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LETTER FROM THE PRESIDENT

The policy issues faced by the scientific community have of grown dramatically more complex since FAS was founded over 50 years ago. The organization began before we understood that the cheap energy sources responsible for spectacular economic growth also had the ability to transform the climate and weather patterns of the entire planet, or that the molecular biology we depend on to cure disease and ensure food for six billion people could also lead to unimagined risks.

The scientific community has a vital role in addressing these issues because researchers have a unique early view of the opportunities and problems created by advances in science. They have a unique responsibility for bringing these issues to public attention and for ensuring that clear, timely, and relevant information is available to inform the public debate.

During the next few years, I would like to see FAS pursuing four major goals:

- We will work tirelessly to ensure that the Senate endorses the Comprehensive Test Ban Treaty. This treaty is a cornerstone of nonproliferation policy.
- We will help the US and its friends minimize the risk of missile attacks in a way that actually strengthens our security. This clearly doesn't include building a costly nationwide missile defense that won't work and would almost certainly trigger dangerous counter reactions from our friends and our adversaries.
- We will work to encourage communities around the world to explore ways that information technologies and other advanced technologies can create high living standards and a high levels of choice and individual freedom while ensuring minimal impact on the environment

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NOBEL LAUREATES URGE AGAINST NATIONAL MISSILE DEFENSE DEPLOYMENT

On the eve of the third intercept test of the administration's national missile defense system, fifty American Nobel laureates of the sciences sent a letter to the President urging him not to decide to deploy the system. The day after the letter was sent, we received word that three additional Nobel laureates had agreed to sign — bringing the total number of supporters to 53. The letter concludes: "Even if the next planned test of the proposed anti-ballistic missile system works as planned, any movement toward deployment would be premature, wasteful and dangerous." The letter was sponsored by FAS and drafted by Dr. Hans Bethe, one of FAS's founders. The signers noted that their conclusion would not be altered by a successful third test.

Two days after the letter was sent, the third test failed when the kill vehicle failed to separate from its booster rocket. The target vehicle also failed to

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and no risk of nuclear proliferation.

• Finally, we will search for ways to use modern information technology to ensure that every American, and every citizen of the world has practical access to high quality, affordable education. While not sufficient, education is essential for ensuring that all people have equal access to the fruits of a prosperous world economy. Information technology provides a stunning new set of tools that can redefine what we can expect in the cost, quality, and availability of education for all people in all subjects.

We will, of course, continue and build on the superb programs FAS has underway in space policy, government secrecy, conventional weapons monitoring, animal health, and chemical and biological weapons.

Whether we like it or not, all of our fates are tied to the skill with which we manage technology – there is no possibility of retreat. The real test of American leadership in the coming generation will be whether we have the wisdom to combine investments in diplomacy and military readiness in ways that build real and lasting security for ourselves and our friends. Our security depends essentially on whether the net impact of our intervention in world affairs leads will lead to a world where individuals and companies focus their genius and passion on competing in business, in the arts, in scientific discovery – a world where global prosperity supports environmental quality and universal opportunity – a world where state supported weapons of mass destruction become truly unthinkable. Will we have the vision and the wisdom to do this or will we retreat from our collective responsibilities and look backwards? The next few years will be fateful ones. FAS can play a critical role if its members are willing to help. I hope you will.

--Henry Kelly, President

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Current war and peace issues range from nuclear disarmament to space policy to arms sales; related issues include drug policy, biological weapons control and disease surveillance. FAS also works on learning technology and on reductions in government secrecy.

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THE "ROGUE STATES" - NO CLEAR AND PRESENT DANGER

By John E. Pike

The American ballistic missile defense (BMD) programs now under development are justified by the need to defend against the so-called "rogue states" such as North Korea, Iran, and Iraq. This justification requires an assumption that (a) these states will soon be able to launch a nuclear or other weapons of mass destruction (WMD) attack against the US using long-range ballistic missiles, and (b) that the states are so irrational that they are not deterred by the threat of certain annihilation by the inevitable US retaliation to such an attack on its territory. Both of these assumptions are questionable. Even if a state acquires the technical ability to conduct a WMD attack on the US, there is no evidence that it would have any incentive to conduct such an attack.

This discussion will concentrate on North Korea and Iran. While Iraq clearly meets the criteria of a "state of concern" (the new official parlance), there is general agreement that the UNSCOM (United Nations Special Commission) inspections significantly delayed Iraqi work on WMD. Nonetheless, Iraq presumably has been working to resurrect its WMD program since UNSCOM was forced out in December 1998.

"Rogue States" to "States of Concern": The Implications

Secretary of Defense Les Aspin, in his 13 May 1993 briefing announcing "The End of the Star Wars Era" contended that "... the Russians (Soviets) were a bunch of thugs, but the Russians were not crazy. It's not quite so clear with some of the people that ... may get nuclear weapons along the way.... if Iran gets nuclear weapons or if North Korea gets nuclear weapons, we're talking about countries that we're not sure the old policy of deterrence worked with these people..... we don't know whether a balance of terror will work with renegade states. That's why you need defense." After almost a year of deliberations on what to call these "renegade states," the Clinton administration settled on "rogue states."

On 19 June 2000 the US Department of State formally changed the approved term of art from "rogue state" to "country of concern." The change in terminology immediately followed the historic North-South summit in Korea, and the lifting of some US economic sanctions on North Korea. This rectification of names reflected both

an evolution in the apparent behavior of these states, as well as an evolution in American understanding of these states. According to the State Department briefing, "some places that were described that way have embarked upon more democratic internal life; others have been willing to address some of the issues that are of primary concern to the United States."

