



## **Pakistan Expanding Dera Ghazi Khan Nuclear Site: Time for U.S. to Call for Limits**

**By David Albright, Paul Brannan, and Robert Kelley  
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ISIS has obtained commercial satellite imagery from DigitalGlobe taken August 25, 2008 of Pakistan's key military and civilian fuel cycle site near Dera Ghazi Khan, which produces natural uranium hexafluoride ( $UF_6$ ) and uranium metal, two materials used in producing Pakistan's nuclear weapons (see figure 1).<sup>1</sup> In comparison to earlier satellite imagery taken on October 11, 2004, the latest pictures show expansion of the industrial facilities at the site. Pakistan has also cleared a new plot of land adjacent to the largest of the three compounds on site, which will double the size of this compound (see figures 2 and 3). The expansion includes new industrial buildings, new anti-aircraft installations, and several new settling ponds among the three compounds identified in commercial satellite imagery (see figures 2-7).

US officials have recently said that Pakistan has the fastest growing nuclear weapons program in the world, at least in terms of installing additional capacity to produce nuclear materials for nuclear weapons. Commercial satellite imagery supports the conclusion that Pakistan, over the last several years, has concentrated on greatly expanding its nuclear weapons production complex. The reasons for this expansion are undoubtedly related to Pakistani decisions to upgrade its nuclear arsenal, currently estimated to contain roughly between 60 and 100 nuclear weapons deliverable by attack aircraft and ballistic missiles.

ISIS previously assessed that Pakistan's on-going [expansion of its plutonium production program](#), which includes new undeclared, unsafeguarded reactors and plutonium reprocessing facilities, is likely linked to a strategic decision to improve the destructiveness and deliverability of its nuclear arsenal. In particular, Pakistan may build smaller, lighter plutonium-fission weapons and deliverable thermonuclear weapons that use plutonium as the nuclear trigger and enriched and natural enriched uranium in the secondary.<sup>2</sup> Pakistan may have decided to create a plutonium-based arsenal to

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<sup>1</sup> Latitude: 29.994176; Longitude: 70.586998

<sup>2</sup> [http://www.isis-online.org/publications/southasia/Khushab\\_18September2008.pdf](http://www.isis-online.org/publications/southasia/Khushab_18September2008.pdf)

[Banner image credit: DigitalGlobe-ISIS]

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supplement or replace its current arsenal that relies mainly on fission weapons made with weapon-grade uranium.

The expansion of the facilities at Dera Ghazi Khan is more difficult to assess because of uncertainties about the activities conducted at this site related to nuclear weapons production. Nonetheless, this expansion is likely related to renovating older facilities and producing additional natural UF<sub>6</sub> and uranium metal. The former would allow Pakistan to increase its stock of weapon-grade uranium. The latter could permit Pakistan to make more fuel for its Khushab reactors and more sophisticated uranium components for nuclear weapons, including components for thermonuclear weapons.

### **Chemical Plants Complex**

This site houses the Chemical Plants Complex (CPC), which converts yellowcake into UF<sub>6</sub> and produces uranium metal for the nuclear weapons program. This undeclared and unsafeguarded nuclear site was originally built in the 1970s and early 1980s with the help of foreign suppliers. A German supplier secretly provided up to nine process lines or facilities for converting yellowcake into natural UF<sub>6</sub>, the feedstock for gas centrifuges.<sup>3</sup> The natural UF<sub>6</sub> was shipped to Khan Research Laboratories, nearly 480 kilometers away, for enrichment to weapon-grade. After enrichment, the weapon-grade UF<sub>6</sub> returned to this site for conversion to metallic form for use in nuclear weapons in a facility also provided by the same German supplier.<sup>4</sup> KRL, apparently, also developed its own uranium metal production facility, which served as a safety and security measure that cut down on the overall transportation of highly-enriched UF<sub>6</sub> around the country.<sup>5</sup> There is no indication, however, that the metal production capability ever stopped operating at the Dera Ghazi Khan site.

