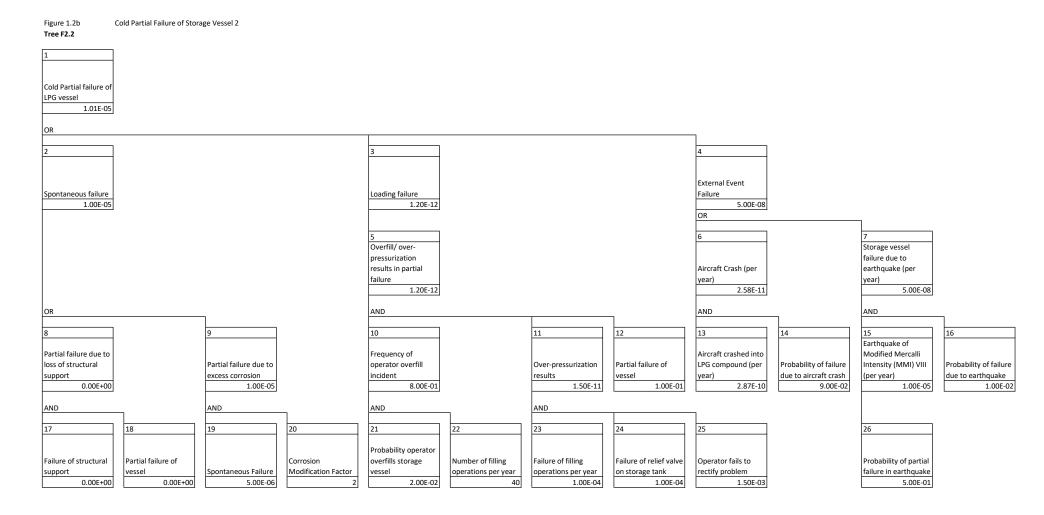
Figure 1.1a Cold Catastrophic Failure of Storage Vessel 1 Tree F1.1 Cold catastrophic failure of LPG vessel 4.10E-07 External Event Spontaneous failure Loading failure Failure 3.60E-07 1.20E-13 5.00E-08 OR Overfill/ over-Storage vessel pressurization failure due to earthquake (per results in Aircraft Crash (per catastrophic failure year) year) 1.20E-13 2.87E-12 5.00E-08 AND AND AND 13 10 12 Earthquake of Catastrophic failure Catastrophic failure Frequency of Aircraft crashed into Modified Mercalli due to loss of LPG compound (per Probability of failure due to excess operator overfill Over-pressurization Catastrophic failure Probability of failure Intensity (MMI) VIII due to earthquake structural support incident due to aircraft crash corrosion results of vessel year) (per year) 0.00E+00 3.60E-07 8.00E-01 1.50E-11 1.00E-02 2.87E-10 1.00E-02 1.00E-05 1.00E-02 AND AND AND AND 17 19 20 18 23 24 25 Probability operator Probability of Failure of structural Catastrophic failure Corrosion overfills storage Number of filling Failure of filling Failure of relief valve Operator fails to catastrophic failure Modification Factor rectify problem in earthquake support of vessel Spontaneous Failure vessel operations per year operations per year on storage tank 0.00E+00 0.00E+00 1.80E-07 2.00E-02 40 1.00E-04 1.00E-04 1.50E-03 5.00E-01

