capacity of government departments in non-proliferation and disarmament.
- A review of the Australian Safeguards and Non-Proliferation Office.
- Any R&D on uranium enrichment still being undertaken at Lucas Heights or anywhere else in Australia should be shut down.
- Australia should actively promote benign, renewable energy sources and energy efficiency both domestically and internationally, and the creation of an International Renewable Energy Agency.
- The government should practically implement its stated support for disarmament education in schools and universities as well as the broader community.
- The government should publicly and privately encourage all US presidential candidates to make decisive policy commitments to US leadership in rapid progress towards a nuclear weapons free world, and work with other countries to make a strong call at the end of

this year on the new US and Russian presidents for decisive joint action to abolish nuclear weapons.

2. In your evidence, you said you were opposed to the sale of uranium at this time. Which countries would be you be in favour of for sales of uranium?

From the response above, it should be clear that ICAN would recommend that uranium mining and export be phased out. The needs of uranium for research and generation of isotopes for medicine, scientific research and industry are miniscule compared with those of fuelling nuclear power generation, and current stockpiles would be sufficient to meet these needs for very many millennia.

The half-lives of relevant uranium and plutonium isotopes are:
U-238 – 4.51 billion years
U-235 – 713 million years
Pu-239 – 24,400 years
This longevity means that the accident, contamination, terrorist and proliferation dangers associated with these materials are essentially indefinite, far beyond the time horizons of any human institutions, including nation-states and governments. We cannot have any certainty about future political and social changes, including those that may affect the safety or use in weapons of fissile materials and their precursors. An example is Iran – 3 decades ago Australia was planning a bilateral safeguards agreement paving the way for uranium exports to Iran – unthinkable in today's context. The risk of uranium provided to a state with no current nuclear weapons aspirations being available to a government with different intentions is a real possibility in any country over even a small fraction of the geological timeframes for which uranium or plutonium will exist.

Basing decisions on the nature and risks inherent in the materials seems the only reasonable, evidence-based decision making framework for materials with such unique hazards and extraordinary longevity.

While Australia does mine and export uranium, we would advocate conditions be placed on receiving countries, which could significantly reduce the risk of Australian uranium being used for nuclear weapons. These include:

- Exclusion of states possessing nuclear weapons. For these, at best, Australian uranium, even if not used for weapons, facilitates other supplies, including local ones, being used for weapons. Some, such as China and Pakistan, have appalling records of spreading sensitive nuclear technologies to other countries. All states possessing nuclear weapons have failed to deliver on their obligation under the NPT and international law, as stated unanimously by the judges of the International Court of Justice, to abolish their nuclear weapons. Some have not committed to cease production of fissile material for weapons

- Exclusion of states not party to the NPT

- Exclusion of states which have not signed and ratified the Comprehensive Test Ban Treaty

- Exclusion of States which do not have full-scope IAEA safeguards and an Additional Protocol in place, with a consistent record of compliance

- Exclusion of uranium enrichment in facilities not under multilateral control

- Exclusion of states which reprocess spent nuclear fuel to extract plutonium

- Exclusion of states which do not have excellent standards of nuclear regulation and safety, materials accountancy and physical security of nuclear facilities and materials

- Exclusion of states which do not have credible provision for safe long-term storage of radioactive waste

3. What evidence does ICAN have of Russia not managing its nuclear waste and what incidents of the loss of nuclear material have you got evidence of?

This question is complex and would require a significant research effort to address comprehensively, beyond the time and resources available to us to respond to this question. Much relevant information is not in the public domain. This response should therefore not be seen as comprehensive, but a selection of information available in the public domain. I would recommend though that a detailed review of the evidence on nuclear materials management and security in Russia would be relevant to the Committee's deliberations and could appropriately be sought.

To summarise a few aspects demonstrating the high level of international concern about security and management of nuclear materials in Russia:

- The security of nuclear weapons and materials has been a major security concern for the US government for the past 2 decades, and resulted in a variety of initiatives and multibillion dollar programs to secure these, particularly through:
    - the Nunn-Lugar Cooperative Threat Reduction Program initiated in 1992
    - The G8 Global Partnership against the Spread of Weapons and Materials of Mass Destruction established in 2002
    - The 2000 Russia-USA Plutonium Management and Disposition Agreement
    - The Russian-US Global Initiative to Combat Nuclear Terrorism, launched in 2006
    - The US Dept of Energy (DOE) Nuclear Cities Initiative, established to manage the economic conversion of 10 Russian closed cities that manufactured nuclear weapons, and particularly to provide employment to laid-off and poorly paid nuclear weapons specialists in order to prevent them offering their skills to 'states and organisations of proliferation concern.' Additional programs aiming to prevent Russian nuclear brain drain are the International Science and Technology Centres, and Initiatives for Proliferation Prevention. However, according to reports from German Federal Intelligence, numerous Russian nuclear specialists have undertaken work in other countries.
    - Major non-governmental initiatives have also been undertaken in this area, particularly in the securing of fissile materials, such as by the Nuclear Threat Initiative; and by the IAEA.

