



Development of an intermediate societal risk methodology

An investigation of FN curve representation

Addendum to RR283

Prepared by **ERM Risk Ltd** for the
Health and Safety Executive 2005

RESEARCH REPORT 283(ADD)



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The Health and Safety Executive (HSE) commissioned Environmental Resources Management (ERM) to undertake a study for the 'Development of an Intermediate Societal Risk Methodology'. The study was performed between May and October 2003, and revised in August 2004. The study was published on HSE's web site as a HSE research report in 2004 (RR 283).

The following sections form an addendum to the HSE research report 283 (RR283) and describe the calculations and results for 'expectation values' for the base cases detailed in RR283. Therefore, specific details of the cases are not reproduced here and reference should be made to RR283.

This report and the work it describes were funded by the Health and Safety Executive (HSE). Its contents, including any opinions and/or conclusions expressed, are those of the authors alone and do not necessarily reflect HSE policy.

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First published 2005

ISBN 0 7176 6113 X

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The results for the expectation value (EV) and maximum number of persons harmed (N_{\max}) are summarised in *Table 1.1*.

The expectation value (sometimes referred to as potential loss of life or rate of harm) is the average number of persons receiving the specified level of harm (i.e. fatality) per year, calculated by summing the products of impact frequency, harm probability and number of persons affected.

Table 1.1 Results Summary

| Case | Population | EV | N _{max} |
|---|----------------------------|-------|------------------|
| <i>Chlorine installation 1</i> | | | |
| All scenarios 1-44 | High | 1733 | 1455 |
| All scenarios 1-44 | Medium | 1103 | 1150 |
| All scenarios 1-44 | Low | 1639 | 1275 |
| Scenarios 1-5 | High | 369.1 | 352 |
| Scenarios 6-12 | High | 8.6 | 83 |
| Scenarios 13-21 | High | 123.7 | 101 |
| Scenarios 22-31 | High | 756.4 | 1455 |
| Scenarios 32-35 | High | 112.8 | 107 |
| Scenarios 36-43 | High | 361.9 | 91 |
| Scenario 44 | High | 0.6 | 1 |
| <i>Chlorine installation 2</i> | | | |
| All scenarios 1-51 | High | 6587 | 4515 |
| All scenarios 1-51 | Medium | 4203 | 3852 |
| All scenarios 1-51 | Low | 6319 | 3932 |
| Scenarios 1-5 | High | 3289 | 352 |
| Scenarios 6-12 | High | 8.6 | 83 |
| Scenarios 13-21 | High | 122.9 | 101 |
| Scenarios 22-31 | High | 2456 | 4515 |
| Scenarios 32-35 | High | 112.7 | 107 |
| Scenarios 36-43 | High | 373.3 | 96 |
| Scenarios 44-51 | High | 224.3 | 87 |
| <i>Chlorine installation 3</i> | | | |
| All scenarios 1-13 | High | 3006 | 39 |
| All scenarios 1-13 | Medium | 918 | 8 |
| All scenarios 1-13 | Low | 2912 | 20 |
| <i>Hydrogen fluoride installation</i> | | | |
| All scenarios 1-69 | High | 593 | 460 |
| All scenarios 1-69 | Medium | 368 | 273 |
| All scenarios 1-69 | Low | 547 | 337 |
| <i>Liquefied flammable gas processing plant</i> | | | |
| All scenarios 1-13 | General + housing + school | 5656 | 56 |
| All scenarios 1-13 | General + housing | 5593 | 52 |
| All scenarios 1-13 | General | 5217 | 45 |
| Scenarios 1-3 | General + housing + school | 1843 | 22 |
| Scenarios 4-8 | General + housing + school | 2190 | 49 |
| Scenarios 9-10 | General + housing + school | 5.5 | 2 |
| Scenarios 11-12 | General + housing + school | 30.1 | 3 |
| Scenario 13 | General + housing + school | 1588 | 56 |
| <i>LPG distribution depot</i> | | | |
| All scenarios 1-24 | General + housing + school | 51631 | 148 |
| All scenarios 1-24 | General + housing | 51382 | 143 |
| All scenarios 1-24 | General | 49123 | 111 |
| Scenarios 1-3 | General + housing + school | 15535 | 27 |
| Scenarios 4-6 | General + housing + school | 5170 | 27 |
| Scenarios 7-11 | General + housing + school | 2998 | 148 |
| Scenarios 12-16 | General + housing + school | 2343 | 116 |
| Scenarios 17-18 | General + housing + school | 5.5 | 2 |
| Scenarios 19-20 | General + housing + school | 30.1 | 3 |
| Scenarios 21 | General + housing + school | 4535 | 56 |
| Scenarios 22-24 | General + housing + school | 21015 | 10 |

Notes

1. EV - expectation value (fatalities per million years of plant operation).
2. N_{max} - maximum number of persons harmed.



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£10.00

ISBN 0-7176-6113-X

