

## Modifications at the Parchin Site: A Comprehensive Timeline; New Imagery Suggests Re-Asphalting

By David Albright, Serena Kelleher-Vergantini, and Christopher Coughlin

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*New Digital Globe imagery purchased and analyzed by ISIS shows continued signs of external activity at the Parchin military site where Iran is alleged to have conducted work related to nuclear weapons development (see figure 1). The signatures visible in the most recent imagery indicate that Iran may be engaging in new asphaltting at the site, efforts likely aimed at concealing past banned activities.*

*Parchin continues to be a key outstanding issue to the International Atomic Energy Agency (IAEA) in resolving its concerns about Iran's past and possibly on-going nuclear weapons work and military fuel cycle activities. Iran has yet to grant the IAEA access to the site, provide information about alleged activities at this site, allow interviews of officials linked to activities at the site, or permit visits to other sites linked to the alleged military dimensions of Iran's nuclear programs.*

*Prospects for a comprehensive agreement dim if Iran remains intransigent on Parchin. A deal that does not include Iran addressing the IAEA's concerns about the past and possibly on-going military dimensions of its nuclear program would undermine the verifiability of a long-term agreement, and thus the credibility of a comprehensive deal. Any deal will depend heavily on the adequacy of the verification arrangements. Unless reversed, Iran's consistent and unjustified refusal to address the IAEA's concerns, which require access to Parchin and other military sites, creates a dangerous precedent that makes adequate verification of a long-term agreement impossible, even if Iran ratifies the Additional Protocol. Prior to the finalization of a long-term deal, the IAEA must make significant progress on resolving its concerns about Parchin and other alleged nuclear weapons related activities. Certainly, without such progress, no key economic or financial sanction on Iran should be lifted.*

### Background

A specific site at the Parchin Military Complex became of particular public interest after the IAEA first asked to visit it in early 2012, as a result of a range of information obtained by the inspectors, including the startling allegation that at least one building was the location of high explosive tests related to the development of nuclear weapons.<sup>1</sup> However, Iran denied access to the IAEA and, after

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<sup>1</sup> The IAEA also developed evidence that a former Soviet nuclear weapons expert aided in the development of a high-explosive testing chamber inside the building and possibly provided help in using sophisticated diagnostic equipment for testing the spherical symmetry of high explosive shaped charges. See David Albright and Robert Avagyan, *Revisiting Danilenko and the Explosive Chamber at Parchin: A Review Based on Open Sources*, ISIS Report, September 17, 2012, <http://isis-online.org/isis-reports/detail/revisiting-danilenko-and-the-explosive-chamber-at-parchin-a-review-based-on/8>,

years of no activity at this particular site, suddenly undertook substantial reconstruction and site modifications that have continued to this day.<sup>2</sup> Despite repeated requests by the IAEA and its Board of Governors to stop such activities and grant access, Iran has continued demolishing, modifying, and reconstructing portions of the site. The IAEA has concluded that the activity at this Parchin site could undermine its ability to conduct effective verification of Iran's peaceful commitments and its obligations under the Nuclear Non-Proliferation Treaty.

Iran may also be repurposing this site. It did this in 2003 and 2004 when it leveled and scraped the site of the Physics Research Center at Lavisan-Shian, which was linked to military nuclear work, and then converted the site into an athletic center.<sup>3</sup> At some point, Iran may try to argue that the "remodeled" Parchin site is dedicated to some other activity, perhaps also occurring at nearby sites. As in the case with Lavisan, the extensive modifications may undermine the ability of the IAEA to conduct on-site verification, but it does not stop the IAEA from seeking records and interviews with personnel linked to the alleged high explosive work at this site and access to other sites relevant to the inspectors' investigation. The IAEA can also seek further clarification from Iran about overseas assistance to its Parchin efforts from a foreign nuclear weapons expert<sup>4</sup> and its procurements abroad of goods and materials related to nuclear weapons development. (Iran has conducted extensive illicit procurements to support a broad range of its nuclear facilities and activities; some illicit nuclear procurements have occurred since the Joint Plan of Action was signed in November 2013.)

