

# IRANIAN BALLISTIC MISSILE TESTS SINCE THE NUCLEAR DEAL – 2.0

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## EXECUTIVE SUMMARY

- The Foundation for Defense of Democracies (FDD) has identified as many as 23 ballistic missile launches by Iran since the conclusion of the July 2015 nuclear deal known as the Joint Comprehensive Plan of Action (JCPOA).
- This calculation is the result of a comprehensive review of open-source material in both Persian and English, building on a February 2017 review by FDD which was the first of its kind.
- Such an assessment is necessary because of the limited U.S. and UN reporting on Tehran's post-deal missile launches. A reliable count of launches remains essential for assessing both the Iranian missile threat as well as Tehran's compliance with relevant UN Security Council Resolutions (UNSCRs).
- Iran has apparently launched only one medium-range ballistic missile (MRBM) since February 2017. Between July 2015 and February 2017, Iran launched as many as nine MRBMs, more than any other type of missile tested. All of Iran's MRBMs are nuclear-capable, and can strike U.S. bases and partners in the region when fired from Iranian territory.

## INTRODUCTION

Since the conclusion of the JCPOA, Iran has launched as many as 23 ballistic missiles. This number is based on aggregated open-source reporting, since neither the U.S. government nor the UN have issued an official statement on the total number of post-deal missile launches. Although the JCPOA did not itself impose any restrictions on Iran's ballistic missiles<sup>1</sup> – which past and present U.S. Directors of National Intelligence (DNI) have assessed to be Iran's most likely delivery vehicle for a nuclear weapon<sup>2</sup> – UNSCR 2231, which codifies the JCPOA, contains prohibitions on the testing and transfer of these munitions.<sup>3</sup>

\* Updated January 26, 2018.

1. Despite advice from analysts. See, for example: Behnam Ben Taleblu, "Don't Forget Iran's Ballistic Missiles," *War on the Rocks*, August 25, 2014. (<https://warontherocks.com/2014/08/dont-forget-irans-ballistic-missiles/>)

2. Daniel R. Coats, "Worldwide Threat Assessment of the U.S. Intelligence Community," *Statement for the Record Submitted to Senate Select Committee on Intelligence*, May 11, 2017, page 7. (<https://www.dni.gov/files/documents/Newsroom/Testimonies/SSCI%20Unclassified%20SFR%20-%20Final.pdf>); James R. Clapper, "Worldwide Threat Assessment of the U.S. Intelligence Community," *Statement for the Record Submitted to Senate Armed Services Committee*, February 9, 2016, page 8. ([https://www.armed-services.senate.gov/imo/media/doc/Clapper\\_02-09-16.pdf](https://www.armed-services.senate.gov/imo/media/doc/Clapper_02-09-16.pdf))

3. United Nations Security Council, "Resolution 2231 (2015): Ballistic Missile-Related Transfers and Activities," accessed October 27, 2017. (<http://www.un.org/en/sc/2231/restrictions-ballistic.shtml>)

This memo builds on an earlier FDD product from February 2017, which determined that Iran conducted 14 post-JCPOA launches.<sup>4</sup> FDD was the first organization to provide a number explicitly for post-deal launches,<sup>5</sup> contributing to the public debate over Iran’s ballistic missile capabilities and intentions.<sup>6</sup> Like the previous memo, this document explains how FDD determined the number of missile tests and explores the implications.

## WHY HAVING AN ACCURATE COUNT MATTERS FOR U.S. POLICY

The Islamic Republic has invested considerable time, energy, resources, and prestige into its ballistic missile program.<sup>7</sup> For three reasons, Americans need a clear understanding of the number and type.

First, missile launches mark Iran’s commitment to a functioning delivery vehicle for a nuclear weapon. The Islamic Republic has promised to grow its missile power considerably,<sup>8</sup> so knowing what systems it tests, when it tests them, as well as the success/failure rate offers insight into the regime’s long-term strategic intentions and capabilities. Second, knowing what Iran has and has not tested since agreeing to the JCPOA, which was enshrined by UNSCR 2231, matters a great deal for discerning the nature of Iran’s adherence to this UNSCR and the spirit of the JCPOA more generally. And lastly, for those concerned with Iran’s nuclear-capable and conventional missile force, more data on Iran’s missile tests will aid in devising policies that can impede the growth, modernization, lethality, and readiness of that force.

## WHAT IRAN HAS REPORTEDLY TESTED SINCE THE LAST MEMO

The following is a list of reported Iranian ballistic missile launches since February 2017. Note, the Hormuz-2 launch in March 2017 does not count toward the 23 post-JCPOA launches identified by FDD, because it was an anti-ship ballistic missile (ASBM).

4. Since the publication of that memo, FDD has reassessed that from July 2015 to February 2017, Iran reportedly tested 15 ballistic missiles, since evidence of a late 2016 Qiam-1 test was reported in June 2017, four months after the publication of the first missile memo. United Nations Security Council, “Fourth Report of the Secretary-General on the implementation of Security Council resolution 2231 (2015),” December 8, 2017, page 5. ([http://www.securitycouncilreport.org/atf/cf/%7B65BF9B-6D27-4E9C-8CD3-CF6E4FF96FF9%7D/s\\_2017\\_1030.pdf](http://www.securitycouncilreport.org/atf/cf/%7B65BF9B-6D27-4E9C-8CD3-CF6E4FF96FF9%7D/s_2017_1030.pdf)); Bethan McKernan, “Iran is using the Star of David as target practice for missile tests,” *The Independent* (UK), June 29, 2017. (<http://www.independent.co.uk/news/world/middle-east/israel-iran-nuclear-ballistic-missile-tests-star-of-david-isis-tehran-attack-a7815276.html>); Behnam Ben Taleblu, “Iranian Ballistic Missile Tests Since The Nuclear Deal,” *Foundation for Defense of Democracies*, February 9, 2017. ([http://www.defenddemocracy.org/content/uploads/documents/20917\\_Behnam\\_Ballistic\\_Missile.pdf](http://www.defenddemocracy.org/content/uploads/documents/20917_Behnam_Ballistic_Missile.pdf))
5. FDD is cited in: Lucas Tomlinson, “Iran launched 2 ballistic missiles, US officials say,” *Fox News*, March 6, 2017. (<http://www.foxnews.com/world/2017/03/06/iran-launched-2-ballistic-missiles-us-officials-say.html>)
6. Since then, other research institutes have recognized the importance of developing a comprehensive database of Iranian ballistic missile launches. For example: “Iranian Missile Launches: 1988-Present,” *Center for Strategic and International Studies*, accessed October 27, 2017. (<https://missilethreat.csis.org/iranian-missile-launches-1988-present/>); “The CNS Iran Missile and SLV Launch Database,” *Nuclear Threat Initiative*, August 2, 2017. (<http://www.nti.org/analysis/articles/cns-iran-missile-and-slv-launch-database/>). Elsewhere, scholars working on Iranian missiles have focused on flight tests of a particular class of missiles, both before and after the publication of the FDD memo. Michael Eisenstadt, “Testing the Limits: Iran’s Ballistic Missile Program, Sanctions, and the IRGC,” *Testimony submitted to the House Foreign Affairs Committee*, March 29, 2017, page 8. (<http://www.washingtoninstitute.org/uploads/Documents/testimony/EisenstadtTestimony20170329.pdf>); Michael Elleman, “Iran’s Ballistic Missile Program,” *Written Statement Presented to U.S. Senate Committee on Banking, Housing, and Urban Affairs*, May 24, 2016, page 3. ([http://www.banking.senate.gov/public/\\_cache/files/f64d023a-d6fc-4dc4-84a7-ea10ba8192cf/90DC029490361D182584B92FCAD76111.052416-elleman-testimony.pdf](http://www.banking.senate.gov/public/_cache/files/f64d023a-d6fc-4dc4-84a7-ea10ba8192cf/90DC029490361D182584B92FCAD76111.052416-elleman-testimony.pdf))
7. Erik A. Olson, “Iran’s Path Dependent Military Doctrine,” *Strategic Studies Quarterly*, Summer 2016. (<http://www.au.af.mil/au/ssq/digital/pdf/Summer16/Olson.pdf>); “Iran Missile Milestones: 1985-2017,” *Iran Watch*, September 27, 2017. (<http://www.iranwatch.org/our-publications/weapon-program-background-report/iran-missile-milestones-1985-2017>)
8. “توسعه توان موشکی با قدرت ادامه می یابد” (Developing Missile Capability Will Continue With Strength),” Defa Press (Iran), November 14, 2017. (<http://defapress.ir/fa/news/266250/>). (توسعه توان موشکی با قدرت ادامه می یابد). (Iran’s Missile Capability is Growing Fast),” *ISNA* (Iran), July 19, 2017. ([www.isna.ir/news/96042816911/توان-موشکی-ایران-به-سرعت-در-حال-رشد-است](http://www.isna.ir/news/96042816911/توان-موشکی-ایران-به-سرعت-در-حال-رشد-است)); (Hatami: We Will Grow Missile Power Specifically Ballistic and Cruise [Missiles]),” *ISNA* (Iran), August 17, 2017. (<https://www.isna.ir/news/96052616321/>) (حاکمی-قدرت-موشکی-به-ویژه-بالستیک-و-کروز-را-توسعه-می-دهیم)

## HORMUZ-2

- **Reported launch date:** March 2017
- **Type:** Solid-fueled ASBM
- **Number:** 2
- **Source and comments:** Both Iranian<sup>9</sup> and Western<sup>10</sup> outlets reported that between March 4-5, Iran fired two missiles at its own barges in the Persian Gulf, with one of them missing its target.<sup>11</sup> While it turned out the missile was the Hormuz-2 ASBM,<sup>12</sup> unnamed U.S. officials initially called the missiles the Fateh-110, which is the original surface-to-surface missile (SSM) upon which the Hormuz-2 is based.<sup>13</sup> Iranian media has reported that the Hormuz-2 can travel up to 300 km and can carry a payload of 450-600 kg.<sup>14</sup>

## ZULFIQAR (AKA ZOLFAGHAR)

- **Reported launch date:** June 2017 (part of Operation Laylat al-Qadr)
- **Type:** Single-stage, solid-fueled short-range ballistic missile (SRBM)
- **Number:** At most 5
- **Source and comments:** Israeli sources initially claimed that Iran had fired the Shahab-3 MRBM<sup>15</sup> at Islamic State positions in eastern Syria.<sup>16</sup> Iranian outlets attest that a mix of the Zulfiqar and Qiam-1 SRBMs were launched, for a total of six missiles,<sup>17</sup> while an Iranian infographic from a semi-official news outlet reported that six Zulfiqar SRBMs were fired.<sup>18</sup> FDD estimates that at most five Zulfiqars were launched, accounting for reports of another missile being fired among the six. Despite drone videos of the missiles' impact,<sup>19</sup> the accuracy and battlefield effectiveness of the Zulfiqar remains open to debate.<sup>20</sup> Iranian outlets allege that the Zulfiqar has a range of 700-750 km, and can carry up to a 500 kg warhead.<sup>21</sup>

9. "Iran successfully test-fires Hormuz-2 ballistic missile," *Press TV* (Iran), March 9, 2017. (<http://www.presstv.com/Detail/2017/03/09/513676/Iran-Hormuz-Amirali-Hajizadeh>)

10. "Iran says ballistic missile capable of hitting ships tested successfully," *CBS News*, March 9, 2017. (<https://www.cbsnews.com/news/iran-ballistic-missile-capable-hitting-ships-test-launch/>)

11. Curt Mills, "Iran Launched Ballistic Missiles, U.S. Officials Say," *U.S. News and World Report*, March 6, 2017. (<https://www.usnews.com/news/world/articles/2017-03-06/iran-launched-ballistic-missiles-us-officials-claim>)

12. Jeremy Binnie, "Iran successfully tests radar-guided anti-ship ballistic missile," *Jane's Defence Weekly*, March 10, 2017. (<http://www.janes.com/article/68625/iran-successfully-tests-radar-guided-anti-ship-ballistic-missile>)

13. Lucas Tomlinson, "Iran launched 2 ballistic missiles, US officials say," *Fox News*, March 6, 2017. (<http://www.foxnews.com/world/2017/03/06/iran-launched-2-ballistic-missiles-us-officials-say.html>)

14. "موشک-هرمز-شکارچی-ایرانی-ناوهای-آمریکایی (The "Hormuz" Missile: An Iranian Hunter of American Ships)," *Tabnak* (Iran), October 22, 2016. (<http://www.tabnak.ir/fa/news/634285/موشک-هرمز-شکارچی-ایرانی-ناوهای-آمریکایی>)

15. "Iran launches missile strike into Syria in response to Tehran attacks," *The Times of Israel* (Israel), June 18, 2017. (<https://www.timesofisrael.com/iran-launches-missile-strike-into-syria-for-tehran-attacks/>)

16. "«The Uprising» of the IRGC with the "Zulfiqar" Landed on the Terrorists' Head," *Fars News Agency* (Iran), June 19, 2017. (<http://www.farsnews.com/newstext.php?nn=13960329000517>)

17. "UPDATED: Iran Launches Missile Strikes at ISIL to Avenge Tehran Terrorist Attacks," *Fars News Agency* (Iran), June 18, 2017. (<http://en.farsnews.com/newstext.aspx?nn=13960328001862>)

18. Infographic of missile launch, *Tasnim News Agency* (Iran), accessed November 29, 2017. (<https://newsmedia.tasnimnews.com/Tasnim/Uploaded/Image/1396/03/29/13960329021311424111863410.jpg>); One Israeli outlet alleged that seven Zulfiqar missiles were fired: Amos Harel, "Iran's Missile Attack on Syria Failed: 5 Missed, 3 Landed in Iraq," *Haaretz* (Israel), June 21, 2017. (<https://www.haaretz.com/middle-east-news/1.796836>)

19. "Drone video of Iran missile strikes on ISIL positions in Syria," *Mehr News Agency* (Iran), June 19, 2017. (<https://en.mehrnews.com/news/126029/Drone-video-of-Iran-missile-strikes-on-ISIL-positions-in-Syria>)

