

**Testimony of David Albright,
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Before the Committee on Foreign Relations
on the
Negotiations On Iran's Nuclear Program**

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The Joint Plan of Action (JPA) negotiated between Iran and the United States and its partners in the P5+1 accomplishes a great deal in the short run, but its success remains uncertain, pending the negotiation of long-term arrangements. The JPA's interim steps, which began on January 20, 2014, are technically sound and lengthen Iran's breakout time to make enough weapon-grade uranium for nuclear weapons, establish transparency over many previously opaque Iranian nuclear activities, and freeze and even temporarily reverse key portions of the nuclear program. The JPA, however, leaves many key issues unsettled regarding a long-term, comprehensive solution.

The test of the JPA lies in negotiating these long-term arrangements, a process President Obama gives a 50-50 chance of succeeding. A final agreement must create long-term, meaningful limits on Iran's nuclear program combined with adequate verification sufficient to ensure that any attempt by Iran to build nuclear weapons would be detected in a timely manner and provide adequate time for an international response.

To improve the chances of success, the United States needs to clearly state its goals and be willing to walk away from a bad deal, particularly also if the administration judges that a deal is unlikely in the face of Iranian delays and unreasonable demands. If a comprehensive solution cannot be negotiated by the end of the interim period, the United States should increase economic sanctions on Iran and move to further its political isolation, while avoiding military strikes. Given the relatively low chances of success, the United States would be prudent to plan for such a possibility today. Doing so would also reinforce a critical message to the international business community and other governments that this crisis is not over and sanctions have a 50-50 chance of being reapplied and strengthened.

Limited Interim Deal

For six months, Iran has pledged to halt advances in major parts of its gas centrifuge program and its Arak reactor. An important accomplishment is that Iran is committed to eliminating its most readily nuclear weapons-usable stock of near 20 percent low enriched uranium through dilution or conversion into oxide form. Iran has committed not to make, install, or stockpile centrifuges during the six month period. It will not enrich in any of its approximately 1,000

installed advanced IR-2m centrifuges at the Natanz Fuel Enrichment Plant. The IR-2m centrifuges are particularly problematic because they can enrich three to five times faster than Iran's first generation IR-1 centrifuges, meaning far fewer are needed to make weapon-grade uranium for nuclear weapons. The International Atomic Energy Agency (IAEA) will have greater access to Iran's nuclear sites and information; overall transparency will increase significantly. All these conditions mean Iran's nuclear program will pose fewer risks in the short term.

In particular, Iran would take longer to break out, namely divert its low enriched uranium and further enrich it to weapon-grade in sufficient quantities for a bomb. Once all the near 20 percent low enriched uranium is diluted or converted into oxide, the breakout times, if Iran used its currently installed centrifuges, would lengthen from at least 1 to 1.6 months to at least 1.9 to 2.2 months. This may seem a small increase but with IAEA inspectors visiting daily the Natanz and Fordow enrichment sites, this increase in breakout times would be significant and allow the United States and its allies more time to respond to stop Iran before it produces enough weapon-grade uranium for a bomb. For the first time since Iran's capability to break out began approaching dangerous levels this year, breakout times would lengthen rather than shorten.

While the interim steps remain in place, Iran will be unable to reach the point where it has sufficient centrifuges and near 20 percent enriched uranium to break out and produce enough weapon-grade uranium for a bomb without being detected. ISIS calls this dangerous threshold "critical capability," and estimates that, absent a deal, Iran could achieve this capability in mid-2014. The interim deal, by eliminating Iran's stock of near 20 percent enriched uranium hexafluoride, will delay by many months Iran from achieving this destabilizing threshold, even if the constraints imposed by the deal end after six months.

But the interim steps are not without problems. They are limited in nature and are all reversible. So, if no long-term comprehensive solution is reached, Iran could resume making near 20 percent low enriched uranium and installing more centrifuges. The IAEA monitoring, while improved, falls far short of what is necessary for a long term agreement. Moreover, the increase in breakout times expected at the end of the six-month period may be helpful but is woefully inadequate for the long term and must be lengthened significantly in any comprehensive solution.

