

# North Korea's Denuclearization: Status and Prospects

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# NUCLEAR ARSENAL COMPONENTS

1

## **BOMB-GRADE PLUTONIUM OR HIGHLY-ENRICHED URANIUM**

- Governs size of arsenal
- Reactors (Pu) or enrichment (HEU)
- Hydrogen bombs require deuterium and tritium

2

## **WEAPONIZATION**

- Governs sophistication of arsenal
- Design, build, test steps include physics/computers, high explosives, detonators, initiators, machining, assembly, explosives tests, arming/fuzing/firing, and nuclear testing.

3

## **DELIVERY SYSTEM**

- Governs threat that the arsenal poses
- Delivery systems can include planes, boats, vans, missiles

# NORTH KOREA'S DENUCLEARIZATION STATUS IN 2018

**1**

## **BOMB-GRADE PLUTONIUM OR HIGHLY-ENRICHED URANIUM**

- Reactor, reprocessing facility, and centrifuges were/are operational.
- Likely increased Pu and HEU inventories for 5-7 more bombs for estimated total of 35-37.
- Tritium inventories limited.

**2**

## **WEAPONIZATION**

- End of nuclear testing.
- Closing test site halts progress on hydrogen bombs and limits miniaturization.

**3**

## **DELIVERY SYSTEM**

- End of long-range missile testing, moratorium on rest.
- End of long-range testing rolls back long-range missile threat.

**In 2017, the threat of war was high because of political threats and rapidly advancing nuclear and missile programs.**

**In 2018, the rapid escalation of the nuclear and missile programs halted, rolling back the threat we judged the North's arsenal to pose in 2017.**





# UNDERSTANDING NORTH KOREA'S NUCLEAR HISTORY

An extensive literature review, combined with analysis by Robert Carlin, Siegfried Hecker, and other subject-matter experts, provides a comprehensive picture of the evolution of North Korea's nuclear program.

The analysis illuminates how critical decisions affected the direction of the nuclear program. It points to numerous "hinge points" that proved critical in the evolution of the program and relations between North Korea and the United States.

# VISUALIZING THE EVOLUTION OF NORTH KOREA'S NUCLEAR PROGRAM

## THE COLOR CHART

Provides a visual interpretation of year-by-year diplomatic, technical, and political developments.

Access the the color chart project online at  
<https://cisac.fsi.stanford.edu/dprkhi-story>

## THE CODING CRITERIA

Three shades of red denote negative effects and three shades of green denote positive effects from a US perspective.

Access the list of coding criteria at  
<https://fsi-live.s3.us-west-1.amazonaws.com/s3fs-public/codingcriteria.pdf>

## THE NARRATIVE

A written narrative provides detailed explanations of the key developments.

Access the 1992-2017 narrative at  
<https://fsi-live.s3.us-west-1.amazonaws.com/s3fs-public/narrativescombinedfinv2.pdf>

Access the new 2018 narrative at  
[https://fsi-live.s3.us-west-1.amazonaws.com/s3fs-public/2018colorchartnarrative\\_2.11.19\\_fin.pdf](https://fsi-live.s3.us-west-1.amazonaws.com/s3fs-public/2018colorchartnarrative_2.11.19_fin.pdf)