- The security of Russian nuclear weapons and expertise has been of major concern. The precise number of Soviet nuclear weapons was not precisely known. Former Russian National Security Advisor Aleksandr Lebed has famously claimed that 40 of Russia's 250 suitcase nuclear weapons were missing. Though the veracity of the claim has been challenged, it has not been definitively refuted. The US DOE has undertaken programs to enhance security at 50 Russian Nay nuclear sites, 20 Russian Strategic Rocket Forces sites, and other unidentified military storage sites.[1]

- Many agencies and governments, particularly in Europe, including the EU, have provided assistance to secure the damaged Chernobyl reactor, and construct a new sarcophagus to secure the damaged reactor for the next 100 years.
- Scandinavian governments, in particular Norway, as well as Japan, have been deeply concerned about the long-term risks posed by extensive Russian dumping of nuclear waste, reactors and submarines at sea, and to define and remediate this long-term environmental hazard.
- International research teams, including from Japan and the US, have and are contributing to evaluating the environmental and health effects of the extensive chronic and acute radioactive contamination caused by the interconnected Russian military and civilian nuclear programs, in the face of to date extremely limited, conflicting and poor quality data on health outcomes for the most highly exposed workers and communities.

As mentioned in our submission and my testimony to the Committee's hearing in Melbourne, Russia (and the USSR previously) has a very poor history of environmental and health protection in all its nuclear activities, both civilian and military, with evidence of an alarming willingness to expose downwind communities, workers and the general population inside and outside Russia to significant levels of harm.

Nuclear test explosions

Atmospheric nuclear test explosions generate both local and dispersed radioactive fallout, and because of this are most injurious to human health. Underground tests generate fallout through venting (which occurred in about 30% of Russian underground nuclear tests prior to 1980[2]), and leakage from repositories of highly radioactive waste associated with long–term soil and groundwater contamination. The ability of geological structures to contain the wastes is compromised by the fissuring and fracturing occurring during the nuclear explosions which generate the waste. Former nuclear test sites are in essence waste dumps for highly radioactive waste which do not fulfil any of the regulatory, geological or engineering requirements which should apply to such repositories.

Further, as the Canberra Commission noted:

> *"... it cannot be excluded that one possible future source of fissile material is plutonium, in vitrified form, in former underground nuclear weapon test sites."*[3]

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[1] Stockholm International Peace Research Institute. SIPRI Yearbook 2007. Armaments, disarmament and international security. Oxford; Oxford University Press, 2007:504-5.
[2] International Physicians for the Prevention of Nuclear War, Institute for Energy and Environmental Research. Radioactive heaven and Earth. The health and environmental effects of nuclear weapons testing in, on and above the Earth. New York; Apex Press/London; Zed Books, 1991:103.
[3] Dept of Foreign Affairs and Trade. Report of the Canberra Commission on the Elimination of Nuclear Weapons. Canberra; Commonwealth of Australia, 1996:26.

Russia had the largest number of nuclear test sites (over 50, including underwater), conducted the largest number of above-ground nuclear tests, involving the highest total explosive yield (247 megatons, compared with the US at 154 megatons)[4], and conducted the largest nuclear test explosion ever, a massive 58 megaton blast at Novaya Zemlya on 30 October 1961. The IPPNW/IEER report on nuclear test explosions concludes in relation to the former Soviet Union's nuclear tests: *"... protection of public health and the environment was scant, even compared to other nuclear weapon states."* Environmental monitoring and health follow-up and care of exposed populations have been severely inadequate.