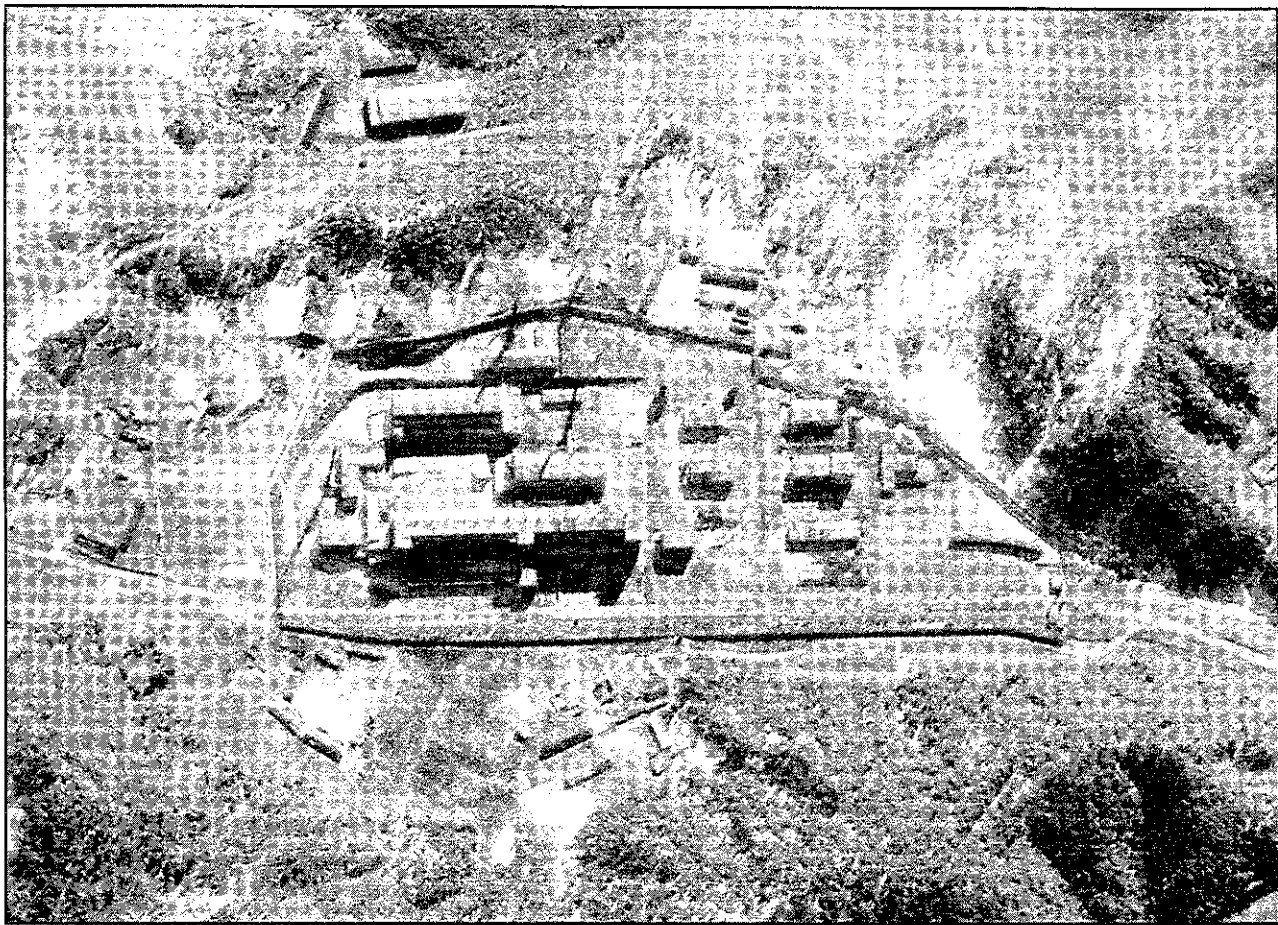
Reading between the lines, North Korea's graduation from "rogue state" to "state of concern" appeared largely predicated on moderation of external behavior without internal regime reform. In contrast, Iran's graduation to "state of concern" appears largely predicated on the progress of internal regime reform, which might lead to a moderation in external behavior.

If the "rogue state" was largely a construct of American diplomacy, it is interesting to consider the extent to which the residual threat from "states of concern" derives from American military strategy. Over the past decade, vastly more effort has been expended in contemplating the special weapons programs of countries such as North Korea or Iran than in contemplating the precise circumstances under which these weapons might be used. When these and other countries were defined as rogue states, the presumption of their fundamental irrationality almost by definition precluded rational consideration of this issue.

States of concern are presumed to be not entirely irrational, and it is possible to consider the circumstances under which they might rationally contemplate a deliberate nuclear attack on the United States homeland or on vital American interests. It is also important to understand the extent to which deliberate choices in American military operational concepts might substantially raise the risks of such deliberate attacks.

Potential Changes to US Military Doctrine

The doctrinal imperative for BMD derives from the requirement to forestall the possibility that an enemy could offset American conventional superiority through a credible threat to escalate to the use of nuclear weapons. The concern is not so much that deterrence would fail, but that it would succeed – by deterring the full application of American conventional military power. BMD was therefore needed to remove this deterrent and allow the



This North Korean facility is thought to have reprocessed enough spent fuel rods to have extracted up to 12 kilograms of plutonium. That would be enough to build between 1-2 nuclear bombs. 1"=150 meters (Credit: Space Imaging Corp.)

US to operate unimpeded by the threat of North Korean ballistic missiles. The logic of this argument hinges on (a) identifying a scenario in which a "rogue state" would have a rational incentive to actually use a nuclear weapon, and (b) absolute certainty that BMD would work.

Nuclear weapons are weapons of last resort, since any nation employing them against the US would certainly be destroyed. Their deliberate employment is least incredible when its leaders conclude that the nation's survival is in doubt because of a US attack. But the US has not threatened to eliminate a regime since General Douglas MacArthur's plan for total defeat of North Korea was rejected during the Korean War. Major Theater Wars from the Korean War through Desert Storm focused on restoration of the territorial status quo ante bellum, not on complete annihilation of the opponent's regime. The United States was content to accept the existence of North Korea, ceased military operations once Iraq had been expelled from Kuwait in 1991, and concluded the campaign against Serbia in 1999, leaving troublesome regimes in place.

MacArthur, of course, objected strongly to this policy, which has not been universally accepted within the Department of Defense. A concept that would lead to a change in this policy is called "Forcible Entry Operations" (FEO), which is embodied in the U.S. Atlantic Command's Joint Experimentation Campaign Plan 2000 of 30 September 1999. FEO contemplates achieving "decisive strategic victory." Advocates of a "rogue state rollback" strategy, including Senator John McCain, clearly would prefer an extension of the FEO notion to include complete elimination of a rogue regime. Such a change in policy would increase the credibility of a nuclear attack against US forces.

For the US to feel that the deterrent effect of long-range ballistic missiles had been neutralized by a BMD system, of course, it would need absolute assurance that BMD would work. During the past decade, the US has been strongly deterred by the risk of losing any significant numbers of military personnel in combat. It is difficult to imagine an objective in theater warfare in Korea or Iraq

that would lead the US leadership to risk the most remote possibility that a single nuclear weapon would detonate on US soil.

NORTH KOREA

Assessment of Capability

North Korea established a nuclear research center at Yongbyon in the mid-1960s, and probably initiated a nuclear weapons development program by the early 1980s. The Yongbyon facility had produced sufficient plutonium for at least one and possibly as many as six nuclear weapons. Following a protracted diplomatic crisis in 1993 and 1994, an Agreed Framework was signed between the US and North Korea in Geneva on 21 October 1994. Under this agreement, North Korea agreed to halt its nuclear program, and to accept inspections of its facilities to verify this halt. Persistent difficulties notwithstanding, it is generally accepted that North Korea has halted construction of nuclear-weapons related facilities, and has not produced additional plutonium since the inception of the Agreed Framework. There is no evidence that the Koreans have tested a weapon and such testing would presumably consume some substantial portion of their plutonium inventory.

