



ISIS Analysis of IAEA Iran Safeguards Report

David Albright, Paulina Izewicz, Andrea Stricker, and Serena Kelleher-Vergantini

September 5, 2014

On September 5, 2014 the International Atomic Energy Agency (IAEA) released its [report](#) on the implementation of the NPT safeguards agreement in Iran and the status of Iran's compliance with the United Nation Security Council resolutions.

Key Findings:

- 1) Several key issues in the safeguards report indicate ongoing efforts by Iran to delay cooperation on resolving the outstanding issues over possible military dimensions (PMD) of its nuclear program; particularly its statement that the issues are “mere allegations and do not merit consideration;”
- 2) Iran did not meet the implementation deadline for the third step of a set of measures under the IAEA/Iran Framework for Cooperation, implementing one prior to and two after the deadline, and has not yet proposed a fourth set of measures as requested by the IAEA;
- 3) Iran is continuing to undertake modification activities at the Parchin military site, which complicate future verification efforts by the IAEA if it is ever granted a visit;
- 4) Iran is not enriching uranium in a recently developed IR-8 centrifuge at the Natanz Pilot Fuel Enrichment Plant. An IR-8 casing is installed there but it does not contain a rotor assembly and thus cannot operate. Iran claims this centrifuge has significantly higher enrichment output than previous models;
- 5) Iran has not produced uranium hexafluoride enriched above 5 percent and its entire stock enriched up to 20 percent has been either downbleded or fed into the conversion process producing an oxide form. However, Iran possesses a significant quantity of near 20 percent LEU oxide which can be reconverted back to hexalufuoride form;
- 6) As of the end of the last reporting period, Iran had put only a small fraction of the near 20 percent LEU oxide into fuel for the Tehran Research Reactor. As of August, only about 15 percent of the near 20 percent LEU oxide has been made into fuel assemblies for the TRR.
- 7) On August 17, 2014, Iran informed the IAEA that it would blend down into natural uranium about 4,118 kilograms of uranium hexafluoride enriched up to 2 percent;
- 8) Iran so far has fed 1,505 kg of UF₆ enriched up to 5 percent U-235 into the conversion process for the production of UO₂ at the Enriched UO₂ Powder Plant (EUPP).

LEU Production and Centrifuge Levels at the Natanz Fuel Enrichment Plant (FEP)

Iran's total 3.5 percent low enriched uranium (LEU) production at the FEP through August 12, 2014 is reported to be 12,464 kilograms (kg). The FEP is Iran's primary enrichment facility, where the majority of its IR-1 centrifuges are installed. Activity at the Pilot Fuel Enrichment Plant (PFEP), where Iran has enriched uranium up to the 20 percent level until January 20, 2014, is discussed below.

The average production of 3.5 percent LEU at the FEP increased slightly from the past reporting period to approximately 235 kg per month from approximately 218 kg per month of LEU hexafluoride. This rate is roughly consistent with Iran's production through 2013 and most of 2012.

Since November 10, 2013, Iran has had 90 IR-1 centrifuge cascades fully installed for a total of 15,420 IR-1 centrifuges, the same as the previous reporting periods. The number of cascades enriching, 54, remains constant since the previous reporting period; these cascades fed with uranium hexafluoride contain 9,156 centrifuges.¹ Iran fed 7,674 kg of natural uranium hexafluoride into the cascades at the FEP, which is lower than Iran's feed rate throughout 2013 but roughly on par with the rate in 2012. Iran's centrifuge performance at the FEP can also be evaluated in terms of separative work units (swu). ISIS derives this value from information about LEU production. In the most recent reporting period, the LEU is taken as on average as being 3.5 percent enriched², and the waste is assumed to have on average a 0.711 percent feed assay and tails assay of 0.4 percent.³ The IAEA did not provide updated concentrations in this report, but these older numbers are used, based on a variety of interviews with knowledgeable senior officials close to the IAEA. Using standard idealized enrichment calculations, 697 kg of LEU translates to roughly 1,714 swu, or an average of 18.84 swu/day. On an annualized basis, this is about 6,874 swu per year (see Figure 6). These numbers are roughly on par with FEP's operation throughout 2013.

The average swu/centrifuge-year for this period was similar to the performance at the FEP throughout 2013 at 0.75 swu/centrifuge-year.⁴ However, for most of 2010, this value was about 0.9 kg U swu per year per centrifuge (see Table 1, which lists these values on a quarterly basis since the FEP started operation, and Figure 6, which displays this data graphically). This consistently lower enrichment output likely indicates that Iran is continuing to have trouble with the IR-1 centrifuges installed at the FEP. Although, reports state that fewer IR-1 centrifuges are breaking at the FEP.

¹ It is possible that not all centrifuges within the cascades fed with uranium hexafluoride were operational during the reporting period. Unlike the most recent report, previous IAEA reports did not mention the exact number of centrifuges. For that reason, ISIS estimated the total number of IR-1 centrifuges. In the last report, ISIS estimated a total of 9,166, a difference of only 10 centrifuges from the actual value.

² The IAEA Safeguards Report mentions an enrichment level of "up to 5 percent," which is a source of some uncertainty. But Iran has had difficulty achieving five percent enriched uranium, and its average value was 3.5 percent for many years. The ideal cascade model utilized by ISIS uses an enrichment level of 3.5 percent for the product. Although this is not a precise figure, it provides an estimate which is reasonable considering Iran's past performance in this area.

³ The calculations are performed using an idealized cascade model, which does not account for a variety of issues in the actual performance of the cascade, including – but not limited to – centrifuges breaking down or performing below their nominal capacity. While an ideal cascade is not achievable in practice, this estimate provides a method to compare swu calculations.

⁴ The value in the last ISIS analysis was 0.71 swu/centrifuge-year; somewhat lower than in the previous report.

Dump Tank Material Blended Down Under Joint Plan of Action (JPA)

On August 17, 2014, Iran informed the IAEA that it would blend down into natural uranium about 4,118 kilograms of uranium hexafluoride enriched up to 2 percent in the isotope uranium 235. Iran committed to this downblending as a recent interim step under the extension of the Joint Plan of Action in late July. The slightly enriched nuclear material originates from the tails or waste produced during the enrichment of uranium hexafluoride up to 20 percent LEU and from nuclear material evacuated from the cascades producing LEU enriched up to 5 percent. The latter enriched uranium is from what has earlier been called the dump tank material. Enriched material in the cascade is evacuated into the dump tank as an emergency measure when there is a risk that the centrifuges in the cascade could break or “crash.”

It is important to note that all of this slightly enriched uranium was not included in the IAEA’s statement of the total amount of LEU enriched up to 5 percent that had been produced so far and thus also not included in ISIS’s reporting. Whether this dump material could have been further enriched is not stated by the IAEA. For example, did the dump tank material contain impurities that would have complicated reuse? In any case, because of questions about its ability to be reused in a straightforward manner, ISIS has not factored this enriched uranium into its breakout estimates.

Installation of Advanced Centrifuges at Natanz Fuel Enrichment Plant

In a letter dated January 23, 2013, Iran informed the IAEA that its advanced, carbon fiber-based centrifuge, designated the IR-2m, “will be used” in one of the modules of Production Hall A. This statement is being widely interpreted as Iran announcing that it intended to install about 3,000 IR-2m centrifuges, which is the normal deployment in a module.

Under the Joint Plan of Action, Iran agreed to halt installation of any additional centrifuges and to not begin enriching in any new machines. In the unit containing IR-2m centrifuges, as of August 13, 2014, the situation remained unchanged from the IAEA’s previous report: six cascades had been fully installed with IR-2m centrifuges; none of these cascades had been fed with natural uranium hexafluoride; and preparatory installation work had been completed for the other 12 IR-2m cascades in the unit.

Iran had not begun enriching in any of these cascades. Figure 7 tracks the IR-2m installation at the FEP.

Centrifuge Research and Development (R&D) at the Natanz Fuel Enrichment Plant

Iran is not precluded from continuing its centrifuge R&D activities under the Joint Plan of Action, although it cannot feed uranium hexafluoride into any centrifuges that had not been fed with UF₆ as of November 2013. Four out of six cascades at the pilot plant are dedicated to this on-going research and development.

They are cascades 2, 3, 4 and 5. As of September 4, 2014, there were:

In Cascade 2: 14 IR-4 centrifuges (up from 13 IR-4 centrifuges in May); 7 IR-6 centrifuges (down from 9 IR-6 centrifuges in May); one IR-5 centrifuge (same as previous report); one IR-2m centrifuge (up

from zero in cascade 2 in May); three IR-1 centrifuges (up from one installed in May); and no IR-6s centrifuges installed (same as previous report);⁵

In Cascade 3: 14 IR-1 centrifuges (same as in the two previous reports); and ten IR-4 centrifuges installed (replacing 10 IR-2m centrifuges installed in May);

In Cascade 4: 164 IR-4 centrifuges (same as in the past year);

In Cascade 5: 162 IR-2m centrifuges (same as in the past year).

Since the previous report, Iran has intermittently fed natural uranium hexafluoride into IR-6s centrifuges as single machines and into IR-1, IR-2m, IR-4 and IR-6 centrifuges, sometimes into single machines and sometimes into cascades of various sizes. It has not yet fed the single installed IR-5 centrifuge with UF₆, and under the interim arrangement, cannot do so through July 20, 2014. Casing remains in place for the IR-8 but without connections. Iran reported success in the media developing the IR-8 centrifuge.