## NORTH KOREA NUCLEAR PROGRAM: TECHNICAL FOCUS

Year	US Diplomacy	DPRK Diplomacy	Yongbyon Presence	Plutonium	Uranium Enrichment	Tritium/Li-6 (H-bomb fuel)	Weaponization Design/build/test	Nukes (Summary)	Missiles (Summary)
1992	G1	G1	G1	G2	G1	G1	R1	R1	R1
1993	G2	G2	G1	G2	G1	G1	R1	R1	R1
1994	G3	G3	G1	G2	G1	G1	R1	R1	R1
1995	G3	G3	G3	G3	G1	G1	R1	G3	R1
1996	G3	G3	G3	G3	G1	G1	R1	G3	R1
1997	G2	G2	G3	G3	R1	G1	R1	G3	R1
1998	G2	G2	G3	G3	R1	G1	R1	G3	R1
1999	G3	G3	G3	G3	R1	G1	R1	G3	G1
2000	G3	G3	G3	G3	R1	G1	R1	G3	G1
2001	R2	G2	G3	G3	R1	G1	R1	G3	G1
2002	R3	G2	G3	G3	R1	G1	R1	G3	G1
2003	R2	R2	R3	R3	R1	R1	R2	R2	G1
2004	R2	R1	R3	R3	R1	R1	R2	R2	G1
2005	R1	R1	R3	R3	R1	R1	R2	R2	R1
2006	R1	R2	R3	R3	R1	R1	R2	R2	R1
2007	G2	G1	G3	G1	R1	R1	R1	R1	R1
2008	G2	G1	G3	G1	R1	R1	R1	R1	R1
2009	R1	R1	R2	R1	R2	R2	R2	R2	R1
2010	G1	R1	R3	R1	R2	R2	R2	R2	R1
2011	G1	G1	R3	R1	R2	R2	R2	R2	R1
2012	R1	R1	R3	R1	R2	R2	R2	R2	R1
2013	R2	R1	R3	R2	R2	R2	R2	R2	R1
2014	R2	R1	R3	R2	R3	R3	R2	R2	R1
2015	R1	G1	R3	R3	R3	R3	R2	R2	R2
2016	R1	R3	R3	R3	R3	R3	R3	R3	R2
2017	R3	R3	R3	R3	R3	R3	R3	R3	R3
2018	G2	G2	R3	R3	R3	R2	R2	R2	R2

## NORTH KOREA NUCLEAR PROGRAM: POLICY FOCUS

Year	US Diplomacy	DPRK Diplomacy	Yongbyon Presence	Nukes (Summary)	Missiles (Summary)	DPRK/ROK Relations	DPRK/PRC Relations	Sanctions	DPRK Economy	US Financial Aid
1992	G1	G1	G1	R1	R1	G3	R2	R1	R2	\$0
1993	G2	G2	G1	R1	R1	G2	R1	R1	R2	\$0
1994	G3	G3	G1	R1	R1	R2	R1	R1	R3	\$0
1995	G3	G3	G3	G3	R1	R1	R1	R1	R3	\$9.7M
1996	G3	G3	G3	G3	R1	R1	R1	R1	R3	\$30.3M
1997	G2	G2	G3	G3	R1	G1	R1	R1	R3	\$82.4M
1998	G2	G2	G3	G3	R1	G1	R1	R1	R3	\$122.9M
1999	G3	G3	G3	G3	G1	G3	G1	R1	R3	\$287.2M
2000	G3	G3	G3	G3	G1	G3	G2	R1	R2	\$138.7M
2001	R2	G2	G3	G3	G1	G1	G2	R1	R2	\$132.97M
2002	R3	G2	G3	G3	G1	G2	G2	R1	R2	\$140.9M
2003	R2	R2	R3	R2	G1	G1	G2	R1	R1	\$27.78M
2004	R2	R1	R3	R2	G1	R1	G1	R1	R1	\$36.4M
2005	R1	R1	R3	R2	R1	G1	G1	R1	R1	\$5.7M
2006	R1	R2	R3	R2	R1	G1	R1	R1	R1	\$0
2007	G2	G1	G3	R1	R1	G3	R1	R1	R1	\$45.1M
2008	G2	G1	G3	R1	R1	R1	G1	R1	R1	\$224.7M
2009	R1	R1	R2	R2	R1	R2	G1	R1	R2	\$24.6M
2010	G1	R1	R3	R2	R1	R3	G2	R1	R1	\$3.5M
2011	G1	G1	R3	R2	R1	R3	G2	R1	R1	\$0.9M
2012	R1	R1	R3	R2	R1	R3	G2	R1	G1	\$0
2013	R2	R1	R3	R2	R1	R2	R2	R2	G1	\$0
2014	R2	R1	R3	R2	R2	R2	R2	R2	G1	\$0
2015	R1	G1	R3	R2	R2	R2	R2	R2	G2	\$0
2016	R1	R3	R3	R3	R3	R3	R2	R2	G2	\$0
2017	R3	R3	R3	R3	R3	R2	R2	R3	G2	\$0.9M
2018	G2	G2	R3	R2	R2	G3	G2	R3	G2	\$0