Iran can make progress on its nuclear programs during the interim period. An area that was not frozen in the interim deal is Iran's centrifuge research and development (R&D) program. The interim steps are not expected to seriously affect Iran's centrifuge research and development program. These steps may delay the final development of new centrifuges that have not yet used uranium hexafluoride at the Natanz Pilot Fuel Enrichment Plant. However, Iran can continue development of several existing types of advanced centrifuges, including the IR-2m, the IR-4, IR-6 and IR-6s.

In particular, Iran can continue its development of the IR-2m centrifuges at the Natanz pilot plant under this loophole in the interim deal. It can enrich uranium in a production-scale cascade of 164 IR-2m centrifuges. Since it remixes the enriched uranium product with the waste or "tails," obtaining natural uranium, no enriched uranium is deposited into the product tanks. This

remixing meets the “letter of the deal.” However, Iran is able to measure the enrichment level of the product before remixing it. Thus, it can further develop the IR-2m centrifuge while hiding any results of its progress from the IAEA, which has access only to the product tank or the natural uranium and does not see the enrichment measurements. At the end of the interim period, Iran is likely to be far better positioned to deploy reliable IR-2m centrifuges on a mass-scale at its enrichment plants. This gain would allow Iran to make up for time lost more quickly.

The weakness of the interim deal on centrifuge R&D needs to be fixed in the comprehensive solution. Any long-term deal needs to limit significantly Iran’s centrifuge R&D program. An unlimited program would pose unacceptable challenges to a comprehensive solution. A centrifuge five to ten times more capable than the IR-1 centrifuge would require five to ten times fewer centrifuges to make the same amount of weapon-grade uranium for nuclear weapons, allowing for much smaller facilities, fewer personnel, and procurement of less material. Centrifuge R&D could also lead to breakthroughs in materials or methods that would further strengthen a secret breakout effort and make both the implementation and verification of a comprehensive solution extremely difficult. More significant limitations on Iran’s centrifuge R&D combined with greater transparency of this program need to be included in the final step of a comprehensive solution, given that Iran’s development of more advanced centrifuges would greatly ease its ability to conduct a secret breakout to nuclear weapons.

Another area not addressed in the interim deal is Iran’s illicit procurement of goods from overseas for its centrifuge program, Arak reactor, and other nuclear programs. Iran remains highly dependent on acquiring from abroad a range of goods needed in its nuclear programs, such as carbon fiber, maraging steel, vacuum equipment, pumps, and valve-related goods, among many others. ISIS’s illicit nuclear trade [case studies](#) contain many examples of this dependency and the smuggling methods Iran uses to obtain these goods. The studies also document many U.S. and allies’ efforts to detect and stop these illegal procurements. During the interim period, particularly with weakening sanctions, Iran can focus on building up its supply of essential goods and alleviating bottlenecks in certain key goods, allowing for a much more rapid expansion of its programs at the end of the interim period.

These problems will grow the longer the interim period lasts. As a result, the limitations of the interim deal require it to be viewed as only temporary. It is not a substitute for a long-term solution. This finite limit is essential to the integrity of the JPA. By no means should the interim steps be seen as sufficient for a long term resolution of the nuclear issue.

The interim deal is intended as a six-month measure. It can with mutual consent be extended for an additional six-months for a total of one year. But this extension should be avoided unless Iran has demonstrated significant progress on resolving core U.S. concerns. Delay works more in the favor of Iran than it does of the United States and its allies.

Addressing the IAEA’s Concerns about Military Dimensions

One issue that needs to be resolved before the finalization of a comprehensive solution is settling the IAEA’s concerns about Iran’s past and possibly on-going work on nuclear weapons and other

alleged military nuclear activities. Iran has stalled on doing this for years. U.S. officials have stated that unless Iran satisfies all the IAEA's concerns there will be no comprehensive deal.

