

反应堆工程

# 压水堆核电站完全丧失给水引发的严重事故研究

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收稿日期 2005-10-24 修回日期 2006-3-12 网络版发布日期: 2007-3-25

**摘要** 采用严重事故最佳估算程序RELAP5/SCDAPSIM/MOD3.2, 建立美国Surry-2核电站的详细计算模型, 对完全丧失给水(TLFW)引发的堆芯熔化事故进行研究分析。为准确预测压力容器内堆芯熔化的进程, 为二级概率安全评价提供可信的初始条件, 计算中考虑了一回路压力边界的蠕变破裂失效, 并评价了人为干预对堆芯熔化进程及事故后果的影响。计算结果表明, 由完全丧失给水引发的压水堆核电站严重事故不会出现人们担心的高压熔堆; 反应堆压力容器下封头的失效位置不是在其底部, 而是在其侧面; 通过打开稳压器释放阀对一回路实施主动卸压能够大大推迟事故的进程。

**关键词** [完全丧失给水](#) [严重事故](#) [堆芯熔化进程](#) [蠕变破裂](#)

分类号 [TL364](#)

## Study on Severe Accident Induced by Total Loss of Feed Water for Pressurized Water Reactor Power Station

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**Abstract** Using the best estimate computer code RELAP5/SCDAPSIM/MOD3.2, the detailed calculation models of US Surry nuclear power plant(NPP) unit 2 were established and core melt accident induced by total loss of feed water(TLFW) was analyzed. In order to predict the in-vessel core melt progression accurately and provide probabilistic safety assessment (PSA) level 2 with the reliable initialization conditions, the creep rupture failure of primary loops pressure boundary was taken into account in code calculation. Core melt progression and accident results with operator action were evaluated. The calculated results suggest that severe accident induced by TLEU will not lead to high pressure core melt and the failure position of reactor pressure vessel lower head is in the side piece but the bottom and the accident progression will be greatly delayed by opening the pressurizer power-operated relief valve.

**Key words** [total loss of feed water](#) [severe accident](#) [core melt progression](#) [creep rupture](#)

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