Rethinking Nuclear Terrorism

A Presentation by

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Introduction

By focusing as much as we do on the worst but most unlikely threats of rogue states, such as Iran and North Korea, possibly handing off their nuclear assets to terrorists, the U.S. and many of its key friends have distorted their anti-nuclear terrorism policies. The U.S. gladly spends billions domestically for “first responders” (local fire departments, hospitals, and police) and many billions more (over $5 billion) to protect 1 billion air travelers against terrorist hijacking and additional billions of dollars for border controls, nuclear detection systems, and improved immigration controls. All of this to prevent and cope with another 9/11 incident and to be ready for a nuclear terror attack against an urban center. Given the possible loss of 30 to 50 thousand people with the explosion of even a crude one-kiloton device, and the loss of 100s of billions of dollars in financial assets, focusing on these attacks is popular (see charts 2-5).

Yet, such domestic spending is hardly matched with much international effort beyond getting as many countries on record as possible to be “against” nuclear terrorism and for tighter “controls” and law enforcement actions. Together these international efforts are measured in millions of dollars spent. Some might cynically see these two efforts as being politically optimal – progress can be claimed on all fronts; spending mostly at home can secure one’s political base for electoral purposes and international consensus bought on cheap can demonstrate the rectitude of one’s approach.

Unfortunately, with our current approach, there are several worrisome facts and dangers that tend to get ignored or deemphasized (see chart 6). These include:

1. **The current limits of what can be detected**: Although there is great domestic interest and spending to detect nuclear bomb materials, the laws of physics are not yet friendly to this undertaking. The signatures of plutonium (e.g., gamma rays) do not propagate very far from their original source (i.e., you must be very close to the bomb material to detect this radiation). As for trying to passively detect heavy objects with protons, x-rays or muons, there is still an intolerably high false alarm rate. Finally, nuclear materials can be broken down into small enough sub-critical masses and shielded to frustrate currently available methods of detection (see chart 7).

2. **The vulnerability of nuclear facilities to attack**. Some of the most likely nuclear terrorist scenarios that groups like Al Qaeda have already threatened and planned to execute do not involve theft of nuclear materials, but rather attacking nuclear facilities -- reactors, their spent fuel storage ponds, and nuclear fuel making plants -- in hopes of producing Three-Mile Island or Chernobyl-like results that would undermine the credibility of the states responsible for maintaining these facilities’ safe operation.
3. **The continued generation of nuclear weapons usable fuels whose possible theft is impossible to detect in a timely fashion.** Aggravating these nuclear facility vulnerabilities is continued state support for uneconomical, dangerous nuclear fuel-making activities in which the nuclear weapons usable materials generated per year is unknown in amounts equal to many bombs worth. The amounts of such civilian materials that need guarding now are beginning to exceed what the world’s military have on hand in bombs or on the ready for military purposes. This creates a nuclear theft hazard that literally is impossible to dismiss as well as enlarging the number of nuclear targets a terrorist might attempt to strike.

4. **The vulnerability of a nuclear state being taken over by terrorist organization.** As frightening as a nation-state’s handing off nuclear weapons assets might be to a terrorist group, a terrorist take over of a nuclear country that is a close ally (e.g., Pakistan), is at least as likely and politically far more troubling.

5. **Nuclear 1914.** Finally, one of the most intractable nuclear terrorist scenario is linked far more to nuclear proliferation to additional states than it is to any nuclear theft or strike made solely by terrorists. Here, the worry is what might follow Iran’s and DPRK’s bad nuclear behavior. Will it distort a firm reading of the nuclear rules? Will it serve as a model for a steady increase in the number of nuclear-ready states? Finally, will it encourage a “Nuclear 1914,” in which the least terrorist incident or political miscalculation—one assassin’s (or terrorist’s) bullet—could bring massive, nuclear war. If so, our current preoccupation on nuclear terrorism as if it was a separate or greater worry than the spread of nuclear weapons capabilities to other countries is highly myopic.

The good news is that the vulnerability of nuclear facilities to terrorist attack and the continued growth of nuclear weapons usable fuel stockpiles can be addressed either with modest investments or actually by spending less on unsound projects. The bad news is that we have yet to tackle these tasks and the other problems listed are not so easy to solve.

