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# Assessing the Feasibility of an Attack of Iran's Nuclear Infrastructure in the Event of a Violation of the JCPOA

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ASSESSING THE FEASIBILITY OF AN ATTACK ON IRAN'S NUCLEAR INFRASTRUCTURE IN  
THE EVENT OF A VIOLATION OF THE JCPOA

By

Cameron Nicholas Rentschler

Submitted in Partial Fulfillment  
of the Requirements for  
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## **Introduction**

Few issues have dominated American foreign policy over the past 30 years than the contentious relationship that America holds with Iran. Of particular concern has been how the US should respond to the existence of an illicit nuclear program within Iran. As of January 16<sup>th</sup> of 2016 however, US-Iran relations entered a new era with the full implementation of the Joint Comprehensive Plan of Action which outlines actions that Iran must take and maintain in order to rejoin the international community as a country with a legitimate interest in nuclear power. However, as we have learned from past nuclear deals, the JCPOA doesn't guarantee that Iran will continue to follow international agreements in regards to its nuclear program. Because of the past experience that US has had with countries who have made commitments about their nuclear programs, it is necessary that we continue to analyze all facets of our relationship to Iran, and the threat of their nuclear program.

If we trust solely in international diplomacy, we lose the ability to retaliate in the event that Iran doesn't uphold their end of the bargain. Without the guarantee of enforcement of the deal, Iran will have no incentive to continue to follow the deal. Because of this, continued analysis is necessary into the ability of the US and other countries to forcefully ensure that Iran doesn't expand its current peaceful nuclear energy program into a dangerous nuclear arms program.

This analysis must include the possibility of a preemptive strike occurring in an attempt to delay Iran acquiring nuclear weapons. This paper will attempt to conduct such an analysis. The goal of this work is to determine if the US or Israel currently have the ability to put a halt to Iran's development of a nuclear weapon if

necessary. While this option is not needed at the moment, and is not, and should not be a topic of heated debate it remains an important peripheral issue. The wisdom of actually attacking Iran is a simple issue right now: it isn't necessary. In fact, debating the wisdom of such an attack will largely be left out of this analysis. Except where that discussion directly is impacted by the ability of the US or Israel to successfully stop the development of a nuclear bomb by Iran, I will leave the topic without discussion.

What I will discuss is what an attack would look like, if the necessity arises. Before that analysis can take place, in Part I, a brief discussion of the development of the Iranian- US relations is necessary, along with a brief discussion of the history of Iran's nuclear program in order to understand what facilities are important to the program. In Part II, I will briefly analyze the US and Israeli forces in the region, and their capabilities based on previous conflicts. In Part III, I will perform an analysis of the capabilities to inflict long-term damage on the Iranian nuclear weapons program based on current capabilities.

## **Part I: Historical Perspective**

For most current scholars, Iran has always been an enemy. This however, has not always been the case when we look to the period before the post-Cold War world. In fact, Iran was one of America's major projects for the early part of the Cold War. Based on both geographic and political factors, the US spent a considerable amount of time attempting to reform Iran into a modern, industrialized nation. Iran and the US shared many of the same interests in the region and the alliance between

the US and Iran was a pragmatic one<sup>1</sup>. This was accomplished through ensuring a pro-US leader in the coup of 1953 to install a Prime Minister in Iran that would allow that Shah of Iran, Mohammad-Rezā Shāh Pahlavi to rule more directly. This coup was unpopular in Iran and led to the widespread anti-American sentiment that we see today. The US was generous in its arming of the now powerful Shah and many of these armaments still remain in Iranian control.

Friendly relations also existed between Israel and Iran during this period. Following the creation of Israel, Iran was one of the first countries to create economic and political ties with Israel<sup>2</sup>. These relations were abruptly disrupted with the Iranian revolution of 1979, and the rise of an anti-Israel regime that continues to rule today<sup>3</sup>.

The revolution in Iran was in part due to the perception that the Shah had surrendered much of the control of both Iranian military and economic affairs to the Americans, losing the support of the Iranian populace in the process<sup>4</sup>. The Iranian revolution suddenly changed the dynamic of US policy goals in the Middle East. What had been a friendly government ruled by an ally became overnight a sworn bitter enemy, whose establishment was at least partially focused on decreasing US influence in the area.

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<sup>1</sup> Vakil, Sanam(2014) Obama's Iranian Gamble, *The International Spectator: Italian Journal of International Affairs*, 49:3, 8-13, DOI: 10.1080/03932729.2014.952980. At 9.

<sup>2</sup> Slager, Katherine. "Legality, Legitimacy and Anticipatory Self-Defense: Considering an Israeli Preemptive Strike on Iran's Nuclear Program." *N.C. J.INT'LL.&COM. REG.* 38 (2012): 267-325. Print. At 308.

<sup>3</sup> Ibid. At 308.

<sup>4</sup> Vakil, Sanam(2014) Obama's Iranian Gamble, *The International Spectator: Italian Journal of International Affairs*, 49:3, 8-13, DOI: 10.1080/03932729.2014.952980. At 9.

The resulting Iranian state was predisposed to see itself as a counter to the US by a number of factors. Key among these was the opposition of Ayatollah Khomeini. Khomeini saw the US as a threat to Iran and wanted to extract, as much as possible Iranian interests from interacting with American interests. It was Khomeini's view that US and Iranian interests were diametrically opposed<sup>5</sup>. This state view of the US was combined with a revival of a nationalist sentiment among the populace that hearkened back to the greatness of the Persian Empire. This opposition from the very founding of the Islamic Republic helped to create the animosity that we see today between the two countries.

Even if the Iranian Revolution hadn't severally damaged US-Iranian relations, the Iran-Iraq war would. Throughout the war, largely due to the results of the Iranian Hostage Crisis and the Iranian Revolution, the US supported the Iraqis in the war<sup>6</sup>. While the US did not intervene directly, it did supply Saddam Hussein's Iraqis with the technology to fight the Iranians to a stalemate. During the war, Saddam used chemical weapons against the Iranian people to devastating effect. To this day, US support for Iraq is linked to those chemical attacks<sup>7</sup>.

It is in this context of a contentious relationship that recent efforts to negotiate an end to the contested nature of Iran's nuclear program have taken place. While the original relationship showed a great deal of promise for promoting

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<sup>5</sup> Barzegar, Kayhan Iran-US Relations in the Light of the Nuclear Negotiations (2014), *The International Spectator: Italian Journal of International Affairs*, 49:3, 1-7, DOI: 10.1080/03932729.2014.953311. At 2.

<sup>6</sup> Vakil, Sanam(2014) Obama's Iranian Gamble, *The International Spectator: Italian Journal of International Affairs*, 49:3, 8-13, DOI: 10.1080/03932729.2014.952980. At 10.

<sup>7</sup> Ibid. At 10.

stability in the region, the events of the Islamic Revolution removed any chance of a close partnership.

The central issue of contest between Iran and the US since those events has been the existence of a nuclear program within Iran. While secrecy shrouded the program through the 1990s, the revelation that Iran was developing its nuclear capabilities made the nuclear issue the centerpiece of the US-Iranian conflict.

Shortly following the Iranian revolution and the end of the Iran-Iraq war, Iranian authorities decided to restart the nuclear program that had been initially started under the shah. Two primary reasons are noted for this strategic move, both of which were due to the Iranian experience during the Iraq-Iran war: first, US involvement and support for Iraq during the war led to a desire to counter US hegemony in the region, and second, the energy shortage during the war also showed a need for the development of alternative energy sources to supplement Iran's vast oil reserves<sup>8</sup>. Iran's view of US policies in the region have been increasingly hostile

In 2011, an IAEA report noted that Iran might have been carrying out actions that would lead to a nuclear weapon<sup>9</sup>. Iran has extensively researched the development of nuclear weapons, though they have never addressed these

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<sup>8</sup> Hussain, Nazir and Abdullah Sannia. "Iran Nuclear Deal: Implications for Regional Security" *Journal of Political Studies*, Vol. 22, Issue - 2, 2015, 475:493. At 478.

<sup>9</sup> *Ibid.* At 309.

accusations.<sup>10</sup> Rather, Iran continues to claim that they are not pursuing weapons, but only the right to the peaceful use of nuclear energy<sup>11</sup>.

Throughout this troubled history, several attempts have been made to negotiate with Iran in order to find an internationally acceptable solution to the question of Iran's pursuit of nuclear weapons. One of the first attempts was by the EU-3 in 2003 when Germany, France, and the UK unsuccessfully attempted to initiate a diplomatic process<sup>12</sup>. These negotiations, which were to cover a broad range of topics, including security and counterterrorism were predicated on Iran halting progress towards enrichment during the negotiations. When it was discovered that Iran was continuing the process towards enrichment, the negotiations were halted. This process, along with several others, all failed to produce significant results.

In 2010, UNSC Resolution 1929 began the implementation process of a host of sanctions against Iran for its continued nuclear program<sup>13</sup>. The negotiation process ultimately led to an interim agreement in 2013 known as the Joint Plan of Action<sup>14</sup>. The Joint Plan of Action then led to Joint Comprehensive Plan of Action (JCPOA). The JCPOA includes five key areas of agreement.

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<sup>10</sup> Cordesman, Anthony H. "Analyzing the Impact of Preventive Strikes Against Iran's Nuclear Facilities." Center for Strategic and International Studies, 10 Sept. 2012. Web. 19 Nov. 2015. At 14.

<sup>11</sup> Hussain, Nazir and Abdullah Sannia. "Iran Nuclear Deal: Implications for Regional Security" *Journal of Political Studies*, Vol. 22, Issue - 2, 2015, 475:493. At 479.

<sup>12</sup> Hussain, Nazir and Abdullah Sannia. "Iran Nuclear Deal: Implications for Regional Security" *Journal of Political Studies*, Vol. 22, Issue - 2, 2015, 475:493. At 479.

<sup>13</sup> *Ibid.* At 479.

<sup>14</sup> *Ibid.* At 479.

First, the JCPOA contained strict limits on enrichment. Under the JCPOA, Iran agreed to severely limit the amount of uranium that it enriches, as well as limiting the extent to which it enriches uranium. It also requires that the Fordow enrichment facility be used exclusively for peaceful purposes<sup>15</sup>. While Iran was enriching uranium to 20% LEU at Natanze and Fordow<sup>16</sup>, under the JCPOA enrichment will be limited to 3.67%<sup>17</sup>. The enrichment requirements extend the breakout period for the production of a nuclear weapon from the current 2-3 months estimate to a full year under the JCPOA<sup>18</sup>. The importance of the level of enrichment is what each level of enrichment is used for. LEU is used for peaceful purposes such as creating energy, only has to be enriched to just below 5%. Research reactors often contain uranium that is enriched up to 20%. Finally, nuclear weapons contain uranium that is enriched to 90%. Thus, enrichment is the key to creating nuclear weapons, and the JCPOA, if followed will prevent the Iranians from possession of the materials to build a weapon.

Second, the JCPOA provides for extensive accountability measures by requiring that Iran allow regular inspection by IAEA inspectors. These inspections will allow the international community to ensure that the other provisions of the JCPOA are being followed. These inspections also will be the likely way that the international community will find out if violations are occurring. Because the JCPOA

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<sup>15</sup> Ibid. At 481.

<sup>16</sup> Cordesman, Anthony H. "Analyzing the Impact of Preventive Strikes Against Iran's Nuclear Facilities." Center for Strategic and International Studies, 10 Sept. 2012. Web. 19 Nov. 2015. At 14.

<sup>17</sup> Hussain, Nazir and Abdullah Sannia. "Iran Nuclear Deal: Implications for Regional Security" Journal of Political Studies, Vol. 22, Issue - 2, 2015, 475:493. At 480.

