MORE THAN A NUCLEAR THREAT: NORTH KOREA'S CHEMICAL, BIOLOGICAL, AND CONVENTIONAL WEAPONS

JOINT HEARING

BEFORE THE

SUBCOMMITTEE ON TERRORISM, NONPROLIFERATION, AND TRADE

AND THE

SUBCOMMITTEE ON ASIA AND THE PACIFIC

OF THE

COMMITTEE ON FOREIGN AFFAIRS
HOUSE OF REPRESENTATIVES

ONE HUNDRED FIFTEENTH CONGRESS

SECOND SESSION

JANUARY 17, 2018

Serial No. 115–104

Printed for the use of the Committee on Foreign Affairs

Available via the World Wide Web: http://www.foreignaffairs.house.gov/ or http://www.gpo.gov/fdsys/

U.S. GOVERNMENT PUBLISHING OFFICE

28–334PDF WASHINGTON : 2018

For sale by the Superintendent of Documents, U.S. Government Publishing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
Fax: (202) 512–2104 Mail: Stop IDCC, Washington, DC 20402–0001

COMMITTEE ON FOREIGN AFFAIRS

EDWARD R. ROYCE, California, *Chairman*

CHRISTOPHER H. SMITH, New Jersey
ILEANA ROS-LEHTINEN, Florida
DANA ROHRABACHER, California
STEVE CHABOT, Ohio
JOE WILSON, South Carolina
MICHAEL T. MCCAUL, Texas
TED POE, Texas
DARRELL E. ISSA, California
TOM MARINO, Pennsylvania
MO BROOKS, Alabama
PAUL COOK, California
SCOTT PERRY, Pennsylvania
RON DESANTIS, Florida
MARK MEADOWS, North Carolina
TED S. YOHO, Florida
ADAM KINZINGER, Illinois
LEE M. ZELDIN, New York
DANIEL M. DONOVAN, JR., New York
F. JAMES SENSENBRENNER, JR., Wisconsin
ANN WAGNER, Missouri
BRIAN J. MAST, Florida
FRANCIS ROONEY, Florida
BRIAN K. FITZPATRICK, Pennsylvania
THOMAS A. GARRETT, JR., Virginia
JOHN R. CURTIS, Utah

ELIOT L. ENGEL, New York
BRAD SHERMAN, California
GREGORY W. MEEKS, New York
ALBIO SIRES, New Jersey
GERALD E. CONNOLLY, Virginia
THEODORE E. DEUTCH, Florida
KAREN BASS, California
WILLIAM R. KEATING, Massachusetts
DAVID N. CICILLINE, Rhode Island
AMI BERA, California
LOIS FRANKEL, Florida
TULSI GABBARD, Hawaii
JOAQUIN CASTRO, Texas
ROBIN L. KELLY, Illinois
BRENDAN F. BOYLE, Pennsylvania
DINA TITUS, Nevada
NORMA J. TORRES, California
BRADLEY SCOTT SCHNEIDER, Illinois
THOMAS R. SUOZZI, New York
ADRIANO ESPAILLAT, New York
TED LIEU, California

AMY PORTER, *Chief of Staff* THOMAS SHEEHY, *Staff Director*
JASON STEINBAUM, *Democratic Staff Director*

SUBCOMMITTEE ON TERRORISM, NONPROLIFERATION, AND TRADE

TED POE, Texas, *Chairman*

JOE WILSON, South Carolina
DARRELL E. ISSA, California
PAUL COOK, California
SCOTT PERRY, Pennsylvania
LEE M. ZELDIN, New York
BRIAN J. MAST, Florida
THOMAS A. GARRETT, JR., Virginia
WILLIAM R. KEATING, Massachusetts
LOIS FRANKEL, Florida
BRENDAN F. BOYLE, Pennsylvania
DINA TITUS, Nevada
NORMA J. TORRES, California
BRADLEY SCOTT SCHNEIDER, Illinois

SUBCOMMITTEE ON ASIA AND THE PACIFIC

TED S. YOHO, Florida, *Chairman*

DANA ROHRABACHER, California
STEVE CHABOT, Ohio
TOM MARINO, Pennsylvania
MO BROOKS, Alabama
SCOTT PERRY, Pennsylvania
ADAM KINZINGER, Illinois
ANN WAGNER, Missouri
BRAD SHERMAN, California
AMI BERA, California
DINA TITUS, Nevada
GERALD E. CONNOLLY, Virginia
THEODORE E. DEUTCH, Florida
TULSI GABBARD, Hawaii

CONTENTS

MORE THAN A NUCLEAR THREAT: NORTH KOREA'S CHEMICAL, BIOLOGICAL, AND CONVENTIONAL WEAPONS

WEDNESDAY, JANUARY 17, 2018

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON TERRORISM, NONPROLIFERATION, AND TRADE
AND
SUBCOMMITTEE ON ASIA AND THE PACIFIC,
COMMITTEE ON FOREIGN AFFAIRS,
Washington, DC.

The subcommittee met, pursuant to notice, at 2:04 p.m., in room 2172, Rayburn House Office Building, Hon. Ted Yoho (chairman of the Subcommittee on Asia and the Pacific) presiding.

Mr. YOHO. The subcommittee will come to order. Chairman Poe got detained because of the weather, and I guess Texas isn't set up for equipment like that, deicing planes.

Members present will be permitted to submit written statements to be included in the official hearing record. Without objection, the hearing record will remain open for 5 calendar days to allow statements, questions and extraneous material for the record, subject to length limitations in the rules.

Good afternoon. I would like to thank Chairman Poe for calling this hearing. It is such an important hearing to have in today's climate. And Ranking Member Keating, Ranking Member Sherman, and all other members of the subcommittee for gathering today to continue working on one of the most urgent security threats facing the United States.

As we will hear from our witnesses today, the danger North Korea poses to the world is more than just its rogue nuclear program and ballistic missile brinksmanship. Pyongyang develops other weapons of mass destruction and backs them with significant conventional military capabilities.

As his pursuit of chemical and biological weapons shows, Kim Jong-un commands tools of indiscriminate mass murder beyond nuclear weapons, and U.S. policy must be responsive to these threats as well.

North Korea, one of only 6 countries that has not signed the Chemical Weapons Convention, is believed to have stockpiles of thousands of tons of chemical weapons, including sulfur, mustard gas, chlorine, sarin, and VX, some of the worst chemicals that mankind has devised. These agents could be delivered by a variety of

North Korean weapon systems, notably the massed artillery deployed near the DMZ which would place Seoul at extreme risk.

Experts believe North Korea would not hesitate to use such tactics as a way to make up the deficiency in its aging military and that such an attack could feasibly result in millions of civilian casualties in South Korea.

Recent reports have also highlighted North Korea's continuing work on another longstanding WMD program, the production of biological weapons, including anthrax and smallpox. It has been known for some time that North Korea possesses the capability to produce anthrax for military purposes, and just last month, a Japanese newspaper reported that North Korea has begun experiments to load anthrax into ICBMs. Tellingly, this assertion is reiterated in the administration's recent national security strategy. The frightening truth is that we already have at least one data point to show that North Korea is ready and willing to use such horrific weapons to accomplish its goal.

In early 2017, we all remember North Korean agents assassinated Kim Jong-nam, the half brother of Kim Jong-un, with VX nerve agent in Malaysia. This operation proved to the world not only that North Korea has access to chemical lethal weapons, but also the willingness and the expertise to transport and apply them in a targeted and sophisticated manner.

Partly in response to this killing, the White House in November announced that it was redesignating North Korea as a state sponsor of terrorism in a large part due to Judge Poe and other members of this committee. An overdue step to remind the world that Kim's unlawful regime is an international pariah. But the threat remains.

To backstop its asymmetric capabilities, North Korea also maintains the world's fourth largest standing army, with over 1 million personnel, accounting for almost 5 percent of its total population. North Korea keeps its substantial conventional forces in a forward-deployed posture, keeping Korea and also Japan under constant threat.

For example, even conservative estimates place hundreds of North Korean artillery tubes within range of Seoul, able to rain thousands of shells per minute down on the metropolitan area. These weapons could inflict enormous costs on South Koreans and the 230,000 Americans living in South Korea. Combined with chemical or biological payloads, the cost would be unimaginable even in the absence of nuclear weapons.

North Korea's conventional, chemical, and biological weapons raise a number of questions that are too often overlooked in the congressional debate over our policies toward North Korea. North Korea's investment in these weapons may increase the cost of potential contingency and constrain U.S. strategic planning. They may give Kim Jong-un additional strategic options to escalate a conflict without using nuclear weapons and provoking regime-ending war.

If North Korea truly wants to rejoin the international community in a meaningful and lasting way, the Kim regime will have to bring something to the negotiating table. Perhaps the regime's chemical, biological, and other weapons aimed solely at civilian populations

might be a fitting place to start as we work toward the goal of full denuclearization.

I look forward to working toward answers to these and other questions, and I thank the panel for joining us today to discuss this concerning topic.

And without objection, the witnesses' written statements will be entered into the hearing record. And I now turn to the ranking member on TNT for any remarks he may have.

Mr. Keating.

Mr. KEATING. Thank you, Mr. Chairman.

Mr. YOHO. Take it away.

Mr. KEATING. Thank you, Mr. Chairman. Thank you for holding the hearing today. One of President Obama's outgoing warnings to President Trump was about the threat posed by North Korea. And here we are.

Today we are not talking about the nuclear threats. It is axiomatic, almost, the question theoretically that was posed to one of our first ladies once, saying, "Other than that, Mrs. Lincoln, how did you enjoy the theater?" But there are, indeed, other real threats posed by North Korea's non-nuclear weapons. As tensions rise and the rhetoric heats up about military options, we need to be having an honest, realistic conversation about the types of threats that we are facing from North Korea and the full range of options we must consider given the very real risk we face.

Frankly, reports that the administration is considering "a bloody nose strategy in North Korea" is deeply concerning. War is not a matter of bloody noses. It is human lives, constant uncertainty, long-term challenges in our investments to achieve some amount of security. And we know all too well that this investment can easily take a generation because security is not just fighting the battle and then going home. It is also everything that comes afterwards. We know this because we are fast-approaching 20 years of military engagement in Afghanistan and Iraq. That is because the instability produced by war is itself a threat.

The chemical, biological, conventional and other non-nuclear threats posed by the North Korean regime are serious indeed. And it is our duty to come together in Congress to best ensure the safety of the American people. Whether we like it or not, if the President launches an attack on North Korea, we will need to make a decision on whether we will give him the authority to continue that military engagement.

U.S. Pacific Commander Admiral Harris, who I had the opportunity to meet with when I visited the Pacific and South Korea roughly 1 year ago, was one of those voices we should listen to closely when it comes to formulating U.S. strategy in North Korea. So when Admiral Harris categorized diplomacy as the most important starting point, we should be taking a hard look in Congress at whether our diplomatic options truly are being pursued as aggressively as we can. Because protecting the American people does not automatically mean sending them to war, or worse yet, all but inviting an attack from a hostile regime.

Before jumping to the military options, we need to be clear on what they look like and most importantly, the full range of diplomatic options that we have available to us.

We need to be clear on our options because the options we choose will matter tremendously to our women and men in uniform and to their families and friends. It will matter to families living across the United States wondering if they might live within the blast radius where North Korea has the ability to strike here at home, and it will matter to the generations forced to clean up the mess left behind by what would inevitably be a long and complicated conflict on the Korean Peninsula.

North Korea is likely not to go its way and follow international law on the use of chemical and biological weapons. It was not so long ago that another brutal regime used chemical weapons in the midst of a conflict. What does it mean to operate on a battlefield where chemical and biological weapons could be in play? What do the civilian casualties look like? Can these weapons be secured in the midst of an armed conflict, and if not, what types of the proliferation risks should we consider?

All this, in addition to the concerns presented by North Korea's conventional forces. What could such a conflict breed in terms of the spillover effects into other countries. A military option should only be used when necessary and once there are no other effective options left on the table.

So I am looking forward to discussing our other options today, our diplomatic options. And I thank the panel for being here to help us in that endeavor.

Congress has already passed sanctions to deal with the threats from North Korea, so where is the diplomatic follow through? Where is our State Department? Where are our Ambassadors? The United States still does not have an Ambassador to South Korea in place. Our allies are not reassured by this administration's actions, and we are not even at the table as North and South Korea negotiate, even though our own security is also very much at stake.

These are serious issues and we have very little information to understand and properly counter these threats. So we need to take stock of what we do have and what we have to do. We have long had strong allies and partnerships in South Korea, Japan and so many other countries that are similarly concerned by the threats posed by North Korea. When we face serious threats of this nature, such as nuclear threats from Iran, what have we done in the past? We worked closely in a coalition of partner nations.

The women and men of the State Department have long been some of our strongest assets in representing the United States at the table to negotiate peace and to make it possible for Americans to sleep soundly at night. Under this administration, they have weakened our State Department and confused our allies. We should be concerned that once a leader, the United States is rapidly becoming a pariah on the international stage, and that does not make us safer.

So I appreciate the witnesses being here. I hope to hear from you on what we could be doing, even in light of the challenging circumstances and alarming threats that we face.

I yield back.

Mr. YOHO. Thank you, Mr. Keating. Words well spoken, well meaning, and hopefully well taken as we go through this.

Being the chair of the Asia-Pacific Subcommittee, and Judge Poe is not here, I am going to turn to the ranking member, good friend, Mr. Brad Sherman from the State of California, who is the ranking member of the Asia-Pacific Subcommittee. And it is important that everybody knows that the two committees have come together on this important topic.

Mr. Sherman, thank you.

Mr. SHERMAN. Thank you. And for many years our policy on North Korea has focused on its nuclear program. We have to make sure that we don't stumble into war. And I am concerned about the rhetoric that sounds like adolescent boys at a junior high school. The idea that we could bloody the nose of our adversary without risk to the Korean Peninsula and the world is absurd.

In today's hearing, I look forward to hearing from our panel on chemical, biological and conventional weapons, but at least in my opening statement, I am going to also focus on the nuclear.

I have cosponsored five bills, many of us have, that sanction and condemn North Korea. But I have also cosponsored the No Unconstitutional Strike Against North Korea Act, because we should not, by presidential fiat, be conducting military strikes and going to war with North Korea.

We need a strong military to deter North Korean action, but we also need diplomacy. And diplomacy starts with reasonable objectives. I am old. I was here when North Korea had as one of its objectives just getting a nonaggression pact with the United States. We turned them down. Vice President Cheney imagined that we could have a righteous invasion of North Korea. Bad idea now. Bad idea then.

We might very well look at the freeze-for-freeze initiative. We could suspend our military exercises in return for a verifiable freeze on North Korea's nuclear and missile testing and production—and I want to emphasize the word "production" because I don't think China has gone that far in its proposal—of both nuclear material and missiles, but also chemical and biological materials.

To reduce the biological threat, we can ask North Korea to affirm that it will remain in the Biological Weapons Convention. We should encourage it in public health and agricultural dialogues to limit bioweapons. And as suggested by one of our witnesses, push a no-first-use pledge and give one ourselves with regard to chemical and biological weapons use. We need to prepare for chemical, biological, and nuclear weapons use in the Korean Peninsula because it may indeed happen.

The idea that you can't reduce casualties from a nuclear strike because a nuclear strike is beyond our imagination, in its horror, is to say that there is no difference between 100,000 casualties, 1 million casualties, and 5 million casualties. Likewise, when we look at the chemical threat from North Korea, we estimate it to have 2,500 to 5,000 tons of chemical agents. We see that the distribution, not only to our troops, but to relevant Korean civilians, of gas masks and more sophisticated countermeasures might well be the investment, not because it would render us invulnerable or our allies invulnerable to such an attack, but only because it would reduce casualties.

Finally, two other points I want to make. One is, North Korea may soon be interested in selling its nuclear weapons or chemical or biological weapons. Roughly 10 years ago Israel destroyed a Syrian nuclear facility which seemed to have Iranian participation. That was all North Korean technology.

North Korea will not currently sell its nuclear weapons because it needs a certain number of weapons to defend itself from us in their mind. But they will quickly in 1 year, 2 years, 3 years, get to the point where they can afford to sell one or more nuclear weapons. They won't sell for a cost that a terrorist group can afford, but sovereign states can indeed produce a billion or several billion dollars, if that is the asking price.

We need to work with China to make sure there are no nonstop flights between Iran and North Korea. I spoke to the President about this, President Obama about this, and he assured me that we were checking ships, but we have no way of stopping planes. China, however, can require refueling of any plane between those two countries.

Second, we have to be willing to risk our trade relationship with China to get a level of cooperation from China on this issue that goes beyond the foreign policy decision that they have made. And if we are not willing to do that, then we are putting the profits of entities of Wall Street above the security of the American people. It is not something we haven't done before, but we continue to do it when it comes to the Korean issue.

And I yield back.

Mr. YOHO. Thank you for your comments. Next, we will go to Mr. Chabot, who used to chair the Asia-Pacific Subcommittee, the previous chairman. Thank you, sir.

Mr. CHABOT. Thank you, Mr. Chairman. And you are doing a fine job of it, maybe not as good as I did, but really good. No, just kidding.

It was mentioned that we are not a part of the talks between South Korea and North Korea, and that is true. But I would argue that those talks are—it is blackmail, it is a fraud, it is a sham, in my view. South Korea is concerned that North Korea is going to screw up the Olympics for them and North Korea is going to get everything they can out of this, as they always do. We have had previous administrations, both Republican and Democrat, who have been suckered by the North Koreans time and time again.

They promise to give up their nuclear program. We give them food, we give them oil. And it doesn't matter whether we are in six-party talks or whoever, all of the countries that deal with North Korea fall into line. We give them a bunch of stuff. They promise to behave. They don't behave.

And now they have nuclear weapons which now can threaten us right here in the continental United States. They have chemical and biological weapons programs that they are proceeding for their conventional weapons programs, whether it is tanks or the artillery system that they have and how they can target Seoul, and us for that matter. It is horrendous that we have, we being the rest of the world, have allowed them to get to this point.

The key to solving this whole thing, in my view, was/is continues to be China. China talks a good game. They act like they are going

to do things, they are going to cooperate and rein in, and they get embarrassed by the regime, the North Korean regime on occasion, but they are not going to rein them in. They are helpful to them. They keep us and our allies off balance. And so even though they act like they are very disappointed, in general what North Korea does benefits China as much as it keeps them off guard to some degree.

China is the key, and as long as China believes that we are not going to be serious with them about cutting them off basically, they benefit one heck of a lot more from trade and a relationship with us than we do from them. And until we get serious—previous administrations never got serious with China. I think there is at least the chance for this administration.

I do believe this President, you know, went into it being very tough with China. And he listened to the Chinese leadership. And I think he has been too gullible, really, in believing what they are saying, and they pump him up and how great he is. And he listens, unfortunately. And that really is unfortunate, because this administration either gets tough with China who can lean on North Korea and get him to back down, or they don't.

In which case, we have a nuclear North Korea now and one of these days something will happen, which the world will regret.

So we are way past too late, but let's hope too late isn't here yet. And I yield back.

Mr. YOHO. Thank you for those comments.

Next we will go to Mr. Connolly from the State of Virginia.

Mr. CONNOLLY. Thank you, Mr. Chairman. I echo what Ben said. I was in Korea last year and went to the DMZ. And what really struck me was that the DMZ is to Seoul what Dulles Airport is to Washington, DC. It is virtually that close.

Mr. YOHO. Yeah.

Mr. CONNOLLY. And so we need to be careful when we saber rattle, when we tweet, when we throw out threats, because it unsettles that part of the world. We have to be careful about how that is interpreted by the North Korean regime and how it can sometimes inadvertently strengthen that regime and its resolve to develop nuclear weapons. But most importantly, that there are 25 million people who live in Seoul who will be the first victims of a violent outbreak. The second victims will be in Japan.

And so we need to be cognizant of that. That isn't to say don't be strong. Is it to say, however, we need to look at carrots as well as sticks, points of leverage to try to engage North Korea, even at the 11th hour, to try to get them to desist. And I think that ought to be the paramount goal of U.S. policy and the region, stay strong, but be willing to be engaged.

Thank you, Mr. Chairman, for holding this hearing.

Mr. YOHO. Thank you. Next, we will go to Mr. Joe Wilson from South Carolina.

Mr. WILSON. Thank you, Mr. Chairman. The totalitarian regime in North Korea continues to threaten the United States and our allies by testing nuclear capabilities and intermediate to long range intercontinental ballistic missiles. We will not and should not tolerate the escalation by this rogue regime in North Korea.

I am encouraged by the leadership of President Donald Trump and Ambassador Nikki Haley, Secretary of State Rex Tillerson, with Deputy Secretary of State, John Sullivan, for their commitment to demonstrating peace through strength, clearly expressing their commitment to keeping all options on the table when it comes to addressing the threat from North Korea, whether it be military, diplomatic or economic. We have a responsibility to protect families across the globe, but especially those of America, South Korea and Japan from this existential threat.

As one of only two Members of Congress to have visited Pyongyang, I saw firsthand North Korea's fragile economy. Buildings without electricity, highways that were virtually empty, inflammatory propaganda posters threatening death to South Koreans and Americans, and an international airport that was scarcely used. When contrasted with the vibrant capital of South Korea, it is clear that the communist regime of North Korea is fragile. This is why I believe the sanctions on North Korea promoted by President Trump have been successful, resulting in recent talks between North and South Korea and North Korea agreeing to attend the Winter Olympics for the first time since 2006.

I am grateful that President Trump is heeding the advice of military leaders, led by Secretary of Defense James Mattis, in taking the threat from North Korea seriously. The United States is fully prepared to handle this threat. And with the leadership of President Trump, Ambassador Nikki Haley, House Republicans and Foreign Affairs Committee Chair Ed Royce, we will be even more prepared in the future.

I yield back my time.

Mr. YOHO. Thank you for those comments. Next we will go to Mrs. Ann Wagner from Missouri.

Mrs. WAGNER. Thank you, Mr. Chairman. I want to thank both chairmen for hosting this important hearing today. Despite international pressure and a host of new sanctions, North Korea continues to develop nuclear weapons, but this should not be our only focus. We know that North Korea is not only miniaturizing a nuclear warhead for placement on a ballistic missile that can reach the continental United States, but also developing offensive chemical and biological weapons. These weapons are agents of terror, and change how we approach strategies to confront the North Korean regime.

Meanwhile, our partners in the west appear blind to the chemical weapons attacks by enemies of freedom across our globe. Just this past weekend, there were reports of a chemical gas attack in Syria that injured civilians. The United States must take a clear stand against the use of chemical and biological weapons and find pathways to disrupt North Korea's weapons of development. I look forward to your testimony and the questions that will ensue.

I thank you, Mr. Chairman.

I yield back.

Mr. YOHO. Thank you. I appreciate your comments. Next we will go to Mr. Dan Donovan from New York.

Mr. DONOVAN. Thank you, Mr. Chairman. With so much focus on North Korea's growing nuclear weapons program, this hearing

brings to light an alarming aspect of North Korea's arsenal that is ignored in the public discourse.

North Korea has a disquieting stockpile of conventional, chemical, and biological weapons which could proliferate to terror organizations and pose a threat to our homeland. I held a hearing on this topic just last month as chairman of the Homeland Security Subcommittee on Emergency Preparedness Response and Communications. So the information that we will gather here today will be enormously helpful for our ongoing Homeland Security activities.

According to public documents and the Congressional Research Service, the U.S. may need to deploy up to 700,000 troops in the event of hostilities on the Korean Peninsula. That is several times more than the troop levels we deployed in Iraq and Afghanistan. Further, the Pentagon estimates that 20,000 civilians in South Korea alone could die each day of a war all before the use of nuclear weapons by North Korea.

This is an incredibly dangerous situation, and that is why I am eager to learn from today's hearing. What we hear today will be useful to foreign policy, military preparedness and homeland security. It is our role as Members of Congress to apply this knowledge to strengthen America's defenses. And I thank the witnesses today for sharing their expertise with this panel and look forward to hearing your testimony.

Thank you, Mr. Chairman.

Mr. YOHO. Thank you for your comments. Mr. Garrett from Virginia.

Mr. GARRETT. It is 2018, and we are shocked as a Nation to learn that slavery is still practiced in areas of the world, and yet, a player on the international stage and in the spotlight, North Korea is in the business, as it were, of literally selling its citizens into slavery. With this being the case, can we have any doubt that North Korea would engage and employ weapon systems that would wreak havoc upon civilian populations? In fact, by my understanding, the population of Seoul is roughly 8 million. The metro area is closer to 24 million.

And having spent time as a fire supporter and understanding the proper employment of cannon rocket and missile fires, and understanding history and the fact that two-thirds of all combat casualties inflicted by the United States military since the Civil War were inflicted with indirect fire, 20,000 civilian casualties a day seems mild.

And the question as to whether a regime that would sell its own people into slavery to line its thinly-lined pockets would use these weapons against foreign civilians seems not to be a question at all. But I think these very people who we seek to protect in the interest of humanity and human rights are the key, and I would look forward to hearing from you how the individuals who might employ these conventional weapon systems might be targeted so that we might see a better humanitarian circumstance and a safer world for all in Korea and beyond. Thank you.

Mr. YOHO. Thank you for your comments. Mr. Dana Rohrabacher from California.

Mr. ROHRABACHER. I have been listening to everyone's comments. I had to grab a sandwich. That is all I've had all day. Let me just note just some reaction to some of my colleagues.

With all due respect, we are talking about the worst, God-awful dictatorship in the world. And we are finding our time, however, our focus on attacking the President of the United States. Now, I don't care. This guy is our President. Yeah, he has got some eccentricities. You think you are going to make war any less by attacking him instead of the enemy, instead of this guy who has murdered his own family and murdered countless people to maintain power in Korea? No.

These insults to our President, we should know when to make them and when not to. This is not the hearing to make those, especially considering the fact that what we have now is this very same communist dictator in South Korea talking about how to cooperate at least with the Olympics. Seems to me, the President calling him "rocket man" and "I have a bigger button to push than he does," maybe had the positive impact, because that is what happens with gangsters. If you deal with them forcefully and you put them down, they will respond to that.

Let me just note, the Democrat response when I first came here, which was a long time ago, during the Clinton administration, what was their response? Their response was to give $4 billion in order to curry favors with that dictatorship in North Korea. We gave them $4 billion worth of fuel. What do you think they used that $4 billion for? That is where they got the money to develop their nuclear weapon right now.

Yeah, of course, people attacking our President even after the last President gave $150 billion to Iran. Oh, yeah. No, I am sorry. This was not the place to attack the President of the United States. And yes, we should be able to be critical of policy. But everybody knows his eccentricities and personality. You are not going to do any good for our country at the cause of peace in a situation like this, that will make sure that the dictatorship in North Korea knows that our President doesn't have support.

Mr. CONNOLLY. Mr. Chairman.

Mr. YOHO. Yes, sir.

Mr. CONNOLLY. Given the fact that my friend from California just went way over time, I would ask 30 seconds to respond?

Mr. YOHO. I would rather wait till the end. I would like to get to the witnesses for the respect of them.

Mr. CONNOLLY. Well, the gentleman has said——

Mr. ROHRABACHER. I would request that he be given the extra 30 seconds to refute me. He always does.

Mr. YOHO. We will do 30 seconds.

Mr. CONNOLLY. I thank my friend.

Mr. YOHO. We need to get on for the——

Mr. CONNOLLY. I thank my friend.

Mr. YOHO [continuing]. Benefit of the witnesses.

Mr. CONNOLLY. I thank my friend. I find it ironic that in the midst of criticizing people for criticizing Mr. Trump, my colleague then goes on to criticize previous Presidents, all Democrats.

I would simply assert that in a democracy, we get to criticize an administration. And thank God for that. That is a right not allowed

in the North Korea regime. It is one still allowed here. And I, and my colleagues on this side of the aisle, intend to exercise it.

Thank you, Mr. Chairman.

Mr. YOHO. Thank you for pointing that out because around the world we see so many people don't have that voice of dissension, and that is something we are blessed with in this country.

Any other members seek recognition?

Hearing none, we will go to our witnesses. Starting with the panel, Dr. Anthony Cordesman is the Arleigh A. Burke Chair in Strategy at the Center for Strategic and International Studies. He previously served in the Office of the Secretary of Defense and the State Department. And we thank you for your long public service to this country.

Mr. John Parachini. He is the director of Intelligence Policy Center at RAND Corporation. Previously, Mr. Parachini served as executive director of the Washington Office of the Monterey Institute of International Study Center for Nonproliferation Studies. I look forward to hearing from you and all the other ones.

Mr. Anthony Ruggiero is the senior fellow at the Foundation of Defense for Democracies. Prior, Mr. Ruggiero was a foreign policy fellow for Senator Marco Rubio, served in the Department of Treasury and State.

And Ambassador Bonnie Jenkins is the founder and the president of the Women of Color Advancing Peace, Security and Conflict Transformation. Ambassador Jenkins previously served as the Coordinator for Threat Reduction Programs in the Bureau of International Security and Nonproliferation at the State Department.

I want to thank all of you for being here, for taking your time to educate us. And out of these meetings come policy recommendations and ideas that we have seen implemented. And so these are very important hearings.

And with that, you guys, I think, have been here enough to know how the light system works. You got green, yellow and red. Push your button before you speak so the microphone is on and Dr. Cordesman, we will start with you.

Thank you.

STATEMENT OF ANTHONY CORDESMAN, PH.D., ARLEIGH A. BURKE CHAIR IN STRATEGY, CENTER FOR STRATEGIC AND INTERNATIONAL STUDIES

Mr. CORDESMAN. Thank you, Mr. Chairman, ranking members, members of the committee. We are talking about a range of threats which include two massive sets of conventional forces. Each of which is equipped to fight unconventional wars in very different ways and in unpredictable scenarios.

We have biological capabilities in North Korea. I would caution the committee that almost all of the open-source data on agents, quantities, manufacturer and delivery systems are extremely unreliable. And that you should consult intelligence sources because all of what you see is, shall we say, inventive, in ways that are perhaps discouraging.

But certainly, North Korea is moving to the point where it can get biological weapons with nuclear lethalities. It can use infectious biological agents. The days in which you could control biological

agents, I think, quite frankly are over. The Australia controls, which once were controls, are now more of a shopping list in a cookbook in an international environment where very small and dual facilities can be rapidly converted.

Chemical weapons lethality is perhaps much more questionable than many people realize, but it is also something you can easily manufacture and deliver. Within the other areas, you have precision-guided ballistic weapons, unmanned aerial vehicles, and cruise missiles. These can be used to destroy critical infrastructure, critical movement capabilities and communications capabilities. And in Korea, this presents very special problems, both because Seoul and the greater Seoul area is so close to the DMZ and because this is such a fragile country in comparison with many other countries. There also is cyber and that, too, presents a problem.

I think the point that I would make that the committee needs to consider, casualties and direct casualties are not a real measure of what war can be. What we have seen in Syria, Afghanistan, Yemen, and Iraq shows that war fighting can have massive human consequences without using weapons of mass destruction.

