

Nuclear Iran: Not Inevitable

ESSENTIAL BACKGROUND AND RECOMMENDATIONS FOR THE OBAMA ADMINISTRATION

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EXECUTIVE SUMMARY



Iran's nuclear program poses immense challenges to the administration of Barack Obama. The year 2009 will likely mark Iran's development of a nuclear weapons capability. The United States must take a bold and all-encompassing approach to inject new urgency and purpose into what has become a moribund issue. While diplomacy has foundered and existing initiatives have failed to gain traction with either Iran or the wider international community, Iran has moved quickly to solidify its gains in mastering the uranium enrichment process and is now well within striking distance of having a "breakout capability" for a nuclear weapon. Once Iran is perceived as close to possessing nuclear weapons, the region is likely to experience a rash of adverse security consequences. Arab nations might seek their own nuclear weapon capabilities or a separate accommodation with Iran detrimental to U.S. interests. Iran and its allies' status, prestige, and influence will increase, further complicating an already difficult situation. Needless to say, such a capability would threaten Israel's security, exacerbate tensions and undermine efforts to reach negotiated settlements of long-standing conflicts.

The nuclear histories of South Africa and Pakistan, which are examined briefly in Part II, offer some intriguing lessons for the current stalemate with Iran. One is that best-case outcomes, as in the case of South Africa, which ultimately gave up its nuclear weapons, can be achieved with patience, time, and a determination not to yield on the desired outcome. In the case of Iran, the objective is a nuclear energy program but with zero enrichment and reprocessing-related activities on Iranian territory. Pakistan's nuclear history demonstrates the pitfalls of accepting a less than optimal outcome (the United States eventually gave up attempting to end Pakistan's enrichment program in the late 1970s after at one time even considering military action to stop it).

The issue of Iran's nuclear breakout capability is important, and understandably will be the media headline when achieved, however it is measured. But the administration must not allow the breakout issue to set the timetable for the diplomatic process or define the issue entirely as a debate about the need for a quick victory over Iran on the issue of enrichment. Otherwise, decision makers are left with a dangerous binary choice between either acquiescence to Iran or the use of military force to defeat its nuclear program—neither is an acceptable outcome.

ISIS's roadmap contains nine elements:

- 1) **Increase sanctions:** Expanding and better targeting sanctions against Iran is necessary at least in the near term. Existing sanctions adopted by the United Nations Security Council have targeted a few Iranian financial institutions, along with individuals and entities associated with Iran's missile and nuclear programs. Iran's failure to comply with the UN Security Council's resolutions calls for a new round of sanctions, including targeting Iran's oil and gas sector, in particular the gasoline imports on which Iran has come to depend. (In a positive development, Reliance Industries of India recently announced that it would not renew contracts to sell to Iran). As a first step, the Obama administration should ask all of Iran's gasoline suppliers to stop their sales to Iran, followed by an initiative to seek agreement among supplier nations not to provide Iran gasoline. Another priority is stopping Iran's acquisition of dual-use goods for its uranium enrichment and Arak heavy water reactor projects.
- 2) **Hold direct talks:** The United States should immediately offer Iran the prospect of direct negotiations. The reluctance of the United States until now to speak directly with Iran absent a series of preconditions has undermined the diplomatic process led by the European Union. Talks with Iran should be held initially without the precondition that Iran suspend its uranium enrichment program. A model for this approach was the recent "freeze for freeze" initiative that allowed for face-saving pre-negotiations among the parties. (This proposal is summarized in Appendix I). In the negotiations, the U.S. goal should remain an Iran free of uranium enrichment and reprocessing-related activities on its territory.
- 3) **Recommit to incentive package:** The European Union's June 2008 offer to Iran, to which the United States signed on, contained important incentives for Iran to develop a full nuclear power industry, including long-term, legally binding fuel assurances. While both the 2008 and earlier June 2006 offers contain generous provisions, the United States should be open to re-examining proposed incentives with an eye to Iran's current economic and security needs.
- 4) **Seek improved transparency from Iran:** Iran is currently abiding by narrow and outdated interpretations of its safeguards obligations with the International Atomic Energy Agency (IAEA). As a part of any negotiation, an early objective should be Iran's adherence to the Additional Protocol and the clarification of outstanding questions raised in documents indicating Iran's research into nuclear weaponization and other military dimensions of its program. Two related issues concern Iran's refusal to allow the IAEA to implement effectively even the weaker, traditional safeguards arrangement. Iran needs to permit camera-based monitoring at its nuclear facilities, and abide by a universally accepted safeguards revision and declare the construction of new nuclear facilities prior to the start of construction.
- 5) **Take steps toward diplomatic relations:** The Bush Administration put its toe in the water of opening a U.S. interests section in Tehran. This is the obvious first step but should not be the last. Clearly, the issue of full diplomatic ties is wrapped up with a series of issues unrelated to the nuclear one, but the U.S. commitment to working toward this goal in a deliberate way must be made clear to Iran's leadership. Another important

first step is for the State Department to allow and encourage direct contacts between U.S. and Iranian diplomats both in Tehran and abroad.

- 6) **Engage Russia and China:** Both countries have political and economic leverage over Iran that they have not been willing to engage under the Bush Administration. This can and should change, though it will be an uphill struggle. The larger issue is that real progress with Iran will be far easier with the full commitment of these regional powers. Engaging them early and in a positive way is critical.
- 7) **Support regional arms control and security arrangements:** The United States should make a priority the establishment of a nuclear weapons free zone in the Middle East. Where previously lip service, at best, was paid to the objectives of regional security, confidence building and arms control measures, now is the time to demonstrate a renewed commitment to the issues that are often cited by Iran as reason to pursue development of the full nuclear fuel cycle. Progress will not come quickly, but it is essential for the United States to demonstrate in a credible way that it is committed to issues such as ratification of the Comprehensive Test Ban Treaty (by both Iran and the United States), a verifiable Fissile Material Cut-off Treaty, and real progress toward implementation of Article VI of the NPT.
- 8) **Establish regional constraints on nuclear energy:** While focus is on Iran's nuclear program, it is vital that the wider Middle East region not proceed to develop a nuclear energy industry complete with enrichment and reprocessing capabilities, which could provide a civilian cover for nuclear weapons ambitions and significantly complicate establishing a nuclear weapon free zone in the Middle East. A voluntary moratorium on civil reprocessing and enrichment in the region, fuel assurances and spent-fuel take back arrangements, and the establishment of a new norm not to supply nuclear reactors without the Additional Protocol in place are all necessary. The Nuclear Suppliers Group should also agree to refuse sales of enrichment and reprocessing technologies in the region.
- 9) **Oppose a military solution:** The use of military force will not achieve the goal of eliminating or significantly delaying Iran's nuclear ambitions. Rather, it stands to drive underground a program that is already lacking in sufficient transparency, and possibly speed Iran's acquisition of the bomb. It is vital that decision makers remain committed to the objective of an enrichment and reprocessing-free Iran aware that the road to that goal is likely to be a long one, and that the promise of military force is illusory.

The Obama administration is well-positioned to launch a successful effort to solve the Iran nuclear issue. But if Iran persists on its current course, the United States should ensure that Iran grows more isolated. It should focus its policies and actions on convincing Iran, much like the apartheid South African government, that its true course lays elsewhere.

INTRODUCTION

Few foreign policy and national security issues have dominated debate in the United States and abroad as Iran's nuclear program has. Is its declared civil uranium enrichment program a cover for an effort to secretly build nuclear weapons? What should be done to stop Iran from developing a capability to build nuclear weapons?

