



Centre for Air Power Studies (CAPS)

Forum for National Security Studies (FNSS)

14/16

FROM ROAD-MOBILE TO RAIL-MOBILE ICBMS (DF-41): ENHANCING SURVIVABILITY

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Reports in the Chinese media indicate that China's Rocket Force is now equipped with rail mobile DF-41 ICBM.¹ The DF-41 ICBM is reported to have a range of 12000 km which will be sufficient to target any part of the continental United States from China. This is a new development that was reportedly discovered by US intelligence agencies and reported by the Washington Free beacon website.² The spokesperson of China's Ministry of Defence, Colonel Yang Yujun did not deny the testing of rail-mobile DF-41 when a reporter raised the issue during an interview. He replied that scientific experiments and research are being carried out as planned.³ China's nuclear force is constantly improving its nuclear arsenal to ensure credible minimum deterrence. China already has the road mobile version of the DF-41 though it is not yet deployed. This step can be seen as an effort to further improve the survivability of its nuclear deterrent force.

The DF-41 ICBM is a product of tremendous technological milestones achieved by China in ballistic missile development. The MIRV technology, which China was capable of deploying since a long time, has been incorporated in this ICBM. The DF-41 is estimated to be able to carry and deliver up to 10 nuclear warheads over inter-continental distances and hence offers immense deterrence capability.

Except the DF-5A, the DF-31, DF-31A and the DF-41 ICBMs are solid fuelled and are road mobile. China's Rocket Force has built some complex underground tunnels which are believed to run across the country for around three thousand kilometres and are used to store and transport their nuclear systems. In addition to this, road-mobile missiles can be widely dispersed, which enhances their survivability. With such wide dispersed it gets extremely challenging for any adversary even with advanced C4ISRK systems to detect and target



TEL based ICBMs. Nevertheless, nuclear weapon states usually take as many precautions and counter-measures to ensure that their nuclear force remain out of the prying eyes of enemy sensors.

Despite the mobile missile hunt operations being extremely difficult with all the camouflaging, deception and counter-measures employed by a missile unit, if a missile TEL can be spotted then there are chances that it can be tracked and targeted. The problem with mobile TELs is that they move with support vehicles making it a slightly bigger target for detection and identification. Moreover, if successfully picked by an enemy sensor, a TEL can mostly be identified and classified as a target based on their structural characteristics. There were instances when China's ICBM garrisons including the missile TELs and support vehicles were spotted via commercial satellite imagery. In 2011 DF-31 missile units were spotted in Central China in Qinghai province, including the garrisons and the pre-surveyed launch sites.⁴ Hence, TEL based mobile missile units, though they are considerably mobile and widely dispersed, are still vulnerable if detected.

To further improve survivability China has introduced rail-mobile DF-41 ICBM. Earlier in 2013, US based Georgetown University Arms control Project reported that China had obtained ICBM rail car insights from Ukraine.⁵ The pushing factor could be the improving

conventional precision strike capability of the US and the high accuracy of the US ICBMs. It is to be remembered that the US during the Cold War was also prepared for nuclear counter force strikes against the large Soviet ICBM force. Even now, United States retains most of these nuclear armed ICBMs. So it is natural for China to be concerned about the survivability of its comparatively small nuclear ICBM arsenal. Deployment of rail mobile ICBM units⁶ has been in practice for a long time by other nuclear armed countries. Many countries like Russia, India, etc have deployed ballistic missiles on rails. India's Agni series of ballistic missiles are road as well as rail mobile. By the early nineties, the Soviet Union had deployed several rail-mobile SS-24 ICBMs.⁷

China, to some extent, has been following the Soviet pattern in nuclear missile deployment and the present move to deploy rail based ICBMs can be seen as a continuation of the trend. The only difference is, unlike Russia, China has a smaller nuclear ICBM arsenal as its doctrine follows the credible minimum deterrence concept. The important advantage of rail based missile units is the missile is completely concealed inside specially built rail coaches. This practice has become more convenient in the modern times as most of the missiles are solid fuelled and are cold launched which eases rail based launch and transport.

The other advantageous aspects are better mobility (transport) and comparatively less signature than road-mobile missiles. Unlike road mobile missile units where the support vehicles are travelling together, making it, to some extent easier to identify, the support systems of rail based missiles are located inside the coaches⁸ making it extremely hard to find and track. This one big advantage of a rail based missile unit makes it immensely survivable.

