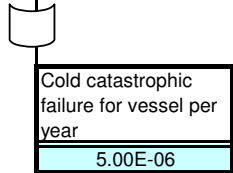
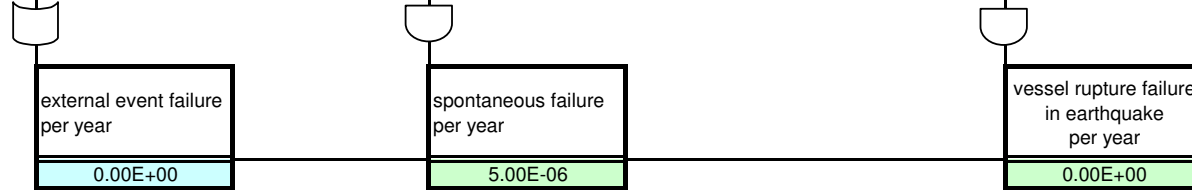
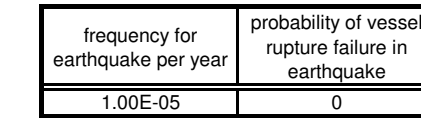
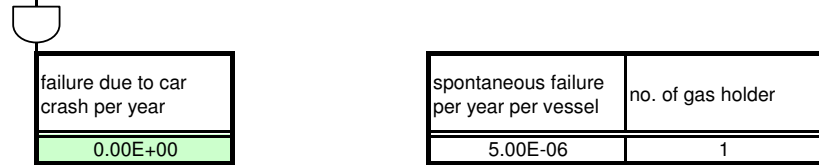
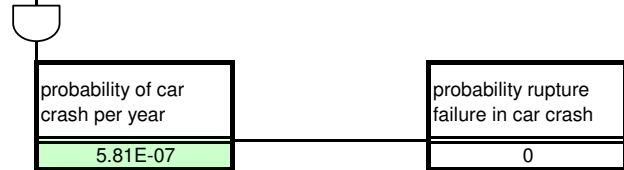


## **Aberdeen Gas Depot**

length of access road (km)	no. vehicle movements per day	no. of days per year
0.1	10	365

severe car accident per km.year	total distance travelled per year	probability running into gas facility	probability damage to gas holder
6.37E-09	365	0.5	0.5



AND gate

OR gate

**Cold Catastrophic Failure for Vessel (all phases)**

length of access road (km)	no. vehicle movements per day	no. of days per year
0.1	10	365

severe car accident per km.year	total distance travelled per year	probability running into gas facility	probability damage to gas holder
6.37E-09	365	0.5	0.5



probability of car crash per year
5.81E-07

probability leak failure in car crash
1



failure due to car crash per year
5.81E-07

partial failure per year per vessel	no. of gas holder
4.00E-05	1

frequency for earthquake per year	probability of failure in earthquake
1.00E-05	0.01



external event failure per year
5.81E-07

partial failure per year
4.00E-05



failure in earthquake per year
1.00E-07



Leak failure of vessel per year
4.07E-05

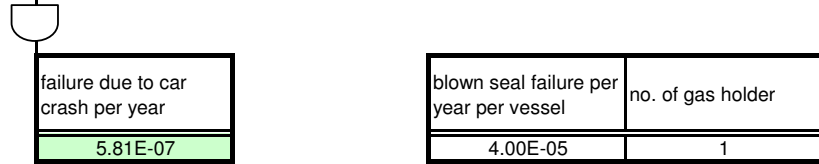
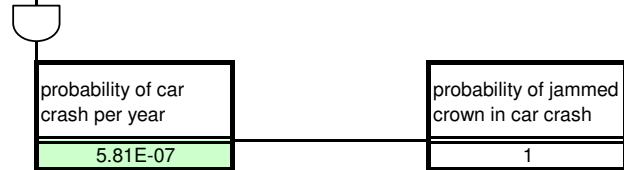
AND gate

OR gate

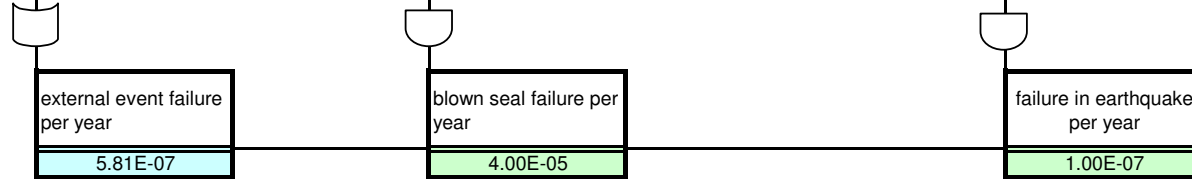
**Partial Failure for Vessel (all phases)**

length of access road (km)	no. vehicle movements per day	no. of days per year
0.1	10	365

severe car accident per km.year	total distance travelled per year	probability running into gas facility	probability damage to gas holder
6.37E-09	365	0.5	0.5



frequency for earthquake per year	probability of failure in earthquake
1.00E-05	0.01



Leak failure of vessel per year
4.07E-05

AND gate

OR gate

**Blown Seal Failure (all phases)**

length of access road (km)	no. vehicle movements per day	no. of days per year
0.1	10	365

severe car accident per km.year	total distance travelled per year	probability running into gas facility	probability damage to gas pipeline
6.37E-09	365	0.5	0.5

damage due to subsidence, per m per year	Length of pipeline (m)	fraction of time carrying out drill & blast works
2.91E-08	40	0.00

probability of car crash per year
5.81E-07

probability rupture failure in car crash
0.1

probability of subsidence per year (existing/operation phase)
0.00E+00

probability of rupture failure
1

failure due to car crash per year
5.81E-08

failure due to subsidence per year
0.00E+00

spontaneous failure per m per year	Length of pipeline (m)
1.00E-07	40

frequency for earthquake per year	probability of failure in earthquake
1.00E-05	0.01

external event failure per year
5.81E-08

spontaneous failure per year
4.00E-06

failure in earthquake per year
1.00E-07

Rupture failure of pipeline per year
4.16E-06

AND gate

OR gate

**Rupture Failure for Pipeline (existing and operation phase)**

length of access road (km)	no. vehicle movements per day	no. of days per year
0.1	10	365