Figure 1.1b Cold Catastrophic Failure of Storage Vessel 2 Tree F1.2 Cold catastrophic failure of LPG vessel 4.10E-07 External Event Spontaneous failure Loading failure Failure 3.60E-07 1.20E-13 5.00E-08 OR Overfill/ over-Storage vessel pressurization failure due to earthquake (per results in Aircraft Crash (per catastrophic failure year) year) 1.20E-13 2.87E-12 5.00E-08 AND AND AND 13 10 12 Earthquake of Catastrophic failure Catastrophic failure Frequency of Aircraft crashed into Modified Mercalli due to loss of LPG compound (per Probability of failure due to excess operator overfill Over-pressurization Catastrophic failure Probability of failure Intensity (MMI) VIII due to earthquake structural support incident due to aircraft crash corrosion results of vessel year) (per year) 0.00E+00 3.60E-07 8.00E-01 1.50E-11 1.00E-02 2.87E-10 1.00E-02 1.00E-05 1.00E-02 AND AND AND AND 17 19 20 18 23 24 25 Probability operator Probability of Failure of structural Catastrophic failure Corrosion overfills storage Number of filling Failure of filling Failure of relief valve Operator fails to catastrophic failure Modification Factor rectify problem in earthquake support of vessel Spontaneous Failure vessel operations per year operations per year on storage tank 0.00E+00 0.00E+00 1.80E-07 2.00E-02 40 1.00E-04 1.00E-04 1.50E-03 5.00E-01

Figure 1.2a Cold Partial Failure of Storage Vessel 1 Tree F2.1 Cold Partial failure of LPG vessel 1.01E-05 External Event Spontaneous failure Loading failure Failure 1.00E-05 1.20E-12 5.00E-08 OR Overfill/ over-Storage vessel pressurization failure due to results in partial Aircraft Crash (per earthquake (per failure year) year) 5.00E-08 1.20E-12 2.58E-11 OR AND AND AND 12 10 11 13 Earthquake of Partial failure due to Frequency of Aircraft crashed into Modified Mercalli loss of structural Partial failure due to operator overfill Over-pressurization Partial failure of LPG compound (per Probability of failure Intensity (MMI) VIII Probability of failure excess corrosion incident results due to aircraft crash (per year) due to earthquake support vessel year) 0.00E+00 8.00E-01 1.00E-01 2.87E-10 9.00E-02 1.00E-05 1.00E-02 1.00E-05 1.50E-11 AND AND AND AND 19 20 23 Probability operator overfills storage Partial failure of Failure of filling Failure of structural Corrosion Number of filling Failure of relief valve Operator fails to Probability of partial vessel Modification Factor operations per year operations per year rectify problem failure in earthquake support vessel Spontaneous Failure on storage tank 0.00E+00 5.00E-01 0.00E+00 5.00E-06 2.00E-02 40 1.00E-04 1.00E-04 1.50E-03

