

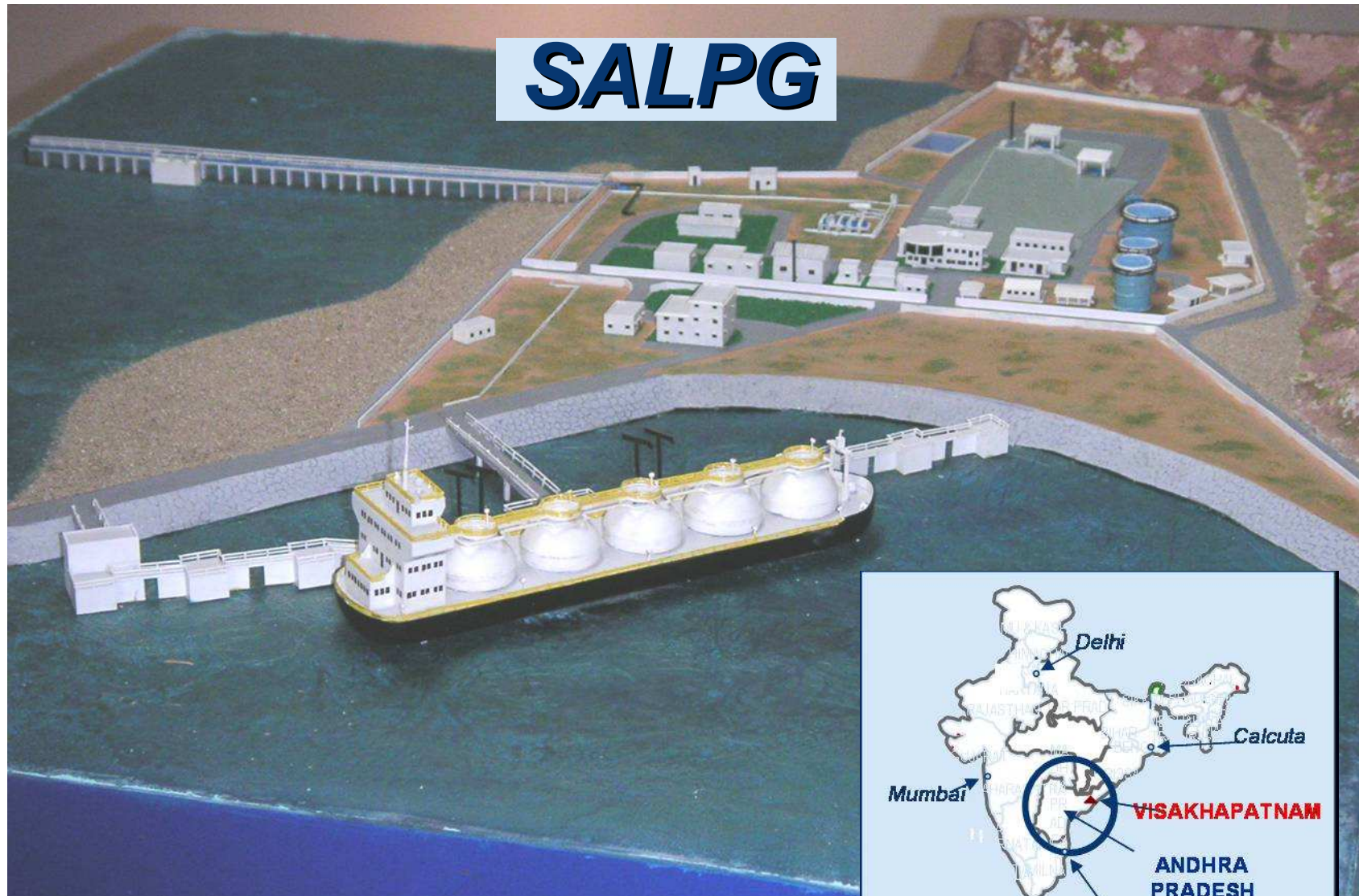


TOTAL

South Asia LPG Private Ltd.
First LPG Storage Cavern in India

*23rd World Gas Conference
5-9 June 2006, Amsterdam
Loran Karwacki and Neeraj Sanghi*