<sup>18</sup> Hussain, Nazir and Abdullah Sannia. "Iran Nuclear Deal: Implications for Regional Security" Journal of Political Studies, Vol. 22, Issue - 2, 2015, 475:493. At 480.

requires extensive access for the IAEA, any restrictions that Iran places on these inspections will be met with extreme suspicion.

Third, further development of a heavy water reactor at Arak will be halted, with the site being redesigned in a way that ensures that plutonium won't be produced through the operation of the nuclear reactor. The JCPOA requires that the core of the heavy water reactor be destroyed and Iran is prevented from building any further heavy water reactors for the next 15 years. Plutonium is a second path that Iran could use to create a nuclear weapon. While some nuclear weapons are made with Highly Enriched Uranium (HEU), another weapon design uses plutonium, which is one of the byproducts of the production of electricity from a heavy-water reactor. The JCPOA would through this requirement cut off the second path to a nuclear weapon that Iran could take.

Fourth, all nuclear related sanctions were lifted from Iran. However, if Iran were to fail to abide by the JCPOA, the sanctions would be implemented again.

Lastly, timing restrictions. Iran is restricted in its enrichment activities for the next 10 years, and is banned from building any new enrichment or heavy-water reactor for the next 15 years.

The JCPOA marks one major step towards the resolution of the Iranian nuclear question. Ideally speaking, no military action will be necessary. The success of the JCPOA to this point gives reason for optimism for continued improvements in US-Iranian relations. While other issues were not on the table while negotiating the nuclear deal, the JCPOA does lay the groundwork for future negotiations on a host of

issues by reestablishing diplomatic ties<sup>19</sup>. It is important that the US continues to show that it is serious about enforcing the nuclear deal. The key to doing this is to ensure that Iran understands that the US is keeping a military option available. A US presence in the region is a key part in an attempt to signal to Iran that the JCPOA will be enforced<sup>20</sup>. The only foreseeable reason for Iran to violate the JCPOA were if it decided to create a nuclear weapon. The restrictions set out in the JCPOA are limited enough that the operation of a civilian nuclear program will not be significantly impacted by the treaty. Should the JCPOA be followed by Iran, it will have been one of the most successful examples of international diplomacy. However, if it fails, world powers will be left with a highly capable Iranian nuclear program and a government apparatus set on the creation of a nuclear weapon.

All result and legacy of these negotiations and diplomacy now rest solely with Iran. The necessity of a preemptive strike is largely dependent on Iran finally deciding to create a nuclear weapon. Unless Iran does so, the decision on the part of the US or other nations to attack Iran would be met with condemnation from around the world. This is to say nothing of the opposition at home to attacking a sovereign nation without provocation. That Iran will at some point chose to create a nuclear weapon is far from given. After all, Iran has the technical ability to make nuclear

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<sup>19</sup> Barzegar, Kayhan Iran–US Relations in the Light of the Nuclear Negotiations (2014), *The International Spectator: Italian Journal of International Affairs*, 49:3, 1-7, DOI: 10.1080/03932729.2014.953311. At 9.

<sup>20</sup> Davis, Lynn E., and David E. Thaler. "The Role of the USAF in the Days After a Deal with Iran." *The Days After a Deal with Iran: Implications for the Air Force*. RAND Corporation, 2015. Web. 1 Dec. 2015. At 2.

weapons, but has so far decided against their development<sup>21</sup>. It is interesting that Iran continues to act in a way that keeps its status among the international community in question. Rather than being open about their nuclear program, and being allowed to operate a nuclear industry to its fullest potential, Iran has continued to operate in secrecy, moving from one crisis point to another, dodging sanctions while struggling to maintain their nuclear program<sup>22</sup>. Perhaps under the JCPOA the Iranians will operate in an open way that avoids crises, however, based on the initial months under the JCPOA, including the continued testing of ballistic missiles and the capture of US military personnel, it appears that Iran will continue to act in an aggressive way towards the US in the region. This does not necessarily mean that they will violate the JCPOA, but it does set the stage for further confrontations. US sanctions and condemnation remain in place for some other Iranian actions. Events following the JCPOA indicate that US-Iranian relations will remain an area ripe for future conflict.

Rather than taking the final step in creating a nuclear weapon, Iran has so far decided to remain a threshold state, similar to Japan<sup>23</sup>. This option allows Iran to acquire nuclear weapons very quickly should the need arise, all the while avoiding the international condemnation that would come with developing a weapon. Iran

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<sup>21</sup> Mehrish, B N. "Iran's Nuclearization and Its Implications for Global and Regional Security." *IUP Journal of International Relations* 6.2 (2012): 67-79. Ebsco Host. Web. 30 Nov. 2015. At 67.

<sup>22</sup> Miller, STEVEN E. "Proliferation gamesmanship: Iran and the politics of nuclear confrontation." *Syracuse Law Review* 57 (2007): 551. Print. At 564.

<sup>23</sup> Mehrish, B N. "Iran's Nuclearization and Its Implications for Global and Regional Security." *IUP Journal of International Relations* 6.2 (2012): 67-79. Ebsco Host. Web. 30 Nov. 2015. At 68.

has made it clear to the international community that it wants to maintain the ability to create a nuclear weapon, even if the international community protests.

Iran has decided so far not to take the final step. There are several reasons for this posture. In part, of course, the threat from foreign intervention deters the Iranians from developing a bomb, but there also remains strong opposition at home to the development of nuclear weapons. While hardliners support the development of nuclear weapons in order to defend against the ever-present threat from foreign powers<sup>24</sup>. Rather than being political outsiders, many of these hardliners are very powerful within the Iranian government hierarchy. Support for creating a nuclear deterrent includes Grand Ayatollah Khamenei, who believes that nuclear weapons would provide a valuable deterrent against foreign aggression<sup>25</sup>. For many Iranians, war is to be avoided at all costs. This view is heavily influenced by the experience of the Iran-Iraq war, in which Iran was devastated both economically and socially<sup>26</sup>. The Iranian government too is focused on avoiding war, instead working to build up other regimes throughout the region to challenge the presence and influence of the United States<sup>27</sup>. Iran's key strategic goals since the Islamic Revolution have been to deter outside influence from the US while also extending its power throughout the region. This remains the greatest predictor of Iranian action. To this point,

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<sup>24</sup> Takeyh, Ray. "Iran, Israel and the Politics of Terrorism." *Survival* (2006): 83-96. *Taylor and Francis Online*. Web. 1 Dec. 2015. At 57.

<sup>25</sup> Mehrish, B N. "Iran's Nuclearization and Its Implications for Global and Regional Security." *IUP Journal of International Relations* 6.2 (2012): 67-79. *Ebsco Host*. Web. 30 Nov. 2015. At 70.

<sup>26</sup> Barzegar, Kayhan *Iran-US Relations in the Light of the Nuclear Negotiations* (2014), *The International Spectator: Italian Journal of International Affairs*, 49:3, 1-7, DOI: 10.1080/03932729.2014.953311. At 3.

<sup>27</sup> Cordesman, Anthony H. "Analyzing the Impact of Preventive Strikes Against Iran's Nuclear Facilities." *Center for Strategic and International Studies*, 10 Sept. 2012. Web. 19 Nov. 2015. At 11.

developing a nuclear weapon has not served these goals in the estimation of the Iranian government decision makers. However, in the event that the ruling powers judge a nuclear weapon to be in Iran's central interests, they will take the final step.

Iran also has significant reasons to want to create a nuclear weapon. Much as Israel views Iran as an existential threat, Iran views Israel's nuclear arsenal as a dire threat to its national security, in addition to viewing nearly all US actions in the region as being directly threatening to its interests<sup>28</sup>. Israel, unlike all of Iran's other local enemies has a highly advanced conventional and nuclear arsenal that would outmatch Iran's military defenses in the event of a war. Given the position of Iran in relation to Israel militarily, it would make sense that Iran would seek a nuclear weapon. One of the few tools that an otherwise inferior military has to prevent an attack from a nation that they see as an aggressor with a more capable military is the deterrent of a nuclear weapon. If Iran were to acquire a nuclear weapon, Israel would be unable to maintain a credible threat of attack because of the consequences of an Iranian nuclear counterattack. Currently, the Israeli military holds broad advantages over the Iranian military due to technological advancement. However, Iran with a nuclear weapon would make many of these advantages irrelevant, as Iran would always have a credible option to deliver immense levels of destruction to Israel. The pursuit of both of Iran's most important foreign policy goals, deterring an attack from Israel or the US and becoming the regional hegemonic power, would be

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<sup>28</sup> Bahgat, Gawdat. "Nuclear Proliferation in the Middle East: Iran and Israel." 2005, Contemporary Security Policy, 26:1, 25-43, DOI: 10.1080/13523260500116067. At 30.

greatly enhanced by the acquisition of a nuclear weapon<sup>29</sup>. Achieving the technological feat of creating a nuclear weapon makes sense from an Iranian perspective, but perhaps more importantly, Iran's actions *look* like those of a nation interested in creating a nuclear weapon.

Iran's nuclear infrastructure was designed with the ultimate goal of creating a nuclear weapon. While many obstructions exist to Iran ultimately creating a weapon, and while serious reasons exist for the Iranians to avoid crossing that threshold, they have nevertheless created a robust, heavily guarded, incredibly secretive nuclear infrastructure. Iran has largely cited the need for an alternative energy source to compensate for their overreliance on oil. This claim does have some merit. Iran's economy is heavily reliant on the oil industry. Despite its immense oil resources, Iran still has difficulty keeping the lights on from time to time. Population growth and industrialization have increased the energy needs of Iran to the extent that new sources of energy, excluding oil will have to be used extensively by 2020 in order to meet domestic demand while also continuing petroleum exports<sup>30</sup>. Electricity shortages have plagued much of Iran over the past decade, and nuclear energy would provide a consistent, abundant, and nearly limitless supply of electricity. However, given the desperate economic situation that developing a clandestine nuclear program has put Iran in due to international condemnation, continuing to develop nuclear power has done little to help Iran

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<sup>29</sup> Kroenig, Matthew. *A Time to Attack The Looming Iranian Nuclear Threat*. New York: Palgrave Macmillan, 2014. Print. At 32.

<sup>30</sup> Raas, Whitney, and Austin Long. "Osirak Redux? Assessing Israeli Capabilities to Destroy Iranian Nuclear Facilities." *International Security* 31, no. 4 (Spring 2007): 7-33. At 11.

address its energy shortage. Additionally, the international community has not asked that Iran give up nuclear power, rather it has simply expected Iran to act in good faith by avoiding creating easy avenues for a weapon such as HEU or producing plutonium from a Heavy Water reactor.

Much of this analysis assumes that Iran is a rational actor, and that it would avoid any decision that would threaten its continued existence. Though the signing of the JCPOA does indicate that they are willing to negotiate, the Iranians still have exhibited signs that they might act in ways that do not take into account the results of those policies. The rhetoric of the Iranian regime against Israel combined with the overwhelmingly negative view of Israel by the Iranian public could also cause the public to call for the destruction of Israel<sup>31</sup>.

A further complicating factor is Iran's close ties with terrorists throughout the world. Iran is the greatest state supporter of terrorism, funding organizations throughout the world. The United States and other international intelligence agencies have long accused Iran of plotting and carrying out terrorist attacks worldwide, and also supporting various terrorist organizations. While Iran denies the accusation, the US has asserted that Iran even went so far as to plot to assassinate a Saudi Ambassador in Washington DC<sup>32</sup>. The groups that Iran supports

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<sup>31</sup> Mindell, David, A Nuclear Iran: Nuclear Warfare or Regional Hegemony (Fall 2008). Yale Israel Journal, Fall 2008. Available at SSRN: <http://dx.doi.org/10.2139/ssrn.1691913> At 72.