Between October 26, 2013 and February 9, 2014, Iran had fed a total of 430.1 kg of natural UF₆ into the centrifuges in the R&D area, but recombined the enriched product and depleted tails. Between February 10, 2014 and August 18, 2014, a total of approximately 397.8 kg of natural UF₆ was fed into centrifuges in the R&D area, but no LEU was withdrawn as the product and the tails were recombined at the end of the process. So, in total for these two periods, Iran fed a total of 827.9 kg of natural UF₆. There is no specific information about the performance of these advanced centrifuges in the report. However, because enrichment in these centrifuges is intermittent and not continuous, questions arise whether any of the advanced centrifuges work well.

19.75 percent LEU Production at the Natanz Pilot Plant: Still Halted

From February 2010 to January 2014, Iran designated two, tandem cascades at the smaller, above-ground Pilot Fuel Enrichment Plant for the production of LEU enriched to nearly 20 percent uranium-235, ostensibly for the Tehran Research Reactor. One of these cascades enriched from 3.5 percent LEU to almost 20 percent LEU, while the second one received the tails from the first and outputted roughly 10 percent LEU and a tails of natural uranium. The ten percent material was fed into the first cascade in addition to 3.5 percent LEU. This process allowed Iran to more efficiently use its 3.5 percent LEU stock. **Per its agreement with the P5+1, Iran ceased production of 19.75 percent enriched uranium in these cascades and began producing 3.5 percent enriched uranium as of January 20, 2014.**

Between October 26, 2013 and January 20, 2014, 90 kg of 3.5 percent low enriched uranium in the form of uranium hexafluoride was introduced into the two, interconnected cascades. Iran withdrew from the tandem cascades a total of 13 kg of nearly 20 percent LEU hexafluoride during this reporting period. This rate, approximately 4.6 kg per month, represented a slight decrease of 0.35 kg per

⁵ Earlier, the cascade held 1 IR-6s centrifuge on February 15, 2014, down from 8 on August 12, 2013, 3 on May 14, 2013 and 2 on February 19, 2013.

month from previous reporting periods. **In total, Iran has fed 1,631 kg of 3.5% LEU to produce 202 kg of 19.75% uranium since the beginning of operations in February 2010.**

As of January 21, 2014, the IAEA reported that Iran began enriching to 3.5 percent in the cascades previously designated for 19.75 percent enrichment. Between January 20, 2014 and August 18, 2014, Iran had fed 519.2 kg to produce 49.7 kg of LEU enriched up to 5 percent of U-235.

On January 20, 2013, in line with its commitment under the JPA, Iran began downblending some of its inventory of UF₆ enriched to 20 percent U-235 to no more than five percent LEU hexafluoride. Between January 20 and July 20, 2014, Iran downblended a total of 108.4 kg of that material, fulfilling its commitment to downblend half of the 209.1 kg of the nuclear material that had been in the form of UF₆ enriched up to 20% U-235 on 20 January 2014. As of June 19, 2014, it had also fed 100 kg of the remaining near 20 percent LEU hexafluoride into the conversion process at its Fuel Plate Fabrication Plant at Esfahan.

Fordow Fuel Enrichment Plant (FFEP)

The Fordow site has two enrichment halls, Units 1 and 2, which together are designed to contain up to 2,976 centrifuges in 16 cascades. Iran was operating the four cascades of 174 IR-1 centrifuges each in two, tandem sets to produce 19.75 percent LEU in a total of 696 enriching centrifuges, the same number of centrifuges enriching as was reported in the August, May, and February 2013 reports as well as the November, August, and May 2012 safeguards reports. In compliance with the Joint Plan of Action, Iran stopped enriching to 19.75 percent in these cascades and began enriching to no greater than 5 percent LEU hexafluoride.

The Fordow facility remains nearly fully outfitted with centrifuges, though Iran has not increased the number of centrifuges enriching in five reporting periods. Figure 11 displays the number of centrifuges enriching and installed at the FFEP graphically.

As of January 21, 2014, the IAEA reported that Iran began enriching to 3.5 percent in the cascades previously designated for 19.75 percent enrichment. Between January 20 and August 17, 2014, Iran had fed 1349.7 kg of natural uranium hexafluoride to produce a total of 142.7 kg of LEU enriched up to 5 percent U-235. On February 8, as previously reported by the IAEA, Iran updated the facility's Design Information Questionnaire as it "had taken measures due to change in level of enrichment and that the measures are temporarily taken during the first step implementation of the JPA."

Production of Near 20 Percent Uranium Oxide

Iran reported in the August 2012 report that it began feeding its 19.75 percent uranium hexafluoride into the Fuel Plate Fabrication Plant at Esfahan. As of August 17, 2014, Iran had fed a total of 337.2 kg of 19.75 percent enriched uranium hexafluoride into the process at Esfahan to produce U₃O₈ containing about 162.3 kg of enriched uranium oxide (uranium mass). The 337.2kg of near 20 percent LEU hexafluoride contains about 225 kg of enriched uranium (uranium mass). Of the total produced, 0.6 kg of this material was stored in hexafluoride form as reference material for mass spectrometry and placed under IAEA seal. The IAEA verified 44 kilograms of uranium in liquid or solid scrap form. Thus, approximately 18 or 19 kg of near 20 percent LEU (uranium mass) remain held up in the process or in waste.

The IAEA also reports that as of August 17, 2014, Iran had produced 27 Tehran Research Reactor (TRR)-type fuel assemblies and one test fuel assembly. Twenty six of these assemblies, including the test assembly, had been transferred to the TRR. The IAEA has continued its publication of additional data in annexes to its report. From this data, the TRR fuel and assemblies and plates contain about 34 kilograms of near 20 percent LEU (U-mass). Of the total amount of 225 kg of near 20 percent LEU (uranium mass) sent for conversion, about 15 percent has so far been made into fuel assemblies for the TRR. Since the last quarterly report, Iran has not fabricated any additional fuel assemblies. However, under the extension of the Joint Plan of Action, it has pledged to use 25 kg of its oxide stock to manufacture fuel plates for the TRR.

Enriched UO₂ Powder Plant (EUPP)

The commissioning of the EUPP facility began in May 2014 using natural uranium. The IAEA's most recent report states that as of August 30, 2014, Iran has fed a total of 2,790 kg of natural UF₆ into the conversion process and produced 167 kg of natural uranium in the form of UO₂. In July 2014, the plant began operations, since which time Iran has fed 1,505 kg of UF₆ enriched up to 5% U-235 into the conversion process for the production of UO₂.

Taking Stock

Iran has produced a total of 12,772 kilograms of 3.5 percent LEU hexafluoride, which constitutes an increase of 794.8 kilograms since the previous report. 115.6 kg of this material comes from downblending. About 3,437 kilograms had been used to make the 19.75 percent LEU hexafluoride. Across its three centrifuge facilities, Iran has installed 18,458 IR-1 centrifuges and 1,008 IR-2m centrifuges. Figure 7 shows IR-2m trends in Iran, and Figure 8 shows historical cumulative IR-1 centrifuge trends in Iran.

Combined, the PFEP at Natanz and the FFEP have produced 448 kg of 19.75 percent uranium, although Iran ceased production of this material on January 20, 2014. Figure 9 represents the cumulative production of 19.75 percent enriched uranium in Iran.

Under the terms of the Joint Plan of Action, Iran has down blended a total 110 kg of 19.75 percent LEU hexafluoride into LEU enriched to less than five percent, including 1.6 kg diluted previously. Since Iran began conversion at its declared facilities, it has fed into the process line at the Fuel Plate Fabrication Plant at Esfahan 337.2 kilograms of uranium hexafluoride enriched up to 20 percent uranium-235, or 225 kilograms of enriched uranium, and it produced 162.3 kilograms of near 20 percent enriched uranium in the form of U₃O₈ powder (U-mass). At present, Iran does not possess a stock of near 20 percent LEU hexafluoride. **Table 2 summarizes these findings. It should be noted that Iran retains a large total stock of near 20 percent LEU, enough if reconverted into hexafluoride form and further enriched for a nuclear weapon.**

Iran has achieved varying rates of separative work in the IR-1 centrifuge at its enrichment plants. Although Iran continues to install and enrich in additional centrifuges at the FEP, the enrichment output measured in swu/centrifuge-year at this plant has varied and declined overall. During this reporting period, the FFEP achieved 0.88 swu/centrifuge-year, an increase from the previous reporting period's 0.87 swu/centrifuge-year, and the PFEP cascades achieved 0.65 swu/centrifuge-

year, a decrease from 0.67 in the previous reporting period. Table 3 compares the enrichment output at the FEP, PFEP, and FFEP.

Arak IR-40 Reactor and Heavy Water Production Plant

According to an August 11, 2014 Design Information Verification (DIV) inspection at the IR-40 Reactor, Iran has not installed any major components at the IR-40 Reactor since the previous report, in line with its obligations under the interim deal of the Joint Plan of Action. On August 31 Iran concluded with the IAEA a safeguards approach for the IR-40 reactor. This was one of the practical measures in the third step of the Framework for Cooperation agreement Iran had agreed to implement with the IAEA by August 25, 2014.