Underground Storage of LPG

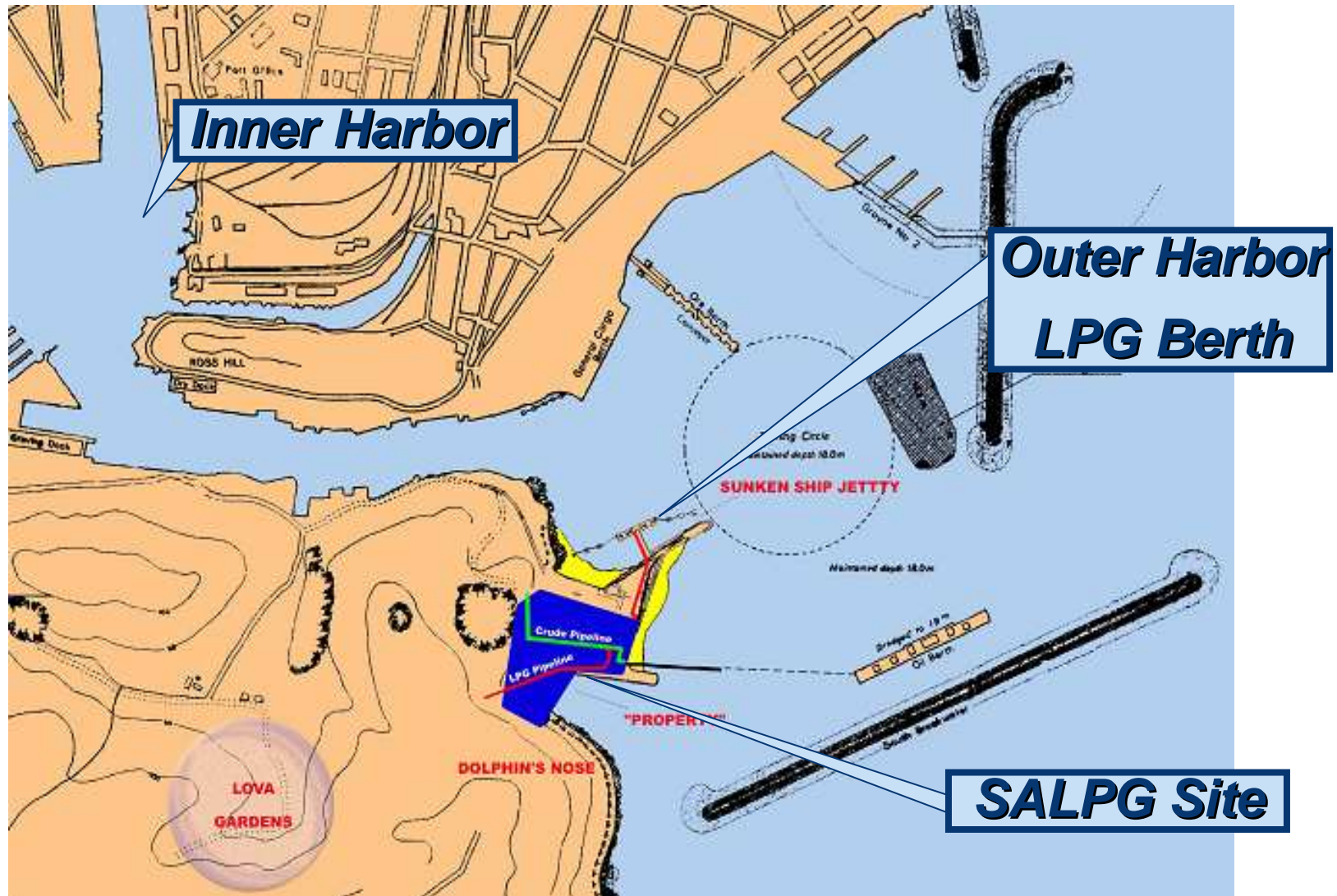


23rd World Gas Conference – June 2006



TOTAL

SALPG Location in the Harbor



Cavern Benefits



- ✓ **At 60 000 tonne capacity, will be the largest LPG storage facility in India**
- ✓ **Will be capable to unload a 40 000 tonne LPG ship in 12 hours compared to existing facilities that can only accept 13 000 tonne ships**
- ✓ **Will benefit LPG consumers through lower transportation cost (larger ships) and improved security of supply (storage capacity)**
- ✓ **Very safe compared to above ground tanks.**

SALPG Concept

Proven Technology - 80 mined caverns for LPG storage exist in USA, France, Canada, Europe, and South Korea

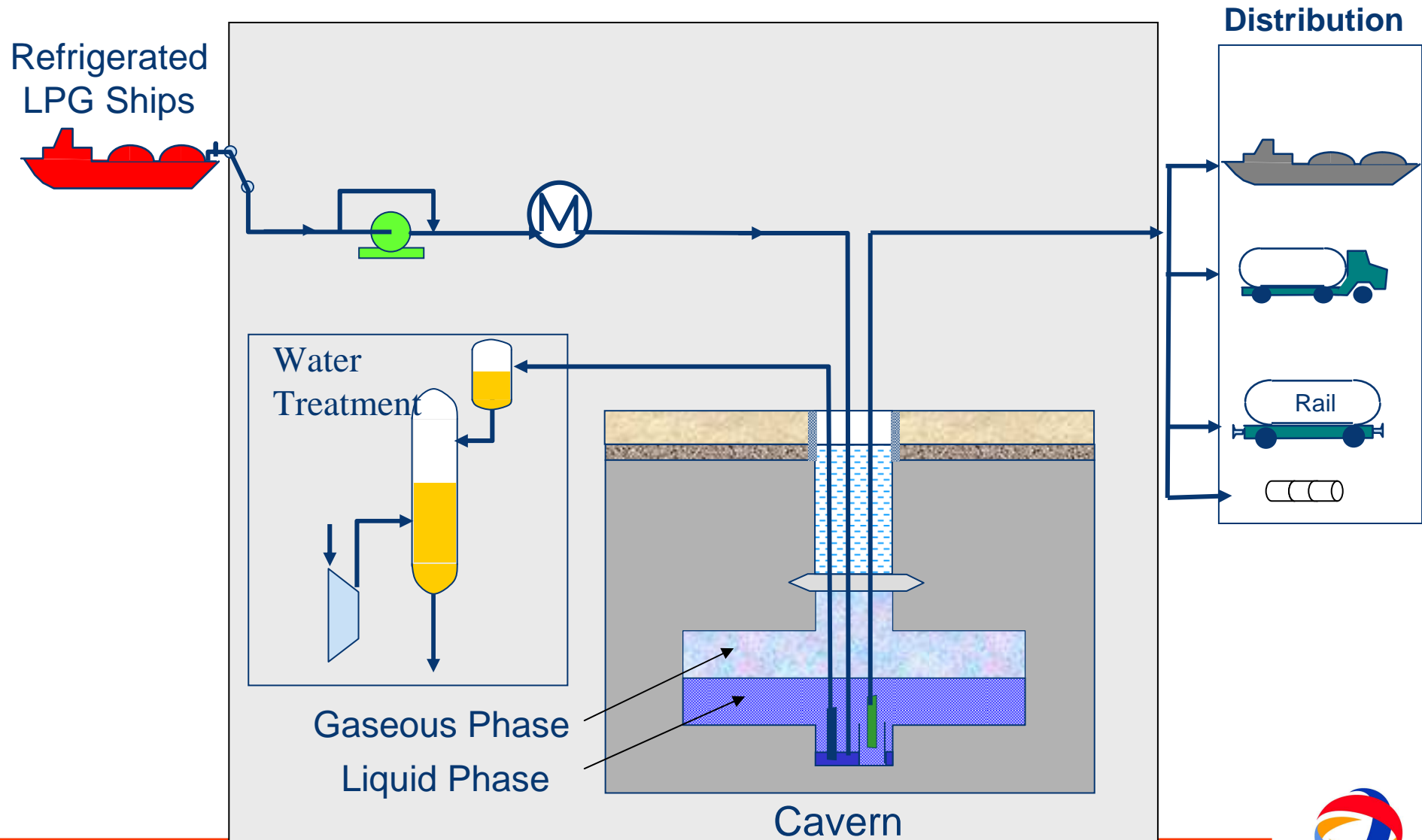
Ground water pressure is sufficient to keep LPG in liquid form