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and Mark Gorwitz, *Revisiting Vyacheslav Danilenko: His Origins in the Soviet Nuclear Weapons Complex*, ISIS Report, September 17, 2012, [http://isis-online.org/uploads/isis-reports/documents/Gorwitz\\_Revisiting\\_Vyacheslav\\_Danilenko\\_17Sept2012.pdf](http://isis-online.org/uploads/isis-reports/documents/Gorwitz_Revisiting_Vyacheslav_Danilenko_17Sept2012.pdf). An excerpt from the former ISIS report follows:

"Danilenko's writings describe a chamber that he designed in 1999 and 2000 that is strikingly similar to the one at Parchin. According to Olli Heinonen, a senior fellow at the Belfer Center at Harvard University and former Deputy Director General of IAEA, the IAEA obtained a photo of the chamber installed at Parchin that was built by the Iranian company Azar AB Industries. The Associated Press [obtained](#) a description and drawing of the chamber built for the Parchin site from a country tracking Iran's nuclear program. The drawing was based on information from a person who had seen the chamber at the Parchin site. Based on this information, the IAEA concluded that the chamber at Parchin is akin to one designed by Danilenko and described in his 2003 book, titled *Sintez i Spekanie Almaza Vzryvom* (Explosive Synthesis and Sintering of Diamonds), which a European intelligence agency said he wrote based on the lectures he delivered in Iran. In his book, parts of which ISIS has [translated](#) from Russian, he states that in 1999-2000, he designed a cylindrical chamber of 4.6 x 19 m<sup>2</sup> with a volume of 315 m<sup>3</sup> capable of withstanding multiple explosions of devices up to 70 kg. The chamber's air-water system is pictured in figure 3.3 (figure 1 in this report). The external part of the central section of a length of 9 meters is strengthened with a reinforced concrete square section of 7.6 x 7.6 m<sup>2</sup> and a mass of 700 tonnes. Before an explosion, the chamber can be showered with water, and a vacuum can be created.<sup>8</sup> These dimensions and characteristics of this chamber are similar to those of the Parchin chamber described by the media.<sup>9</sup>" (The footnotes in the excerpt can be found in original report.)

<sup>2</sup> In its May 2012 Safeguards Report, the Agency stated that "based on satellite imagery, at this location, where virtually no activity had been observed for a number of years, the buildings of interest to the Agency are now subject to extensive activities that could hamper the Agency's ability to undertake effective verification." See Director General, International Atomic Energy Agency, *Implementation of the NPT Safeguards Agreement and relevant provisions of Security Council resolutions in the Islamic Republic of Iran*, GOV/2012/23, May 25, 2012, [http://isis-online.org/uploads/isis-reports/documents/IAEA\\_Iran\\_Report\\_25May2012.pdf](http://isis-online.org/uploads/isis-reports/documents/IAEA_Iran_Report_25May2012.pdf).

<sup>3</sup> David Albright, Paul Brannan, and Andrea Stricker, *The Physics Research Center and Iran's Parallel Military Nuclear Program*, ISIS Report, February 23, 2012, [http://isis-online.org/uploads/isis-reports/documents/PHRC\\_report\\_23February2012.pdf](http://isis-online.org/uploads/isis-reports/documents/PHRC_report_23February2012.pdf)

<sup>4</sup> See footnote 1.

## A Pictorial Review of the Many Changes at the Parchin Site

Figures 2, 3, and 4 show the progressive activities at the Parchin site between December 2011 and January 2015. Figure 2 shows the status of the site in December 2011, before the IAEA's request to visit and the subsequent modifications that took place after the inspectors requested access to the site.

