



May 2016: Monitoring Activities at the Yongbyon Nuclear Site

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DigitalGlobe satellite imagery dated May 22, 2016 shows no signs of full-power operation at the 5 megawatt-electric (MWe) reactor despite the continued presence of two large open bed trucks parked in front of the reactor, which are indicators of activity at the reactor building. At the Radiochemical Laboratory, two important signatures are visible: the activity of the coal plant and the presence of tanks in front of the spent fuel reception building. These are signatures consistent with spent fuel reprocessing, although it remains difficult to determine whether plutonium separation has occurred, is occurring, or will occur in the near future. Construction is progressing at a site 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

DigitalGlobe imagery dated May 22, 2016, shows no signs of full-power operation at the 5 MWe reactor, such as water discharge or steam venting from the reactor's turbine building (see figure 1). However, as mentioned previously, the absence of these two indicators does not mean the 5 MWe reactor is shut down. Our assessment is that the reactor has been operating intermittently or at low power since mid-2014.¹ On May 22, 2016, two large open bed trucks are parked at the reactor entrance, implying activity taking place at the reactor site. 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 and Nuclear Waste Facilities

The Radiochemical Laboratory is the site where North Korea chemically processes discharged irradiated fuel from the 5 MWe reactor and separates plutonium for nuclear weapons. Figure 2 provides annotations of many of the buildings at the Radiochemical Laboratory site. The purpose is to supplement and update information in *Solving the North Korean Nuclear Puzzle*

¹ The reactor may have been shut down at certain times during this timeframe, as we have noted previously.

and more precisely identify activities at the Yongbyon site, some of which have potential environmental consequences.²

On May 22, 2016, nine tanks (or casks) (each 3 meters by 2.6 meters) were lined up in front of the spent fuel reception building (see figure 2). Several tanks were also spotted in this location on April 11, 2016 (see [38North](#)). Additionally, the coal fired steam generation plant was active in the most recent image (see figure 3). Smoke from the coal plant is an important signature often associated with reprocessing activities at the Radiochemical Laboratory. The coal plant's main purpose is to provide a source of industrial steam for the reprocessing activities taking place there. More specifically, one of the major uses of the steam is to generate heat for nuclear waste minimization and solidification. Thus, the steam is importantly used to address the aftermath of plutonium separation.

The activity of the coal plant and the presence of tanks in front of the spent fuel reception building are signatures consistent with spent fuel reprocessing. However, it remains difficult to determine whether plutonium separation has occurred, is occurring, or will occur in the near future.³

The International Atomic Energy Agency (IAEA) has identified two nuclear waste sites at Yongbyon complex that were not declared.⁴ In [April 2016](#), our Institute detected activity at one of these buildings, an undeclared waste storage building also known as "Building 500." This building, which reportedly has four basement pits for liquid waste storage and six smaller compartments for storage of solid wastes, is located on a hill immediately south of the Radiochemical Laboratory.

As figure 3 shows, a trench has been dug next to Building 500. This trench was dug between March 15 and April 4, 2016, based on available commercial satellite imagery of the site. Although the exact purpose of the trench remains unknown, North Korea may be attempting to access the lower portion of the building, where the waste is allegedly stored, to remediate a problem, perhaps a waste leak, or conduct maintenance activities.⁵

No activity has been detected at the other undeclared waste sites.

Suspect Isotope Separation Plant

² David Albright and Kevin O'Neill, *Solving the North Korean Nuclear Puzzle* (Washington, DC: Institute for Science and International Security Press, 2000).

³ See David Albright, Olli Heinonen, and Serena Kelleher-Vergantini, "Correlating the Operation of the Coal Plant to Reprocessing Activities at Yongbyon, April 15, 2016, [http://isis-online.org/uploads/isis-reports/documents/Correlating the Operation of the Coal Plant to Reprocessing Activities at Yongbyon April 15 2016 FINAL.pdf](http://isis-online.org/uploads/isis-reports/documents/Correlating_the_Operation_of_the_Coal_Plant_to_Reprocessing_Activities_at_Yongbyon_April_15_2016_FINAL.pdf).

⁴ *Solving the North Korean Nuclear Puzzle*, op. cit.

⁵ See David Albright and Serena Kelleher-Vergantini, "April 2016: Monitoring Activities at Yongbyon Nuclear Site," April 29, 2016, [http://isis-online.org/uploads/isis-reports/documents/Monitoring Activities at Yongbyon Nuclear Site April 29 2016 FINAL.pdf](http://isis-online.org/uploads/isis-reports/documents/Monitoring_Activities_at_Yongbyon_Nuclear_Site_April_29_2016_FINAL.pdf).

DigitalGlobe's May 22, 2016 image shows several signatures of external activity at a site ISIS identified as a possible isotope separation facility. This site is located in the southern corner of the Yongbyon nuclear complex, east of the fuel fabrication facility, and presents signatures consistent with an isotope separation facility, including tritium separation.⁶

In [April 2016](#), ISIS highlighted that water discharge was visible in front of, and on top of, the main building at the site, while circular-shaped excavation was taking place next to the main building. As of May 22, 2016, both of these signatures are no longer visible. The water was associated with ongoing external activity. The fact that it has been drained could signify that external construction activity could soon be complete. This theory is reinforced by the fact that the area in front of the main building is being cleared of most construction material. The purpose of the circular-shaped excavation was, and remains, unknown. Additionally, the May 2016 image shows the presence of possible water ponds located immediately south of the main building at the site.

Centrifuge Plant

On May 22, 2016, no significant external activity was visible at North Korea's uranium enrichment facility.

⁶ 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://isisonline.org/uploads/isisreports/documents/Update_on_North_Koreas_Yongbyon_Nuclear_Site_September15_2015_Final.pdf.



Figure 1. DigitalGlobe imagery showing North Korea's 5 MWe and LWR reactors on May 22, 2016.



Figure 2. DigitalGlobe imagery showing North Korea's Radiochemical Laboratory on May 22, 2016. The slight distortions in the image are caused by the angle at which the image was taken.



Figure 3. DigitalGlobe imagery showing Building 500 and the coal fired steam generation plant at Yongbyon on May 22, 2016.



Figure 4. DigitalGlobe imagery showing the possible isotope separation facility at Yongbyon on May 22, 2016.



Figure 5. DigitalGlobe imagery showing the fuel fabrication facility at Yongbyon on May 22, 2016.