severe car accident per km.year	total distance travelled per year	probability running into gas facility	probability damage to gas pipeline
6.37E-09	365	0.5	0.5

damage due to subsidence, per m per year	Length of pipeline (m)	fraction of time carrying out drill & blast works
2.91E-08	40	0.00

probability of car crash per year	probability leak failure in car crash
5.81E-07	0.9

probability of subsidence per year (existing/operation phase)	probability of leak failure
0.00E+00	0

failure due to car crash per year
5.23E-07

failure due to subsidence per year
0.00E+00

leak failure per m per year	Length of pipeline (m)
5.00E-07	40

frequency for earthquake per year	probability of failure in earthquake
1.00E-05	0.01

external event failure per year
5.23E-07

leak failure per year
2.00E-05

failure in earthquake per year
1.00E-07

Leak failure of pipeline per year
2.06E-05

AND gate

OR gate

**Leak Failure for Pipeline (existing and operation phase)**

length of access road (km)	no. vehicle movements per day	no. of days per year
0.1	10	365

severe car accident per km.year	total distance travelled per year	probability running into gas facility	probability damage to gas pipeline
6.37E-09	365	0.5	0.5

damage due to subsidence, per m per year	Length of pipeline (m)	fraction of time carrying out drill & blast works
2.91E-08	40	0.33

probability of car crash per year
5.81E-07

probability rupture failure in car crash
0.1

probability of subsidence per year (construction phase)
3.88E-07

probability of rupture failure
1

failure due to car crash per year
5.81E-08

failure due to subsidence per year
3.88E-07

spontaneous failure per m per year	Length of pipeline (m)
1.00E-07	40

frequency for earthquake per year	probability of failure in earthquake
1.00E-05	0.01

external event failure per year
4.46E-07

spontaneous failure per year
4.00E-06

failure in earthquake per year
1.00E-07

Rupture failure of pipeline per year
4.55E-06

AND gate

OR gate

### Rupture Failure for Pipeline (construction phase)

length of access road (km)	no. vehicle movements per day	no. of days per year
0.1	10	365

severe car accident per km.year	total distance travelled per year	probability running into gas facility	probability damage to gas pipeline
6.37E-09	365	0.5	0.5

damage due to subsidence, per m per year	Length of pipeline (m)	fraction of time carrying out drill & blast works
2.91E-08	40	0.33

probability of car crash per year
5.81E-07

probability leak failure in car crash
0.9

probability of subsidence per year (construction phase)
3.88E-07

probability of leak failure
0

failure due to car crash per year
5.23E-07

failure due to subsidence per year
0.00E+00

leak failure per m per year	Length of pipeline (m)
5.00E-07	40

frequency for earthquake per year	probability of failure in earthquake
1.00E-05	0.01