**Nuclear Facilities and Materials: Avoidable Terrorist Vulnerabilities**

When one reads about terrorists possibly striking a nuclear plant, the two most prominent scenarios discussed are some sort of commando raid with guns or an airplane being crashed into the reactors protective pressure vessel containment dome. Industry and nuclear regulators have tended to minimize these threats while nuclear critics have highlighted them. Unfortunately, nuclear facilities are vulnerable on a number of other counts that make terrorist success more likely than these two scenarios (see Chart 8).

The first of these are the spent fuel ponds located at all large reactors and at fuel reprocessing plants. If hit by a missile or large plane and drained of water, the spent fuel ponds could heat up to a point where the stored spent fuel could ignite into flames. In the
case of light-water reactors, the most popular power reactor type, the potential for radiological releases from zirconium fire releases could produce Chernobyl-like results.

The second, potential safety hazard at large reactor sites is the loss of electricity needed to operate the water pumps and control rods, which are critical to stave off a loss of coolant accident, i.e., a repeat of a Three-Mile Island-type accident. Here what is critical is that there be at least two separate, reliable sources of electricity running into the nuclear reactor site in addition to the emergency diesel generator located at the reactor location. The later are fairly reliable (90 to 95 percent) but they are not foolproof. If one or more transformer stations feeding electricity to ten or more reactors should fail or be attacked, it is conceivable that one of the diesel generators would simply fail. An attractive target in this regard might be power lines feeding into a number of reactor plants.

It should be kept in mind that Al Qaeda has already discussed targeting reactors in the U.S. Hitting these targets is attractive if only because the full faith and credibility of the U.S. government is literally on the line. The U.S. Nuclear Regulatory Commission, the Department of Homeland Security, and the Department of Energy, have all insisted that these facilities are safe against most terrorist attacks. In addition, an attack against one U.S. reactor could affect operations at power reactors world-wide.

Yet, another nuclear target for terror organization is large nuclear fuel making plants. The number of these is slated to increase. Japan, Russia, China, Brazil, India, and the U.S. are all completing or expressing a keen interest in building new nuclear fuel making plants (see chart 9). Of particular concern are plutonium reprocessing plants, which have, in the case of France’s large facilities, open spent fuel storage ponds that could be easily targeted (France has already been rumored to have taken the precaution of installing anti-aircraft batteries around these facilities).

Beyond the possibility of been struck by a terrorist attack, these nuclear fuel making plants present a different worry – insider theft of enough material to make a bomb. Much has been written about the dangers of the continued availability of nuclear weapons usable highly enriched uranium at research reactors world-wide. This material is being called back by the U.S. and Russia, and, the reactors modified to use non-weapons usable low enriched uranium. This effort is slated to be completed in roughly a decade.

On the other hand, the expansion of uneconomical reprocessing activities in the countries listed has resulted in a massive increase in the amount of nuclear weapons usable materials being stockpiled in the civilian sector. Currently, the amount of surplus separated plutonium in the civilian sector worldwide (well over 220 tons) now exceeds the amounts of surplus military weapons plutonium in the U.S. and Russia (see chart 10). As little as 4 kilograms of this material is needed to make a Hiroshima yield device.

Unfortunately, the International Atomic Energy Agency (IAEA) cannot detect diversions from such nuclear fuel making plants early enough to assure their prevention. Partly, this is due to poor safeguards system support: The IAEA, for example, lacks near-real time
surveillance at nearly 70 percent of its facilities and of 100 percent of the most worrisome sites. As a result, the agency discovered that on 12 occasions over the last 6 years, the lights were turned off at inspected facilities for more than 30 hours. Worse, the IAEA made these discoveries often *months* after the blackout occurred.

Another problem is the IAEA’s safeguards objectives. The IAEA’s current detection goals, for example, are overly generous in comparison to the time it would take to convert plutonium and plutonium-based fuels into nuclear weapons. Even by IAEA estimates, it would only take 7 to 10 days to convert separated plutonium into a nuclear weapon. Yet, the IAEA detection goal is to inspect facilities having such materials only once a month (see chart 11).