20. Amos Harel, "Iran's Missile Attack on Syria Failed: 5 Missed, 3 Landed in Iraq," *Haaretz* (Israel), June 21, 2017. (<https://www.haaretz.com/middle-east-news/1.796836>)

21. "22-Su دیوار صوتی رسانه‌ها با شکست / موشک نقطه‌زن ایران 750 کیلومتری شد." (Breaking the Sound Barrier of the media with the SU-22/Iran's Precision-Strike Missile Reached 750 kilometers), *Fars News Agency* (Iran), September 21, 2016. (<http://www.farsnews.com/newstext.php?nn=13950631000684>)

## QIAM-1

- **Reported launch date:** June 2017 (part of Operation Laylat al-Qadr)
- **Type:** Liquid-fueled SRBM
- **Number:** At least 1
- **Source and comments:** As noted above, both Persian<sup>22</sup> and English language Iranian sources<sup>23</sup> attest that the Qiam-1 was part of the batch of missiles fired at Islamic State positions in Syria. Independent experts assess that the Qiam-1 can travel between 600-800 km and can carry up to a 750 kg warhead.<sup>24</sup> Iranian outlets report similar statistics.<sup>25</sup>

## UNKNOWN BALLISTIC MISSILE

- **Reported launch date:** July 2017
- **Type:** MRBM (likely liquid-fueled)
- **Number:** No more than 1
- **Source and comments:** In a July 28 joint statement condemning a July 27 satellite-launch vehicle (SLV) launch by Iran, the U.S., France, Germany, and the UK drew attention to a previously unmentioned July 4 MRBM test by Tehran.<sup>26</sup> No other U.S. government source has mentioned this launch, and the Iranian media was silent on the matter.<sup>27</sup> Major Western press outlets which reported the SLV launch on July 27/28 omitted any reference to the alleged MRBM launch,<sup>28</sup> with only one major Middle Eastern outlet reporting the State Department allegation in English.<sup>29</sup>

22. “The Uprising” of the IRGC with the “Zulfikar” Landed on the Terrorists’ Head,” *Fars News Agency* (Iran), June 19, 2017. (<http://www.farsnews.com/newstext.php?nn=13960329000517>)

23. “Photos Show IRGC Used Zolfaqar, Qiam Missiles in Deir Ezzur Attacks,” *Fars News Agency* (Iran), June 19, 2017. (<http://en.farsnews.com/newstext.aspx?nn=13960329000502>)

24. “Qiam-1,” *Center for Strategic and International Studies*, September 28, 2017. (<https://missilethreat.csis.org/missile/qiam-1/>); Michael Elleman, “Iran’s Ballistic Missile Program,” *Written Statement Presented to U.S. Senate Committee on Banking, Housing, and Urban Affairs*, May 24, 2016, page 3. ([http://www.banking.senate.gov/public/\\_cache/files/f64d023a-d6fc-4dc4-84a7-ea10ba8192cf/90DC029490361D182584B92FCAD76111.052416-elleman-testimony.pdf](http://www.banking.senate.gov/public/_cache/files/f64d023a-d6fc-4dc4-84a7-ea10ba8192cf/90DC029490361D182584B92FCAD76111.052416-elleman-testimony.pdf))

25. “موشک-قیام-1-استثنایی-ترین-موشک-ایران» (The ‘Qiam-1’ Iran’s Most Exceptional Missile,)” *Young Journalists Club* (Iran) July 14, 2012 (<http://www.yjc.ir/fa/news/4017179/موشک-قیام-1-استثنایی-ترین-موشک-ایران>)

26. U.S. Department of State, Bureau of Public Affairs, Press Release, “Iran’s Space Launch Vehicle Inconsistent With UNSCR 2231 Joint Statement by France, Germany, the United Kingdom and United States,” July 28, 2017. (<https://www.state.gov/r/pa/prs/ps/2017/07/272934.htm>)

27. Instead, Iranian outlets reported statements by Iran’s Supreme Leader Khamenei praising SRBM launches into Syria a month earlier, as well as reporting the North Korean missile launch. Both of these developments took place on July 4/5, 2017: “امام-خامنه‌ای-کارتان-خیلی-عالی-بود/هرچه-می-توانید-روی-موشک-کار-کنید” (Imam Khamenei: Your Work Was Very Excellent/Do Whatever You Can To Keep Working On Missiles), *Tasnim News Agency* (Iran), July 5, 2017. (<https://www.tasnimnews.com/fa/news/1396/04/14/1454869/امام-خامنه‌ای-کارتان-خیلی-عالی-بود-هرچه-می-توانید-روی-موشک-کار-کنید>);

“شلیک-موشک-کره-شمالی-به-سمت-منطقه-اقتصادی-ژاپن” (North Korea’s Firing of Missile Towards Japan’s Economic Zone),” *Tasnim News Agency* (Iran), July 4, 2017. (<https://www.tasnimnews.com/fa/news/1396/04/13/1452986/شلیک-موشک-کره-شمالی-به-سمت-منطقه-اقتصادی-ژاپن>)

28. “U.S. says Iran rocket test breaches U.N. resolution,” *Reuters*, July 27, 2017. (<https://www.reuters.com/article/us-iran-satellite/u-s-says-iran-rocket-test-breaches-u-n-resolution-idUSKBN1AC1YY>); Amir Vahdat and Adam Schreck, “Iran claims launch of satellite-carrying rocket into space,” *Associated Press*, July 27, 2017. (<https://www.apnews.com/3f7ab7ad638649618e859e55aa0e7120>); Thomas Erdbrink, “Iran Reports Successful Launch of Missile as U.S. Considers New Sanctions,” *The New York Times*, July 27, 2017. (<https://www.nytimes.com/2017/07/27/world/middleeast/iran-reports-successful-launch-of-missile-as-us-considers-new-sanctions.html>)

29. Taimur Khan, “Nuclear deal signatories condemn Iran’s ‘satellite rocket’ launch,” *The National* (UAE), July 29, 2017. (<https://www.thenational.ae/world/mena/nuclear-deal-signatories-condemn-iran-s-satellite-rocket-launch-1.615218>)

## SIMORGH

- **Reported launch date:** July 2017
- **Type:** Two-stage, liquid-fueled<sup>30</sup> space/satellite-launch vehicle (SLV)
- **Number:** 1
- **Source and comments:** While both Western<sup>31</sup> and Iranian news outlets<sup>32</sup> reported the launch of the Simorgh, unnamed U.S. officials from U.S. Strategic Command later told a *Fox News* journalist that no satellite had been put into outer space and that the entire endeavor was a “catastrophic failure.”<sup>33</sup> Yet at least one American analyst who has traditionally been skeptical of Iran’s missile capabilities cited it as “the first successful launch of the Simorgh.”<sup>34</sup> However, it remains unknown if the Simorgh was carrying a satellite. Nonetheless, Iranian outlets claim that the Simorgh can put a 250 kg satellite into 500 km orbit.<sup>35</sup>