The IAEA gained managed access to the Arak Heavy Water Production Plant in December 2013 and gained mutually agreed relevant information. At the time, the IAEA also gained access to the heavy water storage location at the Uranium Conversion Facility (UCF) at Esfahan and was able to characterize the heavy water. The new report continues to not state the results of this characterization.

Finally, Iran continues not to produce or test fuel for the IR-40 Reactor under the JPA. The Mini IR-40 prototype fuel assembly remains in the storage pool as of August 12, as agreed.

Status of Iran's Implementation of the IAEA/Iran Framework for Cooperation and Resolution of Outstanding Possible Military Dimensions (PMD) Issues

I. Framework for Cooperation

During a high-level meeting in Tehran on August 17 between IAEA Director General Amano and President Hassan Rouhani, Atomic Energy Organization of Iran chairman and Vice President Ali Akbar Salehi, and Minister of Foreign Affairs Javad Zarif, which was aimed at advancing dialogue and cooperation between the IAEA and Iran, Iran stated a willingness to "accelerate the resolution of all outstanding issues." The IAEA notes that "Iran's engagement with the Agency, including the provision of information, and the Agency's ongoing analysis are helping the Agency to gain a better understanding of Iran's nuclear programme." However, the Director General noted during the meeting that "the Agency would need to consider all past outstanding issues, including EBW detonators, integrating all of them in a 'system' and assessing the 'system' as a whole."

Third Step Status

The IAEA reports that Iran had implemented one of five practical measures in a third step of the IAEA/Iran Framework for Cooperation by the deadline of August 25, 2014. It implemented two others of these five measures after the deadline and began discussing with the IAEA implementation of the last two measures. The IAEA requested that Iran propose new practical measures for a fourth step in the Framework for Cooperation by September 2, 2014, but Iran has not yet done so. In a letter to the IAEA dated August 28, Iran proposed that "a road map be developed before any new measures are identified." In a September 4 reply, the IAEA reiterated its invitation to Iran to propose new practical measures to address additional outstanding issues of concern without further delay.

The IAEA reports that the three practical measures in the third step that Iran implemented before and after the deadline include:

- Provided mutually agreed information and arranged a technical visit to a centrifuge research and development center (technical visit occurred on August 30, 2014, just after the August 25 deadline).
- Provided mutually agreed information and managed access to centrifuge assembly workshops, centrifuge rotor production workshops and storage facilities (also one of Iran's commitments under the JPA) (the most recent of which took place on August 18, 19, and 20, 2014, ahead of the August 25 deadline). Regarding these visits and information, the IAEA reported that it "can confirm that centrifuge rotor manufacturing and assembly are consistent with Iran's replacement programme for damaged centrifuges" (which is also one of Iran's commitments under the JPA).
- Concluded the safeguards approach for the IR-40 Reactor (on August 31, 2014, just after the August 25 deadline, as detailed above).

The IAEA is analyzing the information provided by Iran. On August 31, the IAEA and Iran held a technical meeting and Iran began discussions on implementing the other two practical measures in the third step of the Framework for Cooperation, "relating to the initiation of high explosives and to neutron transport calculations." They agreed to hold a subsequent meeting.

Second Step Status

The IAEA reports that since its May 2014 safeguards report, Iran provided additional clarifications about its past work on EBW detonators, one of the practical measures agreed to carry out in the second step under the Framework for Cooperation. With regard to the EBW detonator matter, the IAEA reports that during his August 17 high-level meeting in Tehran, the Director General was able to note that "Iran had provided information and explanations to the Agency on Iran's decision in early 2000 to develop safe detonators." "Iran had also provided information and explanations to the Agency on Iran's work after 2007 related to the application of EBW detonators in the oil and gas industry which was not inconsistent with specialized industry practices." The IAEA reports, "On the basis of its analysis of the information provided by Iran in relation to the other six practical measures in the second step, the Agency currently has not identified any outstanding issues in relation to that information," but it stressed the need, as stated above, to assess all evidence provided, "integrating all of them in a 'system' and assessing the 'system' as a whole." It should be noted that the IAEA uses the double negative construction of "not inconsistent" when it signifies that the issue is not resolved. It may mean for example that the declaration is consistent on its own but there be more to the issue which remains undeclared.

II. Update on Possible Military Dimensions (PMD) Issues

Iran has pledged under the Framework for Cooperation to resolve all outstanding issues relating to the possible military dimensions of its nuclear program. These issues were detailed in an annex in the IAEA's November 2011 safeguards report. The evidence underlying the outstanding issues continues to be viewed by the IAEA as "overall, credible." Notably, the IAEA reports that Iran, in a letter to the IAEA dated August 28, 2014 stated that "'most of the issues' in the Annex to GOV/2011/65 (the November 2011 safeguards report) were 'mere allegations and do not merit consideration.'"

The IAEA reiterates in this report with respect to its investigation:

The Board of Governors has confirmed on numerous occasions, since as early as 1992, that para. 2 of INFCIRC/153 (Corr.), which corresponds to Article 2 of Iran's Safeguards Agreement, authorizes and requires the Agency to seek to verify both the non-diversion of nuclear material from declared activities (i.e. correctness) and the absence of undeclared nuclear activities in the State (i.e. completeness).

It further reiterates its systematic investigatory approach with regard to outstanding issues, noting that “the Agency needs to be able to conduct a ‘system’ assessment of the outstanding issues contained in the Annex to GOV/2011/65. This will involve considering and acquiring an understanding of each issue in turn, and then integrating all of the issues into a ‘system’ and assessing that system as a whole.”

Of note, the IAEA includes a complaint in its most recent report about Iran's persistent denial of a visa to one member of the IAEA team who has intended to visit Tehran for technical meetings. The individual has been denied a visa on three occasions and thus unable to participate in three rounds of technical meetings. The IAEA writes, “For the Agency to be able to address the outstanding issues effectively, it is important that any staff member identified by the Agency with the requisite expertise is able to participate in the Agency's technical activities in Iran.” Specifics about the person's technical qualifications are not included in the report.

Increased Activity Observed at Parchin

Although Iran has pledged to cooperate further on addressing the past and present issues relative to the possible military dimensions of its nuclear program, the latest IAEA report notes that the IAEA continues to seek answers and access to a particular location at the Parchin military site where high explosive activities related to nuclear weapons development are alleged to have taken place.

The IAEA reports that Iran continues to take steps to modify the Parchin site, as observed by the IAEA in satellite imagery (and by ISIS in satellite imagery reports), which are likely to have “further undermined the Agency's ability to conduct effective verification.” Since the May 23, 2014 safeguards report, satellite imagery continues to show construction activity related to the “removal/replacement or refurbishment of the site's two main buildings' external wall structures.” One building is alleged to contain a high explosive chamber; the alleged contents of the other building (located on the north end of the site) are not specified. Additionally, the Agency reports that “one of these buildings has also had a section of its roof removed and replaced.” Finally, the Agency observed that the increased presence of deposits of material and/or debris and equipment suggests that “construction activity has expanded to two other site buildings.”

Most of these new activities are highlighted in the latest [Parchin ISIS Imagery Brief](#) and are visible in Figure 1.

III. ISIS Assessment

The IAEA's update on Iran's progress under the Framework for Cooperation and with regard to resolving the outstanding issues over its nuclear program is not particularly encouraging. Although it is important that Iran continues to engage with the IAEA, allowing the IAEA to improve its understanding of Iran's nuclear program, particularly on improving its understanding of centrifuge research and development efforts, several key issues in the safeguards report indicate ongoing efforts by Iran to delay cooperation:

- 1) Iran did not meet the implementation deadline for the third step of measures under the Framework for Cooperation.
- 2) Iran has called for the creation of a "roadmap" to address the outstanding issues rather than proposing a new set of practical measures to be carried out, as the IAEA has requested.
- 3) Iran has categorically dismissed the outstanding issues and evidence included in the IAEA's November 2011 safeguards report annex, as recently as August 28, as "mere allegations and do not merit consideration."
- 4) Iran is continuing to undertake extensive modification activities at the Parchin military site, which could complicate any future verification efforts by the IAEA if it is ever granted a visit.

Taken together, these efforts suggest that Iran is not yet prepared to seriously discuss and explain to the IAEA the past and possibly on-going military dimensions of its nuclear program. Iran may be awaiting further progress with the P5+1 negotiations aimed at reaching a comprehensive solution over its nuclear program – perhaps in hope that the P5+1 will not make resolution of the PMD issues one of the elements of a negotiated agreement. The suggestion by Iran that the IAEA and Iran now create a roadmap to resolution is in particular not encouraging, since previous efforts by Iran to create such a roadmap with the IAEA resulted in many meetings over many months but ultimately no resolution of the outstanding issues.

With respect to resolving the outstanding issues to its nuclear program, Iran needs to re-evaluate internally its current path of non-cooperation. It is highly unlikely (and inadvisable) that a long term agreement with the P5+1 would overlook this facet of Iran's nuclear program when faced with the decision to grant major sanctions relief.

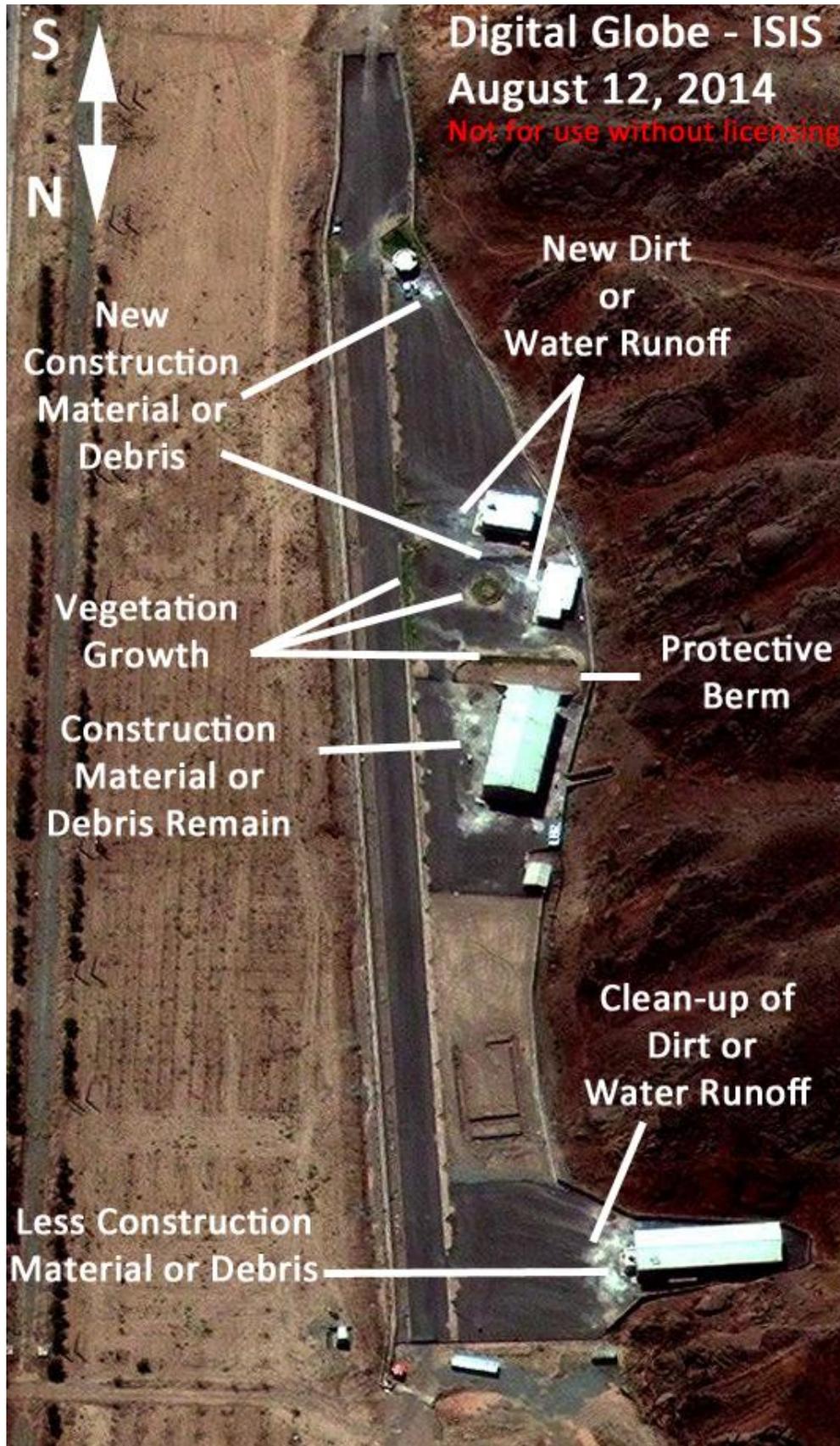
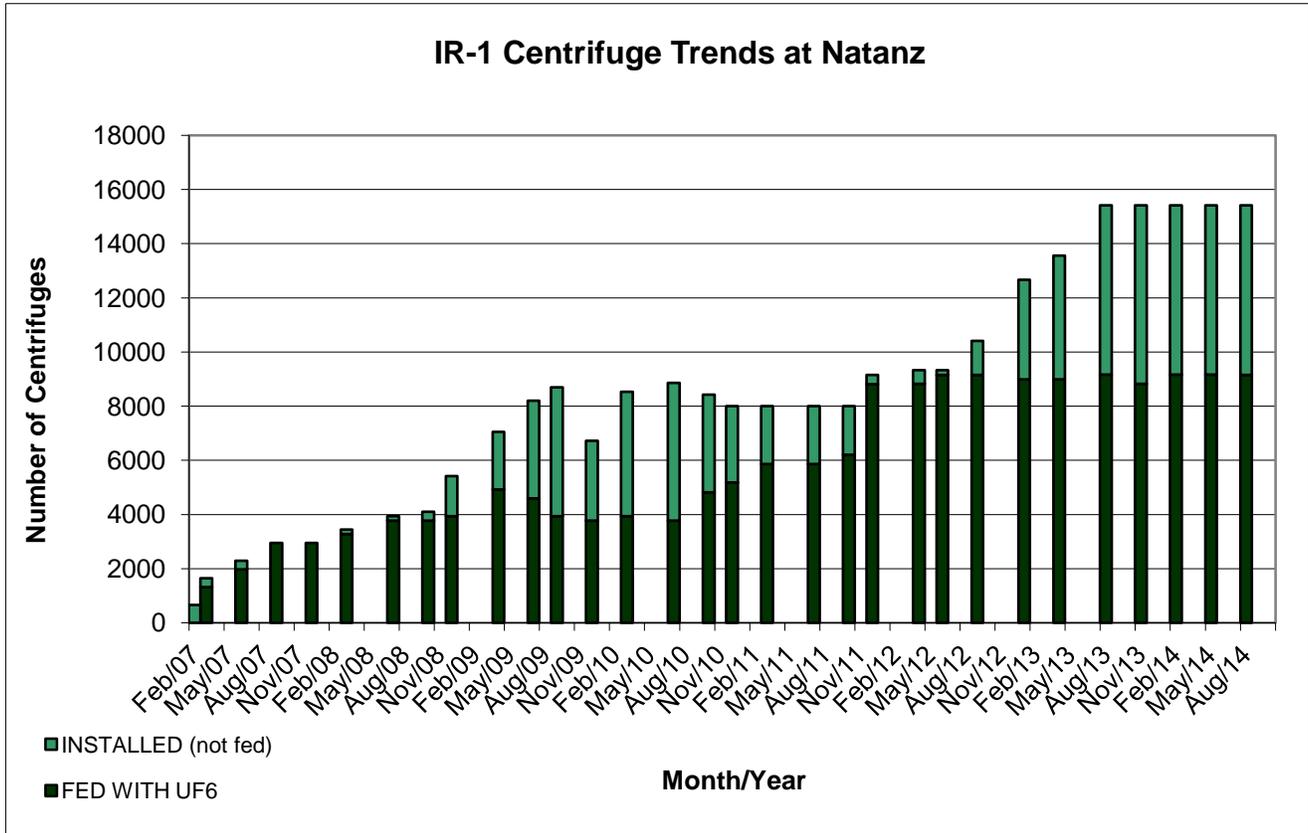


Figure 1. Digital Globe imagery shows the status of the alleged high explosive test site at the Parchin military complex on August 12, 2014.

Figure 2: IR-1 Centrifuge Trends at Natanz**



** The dark green bar represents the number of IR-1 centrifuges enriching, while the light green represents the number of IR-1 centrifuges installed but not enriching. The sum of the two represent the total number of IR-1 centrifuges installed at the FEP.