During the year 2012, Iran engaged in several clean-up, demolition, and reconstruction activities. Iran completely demolished and removed debris from one medium size building, partially demolished and rebuilt a small building near the alleged explosive chamber (located in the center of figure 2 and other figures). Iran removed equipment from the building alleged to hold the explosive chamber, modified/replaced the roof and walls of this and the northern-most building (also possibly housing suspicious activity and located on the right side of figure 2 and other figures). Between June and December 2012 multiple vehicles, large open bed trucks, and earth piles were present at the site. Considerable earth moving activities took place, possibly to remove layers of original soil and replace it with new soil. Iran also removed and rebuilt a new solid wall security perimeter and trenches surrounding the site. During this year, Iran engaged in re-designing the layout and security of the site.

By January 2013, several earlier activities had been completed, and by August 2013 Iran had asphalted large sections of the site (see figure 3). As noted in several of the IAEA's quarterly Iran safeguards reports, asphaltting and the other documented activities have significantly changed the site and impacted the ability of IAEA inspectors to collect environmental samples and other evidence that it could use to determine whether nuclear weapons-related activities once took place there.

In the latter part of 2013, commercial satellite imagery showed no significant visible alterations. However, activity commenced again in early 2014 (see figure 4). In January 2014, commercial satellite [imagery](#) confirmed the presence of building material and debris at the site, as reported by the IAEA.<sup>5</sup>

April 2014 [imagery](#) showed several signs of external activity at the site. The imagery showed building material and debris in front of the two main buildings, the movement of two trucks or containers, the appearance of a larger object, possibly a truck or large container, north of the main building, and dirt or water runoff in front of the northern building.

This activity continued into [August 2014](#), when satellite imagery showed that although new construction material or debris, as well as new dirt or water runoff, appeared in front of the three buildings in the southern part of the site, the dirt or water runoff and some of the possible construction material that previously appeared in front of the northern building was no longer visible. In October 2014, much of the construction material/debris and the dirt/water runoff was still visible at the site, although no other significant changes were visible.

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<sup>5</sup> Director General, International Atomic Energy Agency, *Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran*, GOV/2014/10, February 20, 2014, <http://isis-online.org/uploads/isis-reports/documents/iaea-iranreport-02202014.pdf>.

More recent Digital Globe satellite imagery dated January 31, 2015, shows signs of external activity at the northern section of the site and the absence of most of the material/debris and the dirt/water runoff by the main building (see figure 1, where the northern section is on the right side of the image). In front of the large building in the north end of the site, another building of interest to the inspectors, imagery shows the presence of gravel or recycled asphalt. These signatures are consistent with activities of resurfacing that are usually undertaken prior to the lay-down of new asphalt. It is, therefore, possible that Iran is engaging again in asphaltting activities in the northern portion of the Parchin site.

## **Conclusion**

Over the last three years, Iran has substantially modified the Parchin site. Like its actions at the Lavisan site, Iran's more recent modifications at Parchin are probably aimed at concealing past nuclear weapons-related activities from the IAEA and the P5+1, who are in charge of negotiating a long term agreement with Iran. Tehran has a long history of hiding its nuclear facilities and conducting secret, illicit nuclear procurement activities to outfit its nuclear programs. The removal of key economic and financial sanctions will depend on a variety of factors in a long term agreement, including significant cuts in Iran's centrifuge program. But the lifting of these sanctions also depends on Iran stopping its nuclear-related concealment activities and its illicit nuclear procurements and addressing the IAEA's concerns about past and possibly on-going work on nuclear weapons.