North Korea has an extensive chemical weapons program, and is believed to have conducted work on the development of biological weapons agents. While the precise size and composition of the chemical weapons stockpile is uncertain, North Korea is generally credited with possessing a diverse range of lethal agents, with a total stockpile that may be as great as 5,000 tons (about one-tenth the size of the Soviet stockpile, and roughly equal to that of Iraq at the time of the Gulf War).

North Korea has a variety of means for delivery of nuclear, chemical, or biological weapons. With Egyptian assistance, North Korea began development of an indigenous missile capability in the mid-1970s. By the mid-1980s North Korea was producing Scuds, with a range of some 300 km, and Scud-derived missiles, with a range of up to 500 km. Reportedly at least 250 missiles, worth over \$500 million, were exported to Iran, Syria and the United Arab Emirates between 1987 and 1992. North Korea probably has at least 200 of these missiles operationally deployed.

North Korea has also developed the longer range Nodong missile, apparently based on Soviet submarine

launched ballistic missile technology. With a liftoff mass of about 16,000 kg (three times that of the Scud) and a potential range of up to 1,300 km, this missile could attack targets in Japan. North Korea tested this missile once, to a range of 500 km in May 1993. North Korea has reportedly deployed at least a dozen, and perhaps as many as three dozen, of these missiles in at least one and perhaps as many as four locations. North Korea has exported elements of this program to Iran (designated the Shahab-3 missile) and Pakistan (the Ghauri missile). These countries evidently regard the Nodong as a work in progress rather than a finished product, and have constructed extensive test facilities for continued development. As of mid-2000 both Iran and Pakistan have each conducted at least two test flights of their versions of the Nodong. These continued development efforts cast doubt on the operational reliability of the Nodong missiles deployed by North Korea.

The Taepodong-1, another North Korean long-range missile, is a 22,000 kg vehicle which consists of a Nodong first stage topped by a Scud-derived second stage. The first and only flight test of the Taepodong-1 occurred on 31 August 1998. Previously, it was anticipated that this system was a two-stage ballistic missile with a range of 1,500-2,200 km. In fact, this initial test attempted to place a small satellite in orbit using a small third stage, suggesting that the vehicle could be used as a ballistic missile with a potential range (with a rather small payload) of 4,000-6,000 km. Although this range capability would place some parts of Alaska at risk, it is unlikely that North Korea could develop a sufficiently lightweight nuclear warhead for this application, and extensive testing would be required to develop a lightweight warhead for delivering chemical or biological agents. There are no indications that this missile has been deployed, or that preparations have been made for facilities for its deployment.

The Taepodong-2 is believed to be an 80,000 kg vehicle consisting of a large first stage using four Nodong rocket engines, with a second stage consisting of a single Nodong missile. Unlike prior North Korean vehicles, which were based on well-proven Soviet designs, the TD-1 first stage is evidently of North Korean origin. Although a missile of this type has been on a pad at the Musadenri test range since mid-1999, no flight tests have taken place as of mid-2000. This missile is assessed as having a range of about 6,000 km if armed with a nuclear warhead, and range sufficient to reach the lower 48 states

if topped with a smaller chemical or biological warhead, or with a sophisticated light-weight nuclear warhead. It is not apparent that North Korea could develop such a small nuclear warhead without nuclear testing.

Currently identified North Korean missiles appear incapable of attacking American targets, apart from Alaska or Guam, with heavy first-generation nuclear weapons that might be developed without actual nuclear testing. Conjecturally, North Korea might achieve such a capability by strapping together four Taepodong-2 first stages, and topping this with an additional Taepodong-2 first stage. Such a clustering approach was used by the Soviet Union in the development of the R-7/SS-6 ICBM that launched Sputnik-1, and would represent the lowest-risk path to a true ICBM capability for North Korea. However, such a Taepodong-3 vehicle would have a gross lift-off weight of about 250,000 kg, which would be entirely outside the experience base of North Korea. Although it cannot be doubted that time and effort could eventually achieve this result, deployment of a credible, let alone reliable, ICBM of this class would clearly require a rather more extensive test effort and test infrastructure than has been evident to date.

Assessment of Intention

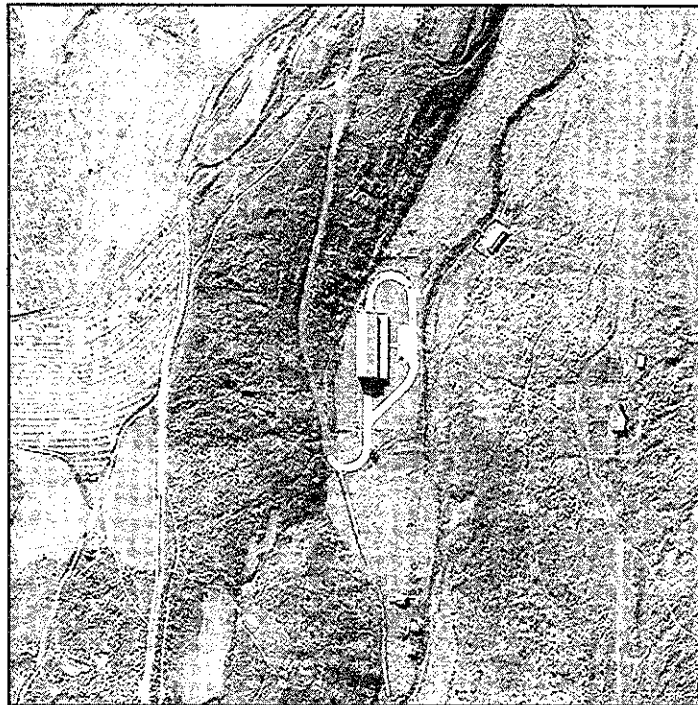
Although the North Korean leadership is popularly viewed as irrational, there is very little precedent in the established operational code of North Korea to suggest literal irrationality. The North Korean leadership is evidently brutal, but it gives no evidence of indifference to regime survival. Indeed, the months leading up to the outbreak of the Korean War in 1950 were a model of rational calculation on the part of Kim Il-sung, who patiently solidified the backing of both Beijing and

Moscow before commencing operations against a fragile South Korea that had been declared outside America's defense perimeter. Half a century later, none of these preconditions for North Korean military action obtain. South Korea is strong, firmly within America's security perimeter, and it is inconceivable that North Korea would seek or obtain the backing of Moscow or Beijing for offensive military operations across the Demilitarized Zone (DMZ).