The CPC is located in compounds labeled #1 and #3 in the satellite imagery. There are new buildings, new anti-aircraft installations, and new ponds at compound #1 in the latest imagery (see figures 2 and 3). A new plot of land adjacent to the southern side of compound #1 will likely contain new industrial buildings and will roughly double its size

In the last four years, an industrial facility at Compound #3 has roughly doubled in size, indicating that the industrial processes that take place at this compound have increased (see figures 6 and 7). Compound #3 also contains a short, high volume ventilation stack and the entire compound has its own security wall. It is also isolated from the other two compounds (see figures 6 and 7). Compound #3 could also house facilities for machining uranium metal into finished components for weapons. Such precision machining of uranium metal would be useful for conventional weapons as well as for finished nuclear weapon components.

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<sup>3</sup> Steve Weissman and Herbert Krosney, *The Islamic Bomb* (Times Books, New York, 1981), p. 220; and Holger Koppe and Egmont R. Koch, *Bomben Geschaefte* (Knesebeck and Schuler: Munich, 1990), p. 61.

<sup>4</sup> *The Islamic Bomb* op. cit., p. 220; and *Bomben Geschaefte*, op. cit., p. 61

<sup>5</sup> Shahid-Ur-Rehman *Long Road to Chagai* (Print Wise Publication, Islamabad, 1999), p. 67. On this page, Rehman paraphrases a speech given by Dr. Samar Mubarakmand of the Pakistan Atomic Energy Commission in November 1998.

CPC also houses facilities to machine natural and depleted uranium metal for use in a number of other applications including reactor fuel and conventional armor-piercing artillery.<sup>6</sup> The site has also converted uranium for use as fuel in the Karachi Nuclear Power Plant (KANUPP).

The exact location of the original facility to convert weapon-grade UF<sub>6</sub> into metal cannot be determined from the imagery. It is likely one of the older buildings in the western part of compound #1.

### **Baghalchur Uranium Mill**

The site also houses the Baghalchur uranium mill known as BC-1, which produces yellowcake. In the satellite imagery, BC-1 is in compound #2 (see figures 4 and 5). There is a new pond at this compound, but few other new buildings. The current status of the site is unknown.

In the past, the Baghalchur mine supplied uranium ore to the BC-1 site. A Nuclear Suppliers Group (NSG) hand-out from about 2005, titled “Procurement Activities for the Pakistani Nuclear Program since Beginning 2004,” notes that a tunnel system in Pakistan was located at a point on the Suleman mountain range only 20 kilometers away from the Dera Ghazi Khan nuclear site. Less than 300 meters from the exact coordinates listed on the NSG document are a series of tunnel entrances (see figure 8). There is a road connecting these tunnels with BC-1. These tunnel entrances may be associated with the Baghalchur mine, which was apparently closed by 2000.<sup>7</sup> Pakistan’s current source of uranium is being debated.

### **Ground Attacks**

In the last several years, the Dera Ghazi Khan nuclear site, or its adjacent worker compound, has been the target of at least one ground attack by more than a dozen gunmen, and nearby railway tracks have also been bombed.<sup>8</sup> These attacks were likely carried out by separatist fighters from the adjacent Baloch region of Pakistan and not Taliban forces. The brazen ground assault and nearby bombings are nevertheless troubling considering the role that the Dera Ghazi Khan plant plays in Pakistan’s nuclear weapons program. On February 5, 2009, a suicide bomber killed more than 30 people in Dera Ghazi Khan. This was a sectarian attack targeting a funeral procession outside a Shiite mosque, although Pakistani police later arrested the suspected mastermind behind the bombing and reportedly said he has ties to the Taliban.<sup>9</sup>

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<sup>6</sup> *Long Road to Chagai*, op. cit., p. 67.

<sup>7</sup> Zofeen Ebrahim, “Pakistan: Villagers Pay the Price of Nuclear Ambitions,” *Inter Press Service*, May 31, 2006”

<sup>8</sup> “Attack on PAEC Centre,” *The Pakistan Newswire*, April 27, 2003; and “Rail Track Blown Up,” *Dawn*, February 6, 2007.

