

EU Non-PROLIFERATION CONSORTIUM

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Promoting nuclear safety and nuclear security in the Middle East region

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Background paper

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Abbreviations

ASEAN	Association of Southeast Asian Nations
ARASIA	Cooperative Agreement for Arab States in Asia for Research, Development and Training related to Nuclear Science and Technology
CD	Conference on Disarmament
CNS	Convention on Nuclear Safety
CPPNM	Convention on the Physical Protection of Nuclear Material
GCC	Gulf Cooperation Council
GICNT	Global Initiative to Combat Nuclear Terrorism
IAEA	International Atomic Energy Agency
IND	Improvised Nuclear Device
OSART	Operational Safety and Review Team
RDD	Radiological Dispersal Device
SESAME	Synchrotron-Light for Experimental Science and Applications for the Middle East
UAE	United Arab Emirates
UN	United Nations
UNESCO	UN Educational, Scientific and Cultural Organization

1. Introduction

As states in the region work towards establishment of a Zone in the Middle East free of nuclear weapons and other weapons of mass destruction, they may in the meantime wish to consider cooperative measures in the field of nuclear safety and security that would be valuable in their own right and could help to establish the greater sense of trust that will be necessary for materialization of a “Zone”. With nuclear power having newly arrived in the region and with more reactors on the way, issues of nuclear safety and nuclear security take on vital importance. It will be critical for Middle East states that are pursuing nuclear power to implement effective national policies, to sign up to international instruments and to adhere to global regimes. Mutual encouragement to adopt such national policies and practices is one way that states of the region can join in common purpose. Another way, and at a higher level of political difficulty, Middle East states may find utility in coordination and cooperation on a regional basis. At the highest level of aspiration, states might seek to build a structure for regional collaboration on nuclear and radiological safety and security.

2. Introduction of nuclear power

In the past several years, nearly every state in the Middle East has given consideration to introducing nuclear power as a means of strengthening energy security, diversifying energy sources, saving fossil fuels, mitigating climate change and even enhancing national prestige. The so-called “nuclear renaissance” was over-hyped from the beginning, and the Fukushima nuclear set back nuclear energy plans in many areas of the world, including the Middle East. Nevertheless, the region remains a growth area for nuclear power. This year Iran became the first nation in the Middle East to produce nuclear energy, with the start-up of the long-delayed Bushehr reactor.¹In the United Arab Emirates, construction began this July on the first of four reactors, scheduled to come into operation by 2020. Saudi Arabia in June 2011 announced an ambitious plan to spend \$300 billion on 16 nuclear reactors by 2030, with the first to come into operation by 2021. In Egypt, weeks after taking office, newly elected President Mohamed Morsi said that Cairo was again considering a civilian nuclear power program, which was put on hold the previous year amidst political turmoil. Meanwhile, Jordan has ambitious plans to introduce nuclear power for electricity generation and water desalination, for which it has undertaken feasibility studies and sought foreign cooperation. Adjacent to the narrowly defined Middle East region,²Turkey recently announced that

¹ Although Bushehr is the only operational nuclear power plant in the Middle East, six countries operate research reactors to produce isotopes for medical and industrial use and for research and training purposes. Most of these facilities are small. Egypt has two research reactors at Inshas, one with a thermal output of 10MW that has been operating since 1961 and is at the end of its lifetime, and a newer, larger reactor with a 22MWt capacity. Algeria has a 1MWt pool-type research reactor at the Draria nuclear complex that went critical in 1989 and a 15MWt heavy-water-moderated reactor at Ain Oussera, which went critical in 1992. Libya’s 10MWt research reactor at Tajoura went online in 1981 and in 2006 was converted to run on low enriched uranium. Morocco has a 2MWt TRIGA Mark II-type light-water reactor which went critical in 2006 and was declared operational in May 2007. Iran has four small research reactors at Esfahan and is constructing a 40MWt heavy-water research reactor at Arak. Israel operates a 5MWt civilian research reactor at Soreq and an unsafeguarded 70Wt reactor at Dimona that produces plutonium for weapons purposes.

