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Constructability and Value Engineering "Top Ten" Best Practices for Underground Laboratory Construction

Abstract:

The physics community is developing conceptual designs for a new generation of underground facilities. The facilities will be accessed and housed in shafts, tunnels and caverns, sited at depth underground. The host excavations and service systems will need to meet strict tolerances for dryness and stability, delivering state-of-the-art design in underground ventilation, life safety and emergency egress.

There is worldwide interest in building such facilities. Sites are being evaluated in Asia, Europe and North America. The international community is collaborating to find the best value option for building these facilities, while pool resources and minimizing the potential for experimental duplication.

The physical scale and construction cost of these new physics projects are large. The capital cost of "conventional" facilities alone is likely to range from hundred of millions to over a billion dollars. The facilities will constitute a major portion of the overall research investment. Funders will need strong assurance that the cost is affordable prior to giving a green light for such large investments of their limited research budgets.

Best value practices in underground engineering, including constructability review, value engineering, risk analysis, life cycle and safety performance, must be adopted on a site-specific and regional basis in order to optimize these projects for cost and risk. This paper will outline a top ten list in underground engineering best practices in site selection, design and construction. The paper will be based on the author's firsthand experience working on underground physics projects in North America, Europe and Asia.