Most experts agree that a nuclear-armed Iran would pose real risks to stability and security in the region, if not lead to war between Iran and either its Arab neighbors or Israel. The challenge of how to contain and roll back Iran's developing nuclear weapon capability has confounded policy makers and international diplomats, who have passed now five United Nations Security Council resolutions calling on Iran to forgo its uranium enrichment efforts. The stakes could not be higher. Initially, the Bush administration rebuffed overtures from Iran and snubbed European negotiations when they began in late 2003. Only later did it seek to engage Iran via the European Union-led process, but precious years were lost. Iran no longer felt as vulnerable to U.S. military and economic pressures, and its enrichment facilities had grown far more advanced.

Today, the diplomatic process is moribund as Iran gradually improves and expands its uranium enrichment efforts, and troubling suspicions remain about its ultimate intentions.

The Obama administration faces a formidable and urgent challenge to sculpt a policy that can convince Iran to abandon or defer a nuclear weapons capability. This report seeks to answer several key questions about how much Iran has

achieved. It also offers a roadmap for resolving the nuclear issue both peacefully and in a manner that would redirect Iran away from proliferation-sensitive parts of the fuel cycle, in particular uranium enrichment, while strengthening



AP Photo

international monitoring of its nuclear capabilities. Part I of this report contains an overview of Iran's uranium enrichment program with

an emphasis on questions related to Iran's nuclear weapons capability, including when it might achieve such a capability and the state of evidence suggesting research and development of a weapons program. Part II looks to the recent nuclear histories of Pakistan and South Africa as possible futures for Iran's nuclear program and draws out key lessons from those experiences. Part III offers a detailed set of recommendations and specific steps that the incoming administration should consider as it seeks to confront the specific challenges posed by Iran's nuclear program in a wider context of competing regional political and security concerns. President Barack Obama stated his intention to negotiate with Iran. Any negotiations with Iran over this highly complex issue are likely to be lengthy and should not be rushed by imposing arbitrary fixed time lines for negotiations. At the same time, Iran must not use the negotiations to stall for time as it expands its nuclear weapons capabilities. A new strategy should go beyond mere negotiation and include a plan to increase pressure on Iran to comply with its

obligations under United Nations Security Council resolutions. This approach should include a renewed focus on imposing sanctions on Iran, if military options are to be avoided as they should be. Below we discuss further how and why this approach should be pursued.

PART I - HOW FAR HAS IRAN COME?

As of early November 2008, Iran was operating approximately 3,800 P1 centrifuges at the Natanz Fuel Enrichment plant (FEP). Another 2,100 P1 centrifuges were expected to start soon, bringing the total operational amount to almost 6,000 centrifuges.

Iran told the International Atomic Energy Agency (IAEA) that it intends to start installation of a third module of 3,000 P1 centrifuges at FEP at the beginning of 2009. Iran is also preparing other areas of the FEP for the installation of two more modules of centrifuges. Construction activity is in its early stages, and according to the senior IAEA official, the Agency does not know whether Iran intends to install more P1 centrifuges or a more advanced centrifuge in these modules. But if completed, Iran would have a total of 15,000 centrifuges. Since February 2007, when enrichment activity shifted from the pilot-scale facility at Natanz to the larger, underground centrifuge plant, Iran has introduced more than 9,750 kilograms of uranium hexafluoride into the cascades at the FEP, yielding a total of 630 kilograms of low enriched uranium hexafluoride.

To give a sense of how much (or little) uranium this is, if Iran sought to fuel the Bushehr nuclear power reactor for one year, it would need to produce

approximately 37 tonnes (37,000 kg) of low enriched uranium (LEU) hexafluoride annually, or about 60 times more annually than its current total LEU production. Iran's centrifuge enrichment capacity is thus still far short of this capacity; it would need about 50,000 well-functioning P1 centrifuges to satisfy that annual requirement. If however, Iran is seeking to establish the capability to produce enough weapon-grade uranium for a nuclear weapon, its current centrifuge program is more than adequate. With 6,000 P1

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centrifuges, operating at current levels, Iran could produce enough weapon-grade uranium for one or two nuclear weapons per year.

In the past, Iran experienced difficulties in running its P-1 centrifuge cascades, encountering a high rate of centrifuge breakage and instability in their operation. These problems resulted in a lower than expected output of LEU. Iran now appears to have overcome these problems, as reflected in the increased uranium hexafluoride feed rates and LEU production.

Iran's centrifuges now appear to be operating at close to or at their stated, albeit modest, target capacity, a significant

increase over previous rates. IAEA officials in September stated that the cascades are operating at near-capacity and producing LEU at a rate of about 2.5 kilograms per day of low enriched uranium hexafluoride. The reported rate in early November was slightly lower but still far above initial rates. Iran could make further improvements in P1 centrifuge operation. Its stated goals are lower than the enrichment levels achieved with this type of centrifuge by Pakistan and earlier by the Netherlands, the original owner of this design.

Next generation centrifuge designs in testing phase

At the Natanz Pilot Fuel Enrichment Plant (PFEP), Iran has installed a small number of two or three types of next-generation centrifuges: the IR-2, the IR-3, and possibly a longer centrifuge. These centrifuges are expected to have greater enrichment output and perform better in operation than the P1 centrifuges. Iran has significantly increased the feed rate into its IR-2 centrifuges during the second half of 2008. This development appears to reflect Iran's goal to develop a more advanced centrifuge, which could replace the less efficient P1 centrifuges. We do not know how long Iran intends to test these new designs or when they could be deployed in large numbers in the underground halls.

Significant stocks of uranium hexafluoride

Iran has successfully produced relatively large quantities of uranium hexafluoride, although the size of these stocks depends on one's perspective. Since production began in earnest at Esfahan's uranium conversion facility in June 2006, Iran has produced some 350 tonnes of uranium in

the form of uranium hexafluoride, using only 9.8 tonnes of this uranium hexafluoride at Natanz. If Iran were to provide enriched uranium for the Bushehr reactor, it would need to produce over 250 tonnes of uranium hexafluoride each year. To accomplish this level of production on a regular basis, Iran would also need to significantly expand its mining of uranium (or acquisition of uranium yellowcake from abroad). Currently, Iran does not mine enough uranium to meet this annual requirement, and, given the UN Security Council resolutions, cannot rely on purchasing uranium from overseas.

From the perspective of nuclear weapons, its existing stock of uranium hexafluoride is enormous. Given that between five and ten tonnes of uranium in the form of uranium hexafluoride are needed to feed into cascades to make enough HEU for a nuclear weapon, Iran has accumulated enough uranium hexafluoride for over 35 nuclear weapons. All of the uranium hexafluoride is safeguarded by the IAEA.

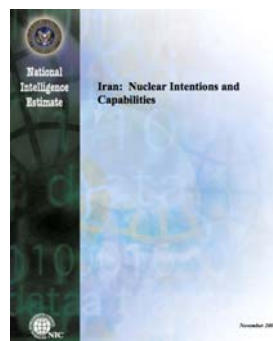
Is Iran developing nuclear weapons?

In December 2007, the intelligence community published the key findings of a

[National Intelligence Estimate \(NIE\)](#) on

Iran that concluded with "high confidence" that "Iranian military entities were working under government direction to develop

nuclear weapons" but "in fall 2003, Tehran halted its nuclear weapons program." The



NIE defined what is commonly called “weaponization” as becoming proficient in the actual construction of a nuclear weapon, assuming that enough nuclear explosive material is already available. The same report judged with “moderate confidence” that the “earliest possible date Iran would be technically capable of producing enough HEU for a weapon is late 2009, but that this is very unlikely,” and it “probably would be technically capable of producing enough HEU for a weapon sometime during the 2010-2015 time frame.” The report also assessed with “high confidence” that “Iran has the scientific, technical and industrial capacity eventually to produce nuclear weapons if it decides to do so.”