## ANALYSIS OF THE MOST RECENT MISSILES LAUNCHED

Since being put “on notice” by the Trump administration in February 2017,<sup>36</sup> Iran has reportedly only once conducted an MRBM test.<sup>37</sup> This matters because the bulk of Iran’s missile tests in the previous reporting period (July 2015 – February 2017) were MRBMs, which are generally considered more threatening than SRBMs because all of Iran’s MRBMs are nuclear-capable. It is highly likely that the administration’s threat intimidated Tehran, altering its flight-testing calculus. In fact, a hardline Iranian outlet quoted an Islamic Revolutionary Guard Corps (IRGC) official who complained that an SLV test was delayed due to fears over the potential American response.<sup>38</sup>

Out of all the ballistic missiles Iran launched in 2017, only four can be considered nuclear-capable. In 2016, Iran fired 10 missiles that can be considered nuclear-capable.<sup>39</sup>

30. Jeffrey Lewis, “Will Iran’s Simorgh Space Launcher Appear in North Korea?” *Nuclear Threat Initiative*, July 8, 2016. (<http://www.nti.org/analysis/articles/will-irans-simorgh-space-launcher-appear-north-korea/>)

31. “Iran says it has launched a satellite-carrying rocket into space,” *Associated Press*, July 27, 2017. (<http://www.latimes.com/world/la-fg-iran-satellite-20170727-story.html>)

32. “Iran Opens New Space Center with Launch of Satellite Carrier,” *Tasnim News Agency* (Iran), July 27, 2017. (<https://www.tasnimnews.com/en/news/2017/07/27/1476247/iran-opens-new-space-center-with-launch-of-satellite-carrier>)

33. Lucas Tomlinson, “Iran rocket suffered ‘catastrophic failure,’ likely blew up, US official says,” *Fox News*, July 28, 2017. (<http://www.foxnews.com/world/2017/07/28/iran-rocket-suffered-catastrophic-failure-likely-blew-up-us-official-says.html>)

34. Laura Grego, “Simorgh Launch: Iran’s Bigger Ride to Space Gets off the Ground,” *Union of Concerned Scientists*, July 30, 2017. (<http://allthingsnuclear.org/lgrego/simorgh-launch-2017>)

35. “Iran Opens New Space Center with Launch of Satellite Carrier,” *Tasnim News Agency* (Iran), July 27, 2017. (<https://www.tasnimnews.com/en/news/2017/07/27/1476247/iran-opens-new-space-center-with-launch-of-satellite-carrier>)

36. The White House, Press Release, “Statement by the National Security Advisor,” February 1, 2017. (<https://www.whitehouse.gov/briefings-statements/statement-national-security-advisor-michael-t-flynn-iran/>)

37. See reference to alleged July 4 test: U.S. Department of State, Bureau of Public Affairs, Press Release, “Iran’s Space Launch Vehicle Inconsistent With UNSCR 2231 Joint Statement by France, Germany, the United Kingdom and United States,” July 28, 2017. (<https://www.state.gov/r/pa/prs/ps/2017/07/272934.htm>)

38. “آقایان با یک تشر، موشک ماهوار مبر را به انبار بردند!” *Kayhan* (Iran), March 10, 2017. (<http://kayhan.ir/fa/print/99832>); First noted in: Behnam Ben Taleblu, “Missing The Point On Iran’s Ballistic Missiles,” *War on the Rocks*, April 28, 2017. (<https://warontherocks.com/2017/04/missing-the-point-on-irans-ballistic-missiles/>)

39. Both tallies reflect the assessment that the Simorgh SLV is considered nuclear-capable (should it undergo significant modifications), while the Zulfiqar SRBM is assumed unlikely to be nuclear-capable.

The first is the Khorramshahr, an MRBM fired in late January 2017 which was included in the original FDD assessment from February.<sup>40</sup> The Khorramshahr is believed to be an Iranian copy of the North Korean BM-25 Musudan. The Musudan is a liquid-propelled intermediate-range ballistic missile (IRBM) reportedly derived from a Soviet submarine-launched ballistic missile (SLBM).<sup>41</sup> Open source reporting and analysis suggests that Pyongyang may have provided Tehran with the Musudan.<sup>42</sup>

The second is the Qiam-1 SRBM, at least one of which Iran reportedly fired at Islamic State positions in eastern Syria during an operation in June 2017.<sup>43</sup> The Qiam-1 is Iran's first finless ballistic missile,<sup>44</sup> and is an upgraded Shahab-2/Scud-C liquid-propelled missile with a triconic warhead.<sup>45</sup>

The third is an unknown ballistic missile, which a State Department press release mentioned in passing in response to Iran's July 27 SLV test. Although the press release did not mention the exact type of MRBM, all of Iran's MRBMs<sup>46</sup> meet the requisite Missile Technology Control Regime (MTCR) threshold for being a nuclear-capable missile.<sup>47</sup> It is unclear why Western or Iranian media chose to omit the reported launch from their coverage.

40. Behnam Ben Taleblu, "Iranian Ballistic Missile Tests Since The Nuclear Deal," *Foundation for Defense of Democracies*, February 9, 2017, page 4. ([http://www.defenddemocracy.org/content/uploads/documents/20917\\_Behnam\\_Ballistic\\_Missile.pdf](http://www.defenddemocracy.org/content/uploads/documents/20917_Behnam_Ballistic_Missile.pdf))

41. "North Korean Ballistic Missile Models," *Nuclear Threat Initiative*, March 21, 2016. (<http://www.nti.org/analysis/articles/north-korean-ballistic-missile-models/>)

42. Uzi Rubin, "The Global Reach of Iran's Ballistic Missiles," *The Institute for National Security Studies* (Israel), November 2006, pages 29-36. ([http://www.inss.org.il/he/wp-content/uploads/sites/2/systemfiles/\(FILE\)1188302022.pdf](http://www.inss.org.il/he/wp-content/uploads/sites/2/systemfiles/(FILE)1188302022.pdf)); "BM-25 MUSUDAN," *Military Edge*, accessed November 27, 2017. (<https://militaryedge.org/armaments/bm-25/>); Jeffrey Lewis, "Origins Of The Musudan IRBM," *Arms Control Wonk*, June 11, 2012. (<http://www.armscontrolwonk.com/archive/205337/origins-of-the-musudan-irbm/>); Lucas Tomlinson, "Exclusive: Iran conducts 4th missile test since signing nuke deal," *Fox News*, July 15, 2016. (<http://www.foxnews.com/world/2016/07/15/exclusive-iran-conducts-4th-missile-test-since-signing-nuke-deal.html>)

43. "Photos Show IRGC Used Zolfagar, Qiam Missiles in Deir Ezzur Attacks," *Fars News Agency* (Iran), June 19, 2017. (<http://en.farsnews.com/newstext.aspx?nn=13960329000502>); "Iran's Top General Commends IRGC's 'Mighty' Response to Terrorists," *Tasnim News Agency* (Iran), June 21, 2017. (<https://www.tasnimnews.com/en/news/2017/06/21/1443305/iran-s-top-general-commends-irgc-s-mighty-response-to-terrorists>)

