BASIC Getting to Zero Papers, No. 4

Iran's Missile Program

15 July 2008

Bharath Gopalaswamy, Cornell University

Summary

A nuclear weapon program requires not only the production of fissile material and its weaponization, but also an effective and credible delivery system with range, accuracy and survivability. Alongside the US National Intelligence Estimate judgment that Iran was pursuing a nuclear weaponization program prior to 2003, this suggests a possible Iranian strategy of currently focusing its energies on developing the essential but ambiguous dual-use capabilities for the delivery of nuclear weapons whilst international attention is trained upon them. However, Iranian mastery of long-range technology still looks some way off, so that current US intelligence estimates appear to be based upon incredible worst-case scenarios. This paper looks briefly at recent Iranian developments in missile technology in the light of its recent tests.

Missile test?

Earlier this year Iran announced the launch of its single-staged rocket called the Explorer-I. The launch, on 4 February, was timed to coincide with the 29th anniversary of the Iranian revolution. The test was officially announced a success, though video footage showing debris falling from the rocket may indicate otherwise. The modified Shahab-3 launch was part of Iran's testing program for the launch of its first domestically-built satellite, the Omid (Hope), though some have suggested there were military motives. Iran's first satellite, Sinah-1 was built and launched in Russia in October 2005. *Jane's Intelligence Review* has obtained satellite images of sites south east of Semnan city showing high levels of security and recent construction activity. One stands out as displaying unique features consistent with those in the launch video shown on Iranian television, and was probably an upgraded facility previously used for SCUD-type launches.

This launch was followed by recent Iranian missile tests carried out last week. Iranian officials claimed the tests demonstrated a new variant of a Shahab missile that had a range of 1,250 miles. Such a missile would put much of the Middle East in striking distance, including Israel - as close as 650 miles from Iran - as well as Turkey, Pakistan and the Arabian peninsula. In addition, an Iranian government photograph showing a cluster of missile launches was apparently doctored to add a fourth missile lifting off from a desert range. These test must be viewed with

a fair degree of skepticism since Iran has a rich tradition of exaggerating its capability of missiles. These tests came just after a day when the United States and the Czech Republic signed an accord to allow the Pentagon a part of its contentious missile defense system. Furthermore, it could also be speculated that these tests are in response to the Israelis, whose air force last month practiced what American intelligence officials called a rehearsal for a possible strike on the Iranian nuclear facilities.

International concern over Iran's strategic intentions have been high ever since Alireza Jafarzadeh, a prominent Iranian dissident, exposed nuclear-related developments at Natanz and Arak in 2002. Iran's face-down of demands to cease its fuel-cycle activities have deepened suspicions of its military intent, particularly as it is easy to comprehend why Iran might view the acquisition of nuclear weapons to be in its strategic interest, and because nuclear weapons continue to be seen by the major powers as instruments of security and status.

No country has yet developed long-range missiles simply to deliver conventional warheads. The expense of ballistic missile development and deployment can only be justified if they inflict the level of strategic blow related to a nuclear weapon. Questions still linger around evidence supplied to IAEA inspectors that suggest design studies for mounting nuclear warheads on long-range missiles prior to 2004, questions that lead many to speculate that Iran's rocket program has primarily military, and therefore nuclear weapon applications.

The National Intelligence Estimates of 1999 and 2001 proposed that Iran could develop an intercontinental ballistic missile (ICBM) capable of reaching the United States by 2015. This worst-case timeline currently still stands officially, and forms the essential justification behind the proposed but untested US missile defense system in Europe; which in turn has harmed US-Russian relations and undermined cooperation under the Missile Technology Control Regime (MTCR). The evidence behind such a proposition is somewhat suspect. Iran largely depends upon North Korea for its missile technology currently, and they have yet to indicate their mastery of accurate intermediate, let alone long-range missiles.

Possible motives

So why would Iran want long-range missiles? First, status. Iran's self-image as a regional power derived from potent stories of empire is a powerful driver, and explains its need for a large military force and symbols of political power. Missiles have come to symbolize power and coercion in international relations. They have been used as tools of political intimidation and coercion.