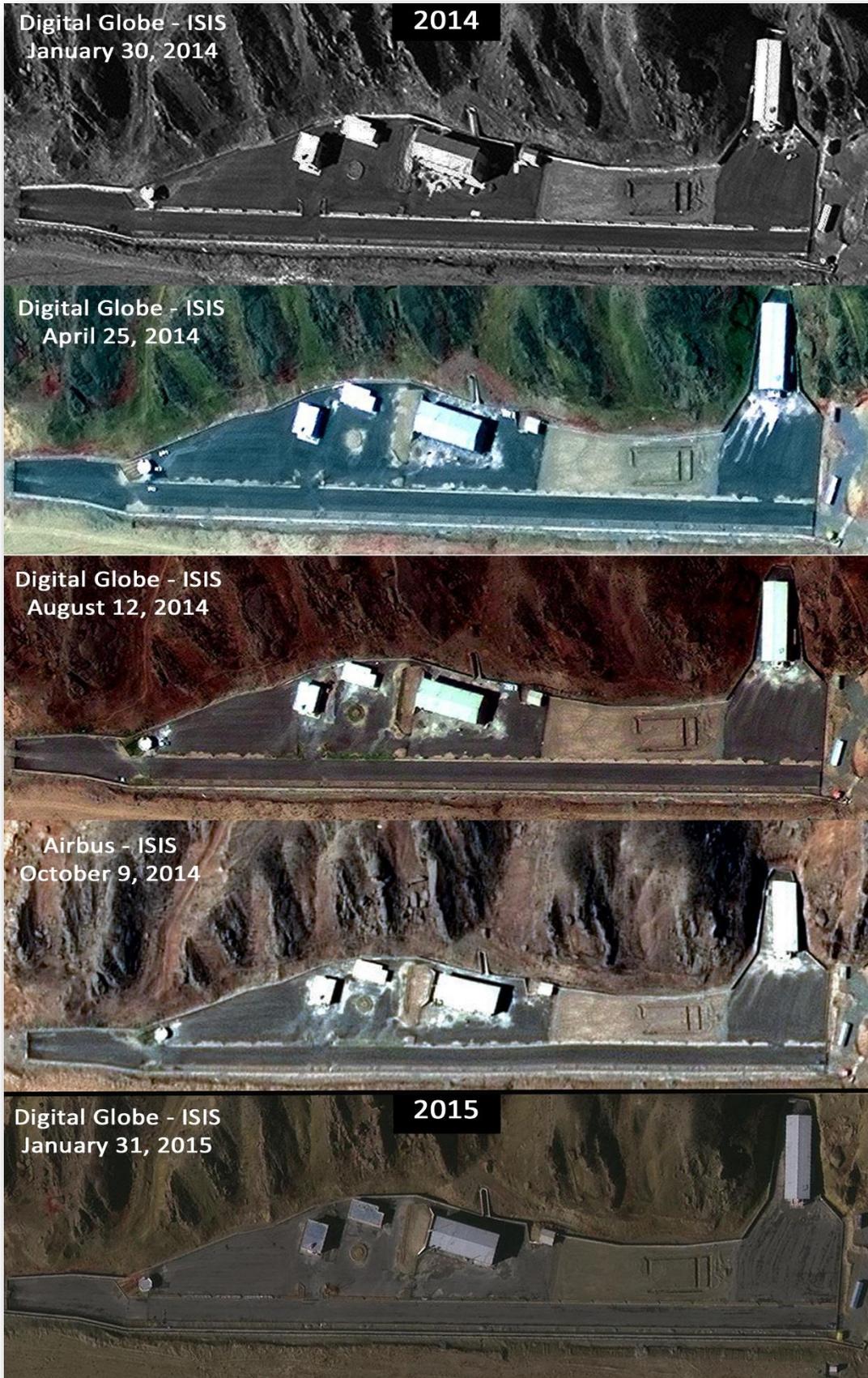
**Figure 1.** Digital Globe imagery showing the status of the alleged high explosive test site at the Parchin military complex on January 31, 2015.



**Figure 2.** GeoEye/Digital Globe high resolution satellite imagery showing changes at the alleged high explosive test site at the Parchin military complex between December 2011 and December 2012.



**Figure 3.** Digital Globe high resolution satellite imagery showing changes at the alleged high explosive test site at the Parchin military complex between January 2013 and November 2013.



**Figure 4.** Digital Globe/Airbus high resolution satellite imagery showing changes at the alleged high explosive test site at the Parchin military complex between January 2014 and January 2015.