² The geographic boundaries of the Middle East to be included in the Zone have not been set in concrete, but are understood to include the Arab states, Iran and Israel.

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construction of the first power unit of Akkuyu Nuclear Power Plant in Mersin city will be completed in 2019.³

With so many nations in the region newly introducing nuclear power in the next two decades, there will be growing concern about the safety and environmental risks. Given the pattern of wind and ocean currents, the direct impact of a nuclear accident in any of the countries of the region would be transnational. All the nuclear power plants under consideration are to be sited on water bodies shared with others: the Persian Gulf, the Mediterranean and the Red Sea.

Particular attention has been paid to the potential for transnational nuclear safety dangers associated with Iran's reactor at Bushehr. This is perhaps inevitable, given that it is the first nuclear power plant to be built in the region. Concerns are also heightened because the Iranian plateau is known to be seismically active and because Iran, being under international sanctions, has not been able to benefit from extensive international cooperation that might directly or indirectly enhance nuclear safety. Officials and non-governmental experts from the countries of the Gulf Cooperative Council (GCC) have often expressed concern about the spread of radiation in the event of a nuclear accident at Bushehr, which is closer to each of the six GCC capitals than it is to Tehran. Radioactive contamination of the Persian Gulf, the only source of water for four of these countries would leave them without drinking water. Being downwind of the reactor, all of the GCC countries would also be adversely affected by air contamination from a Bushehr accident.⁴ The timing of the nuclear disaster at Fukushima, months before start-up of Bushehr, exacerbated concerns.⁵ If even such an economically advanced nation as Japan, with all of its technological prowess and acclaimed safety culture, could fail to prevent and wisely manage a nuclear accident, it is natural to wonder whether the Gulf region could be protected against a disaster at Bushehr.

3. Strengthening nuclear safety

Every country that introduces nuclear power will need to give priority attention to the regulatory framework; management of nuclear plant safety; the safe transport, treatment and disposal of radioactive waste; emergency preparedness to enhance accident prevention as well as remediation in the event of an accident).

To reassure neighbours, but more importantly for the safety of their own citizens, all states in the region that are building or planning nuclear power plants should sign and ratify the **IAEA Convention on Nuclear Safety**, which encourages parties to maintain a high level of safety by meeting international benchmarks.⁶ In the Middle East, the convention is in force in Bahrain, Jordan, Kuwait, Lebanon, Libya, Saudi Arabia, Tunisia, and the United Arab

³ 'Construction of first power unit of Akkuyu nuclear power plant to end in 2019', Anadolu Agency, (20 October 2012), <http://www.aa.com.tr/en/news/92528--construction-of-first-power-unit-of-akkuyu-nuclear-power-plant-to-end-in-2019>

⁴ Tariq Khaitous, Why Arab leaders worry about Iran's nuclear program, in: Bulletin of the Atomic Scientists, (23 May 2008), <http://www.thebulletin.org/web-edition/features/why-arab-leaders-worry-about-irans-nuclear-program>.

⁵ See, for example, Dossier: Sami Al Faraj, Strategist issues Iran nuke warning citing tectonic plates, Fukushima, Geo-Strategy Direct, (2 November 2011), p. 5.

⁶ Here and elsewhere, the author has drawn on David Santoro, Status of non-proliferation treaties, agreements, and other related instruments in the Middle East, Background paper EU Seminar to promote confidence building and in support of a process aimed at establishing a zone free of WMD and means of delivery in the Middle East, Brussels, (6-7 July 2011), <http://www.nonproliferation.eu/documents/backgroundpapers/santoro.pdf>.