<sup>9</sup> “Pak police arrests Dera Ghazi Khan blast mastermind,” *Hindustan Times*, April 6, 2009.

## **Downsizing the Nuclear Weapons Complex**

Activities at Dera Ghazi Khan related to nuclear weapons production are unnecessary, as Pakistan currently has more than enough nuclear weapons. Its plan to upgrade its arsenal stands to accelerate a dangerous and wasteful arms race with India. In the current climate, with Pakistan's leadership under duress from daily acts of violence by insurgent Taliban forces and organized political opposition, the security of its nuclear assets remains in question. An expansion in nuclear weapons production capabilities needlessly complicates efforts to improve the security of Pakistan's nuclear assets.

Faced with a dangerous surge in Pakistan's ability to produce nuclear weapons, the United States should convince Pakistan to halt its production of fissile material and join the negotiations of a universal, verified, Fissile Material Cutoff Treaty (FMCT), which would ban the production of plutonium and highly enriched uranium for nuclear explosives. As an interim step, the United States should press both India and Pakistan to suspend any production of fissile material for nuclear weapons.

Recent media stories have reported that the Pakistani government has made massive cuts in Pakistan's nuclear program.<sup>10</sup> To the extent that these cuts affect the nuclear weapons production complex, they are both wise and long overdue.

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<sup>10</sup> Ansar Abbasi, *Cut in nuke budget: mysterious silence upsets scientists*, The News International, May 10, 2009: [http://www.thenews.com.pk/daily\\_detail.asp?id=176809](http://www.thenews.com.pk/daily_detail.asp?id=176809)



Figure 1. An overview of the Dera Ghazi Khan nuclear site in Pakistan. The site is made up of three main compounds, and the entire facility is surrounded by security fencing with intermediate guard stations. The worker colony is adjacent to the north-east section of the nuclear facility.



Figure 2. October 11, 2004 image of compound #1 at the Dera Ghazi Khan nuclear site. This compound likely includes uranium dioxide conversion and uranium hexafluoride ( $UF_6$ ) production facilities known as the Chemical Plants Complex (CPC). A uranium metal facility might also be included in the industrial facilities at this compound. Several ponds are being excavated

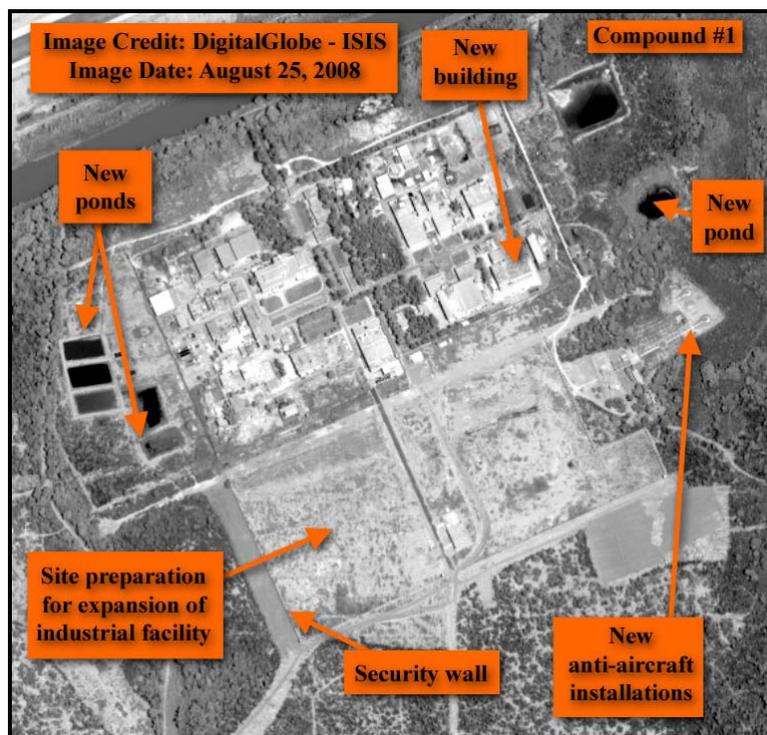


Figure 3. August 25, 2008 image of the same compound. Site preparations can be seen that will double the size of this compound. The prepared expansion area is already surrounded by a security wall. The addition of the security wall and the presence of industrial buildings at the original compound indicate that the new expansion area will also contain industrial facilities. Several ponds have been excavated and filled. There is a new large building at the existing compound and new anti-aircraft installations.

