

عنوان مقاله:

Construction Network Ventilation System for Underground LPG Storage Cavern

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نویسنده:

Fang Lin - National Engineering Laboratory for Green & Safe Construction Technology in Urban Rail Transit, Beijing, China- Beijing Urban Construction Design & Development Group Co. Ltd., Beijing, China

خلاصه مقاله:

Construction ventilation system is divided into two stages based on completion status of shafts in the underground petroleum storage project in Jinzhou, China. With the help of theoretical analysis and numerical simulations by using FLUENT software, in the first stage, reasonable construction ventilation is designed and cases with different outside temperature are discussed to investigate the effect of ventilation performance. It is found that with temperature difference increases, peak value of CO concentration, exhausting time of dirty air and required time to meet the CO concentration qualification decrease, but the influence degree is quite limited. Gallery-type network ventilation technique (GNVT) refined from theories of operation ventilation for road tunnel and mining ventilation network, is proposed to conduct the second stage construction ventilation. Ventilation performance of different ventilation schemes with various shafts' states and diverse arrangements of fans are also analyzed in this study. It turns out that Axial-GNVT with shafts taking in fresh air and access tunnel ejecting dirty air has much better performance than traditional forced ventilation from access tunnel. Improved energy saving scheme is finally adopted to guide the construction. In addition, it is worth mentioning that there is no need to build middle ventilation shafts and construct shafts as large and long as possible. Field test of wind speed, dust, poisonous gas, atmospheric pressure, temperature are performed to detect ventilation effectiveness. Reduction coefficient $\eta = 0.69$ is obtained from the test results in consideration of super-large section and it also indicates that there is no difference if the axial fan is at the shaft mouth or in the bottom.

کلمات کلیدی:

Underground Petroleum Storage Caverns; Construction Ventilation System; Computational Fluid Dynamics; Ventilation Network

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