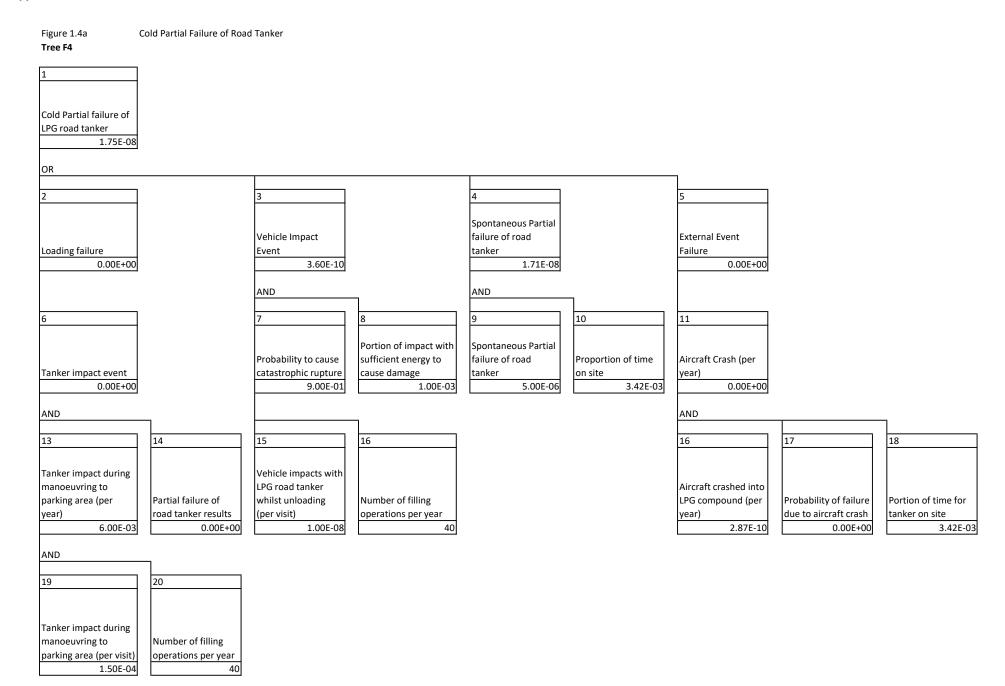


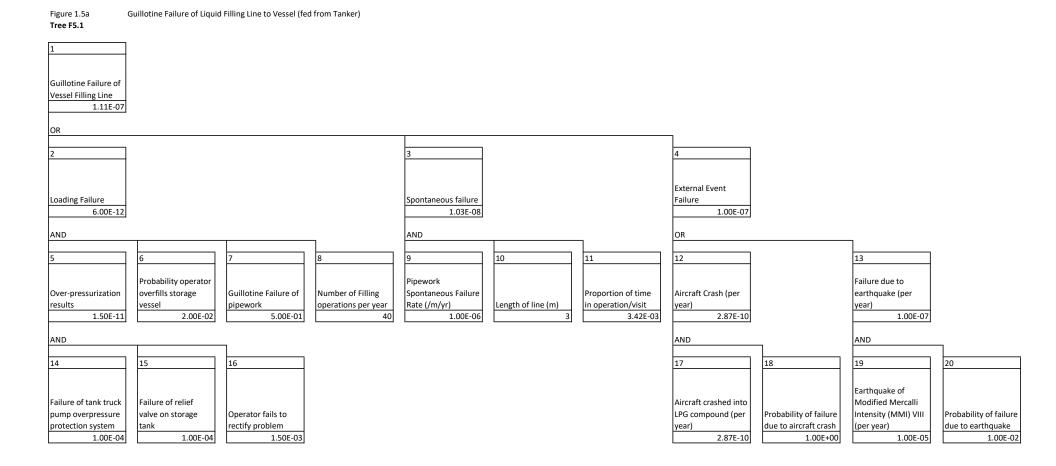
parking area (per visit)

1.50E-04

operations per year

Figure 1.3a Cold Catastrophic Failure of Road Tanker Tree F3 Cold catastrophic failure of LPG road tanker 6.89E-09 OR Spontaneous catastrophic failure of road tanker (time Vehicle Impact **External Event** Loading failure Event on site) Failure 0.00E+00 4.00E-11 6.85E-09 9.83E-13 AND AND 6 10 11 Spontaneous catastrophic failure Portion of impact with Probability to cause sufficient energy to of road tanker (per Proportion of time Aircraft Crash (per catastrophic rupture cause damage Tanker impact event year) on site year) 0.00E+00 1.00E-01 1.00E-03 2.00E-06 3.42E-03 9.83E-13 AND AND 12 13 18 14 15 16 17 Tanker impact during Vehicle impacts with LPG road manoeuvring to Catastrophic failure Aircraft crashed into of road tanker Number of filling LPG compound (per Probability of failure parking area (per tanker whilst Portion of time for unloading (per visit) operations per year year) results year) due to aircraft crash tanker on site 6.00E-03 0.00E+00 1.00E-08 2.87E-10 1.00E+00 3.42E-03 AND 19 20 Tanker impact during manoeuvring to Number of filling





