Onshore Failure Frequency Data Comparison: HCRD vs. Purple Book, Belgium Handbook, and HSE

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ABSTRACT

Frequency values used in quantitative risk assessments is an area of uncertainty as several datasets exist and good data for onshore equipment items is limited. Offshore, following the Piper Alpha accident, UK North Sea Operators were required to record data on all incidents involving the release of hydrocarbons. The HSE compiled and published these each year, resulting in the Hydrocarbon Release Database (HCRD). The HCRD provides the largest, high-quality collection of leak experience with matching equipment populations. It has become the industry-standard source of leak frequencies for offshore QRA. Three onshore failure frequency datasets are in common use, including the Purple Book, the Belgium Handbook Failure Frequencies, and UK HSE Failure Rates. This paper compares these with the HCRD database. The background on those three sources are provided, and a case study is carried out to compare the difference of frequencies predicted based on all four references. Based on the case study results and literature review, the following is concluded in assessing the onshore failure frequency: • HCRD is a good quality database, and is the best source to derive frequencies for onshore facilities, especially if suitable modification factors are included • However, for scenarios with larger hole sizes, the failure frequency from HCRD need to be used carefully. The HSE Failure Rates and Purple Book may need to be referred in predicting the frequency for those scenarios. • For reactors, canned pumps, distillation columns, etc., which are not found offshore, the frequency cannot be based on HCRD. The Case study shows that the leak frequencies for typical onshore equipment are comparable in the three onshore databases.