In practice, the IAEA has been embarrassed by reports of material unaccounted for (MUF) for weapons usable plutonium at the few Japanese civilian nuclear fuel plants currently under IAEA safeguards and those European fuel plants that make such reports. Below is a compilation of the most recent nuclear weapons usable plutonium MUF reports from these facilities (see chart 12):

- 69 kgs of plutonium missing and reported after only 6 years of operation at Tokai-mura Plutonium Fuel Production Facility (first reported in 1994)
- Over 8 kgs. of separated plutonium scrap missing at Tokai-mura (reported in 1996)
- 206 kgs. of separated plutonium missing reported after 15 years of operation at Tokai-mura reprocessing (reported in 2003)
- 19 kgs. of separated plutonium MUF at Sellafield reported in 2004 regarding amounts of separated plutonium gone missing during the previous year of operation
- 29.6 kgs. of separated plutonium MUF at Sellafield reported in 2005 regarding amounts of separated plutonium gone missing during the previous year of operation

What is interesting in each case is how long it took to report the unaccounted material – from between 1 to 15 years. In all cases the reports came far later than it would take to convert the material into a nuclear weapon. Subsequent to some of these reports, some of the missing material was accounted for but only after the expenditure of 100s of millions of dollars and one to two years of additional assay work. In no case was the uncertainty regarding the MUF reduced below one significant quantity (i.e., enough separated plutonium to make one crude bomb).

With the projected opening of even larger plutonium fuel-making facilities, the amount of MUF is projected to grow. In the case of the large reprocessing plant at Rokkasho, which is to come on line sometime this year, the amount of material that is likely to go unaccounted for per year is roughly 250 kilograms of plutonium, i.e., enough to make at least 50 crude nuclear bombs.
Given the amounts that go “lost in the pipes” or “dissolved in solution” and the tardiness of the reports regarding this missing material, an insider might steal enough material to make a bomb and no alarm would go off. The nuclear industry has tried to deflect this concern by insisting that physical security at these sites is being upgrades such that no material could leave the site undetected. The problem here, however, is that if it is unclear at any given time what the precise amount of nuclear weapons usable material is that a plant has made or has on hand and this uncertainty is equal to more than one bomb’s worth of material, one can never be sure if a weapons worth of material had not been diverted.

**Unclear and Not So Present Danger: A State Hand-off of the Bomb to Terrorists**

In contrast to these unattended worries, much has been said about the possible Iranian and North Korean hand off of nuclear materials or weapons to terrorist organizations. In the Iranian case, the thinking seems to be that Iran would do this to spite Israel, the U.S. or the West. In the case of North Korea, the thinking seems to be that it would be largely a matter of making money. Yet, for the near-term, neither of these cases seems all that likely (see charts 13, 14 and 15).

In Iran’s case, the problem is two fold. First, it currently lacks the nuclear material necessary to hand off: It still is at least a year away from acquiring enough material to make its first bomb. Whether it would share what little highly enriched uranium it might produce in the next few years is also doubtful. Such sharing with terrorist organizations seems particularly unlikely when one considers the antipathy Shia have for Sunnis, i.e., for those who run most Islamist terror organizations. Finally, Iranian Revolutionary Guards recently were given the mission of controlling Iran’s nuclear program precisely to prevent unintentional leakage.

As for North Korea, the prospect for it handing off nuclear fuel or weapons to terrorists is hardly much greater than it is for Iran. Pyongyang, after all, does not even admit to having a highly enriched uranium production program and it is highly enriched uranium that is of greatest interest to terrorists. Giving any of this material to others would risk uncovering this lie. Finally, Pyongyang has many other ways to make money: Its nuclear assets remain under tight control of the political elite.