<sup>32</sup> Mehrish, B N. "Iran's Nuclearization and Its Implications for Global and Regional Security." *IUP Journal of International Relations* 6.2 (2012): 67-79. Ebsco Host. Web. 30 Nov. 2015. At 76.

are used to fight against Israel, the US and other powers throughout the region<sup>33</sup>. The support for terrorism in Iran is not a new phenomenon, but dates back to terrorist attacks in 1983 in Beirut and in Saudi Arabia in 1996<sup>34</sup>. The long history of Iranian support for terrorism can be viewed in two ways. First, it could simply be an extension of the dual goals of decreasing American influence while helping Iran to consolidate control of the Middle East. Or, second, it could be viewed as a deeper ideological view of the world, one that could have apocalyptic consequences if given the chance. This second option is important to consider because it is a logical extension of the way that Iran came into existence. Given the radicalism that was built into the Iranian government through the 1979 revolution, many of the most radical voices are also some of the most powerful ones.

## **Part II: US, Israeli and Iranian Military Capabilities**

The US has repeatedly shown its ability to project power in the Middle East. Despite recent setbacks in Iraq and difficulties in Afghanistan, US forces in the region remain an overwhelming force against any conventional opponent. History has shown the ability of the American military to quickly and completely defeat conventional threats. Because of the extensive strategic interests that the US has in the region, there remain significant US resources in the region.

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<sup>33</sup> Mindell, David, A Nuclear Iran: Nuclear Warfare or Regional Hegemony (Fall 2008). Yale Israel Journal, Fall 2008. Available at SSRN: <http://dx.doi.org/10.2139/ssrn.1691913> At 73.

<sup>34</sup> Dobbins, James. "Coping with a Nuclearising Iran." *Survival* (2011): 37-50. Print. At 38.

The US maintains approximately 35,000 military personnel in the Gulf, ensuring and extensive continued presence in the region<sup>35</sup>. The key asset in the region is the CTF-50 Strike Force, based in Bahrain<sup>36</sup>. This is one of the 10 Carrier groups that the United States operates. Each includes and aircraft carrier with its air group and multiple supporting ships. These Carrier groups represent the largest concentration of power available to the United States. Besides the fighter and strike capabilities of F-18 Super Hornets, Early Warning systems provided by E-C2 Hawkeye aircraft, and suppression of enemy air defenses (SEAD) provided by EA-18 Growlers, the carrier group also boasts hundreds of Tomahawk cruise missiles. An explanation of the combined firepower of a single Carrier group is too exhaustive for a work of this size, but the basic summary is that a Carrier group represents the ability to carry out a full air campaign independent of other resources in the area. The US air force boasts the worlds most advanced air power capabilities. Its fighters, strike aircraft, and communications and electronic warfare technologies are vastly superior to the hodgepodge assortment of assets that Iran fields.

The US also uses an array of aircraft both to boost access to information, and deny access to information on the ground for its enemies. For suppression of air defenses, the US uses two types of aircraft to jam communications while providing strike aircraft with information on potential targets. The EC-130 Compass Call is tasked with electronic warfare focused on blocking voice communications, while the

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<sup>35</sup> Cordesman, Anthony H. Center for Strategic Studies. July 15th, 2015. *“Joint and Asymmetric Warfare, Missiles and Missile Defense, Civil War and Non-State Actors, and Outside Powers”* Web. At 505.

<sup>36</sup> Ibid. At 520.

RC-130 provides updates to strike aircraft that can then destroy identified SAM sites<sup>37</sup>.

That being said, extensive other resources also exist in the region, including a second Carrier group stationed in the Indian Ocean. While open-source information on the basing of Air Force and Marine Corps assets in the region is severely limited, based on the quick ability to carry out extensive airstrikes against ISIS without substantial rebasing, it is fair to assume that these assets are similarly impressive.

The devastating firepower of the US military has been put to use against similar regimes to Iran on several occasions. The most recent example of this was the short Libyan air war. This operation showed that American air power could quickly and decisively tilt the outcome of a military campaign. It also demonstrates some restrictions to and abilities of American air power. While air power did not win the Libyan civil war, it did play a pivotal role in allowing for the defeat of Gaddafi's armies.

The Libyan air war was impressive for its low cost of only a few billion dollars, and for the fact that there were no American injuries in the conflict. It is also impressive in the fact that it was essentially completed by already available forces, without major deployment of new forces to the area.

While the targets attacked in Libya offer little comparison with those that would be targeted in Iran – most of the Libyan targets were “soft” targets, while most of the Iranian targets are heavily guarded, and hardened, there are still some important lessons to be learned through the Libyan air war. Particularly interesting

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<sup>37</sup> Talmadge, Caitlin. "Closing Time: Assessing the Iranian Threat to the Strait of Hormuz." *International Security* 33, no. 1 (Summer 2008): 82-117. At 114.

for our purposes, the effect of 21<sup>st</sup> century air power on outdated and dilapidated technology. While the Libyan air defense did have access to Soviet S-200 (SA-200) systems, the same systems that make up key parts of Iran's Air Defense system, these S-200s were largely unusable. While military commanders reported that they were 60% ready, actual readiness was just 10%<sup>38</sup>.

The US military capabilities both throughout the world and in the Middle East are unparalleled. The US has the ability to target up to 10,000 targets at the same time<sup>39</sup>, much higher than the necessary number requisite during an attack on Iran. An attack on Iran would involve a very limited set of targets, those crucial to the management of the nuclear program.

The Israeli military is, on a smaller scale, equivalently well prepared for an air war. The technology possessed by the Israelis, especially the air force, is on par with American air power. This is primarily a result of the close ties between the two countries.

In June 2008, the Israeli military attempted a daunting task. A simulated air operation with more than 100 aircraft, a large portion of Israel's air force, meant to give pilots a chance to simulate an attack on Iran's nuclear infrastructure<sup>40</sup>. A difficult task for any military, for Israel, this would be an all or nothing operation.

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<sup>38</sup> Mueller, Karl P., Gregory Alegi, Christian F. Anrig, Christopher S. Chivvis, Robert Egnell, Christina Goulter, Camille Grand, Deborah C. Kidwell, Richard O. Mayne, Bruce R. Nardulli, Robert C. Owen, Frederic Wehrey, Leila Mahnad and Stephen M. Worman. *Precision and Purpose: Airpower in the Libyan Civil War*. Santa Monica, CA: RAND Corporation, 2015. At 43.

<sup>39</sup> Plesch, Dan, and Martin Butcher. "Considering a War with Iran: A Discussion Paper on WMD in the Middle East." SOAS, University of London, 1 Sept. 2007. Web. 19 Nov. At 13.

<sup>40</sup> Talbot, Brent J. *Joint Forces Quarterly*, Issue 56, 1<sup>st</sup> quarter, 2010 "Israel and the Iranian Nuclear Infrastructure". Pg. 97

The chances of true success would be severely limited, both by the number of aircraft required for the operation, as well as the technological difficulties of such an attack.

Completing such a military operation would only be used after all other options have been exhausted on the part of the Israel to attempt to keep Iran from completing a nuclear weapon. This option would also assume that the US had given up on stopping Iran from finishing the bomb. It is unlikely, barring a complete breakdown of the diplomatic process that Israel would ever consider carrying out this option. The condemnation from around the world would be greater, and the retribution from Iran's proxies potentially devastating.

Nevertheless, it is important to consider this option for one important reason: Israel continues to consider it. Even though Israeli commanders admit the difficulty of the operation, and further concede that it will only delay, not destroy the Iranian program, this operation remains as a possible desperation attempt by Israel to keep Iran from developing a bomb.

Israel does have a few distinct advantages over the United States in the planning and execution of such an attack. First, the experience gleaned from previous operations. This would not be the first time that Israel decided to take the fate of a foreign countries' nuclear program into its own hands. In 1981, Israel successfully destroyed Iraq's nuclear reactor at Osirak and again in 2007 a suspected North Korean supplied reactor was destroyed at Syria. These military operations, while no doubt on a much smaller scale, against lesser equipped and prepared opponents do give Israel a key advantage in that they have faced this type

of operation already, and so far have been very successful in carrying out these operations. A second advantage that Israel holds over the United States is the willpower to make this operation politically feasible. For Israel this is considered, rightfully or no, a survival issue. The success of the Iranian nuclear program would mark the demise of the Israeli state. The stakes are high enough for Israel that this type of operation would not be a terribly divisive issue within Israel that is assuming of course, that Iran has decided to build an actual nuclear weapon.

The Israeli military operates within a very specific mission set, and this helps it to focus on doing the necessary work at hand. While other nations, specifically the United States, have large territories and many treaty commitments to uphold, the Israeli military has a very singular central goal: assuring the continued existence of the state of Israel. While the Israeli military is limited by the size of the country's population and size, it is also one of the most advanced in the world. Both the necessary concern for continued existence, and close ties with the United States have allowed the Israeli military to develop or obtain, and operate some of the most sophisticated and advanced military equipment in the world. Additionally, maintaining the capability of denying Iran a nuclear weapon has been a policy goal for the Israeli military, and such, investments have been made in the military in order to achieve this goal. One example of the way Israel has built its air forces to the mission of attacking Iran is through long-range capabilities. While many nations

buy F-16s from the US, Israel's model of the aircraft, the F-16I was specifically designed with additional fuel capacity in order to allow it to reach Iran<sup>41</sup>.

Looking historically, the Israeli attack on the Osirak nuclear facility in Iraq provides us with some insight in to Israeli military tactics and their willingness to engage in a preemptive strike.

First looking internally, the justification for the attack was that the nuclear reactor being built in Iraq was considered a threat to the existence of Israel<sup>42</sup>. This same analysis exists to a large extent today in Israeli circles.

Second, the Osirak strike was immensely successful. The 16-plane strike force was able to completely destroy the Iraqi nuclear reactor without the loss of a single plane, or substantial collateral damage<sup>43</sup>.

Third, an attack on the Iranian program would be much different than the attack on Osirak. Iran's program is much further developed than Iraq's was, with multiple important sites located throughout the country. Iran also has learned a lot from the Osirak attack, placing its nuclear infrastructure in heavily guarded locations<sup>44</sup>.

Fourth, technological development has completely changed the dynamics of an air strike. While the original Osirak strike was completed with "dumb" bombs –

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<sup>41</sup> Bahgat, Gawdat. "Nuclear Proliferation in the Middle East: Iran and Israel." 2005, Contemporary Security Policy, 26:1, 25-43, DOI: 10.1080/13523260500116067. At 39.

<sup>42</sup> Slager, Katherine. "Legality, Legitimacy and Anticipatory Self-Defense: Considering an Israeli Preemptive Strike on Iran's Nuclear Program." *N.C. J.INT'L.L.&COM. REG.* 38 (2012): 267-325. Print.

<sup>43</sup> Raas, Whitney, and Austin Long. "Osirak Redux? Assessing Israeli Capabilities to Destroy Iranian Nuclear Facilities." *International Security* 31, no. 4 (Spring 2007): 7-33. At 11.

<sup>44</sup> *Ibid.* At 11.

that is, bombs without any guidance features except gravity – nearly all munitions today are “smart”, with the most advanced GPS or laser guidance available. Israel has invested heavily in modernizing its munitions with these guidance technologies<sup>45</sup>.

While an attack on Iran would be a completely different operation, the experience gained at Osirak does show that a preemptive attack can be successful. While the success of the military operation was impressive, more important was the success that the operation had in convincing Iraq to give up its pursuit of nuclear weapons.