Kim Jong-il, North Korea's supreme leader, surely cultivates a reputation for unpredictability, and the unexplained one-day delay in the June 2000 summit was entirely predictable unpredictability, but this is little more than the Korean brand of Nixon's "madman" theory of leadership. The appetite for brinkmanship and confrontation that exemplified Kim Jong-il's early years in power may have been nerve-rattling, but he has demonstrated a finely honed sense of crisis management. North Korea's subsequent missile diplomacy appears to have gauged very clearly the potential for even modest missile testing activity to gain the notice of official Washington.

The initial euphoria following the June summit should not obscure the continuing potential for unpleasant actions by North Korea. Shrill rhetoric is the North Korean stock in trade, frustrating negotiating tactics the national pastime, and low-level military provocations a continuing possibility. North Korea remains perhaps the most totalitarian polity extant, and will surely remain outside the embrace of the New World Order so long as the present regime survives.

The popular conception of North Korea as an irrational rogue state, a vast lunatic asylum in the grips of a psychotic leadership, has largely freed analysts and commentators from the burden of considering how to deter the Dear Leader, Kim Jong-il. Rehearsals of specific



This missile assembly building at Nodong is 150 feet long, and can probably house two completed missiles. 1"=150 meters (Credit: Space Imaging Corp.)

scenarios in which chemical or nuclear weapons were used by North Korea are curiously absent from the open literature, apart from garishly cartoonish “bolt out of the blue” narratives that typically begin with the missiles already in flight.

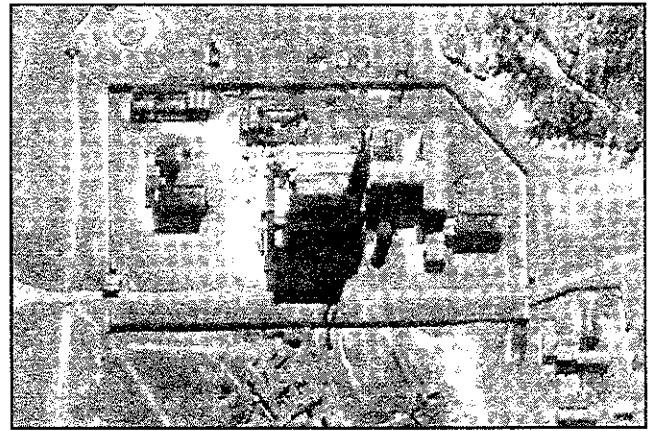
Kim Jong-il presumably did not wait patiently for decades to inherit the family business only to see it vaporized by American nuclear retaliation brought on for no good reason. There must be some level of destruction of some portion of North Korea that would give pause to a North Korean nuclear strike against the American homeland.

The daily brutalities of North Korean life might suggest a rather profound indifference to the loss of life that would result from any large-scale American nuclear strike against North Korea. But the North Korean leadership is evidently aware that leadership requires a populated country to lead. North Korea is reported to be a vast Swiss cheese, riddled with thousands of bunkers intended to ensure the survival of that which the regime holds dear. Continuing construction of the Pyongyang subway system is patterned on the Moscow subway, with tunnels buried an average depth of at least 100 meters below the surface serving as expedient blast shelters for some fraction of the city’s population.

Nuclear Brinkmanship Could Backfire

While irrational nuclear attacks by North Korea are difficult to envision, the circumstances under which North Korea might rationally contemplate using nuclear weapons are less difficult to identify. Although Forcible Entry Operations remains a developmental concept rather than a standard strategy, some variant of this concept of operations appears to lie at the heart of American war-planning in Korea. It is reported that OPLAN 5027 involves a strategy of maneuver warfare north of the DMZ with a goal of terminating the North Korean regime, rather than simply terminating the war by returning North Korean forces to the Truce Line. Operations would include the US invasion of North Korea, the destruction of the Korean People’s Army and the North Korean government in Pyongyang.

Faced with American forces advancing across the DMZ towards Pyongyang, and contemplating the impending extinction of their persons and their polity, it is not difficult to envision the North Korean leadership credibly threatening nuclear strikes against America or



The 50 megawatt reactor at Yongbyon, if completed, would have the potential to produce enough material for 10-12 nuclear bombs per year. 1"=150 meters (Credit: Space Imaging Corp.)

American interests. Whether the American leadership would judge that the extirpation of the North Korean regime warrants this risk is at the core of the debate over the potential efficacy of national missile defense.

A reputation for irrationality notwithstanding, Kim Jong-il has demonstrated a keen appreciation of the extent to which nuclear weapons and missiles are tools of diplomacy rather than weapons of war. The October 1994 Framework Agreement effectively capped the North Korean nuclear program, and a similar diplomatic resolution of North Korea’s missile program is evidently on the Dear Leader’s agenda. In June 1998 North Korea offered to discontinue missile exports in return for appropriate compensation, and only tested the Taepodong-1 missile after the United States ignored the offer. Under an informal understanding reached in October 1999 with former Defense Secretary William Perry, North Korea has agreed to a moratorium on further missile tests, while talks on the future of their missile program continue. In early July 2000 the United States lifted some economic sanctions on North Korea, as promised under the Perry agreement.

On 19 July 2000, Kim Jong-il and Russian President Vladimir Putin proposed termination of North Korea’s long-range missile program, in exchange for assistance in launching a North Korean satellite. This initiative reflects the “Rockets for Peace” proposal first advanced by FAS in the early 1990s, under which missile programs would be curtailed in exchange for enhanced civil space cooperation. This approach has been largely successful in restricting the transfer of Russian rocket technology to other countries, and holds considerable

promise for resolving concerns over North Korea's missile programs.

IRAN

Assessment of Capability

During the Gulf War, Iran experienced first hand the effects of Iraqi chemical warfare capabilities, and subsequently developed a substantial chemical warfare capability of its own. Iran is presently believed to have a diverse inventory of chemical agents, a total stockpile that may consist of several thousand tons of agents, and a variety of means of delivery. Although the scope of Iranian biological warfare activities is obscure, it may be assumed that Iran has conducted work in this field as well.

Although Iran is a signatory to the Nuclear Non-proliferation Treaty, it is generally believed that Iran maintains a nuclear weapons development program. This program is widely believed to be under the control of the Iranian Revolutionary Guard Corps (IRGC), with administrative activities conducted under the direction of the Atomic Energy Organization of Iran and the Defense Industry Organization. Iran's overt nuclear research program is centered at the Nuclear Technology Center at Esfahan (Isfahan), although several other facilities are acknowledged to be associated with nuclear research activities, and other unacknowledged facilities are alleged to exist.