What is the evidence?

The unclassified portion of the NIE did not present evidence for its conclusions. However, the IAEA has investigated this issue and provided troubling corroborating evidence that until 2003 Iran undertook research and development into key parts of

weaponization. According to several IAEA safeguards reports on Iran, in particular those from February and May of 2008, Iran has undertaken research into the development and testing of high voltage detonator firing equipment and the simultaneous firing of multiple explosive bridgewire detonators. The IAEA is in possession of [documents](#) regarding the “testing of at least one full scale ‘hemispherical, converging, explosively

driven shock system’ applicable to an implosion-type nuclear device” and documents that show Iran has worked on the “redesign of the inner cone of the Shahab-3 missile re-entry vehicle to accommodate a nuclear warhead.” In all, the IAEA has listed some 18 documents detailed in the May 2008 IAEA report, hyperlinked above, that reflect such research, dating into early 2004.

Iran has insisted repeatedly that these documents are forgeries and denies ever having undertaken any weapons-related research, even during the height of the Iran-Iraq war in the 1980s. This issue remains one of the most significant areas of disagreement and outstanding questions between the IAEA and Iran. It is vital that Iran address the IAEA’s questions about its weaponization-related work before any long-term agreement is reached about the status of its sensitive fuel cycle facilities.

There is far less public evidence about renewed nuclear weaponization activities since 2003. The

NIE judged with “moderate confidence Tehran had not restarted its nuclear weapons program as of mid 2007.” But detecting the resumption of such activity is enormously difficult, particularly if because of past exposures Iran has tightened its security over these efforts. It is well aware that any credible leak of information about ongoing nuclear weaponization work would be a “smoking gun” that would significantly erode Iran’s support worldwide. This

Weaponization is unlikely to be a significant bottleneck in any nuclear weapons effort Iran may launch. The most important constraint remains the production of enough highly enriched uranium or separated plutonium for nuclear weapons.

assessment also presupposes that the intelligence community can judge Iran's progress on weaponization authoritatively. In the worst case, Iranian weapons experts may have satisfied their leadership that they can make a nuclear weapon, following a decision to do so. In this case, halting work in 2003 would not cause a significant delay in actually building a nuclear weapon at the appropriate time, once Iran had accumulated enough highly enriched uranium and made a decision to build nuclear weapons. Because of these considerations, weaponization is unlikely to be a significant bottleneck in any nuclear weapons effort Iran may launch. The most important constraint remains the production of enough highly enriched uranium or separated plutonium for nuclear weapons.

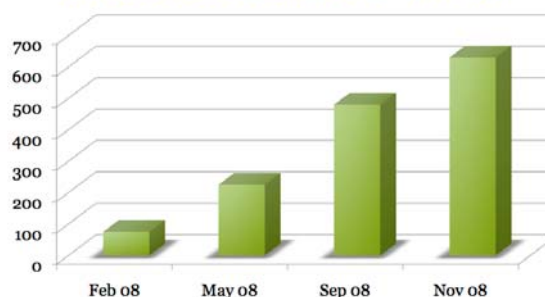
What are Iran's likely potential paths to the bomb?

Iran's faces several challenges in any effort to accumulate enough highly enriched uranium for a nuclear weapon. Although it appears to be on a path to overcoming technical obstacles to producing sufficient quantities of highly enriched uranium, it would likely want to produce highly enriched uranium in secret and quickly. If Iran starts to produce highly enriched uranium, and the international community learns of it, Iran would likely face severe and near immediate international responses, including military attacks of key nuclear sites.

This consideration favors Iranian options that do not directly involve the main Natanz enrichment plant (which despite being underground is vulnerable to military strikes), but would allow Iran to build-up capabilities to make nuclear explosive

material quickly, in theory before the international community could respond. Two key, interrelated options include the construction of a covert enrichment plant and the development of a "break-out" capability. Both of these options would leave IAEA safeguards in place, although in their current weakened form, which are based on a traditional inspection agreement that unduly limits access to sites and information and is recognized as inadequate to provide assurance that a country does not have undeclared materials and facilities. For the foreseeable future,

Low enriched uranium hexafluoride product at Natanz FEP (in kg)



Iran may decide to seek only a break-out capability, possibly accompanied by a largely hidden centrifuge complex, knowing that it could quickly produce weapon-grade uranium and weaponize it.

Once Iran is perceived as being on a threshold just short of actual possession of nuclear weapons, the region could experience a rash of adverse security consequences, including a wave of Arab nations seeking their own nuclear weapons capabilities. A threshold capability would bolster Iran's and its allies' status, prestige, and influence regionally and internationally, while demonstrating U.S. and Western weakness in failing to stop Iran's nuclear progress. Finally, such a capability could

weaken Israel's security.

At some point, Iran may overtly decide to cross the threshold and actually build and deploy nuclear weapons. This situation would undoubtedly be more dangerous and destabilizing, and it could lead to the actual use of nuclear weapons.

In this case, Iran would of course legally withdraw from the Nuclear Non-Proliferation Treaty (NPT), likely citing the treaty's clause that "extraordinary events ...have jeopardized the supreme interests of its country."

When will Iran achieve a breakout capability?

A key benchmark of a break-out capability is when Iran accumulates sufficient low enriched uranium to have the capability to produce quickly weapon-grade uranium for a nuclear weapon. In this case, Iran would use the LEU as feed into existing centrifuges, likely at a secret centrifuge plant, dramatically shortening the time to produce weapon-grade uranium. It is generally assumed that the IAEA would determine quickly that Iran had diverted LEU. However, the reality might be different. Using some pretext, possibly defensible under the weakened inspection rules Iran has demanded, Iran may delay the inspectors' access to the underground enrichment plant where the LEU is stored, complicating any IAEA determination about the status of the LEU.

Under a wide variety of scenarios, Iran is moving steadily toward a break-out capability and is expected to reach that milestone during the first half of 2009.

ISIS has estimated that about 700-800 kilograms of LEU (where the mass refers to total uranium (U) and the average enrichment level is four percent) would give Iran the capability to produce enough weapon-grade uranium for a nuclear weapon. In terms of uranium hexafluoride

mass, 700-800 kilograms of LEU corresponds to about 1,030-1,180 kilograms of low enriched uranium hexafluoride. Given about 630 kilograms of low enriched uranium hexafluoride in November 2008, comprised of 435 kilograms of LEU (uranium mass), Iran appears to need at least another few

months to accumulate enough low enriched uranium to have a break-out capability.

Some experts believe ISIS's estimate of 700-800 kilograms of LEU (mass of U) is too low to signify a break-out capability. One Western government expert believes that the minimum value should be 900 kilograms of LEU (mass of U), given the expected large losses Iran might encounter during enrichment to highly enriched uranium. A senior official close to the IAEA in September 2008 placed that value at over 1,000 kilograms. Others argue that Iran would want enough LEU for two or three nuclear weapons before it could be said to have a break-out capability. A 900 kilogram estimate would delay the date of Iran achieving a nuclear weapons capability by only one or two months. The other estimates would add months to that date.

Despite differences among experts over how “break-out” is defined, the estimate of 700-800 kilograms of LEU represents a level of accomplishment that would permit Iran with a good chance of success to produce

How widespread is uranium enrichment? Not very.