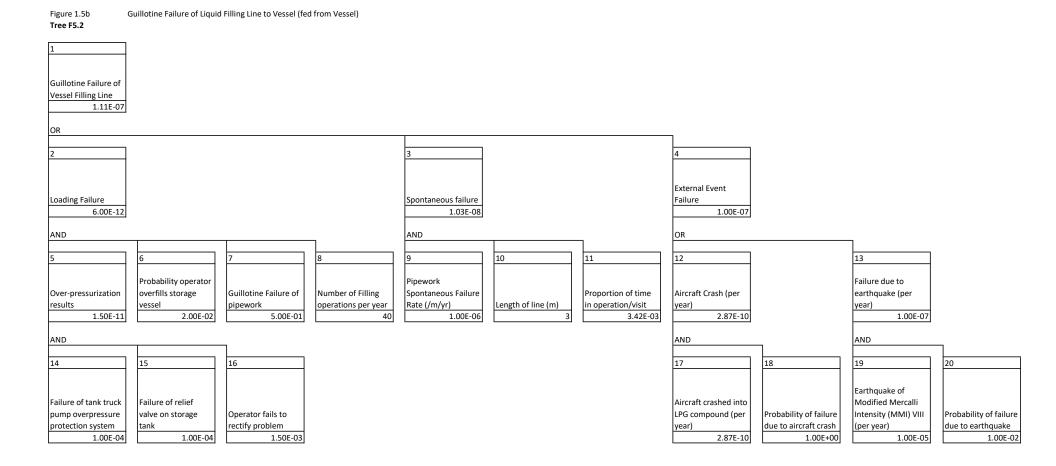
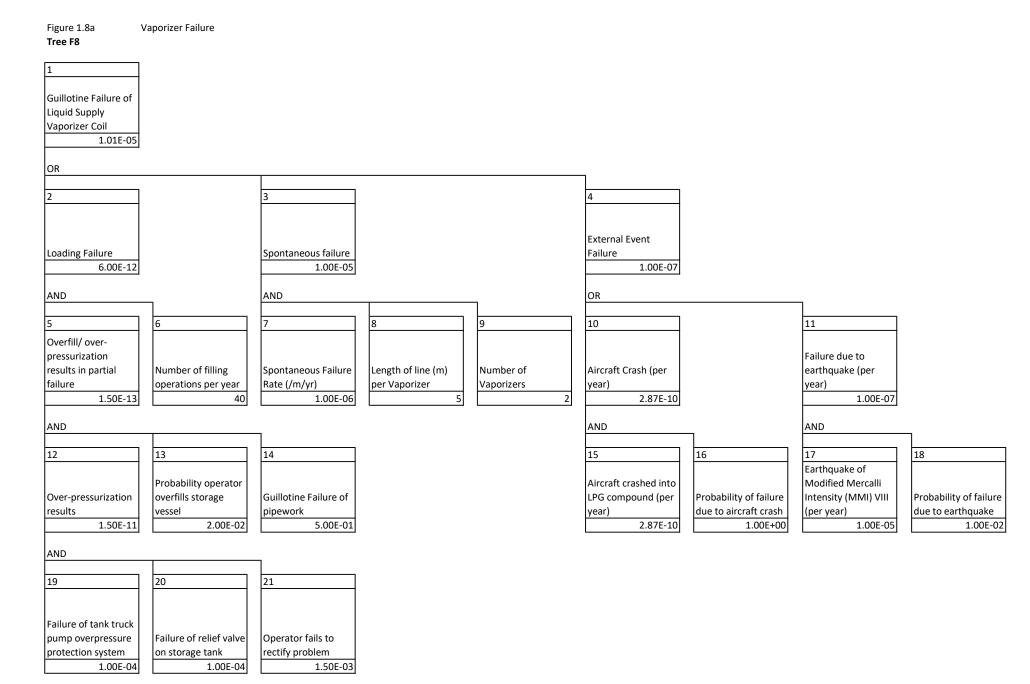