external event failure per year
5.23E-07

leak failure per year
2.00E-05

failure in earthquake per year
1.00E-07

Leak failure of pipeline per year
2.06E-05

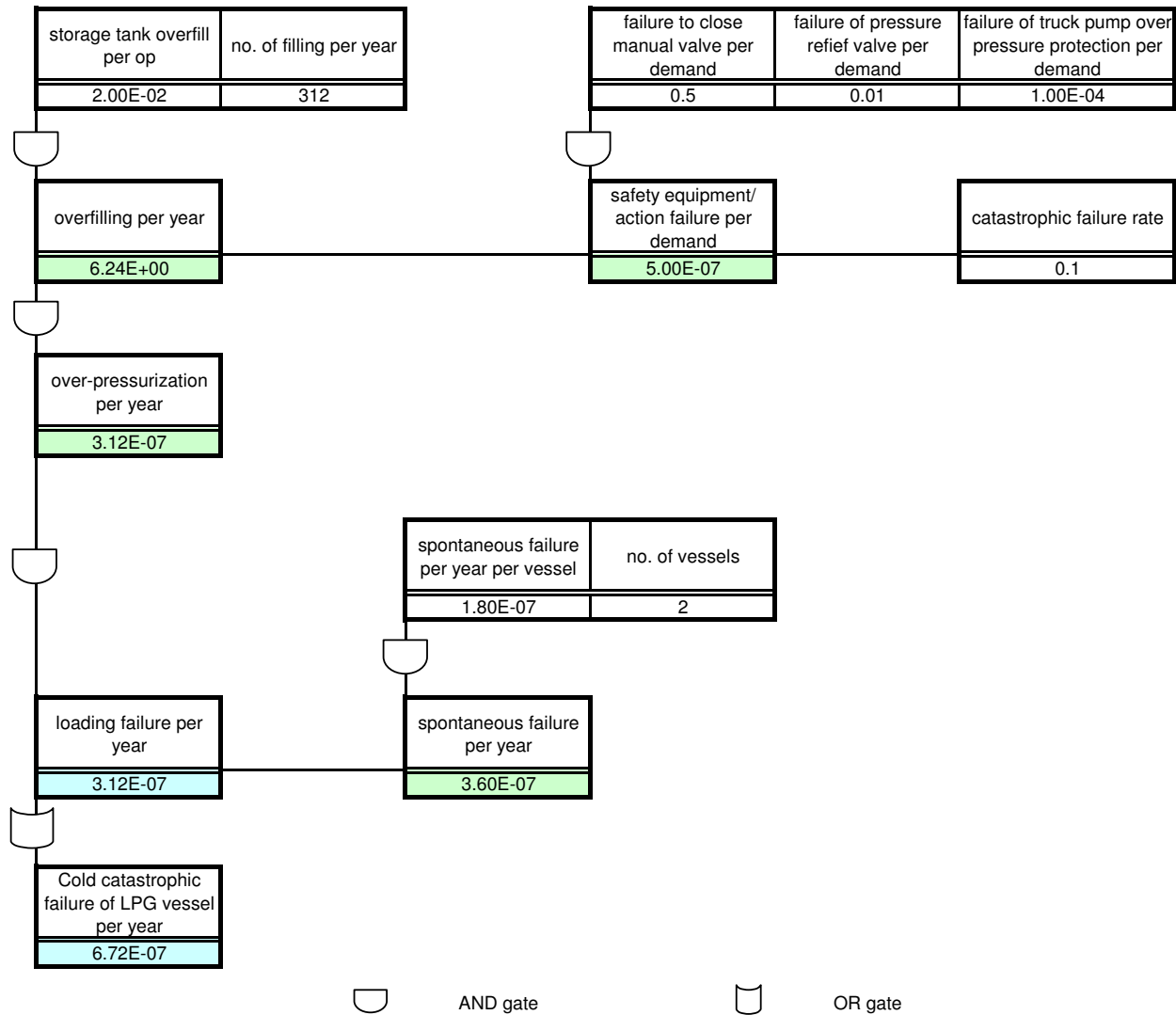
AND gate

OR gate

### Leak Failure for Pipeline (construction phase)



**Ap Lei Chau Shell Depot**



**Cold Catastrophic Failure for Vessel (Shell Depot)**

Probability of catastrophic failure	vehicle impact into road tanker during unloading per op	no. of filling per year	ignored by security guard	driver fails to be stopped by the speed bump
0.5	1.00E-08	3.12E+02	1.00E-01	5.00E-01



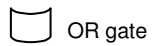
loading failure per year	spontaneous failure per year	external event failure per year	catastrophic failure by vehicle impact per year
0.00E+00	2.00E-06	0.00E+00	7.80E-08



catastrophic failure per year	fraction of time for off-loading operation
2.08E-06	7.12E-02



cold catastrophic failure of LPG road tanker for unloading per year
1.48E-07

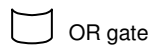
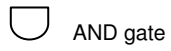


**Cold Catastrophic Failure for Road Tanker (Shell Depot)**

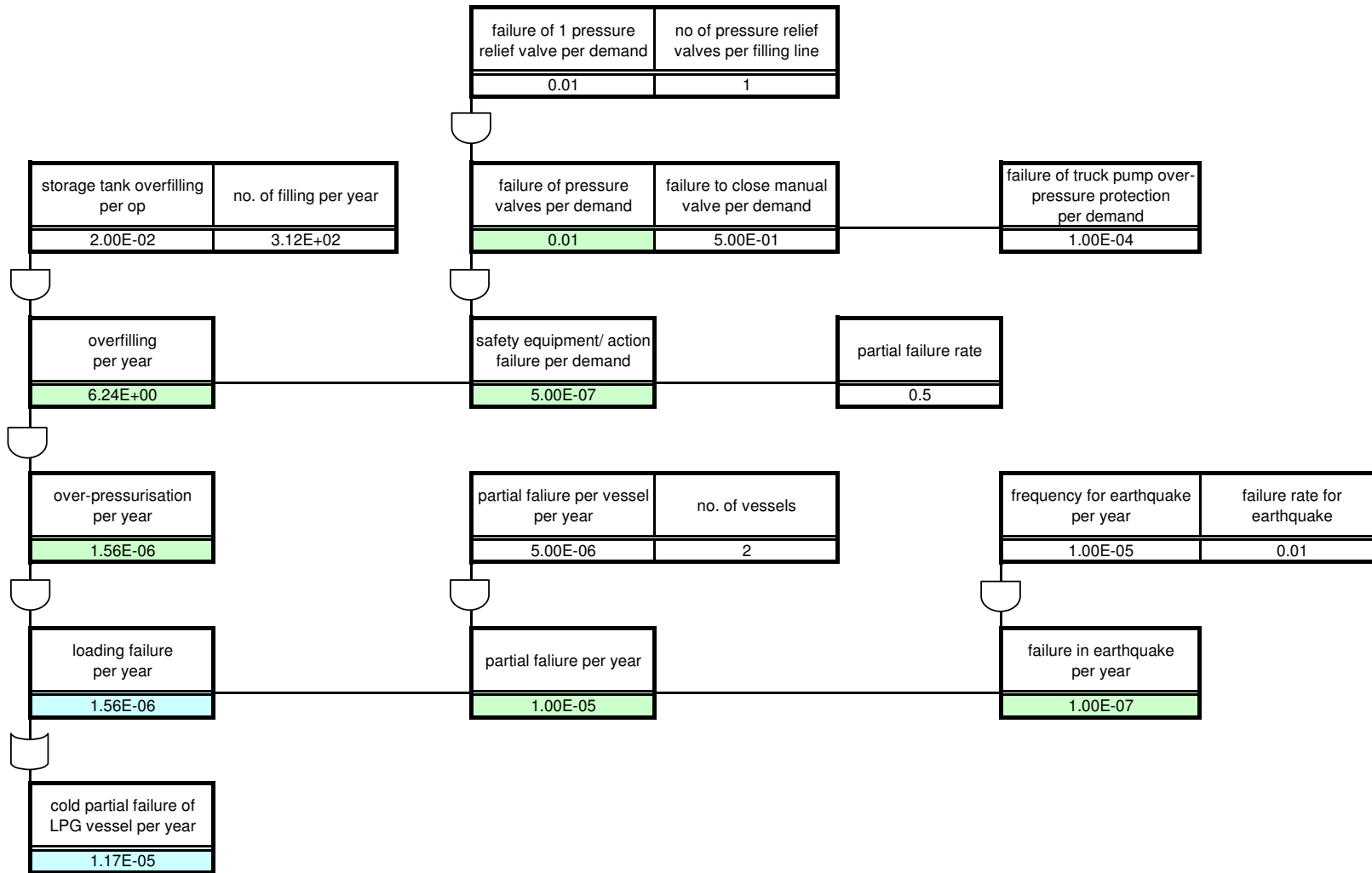
no. of cylinders	spontaneous failure for a LPG cylinder per year
2.00E+03	1.00E-06



