In Response to Recent Questionable Claims about North Korea's Indigenous Production of Centrifuges

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After reading the summary paper presented at a conference in Seoul on September 25, 2013, "New insights into North Korea's gas centrifuge enrichment program" by Joshua Pollack, with the aid of R. Scott Kemp, we remain unconvinced about its central conclusions. In particular, we disagree with several that have been widely reported in the media, such as that policies based on export controls, sanctions and interdiction "won't get much traction" and a verifiable denuclearization deal may be "out of reach."[1] We have identified several problems from the summary of the forthcoming analysis which would undermine those as well as other conclusions they draw.

Our analysis is unfortunately primarily based on Pollack's summary paper. Although the author kindly provided the summary paper, he said that the technical report was unfinished and he was unwilling to send a draft, which had been provided to certain media but under the proviso that it not be shared. Moreover, we understand that this technical report will not be available publicly for some time, despite wide publication of its conclusions.

The summary paper seems to assert that North Korea is likely now self-sufficient in making large numbers of centrifuges. Certainly North Korea can make centrifuge components domestically and would be expected to be seeking, like Pakistan and Iran, independence to the extent possible from foreign supply. But there is a wide range of materials and equipment needed to make these components; many goods are also required for centrifuge and cascade assembly and centrifuge plant operation. Moreover, other cases have demonstrated that proliferant states historically have been unable to rely in each of these aspects on domestic supplies.

The analysis as outlined in the Seoul paper has not demonstrated that North Korea is likely producing indigenously the necessary components, materials, and equipment, even in most of the six areas that are called in the paper the "most important" ones, let alone the many goods needed in other critical areas that are in fact just as important. For example, the conclusions in the summary paper strongly imply that North Korea can indigenously produce computer-numerically controlled (CNC) flow forming machines able to make on a sustained basis maraging steel rotor tubes for P2-type centrifuges. To support this assertion, the summary paper references analysis on Arms Control Wonk, which in turn references other Arms Control Wonk postings, but these postings mainly involve pictures of flow forming machines in North Korean facilities combined with considerable speculation. Some of the

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[1] From "North Korea Learning to Make Crucial Nuclear Parts, Study Finds," by Choe Sang-Hun, *New York Times*, September 23, 2013.

speculation has proven wrong. The analyses on Arms Control Wonk do not show that any of these flow forming machines are involved in centrifuge rotor manufacturing or that they are suitable for such manufacturing. One of the CNC flow forming machines in fact looks like a European manufactured one, according to two experts in flow forming machines, who independently looked at the pictures. A European name plate is not visible, but nameplates can be switched. ISIS has moreover learned of recent, on-going illicit diversion of advanced CNC machine tools (>5-axis) to North Korea that were originally exported to China with a proviso that they would not be retransferred out of China. If North Korea were capable of producing CNC flow forming machines able to make thin-walled P2 rotors on a production-scale, would it not be capable of making these advanced CNC machine tools as well? Yet, it still buys these machine tools internationally and in violation of national export laws.

North Korea could have also stockpiled many goods for its gas centrifuge program before sanctions and export controls were tightened, a point that would also explain North Korea's expansion of its centrifuge program. When the U.S. government started to share information about the then suspected centrifuge program, many other governments started to pay increased attention to North Korean imports and its smuggling efforts. These detection and counterproliferation efforts were further intensified by the United Nations Security Council resolutions after the underground nuclear tests. Thus, North Korea may have acquired many of the necessary centrifuge-related goods relatively easily in earlier years and has them now in stock, explaining its ability to expand its centrifuge program. North Korea's earlier procurement success does not show necessarily that export control and sanctions systems cannot work, only that countries like China should have taken a harder look at North Korea's smuggling efforts.

Pollack and Kemp are conducting a worthwhile study of North Korea's patents and academic scientific and engineering reports. This effort, which is not easy, should be commended. We would expect that their work will lead to new insights into North Korea's scientific and engineering capabilities and perhaps nuclear capabilities. We have both conducted or supported several such analyses of states such as North Korea and much can be learned in this manner. However, extrapolating from this type of study to the actual capabilities of a secret centrifuge program is risky at best. Accurate extrapolations usually also require considerable information about the centrifuge program; such information remains very scarce in the case of North Korea.

We await the full technical paper and hope it will address our concerns. But until the technical paper is publicly available for peer review, we must recommend that the broader conclusions as reported in the media about indigenous centrifuge production, the inability of export controls and sanctions to ever work, and the slim prospects for verified denuclearization be set aside for now as likely incorrect, or at least greatly overstated. The possible conclusion of the paper that export controls and sanctions are no longer effective or are unable to ever control the supply of illicit goods to North Korea may undermine, as a matter of policy, the justification for these efforts. Instead, we have found that these measures remain critically important to preventing North Korea from obtaining the high technology goods and materials that it still cannot produce itself and needs to further expand its centrifuge and other nuclear programs. If anything, the priority is strengthening these measures with China's cooperation.