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Iran Shielding Its Nuclear Efforts in Maze of Tunnels

By WILLIAM J. BROAD
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Last September, when [Iran](#)'s uranium enrichment plant buried inside a mountain near the holy city of Qum was revealed, the episode cast light on a wider pattern: Over the past decade, Iran has quietly hidden an increasingly large part of its atomic complex in networks of tunnels and bunkers across the country.

In doing so, American government and private experts say, Iran has achieved a double purpose. Not only has it shielded its infrastructure from military attack in warrens of dense rock, but it has further obscured the scale and nature of its notoriously opaque nuclear effort. The discovery of the Qum plant only heightened fears about other undeclared sites.

Now, with the passing of [President Obama](#)'s year-end deadline for diplomatic progress, that cloak of invisibility has emerged as something of a stealth weapon, complicating the West's military and geopolitical calculus.

The Obama administration says it is hoping to take advantage of domestic political unrest and disarray in [Iran's nuclear program](#) to press for a regimen of strong and immediate new sanctions.

But a crucial factor behind that push for nonmilitary solutions, some analysts say, is Iran's tunneling — what Tehran calls its strategy of “passive defense.”

Indeed, Secretary of Defense [Robert M. Gates](#) has repeatedly discounted the possibility of a military strike, saying that it would only slow Iran's nuclear ambitions by one to three years while driving the program further underground.

Some analysts say that Israel, which has taken the hardest line on Iran, may be especially hampered, given its less formidable military and intelligence abilities.

“It complicates your targeting,” said Richard L. Russell, a former [Central Intelligence Agency](#) analyst now at the National Defense University. “We're used to facilities being above ground. Underground, it becomes literally a black hole. You can't be sure what's taking place.”

Even the Israelis concede that solid rock can render bombs useless. Late last month, the Israeli defense minister, [Ehud Barak](#), told Parliament that the Qum plant was “located in bunkers that cannot be destroyed through a conventional attack.”

Heavily mountainous Iran has a long history of tunneling toward civilian as well as military ends, and [Mahmoud Ahmadinejad](#) has played a recurring role — first as a transportation engineer and founder of the Iranian Tunneling Association and now as the nation's president.

There are hundreds, perhaps thousands, of big tunnels in Iran, according to American government and private experts, and the lines separating their uses can be fuzzy. Companies owned by the [Islamic Revolutionary Guards](#) Corps of Iran, for example, build civilian as well as military tunnels.

No one in the West knows how much, or exactly what part, of Iran's nuclear program lies hidden. Still, evidence of the downward atomic push is clear to the inquisitive.

Google Earth, for instance, shows that the original hub of the nuclear complex at Isfahan consists of scores of easily observed — and easy to attack — buildings. But government analysts say that in recent years Iran has honeycombed the nearby mountains with tunnels. Satellite photos show six entrances.

Iranian officials say years of veiled bombing threats prompted their country to exercise its “sovereign right” to protect its nuclear facilities by hiding them underground. That was their argument when they announced plans in November to build 10 uranium enrichment plants.

Despite the improbability and bluster of the claim, Iran's tunneling history gave it a measure of credibility.

"They will be scattered in the mountains," the chief of the Atomic Energy Organization of Iran, Ali Akbar Salehi, told Iran's Press TV. "We will be using the passive defense so that we don't need to have active defense, which is very expensive."

Mr. Gates, along with other Western officials, has dismissed that line of argument as cover for a covert arms program.

"If they wanted it for peaceful purposes," he said of the Qum plant on CNN, "there's no reason to put it so deep underground, no reason to be deceptive about it, keep it a secret for a protracted period of time."

Iran denies that its nuclear efforts are for military purposes and insists that it wants to unlock the atom strictly for peaceful aims, like making electricity. It says it wants to build many enrichment plants to fuel up to 20 nuclear power plants, a plan many economists question because Iran ranks second globally in oil and natural gas reserves.

Ploy or not, any expansion seems unlikely to zoom ahead. After a decade of construction, Iran's main enrichment plant, at Natanz, operates at a tiny fraction of its capacity. The Qum plant is only half built. Nuclear experts say the new plants, if attempted, may not materialize for years or decades. Even so, they note that tunnels would be the easiest part of the plan and may get dug relatively soon.

Despite the questions about whether the West can credibly threaten to destroy Iran's nuclear program, analysts insist that the United States, Israel and their allies will never rule out that option. The Pentagon, in fact, is racing to develop a powerful new tunnel-busting bomb.

"Deeply buried targets have been a problem forever," said Greg Duckworth, a civilian scientist who recently led a Pentagon research effort to pinpoint enemy tunnels. "And it's getting worse."

A Tunnel Expert

Mr. Ahmadinejad began professional life as a transportation engineer with close ties to the Revolutionary Guards and an abiding interest in tunnels.

He helped found the [Iranian Tunneling Association](#) in 1998, according to the group's Web site. That year, the Tehran subway began a major expansion, and Iran, in secret, accelerated its nuclear program.

In early 2004, while mayor of Tehran, Mr. Ahmadinejad served as chairman of the Sixth Iranian Tunneling Conference. He praised the leaders of ancient Persia for creating networks of subterranean waterways and called for the creation of new "tunnels" between the government, universities and professional groups.

"I ask God to help us all," he said in a paper. Such tunneling conferences, held regularly in Tehran, draw global manufacturers of tunnel-boring machines — giant devices as big as locomotives that dig quickly through rocky strata. Terratec, an Australian maker, noted early last year that Iran had recently become "one of the most active markets in the world."