There are currently 439 power reactors operating in 31 countries, most in the United States, Western Europe, Japan, Korea, Russia, and Ukraine

Only 8 countries (including one consortium) provide commercial enrichment services: Russia, France, U.S., UK, China, Japan and Urenco (a British-Dutch-German venture). Pakistan and India enrich for domestic military consumption; Brazil has launched a small commercial enrichment program.

enough weapon-grade uranium to fashion a crude nuclear weapon, small enough to fit on a ballistic missile. Smaller quantities of LEU might be enough for a nuclear weapon, but they might also overestimate Iran’s ability to produce such a nuclear weapon. Quantities greater than 1,000 kilograms appear overly conservative about Iranian capabilities or assume a definition of break-out as requiring more than one weapon’s worth of LEU. The latter also assumes knowledge about Iranian intentions and capabilities that cannot be determined with any degree of certainty. Because of the cumulative effect of weakened inspections, for example, growing uncertainties about Iran’s gas centrifuge capabilities make it hard to determine whether Iran could assemble secretly a capability large enough to both enrich LEU to weapon-grade and

have enough additional centrifuges to produce significant quantities of weapon-grade uranium from natural uranium. Faced with these uncertainties, a more technically defensible approach is to focus on the amount of LEU needed to make one nuclear weapon. In any case, under a wide variety of scenarios, Iran is moving steadily toward a break-out capability and is expected to reach that milestone during the first half of 2009.

Why the Additional Protocol and other transparency measures are so important

Iran’s current lack of transparency over its nuclear program heightens suspicions and makes it impossible for the IAEA to provide credible assurance of the absence of undeclared material and activities. A missing piece is Iran’s adherence to the Additional Protocol, an advanced inspection arrangement. If Iran were adhering to the Additional Protocol, it would face many more hurdles in hiding a secret uranium enrichment plant.

Under pressure from the international community and faced with IAEA exposure of numerous violations of its commitments under its safeguard obligations, Iran initially agreed in 2003 to abide by the Additional Protocol; in early 2006 it withdrew that commitment. Since then, the IAEA has not had enough authority to ensure that Iran does not have hidden nuclear activities or materials. Traditional safeguards are not adequate to detect countries conducting secret plutonium separation or enrichment efforts. Iran has not been the only country to exploit the vulnerabilities of traditional safeguards. Iraq, Syria and Libya have all evaded detection of their clandestine

nuclear programs under traditional inspections. In the case of Libya, part of its evasion strategy was to refuse to accept the more intrusive inspections embodied in the Additional Protocol. Without the Additional Protocol and in some cases additional transparency measures in place, the IAEA cannot provide adequate assurances that a country's nuclear energy program is purely civilian in nature.

Under its current safeguards agreement, Iran is not required to share with the IAEA its centrifuge research and development work or details about centrifuge manufacturing. If Iran were observing the Additional Protocol, the IAEA would have access to important parts of such information and the right to visit manufacturing sites. The IAEA's lack of such information has created large uncertainties in assessing the scope and direction of Iran's enrichment program. This is one reason Iran is capable of building a secret gas centrifuge plant with little risk of detection and with no violation of its minimal safeguards obligations.

In its reporting, the IAEA also highlights the need for Iran to provide additional transparency in areas that may not be addressed explicitly by either the Additional Protocol or its traditional safeguards agreement. The IAEA's April 2006 report notes, for example, that "progress ...requires full transparency and active cooperation by Iran — transparency that goes beyond the measures prescribed in the Safeguards Agreement and Additional Protocol — if the Agency is to be able to understand fully the twenty years of undeclared nuclear activities by Iran." Such transparency measures include access to additional documentation, sites, and

scientific personnel.

The "Subsidiary Arrangement" loophole:

Iranian officials often note that under their traditional safeguards agreement with the IAEA, Iran is obligated only to disclose nuclear activities six months prior to the introduction of nuclear material into a facility. This is a reference to Article 42 of Iran's safeguards agreement, and to a secondary document known as a "subsidiary arrangement." Language in the Subsidiary Arrangement requires notice to the IAEA of new facilities "no later than 180 days before the introduction of nuclear material into the facility." Iran used this loophole to justify its refusal to reveal the construction of the Natanz facilities for uranium enrichment after the site was publicly revealed in the fall of 2002.

In 1992, the IAEA Board of Governors called on member states to accept an updated Subsidiary Arrangement, which would require advanced notice when the decision to construct or modify nuclear facilities is made. Iran was the last non-nuclear weapon state member of the Nuclear Non-Proliferation Treaty to agree to the revised Subsidiary Arrangement on February 26, 2003, thereby closing a potential loophole for the construction of fuel cycle-related facilities outside of IAEA safeguards. However, Iran's announcement in 2007 that it would revert to the 1970s-era Subsidiary Arrangement seriously curtails the IAEA's ability to monitor Iran's construction of new facilities.

PART II - THE PAKISTAN AND SOUTH AFRICA NUCLEAR PATHS: WHICH WILL IRAN FOLLOW?

Not so long ago, South Africa gave up its nuclear weapons and joined the international community as a staunch advocate of nuclear disarmament and nonproliferation. By contrast, Pakistan, which began its nuclear weapons program in the early 1970s along with South Africa, continues to expand its weapons facilities.

As we know, several of its program's leaders dangerously proliferated equipment, know-how and weapons designs to Iran, Libya, and North Korea. Two Pakistani nuclear scientists even sat around a campfire with Osama Bin Laden discussing how to make nuclear weapons.

Analogies should not be over-stretched, but a brief review of how the international community responded to their respective nuclear programs offers some intriguing lessons for the current stalemate with Iran.

In 1989, newly elected President F.W. De Klerk decided that in order for South Africa to end its international isolation it must give up both its oppressive system of apartheid and its nuclear arsenal, which included a mix of deliverable nuclear weapons and test

devices. By 1991 it signed the Nuclear Non-Proliferation Treaty (NPT) and after two years of intensive inspections, the IAEA declared that South Africa had dismantled its nuclear weapons and associated



The H2 (Raptor) glide bomb, developed by South Africa, was its primary nuclear weapons delivery system. 60 km range.

facilities. The arc of South Africa's nuclear weapons program lasted approximately two decades—taking off in 1970 with the decision to build a uranium enrichment plant to produce highly enriched uranium for nuclear weapons in secret, leading to the construction of sophisticated deliverable nuclear weapons throughout the 1980s, and ending when the weight of international isolation grew too enormous. Propelled jointly by worldwide opposition to its nuclear weapons and revulsion to apartheid policies, the de Klerk regime had little choice but to abandon its nuclear weapons program. Its decision was helped by successful U.S. efforts to broker an end to the military conflicts in Southern Africa, which had been backed by the Soviet Union and that had fueled South Africa's justification for nuclear weapons.

In Pakistan, the narrative is driven by a rivalry with India, the patronage of China, and the U.S. need for Pakistan's support in a war first against the Soviet occupation of

Afghanistan and now in the war on terror. In Pakistan as in South Africa, a nuclear weapons program was launched in secret in the early 1970s. Today, Pakistan has a large enrichment program dedicated to the production of highly enriched uranium for nuclear weapons. In the 1970s, Pakistan's nuclear program was initially underestimated by U.S. intelligence, which



Kahuta gas enrichment facility, October 19 2005;
Image credit Digital Globe-ISIS

doubted Pakistan could ever build a gas centrifuge plant and believed it would depend instead on importing a reprocessing plant to separate plutonium for nuclear weapons. To the surprise of U.S. officials, just after convincing France not to sell Pakistan a reprocessing plant in the summer of 1978, they learned that A.Q. Khan was building a secret centrifuge plant near Kahuta using purloined plans from the Netherlands and wide scale assistance from Western suppliers. Desperate to stop Khan, U.S. officials even considered bombing the Kahuta plant, but after the Soviet Union invaded Afghanistan in 1979, the United

States essentially gave up trying to end Pakistan's uranium enrichment program and accepted its existence. Along the way, courageous voices in the U.S. government and nonproliferation community tried to be heard over the din of great power politics with little success. U.S. officials eventually persuaded Pakistan to cap its uranium enrichment, gaining its commitment to producing only low enriched uranium-- well after it had enough highly enriched uranium for its first weapons. But after Pakistan tested nuclear weapons in May 1998, in response to India's tests, it ended its freeze on uranium enrichment and broke out, quickly enriching the low enriched material to weapons-grade and dramatically expanding the size of its nuclear arsenal.