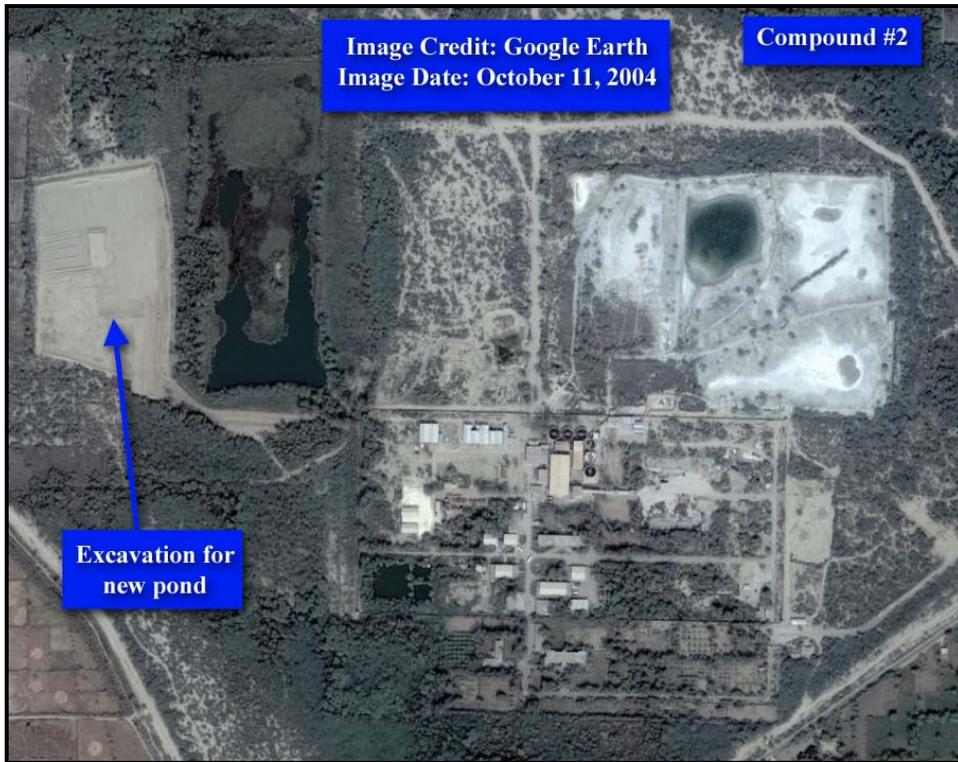


Figure 4. October 11, 2004 image of compound #2 at the Dera Ghazi Khan site. This compound is the uranium milling facility, BC-1, named after the near-by Baghalchur uranium mines. A new pond has been excavated.