Cavern is 160 m below ground level in competent rock

Capacity for 120 000 m³ of LPG (60 000 tonne)

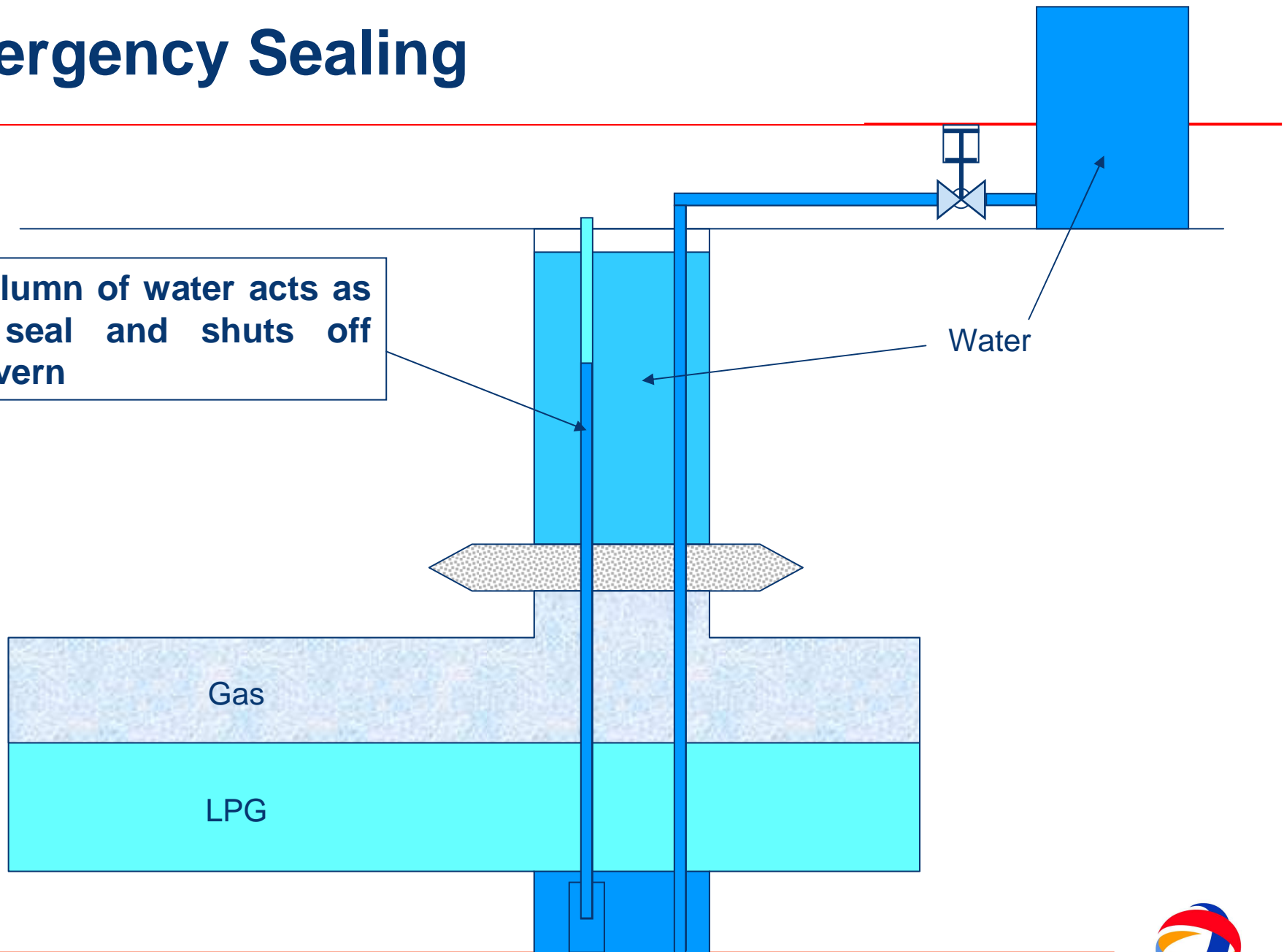


SALPG – Process Diagram

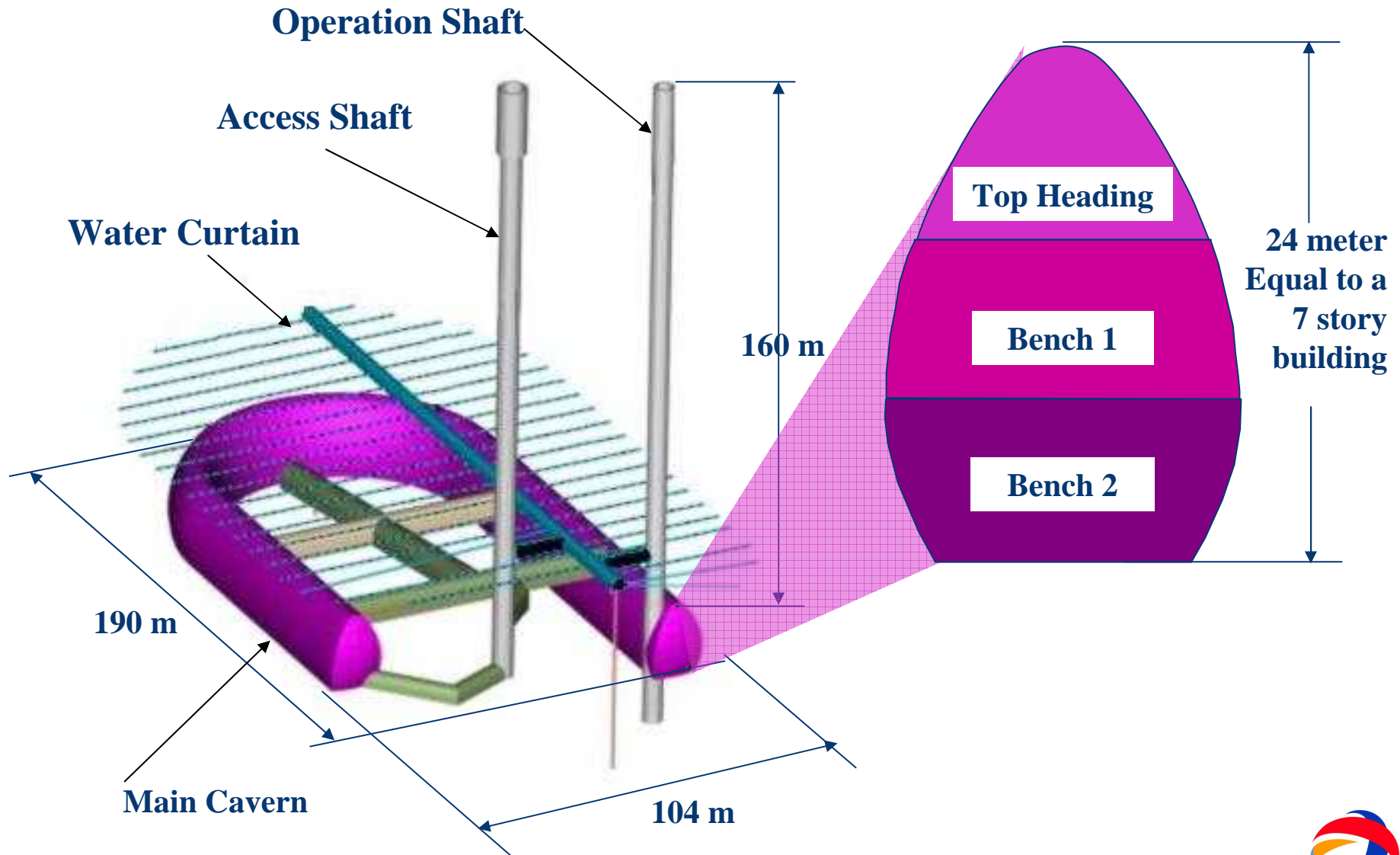


