

# CRS Report for Congress

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## Iran's Nuclear Program: Recent Developments

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### Summary

On September 24, 2005, the International Atomic Energy Agency (IAEA) Board of Governors found Iran to be in non-compliance with its Nuclear Nonproliferation Treaty (NPT) safeguards agreement. The Board's resolution, GOV/2005/77, did not immediately refer Iran to the United Nations Security Council, leaving room for further negotiations. IAEA inspections of Iran's nuclear program since 2003 have revealed significant undeclared activities with potential application for nuclear weapons, including uranium enrichment facilities and plutonium separation efforts. Iran's actions to conceal activities over two decades and restrict access for IAEA inspectors have eroded international confidence in Iran's peaceful intentions. Iran agreed to suspend its enrichment and reprocessing activities in exchange for promises of assistance from Germany, France, and the UK (EU-3), but negotiations broke down in August 2005, leading to the Board's decision. This report will be updated as needed.

### Background

Iran has had a nuclear program for close to 50 years, beginning with a research reactor purchased from the United States in 1959. The Shah's plan to build 23 nuclear power reactors by the 1990s was regarded as grandiose, but not necessarily viewed as a "back door" to a nuclear weapons program, possibly because Iran did not then seek the technologies to enrich or reprocess its own fuel.<sup>1</sup> There were a few suspicions of a nuclear weapons program, but these abated in the decade between the Iranian 1979 revolution and the end of Iran-Iraq war, both of which brought a halt to nuclear activities. Iran's current plans — to construct seven nuclear power plants (1000 MW each) by 2025

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<sup>1</sup> However, there were reports that Iran sought laser enrichment technology in the United States in the late 1970s, and conducted reprocessing-related experiments. In addition, there were intelligence reports that the Shah had a secret group to work on nuclear weapons. See Leonard S. Spector, *Nuclear Ambitions* (Colorado: Westview Press, 1990), p. 204.

— are still ambitious, particularly for a state with considerable oil and gas reserves.<sup>2</sup> Iran argues, as it did in the 1970s, that nuclear power is necessary for rising domestic energy consumption, while oil and gas are needed to generate foreign currency. Few observers believe that such an ambitious program is necessary or economic for Iran, including the United States.

Iran has asserted repeatedly that its nuclear program is strictly peaceful, stating in May 2003 that “we consider the acquiring, development and use of nuclear weapons inhuman, immoral, illegal and against our basic principles. They have no place in Iran’s defense doctrine.”<sup>3</sup> Iranian officials have also insisted on their right to develop peaceful uses of nuclear technology. President Khatami stated in March 2005 that ending Iran’s uranium enrichment program is “completely unacceptable,” but that Iran would provide “objective guarantees” of the peaceful uses of enrichment. Uranium enrichment can be used for both peaceful (nuclear fuel) and military (nuclear weapons) uses. At the heart of the debate lie two issues: doubt about Iran’s intentions, magnified by revelations of almost two decades of clandestine activities, and whether the international community can adequately verify the absence of enrichment for nuclear weapons or should further restrict access to sensitive nuclear technologies.

## What Inspections Revealed

In 2002, the National Council of Resistance of Iran (NCR) helped expose Iran’s undeclared nuclear activities by providing information about nuclear sites at Natanz (uranium enrichment) and Arak (heavy water production). In three years of intensive inspections, the IAEA has revealed significant undeclared Iranian efforts in uranium enrichment (including centrifuge, atomic vapor laser isotope separation and molecular laser isotope separation techniques) and separation of plutonium, as well as undeclared imported material. Iranian officials have delayed inspections, changed explanations for discrepancies, cleaned up facilities and in one case, Lavizan-Shian, razed a site.<sup>4</sup> According to IAEA Director General Mohamed ElBaradei, “Iran tried to cover up many of their activities, and they learned the hard way.”<sup>5</sup> Only in January 2005 did Iranian officials share a copy of Pakistani scientist A.Q. Khan’s 1987 offer of a centrifuge enrichment “starter kit.”<sup>6</sup> In November 2005, Iran finally admitted that the Khan network supplied it with information on casting and machining parts of nuclear weapons.<sup>7</sup>

Iran admitted in 2003 it conducted “bench scale” uranium conversion experiments in the 1990s (required to be reported to the IAEA) and later, admitted that it used for those

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<sup>2</sup> See statement by Iran’s Foreign Minister Kamal Kharrazi at [[http://www.pbs.org/newshour/bb/middle\\_east/july-dec04/iran\\_9-27.html](http://www.pbs.org/newshour/bb/middle_east/july-dec04/iran_9-27.html)].