What does this mean for Iran? One lesson is that once the goalposts are set that enrichment is acceptable, as in the case of Pakistan—it is near impossible to move them. Promises to limit enrichment to peaceful purposes are unlikely to mean much if security concerns remain overpowering or if prestige and national pride are dominant themes. On the other hand, consistently applied international pressure, as in the case of South Africa, can in fact be effective in changing behavior but can require time and perseverance. Throughout the history of South Africa's nuclear weapons program, the United States moved to both contain the threats posed by South African nuclear weapons and reduce the underlying motivations to have them.

Another lesson from the South Africa paradigm is that the binary choice with which some experts now present the Iran dilemma—capitulation or military strikes—is particularly counterproductive and

overdue for a jolt of new thinking. The following recommendations highlight the fact that this binary choice between capitulation or military strikes is not an accurate portrayal of the options available to stem Iran's nuclear program. There are in fact many different tools at hand which can be used.

PART III- ROADMAP AND ELEMENTS OF A SOLUTION

The United States should continue to insist that Iran relinquish its uranium enrichment program, stop construction of the Arak heavy water reactor, and accept adequate IAEA verification. The United States should also pursue additional sanctions because of Iran's refusal to abide by the calls of the U.N. Security Council to suspend its sensitive nuclear activities. Applied both through the Security Council and other multilateral agreements, sanctions are the most effective way to sustain pressure on Iran's economy while communicating the message that its nuclear weapons capability is unacceptable. Sanctions make stark the choices that Iran faces.

But sanctions must not drown out the need for sustained, direct dialogue with Iran based on mutual respect. Any strategy should emphasize both multilateral and bilateral negotiations with Iran on the nuclear issue. The existing framework, involving Britain, France, Germany, China,

Russia, the United States, referred to as the "EU3+3", should be preserved and extended. In parallel, the United States should sit down directly with Iran to discuss the nuclear issue. In addition, it should launch several other initiatives to reduce the danger posed by Iran's growing nuclear weapons capability. **The following are specific steps or initiatives that should be embraced by the United States.**

Increase Sanctions

In the absence of Iranian suspension of its enrichment program, the Obama administration should seek significantly strengthened sanctions against Iran. In the short-term, they provide a relatively low-cost way to increase pressure on Iran to reconsider its options.

Thus far, sanctions have had a mixed record of success in Iran's case. According to a [December 2007 report](#) by the U.S. General Accounting Office, Iran's role as a leading energy supplier limited the ability of the United States to "isolate Iran and pressure it to reduce proliferation and support for terrorism." There can be no question that Iran poses unique challenges for identifying and adopting effective sanctions.

Contrary to popular perceptions that the sanctions currently in force have had little impact, some evidence suggests that Iran is in fact increasingly feeling the effects of sanctions. International financial constraints have likely exacerbated its high unemployment and high inflation rate, which now stands at 30 percent. Its oil and gas industry continues to face shortages for spare parts and long-deferred investment in infrastructure. A November 13, 2008 *Wall Street Journal* [op-ed](#) by Orde Kittrie cites a recent petition signed by top Iranian

economists calling on the regime to abandon its "tension creating" foreign policy which has "scared off foreign investment and inflicted heavy damage on the economy" by forcing the use of expensive middlemen for imports and exports.

Higher energy prices once made the costs of many banking and financial sanctions tolerable to Iran. Under the current global financial crisis, however, this has already begun to change. If oil prices remain low for a sustained period of time, the impact on Iran's oil and gas industry would affect its wider economy to a point where sanctions would have a significantly greater effect.

Additional sanctions currently under consideration would build on efforts to freeze Iranian assets and restrict the movement of senior officials. The United States, Britain, France, Germany, and Italy are also cooperating on a range of nationally-imposed sanctions that include reaching out to the banking, insurance, and energy sectors to warn them of the high costs and penalties of business with Iran. This approach should aim at not only more forcefully implementing existing sanctions but also discouraging future business with Iran.

Several experts have pointed out that Iran's energy sector remains vulnerable to curbs on its gasoline imports. Iran is believed to import 40 percent of its gasoline because of shortfalls in its refining capacity, much of this supplied by a small number of firms (India's Reliance Industries, under pressure from the Export-Import Bank recently announced it would halt exports once current contracts were fulfilled). A

potentially powerful sanction would be to target those companies selling gasoline to Iran. These sanctions would not be an easy sell, and they are not without controversy, but they stand to drive home clearly the high cost of Iran maintaining the status quo. A first step is for the United States to simply ask these companies to stop selling Iran gasoline. This could be accompanied by seeking agreement among supplier nations not to sell Iran gasoline. A critical element of this action is persuading Russia and China to support such sanctions in particular as a means of pressing Iran to start serious negotiations aimed at resolving the nuclear question.

Stop Illicit Trade: Another priority is stopping or slowing Iran's acquisition of dual-use materials, equipment, and components for its sensitive nuclear programs, including its uranium enrichment and Arak heavy water reactor programs. Iran has a continuing need for a range of items and it operates sophisticated international smuggling networks aimed at acquiring these items overseas. An important aspect of the U.N. Security Council resolutions is their emphasis on stopping Iran's illicit nuclear procurement. Countries could do more domestically to stop this trade. Even today some countries, including Malaysia, are without effective export controls laws, making them targets for Iranian smuggling operations. China and India need to improve their implementation of export controls. Countries of transit concern, such as the United Arab Emirates should take more action to stop the misuse of their countries by Iran to acquire dual-use items for its nuclear programs.

The United States needs to review its own practices to ensure that it has the most

effective approach to detecting and thwarting Iranian illicit nuclear and nuclear-related procurements. The recent U.S. emphasis on a punitive approach with companies, which imposes large fines and other penalties on businesses violating export control laws has been necessary to increase company compliance with existing laws. However, the pendulum has swung too far to the punitive side, particularly against responsible companies who have committed accidental breaches of the law. Doing so has had a chilling effect on any fruitful information-sharing relationship between government and industry on potential Iranian procurement schemes. The United States should institute more cooperative approaches with both responsible companies and other governments that can lead to more prompt detection of illicit nuclear trade and more effective strategies to stop such trade before a supplier ships any items.

Hold Direct Talks

One of the most important Obama administration commitments is to negotiate directly with Iran. In pursuing this initiative, the United States should remain an active member of the EU3+3 negotiations. A useful model is the Six Party Talks involving North Korea.

The United States should also step up its discussions on these issues with the Gulf States and other affected Arab states, which have increasingly expressed concern about Iran's nuclear progress. The risk is that some of these states may view negotiations with Iran negatively, perhaps as an implicit acceptance of Iran's nuclear capability, leading them to either make a separate accommodation with Iran or

develop their own nuclear weapons capabilities.

Negotiations should be held initially without the precondition that Iran suspend its uranium enrichment program. A model for this approach was the recent "freeze for freeze" initiative that allowed for face-saving pre-negotiations among the parties. (This proposal is summarized in Appendix I). In exchange for a freeze on further sanctions, Iran would refrain from new nuclear activity, including the installation of additional centrifuges. Iran reportedly rejected this negotiating approach. It wanted more concessions on sanctions, and it refused to consider stopping its enrichment program, a step necessary to move from pre-negotiations to full negotiations.