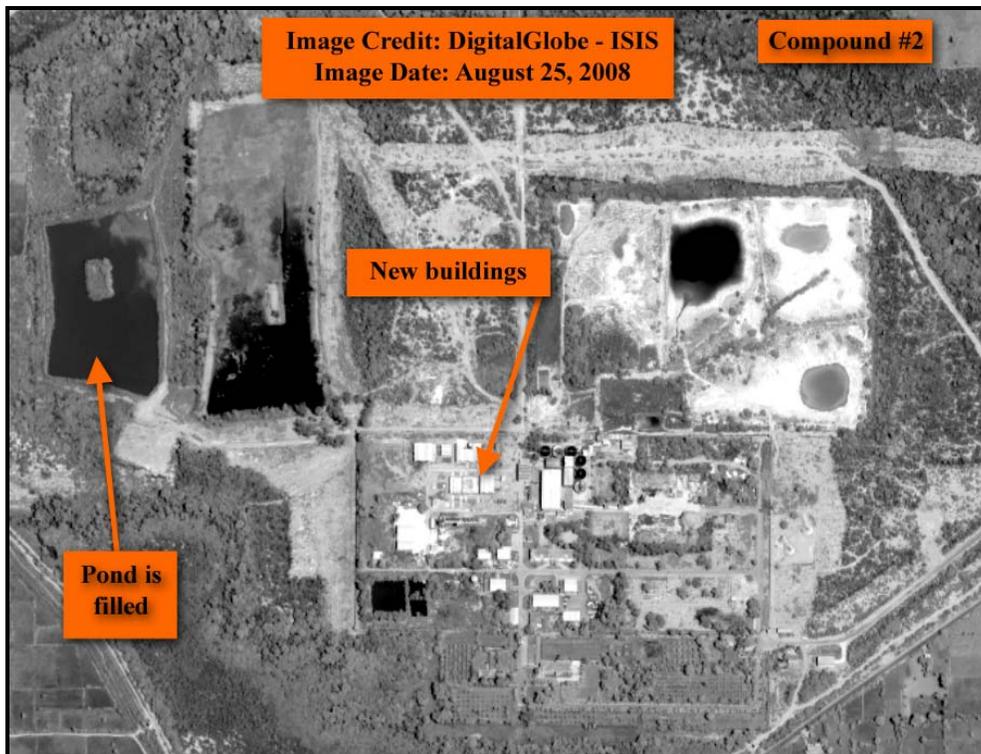


Figure 5. August 25, 2008 image of the same compound. The excavated pond in figure 4 is now filled with water and there are a few new buildings.



Figure 6. October 11, 2004 image of compound #3 at the Dera Ghazi Khan site.