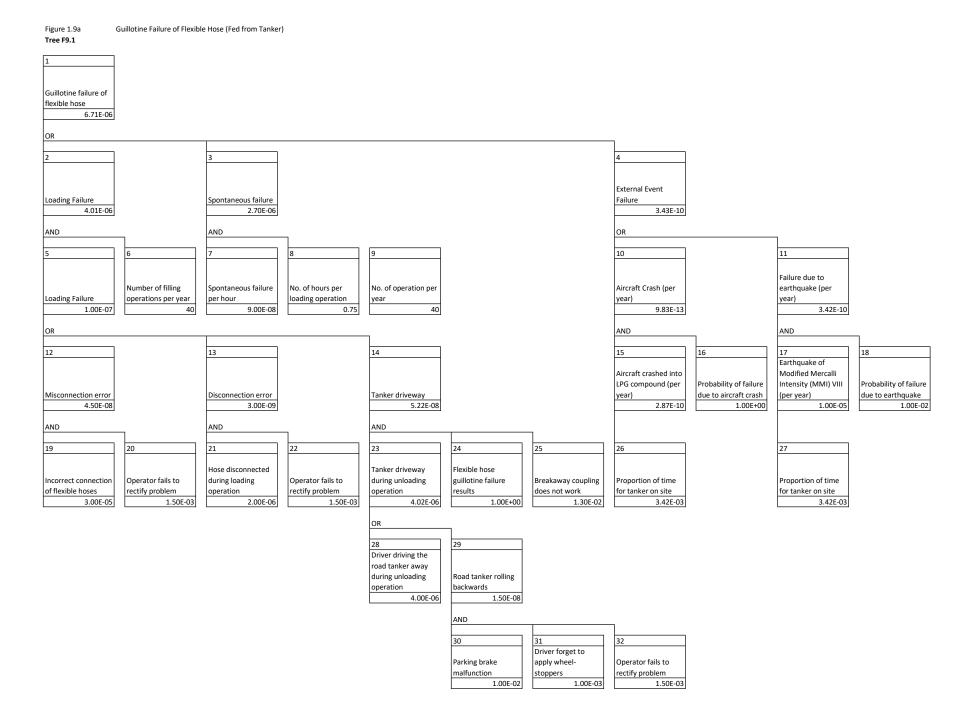
Figure 1.6a

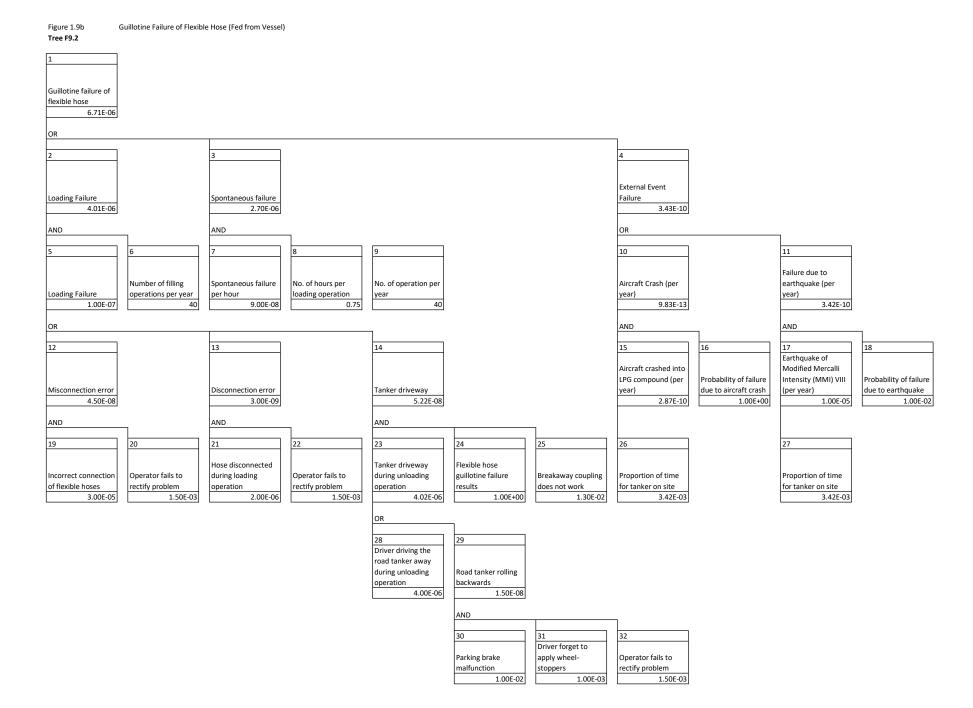
Guillotine Failure of Liquid Supply Line to Vaporizer

