



U.S. Purchase of Iran's Heavy Water: Encouraging a Dangerous Nuclear Supplier

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Under the Joint Comprehensive Plan of Action (JCPOA) Iran has agreed to a cap on the amount of heavy water it can have in the country. However, Iran wants to produce more heavy water than it needs, and the JCPOA does not explicitly ban additional production as long as Tehran finds international buyers for any excess. The United States intends to buy about 32 tonnes of Iranian heavy water that has been temporarily stored in Oman, and it may buy more.¹ The heavy water sale risks legitimizing Iran as a nuclear supplier despite it not being one. Iran has frequently violated other nations' export control laws, among other laws, and a series of United Nations resolutions instituting an embargo on its access to nuclear goods, which was designed to prevent it from outfitting its previously sanctioned nuclear programs. Significantly, it continues to violate remaining United Nations and national missile and conventional arms embargos. The sale also risks disrupting a North American commercial supply chain of heavy water at a critical time. The United States should consider ending the planned purchase of heavy water, encourage Iran to stop making excess heavy water, and blend down any excess to normal water. If the US purchase cannot be reversed it should be a one-time occurrence. The use of Oman as an intermediate storage area for excess Iranian heavy water should be ended.

Iran's Heavy Water Inventory and Exports

The International Atomic Energy Agency (IAEA) has not released the amount of heavy water in Iran prior to Implementation Day but this amount can be estimated. Heavy water is a controlled, non-radioactive nuclear material used in nuclear reactors and a growing number of non-nuclear civil applications. On Implementation Day, according to the IAEA, Iran had less than the cap under the JCPOA, which is set at 130 tonnes of heavy water.² However, Iran continued producing heavy water at the Arak Heavy Water Plant and reached an inventory of

¹ Jay Solomon, "US to Buy Material Used in Iran Nuclear Program," *The Wall Street Journal*, April 22, 2016. <http://www.wsj.com/articles/u-s-to-buy-material-used-in-iran-nuclear-program-1461319381>

² IAEA Director General, *Verification and Monitoring in the Islamic Republic of Iran in light of United Nations Security Council Resolution 2231 (2015)*, February 26, 2016. http://isis-online.org/uploads/isis-reports/documents/IAEA_Iran_Report_February_26_2016.pdf

130.9 tonnes on February 17, 2016, slightly in excess of the cap.³ Shortly afterward, on February 24, Iran exported 20 metric tonnes of heavy water, lowering its inventory to about 111 tonnes.

This export has allowed Iran to continue producing heavy water without constantly violating the cap. According to the IAEA, the Arak plant can produce heavy water at a rate of about 16 tonnes per year. Thus Iran is assured of being able to keep the Arak plant running at full capacity for at least the next year and a quarter, unconstrained by the JCPOA heavy water cap.

Although the IAEA did not provide the destination of the exported heavy water, officials have said it was Oman. Iran exported the heavy water without having a buyer at the time of export, a fact omitted in IAEA and US government public reporting. Reports have also omitted that Iran appears to have exported some additional heavy water to Oman before Implementation Day. We learned from a number of P5+1 officials that, as of a few months ago, Oman had received from Iran 50 tonnes of heavy water in total. This would mean that Iran had likely exported around 30 tonnes of heavy water before Implementation Day, in addition to the 20 tonnes exported on February 24. The pre-Implementation Day export was likely done with the intention of bringing Iran into compliance with the cap of 130 tonnes, without requiring Iran to blend down this heavy water to regular or “light” water. Thus, prior to Implementation Day, Iran likely possessed at least 160 tonnes of heavy water. It is possible that the total inventory was larger and Iran blended some of its heavy water down to the level of regular water. However, there is no evidence that any downblending occurred.

The heavy water planned for sale to the United States will come from this Oman stock. Heavy water is a sensitive material that requires an export license and is controlled by the Nuclear Suppliers Group (NSG) Part I list. It is unclear if the United States is receiving an export license from Oman for the retransfer of the heavy water.

JCPOA Requirement and U.S. Purchase

The JCPOA not only includes a cap on Iran’s heavy water possession, but also states, “All excess heavy water...will be made available for export to the international market based on international prices and delivered to the international buyer for 15 years.”⁴

There is no mention in this provision regarding Iran exporting heavy water, in this case to Oman for temporary consignment, without delivering it to a buyer, or that the P5+1 will aid Iran in selling heavy water. Few details about this secret arrangement are available but no evidence has emerged that Oman took ownership of the heavy water. This arrangement appears to exploit a loophole in the JCPOA that benefits Iran.

³ *Verification and Monitoring in the Islamic Republic of Iran*, op. cit.