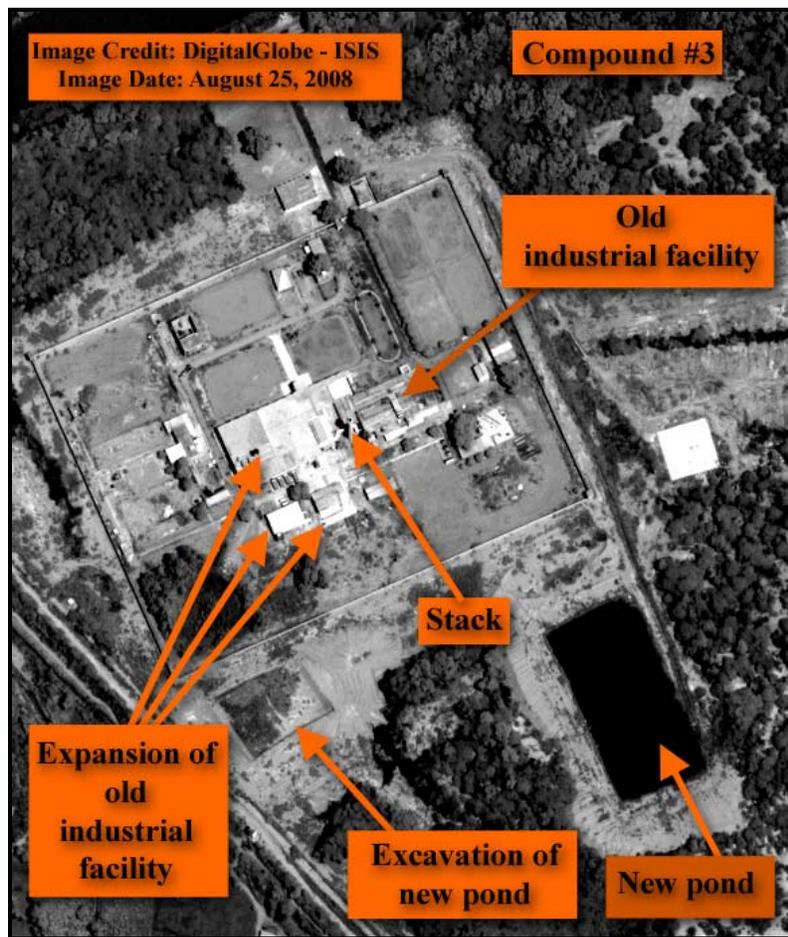


Figure 7. August 25, 2008 image of the same compound. The industrial facility on this compound has expanded to approximately twice its original size. There is a new large pond, as well as excavation for another pond.

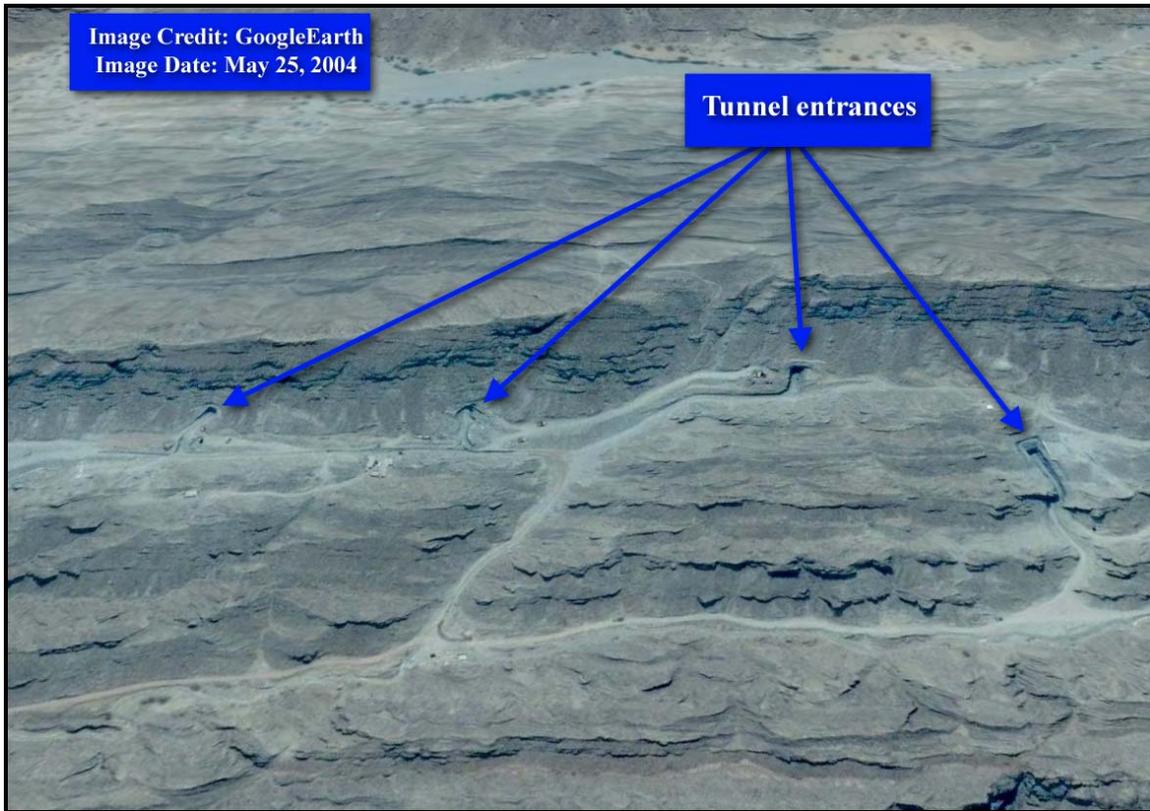


Figure 8. May 24, 2004 image of the Suleman mountain range approximately 20 kilometers from the Dera Ghazi Khan nuclear site. The tunnel entrances seen in the image may be related to the Baghalchur mine, closed in 2000, which originally supplied the BC-1 uranium mill at the Dera Ghazi Khan site.