# HINGE POINTS DURING US-DPRK DIPLOMACY

Year	US Diplomacy	DPRK Diplomacy	Yongbyon Presence	Nukes (Summary)	Missiles (Summary)	DPRK/ROK Relations	DPRK/PRC Relations	Sanctions	DPRK Economy	US Financial Aid
1992	G1	G1	G1	R1	R1	G3	R2	R1	R2	\$0
1993	G2	G2	G1	R1	R1	G2	R1	R1	R2	\$0
1994	G3	G3	G1	R1	R1	R2	R1	R1	R3	\$0
1995	G3	G3	G3	G3	R1	R1	R1	R1	R3	\$9.7M
1996	G3	G3	G3	G3	R1	R1	R1	R1	R3	\$30.3M
1997	G2	G2	G3	G3	R1	G1	R1	R1	R3	\$82.4M
1998	G2	G2	G3	G3	R1	G1	R1	R1	R3	\$122.9M
1999	G3	G3	G3	G3	G1	G3	G1	R1	R3	\$287.2M
2000	G3	G3	G3	G3	G1	G3	G2	R1	R2	\$138.7M
2001	R2	G2	G3	G3	G1	G1	G2	R1	R2	\$132.97M
2002	R3	G2	G3	G3	G1	G2	G2	R1	R2	\$140.9M
2003	R2	R2	R3	R2	G1	G1	G2	R1	R1	\$27.78M
2004	R2	R1	R3	R2	G1	R1	G1	R1	R1	\$36.4M
2005	R1	R1	R3	R2	R1	G1	G1	R1	R1	\$5.7M
2006	R1	R2	R3	R2	R1	G1	R1	R1	R1	\$0
2007	G2	G1	G3	R1	R1	G3	R1	R1	R1	\$45.1M
2008	G2	G1	G3	R1	R1	R1	G1	R1	R1	\$224.7M
2009	R1	R1	R2	R2	R1	R2	G1	R1	R2	\$24.6M
2010	G1	R1	R3	R2	R1	R3	G2	R1	R1	\$3.5M
2011	G1	G1	R3	R2	R1	R3	G2	R1	R1	\$0.9M
2012	R1	R1	R3	R2	R1	R3	G2	R1	G1	\$0
2013	R2	R1	R3	R2	R1	R2	R2	R2	G1	\$0
2014	R2	R1	R3	R2	R2	R2	R2	R2	G1	\$0
2015	R1	G1	R3	R2	R2	R2	R2	R2	G2	\$0
2016	R1	R3	R3	R3	R3	R3	R2	R2	G2	\$0
2017	R3	R3	R3	R3	R3	R2	R2	R3	G2	\$0.9M
2018	G2	G2	R3	R2	R2	G3	G2	R3	G2	\$0

**POOR U.S. DECISIONS WERE NOT RISK-BASED AND LED TO MISSED OPPORTUNITIES DURING THE HINGE POINTS DEPICTED ON THIS CHART.**



# KEY TAKEAWAYS



- North Korea's pursuit of nuclear weapons has been deliberate, determined, and patient.
- US diplomacy since 2000 has been sporadic, reactive, and often motivated by a desire to avoid risk instead of managing risk. The US has missed several opportunities in the past by not properly managing the incremental risks.
- North Korea's nuclear program has been slowed, sometimes reversed, during periods of diplomacy but never abandoned.
- One of the most important factors in slowing North Korea's nuclear program has been US/IAEA presence in Yongbyon.
- Nuclearization was a massive enterprise, taking 25 year to go dark red. Going to dark green (denuclearization) will take time.
- The narrative that "North Korea has cheated on every agreement" is neither accurate nor useful.

