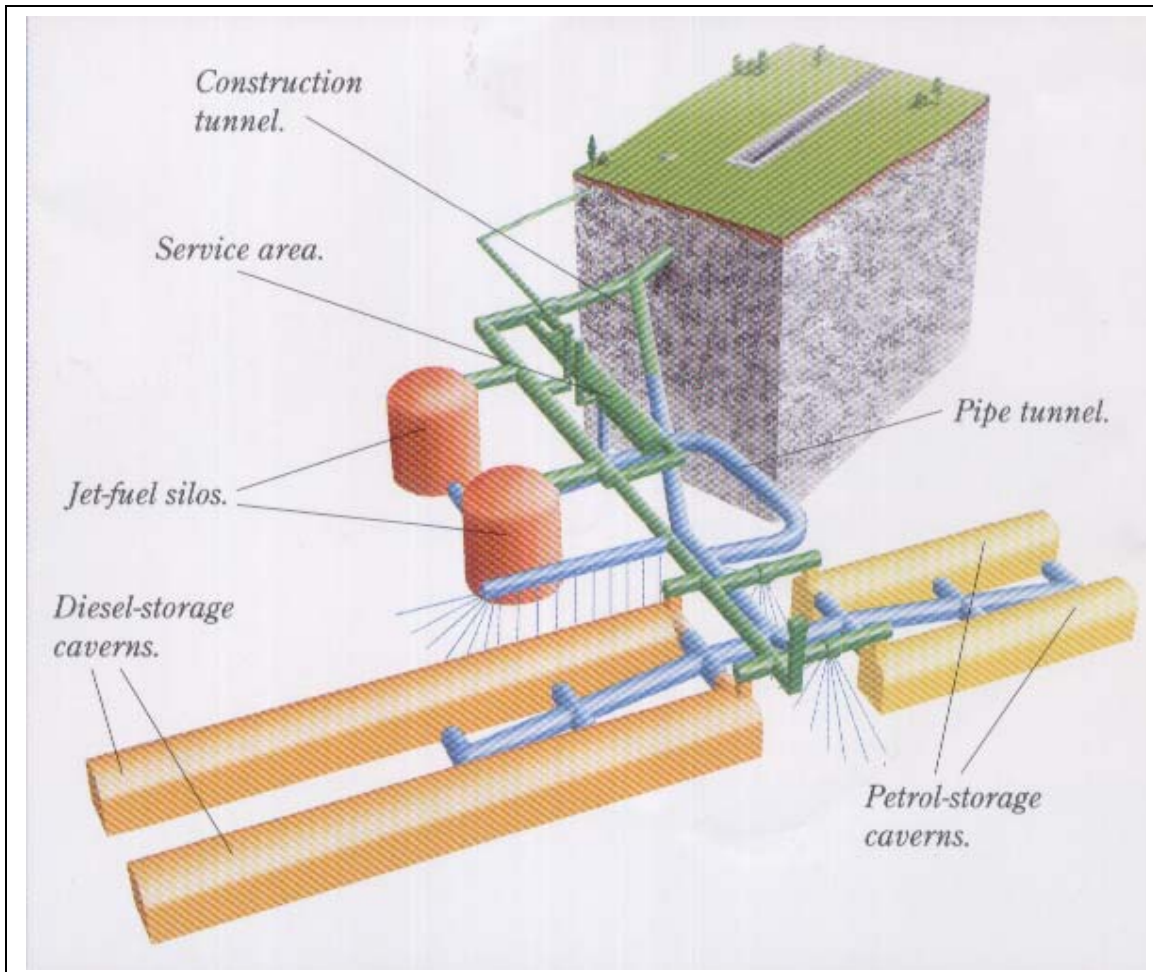


FEASIBILITY STUDY ON CONSTRUCTION OF CRUDE OIL STORAGE COMPLEX IN UNLINED MINED CAVERNS OF PROPOSED HPCL SITE AT CHEMBUR, MUMBAI

BACKGROUND

Storing petroleum products in unlined underground caverns instead of above ground in steel tanks are being practiced in all the developed countries due to the advantages in terms of cost (for low storage volume), less maintenance, low leakage and evaporation, requirement of less surface area and low impact on environment. Further the risk and hazards such as sabotage, fire storms, earthquake and explosion are minimized. The USA took lead in this direction for the salt dome deposits at a depth of 1 km from surface. Germany, France and Russia followed the technique. The technique is widely used in Norway, (rock mass of Precambrian gneiss), Sweden (in compact, non-carbonic, and non-volcanic rock masses), Greece (in limestone and dolomite formations), Japan (in granite), South Korea (in andesite & granite) and in Southi Arabia. The schematic diagram of an oil storage cavern is shown in the following figure.





The first crude oil cavern in India is proposed to be constructed in Chembur, Mumbai at M/S Hindustan Petroleum Corporation Limited site. The CMRI (presently CIMFR) Regional Centre, Nagpur was entrusted to prepare the feasibility report of the construction beneath the sea-level in basaltic formations at a depth of 60-100m. The total storage capacity requirement is 6,50,000 Mt or more. The feasibility study encompassed rock mass characterization through seismic profiling, electrical resistivity profiling cross-hole tomography, assessment of post failure criteria of rock, geological information, hydro-geological information, determination of in-situ stress and hydraulic contamination, numerical modelling, detailed design of caverns indicating shape, size etc., risk assessment and sharing and design of construction schedule.

The methodology of construction of crude oil storage caverns is unique in the sense that a water curtain with pressure (equal to water head from the surface to the crown of the cavern) will be maintained permitting water to percolate in the fissures of the unlined cavern to prevent leakage and dissemination. The cavern remains partially filled with water at the bottom and is kept empty at the top to accommodate the evaporated oil.

The proposed methodology and work elements to carry out the study is shown in the flow chart.

The S-wave seismic profiling done to assess the underneath rock mass upto a depth of 50 m and finalizing the exploratory drill hole locations are shown below:

