



## April 2016: Monitoring Activities at Yongbyon Nuclear Site

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*Airbus satellite imagery dated April 23, 2016 continues to show no signs of full-power operation at the 5 megawatt-electric (MWe) reactor. However, the presence of three large trucks, two of which are very large open bed trucks parked in front of the reactor, implies that some sort of activity is taking place at the reactor building. Although no external activity linked to the operational status of the reprocessing building is visible at the Radiochemical Laboratory, three open bed trucks are visible at the site and three structures are being covered with soil. These structures are located at the site known to house underground nuclear waste tanks. Also, excavation activities are visible at one of North Korea's undeclared waste storage buildings, also known as "Building 500." Construction is progressing at a site ISIS has identified as a possible isotope separation facility. No significant new external activities are visible at the site of the Experimental Light Water Reactor and at the centrifuge plant.*

### 5 Megawatt-Electric Reactor and Experimental LWR

Airbus satellite imagery purchased and analyzed by ISIS shows no clear indicators that the 5 MWe reactor is operating at full power on April 23, 2016. As figure 1 shows, no water is visibly being discharged from the reactor's discharge pipeline and no steam is venting from the turbine building beside the reactor. However, the absence of these two indicators does not mean that the reactor is shutdown. ISIS estimates that the 5 MWe reactor has been operating intermittently or at low power since mid-2014.<sup>1</sup>

Nonetheless, the presence of three large trucks, two of which are very large open bed trucks parked in front of the reactor, implies that some sort of activity is taking place at the reactor building. However, the nature of this activity is unknown.

No significant external activities are visible at the site of the Experimental Light Water Reactor (LWR).

### Radiochemical Laboratory

The Radiochemical Laboratory is the site where North Korea chemically processes newly discharged irradiated fuel from the 5 MWe reactor and separates plutonium for nuclear weapons. No external activity linked to the operational status of the reprocessing building is visible on April 23, 2016 (see figure 2).

However, there are two indicators of other external activity: three open bed trucks are visible at the site, while the three structures that had been previously [identified](#) by ISIS as possible waste tanks are being covered with soil. These structures are located at a site known to house underground nuclear waste tanks. In fact, it is possible that these structures are in fact waste tanks that were known to be

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<sup>1</sup> It is possible that, during this timeframe, the reactor was shut down at certain times.

buried in this approximate location.<sup>2</sup> Therefore, North Korea may have uncovered these aged waste tanks. Although the reason for this activity is unknown, the excavation activities started in the fall of 2014, just after the 5 MWe reactor stopped full power operation, which had lasted from about August 2013 to June 2014. This could suggest that North Korea was renovating its nuclear waste disposal facilities at the Radiochemical Laboratory, possibly in anticipation of additional plutonium separation activities from irradiated fuel from the 5 MWe reactor that would generate more nuclear waste. Alternatively, the tanks may have required maintenance due to leaks or age.

### **Other Nuclear Waste Facilities**

In April 2016, activity has been detected at one of North Korea's waste buildings. Figure 3 shows three nuclear waste sites within the Yongbyon nuclear complex, two of which were not declared to the IAEA. One of them is an undeclared waste storage building, also known as "Building 500," located on a hill immediately south of the Radiochemical Laboratory. This building was built in 1991 and has a vault in the basement divided into four pits for liquid waste storage tanks and six smaller compartments for storage of solid wastes. As figure 3 shows, between March 15 and April 4, 2016 a trench was dug next to this building. The purpose of this activity is unknown, but it raises many questions: is North Korea trying to create an access point for the waste stored in the basement vaults? If so, why? Are they renovating this waste storage facility? Are they trying to store more waste? Is it possible that after 15 years of storage the tanks and concrete cells are leaking?

A road connects the main entrance of Building 500 to the Radiochemical Laboratory and other parts of the Yongbyon complex. However, a smaller dirt road breaks off to allow access to the southern side of the building. This smaller dirt road has been present since early 2000, but its visibility has varied based on use. Between March and April 2016, this small dirt road became more visible, likely because it was more heavily used, probably by vehicles used to excavate the trench.

However, this is not the only alteration that has been visible at Building 500. Satellite imagery shows that in 2010 the roof of Building 500 started to change color. Interestingly, this color change only affected the southern half of the roof. It is very unclear what this color alteration signifies. One possibility is that this uneven color alteration is from corrosion caused by substances or processes inside the building. In 2012, this color alteration became even more pronounced, possibly meaning that corrosion worsened. An alternative explanation is that in 2012, North Korea may have replaced some of the panels on the side of the roof that had been affected by earlier corrosion. This uneven coloring of Building 500's roof persists today. Additionally, a small building beside Building 500 was demolished between April 2004 and March 2005.

No activity has been detected at the other two waste sites. One of these sites is located east of the Radiochemical Laboratory and was declared by North Korea as a radioactive waste storage. This site is believed to store only solid wastes and is probably used as a repository of low and intermediate level solid wastes from the entire Yongbyon nuclear complex.<sup>3</sup> Over the years, only the movement of some construction material has been spotted at this site, which is often covered by light vegetation. North of

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<sup>2</sup> David Albright and Kevin O'Neil, *Solving the North Korean Nuclear Puzzle* (Washington, DC: Institute for Science and International Security Press, 2000) pp. 153-154.

<sup>3</sup> *Solving the North Korean Nuclear Puzzle*, op.cit.

this site is an undeclared waste site that may have been used earlier for storage of wastes from the reprocessing of targets from the IRT reactor. This site originally housed an above ground waste storage facility that North Korea covered in about 1992. The facility originally had vaults containing two large liquid waste tanks and several compartments for storing solid waste. Evidence associated with the recovery of small amounts of plutonium produced in the IRT reactor is suspected of being buried here.<sup>4</sup> No activity has taken place at this site since 2003, when the roads leading to this site were heavily used. The site is often covered with light vegetation.

### **Suspect Isotope Separation Plant**

As of April 23, 2016, several signatures of external activity are visible at a site ISIS identified as a possible isotope separation facility, located east of the Yongbyon fuel fabrication complex. Additional water discharge is visible in front of, and on top of, the main building at the site (see figure 4). Additionally, circular-shaped excavation is taking place next to the main building. Its purpose is unknown.

This site presents signatures consistent with an isotope separation facility, including tritium separation.<sup>5</sup>

### **Centrifuge Plant**

No significant external activity is taking place at North Korea's uranium enrichment facility.

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<sup>4</sup> *Solving the North Korean Nuclear Puzzle*, op. cit.

<sup>5</sup> See David Albright and Serena Kelleher-Vergantini, "Yongbyon: A Better Insight into the Status of the 5MWe Reactor," April 29, 2015, <http://isis-online.org/isis-reports/detail/yongbyon-a-better-insight-into-the-status-of-the-5mwe-reactor/10#images>; "Update on North Korea's Yongbyon Nuclear Site," September 15, 2015, [http://isis-online.org/uploads/isis-reports/documents/Update\\_on\\_North\\_Koreas\\_Yongbyon\\_Nuclear\\_Site\\_September15\\_2015\\_Final.pdf](http://isis-online.org/uploads/isis-reports/documents/Update_on_North_Koreas_Yongbyon_Nuclear_Site_September15_2015_Final.pdf).