# UNDERSTANDING 2018 DEVELOPMENTS

Year	US Diplomacy	DPRK Diplomacy	Yongbyon Presence	Plutonium	Uranium Enrichment	Tritium/ Li-6	Weaponize Design/build/ test	Nukes (Summary)	Missiles (Summary)	DRPK/ROK Relations	DPRK/PDC Relations	Sanctions	DPRK Economy	US Financial Aid
2016	R1	R3	R3	R3	R3	R3	R3	R3	R2	R3	R2	R2	G2	\$0
2017	R3	R3	R3	R3	R3	R3	R3	R3	R3	R2	R2	R3	G2	\$0.9M
2018	G2	G2	R3	R3	R3	R2	R2	R2	R2	G3	G2	R3	G2	\$0

IN 2018, A DRAMATIC REDUCTION IN TENSION CREATED SPACE AND TIME FOR DIPLOMACY. THE SINGAPORE SUMMIT PLEDGED DENUCLEARIZATION AND NORMALIZATION, THOUGH NEGOTIATIONS FAILED TO GAIN TRACTION FOR MOST OF THE YEAR.

THE NORTH HALTED AND ROLLED BACK PART OF ITS NUCLEAR PROGRAM (ENDING NUCLEAR AND MISSILE TESTS) AT A TIME DURING WHICH THE NORTH HAD BEEN RAPIDLY INCREASING THE SOPHISTICATION, DESTRUCTIVE POWER, AND REACH OF ITS NUCLEAR ARSENAL.

AT THE SAME TIME, THE NORTH UNSURPRISINGLY MAINTAINED NUCLEAR/MISSILE SITES AND PRODUCED FISSILE MATERIALS ABSENT A NEGOTIATED AGREEMENT.

Nuclear Capability	April 2019 (Rough estimates)
Plutonium	25 – 48 kg
HEU (highly uncertain)	400 - 650 kg
Tritium	Very limited
Nuclear devices (sufficient material)	~35
Nuclear device deliverable by SCUD & Nodong missiles	Yes
Nuclear device deliverable by IRBMs & ICBMs	Hwasong-12, 14, 15 Not yet military useful. Need more tests

# RISK-BASED FRAMEWORK FOR DENUCLEARIZATION

A “halt, roll back, and eliminate” phased approach that will stretch over a decade or so will be required to eliminate North Korea’s nuclear weapons and weapons program because of the enormity of its nuclear weapon enterprise and the huge trust deficit between Washington and Pyongyang. We suggest that North Korea, South Korea, and the US explore cooperative efforts to demilitarize North Korea’s nuclear and missile programs and convert them to civilian nuclear and space programs. Such cooperation will, in the long term and in conjunction with IAEA monitoring and safeguards implementation, make adequate verification much more likely and possibly accelerate the denuclearization timeline.

NEGOTIATIONS  
SHOULD BE AIMED  
TOWARD A MORE  
DEFINITIVE GOAL THAN  
‘DENUCLEARIZATION’ –  
NAMELY, THE  
ELIMINATION OF  
NUCLEAR WEAPONS  
AND THEIR MEANS OF  
PRODUCTION AND  
DELIVERY.

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NEGOTIATIONS WILL  
HAVE TO MATCH THESE  
STEPS WITH  
COMMENSURATE STEPS  
TOWARD  
NORMALIZATION,  
TENSION  
REDUCTION, AND WHAT  
THE NORTH TERMS  
"TRUST BUILDING."