In the event that Iran agrees to suspend its enrichment program and agrees to adequate IAEA verification steps, the United States should support the suspension of discussion of Iran's nuclear program at the U.N. Security Council and the implementation of relevant measures adopted under U.N. Security Council resolutions.

The U.S. goal in negotiations should be an Iranian deferral of any uranium enrichment plants or enrichment-related activities on its soil, the further construction of the Arak heavy water reactor, and any reprocessing or reprocessing-related activities. Such deferrals should be negotiated in the context of achieving a region free of enrichment and reprocessing (see below).

Recommit to an Incentive Package

In June 2006, the EU-3 offered Iran a broad incentive package that included assistance to build a significant number of nuclear power reactors, long-term, legally-binding assurances of fuel supply, and a range of other economic, political, energy, agricultural, environmental, and security measures. This package, with the additional endorsement of the United States, China, and Russia, was re-offered to Iran in June 2008. In case it did not like this package, Iran was invited to suggest its own proposals.

The United States should renew its commitment to offer help to Iran in building advanced light-water reactors that would provide power to Iran's grid, freeing Iran to expand export of its natural gas and petroleum (the economic rationality of developing a nuclear energy program rather than investing in a long-neglected oil and gas infrastructure would be left for Iran to justify to its populace). During the negotiations, the United States should be open to re-examining the incentives package, fine-tuning it to better suit Iran's current economic, political, and security situation.

Improve Transparency

The IAEA can provide the necessary transparency of Iran's nuclear program but only if Iran makes important changes in its relationship with the IAEA. As part of these initiatives, Iran should:

Adhere to the Additional Protocol:

Iran's adherence to the IAEA's Additional Protocol, effectively a commitment to enhanced inspections and reporting requirements, is the most important step in

creating an adequate transparency regime. As important as ratifying the Additional Protocol is Iran's full cooperation with the IAEA in implementing it.

Clarify outstanding questions: Iran continues to insist that documents, called "alleged studies," implicating Iran in nuclear weaponization research are fraudulent. The IAEA finds them credible and has been seeking Iran's cooperation in addressing the matter. If Iran continues to assert that the documents are forgeries, it should provide adequate cooperation with the IAEA to substantiate this claim. In addition, there are a range of other questions associated with Iranian military organizations that remain unanswered due to Iranian non-cooperation.

Adhere to the updated Subsidiary

Arrangement: In April 2007, Iran informed the IAEA that it would no longer adhere to the revised Subsidiary Arrangement under which Iran was obligated to inform the IAEA of new nuclear facilities when they were in the design phase and before the start of construction. Iran must agree to adhere to the updated arrangement.

Allow remote camera-based

monitoring: The IAEA had initially sought to install a remote camera-based monitoring system at the Natanz Fuel Enrichment Plant on grounds that no-notice inspections would be difficult, if not impossible, in a country in which the IAEA maintains no continuous presence and to which travel is time-consuming and easily monitored by Iranian authorities. Iran successfully objected on grounds that the IAEA does not require such monitoring of safeguarded facilities in Europe. To its credit, the IAEA established an inspection system based on unannounced inspections,

as is done in Europe. However, inspector movement in Europe is less constrained than in Iran. In addition, the IAEA conducts unannounced inspections at Natanz on average twice per month. This level of inspection activity is expensive to maintain and may not be sustainable over the long term. Camera-based monitoring will not eliminate the need for inspectors to visit the enrichment plants, but it is a reasonable approach to monitoring under the circumstances. It should also be applied at other nuclear facilities, including the Bushehr reactor, where concern centers on the possible diversion of the reactor's fresh and irradiated fuel.

Take steps toward full diplomatic relations

The United States should make a priority the establishment of a U.S. Interests Section in Iran with the goal of eventually resuming full diplomatic relations. The former Bush administration laid the basis for the Interests Section initiative, allowing the Obama Administration to move quickly on it. In addition, the United States should authorize U.S. diplomats to talk to their Iranian counterparts on a routine basis. On nuclear issues, U.S. officials may want to initiate discussions in New York with officials at the Iranian mission to the United Nations. United States diplomatic overtures should reduce the Iranian leadership's hostility to serious negotiations on the nuclear issue.

Persuade Russia and China to Help

Russia and China are vital to a U.S. strategy to convince Iran to forgo a nuclear weapons capability. The priority must be improving relations with Russia so that it is more willing to impose national and international

sanctions on Iran and less willing to sell Iran conventional armaments. There are enormous challenges facing the U.S.-Russia relationship that go well beyond Iran. Nonetheless, the United States stands to gain valuable leverage and remove a significant irritant to U.S.-Russia relations by agreeing to defer deployment of missile defense systems in Europe. The upcoming renegotiation of the START I treaty offers another opportunity to improve the relationship by renewing the existing limits on long range strategic carriers, particularly missiles, and move quickly to negotiate additional verified strategic arms control treaties that make significant cuts in the numbers of nuclear warheads on both sides.

Pursue Arms Control and Regional Security Agreements

The United States should broaden its arms control objectives in the Middle East. It should re-invigorate efforts toward the establishment of a region-wide nuclear weapon free zone. In particular, it should take the following steps:

Ratify the CTBT: The United States should ratify the Comprehensive Test Ban Treaty (CTBT) and encourage countries in the Middle East to also bring the treaty into force. Iran signed the CTBT on September 24, 1996 but has not ratified the treaty. The Treaty cannot come into force without Iran's ratification (or the ratifications of China, Egypt, India, Indonesia, Iran, Israel, North Korea, Pakistan, and the United States). If Iran takes the step to ratify the CTBT, even in the absence of U.S. ratification, this would send a symbolically important message about Iran's peaceful

nuclear intentions. Israel may also be willing to ratify the treaty.

Commit to concluding a verifiable Fissile Material Cut-off Treaty: President Obama has already expressed his commitment to negotiating a long-sought verifiable and global ban on the production of fissile material for nuclear weapons, commonly called a Fissile Material Cutoff Treaty (FMCT). Toward this goal, the United States should change its relatively new policy of seeking a cutoff treaty that does not include verification. The Bush administration's rejection of the long-standing U.S. policy of requiring verification was a mistake that the incoming administration needs to rectify. The importance of a FMCT in the Middle East region in particular cannot be overstated. In the absence of a decision by Israel to join the Nuclear Non-Proliferation Treaty and relinquish its own nuclear weapons, this agreement would go far toward building confidence in the region that no country is producing plutonium or highly enriched uranium for nuclear weapons. As an interim step, the United States should convince Israel to suspend any production of fissile material for nuclear weapons.

Support implementation of Article VI of the NPT: The United States should bring real leadership in fulfilling its commitment under the Nuclear Non-Proliferation Treaty that the nuclear weapon states "pursue negotiations in good faith" toward nuclear disarmament. The bipartisan call for such negotiations by George Shultz, William Perry, Henry Kissinger, and Sam Nunn has brought enormous momentum to the issue. Concrete steps by the United States would demonstrate that it is serious about its own obligations under the NPT, and believes in

the goal of eliminating nuclear weapons worldwide.

Reestablish a regional security dialog: The initiatives outlined above would help establish international confidence in the peaceful nature of Middle Eastern nuclear programs. These steps are important to gaining the support of nations in the region for a Middle East zone free of nuclear weapons and other weapons of mass destruction (WMD). An appropriate confidence building measure would include the re-creation of a multilateral negotiation forum for sustained discussion about creating a regional WMD-free zone and other pressing security issues. Iran should be included in that forum.