In the case of Syria, you have seen it move something like a third of the population, losing its home, its businesses, casualties which we can't count because of the number of people who have died. One of the members mentioned the population of Seoul. It is actually over 25 million in the greater Seoul area and over 10 million in the urban area. It is concentrated in areas near a massive set of artillery emplacements. The models I have seen generally only focus on two artillery.

I have no idea where the lethality data come from. Quite frankly, they don't make any sense, because there are multiple rocket launchers with far higher volumes of fire and they can, at least in theory, use chemical and biological weapons. When you fire into a city, remember people panic. They run and they go outside the city. And Korea is a mountainous area with none of the spread and surplus facilities to absorb people we are used to.

There are five other urban cities which are critical targets. You are talking about essentially three major container ports. There are four major airports. Each of those is absolutely critical to a country which is dependent on imports, which cannot provide its own fuel and generate its own electricity without sustained traffic. And which bears no resemblance to the Korea of the Korean War.

Unconventional wars that move into these areas, disrupt the economy, make people panic, create refugees and IDPs, are as much a risk as weapons of mass destruction. Losing food, water and power can have the same effect. This is a country with the largest rocket and missile force in unconventional war that we know of. And if those become precision-guided systems, its lethality and war-fighting capability changes much as the use of advanced biological weapons. Thank you.

[The prepared statement of Mr. Cordesman follows:]

CSIS | CENTER FOR STRATEGIC & INTERNATIONAL STUDIES

Statement Before the
House Committee on Foreign Affairs
Subcommittee on Terrorism, Nonproliferation and Trade and
Subcommittee on Asia and the Pacific

"More Than a Nuclear Threat: North Korea's Chemical, Biological and Conventional Weapons"

A Testimony by:

Anthony Cordesman

Arleigh A. Burke Fellow in Strategy
Center for Strategic and International Studies

January 17, 2018

2172 Rayburn House Office Building

Introduction and Main Points

North Korean development of biological weapons both poses a serious potential threat to the United States and its strategic partners, and illustrates the broader dangers of proliferation. Biological weapons pose dangers that are growing steadily with the proliferation of the civil, dual-use, and military technologies that can be used to develop and manufacture biological weapons – such as genetic engineering and drones.

Figures One to **Three** show that some estimates indicate that Cold War biological weapons could be even more lethal that nuclear weapons, and they have always far cheaper. Such weapons can also substitute for nuclear proliferation. They also do not require and high cost delivery systems like large ballistic missiles that are relatively easy to detect and locate, although they can supplement them. Moreover, they can act as a powerful threat and deterrent on their own, or act as compensation for inferiority in nuclear forces.

In theory, North Korea has rejected the development of biological weapons and advocates a "nuclear, chemical, and biological weapons free zone" in the Korean Peninsula. North Korea acceded to the Biological Weapons Convention on March 13, 1987, and has consistently denied that it has biological weapons ever since. It has accused the United States of using biological weapons in the Korean War, and more recently of sending Anthrax to South Korea as part of such an effort, proving "that the United States is a group of gangsters threatening human existence." North Korea has also clearly developed nuclear weapons, however, and has long possessed large stocks of chemical weapons. Its restraint in any area of military activity seems dubious at best.

This means that the United States must plan for the possibility that North Korea has biological weapons and will continue to develop more sophisticated weapons over time. There also is a significant amount of reporting that it does have ongoing biological weapons programs, and even the mere possibility that North Korean -- or any other set of threat -- biological weapons exist already presents major problems for U.S. military planning, and already gives North Korean deterrent and strategic leverage.

Such weapons present major problems for intelligence collection and analysis in both peacetime and war. This is true at both the strategic level – which is illustrated at the end of this testimony – and the operational level. For example, they present unique challenges in attributing and characterizing attacks – particularly if they are used on distant targets, mirror natural disease, and are used at a time when no major crisis and period of tension exists with North Korea.

At the same time, even the best open source efforts present serious problems in terms of access to accurate data on North Korea and in estimating the ability to characterize the real-world effectiveness of current and future weapons programs, and these challenges may limit even the best intelligence efforts. So do key technical uncertainties. Serious questions exist about the ease of developing and producing truly effective biological weapons with predictable and controllable effects. Such questions also exist about the ways in which biotechnology will evolve new threats over the coming decade, and over the risk tolerance of the developer and user.

Accordingly, there are several priorities that this Committee should address in dealing with the issue of North Korea's biological weapons programs.

- The first is the need to ensure that the United States has given the right priority to developing the best possible data at the classified level and that we provide enough reliable unclassified data to properly define and examine the North Korean biological threat.
- The second is to look beyond estimates of the threat based on Cold War technologies and the current state of the art technologies, and examine how a North Korean threat could evolve over the next ten to fifteen years.
- The third is to look beyond more conventional ways that North Korea might use such weapons and examine the full range of ways in which North Korea might use biological weapons in a conflict.

Giving the Right Priority to Developing the Best Possible Data for U.S. Defense Planning

Any testimony on North Korea's biological weapons capabilities should begin with a critical caveat, and one that should govern the work of both this Committee and the overall U.S. Government approach to this issue. Much of the unclassified literature on North Korean biological weapons efforts either downplays the threat or makes estimates based on the capabilities of other countries and/or unverified reports from various Korean media sources and defectors.

The resulting data and analysis is often contradictory both in detail and in estimating the overall seriousness of the threat. Some analysts view North Korea as lacking modern public health facilities and medical progress -- which would limit its capability to use such weapons and make it highly vulnerable to a counter-BW attack. Others feel that its military is funded at levels which allow it to make advanced progress in military technology, and point out that public U.S. intelligence efforts have underestimated North Korea's progress in other high technology areas like nuclear weapons, ballistic missiles, and cyberwarfare.

The ability to analyze the biological weapons aspect of the North Korean threat is further complicated by the fact that much of the open source literature on the development and lethality of biological weapons – like the data in **Figure One, Figure Two**, and **Figure Three** – is theoretical, estimated by people with a technical background but who have not actually worked on biological weapons and their defenses, or draws on Russian assessments of Russian progress during the Cold War – assessments which came from developers with potential motives to exaggerate their progress and the threat.

Many of the models used to estimate casualties or risks of the kind shown in the tables at the end of this testimony seem to represent worst cases for a given disease or toxin. At best, they are estimates where the estimated lethality/effect and coverage is *possible*, but where the lack of actual use in war or large-scale human testing makes it impossible to assign a clear probability.

At the same time, most such weapons lethality, characteristics, and effects data predate advances in the biosciences that increase the ability to genetically engineer or otherwise improve such weapons. Much of the open source material that does touch upon genetic engineering and the modern biosciences is necessarily speculative, and rarely seems to come from experts who have actually worked on future options for offense and defense using such weapons.

Possible North Korean Weapons Efforts

There are indicators that North Korea has a biological weapons program well underway. Several DPRK defectors have claimed that the North tested biological and/or chemical weapons on mentally or physically deficient children and concentration camp prisoners.[i] More officially, South Korean Ministry of National Defense's biennial defense white papers have reported on possible North Korean biological weapons programs since at least 2000. Its 2000 paper stated that, "The North is also suspected of maintaining numerous facilities for cultivating and producing the bacteria of anthrax and other forms of biological weapons." The 2006 paper stated that North Korea "is able to produce biological weapons such as the bacteria of anthrax, smallpox, and cholera."[ii] Its 2010 paper stated that North Korea could "independently cultivate and produce biological weapons, including anthrax, smallpox, and cholera."[iii] Its 2016 paper, however, was more cautious: "It appears that the North can independently cultivate and produce such biological weapons as the bacteria of anthrax, smallpox and pest."[iv]

Other South Korean reports have not been so cautious. From 2002 to 2015, South Korean sources like a ROK Parliamentary Audit reported that North Korea had 13 types of biological weapons, and either has stockpiles or the capability to rapidly cultivate and weaponize them. In 2015, for example, an audit reported that, "North Korea has 13 types of biological weapons in the form of agents, and it can cultivate and weaponize them within ten days. In an emergency, it is likely that the North would prioritize using anthrax which is highly fatal and smallpox which is highly contagious. Special forces, airplanes, and contaminated carcasses are the potential delivery means. It appears that the North has not developed missile warheads with BW payload." A joint working group with a U.S. institute stated that same year that, "North Korea is assumed to have 13 types of biological agents including anthrax and the plague, and it is possible that it would use them in bioterrorism or in an all-out war."[v]

IHS Jane's has also listed recent South Korean MoD states in its November 2017 analysis of the North Korean biological threat,[vi]

> ...on 17 June (2015), the RoK MND issued a report that stated North Korea possesses an assortment of biological agents - including anthrax and smallpox - and the ability to weaponize them within 10 days. The report also stated that the North did not yet possess warheads to employ bioweapons.
>
> ...during June 2015 North Korea announced that it has created a vaccine, known as Kumdang-2, that could treat Ebola, HIV, "a number of cancers", and MERS. Kumdang-2 was reportedly manufactured from ginseng grown in fertilizer made from "rare-earth elements" and "micro-quantities of gold and platinum". Most serious researchers have significant reservations concerning these claims.
>
> ... In the aftermath of Kim Jong-nam's death in February 2017 due to toxic nerve agent VX, South Korea's MND was quoted by Yonhap News Agency as saying that North Korea's military is probably operating a regiment-level biochemical weapons unit.

The credibility of such reporting is uncertain since the number thirteen seems to have been borrowed from the number of biological weapons the FSU developed before the end of the Cold War. Some South Korean media reports, for example, claim the ROK has estimated that half of the DPRK's long-range missiles and 30% of its artillery were able to deliver biological or chemical weapons, though it was unknown if the North was able to equip missiles/artillery in a way that would allow the biological payloads to survive and effectively disperse.[vii]

U.S. intelligence has not reported publicly in any depth on North Korean biological weapons programs since 2012.[viii] However, U.S. intelligence reported in 2005 that,"North Korea has the

scientists and facilities for producing biological products and microorganisms, and has the ability to produce traditional infectious biological warfare agents or toxins. Pyongyang's resources presently include a rudimentary biotechnology infrastructure. In 2004, Pyongyang acquired dual-use bio-technical equipment, supplies, and reagents that could be used to support a BW program. North Korea possesses a conventional munitions production infrastructure that could be used to weaponize BW agents."

From 2006-2008, it reported annually that, "Pyongyang's resources presently include a rudimentary biotechnology infrastructure. North Korea has the scientists and facilities for producing biological products and microorganisms, and has the ability to produce traditional infectious BW agents or toxins. North Korea produces conventional munitions that could be used to deliver BW agents. In 2005, North Korea requested, but was subsequently denied, a preventive vaccine manufacturing facility from South Korea. U.S. intelligence also reported annually in 2009-2012 that, North Korea has a biotechnology infrastructure that could support the production of various BW agents. We judge that North Korea possesses a conventional munitions production infrastructure that could be used to weaponize BW agents."[ix]

Moreover, a DNI report issued in late 2011, noted that "North Korea has a biotechnology infrastructure that could support the production of various BW agents... There is not enough open source information to determine whether Pyongyang has progressed beyond the research and development stage and actually has created piles of actual biological weapons, delivery systems, and doctrine for the use of such weapons. Some reports indicate it has."[x]

The Nuclear Threat Initiative (NTI) website (http://www.nti.org) reports that South Korea's Ministry of National Defense issued a paper in April 2012, entitled "Research on Verification Measures for North Korea's Biological Weapons." It said that North Korea was capable of equipping its field artillery rocket launchers and mortars with biological weapons. The ministry indicated that anthrax, botulinum toxins, and smallpox pathogens were the most likely to be weaponized. It said that North Korea established a chemical defense Brigade and platoon under the guidance of its Nuclear Chemical Defense Bureau.[xi]

Such weapons are reportedly cultured in both civilian and military-related research institutes in the DPRK. **Figure Four** provides a possible list of North Korean agents and toxins, but there are no reliable reports to base any list upon. A number of experts, however, cite pathogens that have possible utility for BW, and that may be developed and weaponized by the DPRK. The most common include: Bacillus anthracis (anthrax), Clostridium botulinum (botulism), Mycobacterium tuberculosis (tuberculosis), Rickettsia prowazekii (typhus), Salmonella typhi (typhoid), Vibrio cholerae 01 (cholera), Yersinia pestis (plague), Korean hemorrhagic fever, Variola major (smallpox), Yellow fever virus (yellow fever), Dysentery, Brucellosis, Staphylococcus aureus, and Yellow Rain (T-2 Micro Toxins), and tetrodotoxin. Other sources indicate that North Korea has sought cultures from a range of source – including the Ebola outbreak in Africa.

Possible North Korean Facilities

What is clear is that even if the DPRK does not possess ready-to-use weapons – which present a range of technical and safety problems, it has the equipment and technical abilities to produce them. A variety of reports have warned over the years that North Korea could conceal a bioweapons research effort and possibly a major production and stockpile effort. Some also warn

that North Korea has dual-use facilities that could be used to produce biological agents and has a munitions industry that could be used to weaponize such agents.

Such reports are often highly speculative, and are no more reliable than the reports that list the diseases and toxins that North Korea *may* have weaponized. They do, however, indicate that North Korea has long had the potential to produce and weaponize biological agents.

Media sources reported in in 2001 that the that the ROK Ministry of National Defense (MND) estimated DPRK maintains at least three possible BW production facilities and six BW or BW-related research centers, including the No. 25 Factory in Chongju, the Central Biological Weapons Research Institute in Pyongyang and a plant in the City of Munchon, Kangwon Province. One ROK newspaper reported the existence of more than 10 facilities.

According to GlobalSecurity.org, Pyongyang's resources presently include a rudimentary (by Western standards) biotechnology infrastructure that is sufficient to support the production of limited quantities of toxins as well as viral and bacterial biological warfare agents.[xii] Other sources had estimated by 2012 that a number of DPRK facilities might be linked to ongoing work in biological weapons research, development, and manufacture.

The NTI has reported a number of facilities in addition to the No. 25 Factory in a report dating back to 2012. It listed:[xiii]

- The Research Institute of the Armed Forces Ministry (synonymous with the Bacterium Research Institute, Second Academy of Natural Sciences), responsible for developing biological weapons.
- A Biological research facility located in Songch'on County, South P'yongan Province, adjacent to the Onjong-ni chemical weapons facility; growth media is allegedly supplied (approximately 200 tons per year) by a facility in Munchon, Kangwon Province.
- A germ-producing facility known as the 25 February Plant (also known as the 25 Plant), located in Chongju, North Pyongan Province.
- The National Defense Research Institute and Medical Academy (NDRIMA), which conducts studies on disease pathogens such as the bacteria and viruses that cause anthrax, cholera, bubonic plague, smallpox, yellow fever, and others.

Some key possibilities dating back to this period are shown in the list in **Figure Five** and the map in **Figure Six.** These lists, however, have been expanded in more recent reports**.**

One such source, IHS Jane's, warns that data on suspect facilities in its November 2017 report are uncertain:

> Little is known about the facilities and organizations engaged in BW research, development, and production. Researchers from the Academy of Sciences' Microbiology Institute are known to study and conduct research abroad, most significantly in China (for example, the Chinese Academy of Sciences' Key Laboratory of Pathogenic Microbiology and Immunology and Institute of Microbiology in Beijing). A December 2001 South Korean press report claimed that the DPRK's Biological Research Institute had succeeded in developing BWs "thanks to a major role played by Russian experts who the institute invited early in the 1990s when they were made jobless in the wake of the collapse of the Soviet Union". Academic papers and reports published during 2011-16 indicate that North Korean scientists and researchers are actively conducting research into a wide range of dual-use technologies that could have direct applications in the development of BWs.

At the same time, IHS Jane's also listed 18 suspect facilities by name and location and the possible location of another.

Another expert, Joseph H. Bermudez, also warns about such uncertainties, but has also developed a relatively long lists of the facilities that might be connected with a biological weapons program – a recent 2017 study listed a total of 20 in all.[xiv] He also concludes that, [xv]

> As with all North Korea's NBC infrastructures, there are presently no detailed and accurate estimates of the number of personnel or organizations involved in the research, development, testing or employment of biological weapons. A rough order-of-magnitude estimate, however, suggests that there are 25-50 entities and 1,500-3,000 personnel directly involved in various aspects of the BW program.

Figure Seven combines the expanded lists shown in these two sources, but it is important to note that it scarcely exhausts the possibilities. North Korea could also follow in Saddam Hussein's footsteps and convert current dual use facilities to weapons R&D or production facilities – or design them in advance for rapid conversion. The DRPK possesses a number of dual-use biotechnology facilities that could be used to research biological weapons agents and produce militarily significant quantities of biological agents.[xvi] Both the Jane's and Bermudez lists of suspect facilities already include medical facilities, highlighting the fact that there is no clear line between biological offense and defense, and between medical/ scientific research and weaponization.

Bermudez notes that,[xvii]

> In its simplest form, the organization for the BW program is similar to the overall NBC program, with some specific modifications. Subordinate to the Cabinet, it is believed that the Ministries of Agriculture and Public Health provide some level of theoretical and practical research and information that inform the BW program. The Academies of Science and Medical Sciences reportedly provide theoretical and practical research and information, train personnel and conduct specific BW-related research and development. The KWP's Civil Defense Department coordinates with the KPA General Staff Department's Civil Defense Bureau and both have a defensive responsibility in coordination with the Ministries of Agriculture and Public Health.
>
> Components of the Munitions Industry Department's Academy of National Defense Sciences and Second Economic Committee have the primary research, development and production responsibilities for BW. Within the Academy of National Defense Sciences there are several research institutes and laboratories that are dedicated to BW development and these have reportedly operated several different test facilities... Within the Second Economic Committee the Third and Fifth Bureaus appear to have a leading role in BW development and production. Within the KPA, it appears that the primary BW defense responsibility resides with the Nuclear- Chemical Defense Bureau. This bureau, through its subordinate research, training and storage components, appears to also have a research and support role.
>
> ... In addition to the above, the State Academy of Sciences, Academy of Agricultural Sciences and Academy of Medical Sciences possess a number of "branches" or "laboratories" that could provide either direct, or indirect, support to the development of biological weapons and defenses. For example, the State Academy of Science's Bioengineering Research Branch has at least 12 institutes and organizations, the Biology Branch has at least eight and the Unjong Branch at least one. There is concern that the laboratories of the Ponghwa Clinic (responsible among many things for the health and longevity of the Kim family) may be associated with the BW program. Moreover, there are a number of additional agricultural, pharmaceutical and scientific entities (some of which may be under the control of the State Academy of Sciences) that could immeasurably enhance its BW program if put to that use, including the. Aeguk Compound Microbe Center. Aoji Protein Factory, Hoeryong Koryo Medicine Factory, Hygienic and Anti-Epidemic Center, Kim Hyong Jik University of Education, Choson Pugang Pharmaceutic Co., Ltd., Jongsong Pharmaceutical General Factory, Pyongsong and Hyesan Beer Factories, Central Epizootic Prevention Center and the Virus Institute and Genetic Medicine Institute at the Kim Il Sung University.

The same is true of a number of types of chemical production. Fertilizer production and food processing facilities that are not on most suspect facility lists. For example, pictures depicting the Pyongyang Bio-technical Institute (which Kim Jong-un was visiting) were released by the North Korean media in 2015. An analysis of these picture and reports on the visit indicated that the site

could potentially be used to produce mass quantities of anthrax.[xviii] North Korea has denied this and even invited members of the U.S. Congress to visit.

A 2017 study of the North Korean biological threat by the Belfer Center at Harvard points out that,[xix]

> In March 2017, according to the Rodong Sinmun, North Korea built an organic fertilizer production complex that covers "thousands of square meters" in Gangnamgun, Pyongyang that is claimed to be capable of producing thousands of tons of organic fertilizers.12 North Korea intends to continue exponential increase in bio-pesticide production to achieve Kim Jong-Un's goal of producing "Juche fertilizer," named after North Korea's self-reliance ideology. Such emphasis on agricultural self-reliance suggests the legitimate use of pesticide facilities for civilian use only.
>
> … a series of photos of the Pyongyang Bio-technical Institute released by the North Korean state media in 2015 raised concerns for dual-use. Analysis of these images revealed that the Pyongyang Bio-technical Institute could produce military-sized batches of BWs, specifically anthrax…. The modern equipment visible in these images also showed a violation of the Australia Group's dual-use items list, and showed that it is possible to convert the facility from pesticide to BW production.

A Lack of Current Official U.S. Reporting and Adequate Base for Open Source Analysis

As has already been mentioned, there has been little recent U.S. official unclassified reporting or testimony on North Korea per se, perhaps because of the concern with North Korean nuclear and missile testing and the clear emergence of a different kind of threat. Neither the DNI nor the Director of DIA chose to mention a North Korean biological warfare threat in the annual threat assessments they provided to Congress in 2016.

Testimony from DIA has previously touched upon the probability of North Korean biological weapons since at least 2006, but has done little to describe their possible use and effectiveness. There also is little open source material to hint at how closely intelligence analysts work with actual experts on biological weapons, and how much attention they give to unconventional options. There are at least some indications that there is a tendency to focus on using ballistic missiles to deliver biological weapons, rather than possible "line source" delivery by slow fliers like cruise missiles and UCAVs, or covert delivery options. In many ways, ballistic missiles are far less desirable options.

There are more recent outside studies of North Korean capabilities that do point out both the dangers of such programs and the uncertainties involved. Two excellent examples include work by Joseph Bermudez for the SAIS/USKI North Korea Instability Project: *Overview of North Korea's NBC Infrastructure,* June 2017; and by Hyun-Kyung Kim, Elizabeth Philipp, and Hattie Chung for the Belfer Center at Harvard, *North Korea's Biological Weapons Program, The Known and Unknown,* October 2017. These sources, however, make it clear that they are often forced to rely on uncertain technical estimates, unclassified Korean media and defector reports, and unverified South Korean parliamentary and MoD statements.

As a result, many analyses by think tanks, academic researchers, and other open source experts rely heavily on press reports – such as one that wrote about a South Korean MoD statement made in 2015, that "North Korea has 13 types of BW agents which it can weaponize within ten days, and anthrax and smallpox are the likely agents it would deploy." There is little reason to assume that such a statement is accurate -- both in terms of 10 days for all 13 agents (which is the number the FSU weaponized) -- and mixing a weapon that is not contagious with one of the most

could potentially be used to produce mass quantities of anthrax.[xviii] North Korea has denied this and even invited members of the U.S. Congress to visit.

A 2017 study of the North Korean biological threat by the Belfer Center at Harvard points out that,[xix]

> In March 2017, according to the Rodong Sinmun, North Korea built an organic fertilizer production complex that covers "thousands of square meters" in Gangnamgun, Pyongyang that is claimed to be capable of producing thousands of tons of organic fertilizers.12 North Korea intends to continue exponential increase in bio-pesticide production to achieve Kim Jong-Un's goal of producing "Juche fertilizer," named after North Korea's self-reliance ideology. Such emphasis on agricultural self-reliance suggests the legitimate use of pesticide facilities for civilian use only.
>
> … a series of photos of the Pyongyang Bio-technical Institute released by the North Korean state media in 2015 raised concerns for dual-use. Analysis of these images revealed that the Pyongyang Bio-technical Institute could produce military-sized batches of BWs, specifically anthrax…. The modern equipment visible in these images also showed a violation of the Australia Group's dual-use items list, and showed that it is possible to convert the facility from pesticide to BW production.

A Lack of Current Official U.S. Reporting and Adequate Base for Open Source Analysis

As has already been mentioned, there has been little recent U.S. official unclassified reporting or testimony on North Korea per se, perhaps because of the concern with North Korean nuclear and missile testing and the clear emergence of a different kind of threat. Neither the DNI nor the Director of DIA chose to mention a North Korean biological warfare threat in the annual threat assessments they provided to Congress in 2016.

Testimony from DIA has previously touched upon the probability of North Korean biological weapons since at least 2006, but has done little to describe their possible use and effectiveness. There also is little open source material to hint at how closely intelligence analysts work with actual experts on biological weapons, and how much attention they give to unconventional options. There are at least some indications that there is a tendency to focus on using ballistic missiles to deliver biological weapons, rather than possible "line source" delivery by slow fliers like cruise missiles and UCAVs, or covert delivery options. In many ways, ballistic missiles are far less desirable options.

There are more recent outside studies of North Korean capabilities that do point out both the dangers of such programs and the uncertainties involved. Two excellent examples include work by Joseph Bermudez for the SAIS/USKI North Korea Instability Project: *Overview of North Korea's NBC Infrastructure,* June 2017; and by Hyun-Kyung Kim, Elizabeth Philipp, and Hattie Chung for the Belfer Center at Harvard, *North Korea's Biological Weapons Program, The Known and Unknown,* October 2017. These sources, however, make it clear that they are often forced to rely on uncertain technical estimates, unclassified Korean media and defector reports, and unverified South Korean parliamentary and MoD statements.

As a result, many analyses by think tanks, academic researchers, and other open source experts rely heavily on press reports – such as one that wrote about a South Korean MoD statement made in 2015, that "North Korea has 13 types of BW agents which it can weaponize within ten days, and anthrax and smallpox are the likely agents it would deploy." There is little reason to assume that such a statement is accurate -- both in terms of 10 days for all 13 agents (which is the number the FSU weaponized) -- and mixing a weapon that is not contagious with one of the most

Looking beyond the "Rational Actor" Scenarios

There is an equal priority to look beyond the conventional Western approaches to deterrence, escalation, and scenario planning. Most such open source analysis tends to focus on the threat to the U.S. -- rather than a range of regional targets -- and on the assumption that North Korean behavior will largely comply with the "rational actor" approach to estimating military options and patterns in escalation. It is the tacit assumption that North Korea will approach the escalation ladder in using biological weapons with the same values and willingness to take risks in climbing from one level to another as the United States.

These assumptions may be correct, but North Korea has a wide range of potential targets to choose from, an authoritarian structure dictated largely by the choices and priorities of one individual, and a leadership whose extreme threats are a warning that its values and willingness to take risks and escalate may differ sharply from those of the U.S. North Korea has shown in the past that it is willing to suddenly escalate to violence, it has large intelligence and special forces elements, and its exercise reflect a potential willingness to escalate that differs from that of South Korea and the U.S.

This does not make Kim Jong-un "irrational." For all the critiques of his hardline rhetoric, threats, and sporadic low-level attacks and assassinations, it is important to note that he is the third generation of a family dynasty of dictators in a world where most dynasties end with the death or overthrow of the first dictator. He would also scarcely be the only hard line negotiator in the current world, or the only authoritarian leader to put his own survival above all other objectives and values.

The rational actor approach -- with its tacit assumption that "rational" is defined by moderate democratic states -- has never really fit the actual nature and history of war. If there is any lesson the U.S. needs to learn from its experience from the First Gulf War to the present, it is that we live in an era of unconventional warfare.

It is also a grim fact that the history of war is often one of "irrational scenarios" driven by unanticipated actions and consequences. The shift to "total war" that Sherman made during the civil war was scarcely the brief decisive battle that both sides anticipated at the start of the Civil War, nor was it a decision that President Lincoln made deliberately.

No one expected or wanted the level of escalation that led to the First World War. The bombing of civilian targets in World War II occurred without deliberate decisions to create a new form of war on either side, and the level of escalation that occurred in the battle of Stalingrad came without deliberate planning on either side.

In case of North Korea, and biological weapons, this raises several grim possibilities – some which may seem far more unconventional or extreme than others, but none of which seem totally outside the possible windows of North Korean planning and use of such weapons:

- **Creating a Phantom Threat**: North Korea's leader has already effectively signaled that North Korea has the technology to produce biological weapons. Disproving a negative is notoriously difficult, particularly since some commercial dual-use biological, medical, and food processing facilities can be converted relatively quickly, and intent is almost impossible to verify. Sending more specific false signals could not only give North Korea added leverage, but potentially drive the U.S. and its partners into a wide range of high cost defensive measures, and confront nuclear attack planning with the issue of combining nuclear and biological counterforce targeting.

- **Creating a Dual Nuclear-Biological Threat:** North Korea may not be able to create a major nuclear-armed ballistic missile threat to the U.S. for years, but developing a deterrent/strategic leverage strategy based on developing a parallel capacity to attack the U.S. or its partners with biological weapons could greatly undermine the credibility of U.S.-use of nuclear weapons and willingness to escalate.
- **Substituting Biological Weapons for Nuclear Weapons:** The cost and timelines for developing a strategy that sacrifice nuclear weapons for biological weapons could well be far cheaper, far harder to contain, and far harder to launch counterforce attacks against that a nuclear weapons strike – particularly if North Korea calculates it does not need intercontinental capabilities to attack the U.S. if it can attack key allies like Japan. It is also far from clear that any biological weapons control and inspection arrangements can be as effective as those for controlling nuclear weapons efforts.
- **Using Biological Weapons to Limit Escalation to Nuclear Weapons or as a Warning Signal of Intent:** A limited demonstrative use of biological weapons might take place in a major crisis as a signal that North Korea was actually prepared to use nuclear weapons, or respond to any number or all-out conventional attack by using them far more widely.
- **Covert and In-Place Attacks:** North Korea might smuggle in infectious agents, use simple low-cost delivery systems like UAVs or sprayers, or even create limited covert production facilities in South Korea, Japan, and the U.S. Even a phantom version of such a threat could take on a new impact. North Korean exercises using biological weapons covertly to attack the U.S. would also present a major challenge to the U.S. in creating effective defenses – particularly if they are exercised as "defensive" reactions to U.S. use of nuclear weapons.
- **Infectious Weapons:** Most studies assume that no leader or nation would risk using weapons whose spread could not be controlled and where using nation could not immunizes its own population and possibly that of its allies. North Korea's leader has already risked the equivalent of a "doomsday" scenario by going nuclear. Threatening – and actually using – a weapon that would present major control problems is at least a possibility. Attacking Japan, the U.S., or Guam might offer North Korea the equivalent of secure target areas, and so might the use of the DMZ as a barrier to movement by the infected population. Such control would be tenuous, but might be acceptable to North Korea's leader.
- **Use an "Unproven" or Uncertain Agent:** North Korea might weaponize. threaten to use, or actually use an agent whose lethality would not be proven reliably, taking a wide range of risks that its effects could be far smaller or greater than it could predict, whether infectious or non-infectious.
- **Create or Exploit a Biological Weapons Test or "Accident:"** A report of a suspicious death -- particularly from a weaponizable disease or one not found in North Korea -- could be used to signal North Korean capability and be the equivalent of a nuclear test, but would still be deniable.
- **Creating Truly Advanced Biological Weapons**: There are serious debates over the level of biotechnology in North Korea, and over how quickly such weapons can be developed and deployed. As work by the Jason Study made clear in the early 2000s, however, the

biosciences and applied technology are rapidly evolving to the point where at least six new types of bioweapons are now practical or will be relatively soon. They include binary biological weapons, designer genes, gene therapy as a weapon, stealth viruses, host-swapping diseases, and designer diseases.

