Commercial Satellite Imagery Suggests Pakistan is Building a Second, Much Larger Plutonium Production Reactor: Is South Asia Headed for a Dramatic Buildup in Nuclear Arsenals?

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Commercial satellite imagery from Digital Globe appears to show the construction of a second heavy water production reactor inside the Khushab complex in Pakistan (figure 1). The image shows a round, metal structure inside a square building under construction that appears to be a reactor vessel. This reactor appears much larger than the operating reactor on the site[1], which went critical in 1998 and is estimated to have a power of about 50 MWth.

The reactor under construction is estimated to be capable of operating in excess of 1,000 megawatts-thermal, according to analysis based on the diameter of the vessel. Such a reactor could produce over 200 kilograms of weapon-grade plutonium per year, assuming it operates at full power for a modest 220 days per year. At 4-5 kilograms of plutonium per weapon, this stock would allow the production of over 40-50 nuclear weapons a year. The reactor could also be used to produce substantial amounts of tritium for boosted fission weapons.

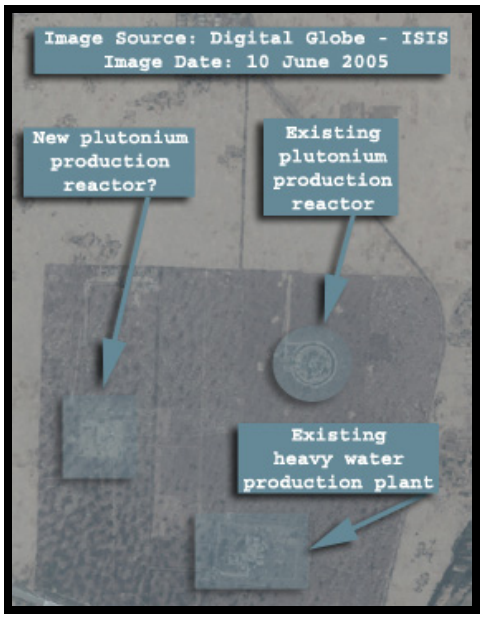

Figure 1 Overview of the Khushab complex, in the Khushab district of Punjab.

[1] See http://isis-online.org/publications/southasia/ikonoskhushabreactor.html

Figure 2 A close up of the building suspected to be a large heavy water, plutonium production reactor.

Based on a set of images, construction of the reactor started after March 2000. In the image from June 2005, a possible reactor vessel is visible within the inner portion of the building (figure 2). The support columns for the outer portion of the building are visible as well. A large crane is visible just outside the building. Situated to the west of the main building is a structure suspected to be a mosque. It is the only building within the Khushab site with walls that are not parallel to those of other buildings and appears to face Mecca.

Figure 3 More recent close up of the construction site.

In an April 2006 image (figure 3), the outer portion of the building has been covered with a roof. Across the ground next to the new crane are what appear to be several arched metal rods. These pieces could be used as the frame for a roof on top of the inner structure. The linear distance between the ends of the arched rods and the distance between the east and west walls of the inside structure are both approximately the same length. The construction activity just above the north-east corner of the entire building could be the foundation for a stack.

The round object inside the building has a diameter of about 5 meters. This is significantly larger than the corresponding vessel in the existing reactor at this site. Based on the size of the vessel, assuming moderation by heavy water, standard values for heavy water reactors, and economical use of the volume of the vessel, this reactor is estimated to be capable of operating in excess of 1,000 megawatts-thermal. It is important to note that this estimate remains uncertain, absent any confirmatory information from Pakistan.

Based on the apparent rate of construction, the reactor could be finished within a few years. However, nothing suggests that Pakistan is moving quickly to finish this reactor. The driving forces behind the reactor completion schedule could be a shortage of necessary reactor components or other parts of the weapons-production infrastructure, such as the rate of heavy water production, the availability of a sufficient fuel reprocessing capacity or, perhaps, the availability of sufficient modern tritium recovery and packaging facilities. For example, Pakistan may not have enough heavy water for this reactor, which could require about 100-150 tonnes of heavy water. The Khushab site has a heavy water production plant[2] able to produce an estimated 13 tonnes of heavy water a year, a relatively small production capability. Pakistan may not be able to reprocess all of the anticipated irradiated fuel from this reactor. It is known to process fuel to separate plutonium at the New Labs facility at Rawalpindi, and this facility was expanded between about 1998 and 2002. However, this increase in capacity was believed to be associated with the smaller, heavy water reactor.

India is likely aware of this reactor construction in Khushab. Has this influenced India to increase its own plutonium production capacity for its nuclear weapons program? India has insisted on maintaining outside of safeguards a major reprocessing facility and a large number of nuclear power reactors in the recent negotiations between the United States and India aimed at increasing peaceful nuclear cooperation.

South Asia may be heading for a nuclear arms race that could lead to arsenals growing into the hundreds of nuclear weapons, or at a minimum vastly expanded stockpiles of military fissile material. A negotiated agreement that results in a halt to the production of fissile materials for nuclear weapons should be a priority for the international community. Not only are such arsenals a waste of precious resources, they increase instability in the region and could needlessly provoke China to respond by increasing the size and lethality of its own nuclear capabilities.

[2] http://isis-online.org/publications/southasia/ikonoskhushabheavyh2o.html