

# Color Shade Coding Criteria

## US Diplomacy

**A measurement of US initiatives and efforts to support diplomatic engagement with North Korea.**

**G3:** Sustained and serious US engagement at every level with North Korea intended to conclude and implement agreements.

**G2:** Continued engagement and efforts to implement agreements reached with North Korea, but without serious, demonstrated intent to push beyond the current levels.

**G1:** Limited engagement, no new initiatives, difficulties dealing with implementation of existing agreements for reasons of internal political or bureaucratic opposition.

**R1:** Episodic engagement for forms sake but no serious overtures; some actions that reverse or undermine existing agreements.

**R2:** Rare, sporadic pro forma contact, limited communication, no realistic proposals. Failure to explore North Korean initiatives. Failure to implement or abrogation of existing agreements.

**R3:** Minimal or no engagement. Overt expressions of hostility.

## North Korea Diplomacy

**A measure of North Korean initiatives and efforts to support diplomatic engagement with the United States, though not necessarily in support of common goals. The metric does not depend on definite progress toward US goals of limiting or terminating the North Korean nuclear and ballistic missile programs.**

**G3:** Sustained and serious North Korean engagement at every level with the US intended to conclude and implement agreements to establish normalized relations with US.

**G2:** Serious attempts to engage the US to develop and implement agreements to establish normalized relations with US. Or, continued engagement and efforts to implement prior agreements reached with the US, but without serious, demonstrated intent to push beyond the current levels.

**G1:** Limited engagement or re-engagement, but with difficulties dealing with implementation of existing agreements, while potentially hedging to retain nuclear capabilities. Or, exploring re-engagement with serious dialogue and proposal.

**R1:** Actions that reverse or undermine existing agreements combined with episodic overtures or engagement with insufficient follow-through or countered by episodic threatening actions. Rare, sporadic pro forma contact, limited communication, no realistic proposals.

**R2:** Actions that reverse or undermine existing agreements. Rare, sporadic pro forma contact, limited communication, no realistic proposals. Failure to explore US initiatives. Failure to implement or abrogation of existing agreements.

**R3:** Minimal or no engagement. Deliberate actions that threaten US and/or allies. Overt and sustained, authoritative-level expressions of hostility.

# Color Shade Coding Criteria

## North/South Relations

**A measurement of the state of relations between North Korea and South Korea.**

**G3:** Sustained high level engagement by both sides, confidence building measures, joint initiatives such as joint statements and agreements.

**G2:** High level engagement on both sides, confidence building measures, and joint initiatives (less intensity than G3)

**G1:** Commitment to engagement accompanied by confidence building action(s) on both sides. Lack of provocative actions.

**R1:** No serious commitment to engage, but also no serious effort to antagonize (i.e. the window stays open to explore dialogue). Some provocative actions as well as some exploration of dialogue possible.

**R2:** The window for engagement is mostly closed. One of the sides may take a limited set of antagonizing actions or explore dialogue – but the relations are mostly strained.

**R3:** No engagement, both sides take antagonizing actions, including possibly military actions.

## North Korea/China Relations

**A measurement of the state of relations between North Korea and China.**

**G3:** Positive engagement, strengthening of alliance. Close interactions between high-level officials. Economic ties and China defends North Korea's interests at UNSC.

**G2:** Positive, successful engagement, with good economic relations and good support by China for North Korea at the UN.

**G1:** Relations still overall positive, but much less support from China and less outreach by North Korea.

**R1:** Official government relations are strained, limited engagement and little economic support. Or, China's willingness to agree to some UNSC sanctions, but not very stringent implementation of sanctions.

**R2:** Increasingly strained relations, minimal engagement. Significantly reduced economic relations, and China's increasing support for UNSC sanctions. Stronger implementation by China of sanctions.

**R3:** Seriously strained relations with minimal official contact and dialogue. Both sides keep official relations to a minimum. China's willingness to approve more stringent UNSC sanctions. Also, implements sanctions more strictly.

# Color Shade Coding Criteria

## US/IAEA Presence at Yongbyon Nuclear Center

**A measurement of the presence of US and/or IAEA personnel at Yongbyon.**

**G3:** Sustained access by US and/or IAEA inspectors and cooperation for inspections in key facilities. Adequate verification of agreements for Yongbyon operations.

**G2:** Limited access by IAEA inspectors with good cooperation.

**G1:** Limited access by IAEA inspectors with disputed cooperation.

**R1:** Access to IAEA inspectors for a large part but not the entire year.

**R2:** Access for a small portion of the year.

**R3:** No US visitors or technical team allowed. No IAEA inspectors allowed.

## Sanctions (US and UN Security Council)

**A measurement of the level of combined U.S. and U.N. sanctions levied against North Korea.**

**G3, G2, G1:** Not applicable since all sanctions try to impose a penalty on North Korea, which has been under US bilateral sanctions since 1950. Sanctions in the 1990s were primarily aimed at North Korean missile trade and cooperation. Severity of sanctions is indicated by shades of red.

**R1:** Low-level US bilateral sanctions and sanctions on a few North Korean commercial or government entities. UNSC sanctions on a few North Korean entities.