# RISK-BASED APPROACH TO DPRK DENUCLEARIZATION

	Specific facilities or activities
Nuclear weapons	Nuclear arsenal
Personnel	Scientists, engineers
Nuclear tests	Nuclear tests
	Tunnels
	Test infrastructure
Missile Tests	IRBM & ICBM
	SLBM & Solid rocket motors
	New engine tests
	Short & med.-range missiles
	Space Launch Vehicles
Plutonium	Inventory
	5MWe reactor
	ELWR
	IRT-2000
	Reprocessing Facility
	Metal fuel fab facilities
Fusion (H-bomb) fuels	Tritium
	Lithium-6
Uranium Enrichment	HEU inventory
	YB centrifuge facility
	Covert centrifuge facilities
No export	Nuclear & missile technology

THE ASSETS AND ACTIVITIES LISTED PROVIDE A FRAMEWORK FOR DESIGNING AND TRACKING THE DENUCLEARIZATION PROCESS.

**In May 2018, we proposed a phased risk management approach to denuclearization by identifying those assets and activities that must be eliminated (*shown in red in the next chart*) and those that can be managed (*shown in yellow in the next chart*).**

**The phased approach will provide an effective way to build trust and interdependence.**

**The chart is meant to provide an overall sense of what is manageable and what must be eliminated and helps focus on the most immediate and pressing risks shown in red.**



# ORIGINAL RISK-MANAGEMENT FRAMEWORK (MAY 2018)

RISK POSED BY NUCLEAR ASSETS/ACTIVITIES: RED (VERY HIGH, MUST BE ADDRESSED), YELLOW (MODERATE, CAN BE MANAGED)

	Specific facilities or activities	HALT - short term < 1 year	ROLL BACK- medium term 2 to 5 years	ELIMINATE or SET LIMITS - long term – 6 to 10 years
<b>Nuclear weapons</b>	Nuclear arsenal	Cap	Declare & reduce	Eliminate & verify. Join NPT
<b>Nuclear personnel</b>	Scientists, engineers, techs	Assist in halting operations	Assist in roll back	Redirect to civilian programs
<b>Nuclear tests</b>	Nuclear tests	Moratorium/suspend	Ban	Ban (sign CTBT)
	Tunnels	Suspend activity	Close	Destroy
	Test infrastructure	Suspend activity	Dismantle	Dismantle & verify
<b>Missile tests</b>	IRBM & ICBM	Moratorium/suspend	Halt, declare & monitor	Ban tests, missiles & developm.
	SLBM & Solid rocket motors	Moratorium/suspend	Halt, declare & monitor	Ban tests, missiles & developm.
	New engine tests	Suspend	Halt & monitor	Ban tests and development
	SR & MR Missiles	Short term suspension	TBD – set allowable limits	TBD – set allowable limits
	Space Launch Vehicles	Short term suspension	TBD – establish protocol	TBD – establish acceptable limits
<b>Plutonium</b>	Inventory	Cap	Cap, declare & monitor	Eliminate
	5MWe reactor	Halt	Dismantle	Decommission
	ELWR	Halt or don't start	Inspect & future TBD	TBD
	IRT-2000	Halt	Dismantle	Decommission, possibly replace
	Reprocessing facility	Don't operate	Dismantle front end (no new fuel)	Dismantle & decommission
	Metal fuel fab facilities	Don't operate	Dismantle	Decommission
<b>Fusion (H-bomb) fuels</b>	Tritium	Halt reactors ( as above)	Dismantle reactors & hot cells	Eliminate
	Lithium-6	Halt production	Dismantle production facilities	Eliminate
<b>Uranium enrichment</b>	HEU inventory	Limit (halt support facilities)	Cap, declare & monitor	Eliminate
	YB centrifuge facility	Halt & inspect	Inspect & future TBD	TBD
	Covert centrifuge facilities	Limit (halt support facilities)	Declare & inspect	Eliminate
<b>No export</b>	Nuclear & missile technology	No-export pledge	No nuclear export. Join MCTR	No nuclear export. Join MCTR

# PROGRESS TOWARD "DENUCLEARIZATION"

## WE IDENTIFIED THE MOST IMPORTANT INITIAL STEPS TOWARD DENUCLEARIZATION

These steps include no nuclear tests, no intermediate or long-range missile tests, no more production of Pu and HEU, and no export of nuclear weapons, materials, or technologies.

