

Assessment of the JCPOA

Richard L. Garwin
IBM Fellow Emeritus¹
IBM Thomas J. Watson Research Center
P.O. Box 218, Yorktown Heights, NY 10598
www.fas.org/RLG/
Email: RLG2@us.ibm.com

¹ Affiliation given for identification only.
04/11/2016

My background

Just to recapitulate briefly and in one place, I have been involved with the technical aspects of U.S. nuclear weaponry since 1950, continuing to the present day, and with policy aspects from 1953 until the present.

During my years as a member (two 4-year terms) of the President's Science Advisory Committee, and a consultant thereto, and as chair of the Arms Control and Nonproliferation Advisory Board throughout the Clinton Administration until 2001, I have been much involved in the analysis and verification of arms control agreements, as well as, specifically, in the intelligence involved in such verification.

In regard to the question of nuclear weapons in Iran, more than a decade ago, I was involved in a series of discussions with Javad Zarif, then Ambassador of Iran to the United Nations, meeting with him in New York with a team of scientists, engineers, and policy analysts, in order to find a way to allow Iran to proceed

with civil nuclear power, while demonstrating that it was not performing work leading toward a nuclear weapon capability.

More recently, in the negotiation of the JCPOA, I was involved in non-governmental discussions among informed individuals in the United States as to how demonstrably to close both the enrichment route to the acquisition weapon-usable highly enriched uranium—HEU—and plutonium from the 40-MW heavy water reactor being designed and built in Iran. In these regards, I made my analyses known to the U.S. government negotiators.

About the JCPOA, concluded July 14, 2015, I have spoken favorably, in part in a letter to President Obama of August 9, 2015, initiated by five of us, and ultimately signed by a group of the initial 5 + 27 other technically informed individuals.

Since then, I have provided brief analyses of the JCPOA, in particular, to the American Philosophical Society November 13, 2015². And in August, 2015 a more extensive presentation³

² "Iran Deal for APS," (Draft with graphics) by R.L. Garwin, presented at the American Philosophical Society, Philadelphia, PA, November 13, 2015.

³ "The 14 July 2015 Iran Agreement: Joint Comprehensive Plan of Action-- JCPoA," by R.L. Garwin. International Seminar on Nuclear War and Planetary Emergencies, Plenary Presentation of 20 August 2015, Erice, Sicily, <https://fas.org/rlg/jcpoa-erice.pdf>

The JCPOA is an immensely complex document, in part because it is a negotiation between six parties and Iran, including the five permanent members of the U.N. Security Council, plus Germany, and the EU, as well. It is a contract with the background of U.N. sanctions against Iran, as well as unilateral and international sanctions, and it names individual aircraft, ships, and people that are the subject of those sanctions, invoked because of their activities in contravention to the undertakings of Iran under the Non-Proliferation Treaty—NPT.

When the negotiations began in earnest that led to the hard-fought JCPOA on July 14, 2015, it was apparent that given the will, Iran was very close in time to obtaining a nuclear weapon, assuming that they had a reasonable design. It is incontrovertible that an array of centrifuges or other enrichment devices capable of supplying the low-enriched uranium fuel for a single power reactor such as that now operating at Bushehr requires about 190,000 separative work units per year (SWU/yr) to move about one ton of U-235 per year from its normal concentration of 0.72% in natural uranium to something on the order of 3.5-4.0% for use in a light-water reactor, of which there are hundreds in the world today. Iran had deployed a much smaller enrichment capacity than that, while arguing that it needed the enrichment in order to fuel not only Bushehr but also ten or

more additional such 1000-MWe reactors. When I first became engaged in such discussions with Javad Zarif when he was Iran's Ambassador to the United Nations, there was every prospect of limiting Iran's centrifuge pool to 500 SWU per year, which would, of course, do even less than the 19,000 centrifuges Iran had operating at the time of the JCPOA. But the important point was that either enrichment plant is far, far less than would be required to fuel even a single large civil power reactor.

On the other hand, simple and noncontroversial calculations show that to enrich 25 kg of U-235⁴ to weapon-grade level (80-95% U-235), beginning with natural uranium, would require only about 6000 SWU altogether. Thus, 19,000 centrifuges, even if each produced only one SWU per year, could provide enough HEU (weapon grade) to supply three nuclear weapons employing 25 kg of HEU.

In addition, Iraq had designed and was constructing a reactor fueled with natural uranium and cooled with heavy water, with a thermal (heat production) of 40 megawatts (40 MW). Such a reactor, although of 100 times the power, was used by the United States⁵ and other countries to produce weapon-grade plutonium. A rule of thumb is that one gram of plutonium is produced per

⁴ According to the IAEA, this is the "significant quantity" (SQ) of uranium that could be used to build a first-generation (implosion) fission bomb.

⁵ <http://www.fas.org/sgp/othergov/doe/pu50yc.html> Savannah River heavy water reactors were originally built to operate at 500 MWt and upgraded to 2500MWt.

megawatt-day of reactor power, so it would take the 40 MWt reactor about 25 days to produce 1 kg of W-G Pu. Israel has long produced plutonium for its military program in a heavy-water cooled reactor.