During the last several months, Iranian officials, including President Hassan Rouhani and Foreign Minister Mohammad Javad Zarif have emphasized that Iran has never pursued or sought a nuclear bomb. Unfortunately, the available evidence provides little reason to believe them.

- The IAEA has considerable evidence of Iranian work on nuclear weapons prior to 2004 and some evidence suggesting that some of that work continued afterward and may continue today. In its November 2011 safeguards report, the IAEA provided evidence of Iran's pre- and post-2003 nuclear weaponization efforts. The IAEA [found](#), "The information indicates that prior to the end of 2003 [the activities] took place under a structured programme. There are also indications that some activities relevant to the development of a nuclear explosive device continued after 2003, and that some may still be ongoing."
- Western intelligence agencies are united in assessing with high confidence that Iran had a nuclear weapon program prior to 2004. They are less united about any such work after 2004. Nonetheless, important allies Britain, France, and Germany all assessed that nuclear weapons relevant work continued after 2003, albeit on a reduced scale.
- Few doubt that Iran is capable of making a crude nuclear explosive today for use in a nuclear test, although doubts remain that it can mount a reliable one on a ballistic missile.
- There is general agreement that the Iranian regime has not made a decision to build a nuclear weapon. There is less agreement whether Iran will refrain from building a nuclear weapon in the future.

The IAEA is scheduled to meet Iran on February 8, 2014 to discuss the next steps for Iran addressing the outstanding issues. Iran will need to allow the IAEA to visit several sites and interview a range of experts and officials in order to address its concerns.

The IAEA has identified several sites to Iran, but so far Iran has refused the IAEA's requests to visit these particular sites. The most prominent is a site at the Parchin military complex that is alleged to have been involved in undertaking high explosive tests related to the development of nuclear weapons. After the IAEA asked to visit this site in early 2012, Iran undertook extensive excavation and reconstruction at this site, compromising the IAEA's ability to settle this issue. Iran will need to address the Parchin issue to the satisfaction of the IAEA, which will inevitably involve more than simply allowing a visit. Other sites include workshops that were involved in making mock-ups of missile re-entry vehicles suitable to hold a nuclear warhead. An upcoming test of Iran's intentions will be whether it soon allows the IAEA to visit Parchin and conduct follow-up visits and interviews at other sites.

If Iran is unwilling to detail its past efforts to build nuclear weapons, or at the very least acknowledge the existence of a program, it will undermine the credibility of statements about its present-day nuclear activities and intentions. If Iran wants the world to believe it will not hide its nuclear activities or build nuclear weapons in the future, the Iranian government should reconsider its denials of ever seeking nuclear weapons in the past.

The Iranian government may reason that if it comes clean about its past activities, it will be punished by the international community. But other cases, such as South Africa, Brazil, and Libya, argue against such a response. The key is admitting these past activities as part of a process of placing strategic limitations on its nuclear programs and instituting far greater transparency. The IAEA and other governments can then develop confidence that Iran is not seeking nuclear weapons. But if Iran seeks to continue to hide its past military nuclear efforts, it may find that no amount of limitations and transparency on its current programs is enough to reassure the international community. Significant questions about its motives, such as a desire to maintain a latent breakout capability, will likely remain. The IAEA will be unlikely to be able to ever find that Iran is in compliance with its safeguards obligations, which remains a key criteria at the heart of the justification for international and regional sanctions.

The Joint Plan of Action is structured to require Iran to satisfy the IAEA's concerns about the possible military dimensions of its nuclear programs prior to achieving a comprehensive solution. If Iran does not, then U.N. Security Council (UNSC) and U.S. economic sanctions should not be removed. In the case of UNSC sanctions, only one member state of the P5 need veto a resolution to prevent removing them, and this state would be fully justified since the IAEA's concerns about possible Iranian military nuclear programs are central to UNSC resolutions.

Comprehensive Solution

In parallel to Iran/IAEA negotiations, the P5+1 will soon start negotiating the provisions of the comprehensive solution. The U.S. negotiators will face very tough resistance from Iran as they seek to achieve a long-term comprehensive agreement that will limit Iran's most dangerous nuclear programs and ensure adequate verification.