Emirates (UAE), most of which ratified or acceded to the Convention within the past three years. Kuwait acceded to the convention in 2006 and Lebanon, ratified it in 1996. Algeria, Egypt, Israel, Morocco, and Syria all signed the convention in 1994, the year it came into effect, they have yet to ratify it. The regional non-signatories are Iran, Iraq, Oman, Qatar, and Yemen. Iran is the only nation in the world that operates a nuclear power plant not to accede to the convention. In addition to remedying that anomaly and the concern to which it gives rise, Iran would also be encouraged to accept a long-standing offer by the International Atomic Energy Agency (IAEA) to send a pre-Operational Safety and Review Team (OSART) mission to evaluate the Bushehr plant.⁷

- The **Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management** is another international convention that all states in the region that operate nuclear facilities should be encouraged to sign and ratify. This instrument calls for review meetings of contracting parties, which are required to submit national reports addressing measures taken to implement the convention obligations. In the Middle East, the only two states parties are Morocco and the UAE. Lebanon signed the joint convention in 1997 but has yet to ratify it.

Two other important nuclear safety conventions have been accepted by most, but not all states of the region:

- The **Convention on Early Notification of a Nuclear Accident**, which was adopted in 1986 following the Chernobyl nuclear plant accident and which establishes a notification system for nuclear accidents that could spread radiation to other countries. The convention is in force in all Middle East states with the exception of Syria (which has signed but not yet ratified the convention) and Yemen.
- The **Convention on Assistance in the Case of Nuclear Accident or Radiological Emergency**, which was also adopted after the Chernobyl accident, and which sets out a framework for international cooperation in the event of accidents. Bahrain, Syria and Yemen are the only countries in the region for which the convention is not in force.

4. Strengthening nuclear and radiological security

There are two categories of security risks associated with nuclear technology: 1) the release radiation as the result of a terrorist attack on or sabotage of a facility or nuclear materials that are in transit, and 2) the production of an improvised nuclear device (IND) or of a radiological dispersal device (RDD) stemming from the theft of nuclear or radioactive materials by non-state actors. Preventing acquisition and use of a nuclear bomb by terrorist groups is accorded top priority by many policy makers because of the extremely adverse

⁷ Nima Gerami, Nuclear safety in Iran, post-Fukushima, in: Bulletin of the Atomic Scientists, (3 August 2011) <http://www.thebulletin.org/web-edition/op-eds/nuclear-safety-iran-post-fukushima>.

consequences albeit the low probability of such an event. Terrorist explosion of a radiological dirty bomb is a more likely scenario, but much less lethal, although the radioactive contamination in a populated area could have serious economic and social consequences for a local economy. To date there has been no incidents of nuclear or radiological terrorism although intelligence agencies in the mainland Europe, the UK, the US and Thailand have foiled RDD plots before they have reached fruition,⁸ and in 1995 Chechen terrorists placed a small quantity of cesium-137 in one of Moscow's parks. Because the radiological material was not dispersed,⁹ it was considered to have been used as a psychological weapon to create panic.

Given that all states have a national interest in preventing nuclear terrorism, states in the region might find it beneficial to discuss common strategies and efforts to protect fissile and radiological material. States in the region should be encouraged to adopt three key nuclear security instruments:

- The **Convention on the Physical Protection of Nuclear Material (CPPNM)**, which was adopted in 1979 and has been in force since 1987, establishes measures to prevent, detect, and punish offenses related to nuclear material. States parties are obliged to make specific arrangements and meet defined standards of physical protection for international shipments of nuclear material; undertake not to export or import nuclear materials unless they have received assurances that these materials will be protected during international transport; cooperate in the recovery and protection of stolen nuclear material; and criminalize specified acts. In the Middle East, the Convention has been acceded to or ratified by all states except Egypt, Iran, Iraq, and Syria.
- An **Amendment to the CPPNM**, adopted by states parties in July 2005, extends its measures to domestic use, storage, and transport of nuclear materials. It also provides for expanded international cooperation to locate and recover stolen or smuggled nuclear material, to mitigate any radiological consequences of sabotage, and to prevent and combat related offenses. To enter into force, the Amendment must be ratified by two-thirds of the CPPNM states parties. Of the CPPNM Middle East states parties, Algeria, Bahrain, Israel Jordan, Libya, Saudi Arabia, Tunisia, and the UAE have deposited documents of ratification or acceptance. CPPNM states parties that have yet to deposit such instruments include Comoros, Djibouti, Kuwait, Lebanon, Morocco, Oman and Qatar.¹⁰
- The **International Convention for the Suppression of Acts of Nuclear Terrorism**, also known as the Nuclear Terrorism Convention, was adopted in 2005

⁸ Scott Sagan, presentation to the AAAS conference titled: Emerging Nuclear Power in Regional Contexts: Southeast Asia, Singapore: Mandarin Oriental, (3 November 2010).