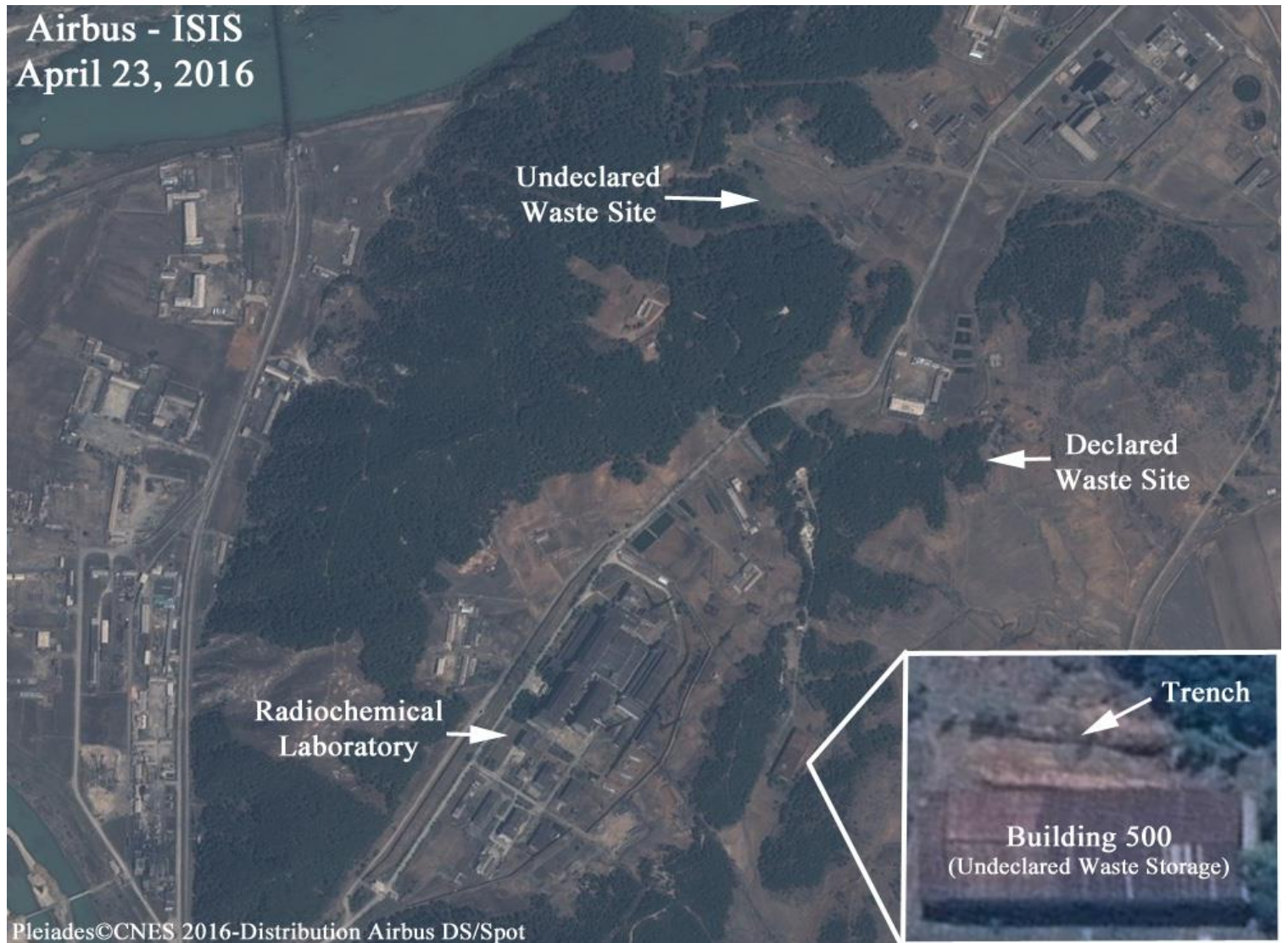
**Figure 1.** Airbus imagery showing North Korea's 5 MWe and LWR reactors on April 23, 2016.



**Figure 2.** Airbus imagery showing North Korea's Radiochemical Laboratory on April 23, 2016.



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April 23, 2016



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Figure 3. Airbus imagery showing three waste facilities on April 23, 2016.



**Figure 4.** Airbus imagery showing the possible isotope separation facility at Yongbyon on April 23, 2016.



**Figure 5.** Airbus imagery showing North Korea's fuel fabrication facility and centrifuge enrichment building on April 23, 2016.