Then there is the demand side. It is assumed that Islamic terrorist want to secure nuclear weapons as soon as possible. Given the immediate concern with the occupation of Iraq and Afghanistan, this seems farfetched. Certainly, Al Qaeda and its affiliates have learned that the suicide bomber is challenge enough for the “occupation forces” in Israel, Iraq, Afghanistan and beyond. Religious emphasis on the self-corruption of the West through smoking, AIDS/HIV, and drugs suggests where the current focus is in the war against the infidels. This may change, but it will take time.
Pakistan and Nuclear 1914: The Nuclear Terror Threats That Remain

What other nuclear terror threats, then, deserve our attention? Two. We need to take far more seriously the prospect of terrorists taking over a state such as Pakistan, which has nuclear weapons (see chart 16). Given that there have already been two assassination attempts been made against Pakistan’s President Musharraf by Taliban sympathizers, this is not all that farfetched a concern. In addition, one of the most popular political figures in Pakistan today is A.Q. Khan, the scientist most responsible for spreading Pakistan’s nuclear plenty to Iran, North Korea, Egypt and North Korea. That Khan is a strident Taliban supporter only lends greater credence to the worry that Pakistan could fall into very different political stewardship, which might find it useful to pass the bomb on to non-state actors. Again, the prospects of such a development may not be immediate but they should be treated as being at least as likely as the nuclear terrorist handoff scenarios being propounded for Iran and North Korea.

This brings us to the final nuclear terrorist threat, which is concomitant with the further spread of nuclear weapons making materials and technologies (charters 17 through 21). As the number of states that can make nuclear weapons increases, the likelihood of mistrust, miscalculation and war increase as well. Certainly, if Iran and North Korea succeed in breaking the nuclear rules with impunity, the model that others are likely to follow will be to come right to the edge of making nuclear arms under the guise of making nuclear fuel claiming that this is their “inalienable” right. If, as North Korea, states can cheat on their pledges not to make bombs and do so without paying a price, it is quite likely that North Korea’s and Iran’s neighbors will all hedge their bets with nuclear fuel-making programs of their own.

This will lead to a world full of nuclear-ready states in which one might know who one’s enemies are but have only the vaguest idea of how lethal their militaries might be if war came. Similarly, one would have some idea of who was a friend but be at a loss as to what they might do when called upon in a crisis (would they back their friends or, like France in 2002, go their own way?). In this world, diplomats will try to hedge against wars by striking a multitude of private bilateral understandings. The military, meanwhile, will attempt to target each potential enemy’s strategic capacity as possible. Both will oversell the amount of security their efforts might secure. In this world, war could be prompted by any number of developments, including the slightest. As with the First World War, no more than a single assassin’s (or terrorist’s) bullet might be needed to ignite a massive conflict that now could end with nuclear use.

What Can Be Done?

For each of the problems detailed, there are steps we can and should take. For the first problem posed by the possible use of nuclear devices against cities, it is important to prioritize the threats first by what’s most likely rather than what might be the most
destructive. Here, the highest probability event is a terrorist attack with a dirty bomb. The good news is that such attacks are not that likely or easy to carry off and that it is very unlikely that such attacks can do serious, massive, lasting harm. Here, education and a focus on controlling the handful of the most threatening radiological source materials are our best defense (see charts 22 and 23).

With regard to the second problem posed by the vulnerability of nuclear plants to terrorist attack, a variety of modest measures should be taken. Passive defenses, including the deployment of global positioning system (GPS) keep-out zones for planes should be considered. The U.S. DARPA has already developed the software to slave large and fast planes’ navigation and control systems to avoid designated ground sites (see chart 24). This system could be deployed relatively quickly and at relatively low cost to existing modern airliners, large jets, and fast-flying private aircraft. Other ideas that German experts have suggested include barrage balloons, the construction of berms, and the development of obscurant generators that would disseminate upon radar prompting (making it more difficult for a terrorist pilot to see and hit his intended target).

To address the worry presented by potential spent fuel pond fires, the installation of wet spray systems and the use of dry cask storage for as much spent fuel on site, which the U.S. National Research Council has recommended, make sense. Finally, to assure a reliable supply of back-up electricity, installation of additional set of diesel emergency generators would be useful. None of these suggestions, it should be noted, require heroic expenditure or changes to the current operation or configuration of existing nuclear facilities.