More recently, Israel showed that it was still willing to take matters into its own hands. The Israeli attack on a reactor in Syria in 2007 remains a secretive operation, but some information can be gained from a short examination of the operation and its impacts. While a Syrian nuclear weapons program was probably years away, the reactor being built with the help of the North Koreans would have been a key part of any weapons program. The spent fuel from this reactor could have produced the necessary materials for one nuclear weapon per year<sup>46</sup>. The attack appears to have been a decisive moment for Syria, as current open-source intelligence has yet to identify further attempts to create new nuclear facilities. The Israeli attack on Syria was by all accounts a resounding success. Even the North Koreans have been reluctant to work with the Syrians any further on its nuclear

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<sup>45</sup> Bahgat, Gawdat. “Nuclear Proliferation in the Middle East: Iran and Israel.” 2005, *Contemporary Security Policy*, 26:1, 25-43, DOI: 10.1080/13523260500116067. At 39.

<sup>46</sup> Kreps, Sarah E. & Fuhrmann, Matthew “Attacking the Atom: Does Bombing Nuclear Facilities Affect Proliferation?” 2011, *Journal of Strategic Studies*, 34:2, 161-187, DOI: 10.1080/01402390.2011.559021. At 173.

program, and the international scrutiny brought to Syria by the attack has stalled any further efforts on the part of the Syrians to develop nuclear weapons<sup>47</sup>.

In considering an attack on the Iranian nuclear program, Israel only has a few major military assets that would come into play. This analysis assumes that Israel will only be using its air forces. While surface-to-surface missiles and submarine forces may come into play, this will be discussed in more detail when we examine Iranian retaliation to an attack.

The first major system that the Israelis would use is a variant of the US made F-16, the F-16I, which was developed specifically for deep-strike missions by the Israelis<sup>48</sup>. This aircraft is capable of being refueled in-flight, further extending its mission range from an estimated 1,700 km with a weapons load of 2, 2,000 lb bombs.

The F-15I is another variant of an American made strike aircraft, specifically designed for ground strike missions. Like the F-16I, the F-15I has roughly a 1,700 km range without refueling.<sup>49</sup>

Lastly, the Israelis also have the capability to refuel aircraft in flight through a variety of different aircraft. Though the exact numbers are not well known, the Israelis have both KC- 707s and KC-130Hs<sup>50</sup>.

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<sup>47</sup> Kreps, Sarah E. & Fuhrmann, Matthew "Attacking the Atom: Does Bombing Nuclear Facilities Affect Proliferation?" 2011, *Journal of Strategic Studies*, 34:2, 161-187, DOI: 10.1080/01402390.2011.559021. At 183.

<sup>48</sup> Raas, Whitney, and Austin Long. "Osirak Redux? Assessing Israeli Capabilities to Destroy Iranian Nuclear Facilities." *International Security* 31, no. 4 (Spring 2007): 7-33. At 21.

<sup>49</sup> *Ibid.* At 21.

<sup>50</sup> Raas, Whitney, and Austin Long. "Osirak Redux? Assessing Israeli Capabilities to Destroy Iranian Nuclear Facilities." *International Security* 31, no. 4 (Spring 2007): 7-33. At 22.

Unlike the militaries of the US and Israel, the Iranian military lacks the state-of-the-art technology that its enemies boast. Most of its weapons systems are severely outdated. The systems that Iran does have are in poor condition due to being unable to receive spare parts from the US because of nuclear-related sanctions and export bans. The crews manning the systems used by the Iranian military aren't properly trained for the equipment. Additionally, and perhaps most importantly, Iran lacks the communications and command to effectively operate a military in a modern environment.

Historically, Iran was well armed. Because of the close ties to the Americans, and the strategic importance of Iran to the region, the Iranian military under the Shah was well armed with the most advanced technology in the world. With the Islamic revolution, Iran lost access to its main military supplier. The US not only stopped delivery weapons systems on order, but also prevented the Iranians from access to spare parts for existing systems. This combined with the lack of continued training and expertise resulted in a military that has digressed with time.<sup>51</sup>

Iran continues to attempt to modernize its military as well as keeping old systems in working order and updated as best as possible. While many of the systems that Iran does possess are out-of-date and would do little against the advanced capabilities of the US and Israelis, some introduction to the Iranian military forces is necessary. While Iran does have extensive ground forces, our focus

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<sup>51</sup> Raas, Whitney, and Austin Long. "Osirak Redux? Assessing Israeli Capabilities to Destroy Iranian Nuclear Facilities." *International Security* 31, no. 4 (Spring 2007): 7-33. At 21.

will be on aircraft and air defense forces, while the problem of naval forces will be discussed later in this work.

On paper Iran's air force is formidable, but years of sanctions has winnowed the force down to a small number of operational aircraft. The most formidable aircraft currently being used is the Mig-29. Iran operates approximately forty of these fourth generation fighter jets. Even these aircraft would not challenge the strike aircraft of the US or Israel<sup>52</sup>. Of these forty jets, only about two dozen are operational at any given time due to lack of maintenance<sup>53</sup>. In addition to the lack of properly maintained aircraft, the crews that operate these aircraft have not been trained effectively.

Similarly, the most advanced Surface to Air (SAM) missile system used by the Iranians is the MIM-23b I-Hawk system, which was introduced in the 1970s. These systems suffer from the same lack of training as Iran's air forces along with improper maintenance. Additionally, because Israel and the US have access to the exact same technology, the electronic countermeasures available against the I-Hawk system would be extensive, rendering its role in air defenses severely limited<sup>54</sup><sup>55</sup>. Iran has tried repeatedly to procure Russian air defense systems. The delivery of advanced Russian air defense systems would make a significant difference for Iran's

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<sup>52</sup> Raas, Whitney, and Austin Long. "Osirak Redux? Assessing Israeli Capabilities to Destroy Iranian Nuclear Facilities." *International Security* 31, no. 4 (Spring 2007): 7-33. At 22.

<sup>53</sup> Caitlin Talmadge. "Closing Time: Assessing the Iranian Threat to the Strait of Hormuz." *International Security* 33, no. 1 (Summer 2008): 82-117. At 111.

<sup>54</sup> Raas, Whitney, and Austin Long. "Osirak Redux? Assessing Israeli Capabilities to Destroy Iranian Nuclear Facilities." *International Security* 31, no. 4 (Spring 2007): 7-33. At 22.

<sup>55</sup> Caitlin Talmadge. "Closing Time: Assessing the Iranian Threat to the Strait of Hormuz." *International Security* 33, no. 1 (Summer 2008): 82-117. At 112.

air defenses. The Russian made S-300 (NATO designation: SA-10 Grumble) is widely considered to be one of the most effective SAM systems in the world and would pose a threat to strike aircraft during a threat. However, as of yet, Russia has not delivered the ordered S-300 systems<sup>56</sup>. The Iranian do have as many as 25 of the older SA-6 air defense systems. However, there has been no evidence that these systems are operational: there hasn't been a single attempt to demonstrate the use of these systems nor have they engaged any UAVs loitering near Iranian airspace<sup>57</sup>.

One homegrown attempt to increase ground-to-ground capabilities is the Shahab-3 missile. This new, and so far unproven SSM (Surface-to-Surface Missile) would give Iran the reach to hit ground targets in Israel, and US bases throughout the region<sup>58</sup>. The Shahab-3 is particularly concerning to Israel because of its ability to deliver multiple warheads in a single missile, allowing for decoys to multiply the number of incoming targets that air defense systems would have to account for, and making it more difficult to neutralize the actual warhead<sup>59</sup>. Despite the advanced technology possessed by both the Israelis and American allies throughout the region, access to nuclear weapons would make the Shahab-3 missile a serious threat to security in the region should a conflict arise.

### **Part III: Considering Military Force**

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<sup>56</sup> Caitlin Talmadge. "Closing Time: Assessing the Iranian Threat to the Strait of Hormuz." *International Security* 33, no. 1 (Summer 2008): 82-117. At 112.

<sup>57</sup> *Ibid.* At 112.

<sup>58</sup> Mehrish, B N. "Iran's Nuclearization and Its Implications for Global and Regional Security." *IUP Journal of International Relations* 6.2 (2012): 67-79. *Ebsco Host*. Web. 30 Nov. 2015. At 71.

<sup>59</sup> Bahgat, Gawdat. "Nuclear Proliferation in the Middle East: Iran and Israel." 2005, *Contemporary Security Policy*, 26:1, 25-43, DOI: 10.1080/13523260500116067. At 38.

While Iran wants to avoid direct military confrontation, it will continue to take advantage of any US failures in the Middle East<sup>60</sup>. Iran will do its best to ensure that the US will not take action against them, the assumption being that any US military action would be disastrous to the Iranian military and governing elite.

The JCPOA currently creates a framework that should keep Iran from developing nuclear weapons, at least for the next 15 years. However, it is important to understand that history of both Iran's nuclear program, and the US experience with nuclear deals. Since 2003, Iran has agreed to cooperate with the IAEA, allowing the international community some level of oversight of Iran's nuclear program. However, Iran has repeatedly reneged on its commitments to the international community on its nuclear program. The existence and development of Iran's centrifuges, the involvement of Iran's military in the development of Iran's nuclear program and the acquisition of documents by Iran of plans for key components of nuclear weapons all represent serious discrepancies between what Iran has claimed that it is doing, and what can actually be confirmed by their nuclear program<sup>61</sup>. While the Iranian government has long claimed that it has no interest in the development of a nuclear weapon, it has pursued several key technologies and capabilities that indicate otherwise. Particularly, enrichment has been a major focus of the Iranian nuclear infrastructure. The only reason for Iran to create HEU is for the construction of a nuclear weapon. Additionally, the creation of a heavy water

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<sup>60</sup>Mehrish, B N. "Iran's Nuclearization and Its Implications for Global and Regional Security." *IUP Journal of International Relations* 6.2 (2012): 67-79. *Ebsco Host*. Web. 30 Nov. 2015. At 68.

<sup>61</sup> Miller, STEVEN E. "Proliferation gamesmanship: Iran and the politics of nuclear confrontation." *Syracuse Law Review* 57 (2007): 551. Print. At 561.

reactor would give Iran access to Plutonium, which is a second material that could be used to create a nuclear weapon. So while public statements indicate no interest in a nuclear weapon, the facilities being built show that this is at least a secondary goal of the Iranian nuclear program. The implication of the lack of consistency in Iran's claims is that there is doubt as to the veracity of the things that they currently claim. The inherent risk of any nuclear deal is the unknown. We have restrictions on the facilities and practices that we know about, but the existence of secret components of the Iranian nuclear program remain a potential problem for the JCPOA

Why would it be problematic for Iran to build and possess nuclear weapons? The argument for keeping Iran nuclear weapon free goes deeper than just the interests of one, or even a group of countries.

While the Cold War showed the efficacy of deterrence, a similar project would be difficult in relation to Iran<sup>62</sup>. The US and her allies were able to convince the USSR that a nuclear war would be sufficiently devastating as to encourage the Soviet government to keep tight control of its nuclear assets and avoid a worldwide war. The international community lacks the power to ensure that Iran's potential nuclear weapons will remain unused. The close ties that Iran maintains with a host of designated terrorist organizations and states that use chemical weapons against their civilian's shows that hardline elements exist and have a powerful influence over Iranian politics. The risk of the hardliners gaining enough control of Iran's nuclear weapons to initiate an attack appears to be high considering that some of

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<sup>62</sup> Clawson, Patrick, and Michael Eisenstadt. "Halting Iran's Nuclear Programme: The Military Option." *Survival* (2008): 13-19. Print. At 17.

the most radical members of Iran's government elite belong to the military, and specifically to the Revolutionary Guard, the elite paramilitary organization that operates separate from the armed forces of Iran<sup>63</sup>. A nuclear Iran is too risky for the world. A further threat exists not in the direct use of nuclear weapons by the Iranians, but through the transfer, accidental or intentional of these weapons to terrorist organizations. This transfer, which has been the central goal of nonproliferation efforts since the fall of the Soviet Union, would be unsurprising due to the close relations that the Revolutionary Guard maintains with some of the most radical terrorist groups in the world. While the Iranian government may maintain some semblance of rationality, a terrorist organization armed with a nuclear weapon remains the ultimate threat. Furthermore, Iran could deliver the materials necessary for a "dirty bomb" to one of its many proxy terrorist organizations, giving them the ability to avoid the most serious retaliation<sup>64</sup>. This threat only increases with a nuclear Iran. While the Soviet threat was very real, it was always rational, that guarantee is not secure when Iran comes into the picture.

