

Briefing Memo

The Implications of the Uranium Enrichment Activities in Iran (an English translation of the original manuscript written in Japanese)

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Introduction

The nuclear development program in Iran, especially the country's engagement in nuclear enrichment activities, highlighted the issue that although a signatory of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) has the right to the peaceful use of nuclear development, it is difficult to ensure the obligations of the treaty are fully met – in other words, to ensure the signatory accepts inspections by the International Atomic Energy Agency (IAEA) in order to secure the transparency of its nuclear development. It has been suspected that Iran is developing nuclear weapons, but Iran is not cooperating to clear this suspicion. In addition, the United States, the United Kingdom and France disclosed that Iran was secretly constructing a facility for uranium enrichment in September 2009. Such frequently deceptive behavior by Iran makes it difficult to justify the country's claim that their nuclear development is for peaceful purposes.

Under these circumstances, the international community proposed that Iran stop its uranium enrichment activities, and instead Russia should conduct uranium enrichment and France should manufacture nuclear fuel rods for Iran. The aim of this proposal was to prevent Iran from possessing uranium enrichment technologies that can be diverted to produce nuclear weapons. However, from Iran's point of view, this is a violation of its right to nuclear development. Therefore, how this issue will develop in future remains uncertain. Nevertheless, the importance of this proposal is that it was initiated by the nuclear issues in Iran and was suggested at the same time as the concept (that the international community should take total control of uranium enrichment technologies directly connected to nuclear weapons) was approved by the IAEA and was about to start in Russia. This study will provide an overview of the uranium enrichment activities and concerns in Iran, and also discuss the purpose of the new approach by the international society, as well as the future influence of the complex nuclear issues in Iran.

The Current Status of Uranium Enrichment Activity and Concerns on Suspected Nuclear Development

Uranium enrichment is a process necessary for the production of the nuclear fuel that is loaded into reactors but is also a form of technology that can be diverted to the production of nuclear weapons. In the peaceful use of nuclear energy, uranium-235 (natural uranium contains 0.7%) is enriched to about 5% in order to produce nuclear fuel rods (low enriched uranium, LEU). When uranium is used for nuclear weapons, it should be enriched to more than 90%. Uranium enriched to more than 20% is called high enriched uranium (HEU), and can in theory be used for nuclear weapons. Nevertheless, in general, uranium needs to be enriched to more than 90% for that purpose. The enrichment process can be carried out by repeatedly feeding uranium hexafluoride (UF₆) in gaseous form into a unit, called a cascade, which consists of multiple, linked centrifuges. Using the same method, Pakistan succeeded in producing nuclear weapons. Moreover, in a confession by Dr. Abdul Qadeer Khan in 2004, known as “the Father of Pakistan's nuclear development,” it was revealed that this technology has been disclosed to at least Iran, North Korea and Libya.

Iran built a facility for research, development and production of uranium enrichment in Natanz, and has been operating full-scale uranium enrichment activities since 2003. Iran has already succeeded in enriching uranium to 5%, which is required for producing nuclear fuel rods, and has also achieved 19.75% (19.3%, according to the evaluation of the IAEA) to the present day. Iran claims that it needs to enrich uranium close to 20% to produce nuclear fuel rods that will be loaded into a reactor for medical research purposes. Currently, Iran does not seem to be producing uranium enriched to over 20%, nonetheless, Dr. Salehi, the head of Iran's Atomic Energy Organization (AEOI), has announced the organization's intention to produce 120kg of uranium enriched to this level in future. According to Mr. David Albright from the Institute for Science and International Security (ISIS), an American think tank specializing in nuclear issues, 125 to 210kg of uranium enriched to 20% is required to produce enough weapon-grade uranium for one nuclear weapon; and this will require only one tenth of the time needed to produce the same amount of weapon-grade uranium from natural uranium. Thus, although Iran seems to be trying not to cross the line between the peaceful use of nuclear power and nuclear weapon development, it could be said that Iran is improving its infrastructure and accumulating technologies, and intending to become a potential nuclear-weapon state in future.

In fact, there have been several reports that suggest Iran's nuclear development activities are suspected to be related to the production of nuclear weapons. The most significant example is its plan to mount an implosion-type nuclear weapon in Shahab 3 missile warheads,

an intermediate-range ballistic missile that Iran owns. In addition, it seems that Iran is also conducting research on a system for initiating explosions underground by remote control, and it is possible the country is undertaking underground nuclear tests. Furthermore, Iran is also developing neutron generators that initiate nuclear fission at the time of implosion, and it has been pointed out that it is inconceivable that this technology will be used for civilian use (The Times online, December 14, 2009).

What are other countries' views on Iran's suspicious activities, then? Among the evaluations of nuclear development in Iran, the most notable were the National Intelligence Estimates (NIEs) published by the United States in November 2007. Some of the content was made available to the public, according to which, Iran seemed to have stopped its nuclear weapon-related activities from 2003 to mid 2007. However, the report itself will possibly be reviewed in the near future (The New York Times online, January 3, 2010). Also it has been reported that the intelligence agencies in the United Kingdom, Germany and France have deemed that Iran restarted its nuclear weapon related activities before 2007. Thus different countries have different opinions, which once again reaffirms the difficulty of evaluating nuclear weapons programs in other countries.