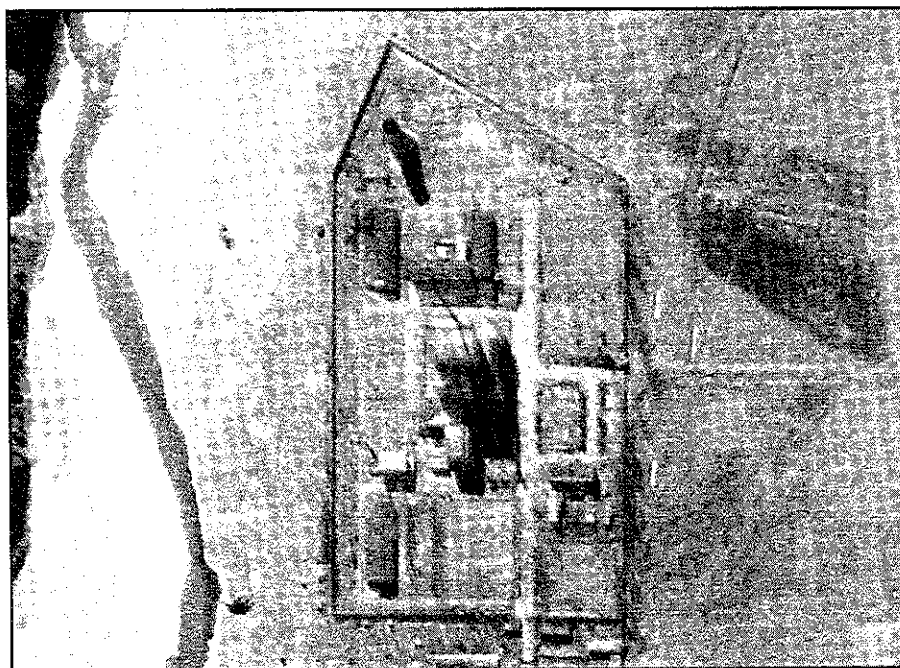
It is almost certainly the case that Iran possesses the requisite skills and expertise to fabricate a nuclear weapon. It is also probably the case that the facilities associated with nuclear weapons design and fabrication

would be sufficiently small and nondescript as to defy confident detection via means such as reconnaissance satellite imagery. The small scale and modest infrastructure of South Africa's former nuclear weapon program clearly sustains this view.

However, the actual status of Iran's efforts to acquire nuclear weapons remains obscure. Having the skills needed to build a bomb is of little more than theoretical interest in the absence of the material needed to fabricate a bomb. Iran might obtain sufficient plutonium or uranium for nuclear weapons either by clandestine acquisition of such materials from another country, or by

clandestine diversion from overt facilities in Iran, or from clandestine production facilities in Iran.

Although from time to time news reports have claimed that Iran has illegally acquired one or more complete nuclear weapons from the former Soviet Union, such reports are widely disbelieved. It is probably the case that Iran attempted to



North Korea's 5 megawatt research reactor is thought to be capable of producing about 7 kilograms of plutonium annually. 1"=150 meters (Credit: Space Imaging Corp.)

illicitly acquire nuclear material from the former Soviet Union in the early 1990s, although there is no indication that the quantities and types of materials so acquired would have provided Iran with a nuclear weapons capability. It is certainly the case that the United States transferred approximately 600 kilograms of highly enriched uranium (HEU) — enough nuclear material to produce around two dozen nuclear weapons — from Kazakhstan in late 1994, to forestall the possibility that this material might fall into the hands of Iran.

The two nuclear power reactors near Bushehr, which have been intermittently under construction since 1974, have been a continuing source of concern to the United States government. Since construction at this facility



View from Space: Missile Test Facility at Nodong

The facility is characterized by a lack of hard surface roads, no permanent housing for staff and scientists, and the absence of a security perimeter. In contrast, foreign missile facilities have these features. 1"=150 meters (Credit: Space Imaging Corp.)

resumed in 1992 with Russian assistance, the United States has repeatedly expressed concern that this facility could contribute to Iran's nuclear weapons potential. The US government has engaged in a series of exchanges with the Russian government to discourage this project, and successfully persuaded Ukraine to suspend a contract to supply components for the power generation system. The Russian government has taken the view that this power reactor will be under the International Atomic Energy Agency safeguards, and thus presents little risk of diversion to a nuclear weapons program. The United States has evidently proceeded from the view that any nuclear assistance to Iran could aid in the development of nuclear

weapons, and that international safeguards could be either circumvented or renounced in the future. Reportedly, construction of the first reactor unit at Bushehr will be completed by the end of 2000.

Published reports have alleged the existence of a variety of other clandestine nuclear-related facilities in Iran. These reports appear largely based on the claims of Iranian opposition organizations, and many appear to be of rather dubious credibility. Mindful of the lessons of Iraq, which was able to construct a rather more elaborate nuclear infrastructure than was apparent to American intelligence prior to the end of the Gulf War, the possibility of clandestine Iranian nuclear materials production facilities

cannot be dismissed out of hand. However, presumably the US intelligence community has learned at least some lessons from Iraq, and is exercising considerable vigilance in monitoring "suspect sites" in Iran. Bad news travels fast, and the experience with North Korean suspect sites is that the fact of their existence quickly migrates to the open literature. The evident absence of persistent rumors of particular suspect sites suggests either the absence of such facilities, or that they are very well hidden indeed.

The precedent of the South African nuclear weapons program provides pause in rushing to judgment on the status of Iran's nuclear ambitions, such as they may be. Although South Africa constructed an extensive nuclear materials infrastructure, the facilities actually devoted to weaponization were quite modest, and largely devoid of apparent signatures detectable by technical intelligence. Depending on choices in nuclear materials production technology, it cannot be excluded that Iran may have successfully hidden this infrastructure as well.

In January 2000, the *New York Times* reported that the Central Intelligence Agency had revised its assessment of Iran's nuclear capacity, to the effect that Iran might now be able to make a nuclear weapon. This evaluation was apparently based on the difficulty in tracking Iran's efforts to acquire nuclear materials. It was also reported that other intelligence agencies were of the view that there was no evidence that Iran had stolen enough fissile material to make a weapon. In June 2000, CNN reported that Gen. Anthony Zinni, the outgoing US Central Commander, said Iran was anywhere from one to seven years away from developing a nuclear weapon, depending on whether it could acquire nuclear materials abroad. The lower range of this estimate is consistent with Iran being able to fabricate a weapon within a few months of acquiring sufficient fissile material. The upper range of this assessment is consistent with an absence of any evidence of Iranian infrastructure needed to produce nuclear weapons.

Iran's missile development efforts have been largely predicated on North Korean assistance, although in recent years it would appear that the student has surpassed the teacher. In the 1980s Iran imported North Korean Scud-B and Scud-C missiles, which were deployed under the Shahab-1 and Shahab-2 designators.