44. For more on the Qiam-1 when it was unveiled, see: Joshua Pollack, "Iran's New Missile," *Arms Control Wonk*, August 23, 2010. (<http://www.armscontrolwonk.com/archive/503101/irans-new-missile/>)

45. This is confirmed by multiple expert sources. See: Michael Elleman, "Iran's Ballistic Missile Program," *Written Statement Presented to U.S. Senate Committee on Banking, Housing, and Urban Affairs*, May 24, 2016, page 3. ([http://www.banking.senate.gov/public/\\_cache/files/f64d023a-d6fc-4dc4-84a7-ea10ba8192cf/90DC029490361D182584B92FCAD76111.052416-elleman-testimony.pdf](http://www.banking.senate.gov/public/_cache/files/f64d023a-d6fc-4dc4-84a7-ea10ba8192cf/90DC029490361D182584B92FCAD76111.052416-elleman-testimony.pdf)); Anthony H. Cordesman, *Iran's Rocket and Missile Forces and Strategic Options*, (Washington, DC: Center for Strategic and International Studies, 2014), page 73. (<https://books.google.com/books?id=nBeMBgAAQBAJ&pg=PA73&lpg=PA73&dq=Qiam-1+missile+SHahab+2&source=bl&ots=v1kcskipdU&sig=OHkOoG3OC4uWK7dyufTH3QWhVE&hl=en&sa=X&ved=0ahUKewj3rbP5nvDRAhXoLcAKHXkIAkQQ6AEIVzAO#v=onepage&q=Qiam-1%20missile%20Shahab%202&f=false>); "Shahab 2 (Scud-C variant)," *Center for Strategic and International Studies*, August 9, 2016. (<https://missilethreat.csis.org/missile/shahab-2/>); "Qiam-1," *Military Edge*, accessed November 27, 2017. (<https://militaryedge.org/armaments/qiam-1/>); "Scud C (Shahab-2/Hwasong-6)," *Military Edge*, accessed November 27, 2017. (<https://militaryedge.org/armaments/scud-c/>)

46. This is inclusive of the Shahab-3, Ghadr, Emad, and Sejji MRBMs, as well as all their variants.

47. Noted in Footnote 2 in: Kelsey Davenport, "The Missile Technology Control Regime at a Glance," *Arms Control Association*, July 2017. (<https://www.armscontrol.org/factsheets/mtcr>); also see: U.S. Department of State, Bureau of International Security and Nonproliferation (ISN), "Missile Technology Control Regime (MTCR) Frequently Asked Questions," January 20, 2017. (<https://www.state.gov/t/isn/rls/fs/2017/266847.htm>)

And the fourth is the Simorgh.<sup>48</sup> Technically, this SLV requires significant design modifications to serve as a battlefield-ready ICBM<sup>49</sup> or even an IRBM.<sup>50</sup> But it is included as a nuclear-capable system because, as cited by Germany, France, the UK, and the U.S in an official complaint, it is “inherently capable of delivering a 500 kg payload to a range of at least 300 km if configured as a ballistic missile.”<sup>51</sup>

Though the stated range for the Zulfiqar is 700 km<sup>52</sup> and Iranian outlets allege that the missile can carry a 500 kg warhead,<sup>53</sup> it is highly likely that this munition, despite meeting the MTCR threshold, may not be nuclear-capable. The Zulfiqar is Iran’s latest single-stage, solid-fueled SRBM.<sup>54</sup> It upgrades the Fateh-313 SRBM, which itself is an upgrade to the Fateh-110 SRBM, which in turn is based on the Zelzal rocket.<sup>55</sup> Absent a significant miniaturization capability, in order for Iranian missile engineers to grow the range of the Fateh platform,<sup>56</sup> they would need to decrease the payload for the missile.<sup>57</sup> Moreover, the true payload cap for the Zulfiqar – whether armed with a unity or cluster munition warhead – remains unknown.<sup>58</sup>

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48. “Iran Opens New Space Center with Launch of Satellite Carrier,” *Tasnim News Agency* (Iran), July 27, 2017. (<https://www.tasnimnews.com/en/news/2017/07/27/1476247/iran-opens-new-space-center-with-launch-of-satellite-carrier>)

49. Michael Elleman, “Iran’s Ballistic Missile Program,” *Written Statement Presented to U.S. Senate Committee on Banking, Housing, and Urban Affairs*, May 24, 2016, pages 7-9. ([http://www.banking.senate.gov/public/\\_cache/files/f64d023a-d6fc-4dc4-84a7-ea10ba8192cf/90DC029490361D182584B92FCAD76111.052416-elleman-testimony.pdf](http://www.banking.senate.gov/public/_cache/files/f64d023a-d6fc-4dc4-84a7-ea10ba8192cf/90DC029490361D182584B92FCAD76111.052416-elleman-testimony.pdf)); Behnam Ben Taleblu, “Making Sense of Iran’s Latest Satellite-Launch Vehicle Test,” *Foundation for Defense of Democracies*, July 31, 2017. (<http://www.defenddemocracy.org/media-hit/behnam-ben-taleblu-making-sense-of-irans-latest-satellite-launch-vehicle-test/>)

50. See ranges listed in: Barbara Opall-Rome, “Israeli Missile Experts: Simorgh Sets Iran on Path to ICBM,” *Space News*, February 15, 2010. (<http://spacenews.com/israeli-missile-experts-simorgh-sets-iran-path-icbm/>)

51. United Nations Security Council, “Fourth Report of the Secretary-General on the Implementation of Security Council Resolution 2231 (2015),” December 8, 2017, pages 4-5. ([http://www.securitycouncilreport.org/atf/cf/%7B65BFCF9B-6D27-4E9C-8CD3-CF6E4FF96FF9%7D/s\\_2017\\_1030.pdf](http://www.securitycouncilreport.org/atf/cf/%7B65BFCF9B-6D27-4E9C-8CD3-CF6E4FF96FF9%7D/s_2017_1030.pdf))

52. Jeremy Binnie, “Iran claims Zolfaghar missile has 700 km range,” *Jane’s Defence Weekly*, September 28, 2016. (<https://web.archive.org/web/20161001033919/http://www.janes.com/article/64149/iran-claims-zolfaghar-missile-has-700-km-range>)

53. “22-Su دیوار صوتی رسانه‌ها با شکست / موشک نقطه‌زن ایران 750 کیلومتری شد” (Breaking the Sound Barrier of the media with the SU-22/Iran’s Precision-Strike Missile Reached 750 kilometers), *Fars News Agency* (Iran), September 21, 2016. (<http://www.farsnews.com/newstext.php?nn=13950631000684>)

54. For more on the Zulfiqar, see: Behnam Ben Taleblu, “Assessing the Latest Iranian Ballistic Missile: The Zulfiqar,” *Military Edge*, September 29, 2016. (<https://militaryedge.org/analysis-articles/assessing-latest-iranian-ballistic-missile-zulfiqar/>)