Seek Regional Constraints on Nuclear Energy

Nuclear power is gaining popularity in the Middle East due to Iran's pursuit of nuclear energy and increasing demand for non fossil fuel-based energy in the face of projected power shortages in countries with growing populations. Oil producing nations also want to supplement domestic energy needs to allow for export of more oil and gas.

However, Iran's nuclear progress is likely to lead other nations to consider their own options, including the acquisition of nuclear weapons under the cover of civil nuclear programs. Ensuring the absence of plutonium separation and uranium enrichment capabilities and minimizing stocks of plutonium are critical to reducing proliferation risks in the Middle East and establishing confidence in the peaceful nature of Middle Eastern nuclear power programs. Their absence is also vital to gaining the future support of all nations in the region for a Middle East zone free of nuclear weapons.

The United States should steadfastly discourage civil reprocessing of irradiated power reactor fuel both domestically and internationally, as ISIS has argued in a [recent paper](#). Where reprocessing already exists it should work to minimize the size of separated plutonium stockpiles. To reduce the threat of proliferation in the Middle East, the United States should work to accomplish the following goals:

Establish a New Norm: No Supply of Nuclear Reactors without Additional Protocol in Force: Suppliers of nuclear reactors should insist that a recipient country has the Additional Protocol in force. Currently, of fifteen Middle Eastern countries that have expressed interest in nuclear power, fewer than half have signed or ratified the Additional Protocol. Only Jordan, Turkey, Libya, and Kuwait have the Protocol in force; Iran, Iraq, Morocco, and Tunisia have signed it. The Obama

<i>Projected Civil Plutonium Inventories in the Middle East, based on announced plans for nuclear reactors</i>	
Current:	0 kg
2020:	13,000 kg
2030:	44,000 kg
Source: ISIS report, Nov. 12, 2008	

administration should work to institutionalize the norm that the supply of a nuclear reactor requires that a state have the Additional Protocol in force.

Voluntary Moratorium on Civil Reprocessing and Enrichment in the Middle East: Middle Eastern countries seeking nuclear power should agree to a moratorium on the development of reprocessing and enrichment capabilities.

NSG Agreement Not to Provide Reprocessing and Enrichment

Technology: The NSG should agree to refuse sales of reprocessing and enrichment technologies to countries in the Middle East and elsewhere where proliferation remains a concern, including to countries that have not signed the Nuclear Non-Proliferation Treaty. Such capabilities are not necessary in the Middle East for nuclear power to thrive, at least during the next several decades, yet they would significantly increase the risk of proliferation.

Spent Fuel Take-back and Fuel Assurances

Reactor suppliers in cooperation with other NSG members and the IAEA should negotiate spent fuel take-back arrangements as well as a guaranteed fuel supply with Middle Eastern countries. Russia has done so with Iran’s Bushehr reactor. Although these arrangements would leave a country with a considerable amount of plutonium-rich spent fuel, they would cap the amount of plutonium in the country and remove all of it after the reactor shuts down, preventing the emergence of “plutonium depots”.

Continue to oppose military solutions

Iran’s determination to build and operate a uranium enrichment plant poses real challenges for those concerned about Iran acquiring a nuclear capability that could threaten its Arab neighbors in the Persian Gulf, Israel, or the United States. The best approach for arresting Iran’s progress toward becoming a nuclear-weapon state is through a combination of creative diplomacy, sustained international pressure expressed primarily through economic sanctions, and perseverance.

Recent discussions of attacking Iran's nuclear facilities militarily sometimes liken the destruction of Iran's uranium enrichment program to Israel's surgical strikes on Syria's clandestine nuclear reactor in September 2007, or Iraq's Osirak reactor in June 1981. In each case a single attack with fewer than ten aircraft destroyed a key facility that could have produced plutonium for nuclear weapons, setting back that country's ability to produce a bomb by several years. In the case of Iran, the analogy goes, an attack on just two facilities, the Natanz enrichment plants and the Esfahan uranium conversion facility, would likewise significantly delay Iran's ability to produce weapon-grade uranium for nuclear weapons.

This analogy is grossly misleading. It neglects the important differences between a gas centrifuge uranium enrichment program and a reactor-based program, and fails to account for the dispersed, relatively advanced, and hardened nature of Iran's gas centrifuge facilities. It also ignores the years Iran has had to acquire centrifuge equipment abroad, often illicitly, allowing it to create reserve stocks of critical equipment.

One lesson learned from both Iraq wars is the difficulty facing intelligence agencies in identifying and targeting correctly sites associated with clandestine weapons programs, in particular a gas centrifuge program. Few if any of Iraq's facilities

involved with its centrifuge enrichment effort were actually targeted in the first Gulf War. Only intrusive inspections identified them correctly later. Numerous reports have shown that assessments prior to the second Gulf War were mistaken about a reconstituted Iraqi gas centrifuge program and suspected associated sites.

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Two options for military attacks are often discussed. One involves air attacks against sites affiliated with Iran's nuclear fuel cycle, in particular those near Arak, Esfahan, and Natanz. The other involves launching a wider aerial attack across Iran targeting actual and suspected nuclear facilities, as well as military command and control, missile production and storage sites, and

retaliatory capabilities.

Setting aside the merits, costs, and risks of these approaches from military and political perspectives, it is important to examine the more narrow issue of what impact such strikes would have on Iran's nuclear program. Targeted strikes against the sites affiliated with Iran's nuclear fuel cycle would certainly set back for a number of years Iran's heavy-water reactor construction project at Arak and its ability to convert large amounts of uranium ore to uranium hexafluoride at Esfahan. They would also likely destroy Iran's centrifuge plant at Natanz, notwithstanding its hardening against such attacks. The survivability of an Iranian nuclear weapons program, however, does not rest entirely on

those sites--knowledge and experience are transferable, and centrifuges are replicable.

The IAEA has considerable knowledge of Iran's centrifuge activities at the Natanz enrichment facilities and the Esfahan uranium conversion plant. However, since Iran ended the suspension of its enrichment program in January 2006 and its provisional adherence to the Additional Protocol one month later, the IAEA is largely ignorant of where centrifuge components are currently made or stored. In addition, Iran might have facilities containing operating centrifuges unknown to the IAEA. Their construction and initial operation would not violate Iran's commitments under the NPT or its safeguards agreement with the IAEA, since Iran no longer provides the IAEA information about when it starts construction of nuclear facilities such as enrichment plants. But following a military strike, such a facility could rather quickly replace the Natanz fuel enrichment plant.

In short, destroying the facilities without the equipment and materials is unlikely to set back the enrichment part of the program. Moreover, rather than delaying or making it impossible for Tehran to carry out a final decision to make nuclear weapons, an attack might force the Iranian leadership's hand. Iran would almost certainly expel or severely limit IAEA inspectors and, freed of any international restraints, might well accelerate any weaponization efforts, launching a Manhattan Project-style undertaking in defense of the homeland. In such a case, the United States would likely be forced to launch and sustain a long, costly war against Iran.

In the event that the United States launched a broader attack, causing far widespread destruction of Iran's infrastructure and disruption of the leadership's ability to retaliate, the United States would be faced with the same problem. There would simply be no assurance that Iran's ability to make nuclear explosive material would be significantly curtailed as long as it possessed covert facilities or the means to build and operate them. Finding them would be extremely difficult absent excellent intelligence. This analysis leaves aside the other obvious, well-discussed downsides to a military attack against Iran, including the human costs, larger issues of its ramifications for U.S. interests in the region and the situation in Iraq, and increased instability throughout the Middle East as Iran retaliates, which it is fully expected to do. In addition, an attack would not only bring an end to the system of IAEA safeguards inspections in Iran but would dramatically reduce their credibility throughout the Middle East.