Emergency Sealing

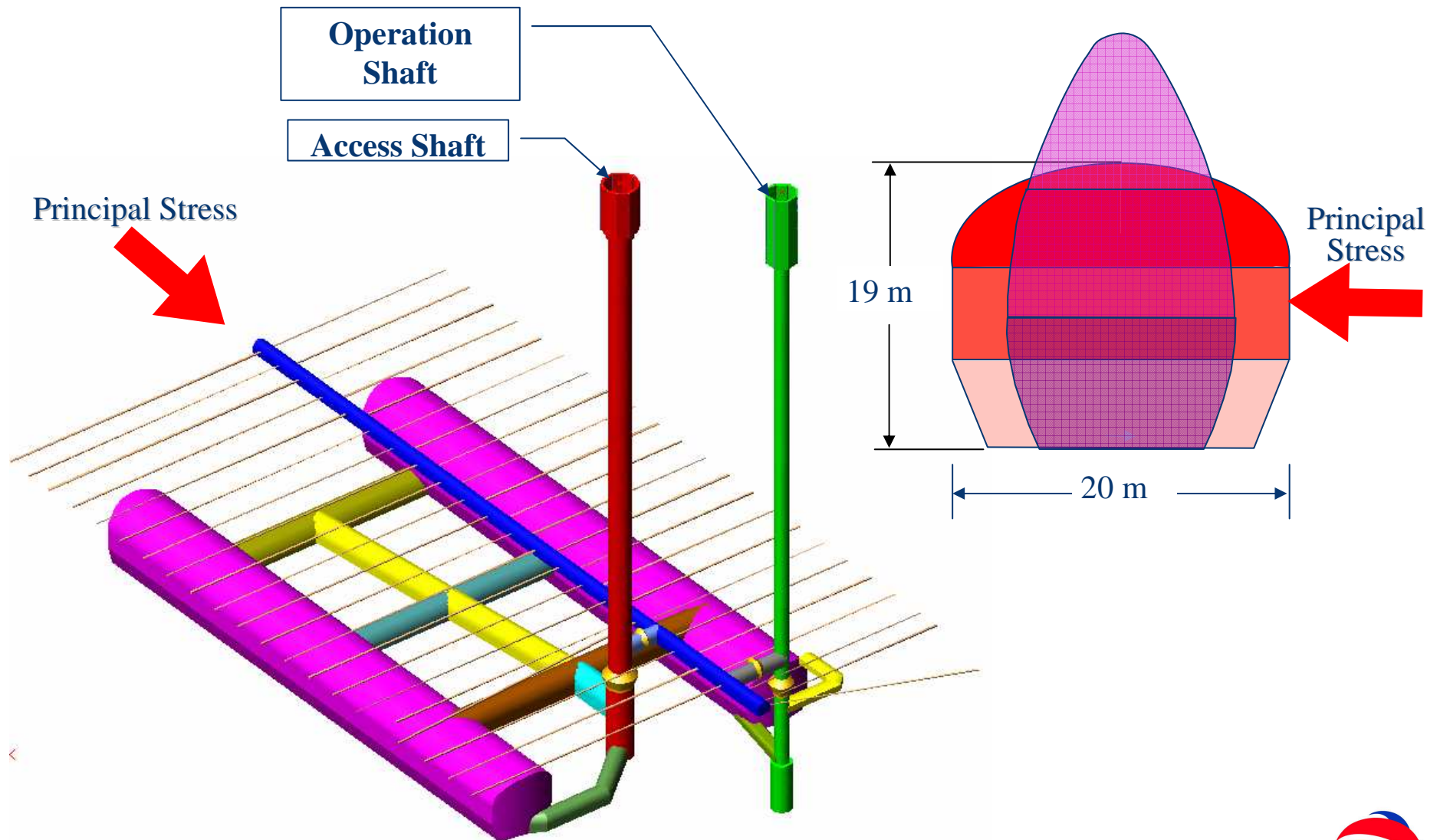
Column of water acts as a seal and shuts off cavern



Original Cavern Design



New Design Oriented to In Situ Stresses



View of Top Header

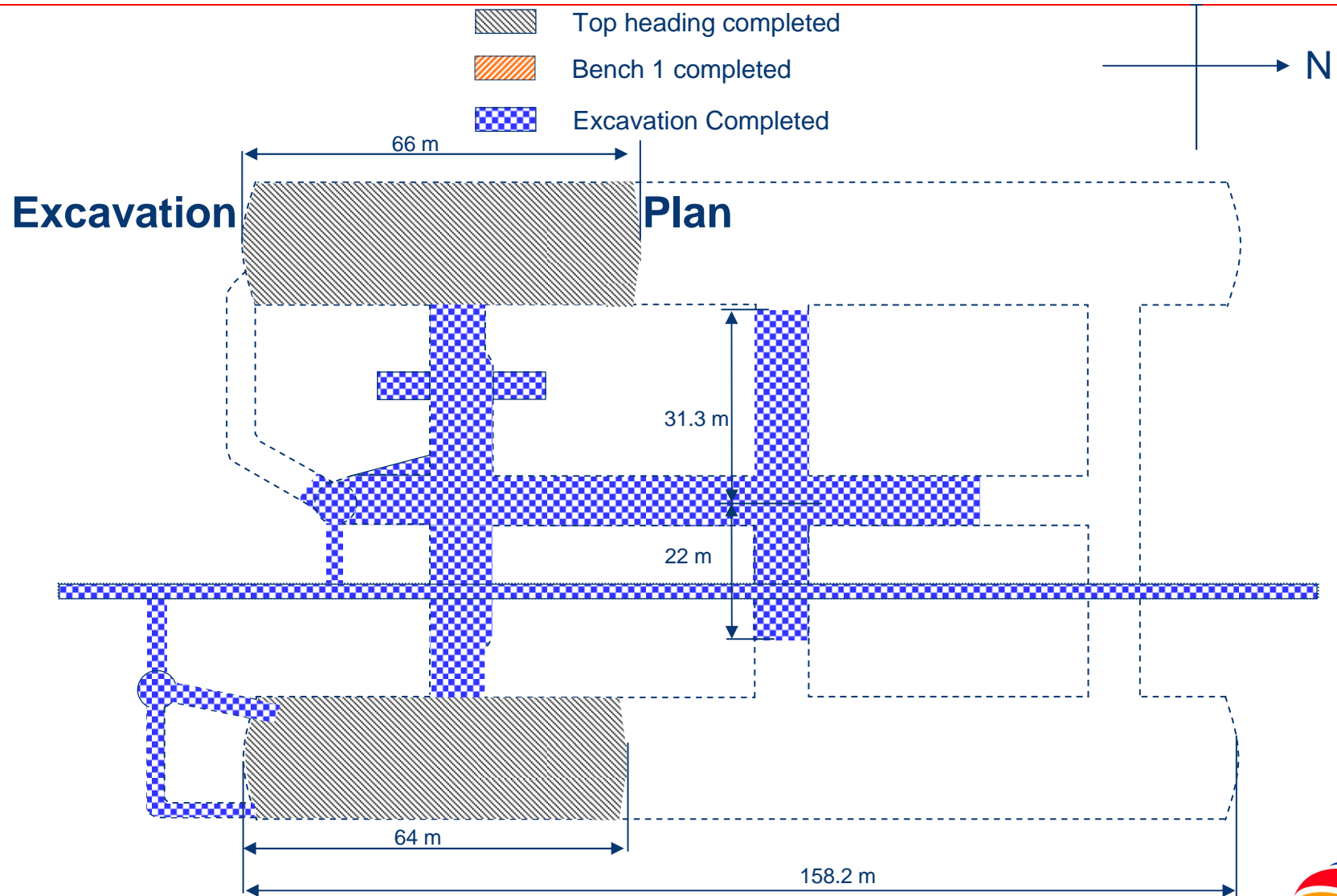


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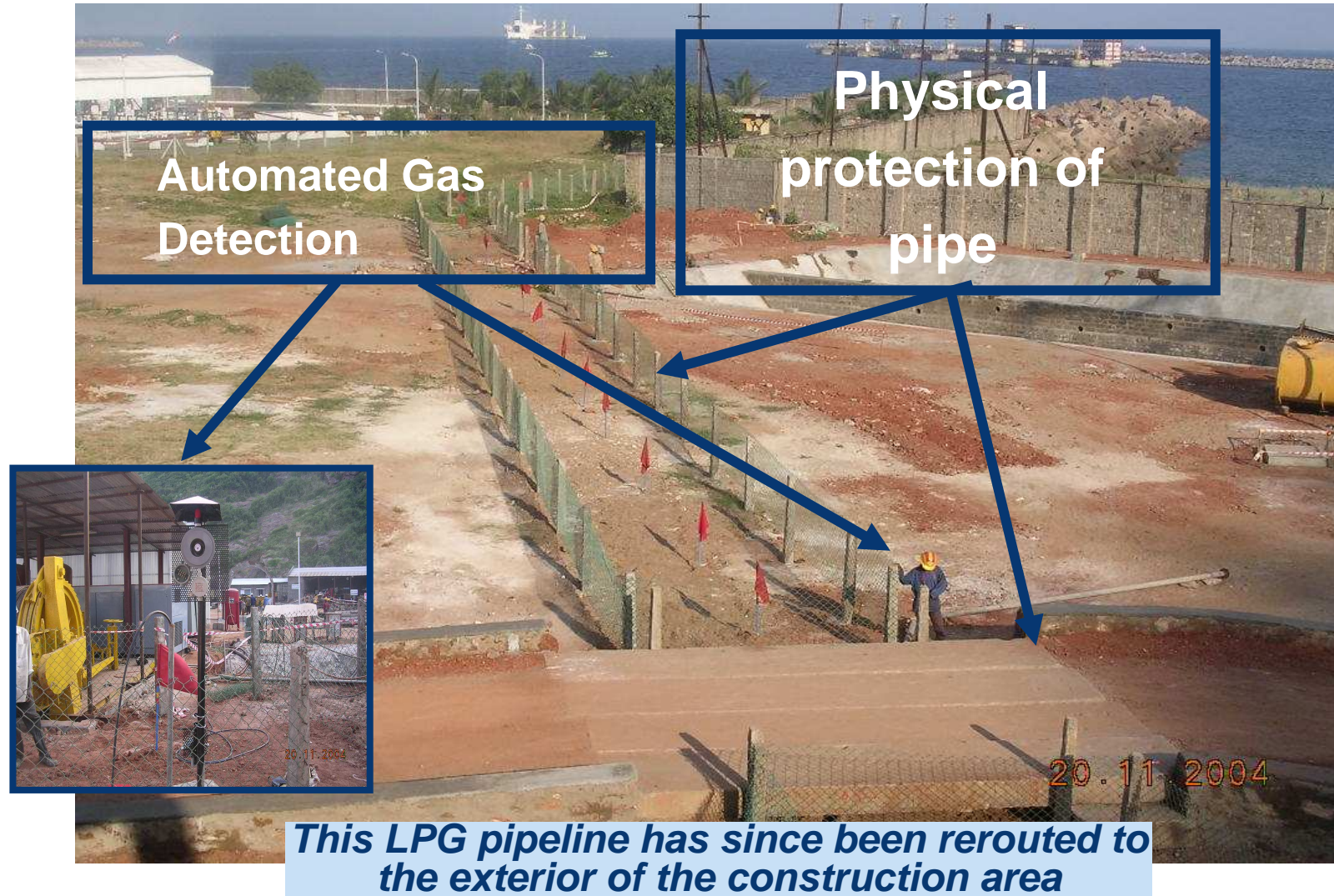


TOTAL

Excavation Progress



Safety Hazard – existing Crude and LPG pipe



Safety hazard – Falling Rock



Probing for loose rock after a blast



Shotcrete coating used to minimize risk of falling rock

SALPG LPG Storage Project



Safe, Economical

Energy for India.....

Thank You