



NEWS RELEASE

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Speech by Mr David Lim, Minister of State for Defence and Information & the Arts, at the Ground-Breaking Ceremony for the Underground Ammunition Facility

12 Aug 1999

Today's ground-breaking ceremony signals the start of construction of MINDEF's first underground ammunition depot. It also marks a new approach to land use in Singapore - the development of underground rock cavern space - which has potential to provide more space in land-scarce Singapore.

About 20% of Singapore's land is currently used by the SAF - for training land, camps and bases, and ammunition storage facilities. The defence of Singapore is a national priority, and the government has therefore given priority to the SAF in land allocation. But given our small size, many uses - such as housing, industry and other economic needs - will always compete for land.

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MINDEF has actively taken measures to reduce its demand for land. Where we can, we are making extensive use of overseas training. At the same time, we are continually increasing development density and land use intensity. For example, we have clustered units together in camp complexes to share common facilities. We have also built multi-storey storage facilities to minimise land use. As a result of these efforts, we have returned more than 30 hectares of land in net terms to the State since 1992. We expect this to increase to more than 400 hectares by 2010.

MINDEF's search for innovative solutions to reduce demand for land led us to explore the use of underground space in the early 1990s. At about the same time, Nanyang Technological

University and the Public Works Department were also studying the feasibility of using underground space to meet Singapore's land needs. They found that there was good potential to exploit underground space because there are extensive rock formations over large parts of the island. Their findings coincided with MINDEF's own conclusions on the feasibility of underground ammunition storage. We agreed that it was timely for us to apply this approach for MINDEF's needs.

Conventional above-ground ammunition storage requires large areas of land. Land is needed not just to store the ammunition magazines. For safety reasons, large tracts of land outside the ammunition dumps must also be set aside as a buffer zone. Inhabited buildings can only be built outside these zones. We cannot compromise on these standards for the safety of our people. But cavern technology can help reduce the unusable areas.

After detailed and careful studies, MINDEF decided last year to proceed with the development of its first underground ammunition facility. This facility, when completed in 2003, will cater for the storage of a significant proportion of the SAF's ammunition. Compared to an equivalent surface ammunition depot, it will save more than 300 hectares of land. This is equivalent to half of Pasir Ris New Town.

The development of an underground ammunition facility of this scale is a complex engineering undertaking. For this task, the Project Team harnessed the best expertise from in-house engineers and operational officers, in addition to experts from the Protective Technology Centres at our two Universities. The Project Team also drew on the wealth of know-how and expertise from American, Norwegian and Swedish defence construction and research organisations. These included Sandia National Laboratories and the Defence Threat Reduction Agency from the United States, the Defence Construction Services and NorConsult from Norway, and the Swedish National Defence Research Establishment, FOA of Sweden.

Safety is of paramount concern in the design of this facility. We have incorporated many advanced and proven provisions to improve the safety of the facility while minimising the safety buffer zone. These provisions include a sophisticated fire and smoke detection system and an automatic fire fighting system. There will also be a system of interconnecting tunnel networks, which are designed to attenuate blast wave effects. In addition, specially designed blast doors will isolate storage chambers to prevent an explosion in one chamber from triggering off explosions in neighbouring chambers. Finally, a special barricade wall will be carved out of natural rock at the facility entrance to further limit blast wave and debris effects.

In undertaking this project, MINDEF achieved a number of ground-breaking results in R&D. Significant achievements have been made in water mitigation and ground shock studies. Water mitigation makes use of water to absorb the energy of an accidental explosion. This greatly reduces the safety buffer zone, freeing up land for productive use. Ground shock studies enables our engineers to formulate structural engineering codes for the safe construction of buildings in areas affected by ground shock effects. This also reduces land wastage.

Both these studies presented challenging problems that required large-scale computer simulation and comprehensive field tests. Our scientists and engineers have acquired international stature for their work.

I would therefore like to congratulate the Project Team from the Lands and Estates Organisation, the Defence Materiel Organisation, the Resource Planning Office and the Army, Navy and Air Force. Your efforts in research, engineering and project planning have helped us to save valuable land and to develop new capability in rock cavern engineering and explosive storage. Your success will also strengthen Lands and Estates Organisation's standing as the National Authority in Protective Technology.

I wish the Project the very best of success. Thank you.

News Release:

- MINDEF Constructs First Underground Ammunition Facility (Document No: MINDEF_19990812001.pdf)

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