Also used to designate low-level nuclear sanctions with ineffective enforcement, especially by China.

**R2:** UNSC sanctions on more North Korean entities, with better enforcement, including by China. Additional US government sanctions.

**R3:** Very stringent UNSC sanctions and greatly improved enforcement by China. Additional strict US government sanctions.

# Color Shade Coding Criteria

## North Korea Economy

**A measurement of the level of economic output and general status of North Korea's economy. Observations based on official statistics, but mostly on assessments of foreign visitors to North Korea. This measure is more about relative change in economy than absolute measure of the economy.**

**G3:** Very positive indicators of improving economy from frequent foreign visitors. Very positive economic statistics such as GDP or state budget growth (for example > 6%) and very positive trends in trade volume.

**G2:** Positive indicators of improving economy from frequent foreign visitors. Positive economic statistics such as GDP or state budget growth (for example > 3%) and positive trends in trade volume.

**G1:** Some positive indicators from frequent foreign visitors. Some positive economic statistics in budget and/or trade.

**R1:** Somewhat negative indicators from frequent foreign visitors. Slowly declining economic statistics.

**R2:** Negative indicators from frequent foreign visitors and signs of food shortages and famine. Generally negative economic statistics.

**R3:** Economy in great difficulty. Serious signs of food shortage and famine. Declining economic indicators.

## US Financial Aid to North Korea

**A measurement of U.S. dollar amounts going to North Korea in the form of food, fuel, and KEDO contributions. An overall estimate of South Korean aid is also provided at the end.**

**Neutral Gray:** There is no color code for financial aid. Actual U.S. financial support for fuel and food is shown in dollars.

# Color Shade Coding Criteria

## Plutonium

### **A measurement of the state of plutonium (Pu) production facilities and current stockpile of weapon-grade plutonium**

**G3:** Very limited suspected Pu inventory (< a few kg quantities). No additional plutonium being produced with facilities under IAEA inspection with presence of US technical teams. Two large Pu production reactors frozen and becoming non-operational or completely abandoned. Significant loss in Pu production potential. Likely to conduct Pu metallurgy, chemistry and manufacturing R&D.

**G2:** Very limited suspected Pu inventory (< a few kg quantities). Pu reactor operating, but no reprocessing. Limited access for IAEA inspectors. Likely Pu metallurgy, chemistry and manufacturing R&D.

**G1:** Likely Pu metallurgy, chemistry and manufacturing R&D, with moderate Pu inventory (< 40 kg). No additional plutonium being produced. Pu reactor and reprocessing facility not operating, and under IAEA inspections and US technical teams.

**R1:** Moderate Pu inventory (< 40 kg) with reprocessing facility possibly operational for reprocessing campaigns with no access to any Yongbyon facilities for IAEA inspectors. Pu production reactor not operating, but likely full-scale Yongbyon operations to prepare for resumed operations (such as fuel rod fabrication). Pu weapons component manufacture along with R&D.

**R2:** Pu production reactor restarted along with expansion of Yongbyon complex, including progress on Experimental LWR. Pu inventory of many 10s of kg. Ongoing weapon component fabrication.

**R3:** All Yongbyon plutonium facilities operational including Pu production reactor and reprocessing facility as required. Total Pu inventory produced > 50 kg with available inventory of 20 to 40 kg. Ongoing weapon component fabrication, likely of greater sophistication.

## Uranium Enrichment

### **A measurement of the state of uranium enrichment program and facilities, and the current stockpile of highly enrichment uranium.**

**G3:** No uranium enrichment effort, including no R&D (likely in 1970s).

**G2:** R&D on potential civilian centrifuge technologies, likely not limited to uranium. Acquisition of centrifuge materials and equipment (likely in the 1980s).

**G1:** Uranium centrifuge R&D. Limited procurement activities of centrifuge materials, equipment and technologies.

**R1:** Uranium centrifuge R&D and greatly increased attempts to procure key materials, equipment and know-how on uranium enrichment. Possible operation of dozens of centrifuges. Likely foreign training of engineers/technicians on centrifuge cascade operations.

**R2:** Centrifuge development and demonstration with focus on operating limited cascades of centrifuges. Production of HEU in centrifuge cascades to demonstrate process. Construction of modern centrifuge facilities.

**R3:** Expansion of centrifuge facilities both at Yongbyon and covert site. Operational centrifuge cascades with ability to produce 10's of thousands SWU per year likely. Production of hundred or more kilograms of HEU annually.

# Color Shade Coding Criteria

## Tritium/Lithium-6

**A measurement of the state of fusion (hydrogen bomb) fuel (i.e. tritium/Li-6D) production facilities and current stockpile of tritium/lithium-6.**

**G3:** No tritium production or R&D.

**G2:** Tritium R&D for potential civilian applications.

**G1:** Tritium R&D for potential dual-use fusion applications. Developing capacity for reactor tritium production and separation.

**R1:** Tritium R&D for potential military applications. Lithium isotope separation and production of fusion fuels - Li6D (lithium deuteride, which can be used to produce tritium in situ in a hydrogen bomb device).