Figure 3: Uranium Hexafluoride Feed at the Natanz FEP

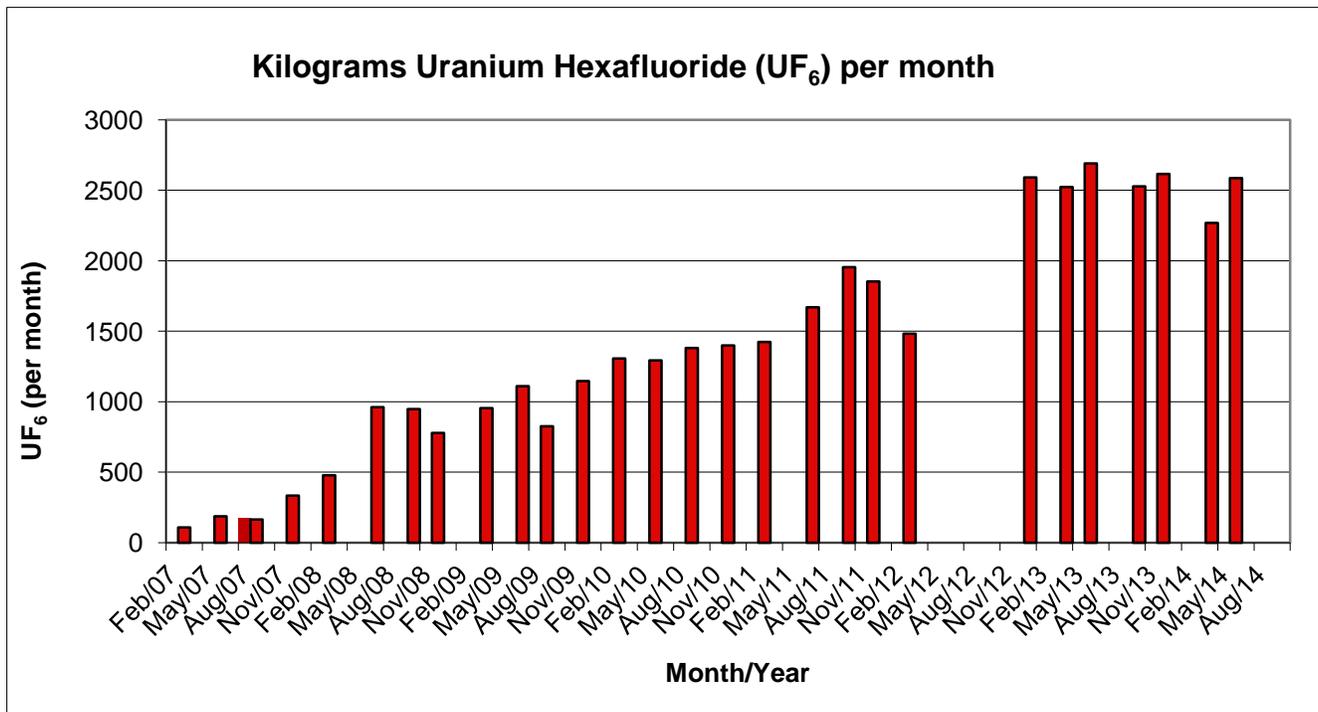


Figure 4: LEU Production (kilograms uranium hexafluoride per month) at Natanz

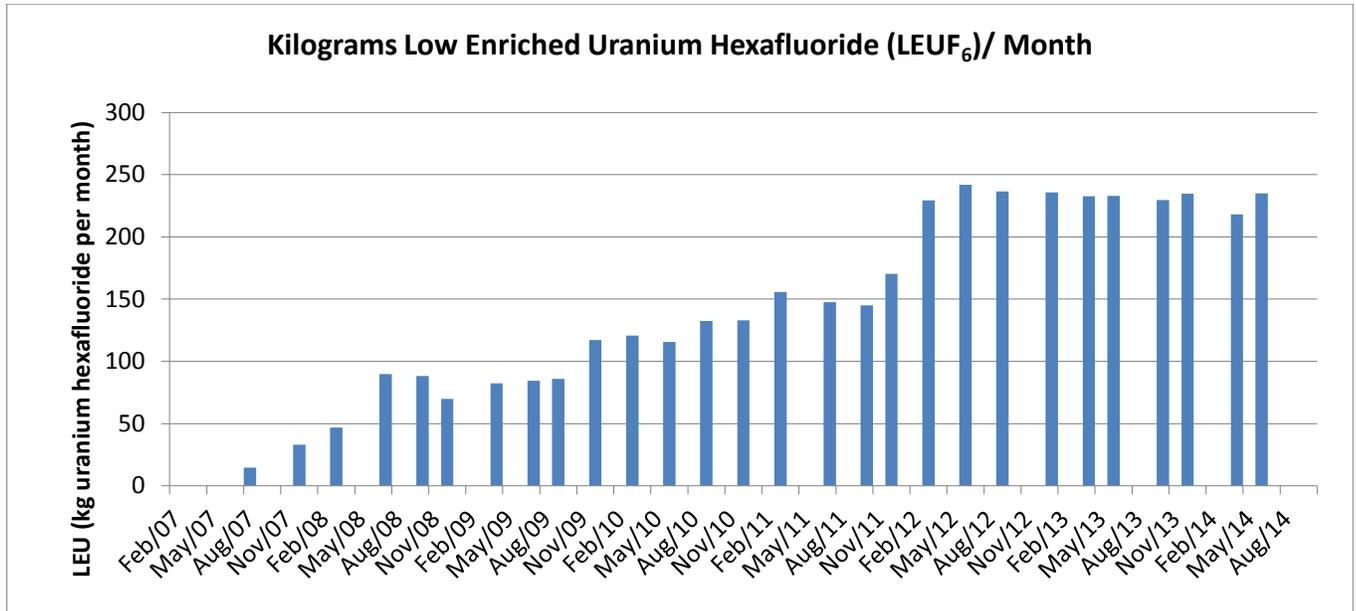


Figure 5: Overall Trends at Natanz

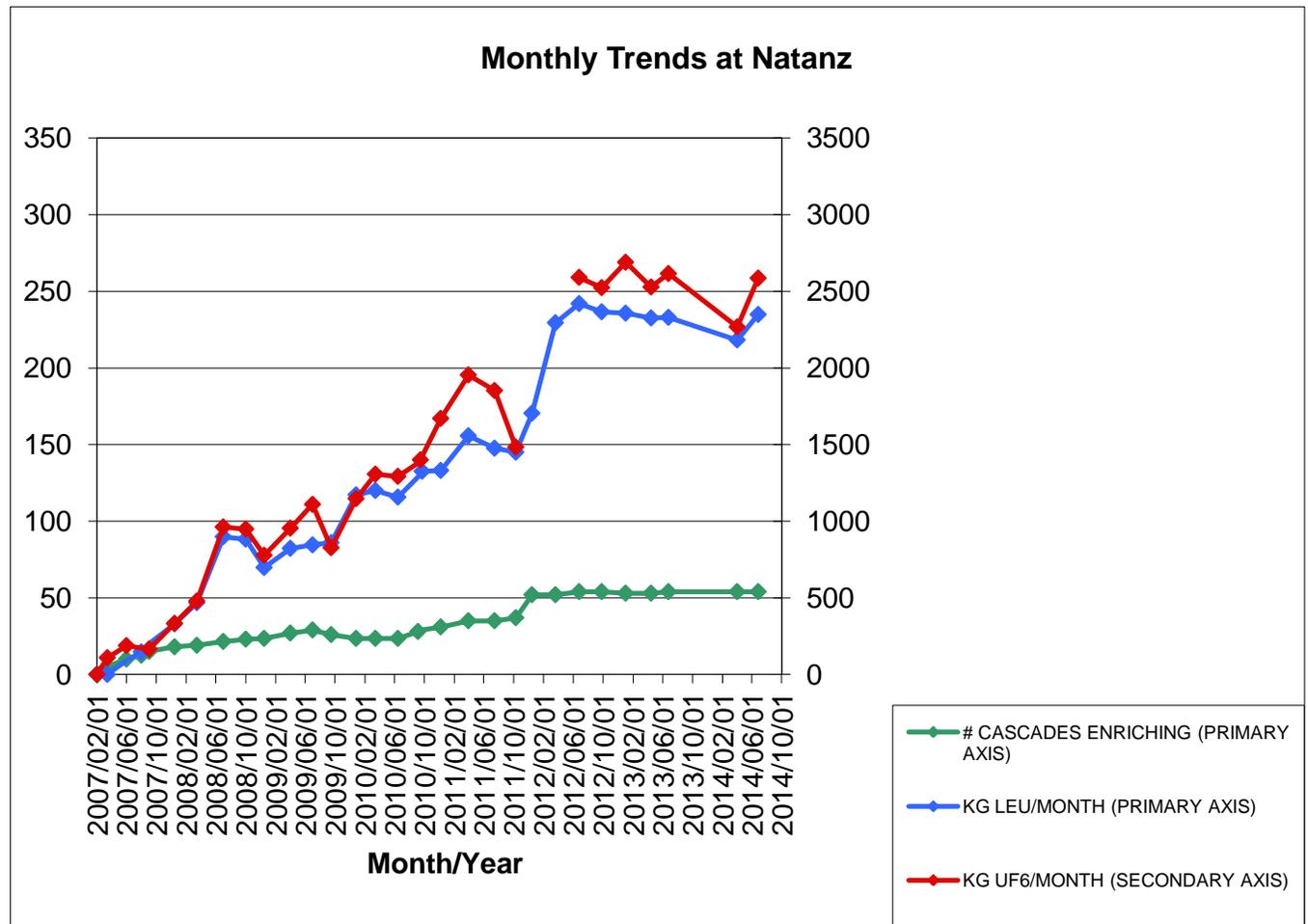