## WE SUGGESTED THAT NORTH KOREA CONSIDER FRONT- END LOADING AS MUCH OF THE DENUCLEARIZATION PROCESS AS POSSIBLE

In 2018, North Korea took the extraordinary step of ending nuclear tests and missile tests, the two most important steps we identified.

## ON THE NEXT CHART, WE INDICATE WHERE NORTH KOREA HAS ALREADY TAKEN POSITIVE ACTIONS

We indicate those areas in which North Korea has already taken positive actions toward denuclearization in blue. The ELWR and IRT-2000 status in light blue are simply continuation of non-operational status from prior years – but importantly, they did not start operations.

# CURRENT RISK-MANAGEMENT FRAMEWORK (APRIL 2018)

RISK POSED BY NUCLEAR ASSETS/ACTIVITIES: RED (VERY HIGH), YELLOW (MODERATE), BLUE (COMPLETED IN 2018)

	Specific facilities or activities	HALT < 1 year	ROLL BACK 2 to 5 years	ELIMINATE or SET LIMITS long term – 6 to 10 years
<b>Nuclear weapons</b>	Nuclear arsenal	Cap	Declare & reduce	Eliminate & verify. Join NPT
<b>Nuclear personnel</b>	Scientists, engineers, techs	Assist in halting operations	Assist in roll back	Redirect to civilian programs
<b>Nuclear tests</b>	Nuclear tests	Moratorium/suspend	Ban	Ban (sign CTBT)
	Tunnels	Suspend activity	Close	Destroy & verify
	Test infrastructure	Suspend activity	Dismantle	Dismantle & verify
<b>Missile tests</b>	IRBM & ICBM	Moratorium/suspend	Declare, disable & monitor	Destroy missiles, no developm.
	SLBM & Solid rocket motors	Moratorium/suspend	Declare, disable & monitor	Destroy missiles, no developm.
	New engine tests	Suspend	Halt & monitor	Ban tests and development
	SR & MR Missiles	Short term suspension	TBD – set allowable limits	TBD – set allowable limits
	Space Launch Vehicles	Short term suspension	TBD – establish protocol	TBD – establish acceptable limits
<b>Plutonium</b>	Inventory	Cap	Cap, declare & monitor	Eliminate
	5MWe reactor	Halt	Dismantle	Decommission
	ELWR	Halt or don't start	Inspect & future TBD	TBD
	IRT-2000	Halt	Dismantle	Decommission, possibly replace
	Reprocessing facility	Don't operate	Dismantle front end (no new fuel)	Dismantle & decommission
	Metal fuel fab facilities	Don't operate	Dismantle	Decommission
<b>Fusion (H-bomb) fuels</b>	Tritium	Halt reactors (as above)	Dismantle reactors & hot cells	Eliminate
	Lithium-6	Halt production	Dismantle production facilities	Eliminate
<b>Uranium enrichment</b>	HEU inventory	Limit (halt support facilities)	Cap, declare & monitor	Eliminate
	YB centrifuge facility	Halt & inspect	Inspect & future TBD	TBD
	Covert centrifuge facilities	Limit (halt support facilities)	Declare & inspect	Eliminate
<b>No export</b>	Nuclear & missile technology	No-export pledge	No nuclear export. Join MTCR	No nuclear export. Join MTCR

## EXPEDITED ELIMINATION OF NUCLEAR WEAPONS THROUGH COOPERATIVE MILITARY-TO-CIVILIAN CONVERSION

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The approach suggested here is based on our belief that North Korea will not give up its weapons and its weapons program until its security can be assured. Such assurance cannot be achieved simply by an American promise or an agreement on paper, it will require a substantial period of co-existence and interdependence—therefore the three time horizons that may stretch to 10 years.

