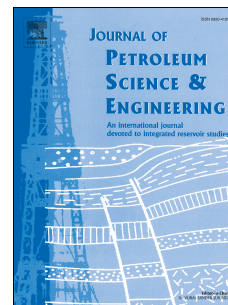


Accepted Manuscript

Comprehensive risk assessment of high sulfur-containing gas well

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PII: S0920-4105(18)30593-X

DOI: [10.1016/j.petrol.2018.07.016](https://doi.org/10.1016/j.petrol.2018.07.016)

Reference: PETROL 5113

To appear in: *Journal of Petroleum Science and Engineering*

Received Date: 15 November 2017

Revised Date: 22 May 2018

Accepted Date: 5 July 2018

Please cite this article as: Naiyan, Z., Zhi, Z., Rui, Z., Jing, L., Cheng, Z., Qingsheng, Z., Wentao, Z., Patil, S., Comprehensive risk assessment of high sulfur-containing gas well, *Journal of Petroleum Science and Engineering* (2018), doi: 10.1016/j.petrol.2018.07.016.

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1 Comprehensive risk assessment of high sulfur-containing gas well

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13 Abstract

14 Well integrity has been a growing concern of oil and gas industry, especially in the years
15 of cheap oil. The failure of well integrity may cause undesirable events or even devastating
16 consequences such as safety hazards or loss of containment. In this paper, a novel calculation
17 model of wellbore integrity comprehensive risk has been presented. Firstly, the risk hazard
18 associated with well barrier failure modes are identified based on the relevant literature. The
19 risk factors of well integrity in production phase are investigated in detail. The risk matrix
20 based on Borda number analytical method and Analytic Hierarchy Process (AHP) is then
21 presented to assess the risks of well integrity in production safety. Finally, the case of XX
22 high sour gas well is empirically investigated to validate the model. The results indicate that
23 27 risk factors are identified for XX gas well in production. In addition, it is found that the
24 XX gas well is prone to suffer damage in presence of H₂S and CO₂, furthermore, the Borda
25 number analytical results also show that the most important factor affecting the well integrity
26 is effect of string corrosion, followed by the corrosion of string sealing accessories and the
27 corrosion environment of material applicability. Therefore, the appropriate measures should
28 be taken to reduce the corrosion of string and sealing accessories, thus prolonging the service
29 life of the equipment. The case of XX high sour gas field verifies the feasibility and
30 applicability of the risk matrix method in wellbore integrity risk assessment. The innovative

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