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阳坝落石对输油管道的冲击分析 (PDF)

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Title: Analysis of rockfall impact on buried oil pipeline at Yangba

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摘要: 兰成渝成品油管道在甘肃康县段遭受了严重的落石灾害,其中08年汶川地震触发的阳坝落石造成管道破坏和巨大经济损失.根据对阳坝落石现场的调查和管道遭受落石冲击的分析,为管道在康县段的减灾防灾提供理论依据和分析方法.系统对比分析了国内外普遍采用的5种落石冲击力算法,并推荐了最出符合实际的算法.通过现场取样和室内实验获取土体力学强度参数,经与工程地质手册推荐的经验数据比对后选择最适合的参数进行计算.选取Marston提出的沟内埋管垂直土压力计算模型分析管道的应力与变形,结果表明:(1)事故原因是管材自身的强度和变形不足以抵抗落石产生的巨大冲击荷载,应力和变形均失效.(2)在落石区进行管道设计时,建议引入日本道路公团方法计算落石最大冲击力.(3)管道在康县区域内再次遭受崩塌灾害的概率很大,有必要对区域内崩塌灾害点进行重点排查,做好相应的管道防护措施.

Abstract: Lanzhou-Chengdu-Chongqing end product oil pipeline suffered serious rockfall disaster in the section of Kangxian County, Gansu

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Province. Yangba rockfall triggered in 2008 Wenchuan earthquake seriously damaged the pipeline and brought about enormous property loss. Based on the investigation of rockfalls, this study provided an analysis method and theoretical basis for the prevention of rockfall disasters. In this paper, five calculation methods of rock fall impact force commonly used at home and abroad were systematically compared and analyzed, and the most realistic algorithms were recommended. Through field investigation and laboratory experiments, the mechanical strength parameters of the soil were obtained. Then the experimental data and empirical data recommend in engineering geological manuals were compared, and the most suitable parameters were selected to calculate. The trench pipe vertical soil pressure calculation model proposed by Marston was used to analyze pipeline' s stress and deformation. Results show that: first, the pipe strength and deformation are not enough to resist the intensive impact of falling rocks, which would cause the stress and deformation failure