⁹ Jerzy Zaleski, New Types and Systems of WMD: Consideration by the CD, UNIDIR Background paper by, (May 2011), paragraph 28, <http://unidir.org/pdf/ouvrages/pdf-1-92-9045-011-F-en.pdf>.

¹⁰ It might be noted that the United States also has yet to ratify the Amendment. Each national ratification is of equal value, of course, in the count to the two-thirds of CPPNM states parties that are required to bring the amendment into force.

under the auspices of the United Nations. It calls on states parties to criminalize acts of nuclear terrorism, to promote law enforcement and judicial cooperation to prevent, investigate, and punish those acts, and to physically protect nuclear and radiological materials as recommended by the IAEA. As of October 2012, the Convention had yet to be signed by Iran, Iraq, Oman, and Yemen or ratified by Egypt, Israel, Jordan, Kuwait, Qatar, and Syria.

The **Code of Conduct on Safety and Security of Radioactive Sources** is another instrument that has been promoted by the IAEA to encourage states to attend to the proper security of nuclear and radioactive materials. As a set of practical guidelines on how to comply with the Code, the IAEA Board of Governors in September 2004 approved a document entitled *Supplementary Guidance on the Import and Export of Radioactive Sources*. The Code is not legally binding, but states are encouraged to make a political commitment with regard to the Code and the *Supplementary Guidance*. Egypt, Iraq, Qatar and Yemen have made political commitments with regard to both instruments. As of 20 September, Israel, Jordan, Morocco, Oman, Syria and Tunisia have notified the IAEA of their commitment to the Code of Conduct but not yet to the *Supplementary Guidance*.

Seven Middle Eastern states have also found it useful to join the Global Initiative to Combat Nuclear Terrorism (GICNT), which was launched in 2006 by the US and Russia in order to improve capacity to prevent, detect, and respond to a nuclear terrorist event. Partner nations organize and host workshops, conferences, and exercises to share best practices to implement the GICNT Statement of Principles.¹¹ The partners in the Middle East are Bahrain, Israel, Jordan, Libya, Morocco, Saudi Arabia, and the UAE.

Transparency in national nuclear programs and adherence to international standards is a sine qua non for addressing concerns about neighbouring states about what the introduction of nuclear power could mean for the safety of their citizens, the protection of their environment and the stability of their economies. Beyond national policies, states in the Middle East might also find benefit in cooperating with one another on nuclear safety and security. This is easier said than done. A case in point is the situation in Southeast Asia, where the states of the region have formed a successful regional organization (ASEAN) and declared a nuclear-weapon-free zone (the Bangkok Treaty). There are no inter-state disputes that the states of the region are not able to manage peacefully. Yet even though the ASEAN members have developed institutions relevant to nuclear safety and security issues, they seem reluctant to make use of these institutions. Despite the rhetoric of consensus, they have not agreed to supplement international cooperation through the IAEA with cooperation at the regional level.¹²

¹¹ The GICNT Statement of Principles is available at <http://www.state.gov/documents/organization/141995.pdf>

¹² International Institute for Strategic Studies, *Preventing Nuclear Dangers in Southeast Asia and Australasia*, London: IISS, (2009), p. 12.

5. Cooperation in nuclear applications and nuclear power

Moving beyond encouragement to accept international instruments relating to nuclear safety and security, states in the region might advance trust in the nuclear field by sharing nuclear technology for various peaceful uses. One such project has already been adopted under the auspices of the IAEA and the UN Educational, Scientific and Cultural Organization (UNESCO): the Synchrotron-Light for Experimental Science and Applications for the Middle East (SESAME) initiative, hosted by Jordan and involving Israel, the Palestinian National Authority, Bahrain, Egypt and Turkey. The aim of the project has been to bolster regional cooperation in nuclear applications. Begun in 2003, and slated to be completed in 2015, SESAME will culminate in the construction of a very large particle accelerator that generates x-ray and ultraviolet light beams, intended for use in research in medicine, physics and other fields.