If Iran's current government, and even the Revolutionary Guard are committed to keeping their stock of nuclear weapons secured and out of terrorist or radical hands, nuclear weapons in Iran would still be an unacceptable risk for the international community to take. While Iran has been one of the more stable powers in the region since the 1979 Islamic Revolution, history shows us that nations in this

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<sup>63</sup> Ibid. At 18.

<sup>64</sup> Eichensehr, Kristen, Targeting Tehran: Assessing the Lawfulness of Preemptive Strikes Against Nuclear Facilities (June 22, 2008). UCLA Journal of International Law and Foreign Affairs, Vol. 11, No. 1, 2007. Available at SSRN: <http://ssrn.com/abstract=1149623> At 2.

region have the tendency to fall without notice. No clearer example exists than Iran itself. Another example of the risk of future instability is Pakistan, which appeared to be a responsible and stable regime in the 1980s, when it acquired nuclear weapons, but not teeters on the brink of collapse and entertains relations with terrorist organizations<sup>65</sup>. While nuclear weapons were deemed safe in Pakistan in the 1980s, today they are considered a high risk. The same could be true for Iran. Today it seems stable, but this is no guarantee for the future. The only safe route is to ensure that Iran does not acquire nuclear weapons.

Whatever the reality of Iran's intentions towards Israel, the Israelis see Iran as the greatest threat to their continued existence. Military leaders among the Israelis have made it clear that they will do anything in their power to prevent Iran from attaining nuclear weapons, including a pre-emptive strike<sup>66</sup>.

It is also important to examine the perceived threat that currently exists in Israel. Even if the situation is not as serious as believed, if the situation is deemed to be dire by Israeli military officials, then the response to apparent developments in Iran's nuclear weapons program will be one which takes the threat of an Iranian attack seriously. Currently, Israel views a nuclear-armed Iran as an existential threat. Israeli officials have also said on multiple occasions that a military attack,

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<sup>65</sup> Clawson, Patrick, and Michael Eisenstadt. "Halting Iran's Nuclear Programme: The Military Option." *Survival* (2008): 13-19. Print. At 18.

<sup>66</sup> Slager, Katherine. "Legality, Legitimacy and Anticipatory Self-Defense: Considering an Israeli Preemptive Strike on Iran's Nuclear Program." *N.C. J.INT'LL.&COM. REG.* 38 (2012): 267-325. Print. At 268.

along with all other options are on the table for Israeli decision makers in confronting the possible threat of an Iranian nuclear weapon<sup>67</sup>.

Regardless of the threat to the US and Israel, there is also the necessary concern of the region being further destabilized due to Iran's nuclear program. One of the biggest threats to stability, apart from the obvious possibility of armed conflict, is that a nuclear arms race will be started in the region. The political landscape of the Gulf States is dominated by the tension between Iran and the Arab Gulf States<sup>68</sup>. Saudi Arabia, the leading power in the region, has already condemned Iran's nuclear program, and is currently developing its own civilian nuclear program<sup>69</sup>. Much like the Iranians, the Saudis are interested in creating alternatives to oil for domestic power generation, with 16 nuclear reactors being slated for constructed over the next 20 years. Currently, the Saudi program is strictly focused on energy. If Iran, Saudi Arabia's biggest enemy in the region, develops nuclear weapons, the Saudi monarchy will feel the need to match capabilities, and yet another nuclear weapon armed country will be created. Furthermore, an Iranian bomb would set off a race in the region towards parity, and in some cases would encourage other nations to pursue nuclear weapons. A nuclear chain reaction would not be surprising to see work its way across the Middle East. Egypt would be one country that would gain immensely from pursuing nuclear weapons in Iran joined

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<sup>67</sup> Bahgat, Gawdat. "Nuclear Proliferation in the Middle East: Iran and Israel." 2005, Contemporary Security Policy, 26:1, 25-43, DOI: 10.1080/13523260500116067. At 38.

<sup>68</sup> Cordesman, Anthony H. Center for Strategic Studies. July 15th, 2015. "Joint and Asymmetric Warfare, Missiles and Missile Defense, Civil War and Non-State Actors, and Outside Powers" Web. At 11.

<sup>69</sup> Mehrish, B N. "Iran's Nuclearization and Its Implications for Global and Regional Security." *IUP Journal of International Relations* 6.2 (2012): 67-79. Ebsco Host. Web. 30 Nov. 2015. At 75.

the nuclear club. Without an alliance with the US or other major power, Egypt would be particularly at risk against a nuclear-armed Iran. In this situation, it is likely that Egypt would pursue a nuclear weapon, likely followed by its rival Algeria, who would be unlikely to allow Egypt to be the only Arab nuclear power in the region<sup>70</sup>. The threat to regional stability from Iran would be nearly limitless. A nuclear-armed Iran could act with impunity in the region in pursuing its policy goals, and considering its often-public support for terrorist organizations, these policy goals would in all likelihood further destabilize the region<sup>71</sup>. The Middle East has been fraught with conflict, adding a nuclear component to the mix would be flirting with disaster. If Iran were allowed to develop nuclear weapons, deploy them and theorize the conditions for their use, other countries in the region would be forced to do the same in order to keep parity with Iran<sup>72</sup>.

One serious concern when approaching the issue of a preemptive attack is the legality of such a strike. While both the US and Israel would probably move ahead with an attack regardless, it is important to understand the context of international law in order to later understand how Iran will retaliate in the event of an attack.

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<sup>70</sup> Tertrais, Bruno. "A Nuclear Iran and NATO." *Survival: Global Politics and Strategy*. Volume 52. No. 6. Pg 45-62. Web. At 49.

<sup>71</sup> Mindell, David, A Nuclear Iran: Nuclear Warfare or Regional Hegemony (Fall 2008). *Yale Israel Journal*, Fall 2008. Available at SSRN: <http://dx.doi.org/10.2139/ssrn.1691913> At 70.

<sup>72</sup> Dobbins, James. "Coping with a Nuclearising Iran." *Survival* (2011): 37-50. Print. At 44.

Nations are internationally recognized to have a right to self-defense<sup>73</sup>. However, this right can be difficult to apply in situations where a clear threat is present, but no aggression has yet occurred. This is the difficult case of international law that faces Israel and the US. Do they have a legitimate claim of self-defense in attacking Iran's nuclear program?

The difficulty of this question is that the answer is based on a determination that Iran is in fact pursuing nuclear weapons. Ascertaining this fact can be difficult, both in lead-up to, and in the aftermath of a preemptive strike. Additionally, the international law is unclear on what conditions allow a nation to engage in preemptory self-defense. Agreed upon standards do not exist that help to define in what situations a nation may take action against other nations in anticipatory self-defense<sup>74</sup>

Regardless, any action by Israel against Iran runs a high risk of angering the international community against Israel based on the idea that Israel is aggressively overstepping the limitations of self-defense<sup>75</sup>. Looking historically, one instance that gives some guidance as to how the international legal community may respond to an attack by Israel is to examine the response to a previous attack on the part of Israel against another Middle Eastern nation pursuing nuclear weapons. Israel's attack on Iraq's Osirak reactor, while being condemned internationally, prevented Iraq from

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<sup>73</sup> Slager, Katherine. "Legality, Legitimacy and Anticipatory Self-Defense: Considering an Israeli Preemptive Strike on Iran's Nuclear Program." *N.C. J.INT'L.L.&COM. REG.* 38 (2012): 267-325. Print. At 270.

<sup>74</sup> Slager, Katherine. "Legality, Legitimacy and Anticipatory Self-Defense: Considering an Israeli Preemptive Strike on Iran's Nuclear Program." *N.C. J.INT'L.L.&COM. REG.* 38 (2012): 267-325. Print. At 280.

<sup>75</sup> *Ibid.* At 269.

acquiring nuclear weapons, and didn't result in any major retaliation against Israel<sup>76</sup>. In examining this attack, and understanding of the goals and consequences shows that despite the international condemnation, the attack served its purpose without incurring unbearable costs. Israel's goal was to prevent Saddam Hussein from acquiring nuclear weapons, which was successfully accomplished, and the only real costs incurred was that the international community condemned the attack.

Again in 2007, Israel was a participant in a preemptive strike against a nuclear related target, this time in Syria. However, unlike in the example of the attack on Osirak, the response from the international community was measured. In fact, the only foreign country to speak out against the attack was North Korea<sup>77</sup>. In this instance a secret nuclear power plant that was under construction with the help of North Korea was destroyed by Israeli air forces. In both of the previous instances of Israeli preemptive action against a nuclear force of another nation, a key interest for the Israeli government was the purpose of the nuclear program in question.

Historically speaking, the standard that the international community has followed indicates that a preemptive strike on Iran's nuclear facilities may fall outside the purview of international law. However, the response from the international community to those who violate this principle have been limited to outcry and condemnation, both results that the US and Israel would be willing to undergo in order to prevent Iran from building a nuclear weapon.

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<sup>76</sup> Ibid. At 303.

<sup>77</sup> Guzansky, Yoel, and Amos Yadlin. "The Arab World's Response to an Israeli Attack on Iran." *Survival* (2013): 107-20. *Taylor and Francis Online*. Web. 1 Dec. 2015. At 109.

Politics will also play a key role in determining if an attack will go forward. While any pre-emptory strike will be met with a large backlash, there remains significant support at home in Israel for a military strike<sup>78</sup>. Much of the public opinion response to an attack would depend on the results of a strike. With a large portion of Israel's air power being devoted to an attack, even the slightest mistake would be fatal to the success of the mission, and by extension, the perception of an attack back home.

Given the past 20 years of American foreign policy, any operation in the Middle East brings with it the risk of giving the impression that America is again playing the role of international police man, or worse, an imperialistic power seeking oil. This was one of the major problems that existed during the Iraq war. Rather than seeing America as a liberating country, much of the Middle East saw the Iraq war as an attempt on the part of America to steal Iraq's oil<sup>79</sup>.

Serious contemplation of an intervention from the US or Israel in Iran's nuclear program must be tempered at the very outset by the prospect of success of any military action. Because of this, much of the remainder of this work will be devoted to determining the likelihood of the success of any intervention.

The first step in analyzing the advisability of military intervention is to define success. In order to weigh the wisdom of intervention rests heavily on what can be accomplished. A strike that results in an additional three months added to Iran's

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<sup>78</sup> Mehrish, B N. "Iran's Nuclearization and Its Implications for Global and Regional Security." *IUP Journal of International Relations* 6.2 (2012): 67-79. *Ebsco Host*. Web. 30 Nov. 2015. At 77.

<sup>79</sup> Allin, Dana H., and Steven Simon. "Obama's Dilemma: Iran, Israel and the Rumours of War." *Survival* 52.6 (2010): 15-44. Print. At 22.

breakout time has a significantly different value calculus than a strike that would prevent development of a bomb for two or three years. Of course, the easiest strike to justify would be a strike that would permanently stop Iran from pursuing nuclear weapons. Thus, the definition of success is crucial to contemplating the issue at hand.

Assuming that Iran decides to create a nuclear weapon, an attack would need to be successful enough to outweigh serious accompanying repercussions of action. Not only would an attacking country both have to deal with political retaliation back home, international condemnation abroad, but would also have to live with a world where Iran's current terrorist sponsorship would be significantly expanded to unprecedented levels. These concerns have been well documented elsewhere, both within this work and in other published material.