More recently, Iran has undertaken the development of the Shahab-3, which is evidently a derivative of the North Korean Nodong missile. With a range of perhaps 1,300 km, the Shahab-3 would be able to strike targets in Israel. It is reported that the Shahab-



The launch pad at Nodong where the Taepodong-1 missiles are tested. North Korea has exported the Nodong missile to Iran, which has re-engineered it and renamed it as the Shahab-3. 1"=150 meters (Credit: Space Imaging Corp.)

3 may have achieved an "emergency" operational capability in 1999, although development and testing of this unproven North Korean product continue in both Iran and Pakistan.

It is reported that Iran is also developing a Shahab-4, which is probably a variant of the Taepodong-1, and a Shahab-5, which would probably represent a variant of the Taepodong-2. Although some testing activity possibly associated with the Taepodong-1 has reportedly been detected by American intelligence, as of mid-2000 Iran had not test flown such a two-stage missile. In the event that flight tests are conducted, it is probable though not certain that Iran would follow the North Korean precedent and characterize the test as a satellite launch. Given the testing associated with the Nodong/Shahab-3, it is probable that Iran would conduct a rather more extensive test program than North Korean before the Shahab-4 or Shahab-5 would enter operational service.

If Iran eventually deploys missiles such as the Shahab-4 or Shahab-5, it would be able to place at risk targets throughout Western Europe, including American military bases in the region. It would, however, be unable to reach the continental United States with a nuclear warhead launched atop these missiles. The open literature suggests that Iran might develop a 10,000 km range Shahab-6 for this purpose, which conjecturally might be constructed along the lines of a Taepodong-3, by clustering

multiple Taepodong-2 first stages. As with North Korea, the development of such a vehicle would evidently go well beyond Iran's existing experience base, and almost certainly require extensive infrastructure development and flight-testing in order to acquire a credible and reliable delivery system.

Assessment of Intention

Although presumably Iran has not previously exhausted all possible forms of military behavior, there is little in either the practice of the theocratic regime of the past two decades or that of predecessor regimes to aid in formulating a historically grounded scenario under which Iran and America become engaged in a Major Theater War. Unlike Iraq, which has twice in as many decades initiated aggressive war, Iran does not have a track record of large-scale military aggression. Iran's territorial disputes are limited to a few trivial islands in the Persian Gulf. Iranian support for Shi'ite factions in Lebanon may continue to frustrate the Middle East Peace Process, but the escalation ladder that would lead to a Major Theater War would seem to lack a number of critical rungs.

This consideration aside, Iran is preoccupied with its own internal political struggle. The competition for political dominance in Iran pits moderates, who are the majority in the newly elected parliament and generally support President Mohammad Khatemi, against the more traditional religious constituencies who support Ayatollah Ali Hoseini Khamenei, who controls the military, the police and the court system. The reform agenda of the moderates evidently extends to liberalizing the living conditions of the Iranian middle class, and engaging the Iranian economy with the global economy. To this end, the moderates might be expected to oppose foreign adventures that might be unduly alarming to Western audiences.

Although the reform process in Iran has captured the interest of Western observers, the implications for Iran's nuclear and missile programs, if any, remain largely unexamined. One might hope that the moderates would be of the view that deployment of a force of nuclear-tipped long-range missiles would create more problems than it would solve. One might further hope that the moderate ascendancy would eventually freeze if not roll back Iran's existing nuclear and missile undertakings.

There is no particular reason for entertaining these hopes at present, though these eventualities cannot be excluded and surely should be encouraged. As with North

Korea, a policy of engagement with Iran might convince the moderate Iranian leadership of the counterproductive consequences of continued long-range missile testing, or more overt moves towards the acquisition of a nuclear weapons potential or capability.

No obvious indications of a debate between moderates and conservatives over Iran's nuclear, chemical or missile programs are in evidence. Indeed, it would not be difficult to imagine that there is a broad consensus among all leadership factions on the general wisdom of their current programs. It is also easy to imagine that the moderates' agenda of domestic reform effectively precludes challenging core elements of the conservatives' foreign policy and national security agenda (much as Lyndon Johnson evidently felt that prosecution of the Vietnam War was a precondition for implementation of the Great Society).

It is not uncommon to find governments, such as France under de Gaulle or Russia under Yeltsin, in which the foreign policy and national security apparatus is under the control of the President, while domestic affairs are run by a Premier or Prime Minister. Contemporary Iran is constructed along similar lines, with the remit of President Khatemi largely confined to domestic matters, while supreme spiritual leader Khamenei retains control of the national security apparatus, to include the IRGC responsible for nuclear weapon and missile development. This structural reality may provide the moderates little insight into or influence over nuclear and missile programs. Moderates may now dominate the parliament, and loosen restrictions on the news media, but there is little reason to hope for parliamentary oversight of Iran's nuclear and missile programs in the near term. Indeed, to pose this question is to answer it, given the dismal track record in countries ranging from America to Israel. Even the most highly developed elected bodies have largely abdicated supervision of nuclear weapons programs, and it is rather difficult to imagine Iran's fragile democracy proving the exception to this rule.

For more than a decade, the question of deterring Iran has largely been posed as one of deterring the Mad Mullahs, and recent trends in domestic reform hold only limited prospect of altering this equation, even if posed in less colorful language. Discussions of the challenge of deterring Iran, whether faced by Israel, America or others, have largely proceeded from observations on the emphasis in Iranian Shi'ism on the sacred significance of martyrdom. It has been assumed that the high estimation

placed on personal self-sacrifice in a holy cause would translate into an eagerness to embrace collective national martyrdom as the price of striking a blow against the Great Satan, or at least an acceptance of this possibility which might frustrate deterrent threats.

Britain commemorated the losses of the Great War with the restrained Cenotaph on the Mall. Iran's counterpart memorial was the garish Fountain of the Martyrs, which gushed red-colored water to commemorate the sacrifice of blood. The numbers tell a rather different story. As with all wars, casualty figures for the Iran-Iraq war are highly uncertain. The war probably claimed at least 300,000 Iranian lives and injured more than 500,000, out of a total population which by the war's end was nearly 60 million. During the Great War, German losses were over 1,700,000 killed and over 4,200,000 wounded (out of a total population of over 65 million). Germany's losses, relative to total national population, were at least five times higher than Iran. France suffered over 1,300,000 deaths and over 4,200,000 wounded. The percentages of pre-war population killed or wounded were 9% of Germany, 11% of France, and 8% of Great Britain - and less than 2% in Iran. Without diminishing the horror of either war, Iranian losses in the eight-year Iran-Iraq war appear modest compared with those of the European contestants in the four years of World War I, shedding some light on the limits of the Iranian appetite for martyrdom, even under the leadership of the main "mad mullah," Ayatollah Khomeini.