catastrophic failure per year
2.00E-03



**Cold Catastrophic Failure for Cylinder (Shell Depot)**

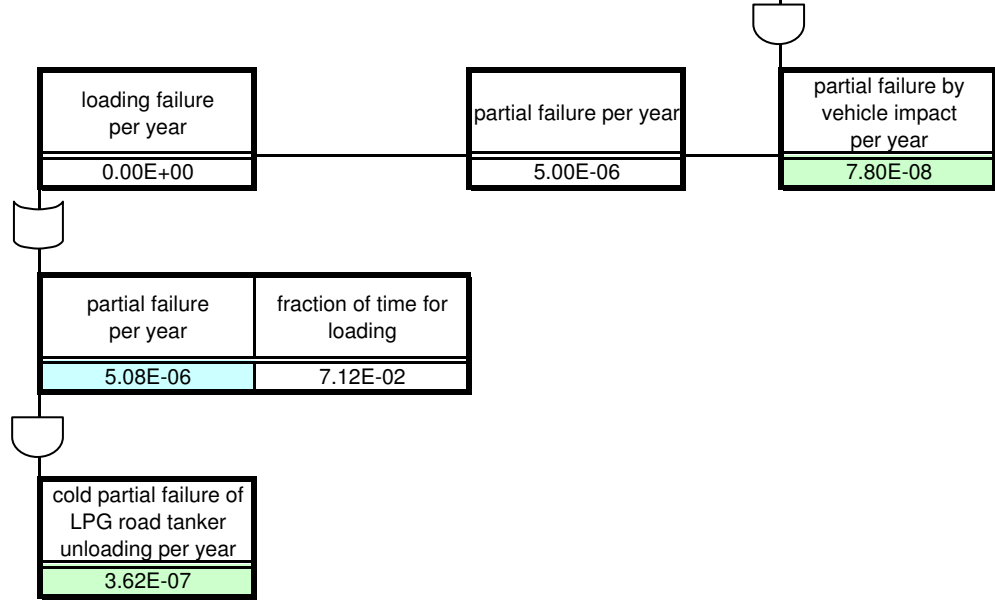


AND gate

OR gate

**Partial Failure for Vessel (Shell Depot)**

vehicle impact into road tanker during unloading per op	no. of filling per year	ignored by security guard	driver fails to be stopped by the speed bump	Probability of partial failure
1.00E-08	3.12E+02	1.00E-01	5.00E-01	5.00E-01



AND gate

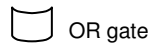
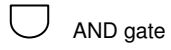
OR gate

**Partial Failure for Road Tanker (Shell Depot)**

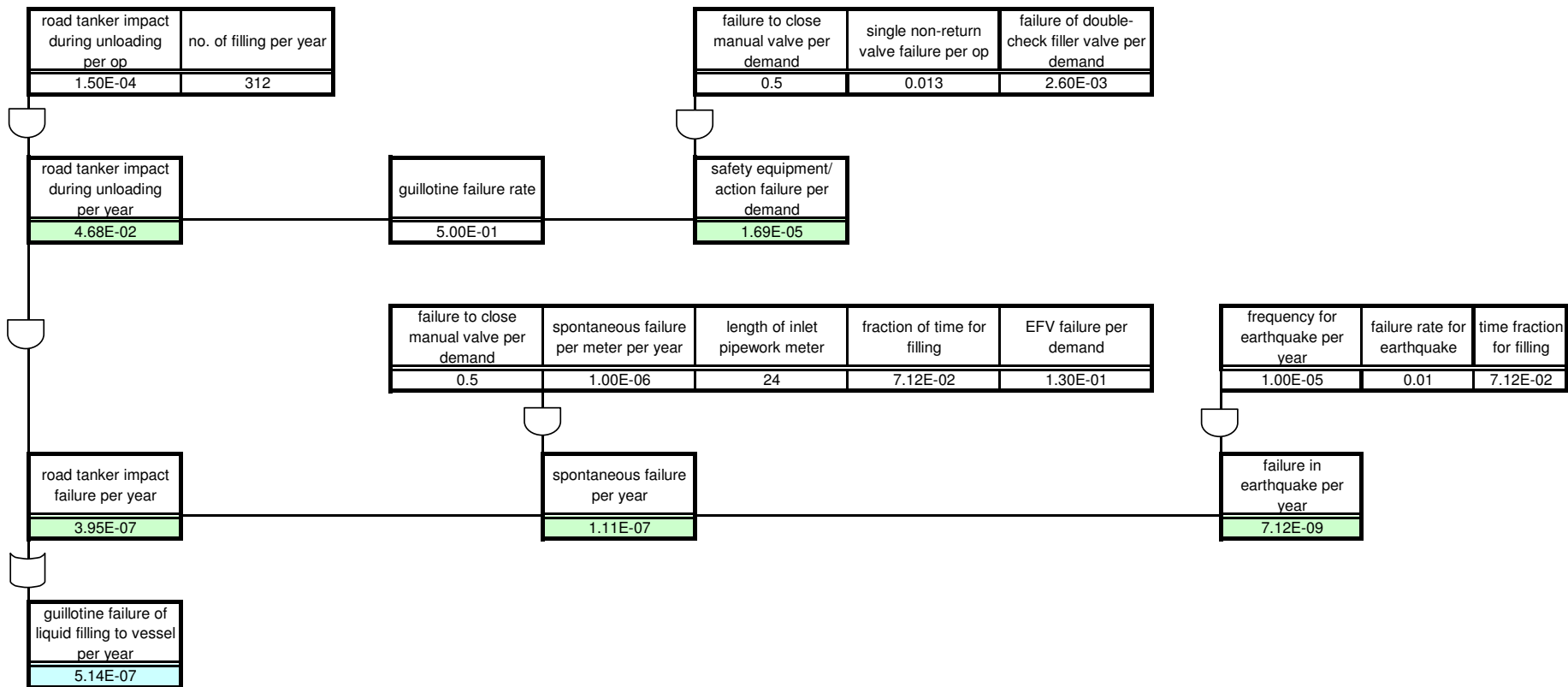
no. of cylinders	leak failure for a LPG cylinder per year
2.00E+03	2.60E-06