So what can be accomplished? Given the level of advancement that has been achieved by the Iranians, the most that can be expected by an Israeli strike is probably an additional delay of a year or two<sup>80</sup>. A US strike could delay the nuclear program of Iran by as many as 5 to 10 years. These numbers seem to be highly variable, with a lot of room for change. Part of the uncertainty is caused by the unknown variable of how Iran will respond. We do not know if a strike will cause Iran to give up their weapons program, or if it will cause them to enhance their attempts or if it will cause unrest in Tehran leading to a more peaceful government. It is also difficult to determine how much of a delay a particular attack will cause.

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<sup>80</sup> Cordesman, Anthony H. Analyzing the Impact of Preventive Strikes Against Iran's Nuclear Facilities. Center for Strategic and International Studies, 10 Sept. 2012. Web. 19 Nov. 2015. At 7.

Partially because of the secrecy of Iran's program but also due in part to the lack of ability to predict how quickly Iran would be able to rebuild key facilities, an exact estimate is difficult. Chokepoint facilities, those that are key to the development of a bomb, would be the target of a preemptive strike. These facilities are well known, but the unknown of what type of resources will be necessary for Iran to rebuild these facilities and how quickly it will be able to do so<sup>81</sup>.

Regime change has become a dirty phrase among policy circles due to several failures throughout the world, but it is the most realistic result of a strike that would stop Iran's nuclear program. While the scope of this work doesn't include the possibility of a ground campaign in Iran, this type of military action, followed by a change of leadership in Iran could for the foreseeable future end the weapons program in Iran, reducing the nuclear program to a state similar to Japan, in which the technology exists for a nuclear weapon to be created, but the reality has no probability of happening. While regime change would be the "best" option for ending the nuclear threat, it is also the least likely result of limited air strikes on the nuclear program of Iran. There is a possibility that Iran's leadership will completely give up the prospect of acquiring nuclear weapons and giving up the ability to quickly acquire a nuclear weapon, but considering the positions of key Iranian leadership members on the subject of nuclear weapons, this should be considered as only slightly likely.

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<sup>81</sup> Kreps, Sarah E. & Fuhrmann, Matthew "Attacking the Atom: Does Bombing Nuclear Facilities Affect Proliferation?" 2011, *Journal of Strategic Studies*, 34:2, 161-187, DOI: 10.1080/01402390.2011.559021. At 165.

A more realistic result of a military strike would be to delay the acquisition of a nuclear weapon by 5-10 years<sup>82</sup>. While the Iranian nuclear program has taken more than 35 years to develop to this point, they now have the knowledge and technology to reproduce what can be destroyed by air strikes. The variability in the time range represents significant unknowns in both Iranian domestic decision-making, and international responses to a strike. If the international community sees the strikes as being necessary given Iran's actions, they will not support the recreation of a nuclear program. Without international support, recreating a nuclear program will be difficult due to lack of expertise and materials. However, if the international community sees the preemptive attack as being unjustified, then it is likely that many countries will compete to help Iran rebuild the destroyed infrastructure.

What if, rather than completely ending the weapons program, or setting it back by 5 to 10 years<sup>83</sup>, the program is only delayed by another 6 to 12 months? This scenario is most likely with an Israeli strike because of the lack of long-range, heavy bombers and the proper ordnance to carry out an attack on some of Iran's hardened targets. In this scenario, the decision is more difficult to make because the same decision will have to be made again in less than a year. For Israel in particular, this would cause great difficulty because of the strain that an operation of this size

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<sup>82</sup> Kreps, Sarah E. & Fuhrmann, Matthew "Attacking the Atom: Does Bombing Nuclear Facilities Affect Proliferation?" 2011, *Journal of Strategic Studies*, 34:2, 161-187, DOI: 10.1080/01402390.2011.559021. At 166.

<sup>83</sup> Kreps, Sarah E. & Fuhrmann, Matthew "Attacking the Atom: Does Bombing Nuclear Facilities Affect Proliferation?" 2011, *Journal of Strategic Studies*, 34:2, 161-187, DOI: 10.1080/01402390.2011.559021. At 166.

would have on the Israeli air force. An attack could still be worth it if this initial strike could convince other powers to ensure that Iran did not continue its pursuit of a nuclear weapon.

While any intervention intended to stop the immediate construction of a nuclear bomb would be difficult, the technological capabilities available today make these difficult missions possible. Both the American and Israeli militaries have an unprecedented ability to deliver devastating firepower with incredible precision. While the attack on Osirak was successfully completed with dumb bombs, which were guided simply by momentum and gravity, today's munitions rely on GPS guidance to deliver explosives to precise targets. For comparison, the unguided bombs previously used were fairly accurate; bombs dropped from an F-16 for example, could be predicted to within a circular error probability (CEP) of 8 to 12 meters. This compared to Joint Direct Attack Munition (JDAM) guided weapons, which have a CEP of only 3 meters.<sup>84</sup> Additionally, these new GPS guided munitions can be dropped from a high altitude, from as far as 15 kilometers away, rather than nearly directly above the target<sup>85</sup>.

Another factor that will impact both the successfulness and the justifiability of an attack is what sites should be included in the target list. While some targets are relatively "soft", meaning that they can easily be neutralized, others would be incredibly difficult for any military, even the United States to successfully destroy. While thousands of important military targets, and even perhaps hundreds of

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<sup>84</sup> Raas, Whitney, and Austin Long. "Osirak Redux? Assessing Israeli Capabilities to Destroy Iranian Nuclear Facilities." *International Security* 31, no. 4 (Spring 2007): 7-33. At 16.

<sup>85</sup> *Ibid.* At 16.

nuclear related targets can be identified in Iran, the Iranian ability to create material for nuclear weapons is limited to just a few targets.

First, the enrichment facility at Fordow. It is the most difficult target to attack, and the one on which much hinges, is the enrichment facility at Fordow. This facility, built into the side of a mountain and buried 250 feet underground, would be a difficult task for the US to destroy, and a potentially impossible target for Israel to destroy. Under the JCPOA, no enrichment is allowed to happen at Fordow for the next 15 years<sup>86</sup>. Israel has no realistic options to destroy this location, though some have suggested the use of nuclear weapons on the site. The use of nuclear weapons is incredibly unrealistic in this context. The use of a nuclear weapon by one state in order to prevent the acquisition of a nuclear weapon by another state would bring universal condemnation from the international community. While this condemnation would make diplomatic efforts difficult, it isn't likely that the response to will carry anything more serious than condemnation. If Israel were to carry out an attack, they would be forced to try to incapacitate the facility by attacking the entryways to the facility, requiring that Iran reopen these before it could continue enrichment. The US does have some conventional weapons that have a legitimate likelihood of damaging or destroying the facility. The Massive Ordnance Penetrator or "MOP" as it is commonly known is a conventional bunker-busting bomb, which was designed to destroy targets like the Fordow facility. The GBU-57 A/B – the official nomenclature for the MOP - is capable of burrowing 200 feet into

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<sup>86</sup> Hussain, Nazir and Abdullah Sannia. "Iran Nuclear Deal: Implications for Regional Security" *Journal of Political Studies*, Vol. 22, Issue - 2, 2015, 475:493. At 481.

the ground and through 60 feet of concrete before exploding<sup>87</sup>. The MOP gives the US a credible option to destroy the Fordow facility. Basic math tells us that two MOPs would need to be deployed in order to penetrate the Fordow facility. This doesn't pose a problem because MOPs are meant to be used in pairs: the first to dig a path for the second to follow and subsequently destroy the target. This strategy of attacking the exact same point multiple times with an armament is known as "burrowing" and was originally conceptualized prior to the 1991 Gulf War<sup>88</sup>. An additional strategy in a truly desperate situation would be to destroy the entrances to the facility. This would be a temporary measure that would only push the issue further down the road, but could function as a stopgap measure if Israel or the US decides to attack the facility without the use of the MOP. The Fordow facility does pose the greatest problem for intervention, but several options remain for a strike. The Fordow facility is a key link in Iran's nuclear chain because of its enrichment capabilities. In order to create weapon, Iran must produce a considerable amount of Highly Enriched Uranium (HEU) and Fordow is the best option that Iran has for doing so, largely because of the security of the mountainous site.

Second, the uranium conversion facility at Isfahan. Uranium Hexafluoride (UF<sub>6</sub>) is the fuel for uranium centrifuges. While the recent nuclear deal focused extensively on centrifuges, specifically how many Iran may produce and operate,

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<sup>87</sup> Cordesman, Anthony H. "Analyzing the Impact of Preventive Strikes Against Iran's Nuclear Facilities." Center for Strategic and International Studies, 10 Sept. 2012. Web. 19 Nov. 2015. At 22.

<sup>88</sup> Raas, Whitney, and Austin Long. "Osirak Redux? Assessing Israeli Capabilities to Destroy Iranian Nuclear Facilities." *International Security* 31, no. 4 (Spring 2007): 7-33. At 16.

this becomes irrelevant without fuel to feed the centrifuges. Isfahan is the only domestic site that has the capability to produce UH<sup>6</sup> for the Iranians<sup>89</sup>. Without the ability to fuel its centrifuges, Iran has little ability to enrich uranium, which is the key to producing a nuclear weapon. The facility at Isfahan does not appear to be hardened, and is located above ground<sup>90</sup> and is therefore not considered a very difficult target. 2,000 lb. BLU 109 bombs could be used to destroy this facility, with approximately 12 being necessary to guarantee destruction of all critical equipment at the facility<sup>91</sup>.

Third, the Natanz uranium enrichment facility. The enrichment facility at Natanz is essentially a large warehouse for centrifuges. The benefit of attacking this facility is that Iran would lose the immense capital investment that it has placed in these centrifuges<sup>92</sup>. This facility would be a difficult target to destroy, but would not pose such a risk of failure as to preclude an attack. The enrichment facility is an underground target with between 8 and 23 meters of earth and concrete covering the target. Again using the MOP, the US could penetrate this facility even without burrowing. The Israelis would also have the ability to destroy this facility with the 5,000 lb BLU-115 warhead. The use of three of these BLU-115s would be more than

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<sup>89</sup> Raas, Whitney, and Austin Long. "Osirak Redux? Assessing Israeli Capabilities to Destroy Iranian Nuclear Facilities." *International Security* 31, no. 4 (Spring 2007): 7-33. At 13.

<sup>90</sup> *Ibid.* At 19.

<sup>91</sup> *Ibid.* At 19.

<sup>92</sup> *Ibid.* At 14.

sufficient to penetrate and destroy each of the two major underground facilities at Natanz<sup>93</sup>.

Fourth, the Arak heavy water reactor. Heavy water reactors pose a significant risk because they produce as a byproduct plutonium, which can be used to make a bomb. While there are some civilian application for the byproducts of heavy water reactors, the facility at Arak would create much more than could be used in Iran. This leads experts to view Arak as a significant proliferation risk in that it provides Iran with a direct path to a bomb<sup>94</sup>. Luckily, the Arack facility is only in the earliest stages of construction and doesn't pose an immediate threat. It would most likely be a target if a strike were ordered though, and would only necessitate additional non-penetrating, smaller warheads<sup>95</sup>.

Other targets exist, such as the Russian built reactor at Bushehr, which is the most well known nuclear site in Iran, these other targets are not essential to the production of a bomb. Specifically, the Bushehr site is not of great interest to us for several reasons. First, the technology for a light-water reactor like the one at Bushehr is readily available and relatively easily replaced. Second, the light-water reactor creates neither highly enriched uranium nor plutonium – both essential to

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<sup>93</sup> Raas, Whitney, and Austin Long. "Osirak Redux? Assessing Israeli Capabilities to Destroy Iranian Nuclear Facilities." *International Security* 31, no. 4 (Spring 2007): 7-33. At 18.

<sup>94</sup> *Ibid.* At 15.