55. Anthony H. Cordesman, *Iran’s Rocket and Missile Forces and Strategic Options*, (Washington, DC: Center for Strategic and International Studies, 2014), page 70. (<https://books.google.com/books?id=nBeMBgAAQBAJ&pg=PA70&lpg=PA70&dq=Zelzal+rocket+Fateh+Missile+Iran&source=bl&ots=v2d8sicsfV&sig=zRSnMaKqcbOBOScU58Z-EebSs&hl=en&sa=X&ved=0ahUKEwi4sdfqmOTXAhUIRN8KHbpMAVs4ChDoAQhMMAY#v=onepage&q=Zelzal%20rocket%20Fateh%20Missile%20Iran&f=false>); For more on the Zelzal, see: “Iran’s arsenal of missiles,” *BBC News* (UK), May 20, 2009. ([http://news.bbc.co.uk/2/hi/middle\\_east/7499601.stm](http://news.bbc.co.uk/2/hi/middle_east/7499601.stm))

56. For a reference to Iran’s domestic missile upgrades, see: J.D. Syring, “Unclassified Statement of Vice Admiral J.D. Syring, USN, Director, Missile Defense Agency,” *Statement Before the Senate Armed Services Committee, Subcommittee on Strategic Forces*, April 13, 2016, page 3. ([https://www.armed-services.senate.gov/imo/media/doc/Syring\\_04-13-16.pdf](https://www.armed-services.senate.gov/imo/media/doc/Syring_04-13-16.pdf))

57. As a predicate, see how Iran converted the Shahab-3 into the Ghadr-1: Michael Elleman, *Iran’s Ballistic Missile Capabilities: A Net Assessment*, (London: International Institute for Strategic Studies, 2010), pages 23-26; also see how Saddam Hussein extended the range of his Scud missiles: Joseph Cirincione, “Why the Patriot Missile Might Fail America’s Military,” *The National Interest*, December 7, 2017. ([http://nationalinterest.org/feature/why-the-patriot-missile-might-fail-americas-military-23530?page=show\\_](http://nationalinterest.org/feature/why-the-patriot-missile-might-fail-americas-military-23530?page=show_))

58. Collin Meisel, “Zolfaghar,” *Missile Defense Advocacy Alliance*, March 2017. (<http://missiledefenseadvocacy.org/missile-threat-and-proliferation/todays-missile-threat/iran/zolfaghar/>); Stéphane Delory and Can Kasapoglu, “Thinking Twice about Iran’s Missile Trends: The Threat is Real but Different than Predicted,” *Fondation pour la Recherche Stratégique* (France), June 29, 2017. (<https://www.frstrategie.org/en/publications/notes/thinking-twice-about-iran-s-missile-trends-the-threat-is-real-but-different-than-predicted-12-2017>)

## METRICS, SOURCES, AND RATIONALES

Rather than focus on the number of military drills or exercises – each of which may be composed of multiple missile launches – FDD logged the type and number of SSMs with a ballistic trajectory that were reportedly fired and mentioned in the Persian- and English-language press. This permits a more complete understanding of the systems in Iran’s arsenal.

FDD’s metrics include SLV tests<sup>59</sup> because Iran’s space program, according to a 2017 U.S. Air and Space Intelligence Center report, “could shorten a pathway to an [Intercontinental Ballistic Missile] ICBM.”<sup>60</sup> That same report further specifies that Iran’s SLVs “could serve as a test bed for developing ICBM technologies.”<sup>61</sup>

FDD’s tally of post-deal launches also includes both tests and combat launches, since tests and combat launches provide indications of Iran’s overall capability. Similarly, missile tests were included regardless of their success or failure. As a general rule, flight-testing provides states with critical data that can be used to refine their capabilities, even if a test fails.<sup>62</sup>

Lastly, FDD’s metrics also includes ballistic missiles that meet and do not meet MTCR’s threshold. While this may pose challenges for determining a technical violation of UNSCR 2231’s Annex,<sup>63</sup> with the right modifications, missiles that fall short of the MTCR’s range threshold could still potentially serve as a delivery vehicle for a tactical nuclear weapon in the future.<sup>64</sup>

What the FDD metrics exclude, however, are cruise missiles, despite their ability to carry an unconventional warhead, and non-SSMs that have at least a quasi-ballistic trajectory, such as anti-ship ballistic missiles (ASBMs). Cruise missiles are excluded due to the explicit emphasis on ballistic missiles in UNSCR 2231, and ASBMs are excluded given that they are intended to strike maritime targets, something we judge would be unlikely for Tehran to do with weapons of mass destruction (WMD). An example of an Iranian cruise missile omitted from this report is the Soumar, a copy of the Russian Kh-55 land-attack cruise missile (LACM) that Iran reportedly tested

59. Amir Vahdat and Adam Schreck, “Iran claims launch of satellite-carrying rocket into space,” *Associated Press*, July 27, 2017. (<https://www.apnews.com/3f7ab7ad638649618e859e55aa0e7120>); Thomas Erdbrink, “Iran Reports Successful Launch of Missile as U.S. Considers New Sanctions,” *The New York Times*, July 27, 2017. (<https://www.nytimes.com/2017/07/27/world/middleeast/iran-reports-successful-launch-of-missile-as-us-considers-new-sanctions.html>)

60. U.S. National Air and Space Intelligence Center, “Ballistic & Cruise Missile Threat,” June 2017, page 2. (<https://fas.org/irp/threat/missile/bm-2017.pdf>)

61. Ibid. An older version of that report stated, “Iran will likely continue to pursue longer range ballistic missiles and more capable SLVs, which could lead to the development of an ICBM system.” See: U.S. National Air and Space Intelligence Center, “Ballistic & Cruise Missile Threat,” 2013, page 19. ([https://fas.org/programs/ssp/nukes/nuclearweapons/NASIC2013\\_050813.pdf](https://fas.org/programs/ssp/nukes/nuclearweapons/NASIC2013_050813.pdf))

62. See logic in: John E. Hyten, *Statement Before the Senate Committee on Armed Services*, April 4, 2017, page 3. ([http://www.stratcom.mil/Portals/8/Documents/Hyten\\_04-04-17.pd.pdf?ver=2017-04-04-154107-750](http://www.stratcom.mil/Portals/8/Documents/Hyten_04-04-17.pd.pdf?ver=2017-04-04-154107-750))

63. For more on these violations, see: Valerie Lincy and Behnam Ben Taleblu, “Iran’s Compliance with UNSCR 2231: Alleged Violations Must Be Addressed,” *Foundation for Defense of Democracies and Iran Watch*, August 2017. ([http://www.defenddemocracy.org/content/uploads/documents/MEMO\\_WPONAC.pdf](http://www.defenddemocracy.org/content/uploads/documents/MEMO_WPONAC.pdf))

64. For non-Iranian examples of this, see the Pluton, Lance, and Hatf-9 missiles, in: “Pluton,” *Federation of American Scientists*, accessed November 22, 2017. (<https://fas.org/nuke/guide/france/theater/pluton.htm>); “Israel Missile Update – 2005,” *Wisconsin Project on Nuclear Arms Control*, November-December 2005. (<https://web.archive.org/web/20160203225241/http://www.wisconsinproject.org/countries/israel/IsraelMissile2005.html>); “Hatf 9 ‘Nasr,’” *Center for Strategic and International Studies*, September 16, 2016. (<https://missilethreat.csis.org/missile/hatf-9/>)



in January 2017.<sup>65</sup> An example of an Iranian ASBM not included in this assessment is the Hormuz-2, two of which were fired during a military drill in March 2017.<sup>66</sup>

