THE USE OF ROBOTIC EXCAVATION TECHNIQUES TO EXCAVATE MAN RATED SUBSURFACE STRUCTURES. A. A. Mardon, Antarctic Institute of Canada, PO Box 1223, MPO, Edmonton, Alberta, Canada, T5J-2M4, mardon@freenet.edmonton.ab

When manned missions resume to the Moon it will be necessary to have habitable structures on or under the Moons surface and also have structures for the protection of industrial activities for the support of manned messions to the Moon. What the author proposes is that in the very near term future robotic tunneling mission are sent to the Moon to excavate small and large caverns for later use by manned missions. It has already been proposed that lunar lava tubes be used for first stage manned missions to the Moon. If within the next two years robotic missions were launched to the Moon with excavation capability then by the time manned missions back to the Moon commenced in ten to twenty years from now then their would be a substantial warren of tubes and larger caverns that could be then converted to man and also machine rated use.

The two different types of excavation that the author proposes is first of all explosives use and the second is conventional burrowing techniques. Once the undersurface structures were excavated then all that the later manned mission would have to do is apply sealant on the tunnel surfaces and or have lightweight large tent like structures. The entrance to the tunnel complex could be sealed and industrial activitiy could be implemented without the deleterious effect of lunar surface dust. Non-pressurized areas could be accessed by humans in lightweight pressure suits that would be substantially lighter then what is necessary to protect an astronaut on the surface.

There are analogue robotic tunneling devices used beneath the surface of many urban settings.

Conclusion: With one or two robotic missions it is possible that a rough unpressurized subsurface lunar base could exist within the next five years. If we prepare today for a Moon mission by having subsurface excavation completed before the next human steps on the Moon a Moon mission would ultimately require less last minute logistical requirements. It might even cost less ultimately in the first phase of the next manned missions to the Moon.