Figure 6: Cumulative LEU Production at the Natanz Fuel Enrichment Plant

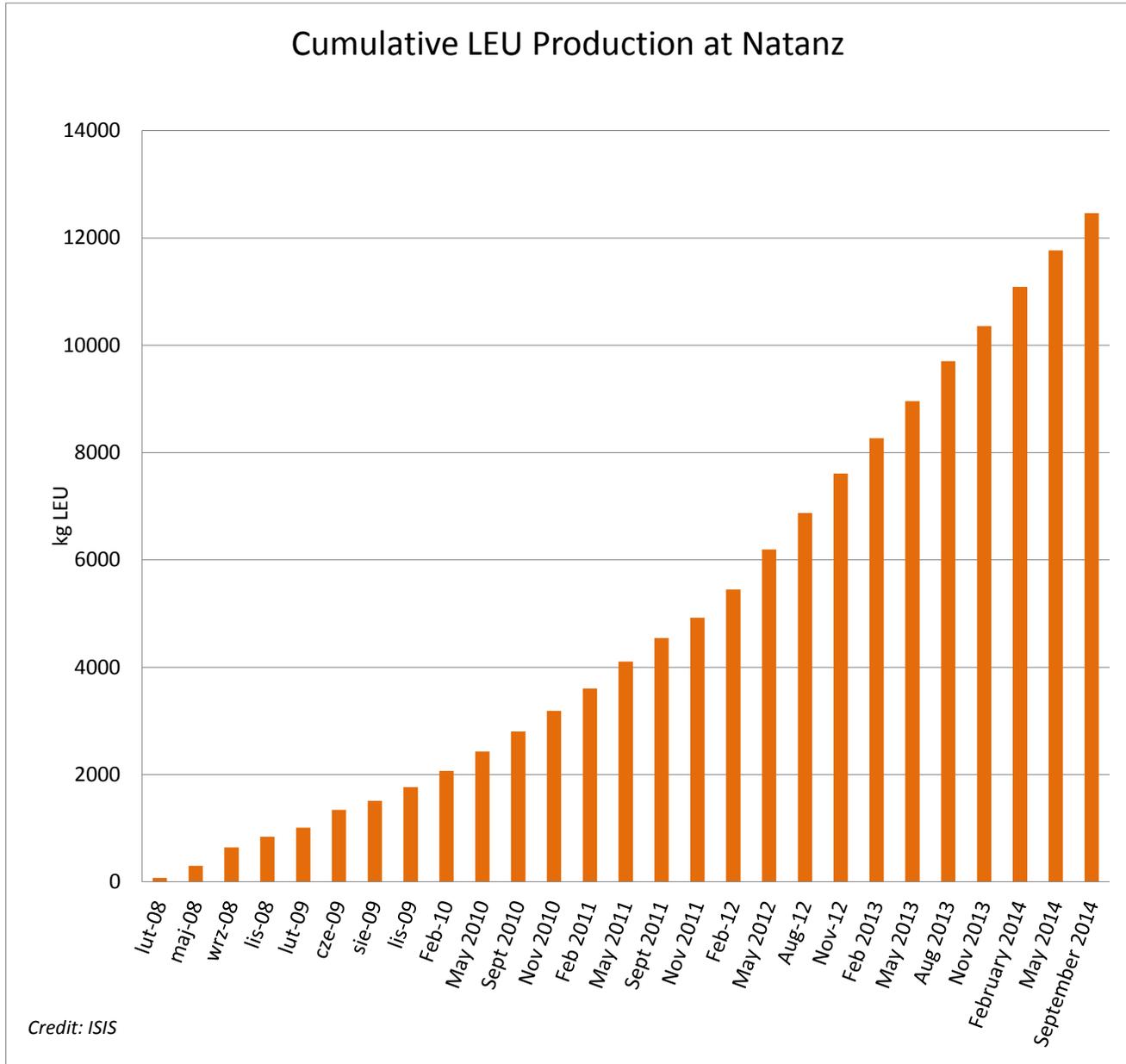


Figure 7: Annualized SWU at Natanz

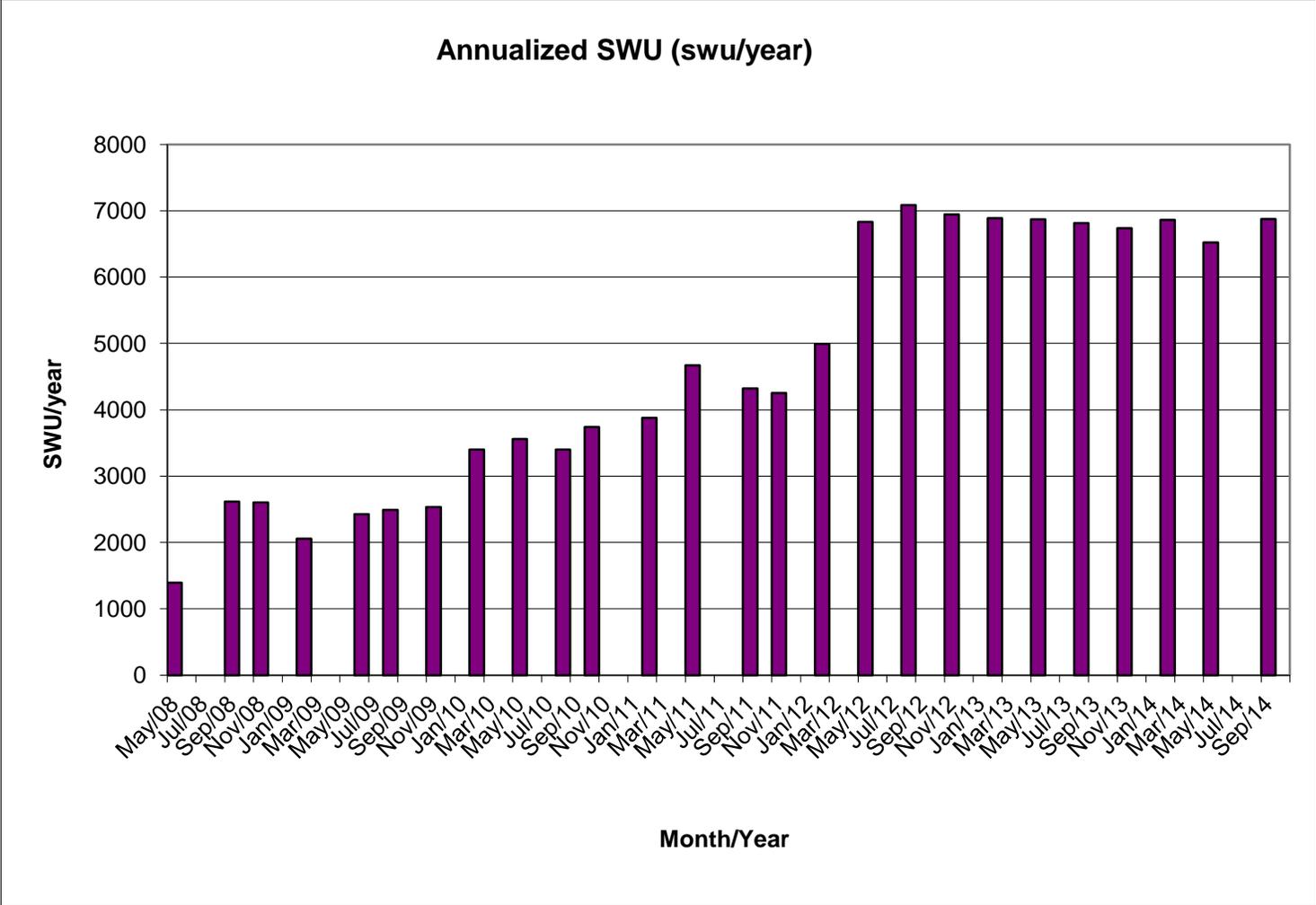


Figure 8: IR-2m Progress at the FEP

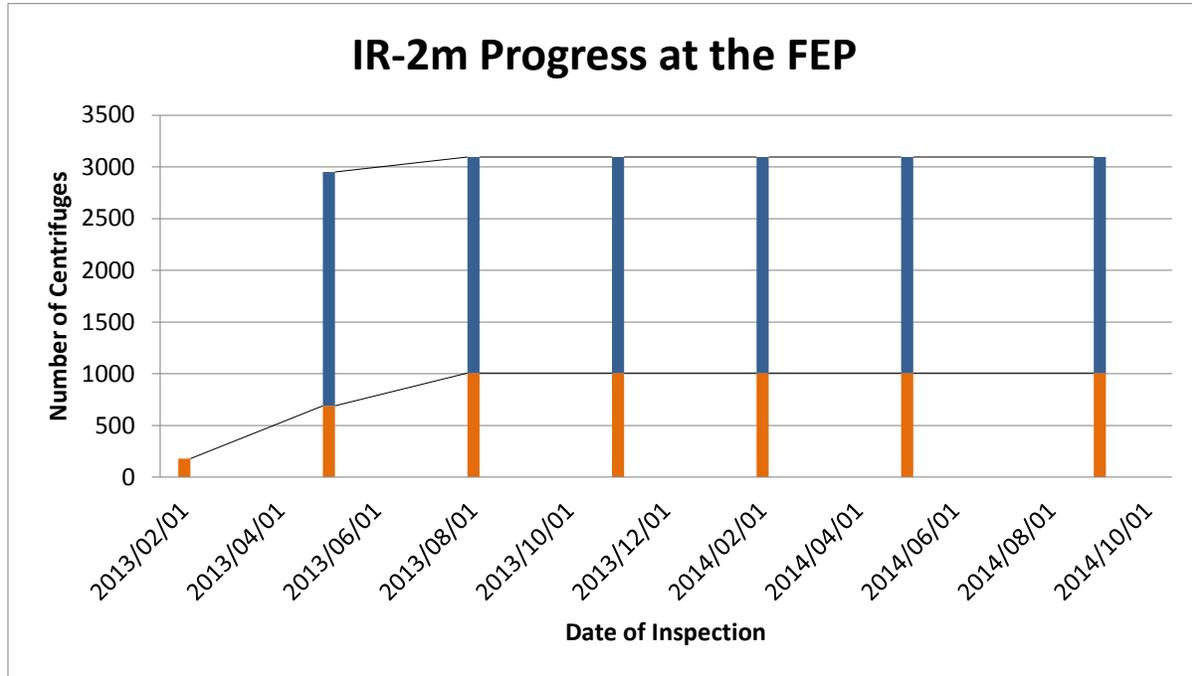