<sup>3</sup> Statement by H.E. Mr. G. Ali Khoshroo, Deputy Foreign Minister for Legal and International Affairs, Second Session of the Prepcom for the 2005 NPT Review Conference, Apr. 29, 2003.

<sup>4</sup> David Albright and Corey Hinderstein, “Iran: Countdown to showdown,” *Bulletin of Atomic Scientists*, Nov./Dec. 2004, vol. 60, no. 6.

<sup>5</sup> “Iran Was Offered Nuclear Parts,” *Washington Post*, Feb. 27, 2005.

<sup>6</sup> *Ibid.*

<sup>7</sup> “Iran ‘Hands Over Nuclear Cookbook,’” November 18, 2005, [Aljazeera.net](http://www.aljazeera.net)

experiments some safeguarded material that had been declared lost in other processes (a safeguards violation). In February 2004, the IAEA concluded that, “given the size and capacity of the equipment used, the possibility cannot be excluded that larger quantities of nuclear material could have been involved than those declared.”<sup>8</sup> The IAEA has deemed credible Iran’s explanation that it needed to convert uranium into metal for its laser uranium enrichment program (revealed only in October 2003).

**Enrichment Activities.** Inspections revealed two enrichment plants at Natanz — a pilot-scale facility(planned to have 1000 centrifuges) and a commercial-scale plant under construction (planned to have 50,000 centrifuges). The pilot-scale plant started up in June 2003 only to shut down after Iran suspended enrichment activities in December 2003. Construction on the commercial-scale plant has also been suspended. The plants are built partly underground, raising concerns about intentions.

Several questions were raised in connection to those plants during inspections:

- Did Iran introduce uranium gas (process gas, or UF<sub>6</sub>) into the pilot-scale plant? If so, the slight enrichment of uranium that would have resulted would have been a safeguards violation if undeclared. Iranian officials told the IAEA that it was too difficult to use process gas, but that Iran was able nonetheless to advance to a production stage of centrifuge enrichment.<sup>9</sup>
- Where did the highly enriched uranium (HEU) particles come from? Iranian officials asserted that HEU particles found at the Natanz pilot plant in 2003 were contaminants from foreign centrifuge assemblies, a first clue revealing the Pakistani A.Q. Khan network as a supplier to Iran. Iran admitted to enriching uranium to just 1.2%, while the particles sampled ranged from 36% to 70% U-235 enrichment. In October 2003, Iranian officials admitted they tested centrifuges at the Kalaye Electric Company using UF<sub>6</sub> between 1998 and 2002.
- Why did Iran keep other information hidden? Iran was slow to reveal the existence of more sophisticated centrifuge designs (using maraging steel or composite rotors) and its laser enrichment program. Iran did not admit that it possessed more advanced centrifuge designs (P-2) until asked by the IAEA in January 2004. In light of Libya’s admission that Pakistan supplied it with P-2 centrifuge designs, Iran’s possession of P-2 designs is not surprising. Iran also did not admit until October 2003 that it also pursued a laser enrichment program beginning in the 1970s, focusing on two techniques.<sup>10</sup>

**Plutonium-Related Activities.** In October 2003 Iran revealed that it had conducted plutonium reprocessing experiments in a hot cell at the Tehran Nuclear Research Center and estimated the amount separated as 200 micrograms. The IAEA calculated that more plutonium would have been produced (about 100g) and Iran admitted

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<sup>8</sup> *Iran*, Report by the Director General, GOV/2004/11, Feb. 24, 2004.

<sup>9</sup> *Iran*, Report by the Director General, GOV/2003/40, June 6, 2003.