⁴ *Joint Comprehensive Plan of Action*, Vienna, July 14, 2015, p. 9.

<https://www.documentcloud.org/documents/2165388-iran-deal-text.html>

When the Wall Street Journal first learned of this sale of heavy water, a surprise was that Iran was having problems finding buyers for its heavy water and yet had no intention of halting production or blending excess down to regular water. The Obama administration appears to have hurried to come up with a stopgap measure to help Iran meet its heavy water cap obligations both on Implementation Day and afterward. It did not announce the sale publicly or the planned use of Oman to store the heavy water, and likely wanted these actions kept secret.

A straightforward reading of the JCPOA would conclude that Iran could export its excess heavy water after it found a buyer, in particular, after it signed a purchase contract. This reading would have obligated Iran to stop making more heavy water and possibly blend down some of its existing heavy water.

US Representing Iran's Heavy Water Interests

Iran's uses for any heavy water are far below the annual output of the Arak heavy water plant, but it has insisted on continuing to produce heavy water at the plant's nominal level. To prevent Iran from exceeding the cap, the Obama administration effectively made itself an agent for Iran's heavy water interests. Iran has been unable to find buyers in a market where there is no pressing shortage of heavy water. There are already several established heavy water producers, including in Canada, India, and Argentina.

Moreover, administration officials have appeared to support the idea of encouraging and legitimizing Iran as a supplier of heavy water. US Secretary of Energy Ernest Moniz told The Wall Street Journal: "The idea is: OK, we tested it, it's perfectly good heavy water. It meets spec. We'll buy a little of this." He continued, "That will be a statement to the world: 'You want to buy heavy water from Iran, you can buy heavy water from Iran. It's been done. Even the United States did it.'" This comment has the unfortunate implication of turning the United States into a promoter and legitimizer of Iran's heavy water sales.

Most of the 32 tonnes of Iranian heavy water is unallocated and potentially available for sale to private companies. Six tonnes were immediately slated for DOE's Spallation Neutron Source (SNS) at Oak Ridge National Laboratory, which uses neutrons to study the makeup of a range of materials.⁵ Other DOE facilities may receive some of the heavy water as well, but the bulk of it appears unallocated or is being considered for sale to private industry. According to the Wall Street Journal, the heavy water could be sold to private US companies that use heavy water for non-nuclear commercial applications, such as the production of semiconductors and fiber optic equipment, and in making pharmaceuticals. Moniz also told the Wall Street Journal that American companies could emerge as buyers of the material.⁶ "We're not going to be their [Iran's] customer forever," Mr. Moniz said. "Maybe some companies in the U.S. will be part of that customer base. They've got to figure it out. [The Iranians] have to establish their presence

⁵ Frank Munger, "ORNL benefits from Iran deal; heavy water will enhance operations at Spallation Neutron Source, Knoxblogs.com, April 22, 2016. <http://knoxblogs.com/atomiccity/2016/04/22/ornl-benefits-from-iran-deal-heavy-water-will-enhance-operations-at-spallation-neutron-source/>

⁶ *The Wall Street Journal*, op. cit.

on the international market if they're going to keep producing [heavy water]," he concluded. Indeed, as Mr. Moniz predicted, US companies are exploring buying some of the Iranian heavy water purchased by the DOE (described further below).

The US stamp of approval will benefit Iran in ways that go beyond the more than \$8 million dollar sale price for the heavy water. Iran could see a boost in other customers' willingness to buy its heavy water. Russia is reportedly interested in buying 40 tonnes of heavy water.⁷

Risk of Falsely Legitimizing Iran as a Responsible Nuclear Supplier

Administration officials have been unwilling to rule out legitimizing Iran as a commercial supplier of heavy water. However, such a policy puts the notion of Iran as a nuclear supplier on a dangerous slippery slope and could lead to Iran's sale of a wide range of nuclear and nuclear-related goods to questionable customers.