Far from deranged religious enthusiasts, the Iranian leadership appears at least as sensible to mass deaths of its citizens as the presumably rational leaders of European countries. As with North Korea, the public literature is largely void of detailed discussions of targeting Iran for deterrence purposes, but there is almost certainly

some level of devastation of some portion of Iran that would discourage a deliberate Iranian nuclear attack on the American homeland.

IMPLICATIONS FOR NATIONAL MISSILE DEFENSE

Neither North Korea nor Iran has tested nuclear weapons or missiles with the range needed to attack the US. There is no evidence that a crash program on either weapons or missiles is underway. The Rumsfeld Commission report establishing 2005 as the earliest date for North Korean deployment of a nuclear tipped missile capable of striking the US was based not on an assessment of what the Koreans *were* doing, but what they *could* do given a concerted effort. While intelligence experts disagree about the nature of the Korean program, there is no evidence that a crash program is underway in either Korea or Iran that would justify a crash program to build a US ballistic missile defense system. There is no evidence that either Iran or Korea are managed by governments that behave irrationally, or that they would have any rational incentive to use nuclear weapons against the US even if they should develop a capability to do so. There is no reason to expect deterrence to work for countries with large arsenals of nuclear weapons but not for countries with small inventories.

We have time to make a reasoned decision about the best technical options for defense and to review diplomatic solutions. We should use this time wisely to avoid a hasty decision to deploy a BMD system. □

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THE VOTE IS IN!

FAS would like to announce the results of the FAS Council elections of the spring of 2000. Congratulations to our new Council members Barbara Hatch Rosenberg, Lynn Sykes, and David Albright. They will replace outgoing Council members Thomas Neff, Sidney G. Winter, and Steve Fetter.

Congratulations to our new FAS Chairman, Frank von Hippel, who will replace outgoing Chair Carl Kaysen. Dr. von Hippel leaves his previous position as FAS Fund Chair vacant; Steve Fetter has been appointed to this position.

On behalf of its members, FAS would like to thank all of its outgoing Council members for their hard work and dedication during their terms. □

MISGUIDED ARMS EXPORT "REFORMS"

By Tamar Gabelnick

In late 1999, the Pentagon developed a number of initiatives designed to expedite and facilitate the arms export licensing process, especially to NATO members, Japan, and Australia. The Pentagon and US defense industry claim that cumbersome US export-licensing rules hinder exports to, and joint projects with, European and other close allies. They maintain that far-reaching reforms are needed to avoid the creation of "Fortress Europe," wherein European arms companies – in the midst of a consolidation process that will boost their selling power – will shut US arms and technology out of the European market. After a heavy-handed campaign by the Pentagon, the administration approved in late May 2000 the "Defense Trade Security Initiative," 17 different "reforms" of US arms export licensing practice.

The administration's initiatives will fundamentally alter the US export licensing system, putting at risk a process that has helped control diversion, unauthorized re-export, and misguided sales. The most far-reaching of the changes will be to grant to certain allies (beginning with the UK and Australia) a license waiver for exports of unclassified weapons systems, effectively ending US control over the transfer of arms to those countries. A similar arrangement with Canada was suspended in 1999 after Canadian firms transferred US military technology to Iran and China (the arrangement was reinstated after Canada agreed to modify its arms exporting system).

Other ill-advised reforms include a loosening of the rules on third-party transfers of US weapons; creating "program licenses" to cover entire major weapons sales (including munitions, engines, and other sub-components that were previously approved separately); and speeding up the licensing process for NATO members. All will further reduce the amount of US scrutiny of arms export decisions and oversight of transferred weapons.

There was little public debate on the need for, or the merits of, the policy changes. Arms control experts were not consulted during the policy formation process; nor were key members of Congress, many of whom share our opposition to the bulk of the changes. Even the inter-agency deliberation process was stilted; the Pentagon essentially bulldozed its way over a reluctant State Department, which has official jurisdiction over arms export policy and is normally more cautious on export controls. On the license waiver issue, the Pentagon actively encouraged the defense industry to lobby the Secretary of State and Chief of Staff Podesta, who ultimately decided to accept all the Pentagon's proposals.

The Pentagon argues that the initiatives were largely designed to provide our allies with a clear incentive to strengthen their arms export systems; in exchange for closing loopholes and strengthening export oversight, they will gain special trading status with the US. The next step for the arms control community will be to hold the administration to this goal. □

UN REGISTER ON CONVENTIONAL ARMS UNDER REVIEW

By Tamar Gabelnick

For the third time, the United Nations is conducting a review of the UN Register of Conventional Arms, a transparency and confidence-building mechanism started in 1991. Since then, states have reported their annual arms imports and exports on seven categories of major weapons systems with an increasing amount of detail and accuracy. Efforts in 1994 and 1997 to strengthen the Register, however, failed to produce any meaningful changes.

The Arms Sales Monitoring Project was present for an informal preparatory session for the third report of the UN's Group of Governmental Experts, held in Japan this June. Many felt that if the Experts' final report failed to significantly update the Register, it would begin to lose

its credibility as a useful instrument for the 21st century. Suggestions included: expanding the categories to include weapons systems designed for combat support or service support (or force projection or multipliers); requiring reports on arms procurement from national production (as opposed to just imports, to render the Register more equitable); and encouraging states to provide more details on their entries (e.g., end-users, brokering info, licensed production agreements, etc.). The ASMP also proposed turning the paper-based annual report into a searchable on-line database, an idea that received widespread support from governments and NGOs alike. The Expert Group's report will be finalized in July. □

SCIENCE, SECRECY AND LOS ALAMOS

By Steven Aftergood

The root cause of the recurring security failures at Los Alamos National Laboratory, we are told, involves a clash between the culture of security and the culture of scientific inquiry.

"The scientific culture of the weapons laboratories complicates, perhaps even undermines, the ability of the Department [of Energy] to consistently implement its security procedures," according to a report of the President's Foreign Intelligence Advisory Board.

"The scientific and academic community has been disdainful of those who are emphasizing the importance of security, and that is a deeply rooted culture that we need to extirpate," said Senator Richard Bryan (D-NV).

The notion that scientists and security officers are "oil and water" — or, as Senator Pat Roberts (R-KS) put it, "sheep and cattle" — is a convenient formulation that is nevertheless misleading. It does not properly describe the particular realities of nuclear weapons science. It also obscures other, far more important challenges to the security of the nation's most sensitive secrets.

Science and Openness

As a general statement, it is undoubtedly true that science encourages and depends on openness. It is by publication of research that scientists establish the priority of their discoveries. It is through peer review that the canons of scientific research and the quality of publication are upheld. It is through the cross-fertilization of ideas among diverse disciplines that new vistas for scientific exploration are opened.

Secrecy by definition impedes each of these essential facets of the scientific enterprise. But granting the importance of openness for scientific and technological progress, it does not follow that scientists can't keep a secret.