<sup>95</sup> *Ibid.* At 20.

the creation of a functioning nuclear weapon. Lastly, sites like Bushehr are soft targets, easily destroyed with sea-based cruise missiles<sup>96</sup>.

Other sites would be attacked in the process of destroying the Iranian nuclear sites. Air defense and early warning installations would be some of the first sites targeted. This would be accomplished by strike aircraft similar to those used in Suppression of Enemy Air Defenses in the recent Iraq war: F-15 Strike Eagles and F-18 Super Hornets delivering missiles that target the radars used by the air defense systems, and EA-18G Growlers which would be used to jam enemy missiles attempting to target US aircraft.

While the US has been involved in several conflicts that required it to attack various air defense systems, the Iranian air defense have not been tested since the Iran-Iraq war. Because of sanctions, Iran is working to create its own domestic military industry. Of particular interest to the Iranians is the development of missile capabilities; in particular, long-range precision guided rockets and missiles<sup>97</sup>. Because of the loss of American supply following the Iranian Revolution, Iran's current air defense system is a patchwork of dilapidated US technology manned by inexperienced and untrained crews and newer technology from Russia and China<sup>98</sup>.

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<sup>96</sup> Raas, Whitney, and Austin Long. "Osirak Redux? Assessing Israeli Capabilities to Destroy Iranian Nuclear Facilities." *International Security* 31, no. 4 (Spring 2007): 7-33. At 13.

<sup>97</sup> Cordesman, Anthony H. Center for Strategic Studies. July 15th, 2015. "*Joint and Asymmetric Warfare, Missiles and Missile Defense, Civil War and Non-State Actors, and Outside Powers*" Web. At 16.

<sup>98</sup> Raas, Whitney, and Austin Long. "Osirak Redux? Assessing Israeli Capabilities to Destroy Iranian Nuclear Facilities." *International Security* 31, no. 4 (Spring 2007): 7-33. At 21.

The problem of Iran's military is particularly time sensitive. While the sanctions regime drained Iran's economy, and by extension, government coffers, the implementation of the JCPOA is likely to result in substantial growth for the Iranian economy<sup>99</sup>. The economic boost that the JCPOA will give to the Iranian economy is likely to come both from foreign trade and to increased investment within the country. This is interesting to us because a burgeoning Iranian economy is also likely to improve the quality of the technology operated by the Iranian military. This improved technology could range from vastly improved air defense systems from Russia to stealth fighters from China. These contracts have not yet materialized, but would change the equation significantly. While US forces could still operate in an environment saturated with new technology, it would greatly increase the number of aircraft needed, and would likely also increase the number of aircraft lost.

A further complicating factor in attacking Iran's nuclear program is that it has been designed with a hostile international community in mind. Iran never viewed its nuclear program as being one that would enjoy support, and even planned that it would meet resistance from several sources. Besides simply keeping its nuclear program a secret, Iran has also learned important lessons from history, in particular Iraq's experience with attempting to create a nuclear program and has specifically avoided pitfalls that would allow for a single attack or set back to substantially damage the overall program's success, for example, creating facilities

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<sup>99</sup> Hussain, Nazir and Abdullah Sannia. "Iran Nuclear Deal: Implications for Regional Security" *Journal of Political Studies*, Vol. 22, Issue - 2, 2015, 475:493. At 485.

buried deep within mountains, spread throughout the country or even within urban population centers<sup>100</sup>.

However, in the near term, the challenges addressed earlier in this work will still have a controlling impact on Iran's attempt to shoot down American or Israeli aircraft. Lack of modern technology, and proper maintenance and training indicate that even Iran's best attempts to intercept American aircraft will be unsuccessful. If the attacking aircraft have even basic fighter sweeps ahead of the strike aircraft, the Iranian fighters will have little impact on the attacking force<sup>101</sup>. If history is any indicator, the power of American air forces will quickly overwhelm any Iranian air force attempt to deter attackers. For example, in 1991, with a better air force, the Iraqis decided to simply stop sending aircraft to attack American strike aircraft due to heavy losses<sup>102</sup>.

A US attack on Iranian nuclear infrastructure would be a fairly simple operation logistically, at least compared to other operations. To attack the listed four facilities, 8 B-2 bombers would need to be rebased to the air base at Diego Garcia<sup>103</sup>. These long-range bombers would be armed with the MOP described previously. Each B-2 has the capability to carry two MOPs, giving each key site four

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<sup>100</sup> Bahgat, Gawdat. "Nuclear Proliferation in the Middle East: Iran and Israel." 2005, Contemporary Security Policy, 26:1, 25-43, DOI: 10.1080/13523260500116067. At 38.

<sup>101</sup> Caitlin Talmadge. "Closing Time: Assessing the Iranian Threat to the Strait of Hormuz." International Security 33, no. 1 (Summer 2008): 82-117. At

<sup>102</sup> Ibid. At 112.

<sup>103</sup> Cordesman, Anthony H. "Analyzing the Impact of Preventive Strikes Against Iran's Nuclear Facilities." Center for Strategic and International Studies, 10 Sept. 2012. Web. 19 Nov. 2015. At 28. Note: Cordesman also considers an attack on the facility at Parchin. The facility at Parchin is a military site that had been used exclusively for conventional weapons research. While this site could easily be added to a list of non-critical sites were the US to target a wider variety of nuclear and non-nuclear related strategic assets, it would not necessitate 2 additional B-2 bombers armed with MOPs. This site could be targeted with other strike aircraft, using other ordnance.

MOPs on target. These B-2s would be escorted by either F-18s from the 5<sup>th</sup> fleet, or F-15E's from bases in the region. These F-18s and F-15s could also be tasked with attacking other targets, Suppression of Enemy Air Defenses (SEAD) and interdiction of whatever aircraft Iran manages to attempt to intercept strike aircraft with<sup>104</sup>. These aircraft could also be supplemented with EA-18 Growlers from the 5<sup>th</sup> fleet, to assist with SEAD. Depending on the target list, Tomahawk cruise missiles could also be launched from the 5<sup>th</sup> fleet to neutralize non-nuclear target sites throughout Iran.

A list of targets for the US to attack would depend a lot on the decisions of American military commanders. I only go into detail on the key parts of the nuclear infrastructure that would need to be destroyed. However, these are also the most highly protected and hardened sites in Iran. Other targets would be destroyed with relative ease compared to these deeply buried and hardened sites.

While any Israeli strike will be a difficult undertaking, there are several options that Israeli military commanders will have to choose between. The primary question that will have to be resolved will be the route taken in order to make a strike on Iran.

The first option would be for Israeli jets to fly north, refuel over the Mediterranean and then fly through Turkey to Iran. This route would offer the easiest refueling, without any threats, over international waters. This route would take Israeli jets through Turkish airspace and near several of Turkey's largest airbases. It is unknown how Turkey would respond to this because there haven't

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<sup>104</sup> Cordesman, Anthony H. "Analyzing the Impact of Preventive Strikes Against Iran's Nuclear Facilities." Center for Strategic and International Studies, 10 Sept. 2012. Web. 19 Nov. 2015. At. 28.

been any publicly available comments on the topic, though Turkey and Israel have historically remained peaceful despite sharing harsh words in public. This route would give Israeli aircraft some leeway in maneuvering against Iranian air defense because of the possibility to refuel on the return leg of the flight, again over the Mediterranean<sup>105</sup>.

The Middle route involves Israeli aircraft flying essentially directly across Jordan and possibly Saudi Arabia into Iraq. This route would be 1,750 km, just above the 1,700 km max range of Israel's aircraft, so refueling would also be required on this route. In this scenario, the refueling would have to happen over Iraq, which would be politically difficult. Iraq has been cultivating closer relations with Iran since American troops left the country, so it is unknown what actions Iraq would take against Israeli jets crossing its airspace to attack Iran. This route would allow the Israeli air force to fly over the least amount of Iranian air space to reach the targets, however, given the proximity to the Iraqi border, air defense in the area might be more ready than on the Turkish border<sup>106</sup>.

The final option for an Israeli air attack would be a southern route along the border of Saudi Arabian-Iraqi border, over the Persian Gulf and then into Iran. This route would be the longest at 2,410 km, again requiring refueling. Diplomatically speaking, this route would be difficult to facilitate, though the Saudis would probably be the most willing to allow the Israeli's to fly through their airspace towards Iran. This would also be the least well-defended route of the three

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<sup>105</sup> Raas, Whitney, and Austin Long. "Osirak Redux? Assessing Israeli Capabilities to Destroy Iranian Nuclear Facilities." *International Security* 31, no. 4 (Spring 2007): 7-33. At 25.

<sup>106</sup> *Ibid.* At 26.

on the part of the Iranians, though refueling would be the most difficult of the three routes<sup>107</sup>.

Each of these routes is problematic because each requires Israeli aircraft to fly through Arab airspace. While absent a threat of a nuclearized Iran, this action would be pretext for war, the Arab world fears a nuclear Iran as much as Israel or the US, and would in all likelihood do nothing to stop Israel from passing through their airspace on the way to attack Iran<sup>108</sup>. The power politics in the region would in this instance allow a normally unimaginable option to be realistic.

An operation by either the US or Israel would be subject to the normal problems that arise in the midst of a military operation. Issues such as mechanical difficulties with aircraft would have a potentially devastating impact on an Israeli strike; they would be less impactful on an American operation. This is due to both the distance that Israeli aircraft have to fly to reach targets in Iran and the total number of aircraft available.

## **Conclusions:**

The analysis above shows that both the US and Israel have the ability to delay Iran's acquisition of a nuclear weapon on a temporary basis. Both nations have the technological capabilities to seriously damage key parts of Iran's nuclear infrastructure while maintaining sufficient resources in the area to counter any retaliation from the Iranians.

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<sup>107</sup> Raas, Whitney, and Austin Long. "Osirak Redux? Assessing Israeli Capabilities to Destroy Iranian Nuclear Facilities." *International Security* 31, no. 4 (Spring 2007): 7-33. At 26.

<sup>108</sup> Inbar, Efraim. "A Strike on Iran: Complex, But Possible." BESA Center Perspectives Paper No. 223, 21 Nov. 2013. Web. 1 Dec. 2015. At 2.

How Iran will react to an attack on its nuclear facilities is a topic of considerable debate. The Iranians have access to considerable conventional as well as chemical weapons, in addition to having extensive control over a wide array of groups throughout the region that could be activated against either the US or Israel. One framework to approach this question from suggests that Iran will do whatever it can to weaken US influence in the region, but not push so far as to invite further condemnation from the world, or worse, further strikes from the United States. While a strike on Iran's nuclear infrastructure would be embarrassing, and would force Iran to retrace its steps on its approach to a weapon, it would not be particularly damaging to Iran's economy, or military assets, or its ability to project power throughout the region. If the option of acquiring nuclear weapons is temporarily removed from the table by a preemptive strike, Iran will then do what it can to control the damage, all the while keeping with its overall strategy of attempting to become the regional superpower.

The most likely retaliation that Iran would consider would be the activation of its various terrorist networks. This would allow Iran to take vengeance for the attacks without necessarily putting itself at risk of further attack. Hezbollah and Hamas both would be tasked with attacks on Israel. However, the impact of these attacks is uncertain. Israeli technology has improved dramatically at countering the threats of these terrorist groups. In a worst-case scenario, Israel could quickly take control of the territory from which these attacks were being launched until the

threat passed<sup>109</sup>. While this would be far from an ideal reality, the necessity of preventing Iran from possessing a nuclear weapon could press Israel to accept the possibility of this retaliation.