Iran's ultimate goal is likely improving its chance of exporting many nuclear and nuclear-related goods, including dual-use goods. The sale of the heavy water is critical to that endeavor. "We are enhancing the industrial section of Iran's nuclear activities technologically with modern systems and machines," said Ali Akbar Salehi, head of Iran's Atomic Energy Organization (AEOI), to a gathering of Iran's ambassadors and envoys to foreign states.⁸ He underlined that the AEOI has been able to establish Iran as an exporter of nuclear products, including heavy water, on international markets, according to Fars News Service.⁹

The US encouragement and legitimization of Iran's nuclear trade is happening at a time when Iran has not proven that it is a responsible nuclear technology state or supplier. In fact, it continues to act in the opposite manner. It still engages in illicit international purchases for its sensitive missile and military programs in violation of UN Security Council resolution (UNSCR) 2231 (2015). These illegal efforts are endorsed by senior Iranian officials. In August 2014, President Hassan Rouhani said, "Of course we bypass sanctions. We are proud that we bypass sanctions."¹⁰ Senior Iranian officials on Iran's Special Parliamentary Commission tasked with approving the nuclear deal stated in October 2015 that Iran does not intend to implement sections of UNSC resolution 2231 that compromise defense and national security, such as

⁷ "AEOI Chief: Iran's N. Program Undergoing Technological Enhancements," Fars News Service, May 14, 2016. <http://en.farsnews.com/newstext.aspx?nn=13950225000938>.

⁸ "AEOI Chief: Iran's N. Program Undergoing Technological Enhancements," op. cit.

⁹ "AEOI Chief: Iran's N. Program Undergoing Technological Enhancements," op. cit. Salehi also mentioned the sale of low enriched uranium (LEU). However, the impact of LEU sales are significantly less than the sale of heavy water because Iran is selling its LEU to Russia and not on the international market. Moreover, the JCPOA commits the E3/EU+3 to "facilitate, where applicable, the conclusion and implementation" of a contract to sell the excess LEU. Like in the case of heavy water, however, the United States should block Iran selling LEU on the international market, rather than just to Russia. Iran's sale of LEU internationally would also be counterproductive to US and international nonproliferation interests.

¹⁰ "Iran President Rouhani Hits Out at U.S. Sanctions," BBC News, August 30, 2014. <http://www.bbc.com/news/world-middle-east-28997452>

restrictions on missile and conventional armament procurements.¹¹ Resolution 2231 codifies the JCPOA into international law and bans missile and conventional arms sales to Iran for eight and five years, respectively. The United States, then, is overlooking compliance on these missile and military embargo obligations while encouraging nuclear related sales. Despite the JCPOA, Iran remains a state engaged in illicit commodity trafficking, where its top leaders encourage schemes to violate supplier laws, including those of the United States.

Iran also trades missiles and conventional weapons with North Korea in violation of UN Security Council resolutions. Tehran hosts representatives of Korea Mining Development Trading Corporation (KOMID), North Korea's primary arms dealer and main exporter of goods and equipment related to ballistic missiles and conventional weapons. KOMID, a North Korean state-owned entity, was sanctioned in 2005 by the Treasury Department for its role in North Korea's proliferation of weapons of mass destruction and was also sanctioned by the United Nations in April 2009.¹² KOMID has offices in multiple countries around the world, including Iran, and facilitates weapons sales for the North Korean government. A senior United Nations official has said that Iran has allowed KOMID representatives based in Tehran to travel frequently to neighboring countries, including the United Arab Emirates and Pakistan. Via KOMID or other North Korean entities, Iran could easily conduct secret nuclear-related business with North Korea in violation of US and international sanctions. It could also do business with other sanctioned countries or even other proliferant states.

This legitimization is even more problematic because the JCPOA is weak on setting conditions on Iran's export of sensitive goods. According to section P annex 1 of the JCPOA, "Iran *intends (italics added)* to apply nuclear export policies and practices in line with the internationally established standards for the export of nuclear material, equipment and technology." Surprisingly, the JCPOA does not require Iran to do so; it only gives assurance that Iran intends to act responsibly. When it would apply these standards is unspecified. Section P does restrict for 15 years Iran's ability to engage in exports of enrichment or enrichment related equipment and technology (and related research and development activities); such exports need the approval of the JCPOA's Joint Commission. Although this provision is important, it is far too limited in scope. Iran could secretly export dual-use goods needed for the functioning of an enrichment plant to North Korea with little chance of being detected. Many sensitive dual-use goods used in other nuclear programs, or in missile, conventional arms, and other military industries, are not covered by the JCPOA export provisions.