The other plus is faster and safer transportation of the missile units in times of crisis. The missile rail containers can be blended along with commercial rail operations making it hard to detect compared to road-mobile missile units. China is estimated to have 74565 miles of railway track including 9942 miles long high speed rail lines.⁹ China is also known to use its rail network to transport its road-mobile missiles. The only points where these road-mobile missiles are vulnerable to detection are the rail transfer points when the missile is either loaded or unloaded for maintenance. These transfer points are usually identified by their proximity to the roads connecting to known missile garrisons.¹⁰ Rail based missiles reduces the number of loadings and reloadings which reduce the chances of the missiles being located by enemy sensors. Even here the practice is to carry out these operations under a covered shed making it even harder to detect. Hence, rail based missiles are far harder to detect than road mobile missiles and in future, more of the DF-41 ICBMs

can be expected to be based on rail-based mobile units.

It is to be seen what kind of deployment practice China is going to adopt. Since China to some extent follows the Soviet deployment methods, it can be expected to go for either garrison based rail-mobile missile deployment or might opt for random deployment. Random deployment is more secure as it would be hard to detect or even know the exact location of a nuclear armed train. China would, by logic, be expected to adopt the random deployment method as unlike Soviet Union China has a limited nuclear arsenal governed by the minimum deterrence requirement and hence survivability should naturally receive high priority.

However, with its road mobile missiles China has adopted the garrison deployment method despite having a limited arsenal. In addition, another problem with China opting for garrison based deployment is that China does not have strategic early warning sensor system to warn of any incoming attack in advance. Despite all these reasons, China is continuing with the garrison based deployment of its road-mobile ballistic missiles, possibly because of the complexity in maintaining a random deployed nuclear ICBM force. Hence, there are also chances that China might do the same with its rail mobile ICBMs.

China's Rocket Force has six missile bases spread across the country. Among these, Base 55 and Base 54 are believed to be handling the ICBMs including the DF-5As and DF-31. It is fairly reasonable to assume that the new DF-41 ICBMs would be handled by Base 55 given the experience, training gained over the years in operating ICBMs. In addition, the facilities to handle ICBM operations already exist under this base. Further, range consideration would be another factor in support of this assumption. The DF-41 is going to be the mainstay of China's nuclear deterrence vector against the United States for the next several decades due to its range and its MIRV capability.

CONCLUSION

China continues to improve the survivability of its nuclear ballistic missiles, particularly its ICBM force. The DF-41 rail mobile ICBM will continue to serve China for several decades to come, given the deterrence value it possesses. The priority on ICBM survivability would continue particularly with the DF-41 ICBM as it combines MIRV capability with better range. More of the DF-41 can be expected to be inducted over the years. Given the size of China's strategic long range nuclear deterrence arsenal, it can be expected that each armed train might be equipped with two to three DF-41s. By logic and the fact that US has better surveillance and reconnaissance and conventional precision strike capability than during the Cold War time, China

would most probably be expected not to go for bunching of missiles as Soviet Union did. In future, the Chinese Rocket Forces might have a combination of road-mobile as well as rail mobile DF-41.

(Disclaimer: The views and opinions expressed in this article are those of the author and do not necessarily reflect the position of the Centre for Air Power Studies [CAPS])

Notes

¹ “国防部回应试射铁路版东风 41 洲际导弹：按计划安排”, <http://mil.news.sina.com.cn/china/2015-12-1/doc-ixfnept3466878.shtml>, 31 December 2015

² Ibid

³ “Chinese Ministry of Defence Confirmed rail Launch Version of DF-41 Missile”, <http://news.hexun.com/2015-12-31/181538554.html>, 31 December 2015

⁴ “Chinese Mobile ICBMs Seen in Central China”, <https://fas.org/blogs/security/2012/03/df-31deployment/>, 01 March 2012

⁵ “China Developing New Rail Mobile ICBM, Say US Officials”, <http://www.janes.com/article/56860/china-developing-new-rail-mobile-icbm-say-us-officials>, 23 December 2015

⁶ “东风 41 导弹列车发射试验证明三大重点” http://military.china.com/kangzhan70/zhiw/11173869/20151224/21007389_all.html, 24 December 2015

⁷ No.1

⁸ No.6

⁹ N0.1

¹⁰ “PLA Second Artillery Corps”, <http://www.ausairpower.net/APA-PLA-Second-Artillery-Corps.html>, 27 January 2014