The purpose of the negotiation, resulting in the JCPOA, was to delay the time at which Iran could have enough material for a nuclear weapon, and to increase the warning time by having Iran accept a strengthened inspection regime, and also by reducing the stockpile of weapon-usable material essentially to zero, and increasing the delay required to produce more feed material for weapon-usable HEU.

Of course, it is easy to criticize any negotiated outcome by saying that the other side would never have signed it if they didn't win from the negotiation. What is true is that the other side wouldn't have signed it if they didn't *benefit* from the negotiation, but that just means that the benefit from a negotiated outcome is greater than the benefit from going it alone, and in this case, the "West" (remember, Russia and China were part of the negotiating team) found the outcome to its net benefit.

Certainly, some who favored negotiations with Iran were hopeful that not only would the acquisition of a nuclear weapon be put off for a decade or more, but that during that time, diplomacy, commerce, and more nearly normal relations among nations would dissuade Iran from acquiring nuclear weaponry.

I am one of those, although not a member of the negotiating team. When I involved in discussions of such matters a decade ago, my principal intent was to show the Iranian government the striking contrast between the very large enrichment facility required to support indigenously a substantial civil nuclear energy sector, but also the relatively small enrichment capability required to build nuclear weapons.

Although I hope that Iran will dissuade itself from nuclear threats and nuclear weaponry, it is by no means clear that it will, and, therefore, means should be readied over the next decade or more not only to provide a diplomatic approach to preventing the reemergence of an Iranian nuclear weapon program, but also to counter it if necessary, to avoid another state like North Korea with nuclear weapons and the professed desire to destroy other states or peoples. North Korea is a state with nuclear weapons and an avowed pursuit of a capability to destroy

the United States in a sea of flames. Iran has much more to risk by adopting such a goal, and very little to gain.

It would be helpful to turn our attention to means for re-imposing nuclear-related sanctions in case of modest violations of the JCPOA by Iran. Just as the U.S. government has been criticized for not prosecuting any of the major figures responsible for the financial collapse of 2008, so it would be far more effective to sanction and punish individuals involved in violation of the JCPOA.

But, in my opinion, such individual sanctions would be more effective than the threat to re-impose the whole set of sanctions unless Iran returned to strict compliance with the JCPOA.

Some dates associated with the JCPOA

Agreed July 14, 2015

Adoption Day, October 18, 2015

Implementation Day, January 16, 2016

Implementation Day, which is January 16, 2016, marks the day on which the International Atomic Energy Agency (IAEA) verified that Iran implemented

its nuclear-related commitments described in sections 15.1-15.11 of Annex V of the JCPOA.

Transition Day

Transition Day will occur eight years from Adoption Day, which occurred on October 18, 2015, or upon the date the IAEA has reached the Broader Conclusion that all nuclear material in Iran is used for peaceful activities, whichever is earlier.

Termination Day—10 years after adoption day...

Fifteen-year commitments—e.g.,

During the 15 year period, and as Iran gradually moves to meet international qualification standards for nuclear fuel produced in Iran, it will keep its uranium stockpile under 300 kg of up to 3.67% enriched uranium hexafluoride (UF₆) or the equivalent in other chemical forms.

Comments by others—e.g., Francois Heisbourg⁶, Amos Yadlin.

“But François Heisbourg, a renowned French expert on nuclear deterrence and proliferation, argues that Tehran is currently not keen on crossing the nuclear threshold, and will likely not even seek to do so even after the nuclear agreement expires in 15 years. Rather, he explained, the regime suffices (and will probably suffice) with what he calls “recessed deterrence.” In addition to avoiding the various headaches that come with operating a military nuclear program, most notably international sanctions, staying clear of the club of nuclear powers gives Iran greater flexibility to wage conventional warfare, Heisbourg argues.

““The Iranians have made their point,” said Heisbourg, who chairs the UK-based [International Institute for Strategic Studies](#) and the Geneva Centre for Security Policy. “They have shown that under certain circumstances they could become a nuclear power. That has value in itself. It provides a form of deterrence, which is, ‘Don’t fuck with me. I am not a nuclear power but I could become one tomorrow, so behave.’ For the time being, this is more than enough for the Iranians.” “

⁶ www.timesofisrael.com › Israel & the Region, 1 Feb 2016

And Amos Yadlin and others⁷,

“U.S. Jews might therefore wonder: Why are there no prominent Israeli voices supporting the Iran deal? Well, the noise has drowned out the fact that a phalanx of security chiefs has publicly supported the deal.

“I’ll mention just a few. There’s former Military Intelligence chief Amos Yadlin⁸, who heads a leading Israeli defense think tank — and who was one of the pilots who destroyed Iraq’s Osirak reactor in 1981. There’s Isaac Ben-Israel, a former weapons developments chief and current chairman of Israel’s space program. And there’s Ami Ayalon, a former head of Israel’s naval commandos and the Shin Bet security service, and Efraim Halevy, a former Mossad chief.”

⁷ MEMO TO U.S. JEWS: DEFEND ISRAEL, SUPPORT THE IRAN DEAL, Carlo Strenger Aug 26, 2015, Haaretz.

⁸ INSS Insight No. 740, August 30, 2015 *Israel and the United States: Time for a Parallel Agreement*, Amos Yadlin.