Although military options pose difficult challenges or are counterproductive to stopping Iran from acquiring nuclear weapons, this does not mean that the United States is weakened in its ability to contain Iran or ensure that aggressive Iranian action can be defeated militarily. To ensure aggressive Iranian action in the region is discouraged, the United States will need to maintain a robust array of military forces in the Gulf region for years to come. A U.S. military presence will also help prevent any Iranian attempt to use its growing nuclear capabilities to intimidate its neighbors.

CONCLUSION

Iran's nuclear policy has undoubtedly arisen from a set of unique circumstances, including a desire to establish its nuclear independence and scientific expertise. But its uranium enrichment program and the Arak heavy water reactor will not lead Iran to self-sufficiency in nuclear power. Its arguments for international justice and fairness are undermined by its pursuit of these options, which Iran cannot separate from almost twenty years of undeclared nuclear work in violation of its IAEA safeguards agreement and its NPT commitments, and are increasingly believed to have included work on nuclear weaponization. When combined with its ongoing lack of transparency and cooperation with the IAEA and staunch resistance to generous political, economic, and security incentives, the unavoidable conclusion is that Iran seeks the acquisition of a nuclear weapons capability, someday followed by the acquisition of nuclear weapons.

The United States is long overdue in charting a new relationship with Iran, and the Obama administration is well poised to launch such an effort. But Iran needs to commit itself as well to charting a new way forward that is less confrontational, with cognizance that its sensitive nuclear programs are unnecessary and run counter to its own security interests. If Iran chooses to continue its current course, the United States should ensure that Iran grows more isolated. It should focus its policies and actions on convincing Iran, much like the apartheid South African government, that its true course lays elsewhere.

APPENDIX I - THE 2008 FREEZE FOR FREEZE PROPOSAL: WHAT HAPPENED?

The “freeze for freeze” proposal was a negotiating formula accepted by the EU3+3 in the spring of 2008 aimed at achieving a breakthrough in the stalled negotiations with Iran, and involving directly the United States in those negotiations. Although only one meeting took place under this approach, in Geneva in July 2008, it serves as an example of an approach that can create a framework for future negotiations.

The proposed formula consisted of three phases. Phase I, for Exploratory Talks, aimed to create agreement for a timetable for consultations and the start of the “Pre-Negotiations” in Phase II. The second phase, envisioned in the proposal as lasting only a few weeks, would prepare the way for the opening of formal negotiations through agreement on objectives, a timetable, and an agenda. During Phase II, the following steps would have taken place:

- The EU+3 would refrain from any new action in the Security Council;
- Iran would refrain from any new nuclear activity, including the installation of any new centrifuges;
- Iran would complete its clarification of outstanding issues in cooperation

with the IAEA regarding its past nuclear activities.

Phase III, “Formal Negotiations,” were envisioned as starting with a meeting of Foreign Ministers of all involved countries, provided that 1) The IAEA had verified that Iran had suspended all enrichment-related and reprocessing activities; and 2) the U.N. Security Council had suspended discussion of Iran’s nuclear program and the implementation of measures adapted under UNSCR 1737, 1747, and 1803.

Phase III aimed for a comprehensive agreement on:

- Long-term bilateral and regional cooperation including but not limited to political, security, economic, and energy issues;
- Mechanisms and commitments for establishing confidence in exclusively peaceful nature of Iran’s nuclear program, including future arrangements, modalities, and timing.

In practice, the negotiators never got to Phase II. Iranian officials indicated to their European Union counterparts that they were unsatisfied with two aspects of the offer. First, Iran believed the freeze on sanctions was too limited and wanted the freeze extended to existing sanctions. Second, Iran insisted that it would never suspend its enrichment program and did not want to enter negotiations in Phase II that could not progress to Phase III, with the blame for the failure to reach Phase III likely laid at Iran’s own door.

APPENDIX II: WHAT ABOUT MULTILATERAL ENRICHMENT?

Several experts have proposed various multilateral mechanisms for maintaining an Iranian enrichment capability, two of which would occur in Iran. The following is a brief analysis of the pros and cons of three such formulations.¹

Multilateral enrichment facility outside of Iran with no indigenous enrichment: This would involve joint ownership or operation of an enrichment facility located abroad, possibly in Russia, which has already offered to host such a facility. Iran would have a role in the operation of the facility and access to the fuel produced, but would not have a direct role in the enrichment process itself, which would use commercially viable and established technology superior to the centrifuges currently in operation at Natanz.

Advantages/disadvantages: This would eliminate indigenous declared enrichment inside Iran. However, some knowledge transfer would likely occur as Iranians would have access to the plant. Iran has already rejected this arrangement, based on mistrust of foreign partnerships, although a negotiated settlement may include this option.

Multilateral enrichment in Iran using proprietary (black box), technology: Under this arrangement, Iran would partner with other countries in the construction of an enrichment facility located in Iran using commercial enrichment technology, either from Russia (Techsnabexport or Tenex) or Urenco. Iran would jointly operate and administer the facility but have no access to or role in the technology used in the enrichment process.

Advantages/disadvantages: The chief advantage of this arrangement is that Iran would not conduct any declared enrichment activity. The facility, however, would be vulnerable to forcible seizure. Although proponents for this option have designed mechanisms for disablement into the centrifuges, a key question is whether the owners could disable the centrifuges in time. Additional disadvantages are also significant: There would be enormous regulatory and technology transfer hurdles to overcome, even assuming the “black box” nature of the transfer, to permit the construction and operation of an enrichment facility using advanced centrifuges. In addition, it is not clear that the enrichment could be made commercially viable without government subsidy. The facility would provide Iran with justification for continued production of uranium hexafluoride, which could be diverted to a secret facility. Iran would be able to stockpile low enriched uranium as uranium hexafluoride, making it significantly easier to divert it for enrichment to weapon-grade in an undeclared facility. Finally, Iran could try to reverse engineer more advanced centrifuges after seizing the plant.

¹ Many of the ideas in this section are based on discussions with John Carlson, Director-General of the Australian Safeguards and Non-Proliferation Office, Department of Foreign Affairs and Trade.

Multinational enrichment using Iranian technology: Some experts have proposed a multinational facility using Iran's own enrichment technology and facilities and involving the international partners in all enrichment activities, including research and development. This proposal is similar to one made by Iran in its "package for negotiations" delivered on May 13, 2008 to the UN Secretary General.

Advantages/disadvantages: This approach would bring only marginal verification benefits, namely allowing a greater degree of monitoring than the IAEA can provide for Iran's declared nuclear program. The disadvantages are substantial. Verification would be difficult. Iran would openly pursue centrifuge research and development and manufacturing, allowing it to more easily hide a covert enrichment program. For example, Iran could under-report actual production of centrifuge components and divert them to an undeclared program (see below). It could benefit from knowledge gained from its international partners and apply it to a secret program. In addition, most of the disadvantages listed in the previous option would also apply. It is also unlikely that such an effort could be commercially viable using Iran's existing technology, raising the possibility that international partners would be asked to subsidize it or provide more advanced centrifuges. This arrangement would be highly undesirable and unlikely under current financial circumstances.

The problem of undeclared production: Proponents of allowing Iran to continue enrichment on its soil underestimate the complications for verification and the support that a declared enrichment program could provide for a secret enrichment effort. Overt enrichment would produce environmental signatures that could mask the presence of those from secret activities. Enrichment research and development activities would benefit secret activities, and open production of centrifuge components could hide additional, undeclared production of components for a secret enrichment facility. From verification considerations, the best option is no enrichment in Iran.