Second, deterrence. Iran's leaders view an increasingly hostile world around them, and not without justification. Although the US invasion eliminated the Iraqi threat, this came at the expense of encirclement by US forces in number, deployed in twelve neighbouring countries: in Iraq, Afghanistan, the new Central Asian republics and in the Persian Gulf. And the United States is regarded as the supreme enemy. But does this deterrence require ICBMs? Possibly, if deterrence directly against US forces or regional allies is deemed insufficient for this purpose. Iran's efforts to build next generation Shahab-4, Shahab-5 and Shahab-6 missiles with reported

ranges of around 4,000-5,000 kilometres is frequently portrayed as threatening to Western Europe, and these may be the final steps to constructing an ICBM that will ultimately threaten the United States.

Sources of technology

Over the past decade, Iran has made modest, steady, and gradual advances in its rocket and missile development, through international cooperation, purchases and indigenous development. Its program appears to have been heavily influenced by extensive assistance from North Korea, Russia and China. Several diverse reports suggest the following elements:

- **Russia** supplied materials, equipment and training**:** Russia has allegedly transferred guidance and propulsion systems and their components, high-strength steels and special alloys, as well as manufacturing and testing equipment. Specialists from two Russian defense firms are known to have visited Iran, and Iranian students have received training in missile technologies at Russian institutes. Russia has helped Iran with wind-tunnel testing of missile nose cones. However, in recent years, technology transfer from both Russia and China has been limited by tightening controls initiated under the MTCR.

- **North Korea** furnished the basic hardware for liquid-fuelled rocket propulsion: In November 1999, Iran imported twelve Nodong missile motors; in 2001 missile airframes, rocket motors and ballistic launchers; and in 2002 SCUD engine clustering and stage-adding technology. Features of the Taepodong-1 rocket motor appear in Iran's Shahab-3. Iran was reported to have acquired Nodong-B missiles in 2005, and to have attended missile tests in North Korea in 2006, though this has not been confirmed. North Koreans also appear to have helped Iran develop missile test facilities around the Shahroud region and in Tabas.

- **China** supplied help with guidance and solid-fuelled rocket propulsion: In 1987 Chinese engineers built a second missile production plant in Semnan, and the Bandar Abbas facility for testing, assembling, manufacturing and upgrading Chinese cruise missiles.

Cutting off the supply

In early March this year, nearly a year after its last sanctions on Iran, the United Nations Security Council approved a moderate step-up in measures intended to pressure Iran into suspending its fuel enrichment-related activities as demanded on previous occasions, including sanctions on missile-related activities. Resolution 1803 calls for freezing assets linked to companies and individuals-almost about a dozen, which have alleged links to Iran's nuclear and ballistic missile program. It also calls for a ban on items, which have "dual-use" application to these programs.

The Shahid Hemat Industrial Group (SHIG) is responsible for developing the Shahab-3 missile and has hosted Chinese and North Korean experts. It took ten years for SHIG to develop the Shahab-3 and no credible reports of any follow-ons have been successfully tested. The Lavizan Technical and Engineering complex comprises several assembly and metallurgy plants and in 2003 opened a solid fuel production facility. While intermediate-range missiles are likely to be

within reach in the next few years, there are several technologies critical to the development of longer range missiles that remain elusive to Iranian scientists; an ICBM will remain out of reach for some years unless North Korea successfully tests such a missile and transfers it to Iran.

Any indigenous missile program would have to develop and perfect key capabilities such as flight stability and control, guidance and staging. A critical challenge lies in reliability, particularly in reducing the risk of launch failure to as low as 2-5%. High failure rates are costly, and would likely delay Iranian missile development way beyond 2015.

A key to slowing Iran's missile development, therefore, is in hampering international assistance. Such a strategy could involve MTCR states tightening loop-holes in multilateral and national export controls, with particular focus on Russia and China; and the establishment of new regional inclusive missile control frameworks. In the longer-term, the Iranian missile threat can only be avoided by developing a broader relationship and strategic dialogue involving other important regional members. However, this would also demand an interlocutor in Tehran who would be receptive to the demands of the West.

Bharath Gopalaswamy has a PhD in numerical acoustics and is a postdoctoral associate at Cornell University's Peace Studies Program. He can be reached at his email address: bg265 at cornell.edu.