<sup>10</sup> “Iran Said To Be Stepping Up Effort to Support Laser Enrichment Program, *Nuclear Fuel*, October 5, 1998.

in May 2004 that it understated the amount. Inspections also revealed that Iran experimented between 1989 and 1993 on irradiating bismuth, which can be used to produce Polonium-210 for civilian purposes (for nuclear batteries) or in conjunction with beryllium to create a neutron initiator for a nuclear weapon. However, polonium, according to many observers, is not ideal for nuclear weapons purposes.

The heavy water program also has raised questions about Iran's intentions. Iran first told the IAEA that it planned to export heavy water, then told the Agency that the heavy water would be used as a coolant and moderator for a planned IR-40 reactor for research and development, radioisotope production, and training. Subsequently, Iran's design information for the facility omitted necessary hot cell equipment for producing radioisotopes, which the Agency asked Iran to clarify, given reports of Iranian efforts to import hot cell equipment. Construction of the heavy water reactor continued into 2005, despite the Board's call for a halt in 2004. The foundation of the reactor has been poured, and the heavy water production plant may soon produce heavy water.<sup>11</sup>

## **Significance for a Nuclear Weapons Program**

Iran is likely years away from producing weapons-grade plutonium or highly enriched uranium. Vice Adm. Jacoby, director of the Defense Intelligence Agency, told the Senate Armed Services Committee in March 2005 that Iran is expected to be able to produce a weapon early next decade. According to one report, the new National Intelligence Estimate on Iran assesses that it will be ten years before Iran has a bomb.<sup>12</sup> That said, Iran has pursued three different methods of enriching uranium and has experimented with separating plutonium, suggesting a steady accrual of expertise in weapons-relevant areas, according to some observers. If Iran received the same nuclear weapon design that A.Q. Khan gave Libya, the remaining technical hurdle (albeit the most difficult) would be fissile material production. A key challenge is verifying that there are no undeclared enrichment facilities or capabilities. Although some NPT members may feel that enhanced inspections under the Additional Protocol will be enough to verify compliance, others feel that access to enrichment and reprocessing technologies must be restricted.

Some observers are concerned about the potential for the Bushehr and the heavy-water-moderated IR-40 reactors to be used for clandestine plutonium production. In addition to IAEA safeguards on these reactors, Iran must also send Bushehr's spent fuel back to Russia for disposal under a 2005 agreement, which according to some observers, could provide further assurances of non-diversion.

## **NPT Compliance Issues**

NPT compliance is, fundamentally, compliance with a safeguards agreement, which is the legal document between the IAEA and a member state. Assessing compliance is rarely black and white; there are myriad opportunities for technical discrepancies that mostly do not rise to the level of noncompliance. Often, a state's willingness to take corrective action weighs heavily in its favor. In the case of Iran, there were clearly many

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<sup>11</sup> For analysis, see [<http://www.isis-online.org/publications/iran/arakconstruction.html>].

<sup>12</sup> "Iran is Judged 10 Years From Nuclear Bomb," *Washington Post*, August 2, 2005.

technical violations, but negotiations have proceeded since 2003 not just with IAEA inspectors and the Board of Governors, but also through an additional route of three European foreign ministers, known as the EU-3. Iran made important concessions, such as signing the Additional Protocol, and agreeing to a voluntary suspension of enrichment and reprocessing-related activities. Some observers would argue, however, that Iran has been free to set the terms of engagement, since its concessions were voluntary and political.

Since October 2003, the foreign ministers of Germany, France, and the UK (EU-3) have negotiated with Iran on restricting its nuclear program in exchange for wide-ranging assistance. Negotiations thus far have failed to obtain Iran's agreement on a key objective — a permanent halt to uranium enrichment activities. In March 2005, Iran proposed running its pilot-scale enrichment facility, which EU-3 negotiators rejected. In April 2005, Iran said it would start-up its uranium conversion plant unless negotiations progressed. A top Iranian negotiator told the press that the EU “would have to offer significant incentives like a deal for 10 nuclear reactors.”<sup>13</sup> Iran demanded a new negotiating proposal by July 31, but the EU-3 delayed, arguing that the incoming Iranian president would be better able to respond in August. On August 1, Iran informed the IAEA it would resume uranium conversion, stating that since uranium conversion was not considered by the IAEA to be enrichment, this would not violate its voluntary suspension.<sup>14</sup>