Tree F6 Guillotine Failure of Liquid Supply Line to Vaporizer 1.81E-05 OR External Event Loading Failure Spontaneous failure Failure 1.80E-05 6.00E-12 1.00E-07 AND AND OR 10 Overfill/ overpressurization Failure due to results in partial Number of filling Spontaneous Failure Aircraft Crash (per earthquake (per failure operations per year Length of line (m) Rate (/m/yr) year) year) 1.50E-13 1.00E-06 18 2.87E-10 1.00E-07 AND AND AND 11 14 15 16 17 12 13 Earthquake of Probability operator Aircraft crashed into Modified Mercalli Over-pressurization overfills storage Guillotine Failure of LPG compound (per Probability of failure Intensity (MMI) VIII Probability of failure due to aircraft crash due to earthquake results vessel pipework year) (per year) 1.50E-11 2.00E-02 5.00E-01 2.87E-10 1.00E+00 1.00E-05 1.00E-02 AND 18 19 20 Failure of tank truck pump overpressure Failure of relief valve Operator fails to protection system on storage tank rectify problem 1.00E-04 1.00E-04 1.50E-03

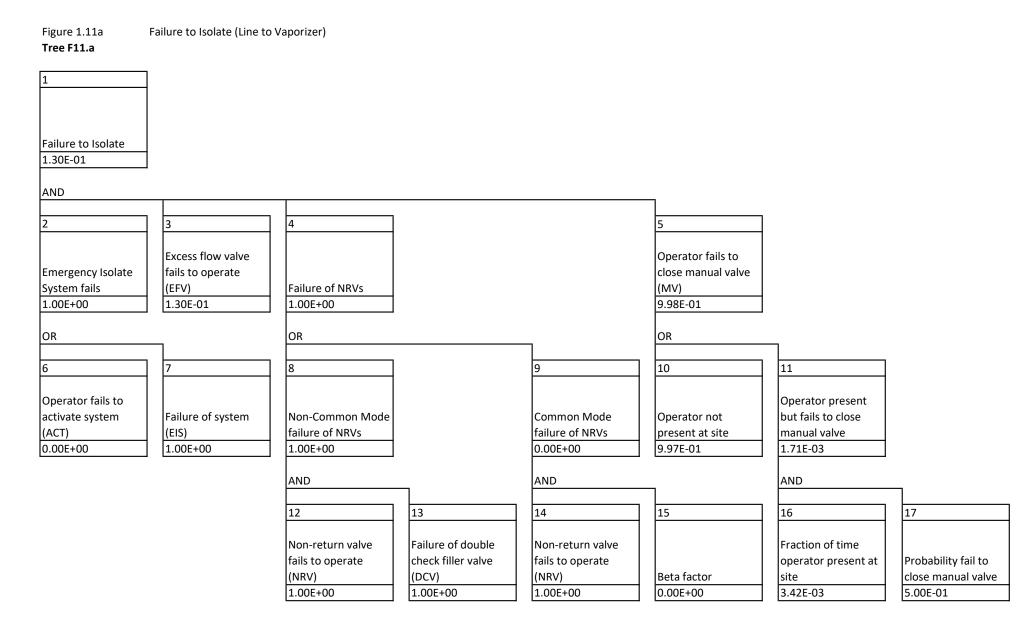
Figure 1.7a Guillotine Failure of Liquid Filling Line to Flexible Hose Tree F7 Guillotine Failure of Liquid Filling Line to Flexible Hose 1.60E-08 AND Guillotine Failure of Liquid Filling Line to Number of Flexible Hose operations per year 4.00E-10 40 OR External Event Loading Failure Spontaneous failure Failure 1.71E-10 2.20E-10 8.59E-12 AND OR 10 11 Failure of Driver error leads to Guillotine failure of Failure due to overpressurization of pipework due to Aircraft Crash (per earthquake (per overpressure protection line overpressure year) year) 2.20E-08 2.00E-02 5.00E-01 2.46E-14 8.56E-12 AND AND AND AND 13 19 12 14 16 18 20 17 Earthquake of Failure of tank truck Proportion of time Aircraft crashed into Modified Mercalli overpressure Driver Fails to Rectify Spontaneous Failure for tanker on site LPG compound (per Probability of failure Intensity (MMI) VIII Probability of failure Problem Rate (/m/yr) Length of line (m) per visit due to aircraft crash due to earthquake protection system year) (per year) 1.00E-04 2.20E-04 1.00E-06 8.56E-05 2.87E-10 1.00E+00 1.00E-05 1.00E-02 22 Proportion of time Proportion of time for tanker on site for tanker on site per visit per visit 8.56E-05 8.56E-05