The most serious concern in attacking Iran's nuclear infrastructure would be that Iran would retaliate with chemical weapons against Israel, US bases or other nations in the Middle East. Iran has in all likelihood developed the ability to mount chemical warheads onto Shahab-3 missiles<sup>110</sup>. The only scenario where this outcome would be even remotely likely would be if a hardliner regime takes over in Tehran. A chemical attack would so alienate Iran's tentative allies that the regime would risk losing any remaining legitimacy in the region. Additionally, this action would most likely invite additional American strikes, and would most definitely cause the Israelis to attack Iran. While an attack on Iran's nuclear infrastructure would be tailored to only impact the narrowly defined nuclear assets necessary to prevent the acquisition of a nuclear weapon, a second strike would be much less restricted. A follow-on attack in response to the use of chemical weapons would be devastating to Iran's military and economy, and could even threaten the stability of the regime itself.

Closing the straits of Hormuz would be one way that many analysts believe that Iran could retaliate. Because Iran has been unable to compete with the US for technological supremacy in the region, it has instead resorted to building up its

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<sup>109</sup> Inbar, Efraim. "A Strike on Iran: Complex, But Possible." BESA Center Perspectives Paper No. 223, 21 Nov. 2013. Web. 1 Dec. 2015. At 3.

<sup>110</sup> Shoham, Dany. "How Will Iran Retaliate to a Strike on its Nuclear Facilities?", (2007) Contemporary Security Policy, 28:3, 542-558, DOI: 10.1080/13523260701746274. At 546.

ability to challenge the United States and her allies asymmetrically, that is, rather than fight against a vastly superior foe, focus on battles that can be won. One of the ways that Iran has worked to build up this ability is in its anti-ship capability<sup>111</sup>. Blockading the straits of Hormuz would limit some of the 17 million barrels of per day that travel through the straits<sup>112</sup> from reaching markets, causing a spike in worldwide oil prices. Iran doesn't have to actually block the straits with its ships, or deny passage with missile forces, it could simply mine the straits, which would prevent ships from passing through the straits until extensive mine clearing once again makes the straits clear again<sup>113</sup>. Iran would need to lay about 700 mines in order to make passing through the straits too dangerous for commercial traffic and could accomplish this level of mine-laying with its current fleet of both surface and submarine assets<sup>114</sup>. Based on historic rates of clearing mines, the US could clear a route through the straits to allow essential traffic within 4 days, and have all mines cleared within 36 days<sup>115</sup>. The ability of Iran to lay these mines would be the key issue. While they are technically capable of completing the mission, assuming an air strike has already occurred, US forces in the area would be on high alert to counter any attempts to mine the strait before the minefield was set, rather than trying to clear it after the fact. The major downside for Iran in mining the straits of Hormuz

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<sup>111</sup> Cordesman, Anthony H. Center for Strategic and International Studies. July 15th, 2015. "*Joint and Asymmetric Warfare, Missiles and Missile Defense, Civil War and Non-State Actors, and Outside Powers*" Web. At 17.

<sup>112</sup> Cordesman, Anthony H. "Analyzing the Impact of Preventive Strikes Against Iran's Nuclear Facilities." Center for Strategic and International Studies, 10 Sept. 2012. Web. 19 Nov. 2015. At 67.

<sup>113</sup> Caitlin Talmadge. "Closing Time: Assessing the Iranian Threat to the Strait of Hormuz." *International Security* 33, no. 1 (Summer 2008): 82-117. At 94.

<sup>114</sup> *Ibid.* At 96.

<sup>115</sup> *Ibid.* At 97.

would be that they would suffer from a lack of oil exports. If Iran is acting in a way that works to preserve their national interests, which they have done so far, they would avoid mining the straits because of the impact to their economy and the likelihood to increase further American intervention into Iran<sup>116</sup>.

Iran could also harass shipping in the Persian Gulf with small boats and cruise missiles. While US military warships have extensive training against small boat attacks, commercial shipping would certainly be at risk if Iran were to start attacking oil shipping in the Persian Gulf. With existing US capabilities in the region, anti-ship missiles would pose only a limited threat. These missiles are launched from mobile launchers, which rather than stationary sites present the difficulty of first finding the location of the launcher. The higher the rate of missiles launched from sites in Iran, the less time that it will take US forces to identify, target and destroy these mobile sites. Because of this reason, the anti-ship missiles that Iran has stockpiled constitute only a limited threat to shipping in the straits of Hormuz and rather than being used as a tool to sink ships, would rather be used to inspire fear<sup>117</sup>. This outcome can be reasonably expected in the immediate aftermath of an attack, though it would be only a temporary threat to shipping in the straits.

Another factor that cannot be overstated is how the lack of command and control will keep Tehran from mounting a successful defense of its nuclear sites. Even in situations where the technology exists, well-trained crews, and well-maintained equipment exist; Iran lacks the critical assets necessary to coordinate

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<sup>116</sup> Clawson, Patrick, and Michael Eisenstadt. "Halting Iran's Nuclear Programme: The Military Option." *Survival* (2008): 13-19. Print. At 16.

<sup>117</sup> Caitlin Talmadge. "Closing Time: Assessing the Iranian Threat to the Strait of Hormuz." *International Security* 33, no. 1 (Summer 2008): 82-117. At 110.

attacks on aircraft penetrating Iranian airspace. There is little to no advanced warning capability, or working high-tech radar<sup>118</sup>. Iran lacks the command infrastructure to identify threats, positively identify enemies, and then task assets on the destruction of these enemy targets. What could be a marginally effective air defense system is crippled by a lack of a central authority to coordinate an intricate response to threats<sup>119</sup>.

Iran could also attack Israel with its Shahab-3 SSMs. Even if a preemptive attack comes from the US, Israel is likely to be targeted for retaliation. While the Shahab-3 missile has the range to reach Israel, and is a new design, Israel is well equipped to handle this threat. While any long-range SSM missile with multiple warheads poses a serious threat to a nations air defenses, the work that Israel has done to ensure its safety is extensive. These efforts go back to the 1980s, when Israel joined the US in research efforts towards a new missile defense system. The Arrow defense system is the culmination of these research efforts. Unlike the United States, Israel currently has a working missile defense shield. The Arrow has the ability to track and engage multiple warheads, discern between real targets and decoys, and has independent analysis of the system has suggested that the Arrow system would defeat 95% of the missiles that it engages<sup>120</sup>. Given the lack of likelihood of a successful missile strike, and the certain devastating retaliation form

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<sup>118</sup> Ibid. At 114.

<sup>119</sup> Caitlin Talmadge. "Closing Time: Assessing the Iranian Threat to the Strait of Hormuz." *International Security* 33, no. 1 (Summer 2008): 82-117. At 114.

<sup>120</sup> Bahgat, Gawdat. "Nuclear Proliferation in the Middle East: Iran and Israel." 2005, *Contemporary Security Policy*, 26:1, 25-43, DOI: 10.1080/13523260500116067. At 40.

both the US and Israel, this option would be considered unwise for Iran in all but the most unlikely scenarios.

How the international community is likely to respond to an attack also plays a key role in any analysis of the advisability of an attack. While the US is likely to support to Israel in an attack, the reaction of the rest of the world, and particularly of Arab countries is less clear.

Arab countries in general, with a few notable exceptions, have a tenuous relationship with Iran. Iran and Saudi Arabia currently are competing for regional hegemony, so it is likely that other Arab countries will largely mirror the reaction of Saudi Arabia. While many Arab countries are concerned by developments to Iran's nuclear program, that concern is unlikely to translate to broad, popular support for either an Israeli or American attack on Iran, despite the relief of considerable tension in the Middle East without the specter of a nuclear-armed Iran<sup>121</sup>.

The context of an attack is also incredibly important. While an attack today would be inadvisable and unnecessary, and roundly condemned by the international community, there are scenarios where the international community would not respond negatively to a strike<sup>122</sup>. Given the JCPOA, action is not currently necessary, however, if Iran were to violate the JCPOA to the extent that the United States or Israel felt that it was necessary to attack Iran, it seems likely that the rest of the world would at least tolerate this action.

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<sup>121</sup> Guzansky, Yoel, and Amos Yadlin. "The Arab World's Response to an Israeli Attack on Iran." *Survival* (2013): 107-20. *Taylor and Francis Online*. Web. 1 Dec. 2015. At 108.

<sup>122</sup> Clawson, Patrick, and Michael Eisenstadt. "Halting Iran's Nuclear Programme: The Military Option." *Survival* (2008): 13-19. Print. At 14.

Even if the international community publicly condemns the attacks as a violation of sovereignty, the likelihood of further action is slim. While criticizing either the US or Israel would be a politically safe response, most nations both in the region and throughout the world would ultimately be in a more secure position following a strike, and thus would be unwilling to retaliate in a meaningful way<sup>123</sup>.

The recent agreement to the JCPOA between Iran and the P5+1 countries was heralded as a turning point in the relationship between Iran and the rest of the world. So far, the implementation of the JCPOA has proceeded according to plan, with the Iranians acquiescing the expectations of the IAEA and the international community. All the while, the rhetoric of Iranian government officials has continued to be openly hostile towards the US and Israel. Additionally, Iran has been found supporting rebels in Yemen since the signing of the JCPOA<sup>124</sup>. While some recent actions have indicated that Iran has decided to participate in the international community in the capacity of a legitimate state, other events have shown that there is still a strong hardliner presence in the decision making process of Iranian political action.

While the West should stand strongly behind the JCPOA, and work to ensure that it is followed by Iran, there should also continue to be a high level of alertness when considering the Iranian nuclear program. What we have seen here is that military force can be an effective tool in enforcing the nuclear regime. Iran has, of its own free will, agreed to a specific set of rules regarding its nuclear program. The

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<sup>123</sup> Inbar, Efraim. "A Strike on Iran: Complex, But Possible." BESA Center Perspectives Paper No. 223, 21 Nov. 2013. Web. 1 Dec. 2015. At 3.

<sup>124</sup> Fitch, Asa. "U.S. Navy Ship Interdicts a Weapons Shipment in the Arabian Sea" April 4, 2016. Wall Street Journal. Web. 15 Apr. 2016.

international community should work to make sure that these rules are now followed with the hope that Iran will be integrated into the international community as a legitimate state actor. However, the option of military force should remain on the table as a tool to ensure that Iran does not test the resolve of the international nuclear regime on the JCPOA. This analysis shows that both the US or Israel could effectively prevent, at least temporarily, the Iranian nuclear program from developing a nuclear weapon. The isolation of the Iranian program to a few key facilities allows a narrow, targeted strike to efficiently cripple the Iranian program.

The prospect of war with Iran should be considered as a last resort. A strike against the nuclear facilities would be devastating to Iran, both economically and politically, but would also be damaging to US interests in the region. This would be due to both the to the international backlash that would likely accompany an attack, as well as the repercussions to American allies in the region. This being said, it is important to maintain the ability to control the situation in Iran. While great progress appears to have been made in Iran, as evidenced through the JCPOA, there remain within the mainstream of Iranian politics forces who are diametrically opposed to peace with the US or Israel, these forces must be taken seriously. While a strike seems unnecessary at this point, close monitoring of the status of Iran's nuclear program is necessary and is happening under the JCPOA. Another necessity is that the US remain ready to intervene should the situation deteriorate. Keeping a military presence in the region helps, but there is also a necessity to continue considering how intervention will happen. This work ultimately helps to accomplish this goal by examining what challenges exist for the US in maintaining a status quo

where an Iranian bomb can be denied. Further analysis is necessary on the ability of the US to slow or even stop the Iranian pursuit of a bomb, should it become necessary. Some analysts would say that the time for military intervention has passed, that there is no longer a necessity for war. At this time, that argument would appear to be true. However, politics in Middle Eastern countries have a tendency to change abruptly without notice. If this were to happen, if the progress that has been made diplomatically were to be undone, we must keep the ability to protect the world from a nuclear-armed Iran. While we may believe that military analysis is unnecessary, and hope that this is true, it remains a necessity for US policy makers, even as Iran appears to be making progress towards rejoining the international community as a responsible political entity.

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