A straight forward open-source summary of their potential by Lt. Colonel Joel O. Almosara for the USAF Non-Proliferation Center, issued in June 2010, is shown in **Figure Eight** that summarizes one estimate of their current major types and status.[xxi] An equally good additional summary is available in work done by Colonel Michael J. Ainscough, also of the USAF Non-Proliferation Center.[xxii] It should be noted, however, that other experts see the development of such weapons as more challenging and uncertain.[xxiii]

- **Ethnic/Racial/Sub-Group Weapons:** An outlier with today's weapons, but tailoring diseases to attack given races, ethnic groups, or subgroups by unique genetic characteristics. Being able to distinguish Japanese, U.S./Western forces, other nationalities or key subgroups.
- **Agricultural warfare:** Attacking crops or animals for longer-term economic and political effects.
- **BW Terrorist Attacks:** Using limited biological attacks to show the credibility of the North Korean BW threat, intimidate given countries or populations, escalate, target key facilities, or arm proxies, non-state actors, and third parties.
- **Non-Lethal and Incapacitating Attacks:** North Korea might use such attacks to incapacitate key parts of the economy, threaten or undermine a target, demonstrate the credibility of more lethal attacks, and limit the levels of U.S., South Korean, and Japanese response or escalation.
- **Infectious attacks with delayed effects:** Infectious agents can be used that take time to bring on the effects of disease while still being highly infectious – effectively use normal population movement as the main method of dissemination and delivery.
- **Use the DMZ as an attack line and attempt barrier to infection: Figure Nine** draws on an excellent CRS summary of the emerging North Korean nuclear threat to show just how vulnerable North Koreas population would be to even an artillery/multiple rocket launcher attack with biological weapons, and how close Chinese and Japanese populating centers are.[xxiv]
- **Carry Out Human Testing.** One of the key problems in biological weapons development is to determine the real-world effects of a given agent. IHS Jane's seems to rely on uncertain sources, but the character and past conduct of the regime makes the following reporting at least possible:

Sporadic and inconsistent reports by defectors during 2003-04 and 2009 state that North Korea has conducted testing of biological agents on political prisoners. For example, "... tests are conducted on political prisoners by the College for Army Doctor and Military Officers and Kim Il-sung University Medical College". ...During June 2013, Joanna Hosaniak, deputy director general of the Citizens Alliance for North Korean Human Rights, claimed that disabled children were being used by the DPRK for "medical tests such as dissection of body parts, as well as tests of biological and chemical weapons".

> … During July 2015 a curious report appeared that a North Korean scientist named only as "Mr Lee", who was reportedly involved in that nation's BW and CW programs in Kanggye, had defected and was residing in Finland. The report claimed that Mr Lee had brought with him a hard drive containing documents detailing not only those programs but the experimentation on humans.
>
> …Although all of these reports are difficult to confirm, they do conform to older reports of this nature that have occasionally appeared since the late 1970s. Taken as a whole, and within the context of what is currently known about the treatment of political prisoners within the country, such reports suggest a long-standing policy of low-level lethal testing of biological agents on unwilling human subjects.

- **Attack U.S. Bases on Islands to Isolate the Impact of Infectious or Highly Lethal Agents, or to Demonstrate Lethality and Risk to the U.S. of Further U.S. Escalation.** The map in **Figure Ten** draws on the same CRS study to show the vulnerability of U.S bases and facilities in South Korea and the broader region.
- **Use the Threat or Reality of Biological Warfare Escalation to Lever China, South Korea, Japan, and other Asian states.** North Korea has already shown that it can use its nuclear and missile threat to influence South Korea and Guam, and put pressure on China. The risk of escalating to use of biological weapons, the added problems in detection and defense, and the inability to predict North Korean restraint all combine to give North Korea potential leverage.
- **Cooperate with Iran and Other Non-Competing Threats to the United States:** This could involve North Korea sharing of technology, equipment, and agents and toxins with Iran and other strategic partners to cut costs, increase capability more quickly, and obtain critical technologies and equipment. As one unverified example, IHS Jane's reports that an Israeli researcher has claimed that North Korea has given update small power cultures to Syria Extending the range and scope of threat requires the U.S. to respond at considerable cost, and could undermine strategic partnerships because of allied fears. Creating widespread proliferation of true weapons of mass destruction as an international norm would also undermine efforts to limit both nuclear and biological proliferation.
- **Biological Attacks on Key Materials:** Tailor diseases to attack key components and materials.
- **"Doomsday Machine:"** Threaten or actually create a capability to launch a massive attack if North Korea faces nuclear retaliation or a successful invasion. Put agents in place, use infection weapons, and/or attack key South Korean population centers. Accept a high loss of life in North Korea as the price of such action.
- **Lash Out/Revenge/Gotterdammerung Attack**: Carry out a similar last response attack once the leader feels his defeat or overthrow is inevitable.

In short, the threat of North Korea's biological weapons presents two important corollaries to Santayana's statement that those who cannot remember the past are condemned to repeat it. First, one has to speculate about the future – since there is no way to remember it -- and those who remember the past repeat it anyway. Second, history repeatedly shows that the estimated probability of given actions is often more misleading than useful. Time and again, the actual probability of what are perceived to be low probability scenarios before the event turns out to be the eventual reality.

Addendum: South Korea's Civilian Vulnerabilities in War

The Broader Range of North Korean Threats

Any effort to look beyond North Korea's nuclear threat must address the fact that we live in an age of unconventional and asymmetric warfare, and one in which that warfare may take a political and/or economic form or be prolonged and a war of attrition. It must also consider the grim lessons of recent wars. The cost to civilians may go far beyond the number of dead and wounded from direct military attacks in some relatively brief, intense conflict. It may be economic, it may be the impact of being turned into refugees and displaced persons, and it may be a tremendous loss of national wealth, security, and the services that support modern urban life, education, and health.

We are also dealing with a threat in North Korea that has a long, proven track record of pushing massive threat and low-level attacks to the edge of war. It is sometimes called irrational for doing so, but in practice it has so far been able to achieve consistent benefits for its leaders – albeit at considerable cost to its people. Kim Jong-un does take serious risks, but it is important to note that he is one of the world's only third generation dictators, and builds on nearly 70 years of using serious military threats and actual military probes, tests, attacks, and assassinations that have kept his regime in power and given it political status and success.

The Committee should also consider the fact that the North Korea is organized for unconventional and asymmetric warfare, as well as for theater-level nuclear and conventional conflict. It can use weapons of mass destruction and focus on mass casualties. It can also use biological warfare in ways that may be as lethal as or more lethal than nuclear weapons, or in a wide range of scenarios that go from intimidation to limited attacks to joint use of nuclear and biological weapons. This is why I have prepared a statement for the record that focuses on the key risks and uncertainties involved, and the range of options that North Korea might exploit in using such weapons.

At the same time, North Korea can inflict major casualties using more conventional weapons like massed, sustained artillery fire because of Seoul's proximity to the DMZ, and intensely concentrated urban populations in other parts of the country. It could sharply increase such casualties by using chemical weapons – and possibly biological weapons as well—in a direct fire mode.

South Korea's Vulnerabilities

Most strategic analysis tends to focus on military balances, deterrence, and warfighting, and not the vulnerability and cost to civilian populations. When estimates are made of civilian casualties, many lack credible modeling and data and are little more than guesstimates. The fact remains, however, that South Korea is an ally with some unique vulnerabilities.

South Korea has a relatively large total population—some 51 million compared to only around 25 million for North Korea. This population compares with only around 21 million at the time of the Korean War, and one that was heavily agricultural and to some extent self-sustaining in rural areas. Today the population is over 80% urbanized—only about 5% of work force is in agriculture. Over 70% is in largely urban services, and most of the rest in manufacturing. Like most Americans, it is a population geared to modern life in a country with a $2 trillion dollar GDP in PPP terms, and $1.4 trillion in Market GDP terms. Peacetime living standards are high among global standards. South Korea has a GDP per capita of $38,000.

To put these figures in perspective, the CIA estimates that North Korea has a GDP of only $45-50 billion in PPP terms and $30 billion in market or foreign exchange terms, and a per capita income of only $1,700-1,800 per capita—with much of its wealth concentrated in its leaders, security forces, party members, and show piece capital.

South Korea also is extremely dependent on the constant flow of trade. South Korean exports total well over $500 million, and imports total over $400 million. Like Japan., South Korea is critically dependent on its seaports and airports for trade, but also for its energy supplies. It economy is also "fragile" in the sense that the secure flow of trade movement, and services is just as critical as in any major American city.

The Risks Inherent in a Major War Involving a Modern Urbanized Trading Nation

South Korea's population now lives in a country that is highly developed, but is also one where approximately 70% of the country is considered mountainous and it is concentrated in cities in the lowland areas, where the population density is very high in a limited number of target areas where displaced persons and refugees have few outside alternatives with any serious surplus capability to provide food, shelter, and services. Its population density also varies sharply in the areas nearest to North Korea. Gyeonggi Province in the northwest, which surrounds the capital of Seoul and contains the port of Incheon, is the most densely populated province. Gangwon in the northeast is the least populated.

The greater Seoul area alone has a population of over 25 million—close to half the 51 million population of the ROK and a far larger population than all of its other cities combined. More than 10 million people live in its city limits, and its core has a population density of well over 17,000 to people per square kilometer and 45,000 per square mile—twice the density of New York, four times that of Los Angeles, and eight times that of Rome. Just one of its 25 districts has 680,000 people. According to some sources, it is the largest single urban complex in the free world.

While Seoul is the key to the ROK's short range vulnerability, five other urban centers also define South Korea's broader vulnerabilities and ability to ride-out and recover from a major conflict. The CIA World Factbook lists the population of these cities as follows: Busan (Pusan) 3.216 million; Incheon (Inch'on) 2.685 million; Daegu (Taegu) 2.244 million; Daejon (Taejon) 1.564 million; and Gwangju (Kwangju) 1.536 million (2015). These cities do not have the sheer scale of urban sprawl of many American cities, and—coupled with South Korea's high levels of development– this adds to its urban and national vulnerability.

South Korea's need for secure maritime routes and ports and air traffic and airports also adds to its vulnerability. South Korea depends on secure maritime and land transit/access traffic to 7 seaport(s): Busan, Incheon, Gunsan, Kwangyang, Mokpo, Pohang, Ulsan, Yeosu. It depends on 3 major container port(s) (TEUs): Busan (19,469,000), Kwangyang (2,327,000), Incheon (2,368,000) (2015). It can conduct naval raids, use midget or other submarines, and use cargo ships to release floating mines—as Iran did in 1987-1988. It is unclear that it has smart mines, but—if it does—any ship with a false flag or submarine could release mines that rest on the bottom, can be set to activate at intervals, and rise up and strike given types of ships based on their sonic signature.

The CIA reports that current air traffic volume is 65+ million passengers a year and 11.2 billion metric tons-km. South Korea has 71 airports, but only 4 major airports, and up to 19 others that might handle some additional traffic. At least 40 are unpaved or unsuitable for long-range traffic. A few Man Portable SAM firings or airport killings could have a major impact in terms of wars of intimidation and threat and counter threats.

At a higher threshold of conflict, North Korea's current long-range conventional weapons seem to have sharp limits on their ability to strike point targets, but a number of reports make it clear that North Korea is developing a range of precision ballistic missiles, cruise missiles, and UCAVs and some reports indicate such capabilities may already exist.

Precision strikes with conventional warheads on South Korea's power grid, water purification and distribution facilities, sanitation facilities, key bridges and rail/road links, and key communications points could turn such weapons into "weapons of mass effectiveness." Sabotage, terrorism, or special forces raids could also have major impact.

The same is true of South Korea's energy situation. It gets 71% of its power from fossil fuels, and 21% from nuclear plants. It needs safe facilities to import 90%+ of its natural gas and around 3 MMB of crude oil plus 900,000 bpd in petroleum products. Moreover, *Oil & Gas Journal* (OGJ) and EIA reports that 3 of the 10 largest crude oil refineries in the world are located in South Korea, making it one of Asia's largest petroleum product exporters – as much as 1.3 mbpd. South Korea also depends heavily on imports from six LNG terminals: Incheon, Kwangyang, Pyeongtaek, Samcheok, Tongyeong, and Yeosu.

There are other areas of special vulnerability. South Korea is an "Internet society" with nearly 90% Internet access. There is no credible way to measure the cyber vulnerability of its economy and critical infrastructure, but it could be great. Some past estimates have downplayed North Korea's capabilities in these areas, but experts now question the extent to which North Korea has created an effective elite of attackers, and how difficult it is to create cadres that can exploit the weaknesses and vulnerabilities in civilian IT systems and networks. These are areas where there are severe open source limits to assessments of the capabilities of the KPA General Staff Department and Reconnaissance General Bureau (RGB), as well as the Ministry of State Security. Some South Korean sources claimed, however, in 2015 that North Korea had approximately 5,900 personnel engaged in cyber warfare.

War and the Greater Seoul Region

One truly successful nuclear or biological attack on Seoul alone could cripple South Korea's recovery capability for a decade, and create massive problems in the short term for the global economy that could severely restrict South Korea's ability to recover its markets and trade over time. Nuclear strikes on two to three cities would raise serious questions about South Korea's ability to recover over time, as would distributing infectious or highly lethal biological agents.

South Korea's very success, however, makes it highly vulnerable to a major conventional invasion and highly vulnerable to a range of unconventional attacks. A land war that swept down into Seoul and the eastern part of the DMZ area could have far worse displacement problems than the world has seen in Syria, Iraq, or Yemen – mountains, by sea, loss of key airport and possible ports. As other recent wars have shown, water, power, sanitation, food, medical services, shelter, and any form of security and education for children would all be critical issues.

As the fighting in Mosul and other Iraqi, Syrian, and Yemeni cities has recently shown, conventional warfare can all too easily ruin the security of millions, and kill or cripple thousands of others in the process that are never reported as casualties of war.

This is why so many studies of the North Korean warn of the threat posed by North Korean shelter artillery posts near the DMZ. These artillery positions can be as a close as 54 kilometers—33 miles from City center. North Korea, however, has a steadily increasing stock of multiple rocket launchers with much longer ranges, and some sources credit them with chemical and even biological warheads.

According to unclassified sources like IHS Janes, there are HARTS (hardened artillery shelters) all along DMZ tailored to region and topography. These hardened artillery sites are fortified fighting positions with gun emplacements, personnel shelters, fire direction centers, trenches for self-defense and communication, and protective cover for prime movers to alter weapons locations. Each weapon has its sheltered emplacement and ammunition supply with connecting passages and emplacements tailored to the local terrain and angles of fire. They are defended with wire and minefields. In many cases, it would take earth penetrators to destroy them and a delivery system with line-of-sight or imagery links to target therm.

To quote from a recent IHS Jane's report,

> North Korea possesses the largest rocket and ballistic missile force in the developing world. Within North Korea, ballistic missiles (i.e., Hwasong-6/-7, KN-02/-10, and KN-07/-08/-14) are controlled by the Strategic Force (see Strategic Weapon Systems), and artillery rockets are controlled by the General Staff and its Artillery Bureau.
>
> Since 2010, North Korea has developed and deployed (sometimes in very limited numbers) new versions of 122 mm, 240 mm and 300 mm MRL systems. The most significant of these is the eight-round (in two, four-round, pods) 300 mm system, which reportedly has a range in excess of 100 km and may employ a GPS guidance system.

Some estimates almost certainly sharply exaggerate the probable number of direct casualties from the conventional use of such weapons, but direct military deaths are scarcely the only measure of human suffering. Moreover, North Korea has two other methods of unconventional attack that merit serious examination, but where unclassified reporting has severe – if not critical– limits.

The casualty, panic, and disruption impacts of such attacks would also be far greater if North Korea used chemical and/or biological weapons. The open source reporting on such North Korean capabilities is highly questionable. These issues are discussed in detail for biological weapons in separate testimony.

Reports that North Korea has stockpiled as many as 20 different chemical agents seem to sharply exaggerate the threat. However, North Korea probably does have a substantial stockpile of artillery rounds, rockets, missiles and bombs that can deliver effective persistent area denial weapons like Mustard Gas that could kill many civilians as well, and both short-term and persistent versions of nerve agents. Even a few rounds of such weapons could easily produce massive panic, and a major barrage could be a truly horrifying killing mechanism.

Special Forces, DMZ Tunnel, and Intelligence Branch Attacks

Again, the details in open source data are questionable. However, the broad nature of the threat is not. IHS Janes also reports that North Korea has built approximately 20-25 such tunnels under the DMZ, and only four have been publicly identified and neutralized by South Korean/US forces.

One of the tunnels that has been discovered had a total length of 3,300 meters, and went 1,100 meters into South Korean territory. It was 50-150 meters deep, and two meters by two meters. Janes reports that as many as 8,000 troops an hour could move through them.

Sudden raids into the Seoul area might never come close to taking the city, but could have a massive disruptive effect. Moreover, such tunnels might be used to infiltrate large numbers of Special Forces who might be able to pass as civilians. According to IHS Janes and the IISS, North Korea is reported to have some 200,000 Special forces, organized into some 60,000 "storm" troops and 140,000 light infantries. IHS Janes quotes General Walter Sharp, who once commanded the South Korean-US Combined Forces Command as saying in 2014 that, "The havoc-raising potential of North Korea's special forces has grown as their numbers have increased and their training has shifted to terrorist tactics developed by insurgents in Iraq and Afghanistan...They are very capable, and they will employ these tactics." A major infiltration into the Seoul area might never succeed in classic military terms, but could be intensely disruptive and have a major civil impact.

There also serious questions as to whether North Korea has sleepers or trained infiltrators outside its special forces in organization like its KPA General Staff Department and Reconnaissance General Bureau. Again, to focus on open source material, HIS janes reports that the RGB is the primary organization tasked with collecting foreign tactical and strategic intelligence, and co-coordinating or conducting all external special operations. It also exercises operational control over agents engaged in military intelligence activities and oversees the training, maintenance, and deployment of guerrilla teams available for operation in the south.

Guarding a Strategic Partner and Ally

It should be apparent that this analysis does focus on "worst cases" to some degree. One of the grim realities of war, however, is that war after war has escalated to a real-world "worst case" that none of those who launched or planned for the conflict intended. It is also probably fair to say that all major wars have been "unconventional" in terms of the actual fighting relative to the plans and intentions of the actors that began them.

If nothing else, the risks described in this testimony, and that are the focus of this committee, should remind us that we all have a deep moral and ethical responsibility to South Korea and all of our strategic partners. We must not simply plan to deter, or to win at a tactical or kinetic level. We must plan to do everything we can to protect an ally or partner's civilians and living standards as well.

Figure One: Illustrative Estimate of Comparative Effects of Biological, Chemical, and Nuclear Weapons Delivered Against a Typical Urban Target

Using missile warheads: Assumes one Scud-sized warhead with a maximum payload of 1,000 kilograms. The study assumes that the biological agent would not make maximum use of this payload capability because this is inefficient. It is unclear this is realistic.

	Area Covered in Square Kilometers	Deaths Assuming 3,000-10,000 people Per Square Kilometer
Chemical: 300 kilograms of Sarin nerve gas with a density of 70 milligrams per cubic meter	0.22	60-200
Biological 30 kilograms of Anthrax spores with a density of 0.1 milligram per cubic meter	10	30,000-100,000
Nuclear: One 12.5 kiloton nuclear device achieving 5 pounds per cubic inch of over-pressure	7.8	23,000-80,000
One 1 megaton hydrogen bomb	190	570,000-1,900,000

Using one aircraft delivering 1,000 kilograms of Sarin nerve gas or 100 kilograms of Anthrax spores v. Assumes the aircraft flies in a straight line over the target at optimal altitude and dispensing the agent as an aerosol. The study assumes that the biological agent would not make maximum use of this payload capability because this is inefficient.

	Area Covered in Square Kilometers	Deaths Assuming 3,000-10,000 people Per Square Kilometer
Bright Sunny Day		
Sarin Nerve Gas	0.74	300-700
Anthrax Spores	46	130,000-460,000
Overcast day or night, moderate wind		
Sarin Nerve Gas	0.8	400-800
Anthrax Spores	140	420,000-1,400,000
Clear calm night		
Sarin Nerve Gas	7.8	3,000-8,000
Anthrax Spores	300	1,000,000-3,000,000

Source: Adapted by Anthony H. Cordesman from Office of Technology Assessment, Proliferation of Weapons of Mass Destruction: Assessing the Risks, US Congress OTA-ISC-559, Washington, August, 1993, pp. 53-54.

Figure Two: Lethality and Stability of FSU Biological Weapons in the Late 1990s

Weapons Type	Q_{50} in Open Air Deployment (liter or kilogram per square kilometer)	Stability
Liquid Plague	3.5-4.5	--1-2 hours in air
Dry Tularemia	3.0-4.0	--several hours to one day in air
Old Dry Anthrax	15-20	--days and weeks in the air, and
New Dry Anthrax	4.5-5.0	years on surfaces
Liquid Anthrax	5.0-5.5	
Dry Brucellosis	3.5-4.5	--up to 2 days in air
Liquid Glanders/Meliodosis	4.5-5.5	--several hours in air
Liquid Smallpox	3.5-4.0	--up to 24 hours in air
Dry Marburg	minus 1.0 dry	--30 minutes liquid in air and several hours
Q fever	-	-- to several days in air
Glanders	-	--several hours in air
Liquid Ebola	- dry	--30 minutes liquid in air and several hours
Coccidioidomycosis	-	--days and weeks in the air

Q_{50} = Amount of agent needed to infect 50% of the exposed population or troops evenly distributed over a square kilometer. These calculations are based on a lethal dose (LD_{50} of 10000-20000 spores for anthrax, 200-400 (up to 1,000?) bacterial cells for Brucellosis, 100-200 (up to 1,000?) bacterial cells for Glanders, 500-1500 bacterial cells for Plague, 10-100 bacterial cells for Tularemia, 1-3 cells for Q fever, 1-10 virons for Ebola, 1-10 virons for Marburg, 5-10 virons (up to 50?) for smallpox, and 10-100 arthospors for Coccidioidomycosis.

Source: adapted from Ken Alibek, "Biological Weapons/Bioterrorism Threat and Defense, - Past, Present, and Future," Paper prepared for the ETH international conference on "Meeting the Challenges of Bioterrorism: Assessing the Threat and Designing Biodefense Strategies, Furigen, Switzerland, April 22-23, 2005.

Figure Three: Area Coverage and Casualty Impact of Line Source Type of Biological Attack

Agent	Downwind Area Reach in Kilometers	Number of Casualties	
		Dead	Incapacitated
Rift Valley Fever	1	400	35,000
Tick Borne Encephalitis	1	9,500	35,000
Typhus	5	19,000	85,000
Brucellosis	10	500	125,000
Q Fever	20+	150	125,000
Tularemia	20+	30,000	125,000
Anthrax	20+	95,000	125,000

Note: Assumes 50 kilograms of agent along a two-kilometer line upwind of a population center of 500,000.

Source: George Christopher et al, "Biological Warfare: A Historical Perspective," Journal of the American Medical Association, 278, No. 5, August 6, 1997.

Figure Four: Possible Classic DPRK Biological Agents

TYPE	SYMPTOMS/CHARACTERISTICS	STATUS
Bacteria		
Bacillus anthracis (Anthrax)	Pulmonary (inhalation): difficulty breathing, exhaustion, toxemia, terminal shock. Cutaneous (skin): itching, small lesions and possible blood poisoning. Intestinal: nausea, fever, diarrhea. Mortality (if untreated): Pulmonary 80–95%; Cutaneous 5–20%; Intestinal 25–60%. Incubation period: Symptoms usually occur with 7 days. Not contagious.	Possibly weaponized, with delivery system
Vibrio cholera (Cholera)	Diarrhea, vomiting, and leg cramps. Rapid loss of body fluids, dehydration and shock. Mortality (if untreated): 5–10%. Death in 1–3 hours. Not contagious.	Unknown
Yersinia pestis (Plague)	Fever, headache, exhaustion, swollen lymph nodes, blood infection, and pneumonia. Mortality (if untreated): 50–60%. Incubation period: 1–3 days, death in 2–6 days. Contagious.	Unknown
Salmonella Typhi (Typhoid Fever)	Fever, malaise, chills, stomach pains, headache, loss of appetite, and rash. Mortality (if untreated): 12–30%. Contagious.	Unknown
Typhus	Fever, headache, chills, whole body rash, and general pains. Mortality (if untreated): 30–50%. Incubation Period: 6–12 days. Not contagious.	Unknown
Mycobacterium tuberculosis (tuberculosis)	Coughing, chest pain, fatigue, loss of appetite, chills, fever, and coughing blood. Mortality (if untreated): 30–50%. Incubation period: 14 days–1 year. Contagious.	--
Virus		
Hemorrhagic fever (Korean Strain)	Fever, fatigue, dizziness, muscle aches, exhaustion, internal bleeding, coma, delirium, and seizures. Mortality (if untreated): 5–15%. Incubation period: 7–17 days. Contagious.	Unknown
Variola (smallpox)	Fever, malaise, aches, rash, and crusting scabs. Mortality (if untreated): 30–40%. Incubation: 7–17 days. Contagious.	Unknown
Yellow Fever	High fever, chills, headache, muscle aches, and vomiting; can lead to shock, kidney, and liver failure. Mortality (if untreated): 5–40%. Incubation: 3–6 days. Not contagious.	--
Toxin		
Clostridium Botulinum (Botulism)	Nausea, weakness, vomiting, and respiratory paralysis. Mortality (if untreated): 60–90%. Incubation: 12–36 hours after inhalation. Death in 24–72 hours. Not contagious.	Unknown

Note: World Health Organization, http://www.who.int/csr/delibepidemics/en/genmay03.pdf; NATO, *Handbook on the Medical Aspects of NBC Defensive Operations AmedP-6(B)*, http://www.fas.org/nuke/guide/usa/doctrine/dod/fm8-9/2toc.htm; and US Army Medical Research Institute of Infectious Diseases, *Medical Management of Biological Casualties Handbook*, http://www.usamriid.army.mil/education/bluebook.html; and Centers for Disease Control. http://www.cdc.gov.

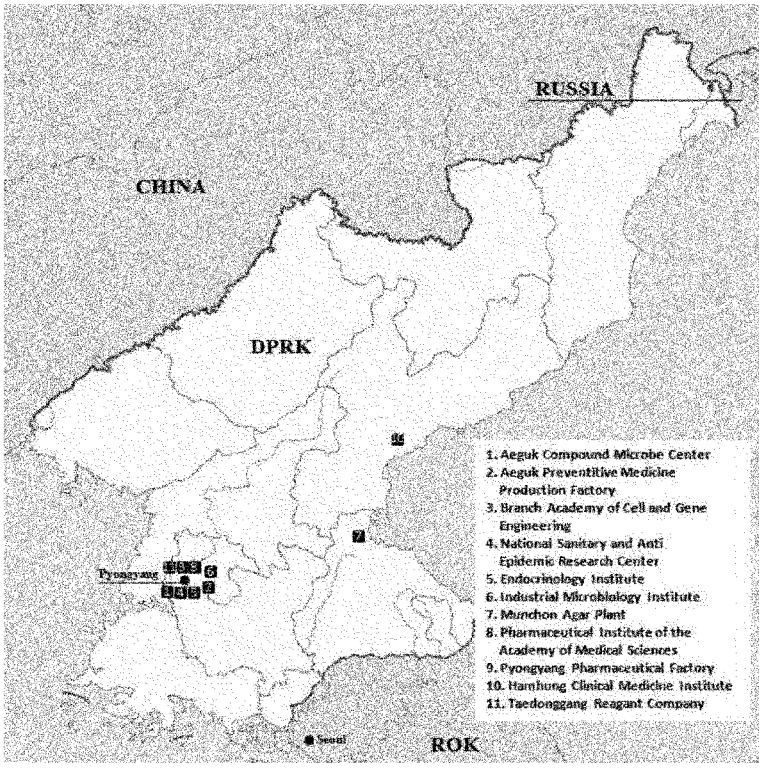
Source: Nuclear Threat Initiative, "North Korea: Biological," http://www.nti.org/country-profiles/north-korea/biological/; Chipman, "North Korea's Chemical and Biological Weapons (CBW) Programs," *North Korea's Weapons Programs*, 50.

Figure Five: Some "Classic" Examples of Possible North Korean Biological Facilities

Aeguk Compound Microbe Center	R&D and production of microbial-based fertilizer supplements.
Aeguk Preventative Medicine Production Factory	Comprised ten laboratories and various workshops devoted to R&D and production of vaccines and medicines. The main product has been hepatitis B vaccine.
Branch Academy of Cell and Gene Engineering	One of nine research branches of the Academy of Sciences. Conducts research on cellular biology and genetic engineering.
National Sanitary and Anti-Epidemic Research Center	Administers quarantines and provides inoculations against various diseases.
Endocrinology Institute	Mainly diagnoses and treats diabetes.
Industrial Microbiology Institute	R&D and production of microbial cultures.
Munchon Agar Plant	Agar (growth media) production. As of 1992, the annual agar production capacity was 200 tons.
Pharmaceutical Institute of the Academy of Medical Sciences	R&D of medicaments. Reportedly located in Pyongyang.
Pyongyang Pharmaceutical Factory	As of August 2000, the factory produced seven drugs, including antibiotics and multivitamins. Has received raw materials and support from UNICEF and Diakonie Emergency Aid of Germany.
Synthetic Pharmaceutical Division, Hamhung Clinical Medicine Institute	R&D of medicaments and clinical diagnostics.
Taedonggang Reagent Company	R&D of vaccines. Previously known as the November 19 Institute.

Sources: NTI, "North Korea: Biological"; "DPRK's NAS Pursues Cultivation of Stock Bacteria for Microbial Fertilizers," Chungang Ilbo, January 17, 2000; "DPRK Korea Donor Update," UNICEF Emergency Programs, August 7, 2000, http://www.reliefweb.int; Chipman, "North Korea's Chemical and Biological Weapons (CBW) Programs," *North Korea's Weapons Programs*, 50.

Figure Six: Map of Possible North Korean Biological Facilities



Source: Chipman, "North Korea's Chemical and Biological Weapons (CBW) Programs," *North Korea's Weapons Programs*, 57.

Figure Seven: More Recent List of Suspected Facilities

1st Biological Research Institute	State Academy of Sciences	Pyongyang
25 Factory (also known as February 25 Factory)	State Academy of Sciences	Chongju
2nd Biological Research Institute	State Academy of Sciences	Hamhung
3rd Biological Research Institute	State Academy of Sciences	Haeju
Bio-engineering Branch	State Academy of Sciences	Pyongyang
Central Biological Research Institute (may be the same as the Medical Research Institute)	Second Academy of Defense Sciences	
Central Biology Institute (also known as Central Biological Institute, Central Germ Research Laboratory)	Academy of Sciences	
Chemical and Biological Defense Research Centre	Nuclear-Chemical Defense Bureau, Korean People's Army	Pyongyang
College for Army Doctor and Military Officers (also known as Armed Forces Medical College)	Ministry of People's Armed Forces	Pyongyang
Experimental Biology Institute, Biological Branch	State Academy of Sciences	Pyongyang[1]
Kim Hyong-chik University of Military Medicine (also known as University of Military Medicine)	Ministry of People's Armed Forces[1]	Pyongyang
Kim Il-sung University Medical College	State Academy of Sciences	Pyongyang
Hygienic and Anti-Epidemic Center		Pyongyang
Medical Biology Institute	State Academy of Medical Sciences	
Microbiology Institute (also known as Institute of Microbiological Diseases, Institute for Medical Science, Microbiological Laboratory)	Academy of Sciences	Pyongsong
No. 25 Factory (aka February 25th Factory)	State Academy of Sciences	Chongju
Ponghwa Clinic Laboratories	Ministry of Health	Pyongyang
Pyongyang Medical College (Pyongyang University of Medicine)	State Academy of Sciences	Pyongyang

Preventive Medicine Unit	Ministry of People's Armed Forces/ General Staff Department, Korean People's Army	
U/I agar production facility[2]	State Academy of Sciences (?)	Munch'on
Vaccination Institute of the Central Sanitary Quarantine Institute	State Academy of Sciences (?)	
Notes: One defector has stated that a test station for biological warfare exists in Yangdok-gun, P'yongan-namdo. However, this remains to be confirmed. In October 2001, a member of the South Korean National Assembly National Defense Committee stated, "The fact that facilities for manufacturing biological and chemical weapons was newly built at the area of Chagang Province of North Korea in December last year was confirmed by the military authorities." The precise location of the biological facility is presently unknown.		