catastrophic failure per year
5.20E-03



**Leak Failure for Cylinder (Shell Depot)**

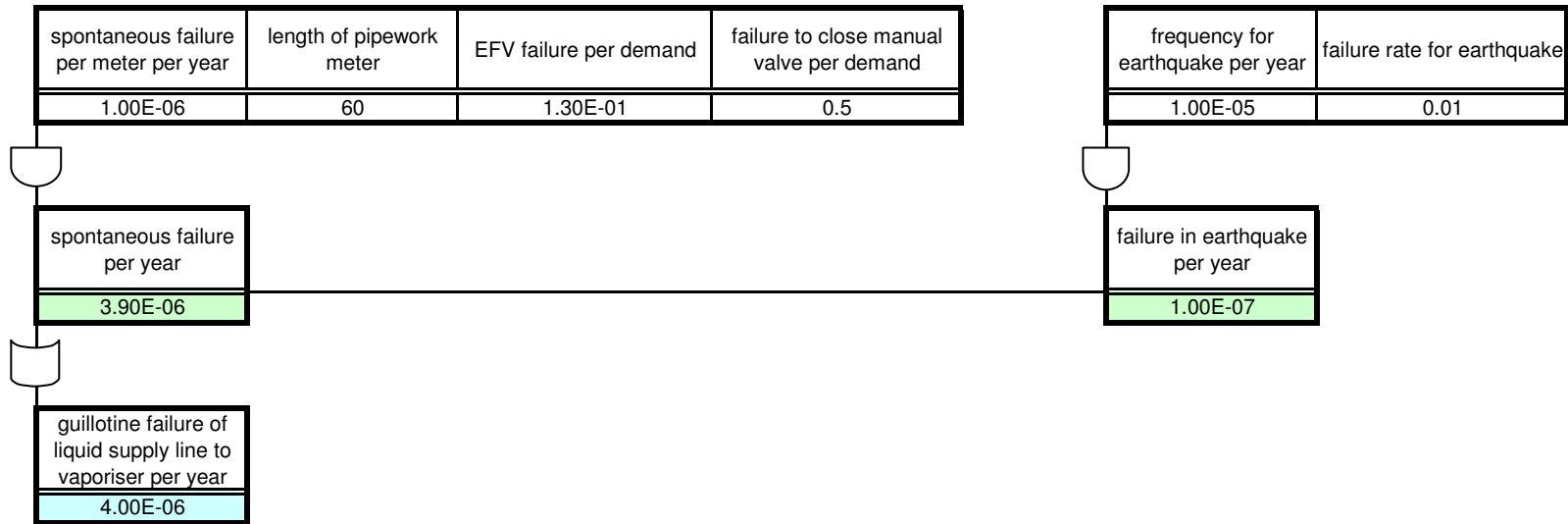


AND gate

OR gate

**Guillotine Failure for Inlet Pipeline (Shell Depot)**

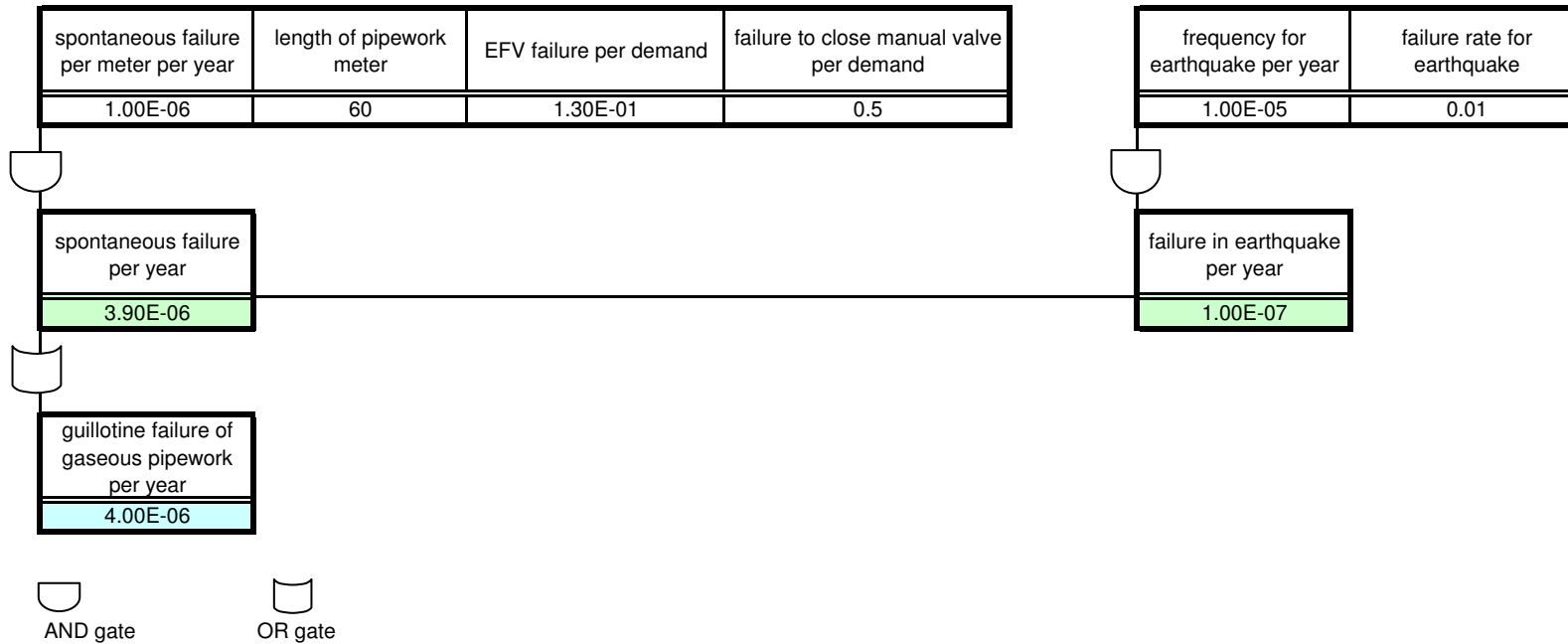