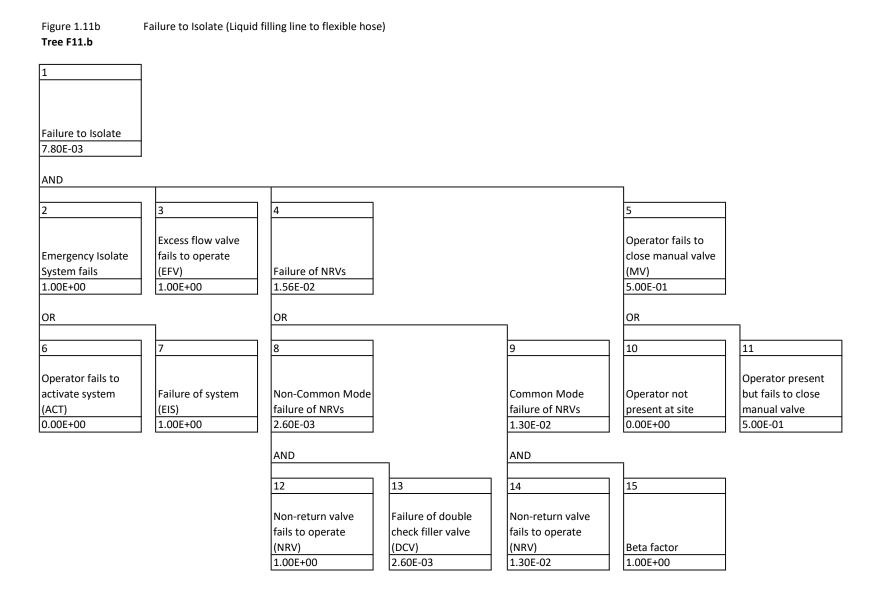


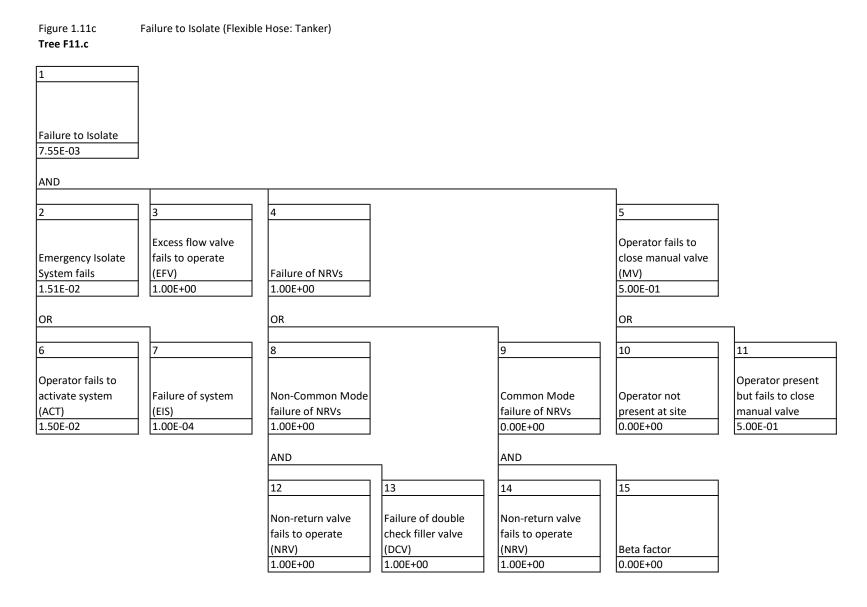


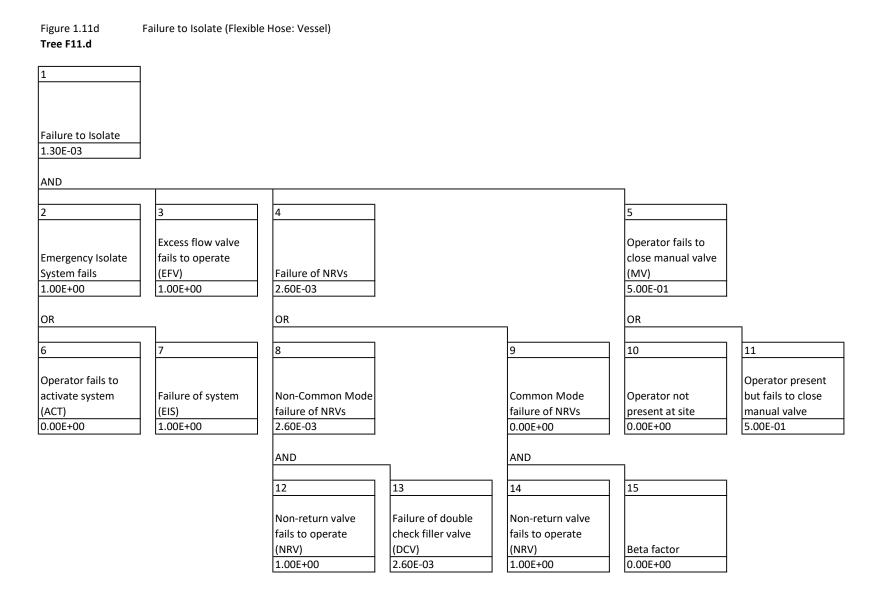