The International Council for Science SCOPE report on nuclear test explosions concludes that most of the global excess cases of radiation-induced death associated with high exposure to local fallout from atmospheric nuclear tests would occur as a result of exposures around Semipalatinsk (Kazakhstan), and that:
"Renewed efforts, mainly in so far poorly assessed areas of the former USSR, are needed to properly assess exposures and health effects and to establish a system of health care and compensation for those suffering from the tests."[5]

Some studies of health effects from Soviet nuclear tests and nuclear weapons production are now producing data and reveal the largest radiation doses received on a population basis outside the survivors of Hiroshima and Nagasaki. Despite methodological limitations and decades of absent or inadequate follow-up, these studies consistently show significantly increased rates of cancer in communities downwind of the Semipalatinsk test site[6].

Nuclear weapons production

Studies underway at Russian and other former Soviet nuclear weapons production sites are now providing data on radiation health risks at doses much higher than those generally occurring in nuclear industries. For example, workers at the Mayak nuclear complex (also known as Chelyabinsk-65), the largest and oldest nuclear weapons production facility in the former USSR, received average external gamma radiation doses of 0.8 Gy, with the highest doses exceeding 10 Gy[7]. These latter doses are extraordinary, and comparable only to doses received during radiation therapy for cancer. The average exposure is more than 40 times higher than the average exposure recorded in the largest study of nuclear industry workers to date – a study by the International Agency for Research on Cancer involving over 400,000 workers in 15 countries[8]. Not surprisingly, significant dose-related increased death rates from solid cancers and leukemia were found among the 21,500 Mayak workers studied.

A Special Commission of International Physicians for the Prevention of Nuclear War and The Institute for Energy and Environmental Research published a global review in 1995 of the health and environmental effects of nuclear weapons

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[4] Warner F, Kirchmann RJC eds. SCOPE 59. Nuclear test explosions. Environmental and human impacts. Chichester; Wiley/Scientific Committee on Problems of the Environment, International Council from Science, 2000:31.
[5] Op cit:222
[6] United Nations Scientific Committee on the Effects of Ionizing Radiation. UNSCEAR 2006 Report. Annex A. New York; United Nations, 2008:47-49.
[7] Shilnikova NS, Preston DL, Ron E et al. Cancer mortality risk among workers at the Mayak nuclear complex. Radiat Res 2003;159:787-98.
[8] Cardis E, Vrijheid M, Blettner M, et al. Risk of cancer after low doses of ionising radiation: retrospective cohort study in 15 countries. Br Med J 2005;331(7508):77-80.

production. It provides a frightening picture of poor management of nuclear materials including radioactive waste, extensive environmental contamination, and disregard of substantial health risks to both workers and downwind and downstream communities in Russia[9]. Under normal operation, Russian nuclear weapon facilities released large quantities of radioactive gases, liquids and solids into the air, ground, and water - canals, rivers, reservoirs, lakes, seas and oceans – for many years. Selected aspects of this ongoing legacy are summarised below.

Marine dumping

The 1993 Russian Government Commission on the Questions Related to the Dumping of radioactive Waste at Sea describes:

- extensive dumping of liquid and solid radioactive waste at sea, despite repeated official denials, in multiple locations in northern seas, off Russia's east coast, and in the Atlantic and Pacific Oceans. Dumping of liquid radioactive waste still occurred in the Sea of Japan in the early 1990s
- dumping of 6 nuclear reactors with fuel and 12 without spent fuel, plus one spent fuel screen assembly
- accidental loss of 5 nuclear reactors at sea
- the total radioactivity involved was up to 10 million curies (370,000 terabecquerels, TBq)
- an additional few million curies consisted of lost nuclear weapons, radionuclide sources, satellites etc, and another 2.7 million curies (by then, this will continue to increase) from radioactive waste washed into the Arctic Ocean from the Yenisey and Ob Rivers
- Other accounts give a sense of the scale of this radioactive dumping[10]:
    - In northern seas between 1964-91, 4900 containers of solid low and medium level radioactive waste, 19 ships, and 144 large objects
    - In the Baltic, Barents, White and Kara Seas, 100,000 cubic m of liquid radioactive waste
    - Off the east coast, between 1986 -91, 6868 containers of low and medium level radioactive waste, 38 ships and 100 large objects