The third problem, the limitations of IAEA safeguards, is a more difficult matter to address (see chart 25). At minimum, it would be helpful if the IAEA determined when and where it could provide timely detection of a significant quantity of direct use nuclear material and where it cannot. It also would be useful to upgrade IAEA safeguards systems where true gains in achieving timely warning are possible. An example here is to increase funding for near-real time surveillance for IAEA cameras and radiation monitors at power and research reactor sites. Finally, until such fixes are in place, the IAEA should urge nuclear fuel making states not to expand their existing facilities’ net capacity. This would allow states to modernize but would force them to reduce existing capacity for any new capacity they brought on line. Such a moratorium would at least keep the IAEA from falling further behind in its inadequate accounting of nuclear materials at such plants.

This, then, leaves the longer term threats posed by weak nuclear weapons states, such as Pakistan, and the growing possibility of a nuclear 1914. To address these problems, the nuclear weapons states that have agreed to the limits of the Nuclear Nonproliferation Treaty, will have to propose additional limits that can be applied to non-signators, like Pakistan, on a country-neutral basis (see charts 27 and 28).

Here, the first step must be to reinterpret existing rules to eliminate the mistaken belief that all forms of civilian nuclear activity, including those that bring states within days of
acquiring nuclear weapons, are guaranteed. Also, withdrawing from the NPT should be penalized unless the state withdrawing is in full compliance at the time it withdraws and first surrenders the best of the nuclear technology it gained under the NPT that could help it make bombs most. For states that are found to be in noncompliance, minimal default actions – e.g., much more intrusive inspections and suspension of all fuel making for a period of a decade or more -- should be spelled out in advance.

Second, NPT nuclear weapons states should go beyond the treaty and propose new obligations for all nuclear weapons and nuclear fuel-making states. These obligations might include a moratorium on the net expansion of existing nuclear fuel making plants and a ban on the redeployment of nuclear warheads on to any other country’s soil in peacetime. They also might include pledges to increase the physical security of nuclear weapons useable material storage and production sites and promoting new regional agreements to increase civil and military nuclear restraints.

All of this, of course, is a much larger, long-term project. But, then, so too is the urgent mission of fending off nuclear terrorism.
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Briefing’s Key Conclusions

• Near-term nuclear terrorism threat is dirty bombs, targeting of nuclear facilities, and possible theft of nuclear weapons usable materials from nuclear fuel making plants
• We can and should reduce these near-term threats and can do so at relatively low costs
• Long-term nuclear terrorism threats are go well beyond these dangers
  – Possible take over of nuclear states – e.g., Pakistan
  – Terrorist ignition of major wars in a world full of nuclear-ready states capable of making nuclear fuel
• Addressing the first set of threats, fortunately, is the minimum to begin to tackle the long-term threats
Our Biggest Worry: Al Qaeda Nuclear Strike Against Capital Cities

• October 11, 2001 Al Qaeda threat to New York might yet be realized with Axis of Evil hand off

• 30,000 minimum dead in favorable attack on San Francisco; 50,000 or more in New York for 1 KT device (NRDC), or 180,000 fatalities in a 10 KT Washington DC attack (see map opposite)

• All that is required is 50 kgs or less of HEU or, with national help on implosion, 8 kgs or less of plutonium from DPRK, Russia, Iran

• 100s of billions of dollars in assets lost

• Al Qaeda articulated interest in nuclear and dirty bombs and attempts to secure technology from key nuclear experts in Pakistan
Urban Nuclear Weapons Terrorism: A Key Driver of Our Policies

• A justification for nuclear talks with DPRK and maintaining military and UNSC options for Iran is to prevent them from passing their nuclear capabilities to terrorists

• Need for Homeland Security Office to spend billions on first responders, install radiation detection capability at major seaports, airports and border crossings turns on potential nuclear terrorist events

• US-Russian efforts to blend down and secure surplus nuclear weapons uranium (the nuclear terrorist material of choice) also aim to head off a sale of bomb material

• UNSC Resolution 1540 response to Khan revelations aimed at securing nuclear materials and preventing future illicit nuclear transfers to potential terrorists

• Major international physical security initiatives to prevent radiological and nuclear material leakage or theft
Felicity of this Approach for the US

• Domestic local support for spending on existing fire departments, police, and customs programs is a patriotic version of urban development or freeway construction pork barrel politics