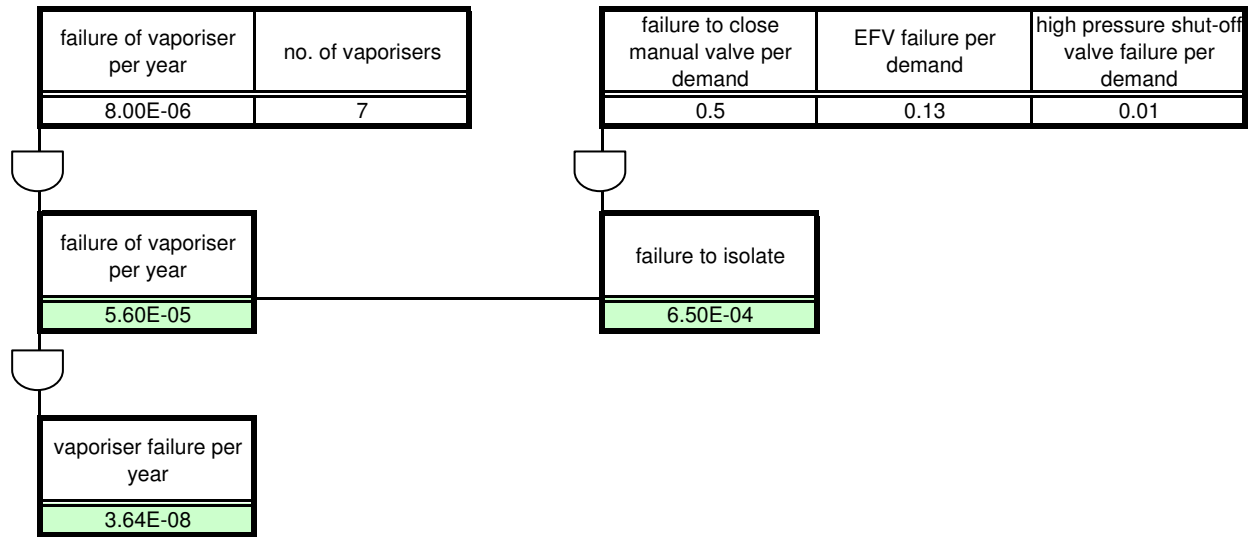
AND gate

OR gate

### Guillotine Failure for Liquid Supply Pipeline (Shell Depot)



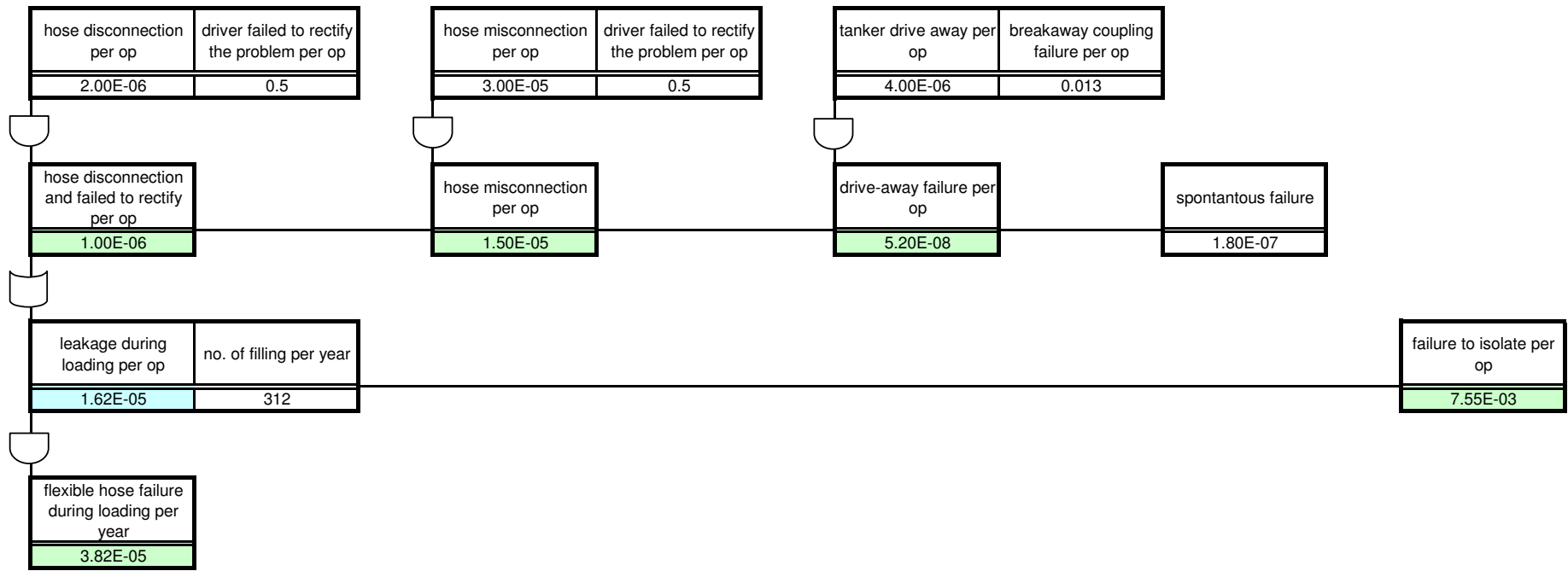
**Guillotine Failure for Gas Outlet Pipeline (Shell Depot)**