The over-riding goal of the negotiations of a comprehensive solution is to establish a set of provisions, and associated verification measures, which if Iran agreed to them would protect the national security interests of the United States and its allies. The resulting limited nuclear programs and extensive verification measures would eliminate the risk of Iran breaking out to nuclear weapons at declared or covert nuclear sites without that effort being detected in a timely manner and without adequate time for U.S. and international responses that would prevent Iran from succeeding in that effort. This approach depends on the United States remaining ready for many years to take the steps necessary to prevent Iran from obtaining nuclear weapons.

However, the need to depend on unilateral military options to deter or prevent breakout would not bode well for the acceptability of a comprehensive solution. Although such options are currently threatened as part of a U.S. policy to prevent Iran from gaining nuclear weapons, such a policy is not realistic or preferable as a long-term solution. Thus, there is a requirement for meaningful limits on Iran's nuclear capabilities that provide timely warning of any move by Iran to build nuclear weapons and greater assurances that Iran's nuclear program will be exclusively peaceful.

The Joint Plan of Action does not grant Iran the right to enrich uranium, but it accepts that in a comprehensive agreement Iran will maintain a centrifuge program. However, Iran conceded that

for a period to be agreed upon, any such program would be subject to limitations on the number of centrifuges, the location of any centrifuge plants, the level of enrichment, and the size of stocks of enriched uranium. It also agreed that the program must be consistent with “practical needs” within “mutually agreed parameters.”

In negotiating limitations on Iran’s centrifuge and other nuclear programs and adequate verification requirements, the United States should be guided by several key principles, including:

- Extending breakout times significantly to at least 6-12 months, reflecting the numbers and types of centrifuges and stocks of low enriched uranium under a comprehensive solution. This requires that Iran remove over 14,000 centrifuges at the Natanz and Fordow enrichment sites. In the longer term, a fraction of these centrifuges would be stored or dismantled for use as spares and the rest would be destroyed;
- Reducing and limiting Iran’s stockpiles of enriched uranium and natural uranium. In the case of near 20 percent low enriched uranium, these stocks would need to be further reduced from the level expected at the end of the interim period;
- Blocking Iran’s plutonium route to nuclear weapons;
- Reducing significantly Iran’s ability to build secret facilities to enrich uranium or separate plutonium;
- Ensuring that Iran commits to stopping its illicit procurements of goods for its nuclear programs;
- Achieving that any limits on Iran’s nuclear programs have a duration of at least 20 years
- Implementing adequate verification that goes beyond the Additional Protocol; and
- Conditioning any end to UN Security Council and U.S. economic sanctions on Iran addressing all of the IAEA’s concerns, in particular those about Iran’s past and possibly on-going nuclear weapons efforts.

The following are a list of provisions that would meet the above principles and form the basis of a comprehensive solution able to protect adequately national security interests. For more detail, the reader is referred to a recent [ISIS report](#) on the necessary elements of a comprehensive solution. For background information, the reader is referred to the [main ISIS website](#) and its [Iran-specific website](#).

Conditions without a defined duration

- The Arak reactor complex will be upgraded to a light water reactor using low enriched uranium fuel.
- Iran will not reprocess any irradiated fuel or build a facility capable of reprocessing.
- Iran will not enrich above 5 percent in the isotope uranium 235, and will not produce stocks of enriched uranium that exceed in quantity the needs of its civilian program, noting that it has long term LEU fuel delivery agreements with Russia and would be expected to have additional ones with foreign reactor vendors after the conclusion of a comprehensive solution.
- Iran will commit not to procure goods for its nuclear programs abroad in a manner that is considered illicit (“illicit nuclear trafficking or trade”).