Freshwater dumping

- At the Mayak nuclear complex, radioactive waste was discharged into Lakes Kyzyltash and Karachay and several reservoirs along the Techa River. This ecological disaster was covered up for decades.
- In the early 1950s, an average of about 4000 curies (150 TBq) were discharged into the Techa River *daily* – altogether the reservoirs and lakes along the Techa contain over 122 million curies (4.5 million TBq) of radioactivity. In 1990 the Russia government declared the entire Chelyabinsk Oblast (region) an ecological disaster zone.
- Residents along the Techa and Tobol Rivers – 124,000 people – were exposed to high levels of radioactivity – up to 50 milligray (mGy) gamma dose per hour along the river banks (about 500 times background levels, typically 0.1 microgray per hour). Average individual whole body-equivalent exposures in the 4 most exposed villages totalled about 1 sievert or more (one hundred times the current recommended annual population exposure limit). Some heavily exposed villagers were evacuated after 7 years, some were never evacuated. Epidemiological

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[9] Makhijani A, Hu H, Yih K (eds.) International Physicians for the Prevention of Nuclear War, Institute for Energy and Environmental Research. Russia and the territories of the former Soviet Union. In: Nuclear wastelands. A global guide to nuclear weapons production and its health and environmental effects. Cambridge, Massachusetts; MIT Press;1995:285-392.

[10] Yemelyanenkov A, Zolotkov A. Military pollution – nuclear waste: sailing directions classified. In: Taipale I, Makela PH, Juva K, et al (eds). War or health? London; Zed Books, 2002:416-9

studies of residents exposed to the river show dose-related increased solid cancer and leukemia rates.

- Gamma readings along the shores of Lake Karachay in 1990 were 200 mGy per hour; at the pipe discharging waste into the lake, gamma radiation doses of 6 Gy per hour were recorded – enough to give an adult a lethal dose in less than 1 hour. This is the most radioactive water body in the world.
- At Krasnoyarsk-26, a huge underground plutonium production complex in Siberia, excavated by more than 65,000 prisoners and 100,000 soldiers, cooling water from the Yenisey River that was radioactively contaminated with plutonium fission products and activation products was directly returned to the river. Gamma readings of 4-5 microgray per hour (40-50 times background) have been measured 85 km downstream, and up to 1 microgray per hour on islands 336 km downstream. Fish 300-500 km downstream are contaminated with phosphorus-32, sodium-24, zinc-65, cobalt-58 and cobalt-60. Annual consumption of 20 kg of such fish, common in the region, would deliver a bone marrow radiation dose of 3-6 millisievert, sufficient to increase leukemia risk by 10-25%.

Underground dumping

Apart from the reprehensible dumping of substantial quantities of radioactive waste on ground surfaces and into surface fresh water, large amounts of radioactive waste, much of it high-level, has been injected deep underground at a number of the nuclear complexes. These are generally inadequately contained or monitored. Examples include:

- at Krasnoyarsk, radioactive liquid wastes from the reprocessing plant were poured into buried concrete tanks or injected into wells at a depth of 270 m. Between 1967 and 1992, a total of 3.8 million cubic meters containing 660 million curies (24,420 million gigabecquerels) were injected into a total of 2500 boreholes.
- At Tomsk-7, over the same period 36 million cubic meters containing 1.06 billion curies were injected into rock layers.

Long-term migration of radioactive materials into soil and particularly groundwater at these and other sites is very likely.

It should be noted that disposal of long-lived radioactive waste is a major unresolved issue throughout the world, and that no long-term repository for high-level radioactive waste, such as those arising from plutonium production, is functioning in Russia or anywhere else.

Waste explosions

As well as the world's most extensive radioactive contamination, the world's worst nuclear accidents, both civilian (the Chernobyl disaster) and military have occurred in Russia. All have occurred because of poor technical and safety standards and a wilful disregard of safety, health and environmental protection.

On 29 Sep 1957, an inadequately cooled high-level liquid radioactive waste storage tank exploded at Chelyabinsk-65, expelling 80 tons of highly radioactive waste containing 20 million curies (740,000 TBq) in a contamination plume stretching several hundred km. This explosion was not reported outside Russia until 1976.

Another tank explosion occurred at the Tomsk-7 complex on 6 April 1993, dispersing 44 curies of uranium, plutonium and fission products up to 37 km away. The pattern of delayed evacuation and other protective measures for affected residents following other nuclear accidents in Russia also occurred following this explosion. The Ministry of Atomic Energy is reported to have paid residents of the contaminated zone about US$3.50 each in compensation.

Other serious explosions at nuclear facilities have involved chemical rather than radioactive hazards, for example in Sep 1990 welding sparks ignited an estimated 4000 kg of beryllium that had accumulated in the ventilation ducts of a beryllium processing plant at Ust-Kamenogorsk, Kazakhstan, contaminating an area home to 120,000 people with levels up to 890 times the permitted levels.