In several regions of the world the IAEA has established regional technical assistance programs to promote cooperative research, training, development and applications in nuclear science and technology. One of these is in the Middle East, where the Cooperative Agreement for Arab States in Asia for Research, Development and Training related to Nuclear Science and Technology (ARASIA) entered into force in July 2002.¹³ As the name implies, it is limited to Arab states. The political benefits of this effort would be increased and extended to the political realm if the cooperative research through the IAEA were extended to other regional parties.

Another example of regional cooperation in nuclear applications is a workshop that Israel intends to host in the framework of the IAEA Technical Cooperation program on “Quality Assurance in Radiotherapy for Asia and Pacific Region. Israel recently announced that it would welcome all states in the region to attend the workshop, and to apply for scientific visits and fellowships in this domain.¹⁴

It should be noted that Iran on several occasions has offered to share its civilian nuclear technology with Muslim neighbours, particularly Egypt.¹⁵

Much ambitiously, joint ventures to build nuclear power plants and to share the electrical output through interconnected grids could make economic sense for several of the smaller states in the Middle East, including Jordan and Israel. In an ideal world, shared nuclear power initiatives could provide huge benefits in terms of confidence building and a sense of shared purpose. However, such cooperation has not proven possible to date even among GCC states, notwithstanding their announcement in December 2006 of a study for a joint programme in the field of nuclear technology.

¹³ Information about ARASIA can be found on the IAEA website at <http://web.aec.org.sy/arasia/>.

¹⁴ Statement by Dr Shaul Chorev, Head of Israel Atomic Energy Commission to the 56th General Conference of the IAEA, 19 September 2012, <http://www.iaea.org/About/Policy/GC/GC56/Statements/israel.pdf>.

¹⁵ See, for example, MP Hopes for Start of Iran-Egypt N. Cooperation after Mursi's Visit to Bushehr Plant, Fars News Agency, (28 August 2012), <http://english.farsnews.com/newstext.php?nn=9106040220>.

6. Ban on radiological weapons

One measure that would present both greater political difficulty and greater political and practical benefit would be to adopt a regional ban on radiological weapons. Proposals for banning such weapons globally have been on the international agenda since 1978 when the General Assembly's Special Session on Disarmament called for the conclusion of a convention "prohibiting the development, production, stockpiling, and use of radiological weapons." The next year the USSR and the US make a joint proposal on major elements of a treaty banning radiological weapons. In the 1980s, contact groups to flesh out the idea floundered in the Conference on Disarmament. Germany revived the proposal in 2002, and the issue remains on the CD agenda though there is little serious interest in negotiating a treaty on the subject. Contentious issues include the scope of the ban, the definition of radiological weapons, and the relationship of the proposed treaty to other nuclear disarmament measures. Verification issues are also problematic, in that tens of thousands of radioactive sources presumably would have to be tracked and inspected.¹⁶ A regional ban might seek to avoid some of these problems by stating a norm against radiological weapons without verification measures, such as is the case with the biological weapons convention.

Whether such a norm would influence the terrorist groups that presumably would be the most likely actors to produce and use radiological bombs is a relevant question. However, developing such a norm would be a good place to start. Since no nation in the region is suspected of possessing radiological weapons or of having any interest in them, a ban should not impose insurmountable difficulties. The key would be not to encumber it with unpalatable conditions or to link with other initiatives that are more intractable.

¹⁶ Jerzy Zaleski, *New Types and Systems of WMD: Consideration by the CD*, UNIDIR Background paper, (May 2011), paragraphs 26, 27, <http://unidir.org/pdf/ouvrages/pdf-1-92-9045-011-F-en.pdf>.