• National Support for border, immigration and travel controls easy to secure and maintain (e.g., $5-plus billion for TSA, toleration of 99% false alarm rates)

• International efforts’ cost is low; initial progress easy to demonstrate
  – Passage and enforcement of national controls are in-kind costs
  – Physical nuclear security assistance measured in the 10s of millions of dollars per year
  – Initial political consensus has been reached quickly
  – Measurable progress immediate in the counting of countries that have backed the new rules
What Goes Largely Ignored

1. The limits of what can be detected

2. Terrorist strike against reactors, their spent fuel ponds, and nuclear fuel making facilities, which could produce Three-mile Island or Chernobyl-like results

3. Increasing support for uneconomical nuclear fuel making activities that will only increase the risk of nuclear theft and the number of potential targets to strike

4. How a terrorist take over of a nuclear country that is a close ally – Pakistan – may be as or more likely and politically embarrassing than a national hand off of nuclear weapons or materials to terrorists

5. How Iran’s and DPRK’s nuclear examples could a.) distort a firm reading of the nuclear rules b.) serve as a model for a steady increase in the number of nuclear-ready states, c.) lead to a “Nuclear 1914,” in which the least terrorist incident or political miscalculation – one assassin’s bullet -- could bring massive, nuclear war
1. Bad News: Laws of Physics Unfriendly to Nuclear Detection

- Gamma rays from Plutonium are local
- Radiation from weapons uranium is minimal
- Detection of heavy masses with, protons, mueons, x-rays, produces high false alarm rates
- Shielding, deconstructing critical mass, further complicates detection
2. Nuclear Plants’ Weak Points: Possible Terrorist Targets

- Al Qaeda discussed and tried to target US reactors

- Targeting transformers, electrical supply and/or back up generators needed to assure nuclear safety could produce Three-Mile Island results

- Targeting spent fuel ponds at reactors or reprocessing plants to produce zirconium fires with and without large airplanes could produce Chernobyl-like results (National Research Council Report, April 2005)

- US NRC design basis threat model does not include what National Research Council Report claims is a “credible threat” – an attack by large planes against spent fuel ponds
3. Kerosene on the Fire: Increased Civilian Nuclear Fuel Production

- Plutonium reprocessing and uranium enrichment plants and the fuels they can make can be quickly converted to make bombs
- Brazil and Iran are starting up new enrichment plants
- US planning new enrichment and reprocessing plants
- Japan is completing a large reprocessing plant
- India is planning to increase reprocessing, MOX and fast breeding in the coming decade
The Amount of Weapons-usable Civilian Plutonium Is Eclipsing Military Holdings

Separated Military and Civilian Plutonium (in metric tons)

- **1990**
  - Civilian Plutonium: 122 MT (32%)
  - Military Plutonium: 257 MT (68%)

- **2000**
  - Civilian Plutonium: 310 MT (55%)
  - Military Plutonium: 257 MT (45%)

- **2010**
  - Civilian Plutonium: 546 MT (68%)
  - Military Plutonium: 257 MT (32%)

Nuclear Control Institute
Timely Detection of Major Civilian Nuclear Diversions Is Not Yet at Hand (1)

• **IAEA lacks near-real time surveillance** of nearly 70% of its facilities and of nearly 100% of most worrisome sites (e.g., IAEA discovered 90 days after previous visit on 12 occasions over last 6 years lights were turned off for more than 30 hours).

• **IAEA detection goals are egregiously generous.** Time needed to convert direct nuclear use materials into bombs is much lower than IAEA detection goals (e.g., IAEA conversion times separated Plutonium is 7-10 days but its detection goal, which it has yet to meet, is one month), while for lightly enriched uranium, the IAEA conversion time is too great – 3 to 12 months rather than several weeks to several months and with IAEA proposed inspections, inspection visits will come only once a year).

• **IAEA-mandated false alarm rates limits are freighting low:** No more than 5% false alarm rate is permitted.
Timely Detection of Major Civilian Nuclear Diversions Is Not Yet at Hand (2)

- Could we know if there was a theft of enough material to make a bomb?