AND gate

OR gate

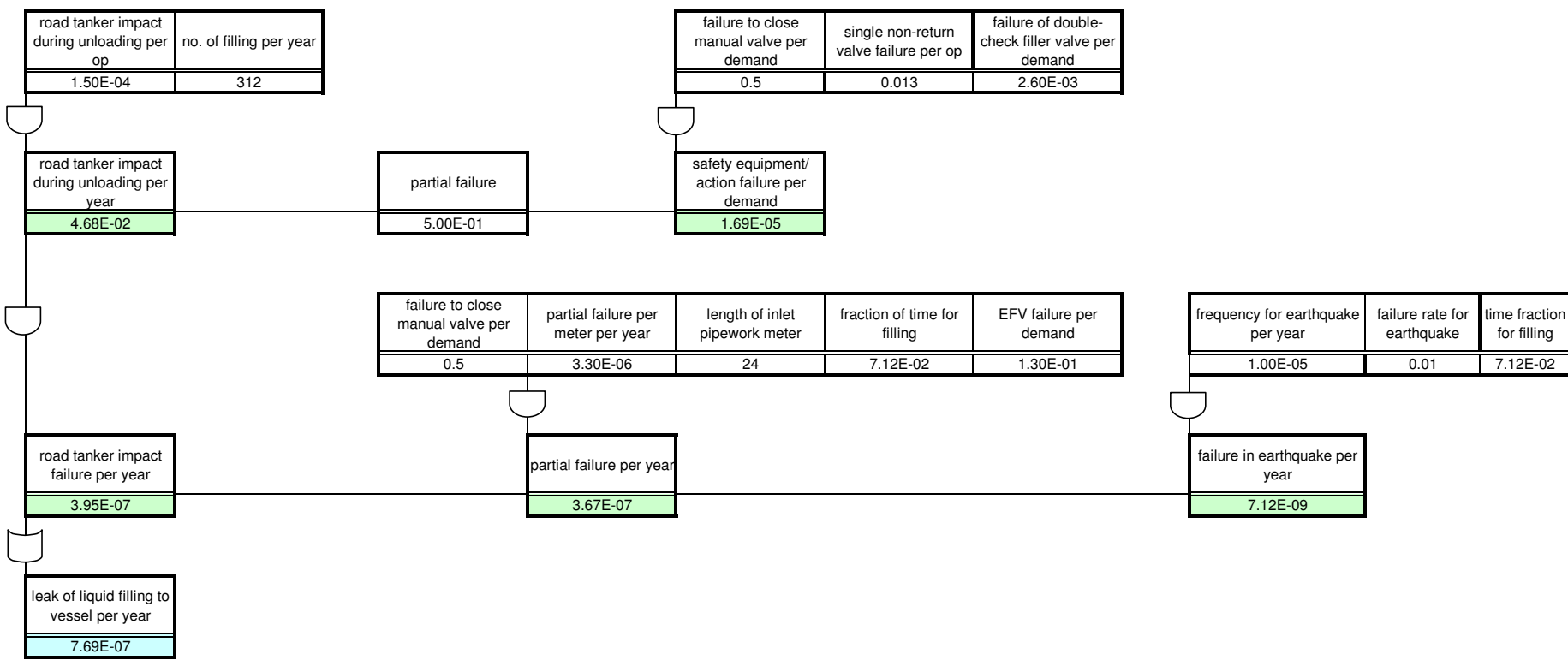
**Failure for Vaporiser (Shell Depot)**



AND gate

OR gate

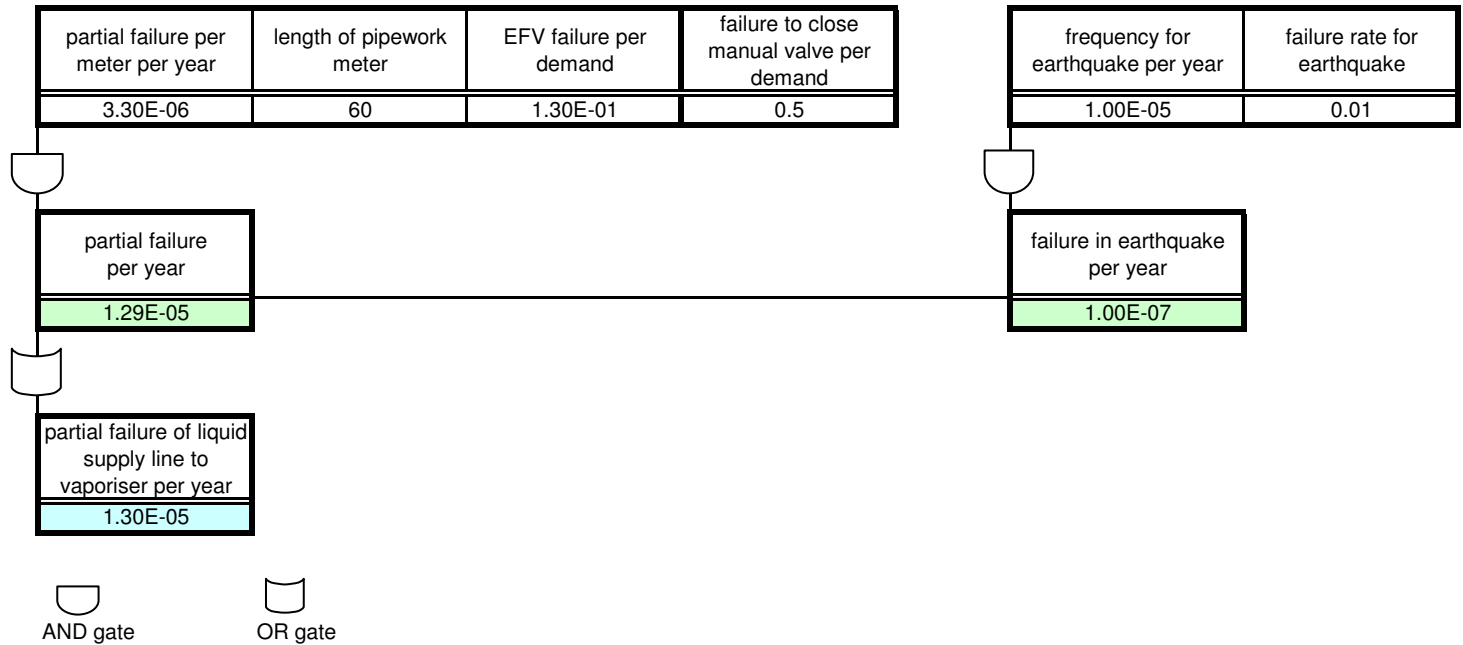
**Guillotine Failure for Flexible Hose (Shell Depot)**