**R2:** Tritium production in reactors. Tritium separation in hot cell facilities. Expansion of tritium and Li6 production and separation facilities.

**R3:** Greater expansion of tritium and Li6D production capabilities and production in reactors. Possible utilization of tritium and Li6D in nuclear devices. Small, but important, annual tritium production capacity greater than multi-grams of tritium.

## Weaponization

**A measurement of the level of nuclear weapons development achieved and in progress, including nuclear tests.**

**G3:** No R&D on nuclear weapons. No dual-use facilities that could readily be transferred to weapons R&D.

**G2:** No R&D specific to nuclear weapons, but existence of dual-use facilities.

**G1:** No R&D specific to nuclear weapons, but existence of dual-use facilities.

**R1:** Existence of dual-use nuclear facilities, indications of R&D on nuclear weapon design, including explosives and cold tests. Likely construction of weapons production and manufacturing facilities. R1 can also signify halting or rolling back from

**R2:** category.

**R2:** Definitive proof of nuclear weapons R&D, production and manufacture, but at low level and likely of relatively primitive design. Can include nuclear tests of such designs. Possible deployment of nuclear weapons with stated development of strategic rocket forces and command and control.

**R3:** Expansion of facilities for R&D, testing and production. Testing of more sophisticated nuclear designs, including miniaturized fission and possible fusion devices. Production and deployment of nuclear weapon arsenal.

# Color Shade Coding Criteria

## Nuclear Weapons (Nukes) Summary (same for diplomacy chart)

**A measurement of the level of nuclear weapons development achieved and in progress (encompassing fissile material production and weaponization, including nuclear tests).**

**G3:** Primary weapons facilities verifiably shut. North Korea takes positive steps to roll nuclear program back (such as verifiable freeze of Yongbyon plutonium facilities and discontinuation of larger reactor construction).

**G2:** Partial freeze on nuclear weapon facilities. Restraint in operations and/or testing.

**G1:** No known expansion of nuclear weapon facilities. Restraint in operations and/or testing.

**R1:** Ongoing research/procurement efforts for weapon facilities. Or intermittent operation of nuclear facilities to produce nuclear materials or make test preparations. Show restraint in facility or device construction and testing.

**R2:** Nuclear facility restart. Continued production of fissile material, and/or fission nuclear device production. Nuclear test site activity and nuclear tests. Show very little restraint in facility or device construction or testing.

**R3:** Nuclear facilities fully operational. Expansion of nuclear facilities and test sites, production of fissile material, production and testing of advanced fission and possibly fusion devices. No restraint.

## Missiles Summary (same for diplomacy chart)

**A measurement of the level of missile development and deployment achieved and in progress (encompassing all aspects of delivery system development).**

**G3:** No missile development or significant rollback of missile capabilities.

**G2:** Complete missile and space launch rocket-testing moratorium or roll back of missile deployment.

**G1:** Ongoing rocket/missile R&D and component testing. In case of previous missile deployments, observing a long and intermediate missile or space-launch testing moratorium.

**R1:** Short and medium (SCUD and Nodong) missile component procurement, manufacturing and deployment with flight tests. Possible development of space-launch rockets, Intermediate Range Ballistic Missiles (IRBMs) or ICBMs but no flight tests. Space launch possible.

**R2:** Significant increase in missile tests. In addition to SCUD and Nodong deployment and testing, also test IRBMs and continued vigorous development of long-range missiles and technologies.

**R3:** In addition to R2, also test ICBM and continue vigorous development and testing of advanced IRBM and ICBMs.

# Color Shade Coding Criteria

## Imports (nuclear and missile related)

**A measurement of the import of technologies, materials, and equipment for all nuclear- and missile-related programs.**

**G3, G2, G1:** Not applicable because North Korea has been importing nuclear and missile-related technologies and materials during the time frame covered.

**R1:** Import of some nuclear-related materials, equipment and technology, particularly centrifuge technologies and possible reactor-related equipment and technologies. But mostly import or missile-related technologies, materials and equipment. Or, also used to indicate a temporary halt or rollback of imports from an R2 condition.

**R2:** Continuing efforts to import nuclear-related materials, equipment and technology, including centrifuge technologies, material, equipment and know-how. Major efforts to import missile-related technologies, materials and equipment.

**R3:** Major and almost unimpeded efforts to import components and materials for both nuclear and missile-related programs.

## Exports (nuclear and missile-related)

**A measurement of technologies, materials, and equipment of all nuclear- and missile-related exports.**

**G3, G2, G1:** Not applicable because North Korea has been exporting nuclear and missile-related technologies and materials during the time frame covered.

**R1:** Steady export of short-range missiles, technologies and know-how, primarily in states of concern (Pakistan, Iraq, Iran, Libya, Syria, possibly Myanmar) or low-level export of nuclear technologies.

**R2:** Continuing significant export of missile technologies and possible export of nuclear technologies. Potential collaboration in these technologies with other states.

**R3:** Egregious export of nuclear technologies – such as sale of UF6 to Libya and construction of plutonium production reactor for Syria. Potential collaboration with other states.