Conditions and parameters with a defined duration of 20 years

- Iran will have only one enrichment site, the one at Natanz. The Fordow site will be shut down or converted into a non-centrifuge-related site.
- Centrifuge research and development will only be conducted at the one enrichment site. All centrifuge testing, with or without nuclear material, will occur at this site. Centrifuge research and development will be limited to centrifuges with the theoretical equivalent enrichment output of no more than five separative work units in kilograms uranium (swu) per year. This is about the level of the IR-2m centrifuge.
- Major centrifuge component manufacturing and storage locations will be limited in number and identified.
- Centrifuge assembly will occur only at the one enrichment site.
- The number and type of centrifuges will be limited to ensure that breakout times are measured in many months and will be a minimum of six to twelve months at all times.
- In order to define a cap in practical terms, it is necessary to first consider the case where only IR-1 centrifuges are enriching at the Natanz Fuel Enrichment Plant. In the case of a six month breakout time, a cap on total number of IR-1 centrifuges at the Natanz site is derived from the condition of the historical IR-1 centrifuge operations at the Natanz Fuel Enrichment Plant and the size of Iran's residual stock of 3.5 and near 20 percent LEU. The estimated cap is about 4,000 IR-1 centrifuges in the case of a breakout estimate of six months and fewer centrifuges in the case of a 12 month breakout estimate.
- Because Iran may seek to replace the IR-1 centrifuges with more capable ones, a more general enrichment cap is derived from the cap on IR-1 centrifuges developed above and is approximately 3,600 swu/year. This value serves as a general enrichment cap regardless of the actual enrichment capacity of any centrifuge that would replace the IR-1 centrifuge in the future. If Iran deployed IR-2m centrifuges, for example, the parties would need to agree upon an average centrifuge enrichment value before deriving the number of IR-2m centrifuges needed to produce 3,600 swu/yr. For example, if an IR-2m centrifuge has an average enrichment output of 4 swu per year, then the cap would be 900 IR-2m centrifuges. If Iran deploys any other enrichment technology, such as laser enrichment, it and any centrifuge plant would need to have a total enrichment output at this cap or below.
- In the case of the IR-1 centrifuges, centrifuge manufacturing would be limited to the replacement of broken centrifuges, if no spares exist (see below). For example, in the case of IR-1 centrifuges, a stock of many thousands of uninstalled centrifuges would be stored and then drawn upon to replace broken ones. Thus, Iran would agree not to build any IR-1 centrifuges until this stock is exhausted.¹ Centrifuge manufacturing of new centrifuges in the case of the IR-2m centrifuge, if used for enrichment at the Natanz Fuel Enrichment Plant, would be unnecessary, at least initially, because any broken ones could be drawn from a surplus stock of them. In the case of new centrifuges, Iran will not build

¹ Broken centrifuges will be replaced with centrifuges of the same type. This should mean, for example, that an installed IR-1 centrifuge would be replaced with an IR-1 centrifuge of the same design and enrichment capability as the one removed. A broken centrifuge is defined as one that has a rotor assembly incapable of spinning under power and cannot be repaired.

more centrifuges than allowed to be installed under the above enrichment cap of 3,600 swu/year and would build more only to replace broken ones.