If Iran is legitimized as a nuclear supplier, it will likely also find it easier to convince foreign suppliers to sell it a range of controlled goods. They may do so in violation of the Procurement Channel that Iran is obligated to use under UN resolution 2231. Iran has a range of goods it

¹¹ "The Iranian Parliament's Response to President Rouhani: The JCPOA Committee Report," Persian document translated by Jordan Olmstead and Paul Bucala, ed. Frederick W. Kagan (Washington, D.C.: American Enterprise Institute, November 2015), pp. 6-7. http://www.irantracker.org/sites/default/files/imce-images/JCPOA_Committee_Report_Translation.pdf

¹² US Department of Treasury, "Treasury Imposes Sanctions Against the Government of The Democratic People's Republic Of Korea," January 2, 2015. <https://www.treasury.gov/press-center/press-releases/Pages/jl9733.aspx>

needs to acquire illegally for its missile, conventional arms, and perhaps even its nuclear programs. Its illicit procurement activities may thus benefit from exploiting the optics of the heavy water sale and a lack of knowledge (or willingness to turn a blind eye) by many worldwide suppliers about their obligations to have nuclear related sales approved by the UN procurement channel and avoid sales to Iran's missile and conventional arms programs.¹³

Iran may also seek dual-use goods from abroad that it cannot manufacture and possibly retransfer them without approval to sanctioned countries. The goods could become part of exported manufactured systems or re-exported as is. Detecting and preventing retransfers is a recurring problem in a number of countries, and Iran may turn into a difficult case given its current attitudes and practices with regard to nuclear, missile, and military commodity trafficking. It is risky to encourage in any way Iran's entry into the international nuclear export market.

There is also a basic moral dimension to this debate. The Arak heavy water plant is one of the many Iranian nuclear facilities that depended on illegally procured goods and know-how from abroad in violation of export and sanctions laws of many countries. The United States is planning to knowingly buy a product that has likely been produced by infringing on other countries' or companies' patent rights and by violating UN sanctions and many countries' trade control laws, including possibly the United States' own trade control laws.

The administration's actions to buy heavy water and encourage others to do so also needlessly risks US national security by perpetuating an Iranian nuclear program originally (and perhaps one day again) intended for devotion to nuclear weapons production. Iran produced heavy water for the Arak reactor, which was likely designed initially for plutonium production for nuclear weapons rather than for civilian use. Because of its use in nuclear reactors able to relatively easily make plutonium for nuclear weapons, heavy water is a tightly controlled material. Moreover, the Iran deal requires Iran to modify the Arak reactor so it cannot be misused for plutonium production and bans stockpiling of heavy water. Although it has no real need for making heavy water, Iran wants to preserve its capability to make heavy water throughout the length of the JCPOA. After the deal's major nuclear restrictions end after 15 years, nothing would stop Iran from greatly exceeding the heavy water cap and building a heavy water reactor able to make weapon-grade plutonium.¹⁴ Working instead to press Iran to get out of the heavy water business is in the US interest and is consistent with the JCPOA.

Negative Impacts on Commercial Business in North America

¹³ For further discussion of Iran's potential for exploiting loopholes in the UN procurement channel, see: Albright and Stricker, "The Iran Nuclear Deal's Procurement Channel: Overcoming Post-Implementation Day Issues," Institute for Science and International Security Report, April 21, 2016. http://isis-online.org/uploads/isis-reports/documents/JCPOA_Procurement_Channel_Post_Implementation_Day_21April2016_Final1_1.pdf

¹⁴ *Heavy Water Reactor Restrictions in the JCPOA*, Institute for Science and International Security Report, July 27, 2015. http://isis-online.org/uploads/isis-reports/documents/Heavy_Water_Reactor_Restrictions_Final.pdf

The Department of Energy did not need to purchase the heavy water from Iran and could have bought it from India, Argentina, or Canada. Because DOE's current needs for the heavy water are relatively modest, most of the recent purchase is being considered for sale to private industry. However, in addition to the negative security implications, the US purchase of the heavy water from Iran threatens the development of a reliable North American supply chain of heavy water. The use of heavy water has been increasing and finding reliable suppliers of heavy water is important. Canada in particular has been creating a reliable, long-term heavy water supply able to meet the projected increased need in North America and elsewhere. US purchases from Iran undermine this commercial plan and thus the development of a reliable heavy water supply chain for the United States. The US decision to buy Iran's heavy water involves a country that is unlikely to become a reliable supplier to the North American market. It also favors Iran over a close ally.

Iran's unreliability was evident recently, when the head of AEOI threatened to block the export of heavy water to the United States over an unrelated issue. Salehi said, "The heavy water supply was due to be delivered to the US but we exercised caution after the US blocked \$2bn [billion] of Iran's assets (referring to a recent court ruling by the US Supreme Court which authorized the transfer of \$2 billion of Tehran's frozen assets to the families of the victims of a 1983 bombing in Beirut)." ¹⁵ "As long as this issue is not resolved, we will negotiate on ways of payment (for the heavy water supply to the US) and other things in a bid to gain confidence," Salehi said. Iran has many contentious issues with the United States that it could use to threaten a heavy water purchase or seek unrelated concessions from the US government.