Many of the companies keep offices in Tehran. Herrenknecht, a German firm considered the market leader, lists three. Engineers say Iran has hundreds of miles of civilian tunneling projects under way, including subways in Tehran, Isfahan, and Shiraz, highway tunnels across the country and water tunnels to irrigate the dry interior.

By all accounts, the seeds of the downward military shift were planted during the Iran-Iraq war in the 1980s, when Iraq hit Tehran and other Iranian cities with waves of missiles. Constructing shelters, bunkers and tunnels became a patriotic duty.

An Opposition Watchdog

In 2002, the [National Council of Resistance of Iran](#), an opposition group, revealed that Iran was building a secret underground nuclear plant at Natanz that turned out to be for enriching uranium. Enrichment plants can make fuel for reactors or, with a little more effort, atom bombs.

Satellite photos showed the Iranians burying two cavernous halls roughly half the size of the Pentagon. Estimates put the thickness of overhead rock, dirt and concrete at 30 feet — enough to frustrate bombs but not to guarantee the plant's survival.

The disclosure of Natanz set off the West's confrontation with Iran. Two years later, the [International Atomic Energy Agency](#) found to its surprise that Iran was tunneling in the mountains by the Isfahan site, where uranium is readied for enrichment. "Iran failed to report to the agency in a timely manner," an I.A.E.A. paper said in diplomatic understatement.

Then, in late 2005, the Iranian opposition group held news conferences in Paris and London to announce that its spies had learned that Iran was digging tunnels for missile and atomic work at 14 sites, including an underground complex near Qum. The government, one council official said, was building the tunnels to conceal “its pursuit of [nuclear weapons](#).” The council further charged that Mr. Ahmadinejad and the tunneling association were providing civilian cover for military work and acquisitions.

The council’s assertions got little notice. Some Western experts saw them as overstated. Some questioned the council’s objectivity because it sought the government’s overthrow. Perhaps the biggest impediment was a suspicion of defectors at a time when the American invasion of Iraq was proving to be based in part on Iraqi dissidents’ false claims about [Saddam Hussein’s](#) unconventional weapons.

[United Nations](#) atomic inspectors did check out a few of the tunnels at Isfahan, but not at Qum because the plant was on a military base and thus off limits for inspection without strong evidence of suspicious activity.

“We followed whatever they came up with,” [Mohamed ElBaradei](#), the recently departed head of the [International Atomic Energy Agency](#), said of the council in an interview. “And a lot of it was bogus.”

Frank Pabian, a senior adviser on nuclear nonproliferation at [Los Alamos National Laboratory](#) in New Mexico, strongly disagreed. “They’re right 90 percent of the time,” he said of the council’s disclosures about Iran’s clandestine sites. “That doesn’t mean they’re perfect, but 90 percent is a pretty good record.”

In 2007, the council announced that Iran was tunneling in the mountains near Natanz, the sprawling enrichment site. Satellite photos confirmed that.

And Qum became a vindication, though belatedly, in late September, when President Obama, flanked by the leaders of France and Britain, identified “a covert uranium enrichment facility” being constructed there.

Military Warrens

In December, the opposition group capitalized on its new stature to issue a report on Iranian military tunneling. It said Iran had dug tunnels and bunkers for research facilities, ammunition

storage, military headquarters and command and control centers. “A group of factories” in the mountains east of Tehran, it said, specialize in “the manufacturing of nuclear warheads.”

Over all, the report raised to 19, from 14, the number of locations where it said tunnels — often multiple tunnels — were hiding military bases and work on arms.

American war planners see Iran’s tunnels — whatever their exact number and contents — as a serious test of military abilities. Most say there is no easy way to wipe out a nuclear program that has been well hidden, widely dispersed and deeply buried.

Among the difficulties, military experts say, are decoy tunnels and false entrances, the identification of which requires good intelligence. The experts add that Iran’s announcement about new enrichment plants may simply produce a blur of activity meant to confuse Western war planners.

[David A. Kay](#), a nuclear specialist who led the fruitless search for unconventional arms in Iraq, said the hiding of a plant or two among the rocky labyrinths could pose a particular challenge for Israel. “They have limited intelligence for targeting,” Dr. Kay said, adding that the United States was better equipped to map out Iran’s nuclear terrain.

Raymond Tanter, an Iran expert at [Georgetown University](#) who served in the Reagan White House, agreed. “So far, the tunneling has not succeeded to the point that the American technology couldn’t get to it,” he contended. “But it makes Israel’s options more problematic, because they have less of a military edge.”

Doubts notwithstanding, the Obama administration has been careful to leave the military option on the table, and the Pentagon is racing to develop a deadly tunnel weapon.

The device — 20 feet long and called the Massive Ordnance Penetrator — began as a 2004 recommendation from the Defense Science Board, a high-level advisory group to the Pentagon.

“A deep underground tunnel facility in a rock geology poses a significant challenge,” the board wrote. “Several thousand pounds of high explosives coupled to the tunnel are needed to blow down blast doors and propagate a lethal air blast.”

The bomb carries tons of explosives and is considered 10 times more powerful than its predecessor. It underwent preliminary testing in 2007, and its first deployments are expected next summer. Its carrier is to be the B-2 stealth bomber.

Bryan Whitman, a Pentagon spokesman, told reporters in October that budget problems had delayed the weapon but that it was now back on track. Military officials deny having a specific target in mind. Still, Mr. Whitman added, war planners consider it “an important capability.”