- MUF at nuclear fuel making plants routinely exceeds what’s needed to make many bombs.
  - 69 kgs of pu at after only 6 years of operation at Tokai-mura Plutonium Fuel Production Facility (1994)
  - Over 8 kgs of separated pu scrap MUF at Tokai-mura (1996)
  - 250 kgs of separated pu MUF annually projected for Rokkasho recycle plant
  - 19 kgs of separated pu MUF at Sellafield (2004)
  - 29.6 kgs of separated pu MUF at Sellafield (2005)
  - 100 kgs. HEU, Apollo, Penn, fuel fabrication plant (early 1960s)
4. Meanwhile: Iranian Nuclear Handoff to Terrorist Is Not Imminent

- Iran HEU will initially be rare and closely guarded by Iranian regime (only offers to share nuclear technology to date is with other states)
- Iranian Shias are distrustful of Arab Sunnis
- Much more controllable conventional, terrorist explosives are available
- Loss of Iranian state control of nuclear program is a bigger worry – major new mission of Revolutionary Guards is to retain control
Why DPRK Handoff Is Also Unlikely

• Have suggested nuclear sales but not to terrorist groups

• Risk of intelligence penetration of nuclear program (especially HEU production, which DPRK has yet to admit to) suggests terrorist hand-off is unlikely

• Alternative means to make cash (conventional arms sales, counterfeiting, drug trade) far less risky to continued Party rule and international reaction
Islamist Nuclear Weapons Efforts

• Near term threat of Islamist nuclear weapons threat is relatively low:
  – Occupation of Afghanistan and Iraq has seriously hindered earlier efforts to contact experts to acquire nuclear weapons materials and know-how
  – Martyrdom attacks have become Islam’s near-term unanswerable threat to the West
  – “WMD” term in many Islamist writings refers to broad array of social diseases that can ruin the West, e.g., AIDS, cigarette smoking, drug use

• Long-term threat is likely to grow:
  – Al Qaeda is mutating toward a more a group with greater interest toward the acquisition and use of nuclear weapons rather than CBW or radiological bombs
  – New generation of Islamists might be more willing to work with non-Islamic groups to acquire nuclear weapons
At Least As Great A Danger: Not State Nuclear Handoff, but a Terrorist Takeover of a Nuclear State – Pakistan

- A.Q. Khan actively sympathetic to Taliban, could be elected president today
- 4 Senior Pakistani nuclear scientists discussed nuclear topics with Al Qaeda
- At least 2 assassination attempts on President Musharraf by military officers cooperating with Al Qaeda
- Pakistani intelligence service and retired military are very supportive of Taliban, Al Qaeda, and related groups
5. Yet the Greatest Nuclear “Terrorist” Threat May Result from Something Far Softer: How We Apply the Nuclear Rules

- If DPRK and Iranian challenge to the rules sticks, all nations that openly declare their nuclear activities may 1. come within days of having bombs, 2. withdraw from NPT and make bombs with impunity.

- Indian-US cooperation may loosen reading of nuclear rules further if India, a state that never complied with the NPT, succeeds in the benefits of civilian nuclear cooperation as it was compliant with the NPT and yet refuses cap its capacity to make or deploy more bombs.
Do States Have a Right to Get to the Brink of Having an Arsenal?

• DPRK, Iran insists the answer is yes and are demanding recognition of this right

• South Africa, Brazil, India, Pakistan, Germany and most Non-aligned Movement states agree as does U.S. State Legal Division

• France, Israel, Some US officials disagree
History, Legal Common Sense Say No

• NPT is a Nonproliferation Treaty; reading it to allow states to get to the brink of having bombs is a perverse, unsustainable legal interpretation

• NPT amendments of Spain and Mexico to assure access to “entire fuel cycle” were explicitly rejected

• No perse prohibition or right to any specific nuclear technology

• Depends if activity with produce “benefits of peaceful nuclear energy” – i.e., if safeguardable and economically profitable (article III and preamble of NPT)
Current Proliferation Seems Manageable

Post-911
Today

21 Possible Strategic Relationships
(6 of the most important with the US)
Future Proliferation: Ramp Up to Nuclear 1914?

Possible Proliferated Future

(136 chances for strategic miscalculation)

Today, plus
Inco DPRK Taiwan Saudi Arabia Egypt
Syria Algeria Turkey South Korea Japan
What’s To Be Done: Problem One

Prioritize nuclear threats, educating public on most likely but yet least destructive nuclear threat -- dirty bombs and secure the most worrisome source materials, e.g., cobalt, powderized cesium.