## CHALLENGES TO ACCURATELY REPORTING IRANIAN MISSILE LAUNCHES

On September 23, Iranian media outlets carried video<sup>67</sup> of the flight test of a ballistic missile identified as a Khorramshahr, alleging that the launch took place the same day.<sup>68</sup> Almost immediately, reputable Western press outlets re-reported the Iranian media's claims about the launch,<sup>69</sup> yet soon a prominent American defense journalist, citing unnamed U.S. government officials, corrected their reporting. There had been no Iranian ballistic missile launched in September.<sup>70</sup> American journalists had fallen for an Iranian bluff. As it turned out, the video was from a failed January 2017 test.<sup>71</sup>

There are two main challenges to using open-source assessments of the number of post-JCPOA missile launches. The first challenge is navigating, aggregating, and analyzing multiple conflicting sources of information, often in different languages. Long-standing Iranian deception efforts in official and semi-official media outlets hype their ballistic missile capabilities. The second is the lack of unclassified U.S. government information about Iranian missile tests and their success rate. It remains unclear if the U.S. desire to withhold this information is due to concerns over sources and methods, political considerations, or both. And in cases where the U.S. government provides information, as in the case of the alleged July 4 MRBM launch, there is scant media reporting to back it up.

## RECOMMENDATIONS AND IMPROVING U.S. REPORTING REQUIREMENTS

Under both the Obama and Trump administrations,<sup>72</sup> the media has had to rely on unnamed U.S. government officials to selectively confirm Iranian missile launches.<sup>73</sup> In fact, the amount of information made public from

65. "Iran tested nuclear-capable cruise missile: German newspaper," *Reuters*, February 2, 2017. (<http://www.reuters.com/article/us-iran-missiles-cruise-idUSKBN15H0WR>); for more on the Soumar, see: Behnam Ben Taleblu and Patrick Megahan, "Iran Fires Cruise Missile Through Sanctions Loophole," *Foundation for Defense of Democracies*, March 11, 2015. (<http://www.defenddemocracy.org/media-hit/behnam-ben-taleblu-iran-fires-cruise-missile-through-sanctions-loophole/>)

66. Allen Cone, "Iranian military says it test-fired Hormuz-2 ballistic missile," *United Press International*, March 9, 2017. (<https://www.upi.com/Iranian-military-says-it-test-fired-Hormuz-2-ballistic-missile/2771489083306/>); Behnam Ben Taleblu, "Iran's Missile Launch is Test for New Administration," *Foundation for Defense of Democracies*, March 9, 2017. (<http://www.defenddemocracy.org/media-hit/behnam-ben-taleblu-irans-missile-launch-is-test-for-new-administration/>)

67. "Iran successfully test-fires new ballistic missile: Video," *Press TV* (Iran), September 23, 2017. (<http://www.presstv.com/Detail/2017/09/23/536111/Iran-ballistic-missile-testfire>)

68. For more on this missile, see: «بردموشک خرمشهر» «۲۰۰۰ کیلومتر» اعلام شد + ویژگی های موشک (The Khorramshahr Missile's Range is Announced at 2,000 km + Specifics About the Missile), *Tasnim News Agency* (Iran) September 23, 2017. (<https://www.tasnimnews.com/fa/news/1396/06/31/1526472/برد-موشک-خرمشهر-۲۰۰۰-کیلومتر-اعلام-شد-ویژگی-های-موشک/>)

69. Hilary Clarke and Shirzad Bozorgmehr, "Iran tests new ballistic missile hours after showing it off at military parade," *CNN*, September 23, 2017. (<http://www.cnn.com/2017/09/23/middleeast/iran-ballistic-missile-test/index.html>); Ali Arouzi and F. Brinley Bruton, "Iran Tests New Ballistic Missile, State Media Reports," *NBC News*, September 23, 2017. (<https://www.nbcnews.com/news/world/iran-tests-new-ballistic-missile-state-media-reports-n804091>)

70. Lucas Tomlinson, "Iran's supposed missile launch was fake, US officials say," *Fox News*, September 25, 2017. (<http://www.foxnews.com/politics/2017/09/25/irans-supposed-missile-launch-was-fake-us-officials-say.html>)

71. For more, see: Behnam Ben Taleblu, "FAQ after allegations of another ballistic missile test by Tehran," *FDD's Long War Journal*, September 28, 2017. (<https://www.longwarjournal.org/archives/2017/09/faq-after-allegations-of-another-ballistic-missile-test-by-tehran.php>); Idrees Ali, "Iran tested medium-range ballistic missile: U.S. official," *Reuters*, January 30, 2017. (<https://www.reuters.com/article/us-usa-iran-missiles/iran-tested-medium-range-ballistic-missile-u-s-official-idUSKBN15E2EZ>)

72. Admittedly, the Trump administration has put greater emphasis on this issue: The White House, Office of the Press Secretary, "Remarks by President Trump on Iran Strategy," October 13, 2017. (<https://www.whitehouse.gov/briefings-statements/remarks-president-trump-iran-strategy/>)

73. See, for example: Jennifer Griffin and Lucas Tomlinson, "Iran tests another mid-range ballistic missile in breach of UN resolutions," *Fox News*, December 7, 2015. (<http://www.foxnews.com/politics/2015/12/07/iran-tests-another-mid-range-ballistic-missile-in-breach-un-resolutions.html>); Lucas Tomlinson, "Iran's supposed missile launch was fake, US officials say," *Fox News*, September 25, 2017. (<http://www.foxnews.com/politics/2017/09/25/irans-supposed-missile-launch-was-fake-us-officials-say.html>)

the U.S. government regarding North Korean launches<sup>74</sup> is far greater than the information available on Iran's launches.<sup>75</sup> Therefore:

**Congress should require that the White House release a tally of all post-JCPOA Iranian ballistic missile launches. This tally should be broken down by missile type, what international conventions it violates, if the test was successful, and if it can be considered nuclear-capable. This data should also inform the capabilities the U.S. maintains or is developing for both itself and its international partners to offset the Iranian missile threat.**

The National Defense Authorization Act of 2017 contains a request for quarterly reports from the DNI to Congress on “any confirmed ballistic missile launch by Iran.”<sup>76</sup> More recent congressional initiatives seek to amend that bill to continue the quarterly reporting requirement on Iranian missile launches “through December 31, 2022.”<sup>77</sup> These reports presumably provide an important baseline in the debate on Iran's ballistic missiles and should be made public.

While questions of how Washington can combat the threat posed by Iran's missiles is outside the scope of this memo, the House of Representatives has passed legislation that can provide more data about the entirety of Iran's missile program.<sup>78</sup> Should this legislation become law, this information should be used to inform the public debate about Iran's ballistic missile intentions and capabilities. More transparency on the threats Iran's ballistic missiles pose will be needed as Tehran's arsenal grows. As members of the administration appear before Congress for hearings in 2018, this information must become public record to inform policy. And while experts debate the quality and quantity of Iran's post-deal launches, there should be no debate that the actual number should have been zero.