Source: Joseph H. Bermudez, June 2017, *Overview of North Korea's NBC Infrastructure*, 38 North, The North Korean Instability Project, http://www.38north.org/wp-content/uploads/pdf/NKIP-Bermudez-Overview-of-NBC-061417.pdf, p. 121; Hyun-Kyung Kim, Elizabeth Philipp, and Hattie Chung for the Belfer Center at Harvard, *North Korea's Biological Weapons Program, The Known and Unknown*, October 2017; IHS Jane's, *"Biological Capabilities, North Korean Strategic Weapon Systems," Jane's Sentinel Security Assessment - China and Northeast Asia*, Posted: 29-Nov-2017

Figure Eight: Almosara Summary of Trends in Advanced Bioweapons

(Excerpted from Lt. Colonel Joel O. Almosara, *Biotechnology: Genetically Engineered Pathogens*, The Counterproliferation Papers, Future Warfare Series No. 53, USAF Non-Proliferation Center, June 2010)

Binary biological weapons: This bioweapon is made up of a two-component system with independent elements that are safe to handle separately but when mixed together form a lethal combination. This system consists of a virus and helper virus, or bacterial virulence plasmid. Hepatitis D is an example of a virus and B as the helper virus; a combination of both produces severe infection to the host. "Hepatitis D needs to infect cells simultaneously with the unrelated virus hepatitis B; both are primarily transmitted through sexual contact or by contaminated blood or needles. The D virus takes advantage of the proteins expressed by the larger B virus, and greatly increases the severity of disease caused by hepatitis B. Infection by hepatitis D alone is not possible."

Examples of bacterial virulence plasmids are the plague (Yersinia pestis), anthrax (Bacillus anthracis), dysentery (Shigella dysenteria), and E. coli (Escherichia coli)....State of the Bioweapon: Binary biological weapons are already in existence. The process of generating this potential bioweapon has been decoded as revealed by a former Soviet Union defector. In 1992, a defector from the former Soviet Union code-named "Temple Fortune," described his experience with binary biological weapons. He revealed that the former Soviet Union secretly continued research on a "new and improved super-plague" (Yersinia pestis) despite President Yeltsin's order to end their offensive biological warfare program. The defector explained that the super-plague "would not only be more resistant to multiple antibiotics but it would be made with a special new process...In its initial form, the plague would not be virulent – so it would be safe to handle and store...Russian Scientists had found a way to convert this non-toxic plague back into a deadly, antibiotic-resistant form as soon as it was needed for weaponization."

It could also be argued that nations who have the equipment, material, resources, and knowledge could very easily produce these genetically engineered pathogens. Binary biological weapons are good candidates for future use because of their benign properties making them easy to store and handle. Because the components are not independently dangerous or hazardous they can easily be transported requiring less signatures for manufacturers. This also makes tracking more difficult.

Because of its properties and ability to be stored in large volumes for a long period without causing any harm, it is presumed that Russia still maintains this bioweapon. Future Application: The binary biological weapons processes are already known and are here to stay. In the wrong hands, bioweapons are an impending and dangerous threat.

Designer Genes and Life Forms: The successful completion of the human genome project paved the way to understanding the nature and content of the complex genetic information that could be used to create new biological life forms. There are about 599 viruses, 205 naturally occurring plasmids, 31 bacteria, 1 fungus, 2 animals, and 1 plant genomic sequence known to date.... This wealth of information regarding human genomes could expand the life forms using synthetic genes, synthetic viruses, and synthetic organisms....

Using the technique called recombinant DNA technology (gene splicing), a single gene is inserted in an organism to alter its genetic properties. An example is the splicing of genes to produce insulin for diabetics. Genes responsible for generating insulin are spliced into plasmid DNA that can then infect bacteria. The infected bacteria will then multiply, and the product is a large amount of insulin for medicinal purposes. The designer genes have been one of the greatest breakthroughs in the field of biotechnology...

...Despite the benefits of this biotechnology, the perils cannot be overlooked because genes can be programmed into an infectious state that could easily be transformed into a bioweapon.
DNA shuffling—also known as multigene shuffling, gene shuffling, and directed in vitro molecular evolution—has allowed scientists to greatly improve the efficiency with which a wide diversity of genetic sequences can be derived. A quantum leap in the ability to generate new DNA sequences...can be used to produce large libraries of DNA that can then be subjected to screening or selection for a range of desired traits, such as improved protein function and /or greater protein production.

State of the Bioweapon: Designer genes could become the most lethal form of bioweapon of the future. Nations that are interested in developing lethal weapons can openly use the genomic sequence databases to choose the genes they

want to design. One assessment noted, "The ever-expanding microbial genome databases now provide a parts list of all potential genes involved in pathogenicity and virulence, adhesion and colonization of host cells, immune response evasion and antibiotic resistance, from which to pick and choose the most lethal combinations."

This biotechnology undoubtedly offers great opportunities for medical purposes, but it could also have a significant impact in the production of genetically engineered pathogens resistant to drugs or vaccines, and increase virulence well-suited for bioweapons…Imagine using synthetic viruses to recreate the Spanish Flu pandemic of 1918 that killed 20 million people; the worst ever in history. With this wealth of information, it would be possible to create diseases using synthetic viruses that could wipe out an entire population.

The scientific and technological breakthroughs in genetically engineered pathogens have already changed the future outlook of the biological weapons and its threat. In October 2004, the Spanish Flu strain of 1918 was partially reconstructed by researchers at the University of Wisconsin using reverse engineering techniques. The influenza A virus was fully sequenced and characterized the following year. Experts predicted that, "Although, the knowledge, facilities, and ingenuity to carry this sort of experiment are beyond the abilities of most non-experts at this time, this situation is likely to change over the next 5 to 10 years".

… This is the bioweapon to watch for in the next 25 years. This technology is highly complex and only nations or groups that have biotechnological capabilities will be able to develop these genetically engineered pathogens. Advancements will continue to increase as the scientific world keeps finding new and innovative ways to manipulate human genetics.

Gene Therapy as a Weapon: ...There are two classes of gene therapy: germline (reproductive) and somatic cell (therapeutic). The DNA changes in a germline cell give it the capability to correct a bad gene allowing this new fix to be passed on through generations. Somatic cell gene therapy is different in that it can only affect the individual who received it Gene therapy has already been used in both animal research and human clinical trials.

Numerous examples of successful gene therapy application have been published and shown to have promising results…Another significant gene therapy outcome was the mousepox virus experiment in Australia. Researchers inadvertently developed a lethal mousepox virus while attempting to prevent the plague, within the mice population. This genetically altered virus attacked the immune systems of the experimental mice; it killed all of them. Researchers also found that sixty percent of those mice previously vaccinated died within days of exposure.

Though the progress of gene therapy is significant, there are more questions to answer and techniques to refine before this therapy becomes a viable treatment for many types of diseases. Although this was unintentionally created, if the same modified virus was added to smallpox, it could present the same lethality for humans.

Gene therapy is expected to gain in popularity. It will continue to be improved upon and could unquestionably be chosen as a bioweapon. The rapid growth in biotechnology could trigger more opportunities to find new ways to fight diseases or create new ones. Nations who are equipped to handle biotechnology are likely to consider gene therapy a viable bioweapon. Groups or individuals without the resources or funding will find it difficult to produce this bioweapon.

Stealth Viruses: The basic concept of this potential bioweapon is to "produce a tightly regulated, cryptic viral infection that can enter and spread in human cells using vectors" (similar to the gene therapy) and then stay dormant for a period of time until triggered by an internal or external signal. The signal then could stimulate the virus to cause severe damage to the system. Stealth viruses could also be tailored to secretly infect a targeted population for an extended period using the threat of activation to blackmail the target.

…Stealth viruses just like the gene therapy, require a vector to be inserted in the body and lay dormant until a trigger mechanism is activated either internally or externally. Imagine having a cancer-causing virus enter a human cell and lay dormant until an external signal triggers the disease. When the signal gets activated the cells become abnormal and could rapidly generate abnormal cell growth leading to a tumor and ultimately, death. Now, apply this concept to a population where an HIV virus gets disseminated within a target population. At a specific time chosen by the perpetrator, the signal would be triggered to harm an entire population all at once. Although this bioweapon is futuristic it is not improbable and deserves to be examined.

… Stealth viruses could become a potential bioweapon in the year 2035. There is much more to learn about the timing of the triggering mechanism to make this a feasible bioweapon. However, with the rapid rise in biotechnology, nations who have the capabilities to conduct research and development could certainly attain that level of knowledge. It would be highly unlikely to see groups or individuals possessing this bioweapon.

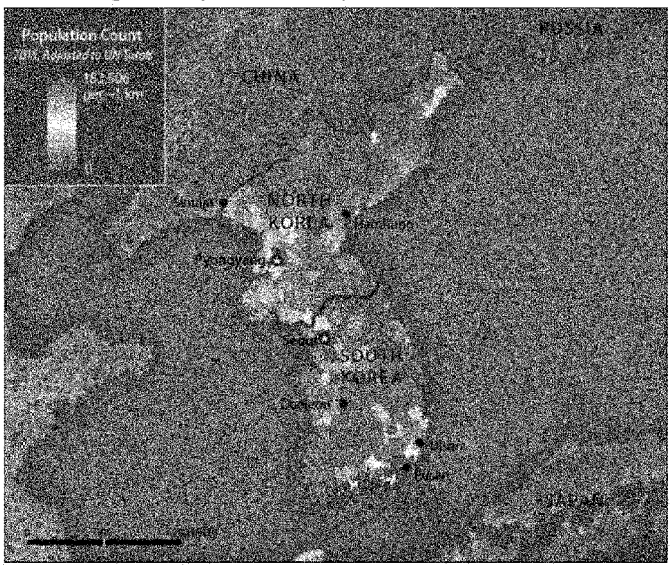
Host Swapping Diseases: Most viruses do not cause disease and are mainly considered parasites. They exist in evolutionary "equilibrium" with their host ranges, but if the "equilibrium" is disrupted, two things could happen; either the viruses become virulent or benign. Disruption of "equilibrium" occurs when a virus jumps out of its host range and transfers to a different host species where it could create another virus by mutating or picking up other genes by mistake. Animal viruses usually reside naturally in a "reservoir" or certain animal species and cause little to no damage to its host. Eastern equine encephalitis uses water fowl for its reservoir, rodents carry hantavirus, bats are the hosts for Ebola virus, and chimpanzees for the AIDS virus. When these viruses move out of their natural host reservoirs they eventually produce extremely lethal pathogens.

…The host swapping diseases are already an emerging biological warfare threat. They are also classified by the Center for Disease Control and Prevention as a Category A, meaning high-priority agent…. It could be argued that host swapping diseases as a bioweapon are already in existence. Nations, groups, and individuals could have fairly easy access to this bioweapon. With the rapid increase in biotechnology and with its dual-use nature, these genetically engineered pathogens can be extremely debilitating to a populace.

Designer Diseases: The knowledge of cellular and molecular biology has progressed nearly to a point where it may be possible to conceptually design a disease first and then create the pathogen to produce the desired effect of that disease. These designer diseases might work by attacking the immune system to affect the cells' natural ability to fight diseases (i.e., HIV virus causes AIDS), or it might reactivate dormant genes to cause destruction of cells (spread of cancer), or simply instruct cells to commit suicide and die (programmed cell death or "apoptosis"). Apoptosis can be useful in curing diseases like cancer. But, it can also be used to activate "death pathways" that could kill all cells at once…

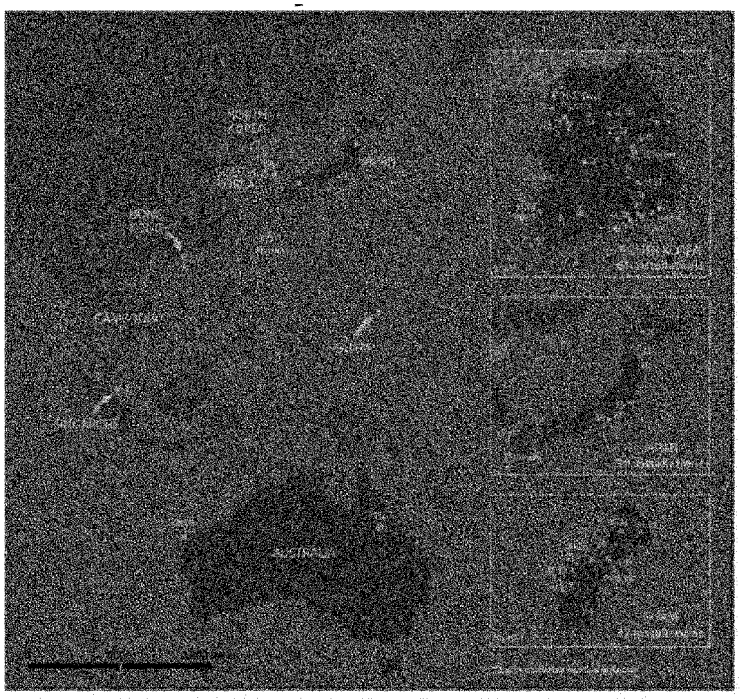
…The designer diseases are certainly a futuristic bioweapon but by no means inconceivable. Imagine designing a disease that could wipe out the whole population or a certain ethnic group? These bioweapons demand more investigation and research to fully understand their nature, properties, and potential harm….Designer diseases could be a viable candidate as a potential bioweapon in 2035. These bioweapons deserve to be further evaluated for future research. Nations who have the resources and capabilities to conduct research and development could certainly attain the knowledge to make this bioweapon a reality. It would be highly unlikely to see groups or individuals possessing this bioweapon.

Figure Nine: Short Range Vulnerability of South Korea's Population



Sources: Graphic created by CRS. Information generated by Hannah Fischer using data from the NASA Socioeconomic Data and Applications Center's Gridded Population of the Word, v4, with a UN-adjusted population count (2015), available at http://sedac.ciesin.columbia.edu/data/set/gpw-v4-population-count-adjusted-to-2015-unwpp-country-totals; Department of State (2015); Esri (2016); DeLorme (2016).

Figure Ten: Vulnerability of U.S. Bases in Asia and Possible Island Targets



Sources: Graphic created by CRS. Information generated by Hannah Fischer using data from the Department of Defense Base Structure Report, FY2015, available at https://www.acq.osd.mil/eie/Downloads/BSI/Base%20Structure%20Report%20FY15.pdf; Department of State (2015); Esri (2016).

[i] NTI and the James Martin Center for Nonproliferation Studies, "North Korea Biological Chronology," August 2012.
[ii] Hyun-Kyung Kim, Elizabeth Philipp, and Hattie Chung, *North Korea's Biological Weapons Program, The Known and Unknown*, Belfer Center at Harvard October 2017, p. 29. Also see their original sources: 한평수,"北, 화학무기 연 4500톤 생산능력"[Pyung-Su Han, "North Korea has capability to produce 4500 tons of chemical weapons per year"], 문화일보 [*Munhwa Ilbo*], September 16, 2002; 이상헌,"北, 화학무기 5천톤, 생물학무기 13종 보유" [Sang-Hun Lee, "North Korea has 5000 tons of chemical weapon, 13 types of biological weapons"], 연합뉴스 [*Yonhap*], October 5, 2009; 하종훈,"생물무기 테러 대응지침 일선부대 배포"[Jong-Hun Ha, "MND distributes guidelines on bioterrorism responses to front-line troops"], 서울신문 [*Seoul Sinmun*], March 3, 2012; 북한, 생물학무기 열흘내 무기화.. 백신치료제 확보 시급"[North Korea can weaponize its BW within ten days...Urgent need for securing vaccines], *MBN News*, June 17, 2015; 최정아, "주한미군, 한국에 탄저균 16차례 반입해 실험.. 북한 생물무기 사용에 대비"[Junga Choi,"USFK has imported anthrax samples 16 times to Korea to be prepared for NK's use of bioweapons"], 동아일보 [*Donga Ilbo*], December 18, 2015.
[iii] "2010 Defense White Paper," Ministry of National Defense, Republic of Korea, 31 December 2010,www.mnd.go.kr.
[iv] Hyun-Kyung Kim, Elizabeth Philipp, and Hattie Chung, *North Korea's Biological Weapons Program, The Known and Unknown*, Belfer Center at Harvard October 2017, p. 29. Also see their original sources: 한평수,"北, 화학무기 연 4500톤 생산능력"[Pyung-Su Han, "North Korea has capability to produce 4500 tons of chemical weapons per year"], 문화일보 [*Munhwa Ilbo*], September 16, 2002; 이상헌,"北, 화학무기 5천톤, 생물학무기 13종 보유" [Sang-Hun Lee, "North Korea has 5000 tons of chemical weapon, 13 types of biological weapons"], 연합뉴스 [*Yonhap*], October 5, 2009; 하종훈,"생물무기 테러 대응지침 일선부대 배포"[Jong-Hun Ha, "MND distributes guidelines on bioterrorism responses to front-line troops"], 서울신문 [*Seoul Sinmun*], March 3, 2012; 북한, 생물학무기 열흘내 무기화.. 백신치료제 확보 시급"[North Korea can weaponize its BW within ten days...Urgent need for securing vaccines], *MBN News*, June 17, 2015; 최정아, "주한미군, 한국에 탄저균 16차례 반입해 실험.. 북한 생물무기 사용에 대비"[Junga Choi,"USFK has imported anthrax samples 16 times to Korea to be prepared for NK's use of bioweapons"], 동아일보 [*Donga Ilbo*], December 18, 2015.

[v] Hyun-Kyung Kim, Elizabeth Philipp, and Hattie Chung, *North Korea's Biological Weapons Program, The Known and Unknown*, Belfer Center at Harvard October 2017, p. 6.
[vi] IHS Jane's, *"Biological Capabilities, North Korean Strategic Weapon Systems," Jane's Sentinel Security Assessment - China and Northeast Asia*, Posted: 29-Nov-2017

[vii] NTI, "North Korea – Biological," updated December 2015, http://www.nti.org/country-profiles/north-korea/biological/.

[viii] Hyun-Kyung Kim, Elizabeth Philipp, and Hattie Chung, *North Korea's Biological Weapons Program, The Known and Unknown*, Belfer Center at Harvard October 2017, p. 30.

[ix] Hyun-Kyung Kim, Elizabeth Philipp, and Hattie Chung, *North Korea's Biological Weapons Program, The Known and Unknown*, Belfer Center at Harvard October 2017, p. 30.
[x] Deputy Director of National Intelligence for Analysis, "Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions, Covering 1 January to 31 December 2010," March 2011, http://www.fas.org/irp/threat/wmd-acq2010.pdf. Also see United States Office

of the Director Of National Intelligence, "Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions," 31 December2011, www.dni.gov; "S.Korea Developing Defensive Measures Against N. Korean Chemical Attacks," Yonhap News Agency, 7 October 2011, www.yonhapnews.co.kr; J. Berkshire Miller. "North Korea's Other Weapons Threat," The Diplomat, 12 November 2011, www.thediplomat.com.

[xi] The Official release date of the report is unknown. Cho Byeong-wook, "군·북 , 생화학무기 13 종...방이책 강구" [Defense Ministry Devising Defense Measure Against 13 Types of Biological Weapons That North Korea Possesses]," *Segye Ilbo* , 23 April 2012, www.segye.com.

[xii] Globalsecurity.org, "Biological Weapons Program," http://www.globalsecurity.org/wmd/world/dprk/bw.htm.

[xiii] NTI, "North Korea – Facilities: Biological," updated February 2013, http://www.nti.org/country-profiles/north-korea/facilities/.

[xiv] Joseph H. Bermudez, June 2017, *Overview of North Korea's NBC Infrastructure*, 38 North, The North Korean Instability Project, http://www.38north.org/wp-content/uploads/pdf/NKIP-Bermudez-Overview-of-NBC-061417.pdf, pp. 110-14.

[xv] Joseph H. Bermudez, June 2017, *Overview of North Korea's NBC Infrastructure*, 38 North, The North Korean Instability Project, http://www.38north.org/wp-content/uploads/pdf/NKIP-Bermudez-Overview-of-NBC-061417.pdf, p. 11.

[xvi] Chipman, North Korea's Weapons Programs, 60.

[xvii] Joseph H. Bermudez, June 2017, *Overview of North Korea's NBC Infrastructure*, 38 North, The North Korean Instability Project, http://www.38north.org/wp-content/uploads/pdf/NKIP-Bermudez-Overview-of-NBC-061417.pdf, pp. 11 and 13. (See pp. 10-14)

[xviii] NTI, "North Korea: Biological," updated December 2015.

[xix] Hyun-Kyung Kim, Elizabeth Philipp, and Hattie Chung for the Belfer Center at Harvard, *North Korea's Biological Weapons Program, The Known and Unknown*, October 2017.

[xx] See *Australia Group Common Control List Handbook; Volume II: Biological Weapons-Related Common Control Lists*, http://www.australiagroup.net/en/documents/Australia-Group-Common-Control-List-Handbook-Volume-II.pdf.

[xxi] Lt. Colonel Joel O. Almosara, "Biotechnology: Genetically Engineered Pathogens," *The Counterproliferation Papers*, Future Warfare Series No. 53, USAF Counterproliferation Center, June 2010.

[xxii] Colonel Michael J. Ainscough, Biotechnology: "Next Generation Bioweapons: The Technology of Genetic Engineering Applied to Biowarfare and Bioterrorism," *The Counterproliferation Papers*, Future Warfare Series No. 14, USAF Counterproliferation Center, April 2002.

[xxiii] For example, see (see Jan van Aken & Edward Hammond, *Genetic engineering and biological weapons, Science and Society*, EMBO reports VOL 4 , special issue,] 2003.)

[xxiv] See Kathleen J. McInnis, Andrew Feickert, Mark E. Manyin, Steven A. Hildreth, Mary Beth D. Nikitin, Emma Chanlett-Avery *The North Korean Nuclear Challenge: Military Options and Issues for Congress*, Congressional Research Service, November 6, 2017, R44994.

Mr. YOHO. Thank you. I appreciate those grave warnings. Mr. Parachini.

STATEMENT OF MR. JOHN PARACHINI, DIRECTOR, INTELLIGENCE POLICY CENTER, RAND CORPORATION

Mr. PARACHINI. Thank you, Mr. Chairman. And I appreciate the committee holding this hearing on this topic.

Examining chemical and biological weapons in this theater has not been done in an open hearing like this as much as it should be. Given the danger they pose, how they might be a catalyst to leading us to a nuclear precipice and indeed how wrong assessments of those capabilities may trigger the wrong response.

There are some distressing parallels with the situation in Iraq. Old assessments get repeated about new information or there is no new information, there is considerable input from defectors, cooperating sources that are hard to validate. There are allied governments that face imminent threats and have reason to hedge against high consequence threats if capabilities exists and if they might be used.

A key difference between the Iraq and North Korean case is that the North Koreans have demonstrated they have nuclear weapons and they are rapidly developing their ballistic missile capabilities. Another difference, though, is that we knew a lot about the past Iraqi capabilities, and then when we entered in 2003, we actually didn't know that much of their current capabilities. With North Korea, we know little about their past and we have a very incomplete understanding of their current capabilities.

But because most states with an industrial capability to produce pesticides have some capability probably to produce chemical weapons, we can be reasonably confident that North Korea has these capabilities and has tested and produced chemical weapons and has a stockpile. However, as Dr. Cordesman mentioned, the repeated assessments suggests that there is an arsenal of a range of agents and delivery systems. But these are the same numbers that get repeated over the last decade and a half. Means of delivery included artillery, rockets, missiles, aircraft and drones. But it begs the question that these same citations of capabilities have not been updated in the last decade and it makes you wonder about their currency.

However, there is a new development, and that is the recent assassination of Kim Jong-nam. Other countries have used poison to assassinate regime enemies, but I think we can assess that this also could be a signal by this regime that we have nerve agent and we are willing to use it.

Biological weapons capabilities in North Korea, the assessments range from a list of agents that might number in a dozen or more to a limited program within existing industrial infrastructure to mere research. The potential of these weapons is great. And so it bears paying very close attention to them, but, again, the evidence we have is indirect, circumstantial, based on third-party observations and South Korean Government information and some unclassified U.S. Government statements.

I think the best we can say at this time is they have the industrial infrastructure for a biological weapons program. They prob-

ably have the know-how and they probably have done some basic R&D. The more disconcerting part that I think one of the members has mentioned is North Korea's history as a proliferator. It helped with the construction of a reactor in Syria. It shipped chemical weapons defensive gear to Syria, and indeed, it has helped with their missile program with some reported allegations that they have helped Syria configure ballistic missiles to carry chemical agent. They have also been a supplier of conventional weaponry to Hamas and Hezbollah over the years.

There is no information that they have transferred unconventional capabilities to terrorist groups, and indeed the empirical record does not show that any nation state has done so. However, this remains an enduring danger that we have to pay attention to.

So what can be done? Well, there are four things. We can expand the dual-use biosurveillance in Korea that would be useful for catching things like SARS and MERS as well as an intentional biological attack. We can help other states enforce the robust set of sanctions that are out there. Many states don't have the capabilities to enforce these sanctions. We can help them do that. We can expand defensive measures. Dr. Cordesman mentioned that.

And finally, we can reinforce the taboo against chemical weapons and biological weapons by asking for a pledge from the North Koreans for no-first-use of these weapons.

Thank you, Mr. Chairman, and I look forward to your questions.

[The prepared statement of Mr. Parachini follows:]

Assessing North Korea's Chemical and Biological Weapons Capabilities and Prioritizing Countermeasures

John V. Parachini

CT-486

Testimony presented before the House Foreign Affairs Committee, Subcommittee on Terrorism, Nonproliferation and Trade, and the Subcommittee on Asia and the Pacific on January 17, 2018.

For more information on this publication, visit www.rand.org/pubs/testimonies/CT486.html

Testimonies

RAND testimonies record testimony presented or submitted by RAND associates to federal, state, or local legislative committees; government-appointed commissions and panels; and private review and oversight bodies.

Published by the RAND Corporation, Santa Monica, Calif.

Assessing North Korea's Chemical and Biological Weapons Capabilities and Prioritizing Countermeasures

Testimony of John V. Parachini[1]
The RAND Corporation[2]

Before the Committee on Foreign Affairs
Subcommittee on Terrorism, Nonproliferation and Trade and the Subcommittee on Asia and the Pacific
United States House of Representatives

January 17, 2018

Any conflict on the Korean peninsula could entail the use of chemical or biological weapons (CBW), including a conflict short of a nuclear exchange. For this reason, it is important not to let attention to nuclear weapons cause us to overlook these other potentially lethal threats, to assess the extent to which North Korea may have these capabilities, and evaluate the threat they may pose. In addition, the use of CBW could easily escalate a conflict to the nuclear level. However, it is important to not exaggerate the threat that CBW present. In one of the heavily armed regions of the world, underestimation or overestimation of a threat can skew precious resources and leadership time one way or another, and prioritizing the threats of different weapons categories is essential. Clearly, nuclear weapons are our greatest concern, but calibrating how CBW and conventional weapons factor into the current military standoff or raise the threat of war is more important today than it has been since the end of the Korean War.

Information about North Korea's CBW capability is incomplete. What information is available has changed over the years and has come from various sources, some of which are indirect and difficult to validate and are shrouded by the North Koreans' skill at denial and deception. There are some parallels with what we knew about Iraq's weapons of mass

[1] The opinions and conclusions expressed in this testimony are the author's alone and should not be interpreted as representing those of the RAND Corporation or any of the sponsors of its research.

[2] The RAND Corporation is a research organization that develops solutions to public policy challenges to help make communities throughout the world safer and more secure, healthier and more prosperous. RAND is nonprofit, nonpartisan, and committed to the public interest.

destruction (WMD) programs before 2003. In the Iraqi case, we knew a good deal about the past programs, but not much about the state of the program at the start of the 2003 military operations. In contrast, in the North Korean case, we don't know much about the past, and sourcing on the present is far from certain.

In this statement, I draw on unclassified sources to outline what we believe we know about North Korea's CBW capabilities, how they might be employed in a conflict, the prospect that North Korea may share these capabilities with others, and possible countermeasures that the United States and the international community should consider to reduce these capabilities and the motivations to use or transfer them.

Calibrating the threat of North Korean CBW capabilities is important for allocating precious U.S. and allied resources. It is important to hedge against even low-probability threats if they have high consequences. Any military capability may escalate to the nuclear precipice. U.S. and international community efforts should therefore aim to reduce the possibility for North Korea to use CBW capabilities because of their potential to escalate military operations to a nuclear level as well as the mass death CBW may cause if used against heavily populated areas.

Information Sources on North Korean CBW Capabilities

We know far less about North Korea's chemical and biological programs than its missile and nuclear programs in part because we have fewer and less-reliable sources of information. Unlike nuclear tests, which generate seismic signatures, and missile launches, which can be detected via a variety of technical collection methods, CBW acquisition, production, and testing can be hidden in legitimate industrial infrastructure. For the most part, North Korea's nuclear and ballistic missile activities are overt and generally conducted from known facilities. For chemical and biological weapons, acquisition is difficult to discern because the equipment and material can also be used for industrial and commercial activities. Production of CBW agents can appear to be legitimate industrial operations; legitimate industrial operations can also be converted to the production of warfare capabilities comparatively easily.

North Korean Chemical Weapons Capabilities: A High Priority Threat

North Korea is believed to have a varied and robust chemical weapons arsenal. The consensus view is that North Korea initiated its work on chemical weapons in the 1960s and began producing them in volume in the early 1970s.[3] Most estimates indicate that North Korea's chemical weapons arsenal contains nerve agents, blister agents, blood agents, choking agents, and riot-control agents. Estimates of the amount of North Korea's stockpile of chemical weapons range from 2,500 to 5,000 tons. This figure has not changed in over a decade,

[3] International Crisis Group, "North Korea's Chemical and Biological Weapons Programs," *Asia Report*, No. 167, June 18, 2009. As of January 15, 2018: https://www.crisisgroup.org/asia/north-east-asia/korean-peninsula/north-korea-s-chemical-and-biological-weapons-programs

which raises some questions about its accuracy.[4] Delivery methods are believed to include artillery projectiles, various types of rockets, aircraft, ballistic missiles, and naval weapons systems.[5]

Many analysts assess that North Korea would use its chemical weapons to gain a quick strike advantage in the early stage of a ground conflict or as a retaliatory measure if the regime was on the verge of defeat. In this scenario, North Korea would use chemical weapons to degrade South Korean and U.S. forces' ground operations and terrorize the civil population in South Korea. Depending upon the intensity of the conflict, North Korea might also launch ballistic missiles with chemical payloads against U.S. air bases in the region to suppress U.S. air support to combat operations on the Korean peninsula.