Moreover, the DOE potentially gave Iran an unfair price advantage. It bought the Iranian heavy water at a reduced price (10-20 percent less) than what it would have paid if it bought the heavy water on the commercial market at the going market price. Although this amount appears relatively small, by paying less, the DOE could give Iran an unfair advantage in the US heavy water market. Moreover, Iran likely paid much more to produce it. The Iranian government may be subsidizing the sale to unfairly undercut international competition. The DOE has not yet set a price for the heavy water and, under US law, it must recover all the costs associated with the purchase, including the price to buy the heavy water, and the assaying, repackaging, and storage of it. However, if the final price is below the market value, the sale would be unfair to commercial sellers of heavy water.

In addition, Iran cannot directly sell any heavy water to US companies because of on-going US sanctions. In essence, the US government is providing a way to bypass its own sanctions laws and allow sales of banned goods to US companies.

Media has stated that the DOE said its normal purchases from Canada were disrupted this year, implying that it needed to buy heavy water from Iran. However, our research has shown that this is false. The Spallation Source Reactor had engaged in a procurement process, formally launched in 2015 but informally started in 2014, to buy six tonnes of heavy water commercially.

¹⁵ "AEOI Chief: Iran's N. Program Undergoing Technological Enhancements," op. cit.

When it was informed from the senior political level of the Iran sale of heavy water, it cancelled the procurement process. During the procurement process no problems in obtaining sufficient amounts of adequate heavy water were identified. Certainly, there were no Canadian disruptions. In fact, there have been many large exports of heavy water from Canada to US private customers during 2016.

There were also erroneous media reports that the SNS team had been looking for a supply of high-quality heavy water for years, largely without success because there is no domestic producer of the water, again implying that the purchase of Iranian heavy water was necessary and ignoring the key role played by sellers in Canada. In 2007, SNS sought heavy water for use in a certain component, called the inner reflector plug, but was unable to obtain it from existing DOE stocks, which are reserved for use in nuclear weapons, and had to use light water instead because it had not budgeted any funds to buy heavy water commercially.¹⁶ With the routine replacement of the reflector plug scheduled for 2017, the SNS had obtained the budget to launch a procurement process to buy the heavy water commercially. It was this procurement that was abruptly cancelled when the United States decided to buy the heavy water from Iran.

In this case, the US government is unduly intruding into the commercial heavy water market, helping an irresponsible nuclear supplier and one that is not likely to become a reliable supplier. The purchase of Iranian heavy water is unwise for US interests in developing a reliable, long term supply of heavy water for the US government and businesses.

Conclusion

The Oman loophole and US agreement to purchase Iran's heavy water are poorly conceived policies. The United States should seriously consider backing out of the sale. The Oman loophole for temporary consignment of heavy water should be ended. Iran should be held to the provision that it will export heavy water only after it has officially sold it. Moreover, the United States and JCPOA partners should lead by encouraging Iran to stop producing the material and pledge to refrain from buying any additional heavy water. If Iran violates the heavy water cap as a result, it will need to down blend the heavy water to regular water or be in violation of the JCPOA.

This US heavy water purchase shows the dangers of secrecy and lack of adequate Congressional oversight over the implementation of the JCPOA. This issue also adds to the view that the administration, whether or not fair, appears more dedicated to protecting the JCPOA against critics and helping Iran avoid its own self-created, potential violations of the JCPOA, in this case, surpassing the heavy water cap.

¹⁶ Frank Munger, "Y-12's shrinking supply of 'heavy water' could affect weapons work," Knoxnews.com, July 18, 2008. <http://cdn.knoxblogs.com/atomiccity/wp-content/uploads/sites/11/2011/06/y-12s-shrinking-supply-heavy-water-could-affect-we?print=1>

The US government is also interfering in the commercial heavy water market, helping an irresponsible nuclear supplier and one that is unlikely to become a reliable supplier, when it could buy this heavy water from a close ally. If the sale is finalized, the DOE should not sell any of the heavy water commercially, stockpiling it for future use in DOE civilian facilities.

US companies would be wise to be careful in any dealings with Iran or its agents. Iran remains a center of illicit procurements, anxious to find ways to circumvent US export controls and sanctions.

The United States should acknowledge that Iran is an irresponsible state dedicated to illicit commodity trading activities throughout the world and broadly warn companies and governments about the danger of doing business with it. If Iran wants to show it has embarked on a more responsible path, the first test should be that it announces it will stop its illicit procurements for missiles and conventional arms as obligated under UNSCR 2231. It should also strictly adhere to the UN procurement channel provision regarding nuclear supply. Iran should prove that it is a responsible nuclear supplier before encouraging it to engage in international nuclear sales.