74. U.S. Department of Defense, Press Release, “Statement by Pentagon Spokesman Col. Robert Manning on North Korea ICBM Launch,” November 28, 2017. (<https://www.defense.gov/News/News-Releases/News-Release-View/Article/1382158/statement-by-pentagon-spokesman-col-robert-manning-on-north-korea-icbm-launch/>); U.S. Strategic Command, “USSTRATCOM Detects, Tracks North Korean Missile Launch,” February 11, 2017. (<http://www.stratcom.mil/Media/News/News-Article-View/Article/1080866/usstratcom-detects-tracks-north-korean-missile-launch/>). This enables detailed media reporting. See: Joshua Berlinger, “North Korea's missile tests: What you need to know,” *CNN*, December 3, 2017. (<http://www.cnn.com/2017/05/29/asia/north-korea-missile-tests/index.html>)

75. In general, U.S. officials have only selectively confirmed Iran's launches, and never provided a full account of *all* post-deal launches in one setting. See: United States Mission to the United Nations, Press Release, “Statement by Ambassador Nikki Haley on Iran's Missile Launch,” July 28, 2017. (<https://usun.state.gov/remarks/7913>); U.S. Department of State, Bureau of Public Affairs, Press Release, “Senior Administration Officials on an Announcement from the Treasury Department on Iran,” February 3, 2017. (<https://www.state.gov/r/pa/prs/ps/2017/02/267435.htm>); U.S. House of Representatives, Foreign Affairs Committee, Press Release, “Chairman Royce Statement on Iran's Latest Ballistic Missile Launch,” March 9, 2016. (<https://foreignaffairs.house.gov/press-release/chairman-royce-statement-on-irans-latest-ballistic-missile-launch/>)

76. National Defense Authorization Act for Fiscal Year 2017, Pub. L. 144-328, 130 Stat. 2000, codified as amended at 114 U.S.C. (<https://www.congress.gov/114/plaws/publ328/PLAW-114publ328.pdf>)

77. The House of Representatives recently passed H.R. 1698, the Iran Ballistic Missiles and International Sanctions Enforcement Act, which contains reporting requirements on Iranian attempts to acquire or export components and whole missile systems as defined by the Annex of UNSCR 2231. See: Iran Ballistic Missile Reporting Act of 2017, H.R. 3078, 115<sup>th</sup> Congress (2017). (<https://www.congress.gov/115/bills/hr3078/BILLS-115hr3078ih.xml>)

78. Iran Ballistic Missiles and International Sanctions Enforcement Act, H.R. 1698, 115<sup>th</sup> Congress (2017). (<https://www.congress.gov/bill/115th-congress/house-bill/1698/text>)

## ANNEX 1

### FDD's Comprehensive Table of Post-JCPOA Launches

DATE	TYPE OF LAUNCH	NUMBER OF MISSILES	NAME OF MISSILE	TYPE OF MISSILE	PROPELLANT	NUCLEAR-CAPABLE?
August 2015	Test	1	Fateh-313 <sup>1</sup>	SRBM	Solid	No
October 2015	Test	1	Emad <sup>2</sup>	MRBM	Liquid	Yes
November 2015	Test	1	Ghadr-110 (aka Ghadr-1, Ghadr-101) <sup>3</sup>	MRBM	Liquid	Yes
March 2016	Test/Drill	1	Ghadr-F <sup>4</sup>	MRBM	Liquid	Yes
March 2016	Test/Drill	2	Ghadr-H <sup>5</sup>	MRBM	Liquid	Yes
March 2016	Test/Drill	1	Qiam-1 <sup>6</sup>	SRBM	Liquid	Yes
March 2016	Test/Drill	1	Shahab-3 <sup>7</sup>	MRBM	Liquid	Yes
April 2016	Test	1	Simorgh <sup>8</sup>	SLV	Liquid	Requires modification, but yes
April 2016	Test	1	Unknown <sup>9</sup>	Likely MRBM	Likely liquid	Unknown, but assumed likely
July 2016	Test	1	BM-25 Musudan <sup>10</sup> (possibly the Khorramshahr)	IBRM (possibly MRBM)	Liquid	Yes
September 2016	Test	1	Zulfiqar <sup>11</sup>	SRBM	Solid	Alleged, but assumed unlikely
November/December 2016	Test	1	Qiam-1 <sup>12</sup>	SRBM	Liquid	Yes
December 2016	Test	1	Shahab-3 <sup>13</sup>	MRBM	Liquid	Yes
January 2017	Test	1	Khorramshahr <sup>14</sup>	MRBM	Liquid	Yes
June 2017	Operation	≤5	Zulfiqar <sup>15</sup>	SRBM	Solid	Alleged, but assumed unlikely
June 2017	Operation	≥1	Qiam-1 <sup>16</sup>	SRBM	Liquid	Yes
July 2017	Test	≤1	Unknown <sup>17</sup>	MRBM	Likely liquid	Unknown, but assumed likely
July 2017	Test	1	Simorgh <sup>18</sup>	SLV	Liquid	Requires modification, but yes

**Total: 23 launches**

*Additional information detailing these missiles' manufacturer, range, payload, translation of their name, as well as other related data and sourcing is available upon request.*

1. لحظه شلیک موشک فاتح-313 + تصاویر (The Moment of Firing Fateh-313 Missile + Images)," *Tasnim News Agency* (Iran), August 22, 2015 (<https://www.tasnimnews.com/fa/news/1394/05/31/836241/لحظه-شلیک-موشک-فاتح-313-تصاویر>)

2. Sam Wilkin, "Iran tests new precision-guided ballistic missile," *Reuters*, October 11, 2015. (<https://www.reuters.com/article/us-iran-military-missiles/iran-tests-new-precision-guided-ballistic-missile-idUSKCN0S505L20151011>)
3. Louis Charbonneau and Michelle Nichols, "U.S. conducting 'serious review' of alleged Iran missile test," *Reuters*, December 8, 2015. (<http://www.reuters.com/article/us-iran-missiles-usa-idUSKBN0TR2G920151208>)
4. "First Missile Test after Nuclear Deal," *Iranian Diplomacy* (Iran), March 9, 2016. (<http://irdiplomacy.ir/en/page/1957075/First+Missile+Test+after+Nuclear+Deal.html>)
5. "Iran test-fires two ballistic missiles during large-scale drills," *Press TV* (Iran), March 9, 2016. (<http://www.presstv.com/Detail/2016/03/09/454681/iran-irgc-ballistic-missile->); "پیام موشکی سپاه به زبان «عبری» مخیره شد: ישראל צריכה להימחק מעל-תصוیر" (The IRGC's Missile Message Was Transmitted in 'Hebrew'...)," *Fars News Agency* (Iran), March 9, 2016. (<http://www.farsnews.com/newstext.php?nn=13941219000316>)
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