The recent killing of Kim Jong-Un's half-brother, Kim Jong Nam, with some form of VX nerve agent in Malaysia's Kuala Lumpur airport provides further information about the prominence of North Korea's chemical arsenal.[6] Assassinating a regime adversary in such a public place with a chemical warfare agent may have been meant to send a message to the international community about the regime's chemical weapons arsenal and its willingness to use it. There are many ways to carry out assassinations, and countries have assassinated people with chemicals and toxins in the past. However, the use of this exotic military warfare agent VX amid tensions on the Korean peninsula could also have been a signal by the regime that it has capabilities short of nuclear weapons and is prepared to use them.

North Korean Biological Weapons Capabilities: A Heavily Latent Threat

North Korea's biological weapons capabilities are the least well known and understood of the its unconventional weapons. There are several reasons we know so little about the regime's biological weapons capabilities. First, the regime may be better able to hide these activities in comparison to its nuclear and missile activities because of their dual-use nature. Second, the regime may have never pursued a biological weapons capability to the same extent as other capabilities because of the difficulty of managing an effective program. Third, the majority of the regime's resources may have been allocated to other components of its military, and the program is not as big or is non-existent. And finally, because of the abhorrent nature of this category of weaponry, the regime may be more inclined to very closely hold the program as secret.

---

[4] For an excellent review of issues associated with the sourcing on North Korea's chemical and biological weapons programs see Elisa D. Harris, "Threat Reduction and North Korea's CBW Programs," *The Nonproliferation Review*, Fall-Winter 2004. See also Sonia Ben Ouagrham-Gormley, "Potemkin or real? North Korea's biological weapons program," *Bulletin of the Atomic Scientists*, July 18, 2017. As of January 15, 2018: https://thebulletin.org/potemkin-or-real-north-korea's-biological-weapons-program10957.

[5] International Crisis Group, 2009; See also Joseph S. Bermudez, Jr., "North Korea's Chemical Warfare Capabilities," *38 North*, October 10, 2013. As of January 15, 2018: http://www.38north.org/2013/10/jbermudez101013; and Kyle Mizokami, "Everything You Need to Know: North Korea's Chemical Weapons Are No Joke," *National Interest*, August 10, 2017. As of January 15, 2018: http://nationalinterest.org/blog/the-buzz/everything-you-need-know-north-koreas-chemical-weapons-are-21849.

[6] For an account of how the attack was likely conducted, see Doug Bock Clark, "The Untold Story of Kim Jong-nam's Assassination," *GQ*, September 25, 2017. As of January 15, 2018: https://www.gq.com/story/kim-jong-nam-accidental-assassination.

Much of the unclassified information on North Korea's biological weapons capability comes from uncorroborated sources from the 1990s, the South Korean government, or defectors.[7] Many of the unclassified assessments repeat one another. Most recent U.S. government unclassified threat assessments have not ascribed much to a North Korean biological weapons program; in some instances, these assessments have been inconsistent. In 1997, the Central Intelligence Agency (CIA) assessed that North Korea was "capable of supporting a limited [biological weapons] effort."[8] In 2005, CIA Director Porter Goss reported that "North Korea has active [chemical weapons] and [biological weapons] programs and probably has chemical and possibly biological weapons ready for use."[9] Since 2014, the U.S. intelligence community's unclassified assessments on biological weapons have dropped North Korea from the list of suspect programs. In 2014, only Syria was singled out.[10] In 2015, Director of National Intelligence (DNI) Clapper cited no state biological weapons programs of concern. The current DNI, Daniel Coats, did not mention any biological programs in his first World Wide Threat statement.[11] In these later years, either the program is not significant enough to mention or the information the DNI has cannot be revealed in open sessions.

In a 2012 white paper by the South Korean Ministry of National Defense (MND), Seoul assessed that North Korea "likely has the capability to produce a variety of biological weapons including anthrax, smallpox, plague, tularemia, and hemorrhagic fever virus," but the paper provides no supportive documentation or evidence.[12] In 2016, the MND slightly altered the language to state that "sources indicate that North Korea is capable of cultivating and producing various types of biological agents such as anthrax, smallpox, and plague on its own."[13] The same is true for many other countries with similar industrial infrastructure.

---

[7] Elisa D. Harris, "Threat Reduction and North Korea's CBW Programs." *The Nonproliferation Review*, Fall-Winter 2004. See also Sonia Ben Ouagrham-Gormley, "Potemkin or real? North Korea's biological weapons program," *Bulletin of the Atomic Scientists*, July 18, 2017. As of January 15, 2018: https://thebulletin.org/potemkin-or-real-north-korea's-biological-weapons-program10957.

[8] Central Intelligence Agency, "Report of Proliferation-Related Acquisition in 1997," last updated June 19, 2013. As of January 15, 2018: https://www.cia.gov/library/reports/general-reports-1/report-of-proliferation-related-acquisition-in-1997.html#North-Korea.

[9] Porter J. Goss, "Global Intelligence Challenges 2005: Meeting Long-Term Chalenges with a Long-Term Strategy," February 16, 2005. As of January 15, 2018: https://www.cia.gov/news-information/speeches-testimony/2005/Goss_testimony_02162005.html.

[10] James R. Clapper, "Statement for the Record: US Intelligence Community Worldwide Threat Assessment," January 29, 2014. As of January 15, 2018: https://www.dni.gov/files/documents/Intelligence%20Reports/2014%20WWTA%20%20SFR_SSCI_29_Jan.pdf.

[11] Daniel R. Coats, "Statement for the Record: US Intelligence Community Worldwide Threat Assessment," May 11, 2017. As of January 15, 2018: https://www.dni.gov/index.php/newsroom/congressional-testimonies/item/1757-statement-for-the-record-worldwide-threat-assessment-of-the-u-s-intelligence-community-before-the-ssci.

[12] Ministry of National Defense, Republic of Korea, "2012 Defense White Paper," December 2012, p. 36. As of January 15, 2018: https://www.nti.org/media/pdfs/ROK_2012_White_Paper.pdf.

[13] Ministry of National Defense, Republic of Korea, "2016 Defense White Paper," p. 34. As of January 15, 2018: http://www.mnd.go.kr/user/mndEN/upload/pblictn/PBLICTNEBOOK_20170518035718005O.pdf.

The evidence to date of a North Korean biological program is thus far not comparable to the evidence for North Korea's nuclear, missile, chemical, and conventional weapons capabilities. Defector reporting presents the most worrisome picture of the North Korean biological weapons program, but most of these reports cannot be corroborated or have been proven false.[14] During 2003–2004 and 2009, several defectors claimed that North Korea tested biological agents on political prisoners, but these reports are difficult to verify.[15] Recent defectors have been reported to have been vaccinated for anthrax, which has led some to assert that the regime has anthrax in its arsenal and is prepared to use it.[16]

There are reasonable explanations for these varying assessments. Over time, different analysts may have just assessed the capability differently or new information emerged that caused them to change their assessments. Alternatively, given how the regime shrouds its weapons programs in secrecy, misinterpretations could occur. Another explanation is that given the potentially high consequences of the use of biological weapons, any intelligence agency would feel the need to hedge against even the possibility that North Korea has biological warfare agents. The question is how much to hedge against this weapons capability as opposed to others.

Several independent analysts and South Korean government assessments assert that North Korea has about a dozen biological agents. Again, defectors vaccinated for anthrax and smallpox lead some to assert that North Korea has these agents and is protecting its troops with vaccinations in the event that these agents are used. This is too strong an assertion. North Korean soldiers who defect might have received such vaccinations because of the regime's own biological weapons arsenal or because the regime fears these agents may be used against its soliders. When the U.S. military mistakenly sent live anthrax cultures to a number of labs in the United States and Osan Air Base in South Korea, North Korea asserted that this was evidence that the United States was prepared to attack it with biological weapons. Shortly after the mistaken shipment, Kim Jong-Un visited a purported biological research facility in an apparent attempt to signal that North Korea also has a biological weapons capability. While the facility was described as a pesticide plant, some assert that it could be used for biological weapons production.[17] This is hard to assess with confidence, based on the images released from the visit and the regime's statements.

---

[14] Elisa D. Harris, "Threat Reduction and North Korea's CBW Programs," *The Nonproliferation Review*, Fall-Winter 2004.

[15] Bruce Bennett, "The Challenge of North Korean Biological Weapons," testimony presented before the House Armed Services Committee on Intelligence, Emerging Threats and Capabilities, October 11, 2013. As of January 15, 2018: https://www.rand.org/pubs/testimonies/CT401.html. See also Bermudez, 2013.

[16] Sofia Lotto Persio, "North Korean Soldier had 'Anthrax Antibodies,' Raising Concerns Over Pyongyang's Biological Weapons Plans," *Newsweek*, December 12, 2017. As of January 15, 2018: http://www.newsweek.com/north-korean-soldier-who-defected-may-have-been-vaccinated-against-anthrax-759919. See also Patrick Knox, "War and Pestilence: Defected North Koren soldier 'vaccinated' against Anthrax amid fears Kim Jong-un plans to use bio-Weapons to spread lethal infectious disease," *The Sun*, December 26, 2017. As of January 15, 2018: https://www.thesun.co.uk/news/5213774/defected-north-korea-soldier-vaccinated-anthrax-kim-jong-un-bio-weapons/.

[17] Melissa Hanham, "Kim Jong Un Tours Pesticide Facility Capable of Producing Biological Weapons: A 38 North Special Report," *38 North*, July 9, 2015. As of January 15, 2018: http://www.38north.org/2015/07/mhanham070915.

North Korean Proliferation Brazenly Breaks International Norms

North Korea has a history of providing conventional and unconventional military capabilities to Iran and Syria.[18] North Korea provides this support to be "in the trenches" with other states the regime views as allies willing to buy its weaponry. Collaboration with Iran and Syria on their missile programs, Syria on a nuclear reactor, and various reports of supplying Syria with assistance on chemical weapons and defenses raise concerns that North Korea is a rogue state willing to transfer any weapons capabilities it has to allies.

These examples of North Korea's provision of support naturally lead to worry about what it might sell or provide to others. In 2007, Israel bombed a North Korean–designed reactor Syria was building in the eastern part of the country near the Iraqi border.[19] It is unclear exactly when North Korea began its secret collaboration with Syria to help build a nuclear reactor. The Syrians did not acknowledge the destruction of the reactor. Syrian reluctance to acknowledge the existence of the reactor creates legitimate suspicion that it was intended for a clandestine nuclear program.

North Korea also has a history of providing conventional weapons to Hamas and Hezbollah, either directly or via Iran. In 2007 and 2012, Syria-bound ships from North Korea were interdicted in Greek and Turkish ports, and the seized items included defense chemical warfare equipment, such as protective clothing and chemical antidotes.[20]

Additionally, there are reports that North Korea has provided Hezbollah and Hamas with training on tunneling and equipment to build tunnels.[21] North Korea has built tunnels under the Demilitarized Zone (DMZ) no-man's land, presumably to infiltrate South Korea at onset of hostilities on the Korean peninsula.

Despite North Korea's breaches of the norm on not transferring unconventional weapons technology by helping to build Syria's reactor and shipping chemical warfare defensive equipment, there is no evidence that it has transferred these capabilities to nonstate actors, such as Hamas or Hezbollah. Thus far, there is no open-source information that any state has transferred nuclear, biological, or chemical weapons capabilities to nonstate actors.

---

[18] Bruce E. Bechtol Jr., "North Korea and Syria: Partners in Destruction and Violence," *The Korean Journal of Defense Analysis*, Vol. 27, No. 3, September 2015, 277-292.

[19] David Makovsky, "The Silent Strike: How Israel bombed a Syrian nuclear installation and kept it secret," *The New Yorker*, September 17, 2012. As of January 15, 2018: https://www.newyorker.com/magazine/2012/09/17/the-silent-strike.

[20] Bermudez, 2013.

[21] Victor D. Cha and Gabriel Scheinman, "North Korea's Hamas Connection: "Below" the Surface?," *National Interest*, September 4, 2014. As of January 15, 2018: http://nationalinterest.org/feature/north-koreas-hamas-connection-below-the-surface-11195. See also Zachary Keck, "North Korea's Middle East Pivot," *The Diplomat*, July 29, 2014. As of January 15, 2018: https://thediplomat.com/2014/07/north-koreas-middle-east-pivot/.

North Korean Proliferation Brazenly Breaks International Norms

North Korea has a history of providing conventional and unconventional military capabilities to Iran and Syria.[18] North Korea provides this support to be "in the trenches" with other states the regime views as allies willing to buy its weaponry. Collaboration with Iran and Syria on their missile programs, Syria on a nuclear reactor, and various reports of supplying Syria with assistance on chemical weapons and defenses raise concerns that North Korea is a rogue state willing to transfer any weapons capabilities it has to allies.

These examples of North Korea's provision of support naturally lead to worry about what it might sell or provide to others. In 2007, Israel bombed a North Korean–designed reactor Syria was building in the eastern part of the country near the Iraqi border.[19] It is unclear exactly when North Korea began its secret collaboration with Syria to help build a nuclear reactor. The Syrians did not acknowledge the destruction of the reactor. Syrian reluctance to acknowledge the existence of the reactor creates legitimate suspicion that it was intended for a clandestine nuclear program.

North Korea also has a history of providing conventional weapons to Hamas and Hezbollah, either directly or via Iran. In 2007 and 2012, Syria-bound ships from North Korea were interdicted in Greek and Turkish ports, and the seized items included defense chemical warfare equipment, such as protective clothing and chemical antidotes.[20]

Additionally, there are reports that North Korea has provided Hezbollah and Hamas with training on tunneling and equipment to build tunnels.[21] North Korea has built tunnels under the Demilitarized Zone (DMZ) no-man's land, presumably to infiltrate South Korea at onset of hostilities on the Korean peninsula.

Despite North Korea's breaches of the norm on not transferring unconventional weapons technology by helping to build Syria's reactor and shipping chemical warfare defensive equipment, there is no evidence that it has transferred these capabilities to nonstate actors, such as Hamas or Hezbollah. Thus far, there is no open-source information that any state has transferred nuclear, biological, or chemical weapons capabilities to nonstate actors.

---

[18] Bruce E. Bechtol Jr., "North Korea and Syria: Partners in Destruction and Violence," *The Korean Journal of Defense Analysis*, Vol. 27, No. 3, September 2015, 277-292.

[19] David Makovsky, "The Silent Strike: How Israel bombed a Syrian nuclear installation and kept it secret," *The New Yorker*, September 17, 2012. As of January 15, 2018: https://www.newyorker.com/magazine/2012/09/17/the-silent-strike.

[20] Bermudez, 2013.

[21] Victor D. Cha and Gabriel Scheinman, "North Korea's Hamas Connection: "Below" the Surface?," *National Interest*, September 4, 2014. As of January 15, 2018: http://nationalinterest.org/feature/north-koreas-hamas-connection-below-the-surface-11195. See also Zachary Keck, "North Korea's Middle East Pivot," *The Diplomat*, July 29, 2014. As of January 15, 2018: https://thediplomat.com/2014/07/north-koreas-middle-east-pivot/.

Improving South Korea's disease surveillance capabilities also provides a dual-use function to detect any future outbreak of a severe acute respiratory syndrome (SARS)- or Middle Eastern respiratory syndrome (MERS)-like endemic or a biological weapons attack. The United States and South Korea have cooperated on the deployment of the Joint United States Korea Portal and Integrated Threat Recognition (JUPITR) program, which provides a bio-surveillance capability that speeds up the detection of biological threats from days to hours.[24] The deployment of this system or some other biosurveillance system has an important dual-use benefit and should be expanded.

Explore Adding a No-First-Use of Chemical and Biological Weapons Pledge on the Korean Peninsula

South Korea, the United States, the other six party talks members, or the United Nations Security Council should explore the possibility of obtaining a pledge from North Korea not to use chemical or biological weapons first. Since South Korea does not have offensive chemical or biological weapons programs, seeking a pledge of no first use is a benefit for that country. Highlighting concerns about CBW on the peninsula and how they complicate a potential conflict may encourage restraint on the part of North Korea. Since North Korea has publicly stated that it is a member of the Biological Weapons Convention when challenged about its biological weapons capabilities, there is at least some acknowledgement that these are taboo weapons. Calling upon the North Korean regime for a no-first use of chemical or biological weapons adds a new topic for discussion and re-enforces for the international community the taboo associated with these weapons.

Reinforce Norms Against the Production, Transfer and Use of Biological and Chemical Weapons Capabilities on the Korean Peninsula to Serve a Global Need

North Korea may not be willing to engage in any dialogue about its actual or latent CBW any more than it has with its nuclear and ballistic missile capabilities. However, there is a broader international audience to underscore the taboo on CBW production and use. The taboo on the production and use of chemical weapons has eroded considerably in the Middle East following the Iran–Iraq war in the 1980s, Iraqi use against the Kurds in 1988, and Syrian use against regime opponents in the last five years. Introducing the idea of a no-first-use of CBW on the Korean peninsula underscores the taboo associated with these weapons. The taboo can extend beyond production and use to also include transfer to third parties.

---

[24] Hyun-Kyung Kim, Elizabeth Philipp, and Hattie Chung, "The Known and Unknown: North Korea's Biological Weapons Program," *Harvard Belfer Center for Science and International Affairs,* October 2017. As of January 15, 2018: https://www.belfercenter.org/sites/default/files/2017-10/North%20Korea%20Biological%20Weapons%20Program.pdf. See also Kevin McCaney, "JUPITR Integrates All Threats into One Early Warning System," *Defense Systems*, December 8, 2015. As of January 15, 2018: https://defensesystems.com/articles/2015/12/08/army-jupitr-chem-bio-base-protection.aspx.

Conclusion

North Korea's actual and latent CBW capabilities are an underexamined component of the military tinderbox on the Korean peninsula. In contrast to the ways the regime has highlighted its nuclear and ballistic missile capabilities, the regime has largely shrouded its chemical and biological capabilities. The regime's chemical weapons capabilities are the priority threat to monitor and counter. The regime's biological weapons capabilities are less well understood, are less certain to be effective during warfighting, and are probably less well developed. Both weapons capabilities warrant enduring vigilance, as North Korea has proven many times that it can surprise the international community with rapid advances in capabilities.

Mr. YOHO. And I appreciate your comments. Mr. Ruggiero.

STATEMENT OF MR. ANTHONY RUGGIERO, SENIOR FELLOW, FOUNDATION FOR DEFENSE OF DEMOCRACIES

Mr. RUGGIERO. Thank you. Chairman Yoho, Ranking Members Sherman and Keating, and distinguished members of these subcommittees, thank you for the opportunity to address you today on this important issue.

Before proceeding, it is important to state plainly, North Korean leader Kim Jong-un's overarching long-term goal, namely the reunification of the Korean Peninsula under Kim family rule, while Pyongyang attempts to distract Washington and the Seoul from this hostile intention, Kim always has his eyes on dominating the peninsula.

North Korea's weapons, both nuclear and non-nuclear, are a means to an end, extorting concessions from Seoul and using nuclear weapons to limit Washington's ability to defend South Korea from North Korea's military provocations for fear of escalating the situation.

Washington's goal is and should remain the denuclearization of the Korean Peninsula. And the good news is that the United States can still act to counter Pyongyang's weapons programs. A combination of deterrence and coercion should be used against North Korea. The strategy would acknowledge the limits of each of these options using them in combination to secure a denuclearization agreement or, failing that, to weaken Pyongyang in order to diminish the threat it poses.

Deterrence is essential to an effective North Korea policy. Yet, American strength has not deterred North Korea from sharing its missile and WMD knowledge with other rogue states. Nor has it prevented Pyongyang's race to expand illegal programs or engage in countless other provocations.

The premise of the Trump administration's maximum pressure policy is that coercion must complement deterrence to limit provocations and create leverage. That coercion should take the form of an aggressive and comprehensive sanctions campaign. The good news is U.S. sanctions have more than doubled since February 2016, but the real test of a renewed and effective sanctions program is whether new sanctions are targeting Pyongyang's overseas business network and the non-North Koreans that facilitate that sanctions of ASEAN.

There is good news here, too. The Trump administration has sanctioned 103 persons since March 31st. Of whom 74 percent operate outside of North Korea and 25 percent are non-North Koreans who facilitate North Korea's sanctions of ASEAN, namely Chinese and Russian nationals. As the maximum pressure campaign has begun to show results, Kim Jong-un went back to a well-worn tactic of trying to drive a wedge between Seoul and Washington.

In 2017, the only thing the United States and North Korea agreed on was that China's freeze-for-freeze proposal where Pyongyang would freeze its nuclear and missile tests in exchange for a freeze of U.S.-South Korea military exercises was a non-starter.

In fact, Washington clarified that military exercises were defensive. So there was no reason to freeze them, whereas Pyongyang's programs entailed violations of numerous U.N. Security Council resolutions.

But with one new year's address, preying on South Korean President Moon Jae-in's desire for an illusion of peace during the Olympics, Kim changed the narrative from freeze-to-freeze to delay-for-nothing. For a mere promise of talks, Pyongyang received a delay of the aforementioned defensive military exercises.

As Seoul moves into a period of negotiation with North Korea on its Olympics participation, Washington's policy should ensure that South Korean engagement in no way undermines the maximum pressure campaign. If there are signs that North Korea is only playing for time, the U.S. should urge an end to talks.

Pyongyang and Beijing should not be allowed to violate U.N. and U.S. sanctions during inter-Korean talks. If at some point in 2018, a substantial improvement in Pyongyang's behavior leads to the prospect of U.S.-North Korea negotiations, Washington should learn from its past mistakes and insist that Kim Jong-un commit to denuclearize before talks begin.

The United States must not allow Moon's desire for a deal and Washington's inherent need to move beyond this crisis to get us into another set of flawed negotiations resulting in a dangerous deal that locks in North Korea's weapons program.

Thank you for inviting me to testify. And I look forward to your questions.

[The prepared statement of Mr. Ruggiero follows:]

CONGRESSIONAL TESTIMONY: FOUNDATION FOR DEFENSE OF DEMOCRACIES

House Foreign Affairs Committee
Subcommittees on Terrorism, Nonproliferation and Trade and Asia and the Pacific

More than a Nuclear Threat:
North Korea's Chemical, Biological, and Conventional Weapons

MR. ANTHONY RUGGIERO

Senior Fellow
Foundation for Defense of Democracies

Washington, DC
January 17, 2018

Anthony Ruggiero January 17, 2018

Introduction

Chairman Poe, Chairman Yoho, Ranking Member Sherman, Ranking Member Keating, and distinguished members of these subcommittees, thank you for the opportunity to address you today on this important issue.

My testimony will review the initial results of the president's "maximum pressure" strategy, areas for additional sanctions measures, the inter-Korean talks, and why the U.S. should continue its maximum pressure campaign and diplomacy. I will also focus on North Korea's nuclear, non-nuclear, and missile programs; and where I focus on one over the other, it is with the understanding that Pyongyang's weapons systems are integrated to serve the Kim regime's near-term goal of pressuring Seoul and Washington. Thus, we cannot separate our approaches to these issues, nor should we ignore human rights violations and other troubling aspects of the Kim regime.

Before proceeding, it is important to state plainly North Korean leader Kim Jong Un's overarching long-term goal: namely, the reunification of the Korean peninsula under Kim family rule. While Pyongyang attempts to distract Washington and Seoul from this hostile intention, Kim always has his eyes on dominating the peninsula.

Kim repeatedly mentioned reunification in his New Year's address and hinted at his intention to drive a wedge between the U.S. and South Korea by noting that only the Korean people can avoid war on the Korean peninsula and that a "climate favorable for national reconciliation and reunification should be established."[1] Deceptively, Kim wanted to persuade South Koreans that peace depends on severing ties with the United States, when the opposite is true.

North Korea's weapons, both nuclear and non-nuclear, are a means to an end: extorting concessions from Seoul and using nuclear weapons to limit Washington's ability to defend South Korea from North Korea's military provocations for fear of escalating the situation. As I note later in my testimony, that is why premature inter-Korea talks are dangerous and could feed into Kim's long-term game plan.

Washington's goal is, and should remain, the denuclearization of the Korean peninsula. And the good news is that the United States can still act to counter Pyongyang's weapons programs. A combination of deterrence and coercion should be used against North Korea. The strategy would acknowledge the limits of each of these options, using them in combination to secure a denuclearization agreement or to weaken Pyongyang in order to diminish the threat it poses.

There is no excuse for a fatalistic approach to North Korea that accepts it as a nuclear weapons state. Likewise, there is no justification for pursuing a freeze deal that would put the U.S. on the path toward recognizing North Korea as a nuclear state. The United States must understand that the world – particularly its adversaries in Tehran, Beijing, and Moscow – is watching how it responds to North Korea's challenge to the international order.

---

[1] "New Year's Address," *North Korea Leadership Watch*, January 1, 2018. (http://www.nkleadershipwatch.org/2018/01/01/new-years-address/)

2017 in Review

North Korea conducted 20 missile tests last year, down from 24 in 2016. Nonetheless, Kim Jong Un has dramatically increased the missile testing pace since 2014, launching more missiles than his father and grandfather combined.[2] Pyongyang also tested a thermonuclear weapon in early September, its sixth nuclear test.[3]

North Korea's final test launch of 2017 illustrated an important lesson about its weapons programs: Even in the absence of visible and highly provocative tests, the program's development continues in the background. In 2017, North Korea stopped missile launches after its September 15 test of an intermediate-range ballistic missile. The pause lasted for 74 days, prompting suggestions that Pyongyang was ready for negotiations. The *Washington Post* reported that the U.S. special representative for North Korea policy told an audience at the Council on Foreign Relations that if North Korea halted nuclear and missile tests for 60 days, it would be a signal it was ready to begin discussions with the United States.[4] Secretary of State Rex Tillerson also mentioned the need for a halt in missile tests without putting a required number of days on it.[5]

North Korea rejected such wishful thinking with its third intercontinental ballistic missile (ICBM) test in late November. The results of that test suggest the missile could reach all of the United States, further shortening the timeline for North Korea to be able to deliver a nuclear weapon to the U.S. homeland. We now know that Pyongyang was not telegraphing a desire to negotiate with the United States; it was using those 74 days to put the finishing touches on its most capable ICBM yet. This is a cautionary tale for those who focus solely on the visible portion of North Korea's weapons programs, while ignoring the research and development that often goes on behind the scenes.

Experts have tracked North Korea's steadily advancing biological and chemical weapons programs, which are often overshadowed by the focus on its nuclear weapons and missile programs.[6] North Korea's efforts to equip Syria with chemical warfare equipment took on a new

---

[2] Shea Cotton, "The Likely Reason North Korea Has Stopped Its Ballistic Missile Test – For Now," *Forbes*, November 17, 2017. (https://www.forbes.com/sites/insideasia/2017/11/17/the-likely-reason-north-korea-has-stopped-its-ballistic-missile-tests-for-now/#3839738d7d52)

[3] Foster Klug, "North Korea conducts 6th nuclear test, says it was H-bomb," *Associated Press*, September 3, 2017. (https://www.apnews.com/edd942c7344c43a7bf12ce94ddef0cba)

[4] Josh Rogin, "Inside the drive to 'make a deal' with North Korea," *The Washington Post*, November 9, 2017. (https://www.washingtonpost.com/news/josh-rogin/wp/2017/11/09/inside-the-drive-to-make-a-deal-with-north-korea/?utm_term=.5cdadab188d1)

[5] U.S. Department of State, "Press Availability in Manila, Philippines," August 7, 2017. (https://www.state.gov/secretary/remarks/2017/08/273217.htm)

[6] Joby Warrick, "Microbes by the ton: Officials see weapons threat as North Korea gains biotech expertise," *The Washington Post*, December 10, 2017. (https://www.washingtonpost.com/world/national-security/microbes-by-the-ton-officials-see-weapons-threat-as-north-korea-gains-biotech-expertise/2017/12/10/9b9d5f9e-d5f0-11e7-95bf-df7c19270879_story.html?utm_term=.0e38a43b2908); Joseph S. Bermudez Jr., "North Korea's Chemical Warfare Capabilities," *38 North*, October 10, 2013. (http://www.38north.org/2013/10/jbermudez101013/)

urgency when the Assad regime began gassing their own people, marking a dangerous turn for the North Korea-Syria relationship.[7]

North Korea's chemical weapons program also jumped into the global conversation when Kim Jong Nam, half-brother of Kim Jong Un, was assassinated in a public airport in Malaysia. Agents hired by North Korean assassins used VX, a deadly nerve agent, to kill Jong Nam.[8] The use of a nerve agent was unnecessary, but did send a message to others that want to challenge Jong Un's rule and a not-so-subtle signal to Washington that Pyongyang's weapons programs extend beyond its nuclear weapons and missile programs. It is not a stretch to say Pyongyang was reminding the Trump administration that it is prepared to use chemical weapons in a wartime environment as most have suspected for some time.[9]

In November, we once again saw the brutality of the Kim regime when a North Korean solider stationed at the demilitarized zone ran for freedom to South Korea. His fellow soldiers shot him five times, and one crossed over the line in an attempt to forcibly return him to North Korea.[10] Fortunately, South Korean soldiers risked their life to rescue a fellow Korean who wanted to choose his own destiny. After the defector received medical attention, he asked to listen to a South Korean song; South Korea sometimes blasts music through loudspeakers at the DMZ.[11] In addition, the soldier had several parasites indicative of malnutrition, suggesting that the regime even has difficulty feeding its most valuable troops, more of whom may be inclined to defect.[12]

North Korea's proliferation activities continue in the shadow of its nuclear and missile tests. Pyongyang's relationships with Syria and Iran are particularly troubling, and each are watching how the Trump administration handles the Kim regime. In Syria, North Korea built a nuclear reactor that Israel destroyed in 2007, and has a robust missile and chemical weapons proliferation relationship.[13] As the war in Syria continues, Pyongyang likely will see an opportunity to sell its military items to a regime shunned by the rest of the international community. With Iran, North Korea has focused on missile proliferation, with the Obama administration sanctioning Iranian missile officials just after implementation day of the Joint Comprehensive Plan of Action.[14]

---

[7] Josh Stanton, "If Assad is the murderer of Idlib, Kim Jong-un was an accessory," *One Free Korea*, April 7, 2017. (http://freekorea.us/2017/04/07/if-assad-is-the-murderer-of-idlib-kim-jong-un-was-an-accessory/comment-page-2/#stlash.QtGYpU9e.dpbs)

[8] Joshua Berlinger, "Kim Jong Nam: The plot to murder North Korea's exiled son," *CNN*, September 26, 2017. (http://www.cnn.com/2017/07/26/asia/kim-jong-nam-killing/index.html)

[9] John Haltiwanger, "North Korea's chemical weapons most overlooked threat from rogue state, experts warn," *Newsweek*, January 10, 2018. (http://www.newsweek.com/north-koreas-chemical-weapons-most-overlooked-threat-rogue-state-experts-warn-776207)

[10] Joshua Berlinger, "Dramatic video shows North Korean soldier's escape across border," *CNN*, December 5, 2017. (http://www.cnn.com/2017/11/21/asia/north-korea-defector/index.html)

[11] Sofia Lotto Persio, "North Korea defector wakes up with pneumonia and hepatitis, asks for South Korean music," *Newsweek*, November 21, 2017. (http://www.newsweek.com/north-korea-defector-wakes-pneumonia-hepatitis-asks-south-korean-music-717845)

[12] Joshua Berlinger, "Dramatic video shows North Korean soldier's escape across border," *CNN*, December 5, 2017. (http://www.cnn.com/2017/11/21/asia/north-korea-defector/index.html)

[13] Gregory L. Schulte, "Uncovering Syria's Covert Reactor," *Carnegie Endowment for International Peace*, January 2010. (http://carnegieendowment.org/files/schulte_syria.pdf)

[14] Anthony Ruggiero, "Gauging the North Korea-Iran Relationship," *Foundation for Defense of Democracies*, March 8, 2017. (http://www.defenddemocracy.org/media-hit/anthony-ruggiero-gauging-the-north-korea-iran-relationship/)

Leaders in Tehran are likely watching Pyongyang's missile advancements with interest, especially the intermediate-range ballistic missile and solid-propellant missile advancements.[15]

North Korea-Iran nuclear cooperation remains a concern, with each side offering something to the other. Pyongyang's advanced nuclear weaponization work will be attractive to Iran in a post-JCPOA environment. Both countries use similar uranium enrichment centrifuges and could offer each other advice on those systems. Tehran also has resources to exchange for nuclear technology or knowledge. This remains an urgent issue that must be monitored.[16]

Deterrence

The first and foremost responsibility of every president is to protect this country's citizens from foreign threats, such as North Korean missile strikes on American cities. Prudently, Washington has focused on military readiness and defense preparations, such as U.S.-South Korea military exercises and bolstering theater and homeland missile defense. Demonstrations of both our offensive and defensive power signal Washington's resolve to resist North Korean aggression and punish those responsible. Nonetheless, it remains unclear whether this will be sufficient to deter Kim Jong Un.