In fact, the story of nuclear weapons development begins with scientific secrecy. At the dawn of the nuclear age in 1939, before the government or the military ever got involved in nuclear research, scientists led by Leo Szilard initiated their own nuclear secrecy policy which they imposed on themselves. Given the wartime environment, they declined to publish certain experimental results related to the fission of uranium and the production of plutonium.

The great nuclear physicist Enrico Fermi went so far as to write that "Secrecy was not started by generals, was not started by security officers, but was started by physicists."

At any rate, the scientists who work in our nuclear weapons programs have long since made their peace with the need for secrecy in their research. After all, if a significant fraction of nuclear weapons scientists couldn't resist blabbing about their work, all of our nuclear secrets would have long ago been disclosed. Yet plenty of secrets remain. Those scientists who cannot abide the sometimes oppressive security environment probably would never have applied for a security clearance and signed a non-disclosure agreement. Those who nevertheless did so would soon have moved on to more congenial pursuits.

There may be a "clash of cultures" at the weapons laboratories today, but it does not revolve around legitimate applications of secrecy. No protests are heard about the need for classification of nuclear weapons secrets, or about the general propriety of background investigations and security clearances.

Where there are protests, they concern what is perceived to be an arbitrary and unwarranted assertion of authority. The most frequently cited example is the widespread opposition to polygraph testing. Energy Secretary Richardson bemoaned the fact that "one-half of the [Los Alamos] X Division members ... signed a petition opposing polygraphs." But they were well within their rights to do so.

The polygraph is something of a fetish in the world of intelligence, where polygraph testing is an indispensable rite of passage, at least from a sociological point of view. But the validity of polygraph testing for general screening of employees has never been scientifically demonstrated. (In contrast, there is some evidence of polygraph utility in incident-specific investigations.) That is one reason that polygraph testing as a condition of employment is prohibited by law in the private sector.

Secretary of State George Shultz famously threatened to resign during the Reagan Administration, rather than undergo polygraph testing. He was no scientist, nor was he indifferent to the requirements of national security. Rather, like many others, he found the polygraph to be intrusive and degrading. It is also, he might have added,

prone to error.

No Absolute Security

Hypothetically, there are two ways to absolutely eliminate any future security violations at the nation's nuclear laboratories.

One way would be to gather all of the nuclear secrets into a vault and to seal the vault permanently shut. That way they could never be removed from secure control. Or used at all.

Another way would be to publish all of the secrets on the world wide web. Once that was accomplished, then by definition it would no longer be possible for anyone to steal those secrets.

Since those options are impractical, it is necessary to accept the fact that there can be no absolute security. The best one can aim for is to *manage* the security risks, keeping them to a reasonable minimum, while optimizing mission performance and limiting costs.

Unfortunately, the current Congress is hooked on absolute risk avoidance, which is the enemy of good security policy. Last year, for example, Congress adopted legislation requiring the Energy Department to conduct a new review of hundreds of millions of pages of documents at the National Archives that had already been declassified in order to search for stray nuclear weapons information that had been inadvertently disclosed. This is a poor investment of security resources, especially since no new funds were appropriated to carry out the requirement.

Meanwhile, as DOE security czar General Eugene E. Habiger noted recently, Congress allocated a mere \$10 million last year out of the \$65 million that DOE had requested for security upgrades in the nuclear weapons complex. In view of the recent consequences of inadequate security, perhaps outraged members of Congress will now call for their *own* resignations.

What to Do?

If absolute security is out of reach, what then should be done? The way forward, charted several years ago by former Energy Secretary Hazel O'Leary but never fully implemented, is to tailor the application of security through a combination of declassification and increased classification.

O'Leary has been celebrated (or vilified, depend-

ing on point of view) for her "Openness Initiative" and her ambitious declassification program. She is less well known, by supporters and opponents alike, for advocating higher classification in certain sensitive areas.

In particular, she initiated a Fundamental Classification Policy Review, which sought to establish a rational, updated foundation for the classification of nuclear weapons information. That Review, conducted by government scientists and military officers, endorsed the declassification of various categories of information, but also called for increasing the classification of other categories of information from the Secret Restricted Data-level to the Top Secret Restricted Data-level.

This approach became known as the Higher Fences Initiative, since it envisioned placing higher security "fences" around select categories of highly sensitive nuclear weapons information, while relaxing or eliminating controls on information of lesser sensitivity. In this way, finite security resources could be brought to bear in the most efficient way possible.

(If such higher fences had been in place, the hard drives at Los Alamos might not have gone missing, since they would almost certainly have been bumped up from Secret to Top Secret, which is more rigorously accounted for.)

Though it has gone largely unremarked, DOE has been pushing the Higher Fences Initiative since 1997. Its efforts, however, have been consistently blocked by the Defense Department, whose concurrence is required.

Last December, Pentagon officials wrote to DOE that the costs of implementing the Higher Fences Initiative would be "substantial," since it would entail upgrading of security clearances for personnel to handle the newly Top Secret information, construction of new secure facilities, and so forth.

There is a delicate balance to be struck here between security, financial costs, and ease of operational use. Maybe it is possible to reconcile both the DOE and DOD positions on some middle ground. Unfortunately, the charged political environment in Congress is not conducive to the achievement of such reconciliation.

But the basic principle remains sound. By focusing security on the most sensitive secrets and relaxing security on everything else, it should be possible to turn a vast, intractable problem into an entirely manageable task.

□

This article previously appeared in the Chronicle of Higher Education.

*Nobel Laureates ...
continued from page 1*

perform properly since it failed to deploy the single decoy balloon that accompanied the reentry vehicle. Thus, even if the kill vehicle had functioned properly, it would not have had the opportunity to demonstrate its ability even against the simplest decoy systems.

The letter has received wide attention from the media, notably in the *New York Times* and also as one of *Time's* "Verbatim" selections for the week. Other groups have also voiced similar objections. On April 29, the American Physical Society issued a statement that "the United States should not make a deployment decision relative to the planned National Missile Defense system unless that system is shown through analysis and through intercept tests to be effective against the types of offensive countermeasures that an attacker could reasonably be expected to deploy with its long range missiles." On June 29, a group of 45 China experts wrote a letter arguing that deployment could jeopardize Chinese participation in nonproliferation efforts and provoke a sharp increase in Chinese nuclear missile development.

It is unprecedented to have over 50 Nobel laureates sign a letter on arms control to the President. The strength of their conviction is measured in part by the fact that these signatures were obtained in less than two weeks. Credit is due to Charles Ferguson, Karen Kelley, and Amy Rossi of FAS and Lynn Erskine from the Council for a Livable World.

The full text of the letter and the affiliations of the signers are posted at <http://www.fas.org/press/000706-letter.htm>. □

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