- When the long term agreement takes effect, centrifuges and all associated cascade equipment in excess of the cap would be turned off, so that no centrifuges are operating and the cascades are not under vacuum. Centrifuges would be turned off in a controlled manner so as to limit centrifuge damage.
- Right after the comprehensive solution is implemented, excess centrifuges and the cascades containing them would be disabled in a manner so as to require at least one month to restart any disabled cascades.
- Excess centrifuges and associated cascade piping and equipment will be scheduled for removal from Natanz and Fordow and stored under IAEA monitoring. These centrifuges and associated cascade items will be stored at an agreed-upon site under IAEA monitoring, pending their use as replacements of broken centrifuges and cascades or their destruction under monitoring.
- Iran will not build any conversion lines that can convert enriched uranium oxide into hexafluoride form.
- LEU stocks will be limited, based on a realistic civil justification.
 - With regard to near 20 percent LEU, Iran will not possess any such LEU in hexafluoride form and its total stock in unirradiated oxide form including in fresh fuel elements and assemblies, will be less than the equivalent of 100 kg of near 20 percent LEU hexafluoride soon after the start of the implementation of the comprehensive solution. It has the equivalent of approximately 310 kg near 20 percent LEU hexafluoride, ignoring additional production in the last few months. A priority is achieving a reduction of the stock soon after the start of the implementation of the comprehensive solution to no more than the equivalent of 100 kg of near 20 percent LEU hexafluoride. During the implementation period, this stock will be reduced further to below the equivalent of 50 kg of near 20 percent LEU hexafluoride.
 - Iran will not possess more than the equivalent of 20 tonnes of unirradiated, less than five percent LEU hexafluoride, almost all of which should be in oxide form. Of this total LEU inventory, Iran will possess no more than 1.5 tonnes LEU hexafluoride at any one time; in essence this cap requires Iran to convert LEU hexafluoride into oxide form.
 - LEU in excess of these caps will be blended down to natural uranium or shipped abroad for storage or fuel manufacturing. In practice, this step is likely to be necessary only if Iran does not find a way to use this LEU in reactors during the next decade.
- Uranium mining, milling, and conversion facilities will be limited in throughput to the actual need for enrichment or other mutually agreed upon use.
- At the beginning of the period of the comprehensive solution, a procurement channel will be established for items needed in Iran's nuclear programs. The list of items will be established by mutual agreement and will include major nuclear facilities, nuclear components, nuclear and nuclear-related dual-use goods, and other sensitive items such as those on watch lists. Procurements of listed items outside this channel will be banned and considered illicit nuclear trade. This condition will also have the benefit of more

clearly identifying procurements from North Korea to Iran as illicit. Iran will declare to the IAEA the key exports received and these items will be subject to IAEA verification.

- Iran will not export or otherwise transfer nuclear materials, reactors, centrifuges, reprocessing equipment, other nuclear facilities or equipment, or the means to make such equipment or facilities to any state, company, or other entity.²
- By the end of the period in which the comprehensive solution will be in force, Iran will implement an export control system in line with the requirements of the four main export control regimes (lists and guidance) and submit a comprehensive report to the 1540 Committee on Iran's implementation of the resolution. Iran will also commit not to export or otherwise transfer reprocessing or enrichment technologies or goods to any state or non-state actor after the comprehensive solution period ends.

Adequate Verification

The provisions in a comprehensive solution require intrusive verification of Iran's nuclear program aimed at ensuring that Iran's declarations are correct and complete and developing confidence in the absence of undeclared nuclear facilities and materials. The latter condition must include sufficient verification measures to detect the construction and operation of secret gas centrifuge plants, a daunting task in the best of circumstances.

Certain key aspects of the verification arrangements are already clear. One overriding condition that will need to be accepted by Iran is what is commonly called the "Additional Protocol Plus" or "AP Plus." This condition recognizes that, despite its central importance, the Additional Protocol (AP) by itself is necessary but not sufficient to verify any comprehensive solution. The other elements that would comprise the "Plus" need to be further developed, but some have been identified in general. One element is the verification of centrifuge manufacturing, including the declaration and verification of key raw materials and components. The declaration needs to include the origin and amounts of key raw materials and the total number of major components, including the number held in stock, the number manufactured or procured, and their fate. Another element is the verification of uranium obtained abroad and produced domestically, e.g. in uranium mines and mills. A third area is the verification of any key facilities, materials, and components associated with the former military dimensions of Iran's nuclear programs. This step, once put in place, would depend on Iran already having satisfied the IAEA's concerns about the military dimensions of its nuclear programs. A fourth step is that Iran would agree to provide the IAEA with details of past and future imports, exports, and uses of key items listed under INFCIRC 254 part 1 and 2 and other critical goods that are used in Iran's nuclear programs.

Goal of Negotiations of Comprehensive Solution

² A model condition developed by ISIS: The state of concern agrees not to transfer to any state or entity whatsoever, or in any way help a state or entity obtain, nuclear weapons or explosive devices, or components of such weapons; nuclear material; nuclear know-how or technology; or equipment, material, goods, technology designed for, prepared for, or that can contribute to the processing, use, or production of nuclear materials for nuclear weapons or in sanctioned nuclear programs.