As we already know, American strength has not deterred North Korea from sharing its missile and WMD knowledge with other rogue states, nor has it prevented Pyongyang's race to expand its illegal programs or engage in countless other provocations.

Traditional Cold War models of deterrence should inform U.S. strategy toward North Korea, yet we also must acknowledge their limits. Deterrence helped to prevent an explosive conflict between the U.S. and the Soviet Union and China, but there were extremely dangerous moments such as the Cuban Missile Crisis. American strategists placed their faith in the concept of mutually assured destruction (MAD), in which both sides' second-strike capability ensured the impossibility of a disarming first strike. North Korea's growing nuclear arsenal and emphasis on road mobile missiles complicate the ability of U.S. military planners to ensure that a first strike can eliminate Pyongyang's weapons. Pyongyang's efforts to move from vulnerable liquid-propellant missiles to more reliable and easier to fuel solid propellant is another effort to protect Pyongyang's second-strike capability.

If MAD kept the Cold War from getting hot, why not rely on it to deter a nuclear North Korea? It is important to remember that the Soviet Union still engaged in dangerous provocations despite the balance of terror. In Berlin and Cuba, it pushed the U.S. to the brink. It is also supported insurgents and terrorists across the globe, in part because its nuclear umbrella ensured that the American response would be limited.

---

[15] Anthony Ruggiero and Behnam Ben Taleblu, "The danger of North Korea and Iran – and how Trump should tackle it," *The Hill*, July 6, 2017. (http://thehill.com/blogs/pundits-blog/foreign-policy/340832-the-great-danger-of-north-korea-and-iran-and-what-trump-can)

[16] Anthony Ruggiero, "Pyongyang's Playbook," *The Weekly Standard*, September 1, 2017. (http://www.weeklystandard.com/pyongyangs-playbook/article/2009511)

There is good reason to believe North Korea would also use nuclear weapons as a shield against retaliation for provocations and proliferation. For example, Pyongyang killed over 40 South Korean sailors when it sunk the *Cheonan* in 2010, maintains a robust relationship with Iran, built a nuclear reactor in Syria that Israel destroyed in 2007, and launched a ballistic missile directly over Japan. Unfortunately, this is a short list of the things deterrence cannot prevent.

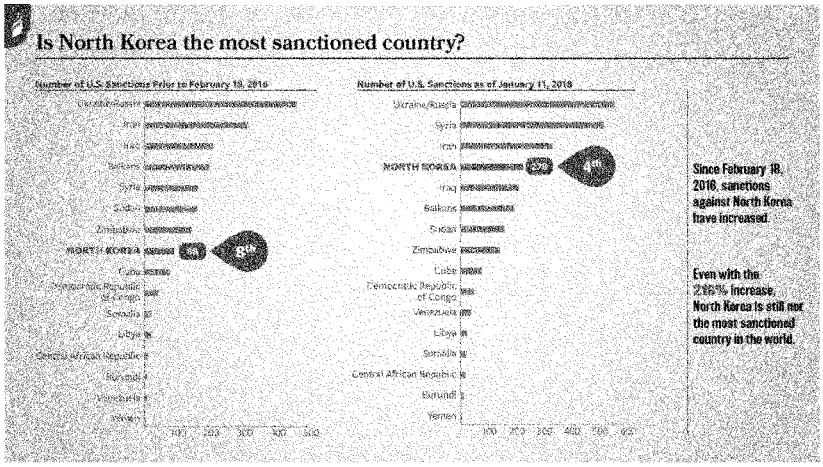
Ultimately, deterrence is a limited tool that will not itself lead to denuclearization. The premise of the Trump administration's "maximum pressure" policy is that coercion must complement deterrence to limit provocations and create leverage. That coercion should take the form of an aggressive and comprehensive campaign of sanctions.

Sanctions

The UN Security Council adopted four sanctions resolutions in 2017 responding to Pyongyang's continued nuclear and missile tests.[17] The resolutions restricted shipments of commodities to and from North Korea (including coal and oil), imposed limits on North Korea's shipping fleet and the vessels that aid North Korea, and mandated an end by 2019 to Pyongyang's practice of sending laborers overseas who work in slave-like conditions and generate revenue for the regime's weapons programs. While China and Russia supported these resolutions, implementation remains a challenge, as Chinese and Russian nationals facilitate North Korea's sanctions evasion. Washington is uniquely positioned to implement both UN and U.S. sanctions by sanctioning those facilitators and thereby strengthening the restrictions supported in name by Beijing and Moscow.

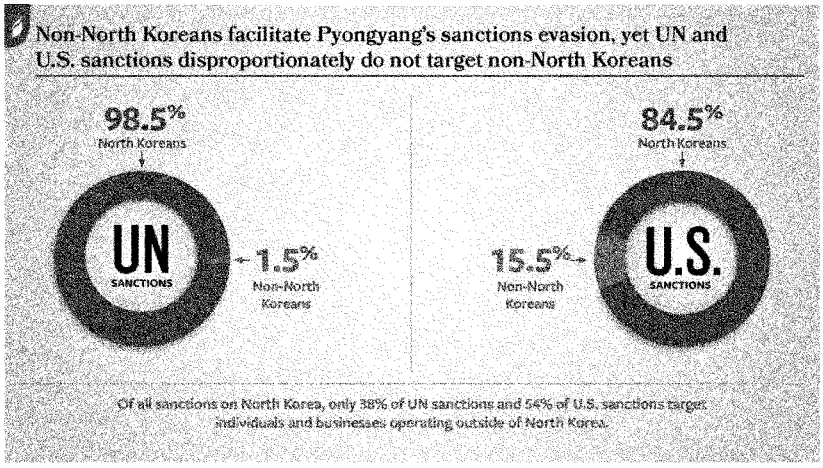
[17] United Nations Security Council, Resolution 2356, June 2, 2017. (http://www.un.org/en/ga/search/view_doc.asp?symbol=S/RES/2356(2017)); United Nations Security Council, Resolution 2371, August 5, 2017. (http://www.un.org/en/ga/search/view_doc.asp?symbol=S/RES/2371(2017)); United Nations Security Council, Resolution 2375, September 11, 2017. (http://www.un.org/en/ga/search/view_doc.asp?symbol=S/RES/2375(2017)); United Nations Security Council, Resolution 2397, December 22, 2017. (http://www.un.org/en/ga/search/view_doc.asp?symbol=S/RES/2397(2017))

There continues to be a widespread misperception that North Korea has been targeted for years by comprehensive sanctions. In fact, when the North Korea Sanctions and Policy Enhancement Act came into effect almost two years ago, U.S. sanctions against North Korea were deficient and trailing lower priorities like Zimbabwe and the Balkans (see graphic 1).[18] The effect of that legislation is clear: it prompted a serious review of North Korea sanctions and clarified that other countries must join Washington's effort to squeeze North Korea. U.S. sanctions have more than doubled since February 2016.

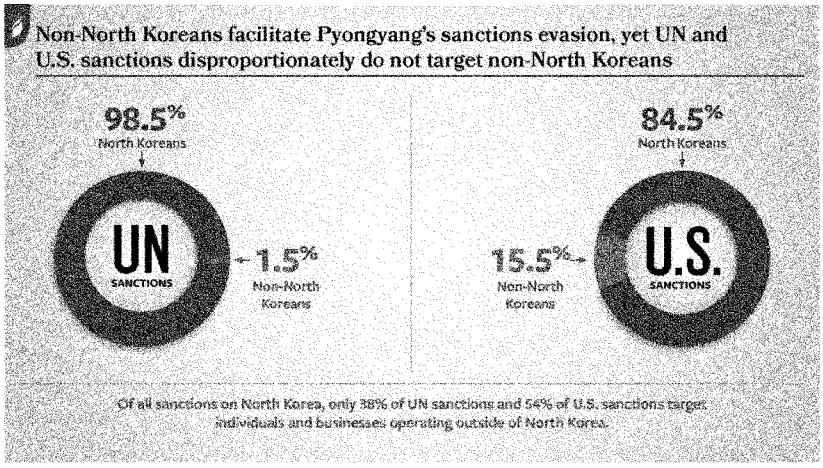


[18] The review of sanctions included those entities and individuals listed on the U.S. Department of the Treasury's Office of Foreign Assets Control Specially Designated Nationals list. The Ukraine/Russia sanctions category includes persons sanctioned under the Sergei Magnitsky Rule of Law Accountability Act and persons subject to the Ukraine-related Directives. U.S. Department of the Treasury, Sanctions List Search, accessed through January 11, 2018. (https://sanctionssearch.ofac.treas.gov/)

But the real test of a renewed and effective sanctions program is whether new sanctions are targeting Pyongyang's overseas business network and the non-North Koreans that facilitate sanctions evasion (see graphic 2). There is good news here, too. The Trump administration has sanctioned 103 persons since March 31, of whom 74 percent operate outside North Korea and 25 percent are non-North Koreans who facilitate North Korea's sanctions evasion. UN sanctions have begun to target North Korea's overseas business network, raising the number to 38 percent overall. Unfortunately, the UN sanctions have not targeted non-North Koreans who facilitate sanctions evasion, since Russia and China object to targeting their citizens engaged in these activities. Still, U.S. sanctions on Russian and Chinese individuals and firms can have a substantial impact, since they need access to the U.S. financial system. In the face of Chinese and Russian obstruction at the UN preventing sanctions against its own nationals facilitating Pyongyang's sanctions evasion, Washington should continue its practice of freezing the assets of, and cutting off access to, the U.S. financial system for these facilitators. Beijing and Moscow face a choice: continue to support Pyongyang's dangerous weapons development or access to the largest global economy; they should not enjoy both.



But the real test of a renewed and effective sanctions program is whether new sanctions are targeting Pyongyang's overseas business network and the non-North Koreans that facilitate sanctions evasion (see graphic 2). There is good news here, too. The Trump administration has sanctioned 103 persons since March 31, of whom 74 percent operate outside North Korea and 25 percent are non-North Koreans who facilitate North Korea's sanctions evasion. UN sanctions have begun to target North Korea's overseas business network, raising the number to 38 percent overall. Unfortunately, the UN sanctions have not targeted non-North Koreans who facilitate sanctions evasion, since Russia and China object to targeting their citizens engaged in these activities. Still, U.S. sanctions on Russian and Chinese individuals and firms can have a substantial impact, since they need access to the U.S. financial system. In the face of Chinese and Russian obstruction at the UN preventing sanctions against its own nationals facilitating Pyongyang's sanctions evasion, Washington should continue its practice of freezing the assets of, and cutting off access to, the U.S. financial system for these facilitators. Beijing and Moscow face a choice: continue to support Pyongyang's dangerous weapons development or access to the largest global economy; they should not enjoy both.



- Sudan: Promised to stop buying arms from North Korea in exchange for easing U.S. sanctions.[27]

- Italy: Rejected worker visa applications for four North Korean citizens at the end of September in an effort to comply with UNSC resolution 2375 on North Korean laborers.[28]

Chinese compliance with UN and U.S. sanctions is mixed as Beijing has imposed tighter restrictions on North Koreans in China but is unwilling to target Chinese nationals aiding Pyongyang's sanctions evasion.[29] The Trump administration has publicly targeted China seven times, using the Justice and Treasury Departments' authorities to prompt greater action by Beijing. But the Trump administration continues to pull its punches, possibly because it is fearful of Chinese retaliation.[30] This fear is unwarranted. Beijing does not want to be known as "North Korea's money launderer" and will cooperate, but only after the U.S. acts. It is important that Washington sustain that pressure on Beijing and its nationals, because China has a tendency to implement some sanctions when the spotlight is shining and revert to its old cheating ways when the focus shifts. The United States should continue its actions against Chinese nationals, especially banks, that facilitate North Korea's sanctions evasion. Beijing should be treated like any other country: If it continues illicit business with North Korea, then it will jeopardize its access to the U.S. financial system.

A new area of focus for the maximum pressure campaign must be North Korea's shipping fleet, especially those vessels engaged in ship-to-ship transfers to evade detection. South Korea announced in late December that it had seized a vessel in late November suspected of transferring oil from Japan in violation of UN sanctions via a ship-to-ship transfer.[31] South Korea seized a second vessel for providing oil to North Korea; it is operated by a company linked to Chinese weapons smugglers.[32] As the Trump administration evaluates the effectiveness of its maximum pressure policy, targeting North Korea's shipping fleet should be at the top of the list and should

---

[27] Matina Stevis-Gridneff and Ian Talley, "U.S. to Ease Sanctions Against Sudan After It Cuts Ties With North Korea," *The Wall Street Journal*, October 6, 2017. (https://www.wsj.com/articles/u-s-to-ease-sanctions-against-sudan-1507311816)

[28] Hamish Macdonald, "Italy rejected visas for N. Koreans seeking cooperation in textiles: report," *NK News* (South Korea), December 21, 2017. (https://www.nknews.org/2017/12/italy-rejected-visas-for-n-koreans-seeking-cooperation-in-textiles-report/?c=1515598943808)

[29] Anthony Ruggiero, "Evaluating Sanctions Enforcement and Policy Options on North Korea," *Testimony before Senate Committee on Banking, Housing, and Urban Affairs*, September 7, 2017. (http://www.defenddemocracy.org/content/uploads/documents/09-07-17_AR_Senate_Banking_Testimony-1.pdf)

[30] Anthony Ruggiero, "It's time to ramp up the pressure on North Korea and China after latest missile test," *Fox News*, November 29, 2017. (http://www.foxnews.com/opinion/2017/11/29/its-time-to-ramp-up-pressure-on-north-korea-and-china-after-latest-missile-test.html)

[31] Seungmock Oh, "China asked UN not to blacklist six ships for illegally shipping to N. Korea," *NK News* (South Korea), December 29, 2017. (https://www.nknews.org/2017/12/china-asked-un-not-to-blacklist-six-ships-for-illegally-shipping-to-n-korea/)

[32] Yuna Park and Hyunjoo Jin, "South Korea seizes second ship suspected of providing oil to North Korea," *Reuters*, December 31, 2017. (https://www.reuters.com/article/us-northkorea-missiles-southkorea-ship/south-korea-seizes-second-ship-suspected-of-providing-oil-to-north-korea-idUSKBN1EP04P); Leo Byrne and James Byrne, "Seized oil tanker linked to N. Korean networks, investigation reveals," *NK News* (South Korea), January 3, 2018. (https://www.nknews.org/2018/01/seized-oil-tanker-linked-to-n-korean-networks-investigation-reveals/?c=1515604563232)

be combined with efforts to renew emphasis on military exercises that entail practice interdictions, which would increase the risk for vessels operating in this sector.[33]

Negotiations

As the maximum pressure campaign has begun to show results, Kim Jong Un went back to a well-worn tactic of trying to drive a wedge between Seoul and Washington. In 2017, the only thing the United States and North Korea agreed on was that China's "freeze for freeze" proposal, where Pyongyang would freeze its nuclear and missile tests in exchange for a freeze of U.S.-South Korea military exercises, was a non-starter. In fact, Washington clarified that the military exercises were defensive, so there is no reason to freeze them, whereas Pyongyang's programs entail violations of numerous UN Security Council resolutions. But with one New Year's address preying on South Korean President Moon Jae In's desire for an illusion of peace during the Olympics, Kim changed the narrative from "freeze for freeze" to "delay for nothing." For a mere promise of talks, Pyongyang received a delay of the aforementioned defensive military exercises.

Kim learned in the first few days of 2018 that South Korea is playing from the same playbook, namely a willingness to provide incentives for minimal or delayed North Korean actions. Once South Korea buys into the false promise of engagement, it will begin pressuring the U.S. to do the same. The Trump administration should nip this dynamic in the bud; Congress should be vigilant as well. Washington should remind Seoul that this approach led us down the path of the failed 1994 Agreed Framework and 2005 Joint Statement. Both nuclear deals were negotiated with the expectation that a freeze of North Korea's nuclear program coupled with incentives to ensure compliance would lead to a denuclearized Korean peninsula. The deals also suffered from back-loading North Korean obligations while front-loading the obligations of the other partners. There is good reason for concern that Kim could parlay the inter-Korean talks into bogus nuclear negotiations with the express purpose of sabotaging the maximum pressure campaign that has started to pay dividends.

Another concern is that the drive toward negotiations will relieve the political pressure that has enabled tougher sanctions and tougher enforcement of those sanctions. In theory, the sanctions and enforcement campaign could continue during negotiations. In practice, we have seen that the U.S. and its allies quickly succumb to false hopes that reducing pressure on North Korea will result in successful negotiations.

When it comes to exerting pressure, the U.S. government seems uncertain of the right course. Last year saw a significant increase in sanctions and coercive diplomacy, but the State Department signaled a willingness to talk (and in some cases conducted actual talks) with North Korea. Some of the efforts were derailed by mixed messages from the Trump administration. The question now is whether Seoul, Beijing, and others will continue to support sanctions at a time of renewed diplomacy. Their track record suggests they will not, even though many of these sanctions target illegal activities, including efforts to access the U.S. financial system, and create additional leverage for any negotiations. Thus, the Trump administration should pursue additional sanctions

[33] Anthony Ruggiero, "Evaluating Sanctions Enforcement and Policy Options on North Korea," *Testimony before Senate Committee on Banking, Housing, and Urban Affairs*, September 7, 2017. (http://www.defenddemocracy.org/content/uploads/documents/09-07-17_AR_Senate_Banking_Testimony-1.pdf)

against North Korea and its facilitators. But even if it decides to withhold new sanctions until after the Olympics, the Trump administration should continue enforcement activities, private coercive diplomacy, and efforts to develop a serious second phase of the maximum pressure campaign that can reinforce the consequences for Pyongyang's continued provocations.

Conclusion

As Seoul moves into a period of negotiations with North Korea on its Olympics participation, Washington's policy should ensure that South Korean engagement in no way undermines the maximum pressure campaign. If there are signs that North Korea is only playing for time, the U.S. should urge an end to talks. Pyongyang and Beijing should not be allowed to violate UN and U.S. sanctions during inter-Korean talks. If at some point in 2018 a substantial improvement in Pyongyang's behavior leads to the prospect of U.S.-North Korea negotiations, Washington should learn from past mistakes and insist that Kim Jong Un commit to denuclearize before the talks begin. The United States must not allow Moon's desire for a deal and Washington's inherent need to move beyond this crisis to get us into another set of flawed negotiations resulting in a dangerous deal that locks in North Korea's weapons programs.

On behalf of the Foundation for Defense of Democracies, I thank you again for inviting me to testify and I look forward to addressing your questions.

Mr. YOHO. Thank you for your comments.
Ambassador Jenkins.

STATEMENT OF THE HONORABLE BONNIE JENKINS, FOUNDER AND PRESIDENT, WOMEN OF COLOR ADVANCING PEACE, SECURITY AND CONFLICT TRANSFORMATION (FORMER COORDINATOR FOR THREAT REDUCTION PROGRAMS, BUREAU OF INTERNATIONAL SECURITY AND NONPROLIFERATION, U.S. DEPARTMENT OF STATE)

Ms. JENKINS. Mr. Chairman, ranking members, ladies and gentlemen, I want to thank you for inviting me here today to speak about North Korea's DPRKs threats outside those of nuclear weapons. It is understandable that with the exchanges between the U.S. and North Korea in the past few months that nuclear weapons are the focus of attention regarding the North Koreans military capabilities.

However, one should not lose sight of the fact that there are other significant military threats from North Korea. Today you are hearing about some of these other threats. And they consist of North Korea's chemical weapons, intentional biological weapons pursuits and the overwhelming conventional weapons. And we have on this panel today experts on the various non-nuclear threats emanating from North Korea, so I will move on to discussing some potential diplomatic mechanisms to meet those threats.

Addressing the DPRKs threat is not a challenge that Washington should tackle alone. North Korean involvement in chemical and biological weapons programs are not in line with the international norms against development and use of those weapons and should be part of a global effort to address those programs.

Few countries have any contact with the DPRK, which limits opportunities for diplomatic exchange. Working with countries that do have that type of relationship, for example, Sweden, can be part of a planned diplomatic effort to engage North Korea. Of course, the key to any negotiations on North Korea's weapons will require North Korea to come to the table, which is a significant challenge.

All of the following ideas had that caveat in mind. On chemical weapons, the general goal of the international community should be that the DPRK destroy any such weapons regardless of the fact that the DPRK is not a party to the CWC. Any discussions with the DPRK on such weapons would require the engagement of the organization for the prohibition of chemical weapons in regional states at a minimum. The DPRK should join the CWC as a state party and agree to destroy any potential weapons with verification.

We have witnessed with the destruction of Syrian chemical weapons that the international community can come together to assist in that process. Regarding conventional weapons, the primary concern is the overwhelming number of such weapons possessed by North Korea.

There should be a reduction in the conventional forces and more equality in the numbers and types of weapons with South Korea as a way to reduce tensions.

In this respect, the two sides may negotiate an agreement similar to the Conventional Armed Forces in Europe treaty, and both

sides can reduce their conventional weapons to an equal amount and types. Such an agreement would require a permanent and verifiable means of destruction. The CFE can provide some thoughts on a way forward.

North Korea is already a party to the Biological Weapons Convention, and as a result, it should not be developing biological weapons. Any activities regarding a biological weapons program should stop. Since there is no verification regime of the BWC, a small number of the countries including those in the region may agree to a verification scheme. The Biological Weapons Convention Implementation Support Unit should be a part of any engagement with additional staff and funding for this particular purpose.

These options lean heavy on the diplomatic effort and negotiations to address the North Korean military threats. Some rely on existing norms that reflect the agreement by a global community by just the possession and use of such weapons.

South Hem conventions are initiatives that can serve as examples for engaging the North Koreans. However, any negotiation needs an element of trust amongst the parties. There must be some belief that the party on the other side wants to discuss the issues and has something to gain by doing so.

If you want North Korea to come to the table, we must temper our threats with real possibilities for diplomacy. In this respect it would be extremely challenging to convince North Korea to relinquish the weapons it believes it needs for its defenses or its domestic purposes. Moving the DPRK to join the international community that has already moved away from the development and use of chemical and biological weapons, for example, will take time and it will need a continuous process.

It is also essential that the international community walk the walk and talk the talk of actions that we want other countries to do, including North Korea. We also need to find a way to make any successful negotiation sustainable. We have seen in the case of negotiations with North Korea's nuclear program through the years that what is considered an agreement continually fails.

How do we make sure that North Korea does not go back to business as usual? In each situation there needs to be a mechanism to continue discussions and help verify that the North Koreans are living up to their agreements. In this respect, the North Koreans would need to be part of existing implementing bodies, treaty implementing bodies. There may be other options that we can do with North Korea assuming we can move them from being an adversary to essentially being a party. This will all take time and a lot of real diplomacy.

Thank you, and I look forward to your questions.

[The prepared statement of Ms. Jenkins follows:]se

Bonnie Jenkins, Ph.D.
Testimony before the
House of Representatives
Committee on Foreign Affairs
Subcommittee on Terrorism, Nonproliferation, and Trade
and the
Subcommittee on Asia and the Pacific
Rayburn House Office Building
January 17, 2018 2:00pm

"More Than a Nuclear Threat: North Korea's Chemical, Biological and Conventional Weapons"

I want to thank you for inviting me here today to speak about North Korea's threats outside those of nuclear weapons.

It is understandable that with the exchanges between the U.S. and North Korea the past few months that nuclear weapons are the focus of attention regarding the DPRK's military capabilities. However, one should not lose sight of the fact that there are other significant military threats from North Korea.

Today you will hear about some of those other threats. They consist of North Korea's chemical weapons, potential biological weapons pursuits, cyber capabilities, overwhelming conventional weapons, and the DPRK's illegal trafficking of military equipment and materials to raise funds for its military goals.

We have on the panel today experts on the various non-nuclear threats emanating from North Korea, so I will only highlight a few points regarding those North Korean capabilities before discussing some possible diplomatic efforts to address those threats.

The DPRK reportedly has pathogens that can produce anthrax and smallpox. The recent discovery of anthrax antibodies in a North Korean defector has raised fears that North Korea is, in fact, developing biological weapons. Some believe the DPRK can quickly launch an industrial-scale production of deadly pathogens. The DPRK has also reportedly offered to sell biotechnology services to developing nations. North Korea is party to the Biological and Toxin Weapons Convention (BTWC). Therefore, any pursuit or use of a biological weapon would violate its obligations under international law.

On chemical weapons, the DPRK has approximately 2,500 to 5,000 metric tons of chemical weapons agents, with the focus on Sarin and VX. These chemical toxins may be fired using conventional artillery, rockets, aircraft, and missiles. The U.S. military reports that there is long-range artillery deployed along the demilitarized zone. North Korea is not a party to the Chemical Weapons Convention ("CWC").

North Korea has tested short, medium, intermediate, and intercontinental range missiles, as well as submarine-launched ballistic missiles. North Korea fired 23 missiles during 16 tests since February last year. They claim that their ICBMs can hit the US mainland. The DPRK is the 4th largest world military with more than 1.1 million personnel in the armed forces. The country has a large number of aircraft, helicopters, combat vehicles, amphibious vessels, submarines, tanks, armored vehicles, and multiple rocket launches.

In addition to the above, cyberattacks are becoming a vital asset for the country to raise funds as it is a fast and easy way to obtain cash. North Korea has targeted banks and reportedly broken into the ROK military systems. Also, North Korea has been accused of being the mastermind behind the global malware attack last May named "WannaCry." The attack encrypted and rendered useless hundreds of thousands of computers in more than 150 countries and sought ransom to unlock the machines.

Finally, the DPRK has developed several covert networks for the sale of technology and materials to fund its military programs. It has supplied banned nuclear and ballistic equipment to Iran, Syria, and other countries. The DPRK has money-laundering schemes to sidestep sanctions and then pay for its military programs. While addressing the nuclear threat is the most crucial issue at the moment, we must also take into consideration the different ways in which the DPRK could enrich itself and continue its threats through these other means, including through proliferation.

International Engagement on North Korean Threats

Addressing the DPRK threat is not a challenge that Washington should tackle alone. Threats like cyberattacks are not ones to which any single country can find a solution. The solution requires the global community and cooperation with the private sector. North Korean involvement in chemical and biological weapons programs are not in line with the international norm against the development and use of those weapons and should be part of a global effort to address those programs. Several countries would have to become involved in any enforcement to enforce sanctions being violated by the DPRK.

Few countries have any contact with the DPRK, which limits opportunities for diplomatic exchange. Working with countries that do have that type of relationship, for example, Sweden can be part of a planned diplomatic effort to engage North Korea. Of course, the key to any negotiations on North Korea's weapons will require North Korea to come to the table, which is a significant challenge. All of the following ideas have that critical caveat in mind.

On chemical weapons, the general goal of the international community should be that the DPRK destroy those weapons, regardless of the fact that the DPRK is not a party to the CWC. Any discussions with the DPRK on such weapons would require the engagement of the Organization for the Prohibition of Chemical Weapons (OPCW) and regional states at a minimum. The DPRK should join the CWC as a State Party and agree to destroy its chemical weapons with verification. We have witnessed with the destruction of Syrian chemical weapons that the international community can come together to assist in that process.

Regarding conventional weapons, the primary concern is the overwhelming number of such weapons possessed by North Korea. There should be a reduction in the conventional forces, and more equality in numbers and types of weapons with South Korea as a way to reduce tensions. In this respect, the two sides may negotiate an agreement similar to the Conventional Armed Forces in Europe Treaty (CFE), and both sides can reduce their conventional weapons to an equal amount and types. Such an agreement would require a permanent and verifiable means of destruction. The CFE Treaty can provide some thoughts on a way forward. Also, we may seek a moratorium on testing missiles during such negotiations. It may, however, be possible to have a separate discussion on missiles independent of talks on conventional weapons.

North Korea is already party to the BWC, and as a result, should not be developing biological weapons. Any activities regarding a biological weapons program should stop. Since there is no verification regime in the BWC, a small number of countries, including those in the region, may agree to a verification scheme. The BWC Implementation Support Unit should be part of any engagements, with additional staff and funding for this particular purpose.

The existing sanctions should be reinforced to ensure the DPRK cannot transit illegal materials and equipment to pay for its military pursuits. Preventing these transits will require a diplomatic push on nations that are violating the sanctions and increased efforts to stop the North Korean ships that may be engaged in smuggling. The illicit transfer of materials and equipment is a topic for discussion at the US and Canada joint meeting in Vancouver on January 16th.

As for cyber-attacks and a way to address cyber issues, there are many conversations taking place in governments and within the non-governmental sector on cybersecurity. However, the complexities of the problem have not yet lead to a possible negotiated response by the international community to cyberattacks. Cyber issues also do not fit comfortably into the traditional lines of arms control, disarmament, and nonproliferation. While there is a general agreement that no one wants to be the victim of a cyberattack, there is also a sense that the community is not yet ready to give up its advantages to using cyber to obtain one's own goals. These are of course my views with the understanding that I am not an expert on cyber issues. However, there does appear to be a need for more international discussions amongst states but also with the private sector, academic institutions, and relevant international organizations, to start to address the challenges of cyberattacks more holistically.