Approach to radiation health

The high population and worker radiation exposures through routine operations, negligent waste management, and accidents throughout the nuclear industries of the former Soviet Union are compounded by decades of secrecy and cover-up, lack of collection of data to enable evaluation of health effects, and lack of adequate care and compensation for those adversely affected. The IPPNW/IEER report notes:

> *"A closed administrative department in the Ministry of Health enforced secrecy around radiation health issues. The responsible investigators, as they now acknowledge, were required to collaborate in distorting and minimizing consequences, and medical researchers had to convert radiation-induced conditions into more benign-appearing diagnoses. This occurred both despite and along with sometimes elaborate medical surveillance efforts following several notable releases. … Internal factors include cover-ups of accidents and the pressure to falsify health outcome records by not reporting radiation-related diseases. For example, physicians reportedly faced seven years of imprisonment if they explained to their patients that the reasons for medical intervention were linked to radiation. …*
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> *It is reported that doctors were forbidden to make radiation-related diagnoses, on pain of punishment. Thus, while some dose data indicate that one should find relatively high levels of fatal cancers, the health findings do not correspond to the dose estimates. New diagnoses such as "weakened vegetative syndrome" and even "ABC disease", unknown elsewhere, were created in Russia, possibly to fill the void for radiation-related diagnoses banned by nuclear authorities."*

The US DOE estimated in 2000 that the cost to remediate contaminated soil and groundwater, manage nuclear and hazardous wastes, stabilize nuclear materials, and decontaminate and decommission nuclear facilities throughout the nuclear weapons complex in the US will be in the range of US$200 to 250 billion – an estimate which over time appears increasingly conservative. The US National Academy of Sciences has stated:

> *"At many sites, radiological and non-radiological hazardous wastes will remain, posing risks to humans and the environment for tens or even hundreds of thousands of years … Complete elimination of unacceptable risks to humans and the environment will not be achieved, now or in the foreseeable future."*

This salutory assessment applies even more in Russia. In the former Soviet Union, the extent of contamination and its future consequences for human health and ecosystems as a result of nuclear programs are greater than in the United States, and indeed anywhere else on the planet. Clean-up of contaminated sites would be an even larger and more costly exercise than in the US, in a more challenging political and resourcing context, with less government commitment and capacity to undertake such remediation. While the examples referred to above are focussed primarily on nuclear weapons related facilities and programs, there is considerable overlap between power generation and weapons production facilities in Russia. A number of power reactors have been used to produce plutonium for weapons; uranium mines, milling, enrichment and fuel fabrication facilities, and reprocessing facilities have served both purposes; all managed within the same government. The fundamental issues raised apply broadly across the nuclear sector in Russia, civilian and military. And many of the improvements in nuclear safety and management which have occurred or are underway in Russia have been dependent on foreign initiative, resources and personnel.

Security of nuclear weapons and materials

Despite extensive assistance to Russia and efforts to secure nuclear weapons and materials, eliminate aging nuclear weapon delivery systems and find alternative employment for the 35,000 excess weapons scientists and workers in the Russian nuclear complex, the Carnegie Endowment for International Peace concludes: *"Despite these efforts, Russia's nuclear complex continues to pose a serious proliferation risk, and much more remains to be done to adequately secure Russian nuclear materials and expertise."*[11]

The assessment in 2000 of a US DOE advisory group chaired by former Senate majority leader Howard Baker and former White House counsel Lloyd Cutler was similar: *"The most urgent unmet national security threat to the United States today is the danger that weapons of mass destruction or weapons-usable material in Russia could be stolen and sold to terrorists or hostile nation states …"*

Fissile material protection, control and accounting

As noted in our earlier submission, Russia has the largest stockpiles in the world of both fissile materials – highly enriched uranium (HEU) and plutonium. According to the most recent (2007) Global Fissile Material Report of the International Panel on Fissile Materials[12], Russia holds an estimated stockpile of 985 tons of **HEU** – directly usable in nuclear weapons. This is well over half the global stockpile, and sufficient for 39,400 nuclear weapons. Russia still has 71 of the world's 140 research reactors which are fuelled by HEU, and does not have a policy of domestic clean-out of HEU and closure of such reactors, or their conversion to low enriched uranium, which cannot be directly used in nuclear weapons. Fifty–four of these Russian reactors are civilian, and in total 30 tons of HEU are estimated to be stored at these many, often poorly secured, civilian facilities.