The EU-3 negotiators approached the Board of Governors in August 2005 to consider referring Iran to the U.N. Security Council. The Board of Governors called on Iran to cooperate once more. However, by September 2005, the Board voted on resolution GOV/2005/77, which found Iran in non-compliance with its safeguards agreement. The resolution is notable for at least two reasons: it did not enjoy a consensus (which is the usual outcome) and it did not immediately refer the issue to the Security Council. Venezuela voted against it and 12 countries abstained from the resolution, which called for Iran again to help resolve outstanding questions.<sup>15</sup> The IAEA Statute requires that once the Board has made a finding of non-compliance, it must report it to the Security Council. The resolution noted that the Board would address “the timing and content of the report required under Article XII.C [of the Statute]”. Although some observers had hoped that the November 2005 Board meeting would address this, it appears that several states on the Board still wish to buy time for a resolution in Vienna, rather than in New York.

The latest IAEA report, GOV/2005/87, found that Iran had provided additional details on some outstanding issues, including what the Khan network provided to Iran, but that the Agency required more assurances that Iran did not conduct an advanced centrifuge (P-2) program between 1995 and 2002. The Agency once again called for Iran's full

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<sup>13</sup> “Iran Seeks Incentives from Europe in Nuclear Impasse,” *New York Times*, May 19, 2005.

<sup>14</sup> INFCIRC/648, *Communication dated 1 August 2005 received from the Permanent Mission of the Islamic Republic of Iran to the Agency*. Available at [<http://www.iaea.org>]

<sup>15</sup> The United States, Australia, Britain, France, Germany, Canada, Argentina, Belgium, Ghana, Ecuador, Hungary, Italy, the Netherlands, Poland, Portugal, Sweden, Slovakia, Japan, Peru, Singapore, South Korea, and India voted for the resolution; Pakistan, Algeria, Yemen, Brazil, China, Mexico, Nigeria, Russia, South Africa, Sri Lanka, Tunisia, and Vietnam abstained, and Venezuela voted against the resolution. “International Consensus Against Iran Fails,” *Tehran Times*, Sept. 25, 2005.

transparency, noting it was indispensable and overdue. Media reports focused on the fact that the Khan network provided Iran with information on uranium casting and machining – two key skills for shaping uranium metal into a nuclear weapon.<sup>16</sup>

Some Iranian media have portrayed the September 24 Board resolution as a victory, indicating that there is no consensus on Iran's noncompliance with the NPT. While few observers are likely to share that overly optimistic assessment, it is unclear how quickly Iran may be referred to the U.N. Security Council, or what action the Security Council might take, given the political divisions on how to proceed forward with Iran's noncompliance. Both Russia and China, which have veto power on the Security Council, abstained from the September 24, 2005 Board of Governors vote. Eventual referral of Iran's noncompliance to the U.N. Security Council raises the question of whether or not international sanctions might be imposed on Iran. A menu of options could<sup>17</sup> include

- Global ban on purchases of Iranian oil or other trade or a ban on international investment in Iran's energy sector.
- Global ban on sales of arms to Iran.
- Enforcement of suspension of uranium-enrichment activities.
- Reductions in diplomatic exchanges with Iran or banning or limiting travel by certain Iranian officials.
- Banning international flights to and from Iran.
- Limiting further lending to Iran by international financial institutions.

Several of these sanctions were imposed for terrorism-related activities in the cases of other states. Whether they would be considered appropriate in the case of Iran's noncompliance with the NPT is unclear. However, shifting the locus of decision-making to the Security Council could mean greater agreement on the need to respond decisively to Iran's noncompliance.

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<sup>16</sup> "Iran 'Hands Over Nuclear Cookbook,'" November 18, 2005, Aljazeera.net

<sup>17</sup> See CRS Report RL32048, *Iran: U.S. Concerns and Policy Responses*, by Kenneth Katzman.