Figure 9: Total Number of Deployed IR-1 Centrifuges in Iran

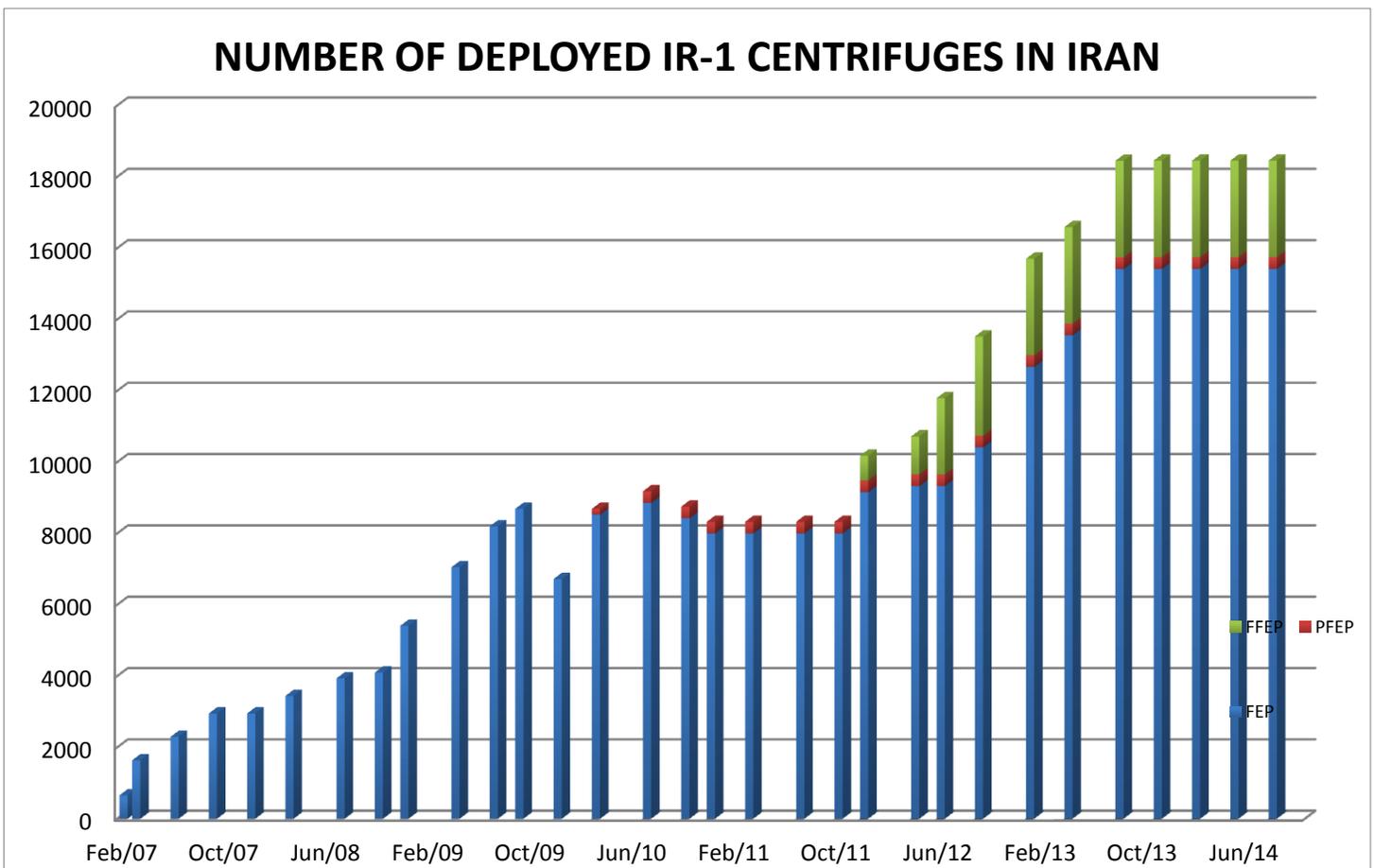


Figure 10: Cumulative 19.75 Percent Uranium Production in the PFEP and FFEP

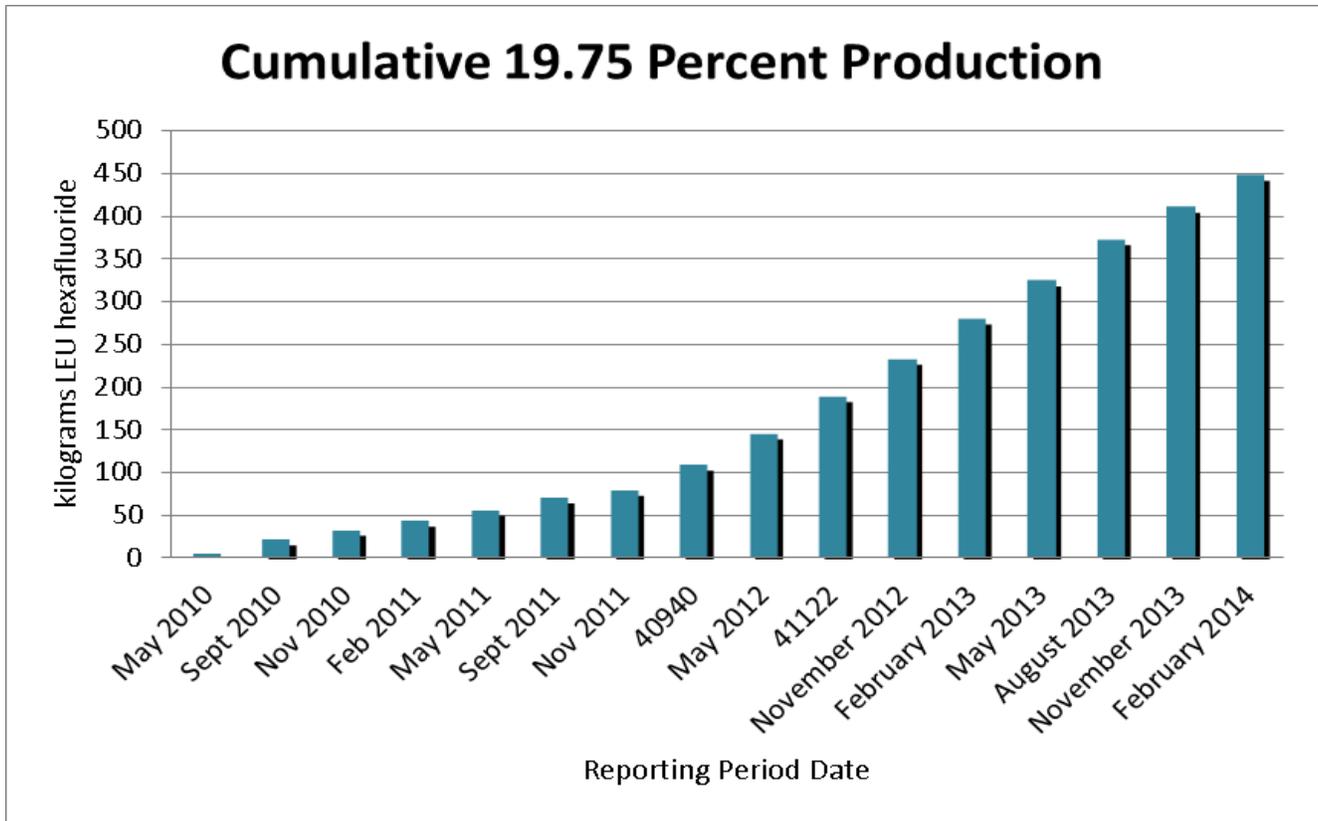


Figure 11: SWU/Centrifuge-year at the Fordow Fuel Enrichment Plant and Pilot Fuel Enrichment Plant