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[11] Cirincione J, Wolfsthal JB, Rajkumar M. Deadly arsenals. Nuclear, biological and chemical threats. 2nd edition. Washington DC; Carnegie Endowment for International Peace, 2005:121-39.
[12] International Panel on Fissile Materials. Global fissile material report 2007. available at: www.fissilematerials.org

The terrorist hazard posed by HEU is exacerbated by the inability of radiation monitors at ports and border crossings to reliably detect HEU.[13]

Russia holds an estimated 186.2 tons of *separated* **plutonium** – also directly usable in nuclear weapons. The US has declassified the fact that 4 kg of weapons grade plutonium are sufficient for a high-yield nuclear weapon – the current Russian stockpile is therefore sufficient for 47,000 nuclear weapons.

Managing these vast quantities of fissile materials, and the radioactive waste that may be generated, as safely as possible for essentially the indefinite future is a major challenge. The Carnegie Endowment concluded:

"Even the best long-term storage and security of nuclear materials cannot eliminate the proliferation risks associated with these huge stocks."

The problem is exacerbated by the lack of precision in the vast Russian inventory of fissile materials. The US nuclear accounting system has a margin of error for plutonium of 1% - in Russia this would be considerably higher. This means that up to hundreds of nuclear weapons worth of fissile material could disappear without this necessarily being able to be identified. Former CIA Director Porter Goss told the US Congress in 2005: *"There is sufficient [Russian] material unaccounted for so that it would be possible for those with know-how to construct [a] nuclear weapon."*[14]

IAEA Director General Mohamed ElBaradei said in March 2006 that in relation to securing nuclear material *"... experts estimate that perhaps 50 per cent of the work has been completed."*
A few months earlier, again in relation to protection of nuclear materials, he said: *"It is imperative that countries implement these measures [strengthened provisions of the Convention on the Physical Protection of Nuclear Material] as fully and as early as possible. We are in a race against time."*[15]

The Carnegie Endowment 2005 report noted*: "Even after ten years of effort, however, the majority of nonweaponized Russian nuclear materials are inadequately protected. By the end of 2004, only 26% of materials had received comprehensive security upgrades."*
They further note that when the current US-Russia program of securing all civilian and military nuclear material sites is complete: *"Even this final level of protection, however, will be below the accepted international standards for the physical protection of nuclear materials. No plans currently exist to provide Russia with the resources needed to reach this level of physical security and accounting."*

A number of organisations, including no doubt numerous governments, keep databases on trafficking in nuclear materials. One prominent publicly available one is the IAEA Illicit Trafficking Database. Its most recent report, covering the period 1993-2006[16], includes 1080 confirmed incidents, of which 275 involved unauthorised possession and related criminal activity. Eighteen incidents involved HEU or plutonium; 15 of these involved unauthorised possession. Some involved seizure of kilogram quantities of weapons-usable material; most involved relatively small quantities, with the concern that a number of these may represent samples of larger quantities. The obvious and unanswerable question is

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[16]Available at: http://www.iaea.org/NewsCenter/News/2007/itdb.html

how many more thefts have not been detected. However an indication that the database may be substantially incomplete is suggested by the several hundred additional incidents reported in various open sources, but not yet confirmed by the states involved. The database only includes incidents reported or confirmed by states, sometimes with considerable delay; for example an incident involving 79.5 g of weapons grade HEU which occurred in Feb 2006 in Georgia was not reported until 2007.

An additional indication that the IAEA database is a significant underestimate of the scale of the problem of nuclear smuggling is that a number of incidents involving large quantities of fissile materials reported by knowledgeable experts do not appear on the database. These include for example 40 kg of weapons grade uranium seized in Odessa in 1993[17], and 1.16 kg of weapons grade uranium seized in October 2001 by Turkish police[18].

It is widely agreed by experts in the field that in the majority of instances of smuggling of fissile material, many of which are almost certainly not being detected or reported, the origin of the material is highly likely to be the former USSR, particularly Russia[19].

Russia's poor record of nuclear waste management and security of nuclear materials are thus of profound and continuing concern.

I trust that the Committee finds these responses to your questions helpful to your important deliberations.

Yours sincerely,

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[18] Helfand I, Forrow L, Tiwari J. Nuclear terrorism. Brit Med J 2002;324:356-9.
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