The Limits of International Control of Uranium Enrichment Technology

While nuclear issues show no sign of resolution, in October 2009, Europe, the United States and Iran temporarily agreed that Iran would transfer most of its LEU stock to Russia, which would take over uranium enrichment process, and then France would produce nuclear fuel rods. Nevertheless, Iran produced uranium enriched close to 20% in 2010, which made the agreement fall through. In fact, Turkey and Brazil joined the negotiation in May 2010, and Iran once again agreed to export LEU outside the country. However, Iran is still producing enriched uranium and is showing no sign of stopping such activities.

These proposals are based on a concept called "nuclear fuel supply assurance" that proposes that sensitive technologies such as uranium enrichment should be controlled by specific countries under the approval of the IAEA in order to prevent nuclear proliferation. Since 2003, the IAEA, the United States and Russia have made various proposals against Iran's nuclear issues. Russia's proposal was adopted first and the "International Uranium Enrichment Centre (IUEC)" was built in Angarsk, Siberia, which was approved by the IAEA in November 2009. When it comes to realizing this concept, there has always been an argument about whether abandonment of uranium enrichment technology should be included in the conditions for receiving enriched uranium and nuclear fuel from similar international centers. For example, the concept proposed by the United States imposes preconditions that

enrichment technology should be abandoned; on the other hand, the proposal by Russia and the IAEA does not include the abandonment of such technology.

It is probably necessary to explain the background of the proposals of Russia and the IAEA. As a condition for receiving enriched uranium and nuclear fuel, Russia's proposal originally did not allow the pursuit of uranium enrichment technology. However, it later changed its stance and proposed that receptor countries need not abandon the right to research/develop enrichment technology. In other words, the conditions for uranium enrichment were relaxed, based on the view that it is a right given to each country by the NPT. Similarly in 2003, Mohamed ElBaradei, former Director General of the IAEA, originally proposed that possession of uranium enrichment technology should only be allowed under multi-national control as it may be diverted for nuclear weapons. Since then, on many occasions, he has proposed that uranium enrichment should be under multi-national control to prevent sensitive nuclear power technology from being spread. Nonetheless, since then the IAEA has stopped calling for the abandonment of uranium enrichment technology so strongly.

This change is based on the background that there have been backlashes against limitations on the possession of nuclear technology for peaceful use, not only from Iran but also from the countries that already possess uranium enrichment technology, such as Argentina, Australia, Brazil and South Africa, as well as the Non-Aligned Movement (NAM). Moreover, there has been strong criticism that in addition to the current situation where the NPT system divide countries into "nuclear-weapon states" (the United States, Russia, the United Kingdom, France and China) and many other "non-nuclear-weapon states", if these "non-nuclear-states" are further divided into "states with uranium enrichment technology" and "states without uranium enrichment technology", the inequality between those countries would be increased.

Thus the approach to seek the abandonment of uranium enrichment technology seems to have reached its limit. However, some countries (i.e. the United Arab Emirates) have officially announced that they will not develop/possess uranium enrichment technologies, and taking this into consideration, it can be said that those countries will have the advantage of being able to rely on the international center developed in Russia. But these "model" countries in terms of non-proliferation policy would not likely be isolated from the international community in the first place, therefore, there is hardly any risk that the supply of nuclear technology and nuclear fuel to them will be disrupted. In fact, these countries do not even need to rely on international centers; they will be able to receive cooperation from the advanced countries that possess nuclear power technologies on a one-to-one basis.

Future Concerns on a “Black Nuclear Fuel Cycle Network”

When viewed this way, it is clear that it is not possible to apply the concept of nuclear fuel supply assurance to countries like Iran that are determined to seek their own technologies. President Ahmadinejad announced that Iran would possess its own nuclear enrichment technology and enter the international market to provide nuclear fuel in 2006. Although Iran claims that it is for peaceful use, due to the ambiguity of nuclear technology, the situation seems to be extremely precarious. Even though there are some complaints, most countries support the NPT system. In this situation, there is a possibility that a network will be formed for facilitating cooperation on nuclear cycle technologies between the countries that have been challenging the international community and have been excluded from receiving nuclear technologies under the NPT regime, such as Iran, which does not cooperate with the IAEA; North Korea, which forcibly conducted nuclear tests; and Syria, which secretly received support from North Korea to build a reactor. These tendencies can be clearly seen in the aforementioned black-market network, as suggested by A. Q. Khan, and also in the history of the export of nuclear-related technologies by North Korea.

Some Iranian scholars suggest that Iran should possess nuclear cycle technologies including uranium enrichment technology like Japan does. Their assertion is that although Japan is not a nuclear-weapon state, it possesses sensitive nuclear fuel cycle technology. Nevertheless, it has to be clearly pointed out that Japan entirely accepts the inspection by the IAEA as an obligation corresponding to the right to the peaceful use of nuclear energy and ensures absolute transparency. Those countries that assert their right to the peaceful use of nuclear energy must not overlook this point.

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