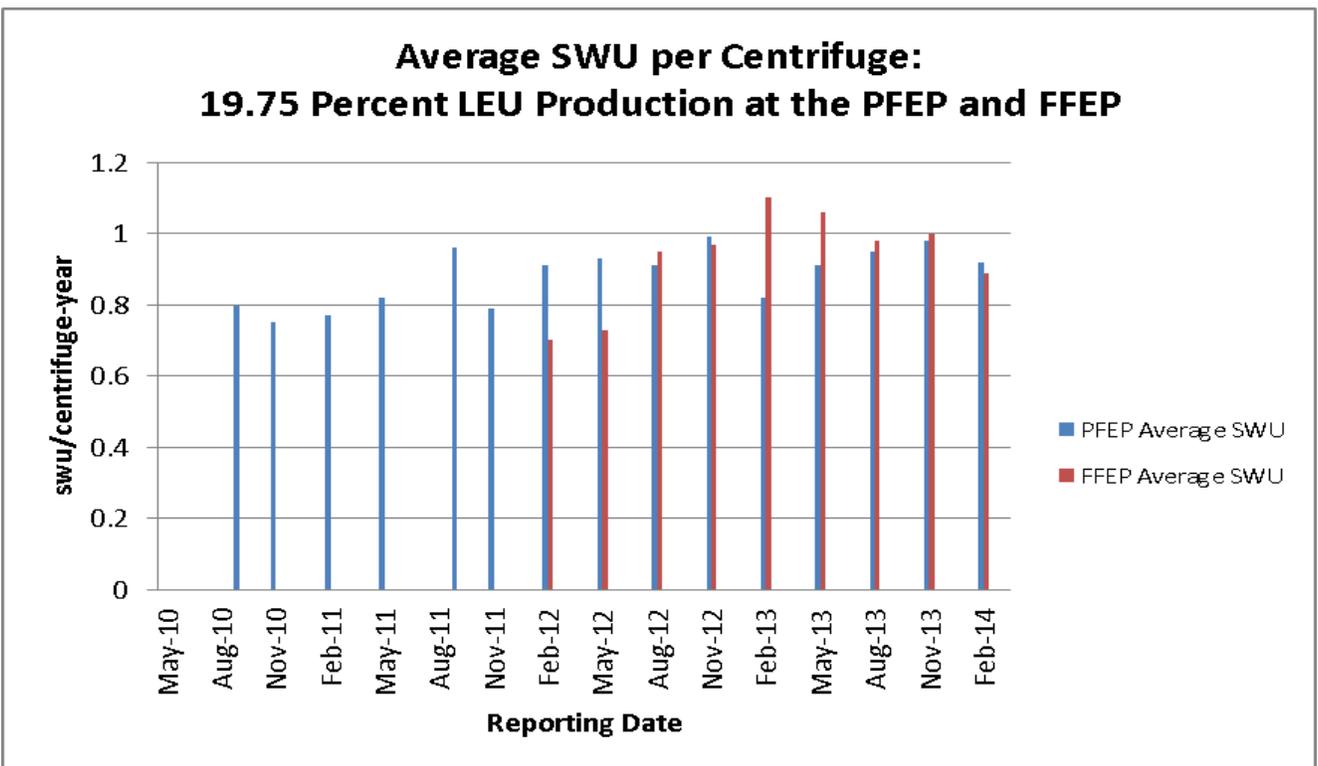
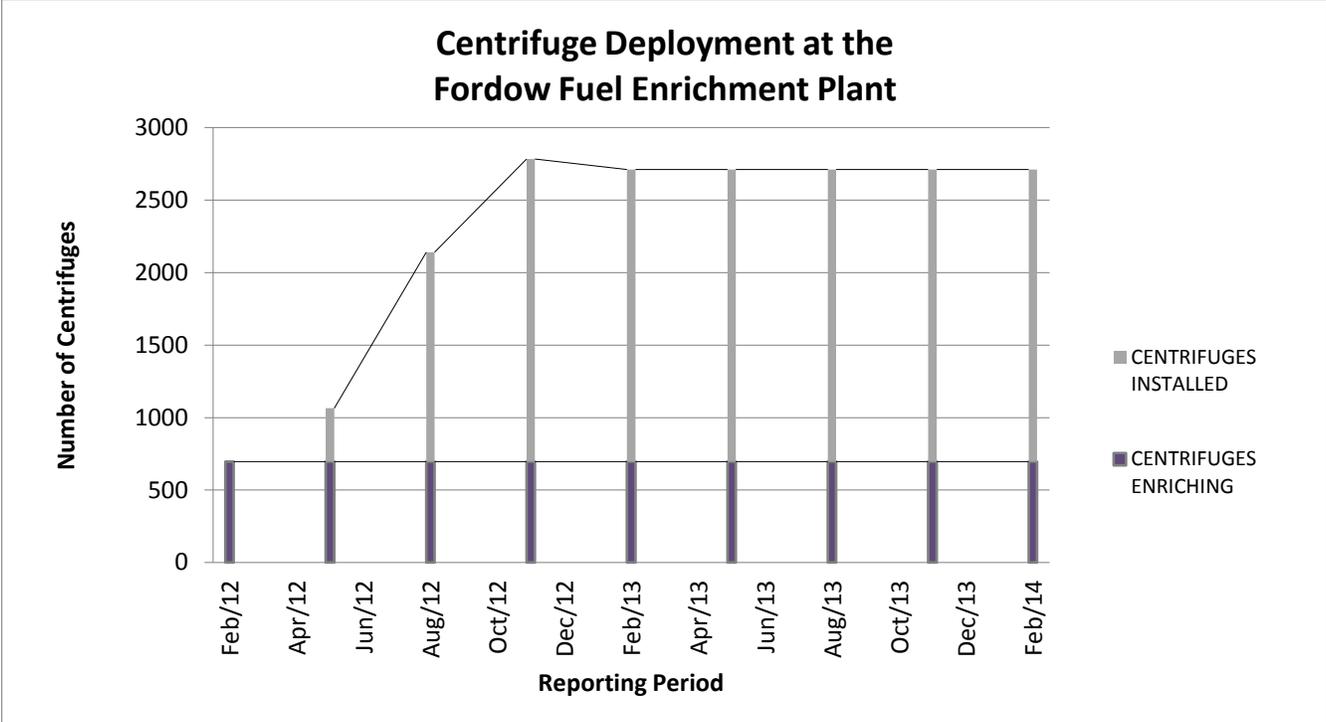


Figure 12: IR-1 Centrifuges Enriching and Installed at the Fordow Fuel Enrichment Plant



Note: All centrifuges are now dedicated to the production of 3.5 percent LEU.

**Table 1: Minimal Average Separative Capacity of an IR-1 Centrifuge at the FEP
(kg U swu/year-centrifuge)**

<i>Period</i>	<i>Start of Period</i>	<i>End of Period</i>
12/13/2007 – 05/06/2008	0.47	0.43
05/07/2008 – 08/30/2008	0.80	0.69
08/31/2008 – 11/07/2008	0.69	0.69
11/08/2008 – 11/31/2009	0.55	0.52
02/01/2009 – 05/31/2009	0.62	0.49
06/01/2009 – 07/31/2009	0.51	0.54
08/01/2009 – 10/30/2009	0.55	0.64
11/23/2009 – 01/29/2010	0.88	0.92
01/30/2010 – 05/01/2010	0.92	0.90
05/02/2010 – 08/06/2010	0.90	0.92
08/07/2010 – 10/31/2010	0.99	0.78
10/18/2010 – 02/05/2011	0.75	0.81 (1.0 if 1,000 questionable centrifuges ignored)
02/06/2011 – 05/13/2011	0.90	0.80
05/14/2011 – 08/13/2011	0.74	0.74
08/14/2011 – 11/01/2011	0.73	0.68
11/02/2011 – 02/04/2012	0.76	0.53 (Note: Iran began enriching in approximately 2,600 additional centrifuges during this period. Therefore, these data are likely skewed.)
02/05/2012 – 05/11/2012	0.77	0.77
05/12/2012 – 08/06/2012	0.77	0.77
08/07/2012 – 11/9/2012	0.77	0.76
11/10/2012 – 02/03/2013	0.75	0.76
02/04/2013 – 05/04/2013	0.76	0.76
05/05/2013 – 08/16/2013	0.76	0.74
08/17/2013 – 11/05/2013	0.74	0.76
11/06/2013 – 02/09/2014	0.78	0.75
02/10/2014 – 05/13/2014	0.71	0.71
05/14/2014 – 09/05/2014	0.75	0.75

Table 2: CUMULATIVE TOTALS OF NATURAL AND ENRICHED URANIUM FEED AND 3.5 AND 19.75 PERCENT LEU HEXAFLUORIDE PRODUCT IN IRAN

LOCATION	0.711 percent hex feed	3.5 percent LEU hex product	3.5 percent LEU hex feed	19.75 percent LEU hex product
FEP	141,513kg	12,464kg	N/A	N/A
PFEP	519 kg	50 kg	1,631 kg*	202 kg*
FFEP	1,350kg	143 kg	1,806 kg*	246 kg*
GROSS TOTAL	143,382	12,772** kg	3,437 kg	448 kg
NET TOTAL	143,382	7,765***	3,437 kg	0.6 kg****

* Figures as of January 20, 2014, when the production of 20 percent enriched LEU has ceased.

** This total also includes 115.5 kg of LEU (<5% uranium 235) resulting from downblending the near 20 percent LEU hexafluoride covered by the Joint Plan of Action.

*** This is a value provided by the IAEA in the safeguards report and has also been reduced by the amount fed into the EUPP, or 1,505 kg. This value, however, is different than the one we have calculated from values in this table and the amount red into the EUPP. Our value is about 65 kg greater. We are seeking an answer to the discrepancy.

****Reference material, under IAEA seal.

Table 3: COMPARATIVE SWU Rate* IN IR-1 CENTRIFUGES AT

IRAN'S ENRICHMENT FACILITIES

LOCATION	IR-1 centrifuges producing 3.5 percent enriched uranium	IR-1 centrifuges producing 19.75 percent enriched uranium
FEP	0.75 swu/cent-year	N/A
PFEP	0.66 swu/cent-year	N/A
FFEP	0.88 swu/cent-year	N/A

*SWU rate represents an average of the SWU/centrifuge-year calculated using the number of centrifuges at both the beginning and the end of the reporting period.