**Figure 1. Long-term Contamination Due to Cesium Bomb in Washington, DC.**

- **Inner Ring:** One cancer death per 100 people due to remaining radiation (5% increase)
- **Middle Ring:** One cancer death per 1,000 people due to remaining radiation (.5% increase)
- **Outer Ring:** One cancer death per 10,000 people due to remaining radiation (.05% increase): EPA recommends decontamination or destruction.

**Figure 5. Contamination Due to Americium Bomb in NYC.**

- **Inner Ring:** One cancer death per 100 people due to remaining radiation (500% increase)
- **Middle Ring:** One cancer death per 1,000 people due to remaining radiation (50% increase)
- **Outer Ring:** One cancer death per 10,000 people due to remaining radiation (5% increase): EPA recommends decontamination or destruction.
Radiological Sources Differ

- Americium 241, Californium 252, plutonium 238, strontium 90 all require ingestion or inhalation

- Cesium 137, cobalt 60, iridium 192 pose internal and external health hazard

- Powdered cesium is relatively easy to distribute, cobalt metal is not

- The most intense radiological sources are the most threatening to the terrorists and difficult to deliver, the least are not
Problem Two

Consider

a. **Passive defenses for nuclear facilities** against large, fast planes as price of dogn nuclear business: including GPS keep-out zones, obscurants, barrage-like barriers, berms, etc.

b. **Passive defenses for spent fuel storage** including increased reliance on dry cask storage (far right), employment of water spray systems (near right) to put out fires and keep fuel cool if attacked.

c. **Install additional emergency electrical generator back up systems**
Three

• Significantly bulk up funding of IAEA to safeguard what it can provide timely warning of diversions of by assessing inspection user fee based on how many man-years of inspection a given nuclear site requires.

• Encourage IAEA to identify the nuclear diversions it cannot provide timely warning of – i.e., diversions from nuclear fuel making plants and the civilian direct use nuclear materials it cannot positively account for.

• Get all nations to cap current nuclear fuel making capacity with a renewable moratorium and to put any future expansion on a diet of private financing without government assurances or support.

• Promote dry spent fuel storage in casks at least until price of uranium can support private financing of reprocessing (many decades from now) and by educating public on the high levels of safety and economy dry cask storage affords as compared to recycle or permanent geological storage
Four

Exploit Pakistan’s current anxiety about India’s potential buildup of nuclear capacity and its desire to be treated as the nuclear equal of other nuclear weapons states to get it, India and as many other nuclear weapons states and nuclear material producing states to reach nuclear restraint understandings, including:

– no retransfer of nuclear weapons or nuclear weapons usable materials on other country’s soil in peacetime

– Measures to increase domestic physical security of and reduce accessibility to nuclear facilities and direct use nuclear materials
Five

- Make enforcement of firm nonproliferation a larger alliance mission for NATO, EU, US-Japan, US-RoK alliance, future ties to India etc.
- Clarify the proper reading of Article IV
- Continue to push for reduced nuclear weapons deployments with reductions driven by advances in non-nuclear military science
- Stigmatize and isolate worst NPT violators – Iran and DPRK
- Establish alternative model of nuclear restraint in Middle East, East Asia, and America
  - urging Israel to take a series of steps starting with suspending fissile production if nuclear neighbors (at least Algeria and Egypt follow its lead)
  - urging China to cap military production and weapons deployments and to make both civilian and military programs more transparent
  - Getting American states (North and South to agree to rolling moratorium on no net expansion of fuel making capacity
Back to Our Greatest Worries

• Taking each of the proposed actions are the most tractable ways to address our greatest fear – nuclear theft and nuclear terror strikes

• Ignoring them is a sure-fire way to increase the prospect that these fears will be realized sooner