If the North insists on retaining civilian nuclear programs and peaceful space access, the incremental risk posed by these can be managed if adequate verification measures are developed. Although an electricity-producing light water reactor can potentially be diverted to plutonium production and a medical isotope research reactor can do the same, the risks are manageable. They are less than those posed by North Korea's current plutonium production reactor. Likewise for space launch vehicles, which under proper verification protocols will not advance the North's ICBM program nearly as much as the missile buildup in prior years.

An agreement to have North Korea retain a civilian nuclear program and peaceful space program also solves the nuclear and missile personnel redirection issue. In addition to transitioning to civilian activities, the technical staff can help to decommission and clean up the facilities dedicated to the weapons program. One can envision a professional staff reorientation along the lines of the Nunn-Lugar program with Russia.

We also suggest that the best verification measures will result from cooperative civilian nuclear programs and space programs. That is, pursuing these ventures cooperatively between North Korea, South Korea and the U.S. (perhaps later with others) will provide a presence of technical personnel at the North's facilities that will allow adequate verification.

**Having North Korea retain civilian nuclear and space programs is shown in green in the next chart. In addition to the benefits mentioned above, allowing North Korea to retain these programs may help to shrink the time scale for elimination of the nuclear weapons program.**



# ACCELERATED RISK-MANAGEMENT FRAMEWORK (PROSPECTIVE)

RISK POSED BY NUCLEAR ASSETS/ACTIVITIES: RED (VERY HIGH), YELLOW (MODERATE), BLUE (2018), GREEN (POTENTIAL CIVILIAN COOPERATION)

	Specific facilities or activities	HALT 3 months	ROLL BACK < 2 years	ELIMINATE or SET LIMITS < 5 years
<b>Nuclear weapons</b>	Nuclear arsenal	Cap	Declare & reduce	Eliminate & verify. Join NPT
<b>Nuclear personnel</b>	Scientists, engineers, techs	Assist in halting operations	Assist in roll back	Redirect to civilian programs
<b>Nuclear tests</b>	Nuclear tests	Moratorium/suspend	Ban	Ban (sign CTBT)
	Tunnels	Suspend activity	Close	Destroy & verify
	Test infrastructure	Suspend activity	Dismantle	Dismantle & verify
<b>Missile tests</b>	IRBM & ICBM	Moratorium/suspend	Declare, disable & monitor	Destroy missiles, no developm.
	SLBM & Solid rocket motors	Moratorium/suspend	Declare, disable & monitor	Destroy missiles, no developm.
	New engine tests	Suspend	Halt & monitor	Ban tests and development
	SR & MR Missiles	Short term suspension	TBD – set allowable limits	No nuclear capable missiles
	Space Launch Vehicles	Short term suspension	TBD – establish protocol	Joint ROK space program?
<b>Plutonium</b>	Inventory	Cap	Cap, declare & monitor	Eliminate
	5MWe reactor	Halt	Dismantle	Decommission
	ELWR	Halt or don't start	Inspect & future TBD	LWR prototype?
	IRT-2000	Halt	Dismantle	Replace for isotope production
	Reprocessing facility	Don't operate	Dismantle front end (no new fuel)	Dismantle & decommission
	Metal fuel fab facilities	Don't operate	Dismantle	Decommission
<b>Fusion (H-bomb) fuels</b>	Tritium	Halt reactors (as above)	Dismantle reactors & hot cells	Eliminate
	Lithium-6	Halt production	Dismantle production facilities	Eliminate
<b>Uranium enrichment</b>	HEU inventory	Limit (halt support facilities)	Cap, declare & monitor	Eliminate
	YB centrifuge facility	Halt & inspect	Inspect & future TBD	Technical, economic, political ?
	Covert centrifuge facilities	Limit (halt support facilities)	Declare & inspect	Eliminate
<b>No export</b>	Nuclear & missile technology	No-export pledge	No nuclear export. Join MTCR	No nuclear export. Join MTCR

READ MORE ABOUT THE  
"COOPERATIVE  
CONVERSION" APPROACH  
AT  
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