Final thoughts

The options outlined above lean heavy on a diplomatic effort and negotiations to address the North Korean military threats. Some rely on existing norms that reflect the agreement by the global community against the possession and use of such weapons. Some have conventions or initiatives that can serve as examples for engaging the North Koreans. However, any negotiation needs an element of trust amongst the parties. There must be some belief that the party on the other side wants to discuss the issues and has something to gain by doing so. If we want North Korea to come to the table, we must temper our threats with real possibilities for diplomacy.

In this respect, it would be extremely challenging to convince North Korea the country to relinquish the weapons it believes it needs for its defense or its domestic purposes. Moving the

DPRK to join the international community that has already moved away from the development and use of chemical and biological weapons, for example, will take time. It is also essential that the international community walk the walk and talk the talk of actions that we want other countries, including North Korea, to agree.

We also need to find ways to make any successes from negotiations sustainable. We have seen in the case of the negotiations on North Korea's nuclear program through the years that what was considered as agreements eventually fell apart. How do we make sure that North Korea does not go back to business as usual? In each situation, there needs to be a mechanism to continue discussions and help verify that the North Koreans are living up to their agreements. In that respect, the DPRK should be part of existing treaty implementation bodies. These include ongoing meetings and events with the OPCW and the BWC. Further, into the future, engagement in other initiatives will be helpful, such as the Global Health Security Agenda, the Global Partnership, and the Global Initiative to Combat Nuclear Terrorism. There may be threat reduction programs that we can engage in with the DPRK. However, none of this will materialize if we do not bring the North Koreans to the table, create an environment for negotiations, engage countries and relevant international organizations as well as the private sector, and move North Korea to be a partner and not an adversary. That will take some time.

Mr. YOHO. I would like to thank the panel for your expert testimony. I look forward to answering the questions.

Dr. Cordesman, you pointed out the number that we know is exactly that. It is what we know. It is what we don't know that really scares us. The unknown. And I guess that is part of—I don't want to say terrorism, but that is part of a hand they play. You know, it is what you don't know.

Are there other techniques that we can do to get other countries to come on board? When I look at what is going on, you know, I have got information in here, that is out there, in August, shipments of 30,000, 30,000 North Korean produced rocket-propelled grenades were intercepted on their way to Egypt. How concerned should we be about Egypt's secret arrangement to procure $23 million worth of weapons, number one, that is funding North Korea while they are an ally of ours. This is not a U.S. problem with what North Korea is doing. It is not a South Korean problem. It is a world problem. And if we have allies, especially ones that we are giving foreign aid to, to get them to the table, how do we find out more information and get everybody on the same page? Like we have to get a resolution to this peacefully and ideally.

Do you have any thoughts on that?

Mr. CORDESMAN. Mr. Chairman, I wish I had more optimistic conclusions, but a little over a month ago, I was in the Middle East at a time there was a supposed 40-country alliance of Arab states that was supposed to be cooperating and dealing with security issues. And quite frankly, I have never seen more hypocrisy at a given meeting than I saw there. I don't think you have any choice unless you are willing to embarrass allies and put pressure on countries, unless you can threaten, not simply sanctions, but actually intercepting known shipments of arms and weapons.

North Korea is going to do anything it can to find ways to export, to obtain technology, import, to do, if it can, simply exchanging the techniques of producing systems with other countries like Iran. Locking that is something we can sometimes do in detail, but it requires an extremely aggressive approach.

And, yes, there are European allies, there are Asian allies that will work with us, but those are not the countries North Korea deals with. And I simply would not be optimistic about the prospects.

Mr. YOHO. Okay. And I would like to get some response on this. The agreement to destroy the chemical weapons in Syria was supposedly carried out and certified 100 percent by the world community. We realize that is not true. You know, there was still some left over. In fact, we just heard reports that the Assad regime may have used chemical weapons, including VX gas.

Does anybody have any information on—is that true? And to think they came out—is there any proof that—is there any information out there that they could have come out from North Korea—anybody want to comment on that?

Mr. Parachini.

Mr. PARACHINI. So we are better off that chemical weapons were eliminated from Syria with the understanding that they had the possibility to both hide and make even after their stockpile was re-

moved, because that meant fewer weapons that they could use against——

Mr. YOHO. Do we know that they are making them, or are they getting them from North Korea?

Mr. PARACHINI. So we don't know—even if there are—if they are getting chemicals from North Korea, they are more in the precursor nature, and they could be making new agents. But, remember, a lot of what we have seen in Syria are attacks using chlorine.

Mr. YOHO. Right, but just recently they said that could have been laced with VX gas. I don't know how you do that or——

Mr. PARACHINI. So Syria—in the Syrian complex, VX has not appeared yet as an agent that has been used. Sarin——

Mr. YOHO. Sarin. I am sorry.

Mr. PARACHINI. Sarin has been the nerve agent that has been used. But look at how they have used chlorine——

Mr. YOHO. Right.

Mr. PARACHINI. Even after they agreed to eliminate their stockpile, they have used a widely available industrial chemical as a weapon of war.

Mr. YOHO. And that is a terrible chemical. Just one more question. If North Korea is serious about earnest dialogue and coming to the table, would you recommend signing on to the CWC, the Chemical Weapons Convention?

Mr. PARACHINI. So I will offer a comment and then Ambassador Jenkins may have some thoughts here.

Mr. YOHO. Sure.

Mr. PARACHINI. North Korea is the only member of the five-party talks—or the six-party talks that is not a member.

Mr. YOHO. Right.

Mr. PARACHINI. So it stands out. So it is to our advantage to press them on this issue, number one. And, number two, the global taboo on the use of these weapons has degraded since the Syrians have used chemical weapons. There is an opportunity to bolster that norm by pushing the North Koreans.

Mr. YOHO. I think that is a good point. Ambassador Jenkins, do you have a comment?

Ms. JENKINS. Yes, I would just agree and say that I think it would be good to have them part of the convention because then they can be part of the multilateral and international negotiations that go on on a regular basis. There are yearly meetings with the OPCW. There are activities that go on, and one way to help make sure that they are doing what they should be doing is have some kind of transparency and some kind of engagement. So I think that would be very helpful.

Mr. YOHO. Thank you for your comments.

We will go to the ranking member, Mr. Keating.

Mr. KEATING. Thank you, Mr. Chairman.

It is clear that one thing we should do is maximize our soft power, that we could, and sometimes things appear, from the administration, to be disjointed. Let me give you an example. We had a new President—President Moon came to power. And one of the strengths we have, at least when I was there just a year ago, was the coalition we have with Japan, South Korea, and the U.S. It is at unprecedented levels. The cohesiveness was stronger than it

ever has been. However, with a new President—our President threatened to pull apart the trade agreement with South Korea during that period. Now, how could that possibly do anything but hinder our ability and cohesiveness as a coalition together, as a fundamental coalition? And how damaging were those comments and the timing of those comments? Does anyone want to address that?

Ms. JENKINS. I guess I would start with that. I would agree with you in what you are saying in terms of how those comments were probably received. I think one of the things that we seem to be lacking now is a much more coordinated approach in the way in which the U.S. Government is really handling a lot of these issues. There seems to be not as much attention for force coming from the Department of State and engagement of the Department of State and engagement of the expertise in discussing some issues before they are actually made and the policies before they are actually made and told to other countries.

So I think that has created a bit of confusion with some of our countries out there, some of our allies out there.

I know I often get questions regarding the way in which the U.S. Government is perceived regarding the State Department and what is coming out of the White House. And I think that we don't have the coordinated message. That would be helpful. It is good to have soft and hard power, but I think you have to have a way in which it is coordinated and it is seen as a whole.

So I think that when you have these kind of statements that are made in the middle of a situation where relationships are going very well, it does cause countries to take a step back and wonder what is going on.

Mr. KEATING. Do any members of the panel think that was helpful, the timing and the effect of that? Thank you.

Dr. Cordesman brought up a couple of important points, I think, takeaways that I had myself. We are focused on the nuclear issue and the missile capability. But every day on the border, there are scuffles, and there are potential conflicts that can escalate at any time. In fact, our own military leadership there has said that they spend an inordinate amount of their time just trying to tamp those down because of that fear. That is one point.

The other point that might come along with those lines is, again, an important point looking down the road, and that is potential refugee problems, should they occur.

So, Dr. Cordesman, do you want to just extend your comments on your perception of how really threatening those border issues are on a day-to-day basis? How they could escalate? And then, secondly, an interesting point that you did bring up in regards to if there is a conflict and there are refugee problems, that will affect China, and you know, are they factoring that in? Because generally China is not taking these issues as seriously as they should be, from our perspective, and that is one thing they should look at, at what happens to the peninsula. Doctor?

Mr. CORDESMAN. I think we have—first, we need to be careful about the term "border." We are talking about the DMZ, and the problem we have is it isn't just the hardened artillery sides near the DMZ, which go all along the DMZ. They are not simply near

the center of Seoul. They are near an area with about 25 percent of the population or more of Korea just in the area around Seoul.

So this is something where longer range rocket systems can have a major effect. And we are talking about depths of perhaps 50 to 100 to 200 kilometers when we throw in unmanned aerial vehicles and cruise missiles, which are actually far better systems for delivering biological and chemical weapons than artillery is because they are slow fires and they disseminate in much more controllable ways.

We also have some 25 tunnels. All of these things could produce a massive refugee population. And looking at Seoul and the greater Seoul area, there simply isn't surplus capacity, and it is remarkably hard for them to even move south, not in the numbers that exist today.

Mr. KEATING. Yeah. Thank you.

And I yield back, but I will be following up with a written question, Chairman, you know, just dealing with a common thread of how we have to improve our intelligence in that region and how maybe working with the coalitions, that is something we should work on as well.

I yield back, Mr. Chairman.

Mr. YOHO. Thank you, Mr. Keating. I appreciate your respecting people's time, and if we have time for a second round, if you are still here, we will let you do that.

I will next go to Mr. Joe Wilson, South Carolina.

Mr. WILSON. Thank you, Mr. Chairman.

I was grateful in September to lead a delegation to South Korea. Of course, we visited the DMZ. We were there in Seoul. We visited, in particular, Camp Humphreys. And it was really incredible for me to know the strong relationship we have with the Republic of Korea and their investments—the American people need to know the hundreds of millions of dollars which have been spent to build a world class facility there at Camp Humphreys, truly indicating the bond that we have between the people of the United States and the people of Korea.

Another issue to me, and I would be really interested in finding out from each of you what your view is, has there been any collaboration on nuclear weapon or missile development with the rogue regime in Iran, between—cooperation between Pyongyang and Tehran?

Mr. CORDESMAN. There is very good evidence of cooperation on missile development. There are questions among experts as to how much cooperation there is in specific areas, how much they are sharing, but it has been clear for years that there is an exchange of technology. It is also clear that some of the technology that is coming from Russia and from China has spread into both North Korea and Iran and is affecting the engines and capabilities for missile development there.

I don't know of any evidence of cooperation in the development of nuclear weapons. There are reports of delegations being present from Iran at the test of North Korean nuclear weapons. Whether they are accurate or not, to be honest, one of the problems we have is a lot of media reporting sometimes claiming it is coming from North Korean—I am sorry—South Korean military sources that is

very unreliable. But to be honest, I am not sure you would detect cooperation in nuclear weapons design. It is not something where you would have to be public or there would be easily observable signals.

Mr. RUGGIERO. I would say, on ballistic missiles, it is important to remember that, on the implementation day 2 years ago of the Iran nuclear deal, that the Obama administration issued sanctions against Iranians for their cooperation—or their missile cooperation with North Korea. It just shows you the sort of level that that cooperation was at.

On the nuclear side, I think the concern here that I have always had is that what each side has fits really well in the sense that they both use very similar enrichment programs, enrichment centrifuges. And Iran, likely, has a desire for both the design and some of the testing information that North Korea has gotten from nuclear tests, and Iran, of course, could pay for that. So that is always the main concern between Iran and North Korea nuclear cooperation.

Mr. WILSON. And wasn't it proven that there was a direct relationship of North Korea with the nuclear development in Syria? But, fortunately, Israel took care of that and may have even dispatched some North Korean scientists on the side. So this is such a danger, the collaboration of totalitarian regimes.

Another question I have for each of you, and it is really frustrating to me that China has benefited so much from trade with South Korea, tourism, investments by South Korea in developing business and industry and opportunity for the people of China. On the other hand, DPRK, the Democratic People's Republic of Korea, is simply a dependency of the People's Republic. Why would they maintain such a dependency when they can see the benefits of working with the Republic of Korea?

Mr. RUGGIERO. Well, I think, you know, I think the relationship in that region is interesting. I would also add that the Chinese always criticize unilateral sanctions until they use them. And, of course, they used them against South Korea, really to their own detriment I think. I think that the Chinese did not win in that. I think the Chinese are realizing that. I think the record on sanctions is mixed. The Chinese are willing to go after North Koreans inside of China, but they still remain unwilling to go after their own nationals that are aiding North Korea. And that is really—and Russia does that, and it is the same thing with Russia as well on North Korea sanctions. So that is really the critical area that we need to get the Chinese to move toward.

Mr. WILSON. Thank you very much. My time is up.

Thank you, Mr. Chairman.

Mr. YOHO. All right. Next, we have Mr. Gerald Connolly.

Mr. CONNOLLY. Thank you, Mr. Chairman. Isn't my timing perfect? Yeah, perfect. And I have been watching and listening upstairs, so thank you.

Ambassador Jenkins, you talked about using hard power and soft power. I was making the same point in my opening remarks.

Could you elaborate a little bit? I mean, what is the soft power available to us that could be efficacious?

Ms. JENKINS. Well, it is interesting you use the word "power" in the situation of North Korea because we are still limited in what we can do in terms of soft power. But I think there is a lot that we have not yet explored. I think, for the most part, the situation with North Korea in that region has been very much a bilateral relationship with the U.S. working directly with each country, and we have worked very much regionally in trying to resolve the issues there.

I think there are other options or other possibilities for working with more countries to try to see if there are ways in which we could address some of these issues. All of the things we are talking about today, whether it is chemical weapons or biological weapons particularly, are issues that are of a concern to the international community. They are issues that, as we have said already—there is international norm against the use of those weapons and the development of those weapons.

So I think that there are options to try to see how countries can start to work together to see how they can address the issues with North Korea. Of course, trying to make sure first of what they actually have, but also trying to see if there is a way that countries can work together on that issue.

Mr. CONNOLLY. So one soft power would be sanctions, correct?

Ms. JENKINS. Yeah.

Mr. CONNOLLY. Mr. Ruggiero, Governor John Kasich wrote a—Governor John Kasich wrote an op-ed piece in which he said we haven't used all the soft power with respect to sanctions that we could have. And he cited things like, you know, more indepth banking, ties and relationships getting really tough on that. He talked about insurance for Merchant Marine fleets, so that shipping suddenly becomes vulnerable because we are denying them insurance, if they are going back and forth to North Korea and the like.

Do you believe we still have leverage that is meaningful that could persuade the North Koreans it is worth pausing, if not rolling back, their nuclear development program, because that is really the object here?

Mr. RUGGIERO. Right, I do. I think this administration has gone after China, whether it is firms or banks or individuals, seven times last year, but they are still pulling back. They are pulling their punches. And I think part of that is because they likely fear Chinese retaliation. When it comes to North Korea, you know, I take your question as, you know, how can you affect the revenue flows? And the good news here is that it looks like, from the examples we have more recently, a lot of this revenue is inside of China, so you can start to affect that. And then North Korea uses that for what I like to call three purposes, military, and obviously the security sources, the weapons programs, and their elites. And right now they get to rank those one A, B, and C. From my perspective what we have to do is rank them 1, 2, and 3 because all of them are key to Kim's survival. And we are not talking about regime change, but we are talking about changing the calculus here.

Mr. CONNOLLY. Right.

Mr. RUGGIERO. And I think, you know, going after Chinese banks, not cutting them off from the U.S. financial system or sanc-

tioning—or freezing their assets, but using regulatory fines, like we did against European banks in the Iran sanctions context.

Mr. CONNOLLY. Which is a model. I mean, that worked.

Mr. RUGGIERO. Right.

Mr. CONNOLLY. Apparently that worked. Mr. Cordesman and Mr. Parachini, and I have got a limited amount of time, but what is your take on how much leverage we really have with respect to Chinese behavior? Can we really bring the Chinese to cooperate with us in a meaningful way? I mean, we talked about soft power, but for example, there are North Korean restaurants and businesses, that is to say, businesses and restaurants run by North Koreans who remit profits back to China, I mean, back to North Korea from China. They open—they are operating with impunity; it is not like it is a secret. So is there more room, and what is the point of leverage we have over the Chinese to cooperate?

Mr. CORDESMAN. I think there is more room, but I think we need to be very careful. They will not take steps which threaten the existence of the regime in North Korea or its status as a buffer. They do not have the same strategic interests we do. And the cooperation can never be enough to by itself probably force North Korea to change.

Mr. YOHO. Go ahead. I will let you finish up.

Mr. PARACHINI. So I would add that the Chinese are very concerned about refugee flow from North Korea to them. And I have met with Chinese from right over the border, and they are very concerned about that. And that may be an area of collaboration between the United States and China, but we have to be very careful about how we manage that because, should there be a collapse of the regime, China is going to be very eager to move first and make sure that we and South Korea do not move very far north.

Mr. YOHO. Thank you.

Next, we will go to Mr. Tom Marino from Pennsylvania.

Mr. MARINO. Thank you, Chairman.

Mr. Parachini, am I pronouncing that correctly? That is Italian?

Mr. PARACHINI. Parachini.

Mr. MARINO. Parachini.

Mr. PARACHINI. Rhymes with zucchini, which is a good vegetable.

Mr. MARINO. Okay. You answered my first question that I wanted to ask, and let's expand on that a little bit. My question was—it is going to be, and I believe this is so because I am of member of NATO Parliamentary Assembly, and we discuss these issues—that China is very concerned about the North Koreans flowing into China because they do not want to have to take care of them. And North Korea is a buffer between the democracy of South Korea and the United States and China. Is that a fairly good assumption to make?

Mr. PARACHINI. I think it is. And there is a longstanding relationship between China and North Korea and between China and Myanmar. And there is a special relationship there between those three countries that is hard to overcome given historical ties.

Mr. MARINO. Do you think at any point—and I don't believe this, but if anyone on the panel believes that North Korea would get into serious discussions with the U.S., do you think that is possible? Anyone?

Mr. PARACHINI. So I would add, we need to think about this as a long-term game.

Mr. MARINO. It has been a long term game.

Mr. PARACHINI. NATO was in place until the Soviet Union fell for a long time. And I think, unfortunately, on the Korean Peninsula, we are in the same type of game. So the question is how to make sure it doesn't come unraveled; we don't have a hot conflict. As we have seen, the North Korean leaders do pass on. So we have to hope for moderated change.

Mr. MARINO. No.

Mr. PARACHINI. I don't think we should be thinking that they are going to negotiate and change. That leopard is not going to change its spots.

Mr. MARINO. No.

Mr. PARACHINI. So we have got to figure out some way to navigate with them over a long term.

Mr. RUGGIERO. I mean, I would just say I guess I am the optimist here, which is kind of surprising for someone who supports sanctions. But the optimist here that, you know, when it came to Iran, we could have conversations about the nuclear deal, but I think even critics and supporters of the deal agree that sanctions brought them to the table.

Mr. MARINO. Yeah, but nobody was there protecting Iran per se. Iran—the sanctions—the economic sanctions were doing well until we gave them $150 billion.

Mr. RUGGIERO. Right.

Mr. MARINO. Aside from that, I don't think anyone else would have been coming to Iran's aid concerning sanctions.

Mr. RUGGIERO. Well, I mean, I would say—I also worked on Iran's sanctions when I was in the government, and I remember conversations about we couldn't go after their oil revenue, and of course, that is what happened. So I think we are talking about the Iran sanctions model with North Korea. North Korea—and, frankly, China—has never really faced what the Treasury Department could do with North Korea sanctions, you know, back to the prior question.

So I think it is, from my perspective, too, we also have to have a conversation of what would those negotiations look like, because my main concern is that those who support diplomacy fall back to the—well, we could get a freeze, and then we could go through extended negotiations, and North Korea will eventually denuclearize. I think you have to flip that on its head and insist that North Korea be committed to denuclearize upfront, not denuclearize, but be committed to do that upfront.

Mr. MARINO. Okay. Doctor.

Mr. CORDESMAN. I think the committee should ask where North Korea will be in 5 to 10 years in its nuclear programs, its precision strike programs, and its biological capabilities. You mentioned a long-term game, in each case, they can edge around an awful lot of negotiating constraints and agreements. And instead of just looking at what you can do that might work, I think you need to take a harder look at what will happen with the existing way that North Korea is proliferating and developing its weapons and technology.

Mr. MARINO. I happen to agree with you. I think that is the first issue that we should tackle in any situation like this.

Ambassador, did you have anything—comment?

Ms. JENKINS. No, I would just—just thinking that we heard a little bit about some of the uncertainties about what North Korea really does have in terms of chemical and biological. I think it is a good time to think about what we can do now to try to get ahead of what we may or may not know about what they have. If in fact they are not at the point of having a biological weapon, for example, what can we do to try to work through that problem and that situation now?

Mr. MARINO. Quickly, in 2 seconds, do any of you believe that China will take out the ruling family in North Korea?

Let the record reflect that no one responded to that they think they will take out the ruling family.

I yield back. Thank you.

Mr. YOHO. Thank you for your questions.

Next, we will go to ranking member of the Asia and the Pacific Subcommittee, Mr. Brad Sherman from California.

Mr. SHERMAN. Public sources have estimated that North Korea has between 2,500 and 5,000 tons of chemical agents. Does anyone on the panel think that a different number has more credibility?

Mr. CORDESMAN. I think that number does not have credibility——

Mr. SHERMAN. Because it is too low, it is too high, or you just have——

Mr. CORDESMAN. Because it is simply a set of round numbers that somebody thought up at a point of time some years back.

Mr. SHERMAN. Does anybody on the panel have any different estimate?

Mr. CORDESMAN. Would you like 12?

Mr. SHERMAN. Any guesstimate that it is an estimate rather than—okay.

If China were to end all banking and all trade, except food and medicine, that is to say, exporting food and medicine to North Korea, how big of an effect would that have on the regime?

Mr. Ruggiero.

Mr. RUGGIERO. Well, I mean, the issue here is that they seem to be willing to do that for North Koreans, but if they are not willing to do that for their own nationals, aiding North Korea's sanctions evasion, then it will not have the impact——

Mr. SHERMAN. I am saying that if China used all of its devices to make sure that there wasn't a single dollar's worth of goods exported from North Korea to China, no coal, no whatever, no labor services, and actually enforced it, what effect would that have on the North Korean regime?

Mr. RUGGIERO. I think it would have a substantial impact. I mean, the point I made earlier is that some of these examples we are seeing is a ledger system between China and North Korea where the money resides in China. And so what you are going to have is North Korea not have the ability to even go to another country for those items that they need.

Mr. SHERMAN. Should we be more strong in our statements to Poland and others that have accepted North Korean workers, to use a euphemism?

Mr. Parachini.

Mr. PARACHINI. So I think getting China to change on this is going to be an enduring challenge, but——

Mr. SHERMAN. It is not an enduring challenge. You just put a 50-percent tariff on all their exports to the United States, and you will get their attention. But the enduring challenge is summoning the political will to do that in a system in which there—obviously, that would have an effect, but if you threaten to do it, they would concede. The reason we haven't threatened to do it is because of the tremendous power of corporations that—on issues of national security. But, please continue.

Mr. PARACHINI. I think there are costs and benefits of that type of economic pressure.

Mr. SHERMAN. There are only benefits if China blinks.

Mr. PARACHINI. But I think there is the opportunity to help other countries enforce the sanction network that is out there that can be—and Poland——

Mr. SHERMAN. Trim around the edges, yes. But Poland continues to have North Korean workers and insists upon doing that for another year and says that is a local rather than a national decision. Whether that is a violation of section 5 of the NATO agreement in spirit, I don't know; probably, technically, it is a violation of section 5 de jure.

We have sanctioned one small bank, Bank of Dandong. We haven't sanctioned any of the major Chinese banks because the economic powers in this country say we shouldn't do it. Last September, Chairman Royce identified several Chinese banks, including the China Merchants Bank and a state-owned bank, the Agricultural Bank of China, as doing sanctionable business with North Korea. Chairman Yoho and I wrote to the Treasury Department deriding several Chinese banks, including the Industrial Commercial Bank of China, the largest bank in the world, and the Bank of Communications, one of the largest banks in the world. The executive branch has failed to pull the trigger.

How—the question is, why have we put preserving the $500 billion or $400 billion trade deficit with China and all the profits that generates above our national security? How do we get the administration to get serious with the big banks? Does someone have a—yes.

Mr. RUGGIERO. Right. I mean, I would say, you know, there was a narrative that North Korean financial activity was going through small Chinese banks and that these medium and large banks were just a conduit. But FinCEN, an element of the Treasury Department, put out an advisory last year, and said some of these accounts are actually at major Chinese financial institutions. So how do you do it? You do it with the regulatory fines. You know, I would also piggyback on the answer——

Mr. SHERMAN. You can do it, but how do you summon the political will to do it?

Mr. RUGGIERO. That is the thing. I mean, these are mandatory sanctions passed by Congress, the same as with——

Mr. SHERMAN. Nothing is illegal if 50 major businesses all decide it is the right policy. And just because we pass laws doesn't mean that the executive branch will follow them.

Mr. RUGGIERO. Right. I think this is stuck in a narrative—not this narrative—but a narrative about whether to do it between doing nothing and freezing their access to New York when there is this interim—what we talked about in terms of Iran sanctions, using fines.

Mr. SHERMAN. I don't think—if you only do the level of economic effect that we had with Iran, this is a much more closed society, and a regime that cares even less about its own people. I think you are going to have to have much tougher sanctions if you are going to get even a freeze of their nuclear program, let alone the unrealistic goals that we at least claim that we are trying to achieve.

I yield back.

Mr. YOHO. Thank for your comments. That is why tomorrow we are going to do the special order on China to draw out some these things, these inequities that they are doing, so that the American people know this and Members of Congress.

Next, we will go to Adam Kinzinger from Illinois.

Mr. KINZINGER. Thank you, Mr. Chairman, thanks for your leadership on this issue.

Thank you all for being here for this very important subject. I think back, and I don't know if it is a good comparison—I think it is—to Neville Chamberlain coming back from his negotiations with Chancellor Hitler in a very difficult time, frankly, in Europe, understanding that they just came out of a major war, chewed up a generation with this prospect of another. They were understandably excited to talk about peace in our time. But I think, looking back at that moment, it is not Neville Chamberlain that we celebrated as the hero of that era. It is a guy like Churchill, who saw the gathering storm clouds. My hope is this does not turn into a kinetic exercise between the United States and North Korea. There is no doubt we would win, but nobody wants to go there.

But I think what is important to note in all of this is that this is a real threat. In 1994, I think it was around then when President Clinton was actually looking at options to bomb North Korea because of this. Jimmy Carter pops up in Pyongyang and says he has an agreement, and we are all excited. We take a nice sigh of relief, and we fixed the problem. And here we are today in 2018 looking down the barrel, frankly, of a gun.

And I actually give the President a lot of props for having really brought this to the forefront. I know it makes people nervous. North Korea should make people nervous. This is a regime that is dead set on destabilizing our allies in the region, all in the goal of maintaining power. But I think it is—we are going to have some very tough decisions to make here.

I think if we go to a posture of saying we are going to just simply accept a nuclear North Korea, which is what some people, frankly, have advocated for, especially in the prior administration, and said we just need to build interceptors that can exceed their ability to launch nuclear weapons, I think that spells, in effect, the end of the Nuclear Non-Proliferation Treaty for the world. How are you ever going to confront Iran's nuclear ambitions if we just allowed

North Korea? What is going to happen to every other rogue regime that decides they want nuclear weapons? We don't have the moral ability to confront them in this, simply because we didn't with North Korea.

So I think we have to take this extremely seriously. I think people that say the military option is absolutely off the table are doing very major damage to our diplomatic effort. As we all understand instruments of power, the diplomatic instrument of power against an adversary does not work without the military instrument of power there to back it up. Otherwise, we can do all the sanctions we want, but if they don't think there is a stick, the carrot has no effect.

Let me ask Mr. Parachini, I hope I said your name right. Given this threat, I think we are all clear-eyed to the fact that North Korea has the potential to sell WMDs to the highest bidder. That could be a rogue regime like Syria—obviously, Assad has shown his desire to kill his own people—or even a terrorist group like al-Qaeda or ISIS. And it is no secret that North Korea provided assistance to Syria in building their nuclear reactor, which was destroyed in 2007. Given the situation in Syria now, I can't fathom how much worse it would be if Syria was a nuclear weapons state. Just because we haven't heard much about North Korea proliferation of other countries doesn't mean they still aren't interested in it. Can you speak to the level of interaction and potential WMD assistance that the Kim regime currently provides or is willing to provide to rogue regimes and non-state actors? What is their moral driver to prevent them from doing it, if in fact that is the answer? And which countries or groups seeking WMD assistance from North Korea should concern us the most?

Mr. PARACHINI. Congressman, I think there has been a special relationship between North Korea and Syria for quite some time, which I think in part explains that relationship. Since the fall of the Soviet Union, which provided a lot of financing for Syrian purchases of conventional weapons and other capabilities, Iran has stepped in to kind of be that bank account. And the close relationship between Iran, Syria, and North Korea I think does explain some of the Assad regime's weapons purchases over the last decade and, indeed, some of the collaboration on either its missile program, the reactor that you referred to that was destroyed, as well as chemical defenses.

On non-state actors, there again, North Korea is in the trenches with Iran and Syria. That is, they see themselves as aligned to support Hamas and Hezbollah, but there is not evidence that they have actually transferred unconventional capabilities to non-state actors. Conventional weapons, yes. Assistance and guidance on tunneling, yes. But in terms of jumping the taboo that is on about states not transferring that, we have not seen that yet.

Mr. KINZINGER. Do you have a fear that it could happen potentially?

Mr. PARACHINI. There is always that possibility. Given the power of these weapons, states are very reluctant to let them get out of control in that way. We feared that with Saddam Hussein, and in the end, it proved not to be the case. Is there a zero possibility? No. There is some possibility, but I think it is very low.

Mr. KINZINGER. Thank you. Since my time is up, I will just say this without asking it. I think it is important that we look at utilizing the potential of boost phase intercept as well. I know this is something that has been discussed. It is inexpensive. Boost phase is the slowest launch phase of an ICBM, and I think it is imperative on the administration to also explore the idea of boost phase intercept as well.

With that, Mr. Chairman, I thank you for your hospitality and thank you for being here, and I yield back.

Mr. YOHO. I appreciate your line of questioning. That has brought up some great points.

Next, we will go to Ms. Dina Titus of Nevada.