As I have underlined, the over-riding goal of the negotiations of a comprehensive solution is eliminate the risk of Iran breaking out to nuclear weapons at declared or covert nuclear sites without that effort being detected in a timely manner and without adequate time for U.S. and international responses that would prevent Iran from succeeding in that effort. In return for these concessions and adequate verification, the United Nations Security Council, the United States, and allied countries should in a phased and reversible manner lift the economic sanctions currently in place against Iran.

An adequate comprehensive solution will depend on the United States and its allies now making clear to Iran what is required of it. Thus, this is indeed a pivotal moment. If the two sides are not able to negotiate an agreement, the P5+1 needs to be prepared to reestablish and increase economic sanctions on Iran. That eventuality needs to be prepared for today.

Thank you for inviting me to testify.

Minimal Breakout Estimates, With and Without Joint Plan of Action

Key:

Black: Historical breakout estimates with interim deal

Red: No Joint Plan of Action

Green: Six month breakout estimate achieved in long-term deal

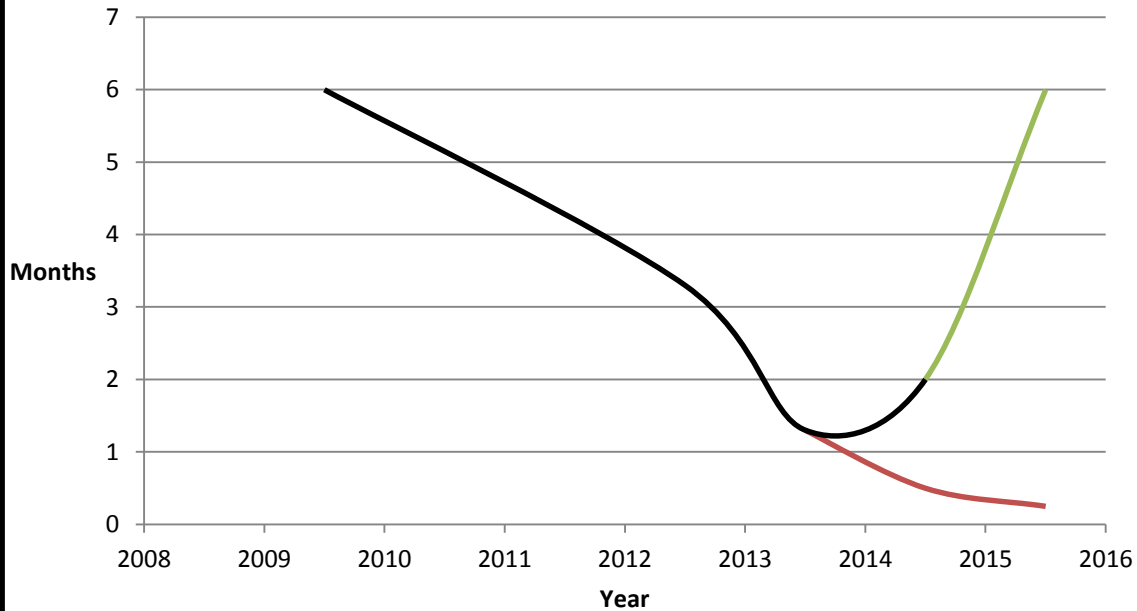


Figure. ISIS's estimated breakout times (central estimates) to produce enough weapon-grade uranium for a nuclear weapon. Breakout times have gotten shorter since 2009, reaching a low near one month by the fall of 2013. Under the interim deal of the Joint Plan of Action (JPA), they will increase to about two months by mid-2014. Afterwards, if a six-months breakout estimate is achieved as part of a comprehensive solution under the JPA, breakout times will further increase. If there had been no Joint Plan of Action, breakout estimates (in red) would have shortened dangerously.