## Appendix 11.4

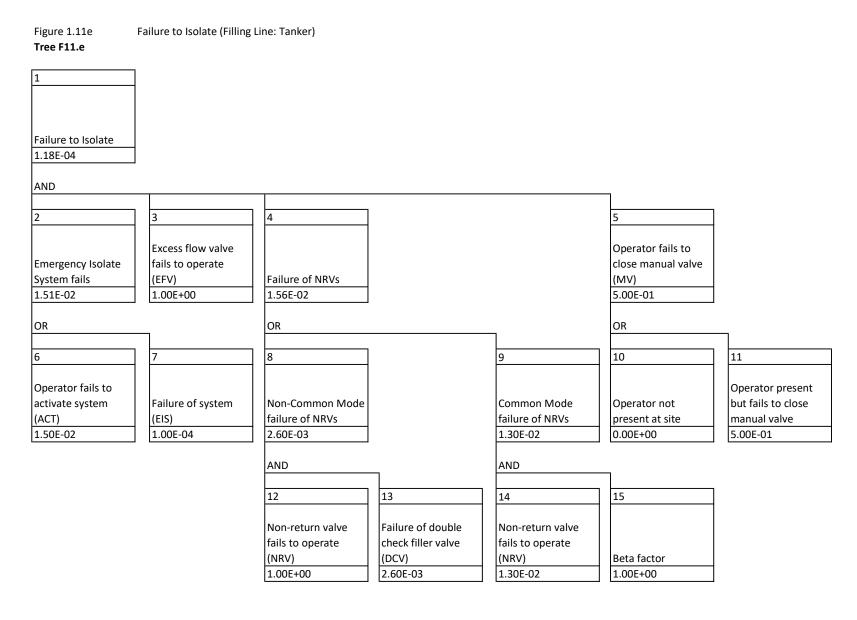








## Appendix 11.4



## Appendix 11.4