Ms. TITUS. Thank you very much, Mr. Chairman, ranking members, for holding this hearing today. With all due respect to my colleagues across the aisle, I think we do have to be concerned about the President's conflicting messages. One minute he is talking and bragging about having a bigger button than North Korea, and the next minute he is trying to take credit for bringing North Korea and South Korea together to talk about the Olympics. We just don't know what is coming out of the White House.

He just now, a little while ago, gave an interview to Reuters in respect to the preemptive strike or the preemptive attack on North Korea, and this was his quote: "We are playing a very, very hard game of poker, and you don't want to reveal your hand."

Well, this isn't a game. And I am from Nevada. We know something about playing poker. There is also a tell when you play poker, and his tell is some of this braggadocio that he is always talking about when he is going to back down or not.

I think most of the questions and the attention has been on the nuclear threat, but I am glad that we are talking about the non-nuclear threat as well. This is especially important in light of the Vancouver meeting and the false ballistic missile warning that kind of terrorized Hawaii just recently.

So let me ask you, Ambassador Jenkins, during your time at the State Department when you were the Coordinator for Threat Reduction Programs, what were your office's greatest assets? What were you able to do to prevent some of the terrorism that we are talking about that is non-nuclear? And would you go on to say and tell us, now that that position is vacant—even though North Korea is such a big threat, they haven't bothered to fill that position—how are we going to address this?

Ms. JENKINS. Thank you for your question. The work that I was doing at the Department of State was really focusing on how to prevent WMD terrorism, and I worked closely with colleagues who were working on the nuclear issues. But my portfolio really did cover CBRN, chemical, biological, radiological, nuclear Issues. And most of the focus was on working amongst countries on how to deal with this issue. Putting funds into all types of programs that would prevent WMD terrorism, whether it was nuclear security, whether it was biological security, whether it was border security issues, whether it was security culture issues with the scientists. So we really worked hard on those issues.

The thing that is important is that the type of programs that I worked on, you would have to be working with a country that is

open to those type of activities. So the type of activities that I was working on would not be useful for, let's say, for North Korea right now because they are not a country that would be open to those kind of things. It is something that would happen later.

But we were able to do quite a bit to reduce the chances of WMD terrorism around the world because it is a global issue. It is a global problem, and we have quite a few countries that are working on it.

Ms. TITUS. I think you also mentioned the cyber threat that North Korea poses. Maybe you could address that. I think there was a bulletin from DHS in June 2017 that North Korea was targeting the U.S., targeting media, aerospace, financial. We don't know the level of sophistication. Do you think there is any possibility they could, like the Russians, target elections?

Ms. JENKINS. Well, I am not an expert in cyber, so I can't really say with any authority whether they could do it or not, but apparently North Korea does have some capabilities when it comes to cyber. So whether they could actually do what we are finding out the Russians have done, I am not sure, but they obviously are in the process of trying to strengthen their cyber capabilities.

Ms. TITUS. Can anybody else address that?

Mr. CORDESMAN. I think that to have anything as broad as a major election would be beyond their current capabilities. But they have used cyber, at least in one case, to attack part of the power grid, or tried to, in South Korea. They have conducted offensive cyber operations, and their capabilities are improving. But whether they would take on anything as broad as the U.S., I think that certainly is beyond their current capabilities.

Mr. RUGGIERO. I mean, I would just say that we shouldn't underestimate North Korea's cyber capabilities. It was only 4 years ago that they attacked Sony Pictures. And I think it is also easy to forget that when certain theaters said they were going to show the movie anyway, then North Korea threatened a 9/11 style attack against the United States.

So North Korea has advanced its cyber capabilities. Now, whether they would want to impact an election, I think is more of a—that is not what they are going for. I think they are going for the ability to use cyber in a pre- and wartime environment. And you look at some of their activities in South Korea, and that is clear, but also to steal money to blunt the sanctions impact.

Ms. TITUS. Thank you.

Mr. YOHO. Thank you for your questions.

Next, we will go to Mrs. Ann Wagner from Missouri.

Mrs. WAGNER. Thank you, Mr. Chairman.

And thank you all for being witnesses today. I appreciate your testimony.

Mr. Cordesman, I really appreciated your thorough review of North Korea's weapon activities. It was very useful to the committee. Do you know to what extent U.S. bases in Northeast Asia have security measures in place to combat infectious or lethal agents?

Mr. CORDESMAN. I think you would have to get a briefing on detection at a different level because it is really, more than anything else now, the ability to characterize an attack that becomes the

most critical issue. Your other problem is that when it comes down to what is the attack, there are so many different agents and so many different ways you can attack, that there are at least some agents which, in an island context, an infectious agent or so on, where it would be extremely difficult for anyone to conduct a defensive measure other than treatment. And in that case, detecting the way in which the weapon was developed would be critical, because if it is altered to have a slow gestation period, which is now possible, it becomes a very difficult problem. I am sure this issue is one that is being examined as part of a broader effort, but I think you are touching on some very sensitive issues.

Mrs. WAGNER. Mr. Ruggiero, I appreciated your summary of how President Trump's diplomatic pressure has caused other countries to end relationships with North Korea. Are there countries partnering with North Korea that stand out to you as needing special attention from the administration?

Mr. RUGGIERO. Well, beyond China and Russia, and, you know, it was mentioned earlier, Poland, there are certainly still countries in Africa I am concerned about. Even though Singapore has said that it will cut off its trade relationship with North Korea, I am still concerned about the actual implementation of that. Malaysia has been an issue in the past. I think the question here is whether the administration is willing to use sanctions authorities to go after companies in friendly countries to show an impact. I think if they did that perhaps once or twice, that it could have an exponential impact.

Mrs. WAGNER. I agree. Ambassador Jenkins, can you speak about the outcomes of yesterday's U.S./Canada meeting in Vancouver on North Korea's illicit transfer of materials and equipment?

Ms. JENKINS. The one thing that I was able to pick up, but I need to get more information, is that there was an agreement by Canada to provide some funding to the U.S. to help with sanctions against North Korea. There was a pledge of $325 million—$3.25 million to help the U.S. with the sanctions, to help other countries with strengthening sanctions.

So I don't think there was a lot of—I don't know how much success there was in terms of bringing North Korea to the table, which is one of the things they wanted to do and, obviously, there is—thinking that by continuing the pressure on North Korea, that will bring them to the table and this is another way to try to do that. But there was a lot of discussion on the sanctions and how to enforce the sanctions.

Mrs. WAGNER. Great. Thank you. It seems that U.S. policy prioritizes the challenge of the nuclear threat over the challenge of the chemical and biological weapons threat. Mr. Parachini, do you believe the U.S. Government should work to change its what I will call cost-benefit analysis and better prioritize the chemical and biological threats? And how do you think we begin to do that, sir?

Mr. PARACHINI. So I think a focus on the nuclear threat is appropriate. It is a demonstrated capability that they have now also demonstrated a ballistic missile capability. So it is generally—it is in a category in and of itself where their chemical and biological weapons capabilities are at different thresholds. We don't have a good sense of what those thresholds may be. They are a greater

threat, I think, in both South Korea and the Asian theater than they are to the homeland, but I think that naturally leads you to prioritize nuclear first.

Their chemical capabilities are probably more robust based on what we know and based on the ease of producing those types of weapons. And their biological weapons are probably least available for use, and we know less about them, so I think I would prioritize those less. I would say if there are ways to do dual-use things for detection and addressing any infectious diseases, that is desirable to deal with I think the least probable of these threats.

Mrs. WAGNER. Great. Thank you.

Mr. Chairman, my time has expired. I thank you.

Mr. YOHO. Thank you.

Next, we will go to Ms. Tulsi Gabbard from the State of Hawaii.

Ms. GABBARD. Thank you, Mr. Chairman.

You know, at this point, I think no one more viscerally appreciates the seriousness of the threat that we face at this moment than the people of Hawaii who just went through a terrifying experience on Saturday morning, receiving this alert on their cell phone that a ballistic missile was incoming, take shelter immediately, this is not a drill. Now, obviously, we know now this turned out to be colossal error on the part of the State officials responsible for this. But it really served as a wake-up call to the country and to the people in Washington about the imminent nature of the threat that we face and the need for urgent and effective action to ultimately remove this threat from our country.

So, Mr. Ruggiero, you were talking about sanctions and through a lot of the different questions, I think you gave responses coming at different angles. It is clear, though, that none of the sanctions that have been put in place over the last few decades against North Korea have proven effective, which is why we are sitting in this position, nor are they anywhere near—nor have they reached anywhere near the effectiveness of the sanctions in Iran that caused the nuclear deal to occur.

Can you label maybe the top most effective changes to current sanctions that would actually prove this sanctions regime to be effective to create this leverage?

Mr. RUGGIERO. Well, I can give you three. We talked about the China financial, so we don't have to go into much detail about that. We talked about the fines, and that would be useful. I would say the other benefit of the Vancouver meeting is something that I testified before this committee last year about, which is the public nature of a like-minded group. And we had that on Iran, and it looks like we now have that with Vancouver. And I think that one of the things in the statement was that they are going to meet more often, so that is the second thing. And the third, which is related to that, is shipping. You know, our research indicates that there are at least double, if not triple, of the number of North Korean linked vessels that can be and really should be sanctioned. And then also we have already seen the South Korean stop two—or excuse me—freeze or impound two vessels with regard to ship-to-ship transfers. That is an area that is going to need more work, and I think a lot of people don't want to interdict vessels, but we need to remember the value of just doing training exercises with regard

to interdicting vessels as well. Doing those in a more public way to increase the costs for some of these vessels that may not know they are involved with North Korea.

Ms. GABBARD. Anyone else? With regard to—there has been some conversation, especially lately, about the possibility of a "preventative or preemptive strike," and I am wondering what actual defense treaties are in place between China and North Korea, and Russia and North Korea, respectively, and what you believe their responses would be from the spectrum of a surgical strike that some are advocating for all the way to an overwhelming military strike coming from the United States? How would China and Russia react to that?

Mr. CORDESMAN. There is no automatic treaty relationship between China and North Korea, but there is a broad security relationship and treaty or agreement. I think that when you talk about how China would react, any kind of bolt from the blue, just preemptive attack without a cause, would almost force China to react, at least diplomatically, and take a very strong political stand. I doubt very much if it would lead to immediate military action, but it would be extremely hard to predict. I think——

Ms. GABBARD. Would you agree that North Korea would respond with military action in that instance?

Mr. CORDESMAN. I think that certainly it would respond with some kind of military action, but whether that action would be something that would offset the impact of a really well-targeted preventative strike, a lot would depend on how well we can actually target preventively and locate and destroy their nuclear capabilities, and how many other things we would do to restrict their retaliatory capability. There is a very wide range between simply trying to strike their nuclear weapons and what could be a major conflict.

Ms. GABBARD. Thank you.

Mr. PARACHINI. I might add that it is very dangerous to think about decapitation because you don't know whether or not this is a regime that has the dead-hand doctrine; that is, when the leadership goes out, some other parts of the military know that it is time for them to go in. And indeed that was a Soviet doctrine. It is a reasonable worry that North Korea may have a similar one. So any type of decapitation attempt, successful or not, might launch something that we really would not like to have occur.

Ms. GABBARD. Yeah. Thank you.

Thank you, Mr. Chairman.

Mr. YOHO. I thank you for your questioning.

Next, we will go to Mr. Tom Garrett from Virginia.

Mr. GARRETT. Thank you, Mr. Chairman.

I want to start with Ambassador Jenkins, Mr. Chairman, because I don't know if you are aware but Ambassador Jenkins went to our Nation's premiere flagship public university, the University of Virginia, for one of her degrees, so I know she is going to have a good answer here.

To your knowledge, Ambassador Jenkins, is there any other nation on the face of the planet circa 2018 that literally sells workers to do work in foreign countries and then has their salaries remitted to the government of that nation?

Ms. JENKINS. I am taking my time with this one just to think. I don't think so.

Mr. GARRETT. I don't either. And I just—I point that out, not because it is directly on point, but because I think it is relevant for those who are trying to understand the nature of this regime. In my opening statement, Mr. Chair, I tried to illustrate that any regime that would sell its very own people into slavery might be willing to utilize weapons of any variety, be they conventional, nuclear, biological or chemical against not only foreigners, but their own citizens. And I also think it is worthy of note that the history in the region indicates hostilities inherent over intergenerational periods between not just the north and the south but also the Japanese and the Koreans, the Chinese and the Koreans, et cetera, and I think most Americans fail to understand that.

Moving somewhat, Dr. Cordesman, dual-purpose improved conventional munitions, submunitions, bomblets, do we know whether or not the North Korean regime employs artillery, canon, rocket, or missile systems that might employ submunitions? I mean, I know the answer, but——

Mr. CORDESMAN. I have not heard that they have extensive stocks of advanced submunitions, but I think that from some of the literature I have seen from Jane's and others, there are indications they have at least some capabilities in these areas.

Mr. GARRETT. And unclassified documentation indicates that a launcher loader worth of dual-purpose improved conventional munitions on the proper mathematical firing solutions would be able to essentially impact every single unprotected target in a single square kilometer. So, again, these references to 20,000 dead in 1 day, I would submit, rhetorically, are probably low, particularly when you consider populations not hardened, densely compacted in civilian areas.

Now, does the United States employ Dual-Purpose Improved Conventional Munitions by doctrine?

Mr. CORDESMAN. We have a range of advanced artillery rounds, yes.

Mr. GARRETT. But did we not remove ourselves voluntarily from the——

Mr. CORDESMAN. Yes.

Mr. GARRETT. And that would have been circa 2015?

Mr. CORDESMAN. Right.

Mr. GARRETT. And so also we have made reference to, and you made reference to hardened artillery emplacements, essentially, in theory, these artillery emplacements might roll out from underneath a protective overhead cover, et cetera, fire and then move back in. Does that accurately characterize some of our understanding in the North Korean indirect fire capability?

Mr. CORDESMAN. They vary sharply according to the terrain. Some do that. Some can fire and do fire from fixed positions.

Mr. GARRETT. And so we voluntarily stop using scatterable submunitions that might counter these in a counter battery scenario. How about area-denial munitions, RAMS and ADAMS, artillery-fired area-denial munitions? Do we have those in our capability? And do we have those in our inventory in the United States?

Mr. CORDESMAN. I know we have them in our capability and had them in our capability. Quite frankly, I do not know the inventories involved.

Mr. GARRETT. In fact, we voluntarily removed ourselves from the realm of nations that would employ scatterable area-denial munitions. Have the North Koreans done this?

Mr. CORDESMAN. No.

Mr. GARRETT. And so might these withdrawals of the United States from the arena of cutting-edge weaponry put us at a competitive disadvantage with the regime that hasn't honored the same commitments that we have made?

Mr. CORDESMAN. If I may make two points. First, we have basically gone to using the equivalent of Earth penetrators rather than submunitions because of the blast doors on the hearts. That is a very restricted capability, but it requires you to penetrate a much more serious barrier than the artillery rounds we then had.

Mr. GARRETT. So, specifically, in a case of a hardened target, the Earth penetrator might be a preferred method. However, if you are trying to deny a roll-in roll-out artillery system, the scatterable mines might be something that would work best.

Let me continue, because I have about 20 seconds remaining. It strikes me that the people who entered this country into these agreements probably never did comprehensive fire-risk planning for offensive or defensive operations. And it strikes me, and I apologize again, with all due respect, sir, and I have an immense amount for yourself and other members of this panel, that we endanger the very lives of the young women and men who have signed on a dotted line to potentially sacrifice everything that they have or ever will have for the freedom of this Nation and defense of the innocent people, not only of South Korea, but the world.

And so I take this opportunity, Mr. Chairman, and I will conclude shortly, to submit that we might relook some of the treaties into which we entered and some of the actions we unilaterally engaged in in light of the very real circumstances in which we find ourselves 24 years post a North Korean nuclear deal that was to, in the words of the President who shouted from the mountaintops of success, "rid the Korean Peninsula of a nuclear threat."

It is indeed existential to the young men and women in our uniforms and to the people, not only of the region, but of the world. Thank you.

Mr. YOHO. Well spoken. I appreciate your words.

Next, Ms. Norma Torres from California.

Mrs. TORRES. Thank you, Mr. Chairman, for holding this hearing.

Mr. Ruggiero—I hoped I pronounced your name correctly—last year, I introduced H.R. 3261, the North Korea Follow the Money Act. It is a simple bipartisan bill that requires a national intelligence estimate on North Korea's revenue sources.

How much do we know about how North Korea is funding its chemical weapons programs?

Mr. RUGGIERO. I would just say that a lot of our understanding of North Korea's finances is very anecdotal partially because North Korea does not report its own trade statistics, partially because some trade statistics that are reported as North Korea are actually

South Korea, and then also because the Chinese report what they want to report.

And to perhaps the question of, you know, whether having an assessment of that type, of the budget and the usefulness of that, I would say, you know, sanctions are now being used more and more often, especially when it comes to North Korea. And I think it would be valuable, at least internally within the U.S. Government, to have a common understanding of where North Korea is now and what are the levers that can be used to affect different revenue streams.

Mrs. TORRES. Specifically, if we want to be very specific and target certain people versus an entire country, correct?

Mr. RUGGIERO. Well, the issue here, there has always been this narrative of leadership assets overseas. That is certainly something that I know that the government has focused on before. And as I noted earlier, the North Koreans' use their revenue really in three ways, military, weapons, and for the elites. And I think if we had an understanding of what the budget is like, but it will always be imprecise, but a way to target the sanctions to go in certain areas and to not harm the people, I think is the first order there.

Mrs. TORRES. Absolutely. That is why I think it is critical for us to, at the very least, Mr. Chairman, try to get a hearing on this bill, once again, H.R. 3261.

I am also very concerned about an incident that occurred June 2017, a cyber attack that shut down our Nation's ports. The Port of Los Angeles was impacted. That is a concern to me because the livelihood of my constituents is dependent on the activities at the ports.

Do you think that North Korea has the capability to carry out cyber attacks against our ports and other critical infrastructure?

Mr. RUGGIERO. Well, I would say that if they don't have the capability now, they are going to certainly work toward getting it. I think what we see in South Korea over the last 5 to 6 years where North Korea used cyber to attack U.S. Forces, Korea, and our South Korean counterparts in a wide approach, and then learned from that and was more specific. In other words, going after 20 Web sites the first time, and then the second time, going after only 2.

So I think that is part of it. The wartime environment, using it in a wartime environment, but then using it—what we like to call cyber-enabled economic warfare, to try and harm the United States as these sanctions increase. And then the third way is to make money to blunt the impact of those sanctions.

Mrs. TORRES. Go ahead, Ms. Jenkins.

Ms. JENKINS. Yes, I would just add that I think the more effective the international community is in terms of sanctions, in terms of interdiction, illicit trafficking of materials and equipment, the more likely North Korea will rely on cyber to raise the funds that they need to do what they need to do. And in doing that, they will develop a capability to use it for other things.

So there is a connection between the effectiveness of activities to prevent them from doing what they are doing and to prevent them from raising the money that they want to raise and their use of this other tool to raise that money.

Mrs. TORRES. So either stealing from us, directly from us, or shutting down our commerce.

What can we do to protect ourselves? Yes, sir.

Mr. CORDESMAN. I think that really is a key question. An awful lot of the problem we face is the failure basically to provide basic defenses, reduce cyber vulnerability, set standards that do not allow ease of attack. When countries like North Korea can attack a critical infrastructure function, the question is, why is it vulnerable in the first place?

Mrs. TORRES. Thank you. I ran out of time.

Mr. Chairman, I yield back.

Mr. YOHO. I appreciate your participation and your questions. And the panel, I thank you for your endurance, your information that you have given us.

What I see is the continuing evolution of the North Korean saga, going from the Korean War to where we are at today. And we have seen past administrations, both Republican and Democrats use the carrot and stick. And at each point, the Koreans got stronger as far as their development.

I have a hard time believing they did this on their own. I feel there was a lot of help, whether it was from Pakistan in the beginning, to Russia, to China, to other actors. And they are used as a proxy state in a lot of these ventures, but now they are at a point where they are today. And I think you just brought up a point about defensive mechanisms. And I look at the THAAD system South Korea put in that was so warranted at the time, but I saw China retaliate against South Korea. South Korea was doing that just for their protection. And I think they were very warranted to bring in the other ones. And again, at the dismay and dissatisfaction of China. But I think it is very important.

And I think we, as a Nation, should make sure that that offer stands on the table as something that South Korea can use to make sure that they have the defensive mechanisms. But this is, of course, up to the South Koreans. And we are at a different point now with the talks that are going on between the two Koreas. We can just hope that with the efforts of the world community coming together, putting pressure on all partners that are trading with North Korea, that this will come to a peaceful resolution.

I can't thank you enough for being here. Do you have any further comments you want to say or you feel pretty confident with what has gone on?

Hearing no other comments, I want to thank the witnesses. I want to thank the members, and I want to thank Judge Poe for calling this important meeting jointly together with the Asia-Pacific Subcommittee. In his absence, I would like to end it with, "and that is the way it is."

This meeting is adjourned.

[Whereupon, at 4:09 p.m., the subcommittees were adjourned.]

APPENDIX

Material Submitted for the Record

JOINT SUBCOMMITTEE HEARING NOTICE
COMMITTEE ON FOREIGN AFFAIRS
U.S. HOUSE OF REPRESENTATIVES
WASHINGTON, DC 20515-6128

Subcommittee on Terrorism, Nonproliferation, and Trade
Ted Poe (R-TX), Chairman

Subcommittee on Asia and the Pacific
Ted Yoho (R-FL), Chairman

January 12, 2018

TO: MEMBERS OF THE COMMITTEE ON FOREIGN AFFAIRS

You are respectfully requested to attend an OPEN hearing of the Committee on Foreign Affairs, to be held jointly by the Subcommittee on Terrorism, Nonproliferation, and Trade and the Subcommittee on Asia and the Pacific in Room 2172 of the Rayburn House Office Building (and available live on the Committee website at http://www.ForeignAffairs.house.gov):

DATE: Wednesday, January 17, 2018

TIME: 2:00 p.m.

SUBJECT: More Than a Nuclear Threat: North Korea's Chemical, Biological, and Conventional Weapons

WITNESSES: Anthony Cordesman, Ph.D.
Arleigh A. Burke Chair in Strategy
Center for Strategic and International Studies

Mr. John Parachini
Director
Intelligence Policy Center
RAND Corporation

Mr. Anthony Ruggiero
Senior Fellow
Foundation for Defense of Democracies

The Honorable Bonnie Jenkins
Founder and President
Women of Color Advancing Peace, Security and Conflict Transformation
(*Former Coordinator for Threat Reduction Programs, Bureau of International Security and Nonproliferation, U.S. Department of State*)

By Direction of the Chairman

The Committee on Foreign Affairs seeks to make its facilities accessible to persons with disabilities. If you are in need of special accommodations, please call 202/225-5021 at least four business days in advance of the event, whenever practicable. Questions with regard to special accommodations in general (including availability of Committee materials in alternative formats and assistive listening devices) may be directed to the Committee.

COMMITTEE ON FOREIGN AFFAIRS

MINUTES OF SUBCOMMITTEE ON *Terrorism, Nonproliferation, and Trade & Asia and the Pacific* HEARING

Day *Wednesday* **Date** *01/17/18* **Room** *2172*

Starting Time *2:05pm* **Ending Time** *4:09pm*

Recesses [ ] (____to____) (____to____) (____to____) (____to____) (____to____) (____to____)

Presiding Member(s)

Representative Yoho

Check all of the following that apply:

Open Session [✓]
Executive (closed) Session [ ]
Televised [ ]

Electronically Recorded (taped) [✓]
Stenographic Record [✓]

TITLE OF HEARING:

"More Than a Nuclear Threat: North Korea's Chemical, Biological, and Conventional Weapons"

SUBCOMMITTEE MEMBERS PRESENT:

Reps. Yoho, Keating, Sherman, Rohrabacher, Connolly, Chabot, Bera, Wilson, Frankel, Marino, Gabbard, Brooks, Titus, Cook, Torres, Perry, Kinzinger, Zeldin, Wagner, Mast, Garrett

NON-SUBCOMMITTEE MEMBERS PRESENT: *(Mark with an * if they are not members of full committee.)*

Reps. Curtis and Donovan

HEARING WITNESSES: Same as meeting notice attached? Yes [✓] **No** [ ]
(If "no", please list below and include title, agency, department, or organization.)

STATEMENTS FOR THE RECORD: *(List any statements submitted for the record.)*

SFR submitted by Rep. Poe
SFR submitted by Rep. Connolly

TIME SCHEDULED TO RECONVENE _____
or
TIME ADJOURNED *4:09pm*

Dawnesh Wallace
Subcommittee Staff Associate

Congressman Ted Poe
Statement for the Record
TNT/A+P Joint Hearing, "More Than a Nuclear Threat: North Korea's Chemical, Biological, and Conventional Weapons"

North Korea continues to be one of the great menaces of our time. Its relentless pursuit of nuclear weapons and the means to deliver them onto American shores, threatens the lives of millions and needlessly risks a major war. However, this evil regime has not only looked to develop nuclear arms to hold the world hostage and murder countless innocent people. It is expanding its arsenal to introduce some of the most horrific weapons of war this world has ever seen.

Based on what evidence is available, North Korea has built or continues to research a broad range of chemical and biological weapons that could unleash untold savagery on its neighbors and Americans in the region. Furthermore, the regime has amassed the conventional military forces needed to rain down destruction on its southern neighbor on a scale approaching the level of carnage that a nuclear weapon can produce.

Millions of people living in Seoul are within range of thousands of North Korean rockets and artillery. On immediate order from the supreme leader, these guns can bombard the South Korean capital and dozens of communities along the demilitarize zone with high explosive shells and chemical warheads, killing tens of thousands of civilians in the first hour of a conflict. The urgency of the North Korean threat cannot be understated and must be understood in full context.

The regime has shown us its brutality and willingness to use globally condemned weapons. Just last year, Kim Jong Un's half-brother was assassinated using VX nerve agent in a busy Malaysian airport. VX is banned by the Chemical Weapons Convention and is more potent than any other chemical weapon devised by man. Its ability to virtually kill on contact, gives little time to treat individuals exposed. And unlike other chemical weapons, it has the ability to sit for long periods of time where it was dispersed, creating a deadly obstacle for medical professionals trying to respond to a VX attack. The recklessness of Little Kim's decision to use it in public place shows how little regard he has for innocent human life.

With the availability of drone technology, the North Korean regime could easily spray the nerve agent across heavily populated areas. It is unclear how we should respond to such an incident. With nuclear weapons, we have a clearly stated policy: if you use yours, we will respond with ours. We must develop and communicate a clear strategy to how we will respond if Little Kim were to use chemical or biological weapons in his next clash with the U.S. and South Korea.

When the Syrian regime conducted a chemical attack on its own people in 2013, then-President Obama did not have a clearly held 'red-line.' The Obama administration displayed little resolve and did not respond with force—instead it made a deal with the Russians so supposedly destroy the Assad regime's chemical weapons stockpiles. But last spring we saw the Syrians use chemical weapons again. Fortunately, the Trump administration did not waver, and responded with sufficient force to deter further use of the deadly weapons. This example demonstrates that if we show weakness in the face of these horrific weapons, it will only invite continued use of them.

We should also consider where the Assad regime acquired these weapons of mass destruction. Available evidence points to the Kim regime. And despite the Obama administrations deal with Putin, reports suggest Assad may be trying to acquire more chemical weapons from North Korea. Last August, the United Nations revealed that two North Korean shipments destined for Syria were intercepted. While it is unclear what the cargo was, we know they were intended for the Syrian agency responsible for Assad's chemical weapons program. So while Little Kim may not have ordered an attack with his chemical weapons arsenal yet, he is actively assisting those rogue actors who are using chemical weapons.

Recent reports also indicate that North Korea is developing the means to produce biological weapons on a massive scale. We do not know if he has deployed these new bioweapons, but given the example he has shown with his nuclear and chemical programs, it is not unreasonable to believe they will be soon. This evil regime has repeatedly demonstrated that it rarely hesitates when pushing the limits of international resolve.

To prevent North Korea from expanding its arsenal of deadly weapons and proliferating them to the world's worst actors, we must continue to apply all pressure available. Our sanctions should block all sources of funding and material for this regime. Only when Little Kim feels the pain and sees that his dangerous pursuit weapons of mass murder will result in his own demise, will he be tempted to back down.

America must lead the way, and show that any use of these deadly weapons will be met with a harsh response. And that's just the way it is.

Statement for the Record
Submitted by Mr. Connolly of Virginia

The North Korean regime's drive to become a nuclear power presents a real and dangerous threat to U.S. national security and that of our allies. But Kim Jong-Un's nuclear aspirations are not the only peril emanating from the North. Pyongyang reportedly has an arsenal of chemical, biological, and conventional weapons that we must reckon with as well. Our priority must be to de-escalate tensions on the Korean Peninsula by providing steady leadership, reassurance for our allies, and a comprehensive strategy to achieve peace and stability, including denuclearization, on the Peninsula. Unfortunately, President Trump has blustered and blundered his way into a military crisis with no clear off-ramp.

North Korea has the world's fourth-largest military, but insufficient training and aging equipment have led the regime to invest heavily in asymmetric capabilities, including chemical, biological, and nuclear weapons. According to Curtis M. Scaparrotti, previous Commander of U.S. Forces Korea, North Korea has "one of the world's largest chemical weapons stockpiles." The country is not a signatory to the Chemical Weapons Convention (CWC), which bans the use and stockpiling of chemical weapons. Selling these types of weapons and other conventional arms, often to countries that threaten U.S. national security interests, remains a key source of foreign currency for the regime. North Korea has also engaged in increasingly sophisticated cyber operations against the United States and our allies.

If conflict were to break out on the Korean Peninsula again, U.S. forces would likely need to operate in zones contaminated by chemical and biological weapons. Upwards of 25 million people on either side of the DMZ, including at least 100,000 U.S. citizens would be at immediate risk. Escalation of a military conflict would result in extraordinary loss of life. It is for this reason that military action must be an absolute last resort. Despite this reality, the President appears to be singularly focused on military solutions. His administration has proposed dramatic increases to the defense budget offset by an evisceration of the State Department. Trump's inflammatory rhetoric and failure to resource U.S. diplomatic efforts are more likely to blunder us into war than set the stage for peace.

Trump has needled Kim Jong-Un through Twitter tirades and kneecapped his own Secretary of State's diplomatic efforts. We have been talking about the North Korean nuclear crisis for the duration of 2017 and it was not until mid-December that this Administration was able to appoint an Ambassador to South Korea, Victor Cha, and an Assistant Secretary of State for the Bureau of East Asian and Pacific Affairs, Susan Thornton. We have a strict and comprehensive international sanctions regime in place. We have the stick. Now we need the carrot to demonstrate to North Korea there is a peaceful alternative to its illicit weapons programs. Unfortunately, the President has spent the better part of a year rejecting this approach.

The Korean Peninsula remains one of the most dangerous flashpoints on the globe, and efficacy, above all else, must drive our efforts to defuse the military threat emanating from Pyongyang. For North Korea, there must be some reward for compliance and cooperation with international nonproliferation

efforts. Otherwise, we are stuck with a policy of talking loudly and carrying a big stick, while tens of millions of lives hang in the balance.

○