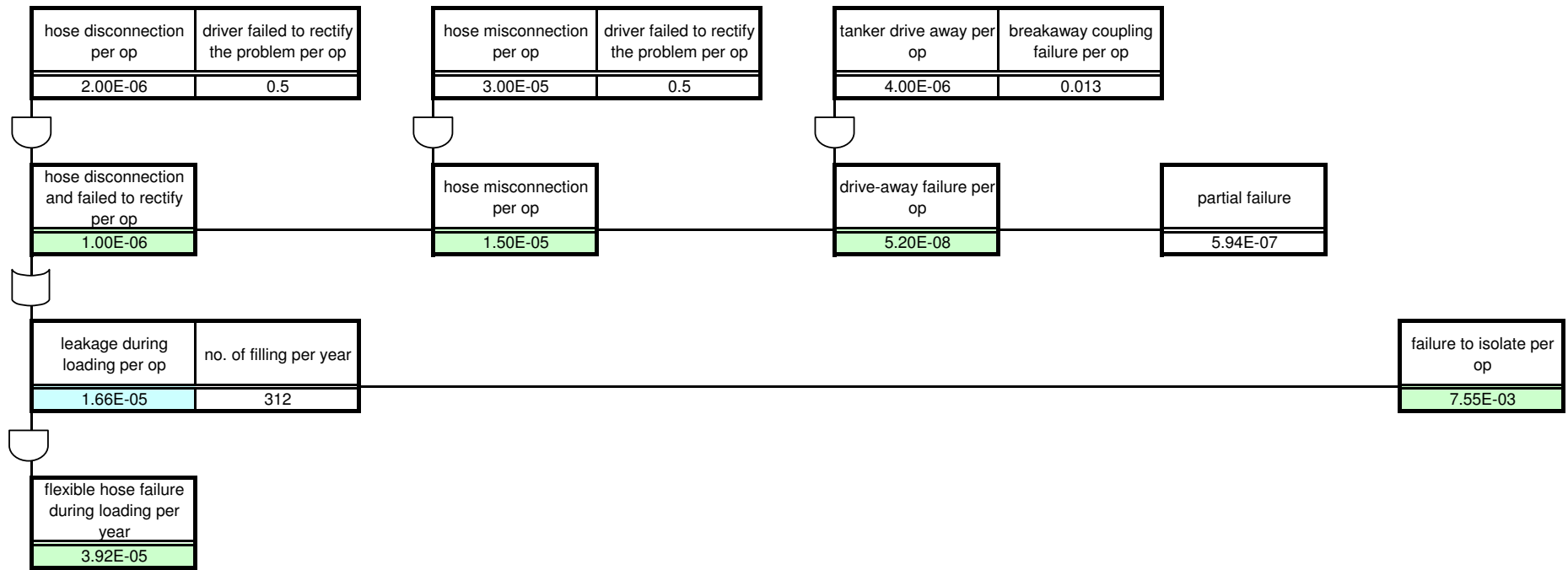
AND gate

OR gate

**Partial Failure for Inlet Pipeline (Shell Depot)**

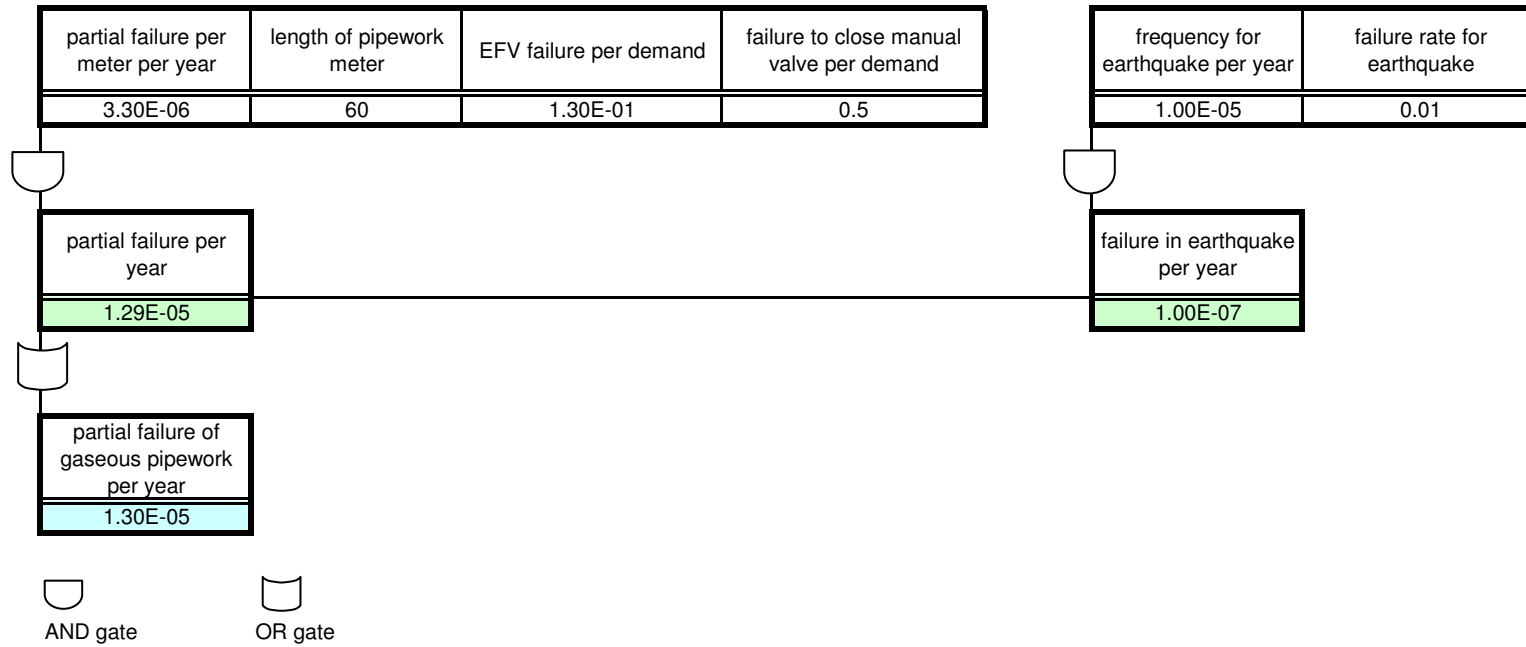


**Partial Failure for Liquid Supply Pipeline (Shell Depot)**



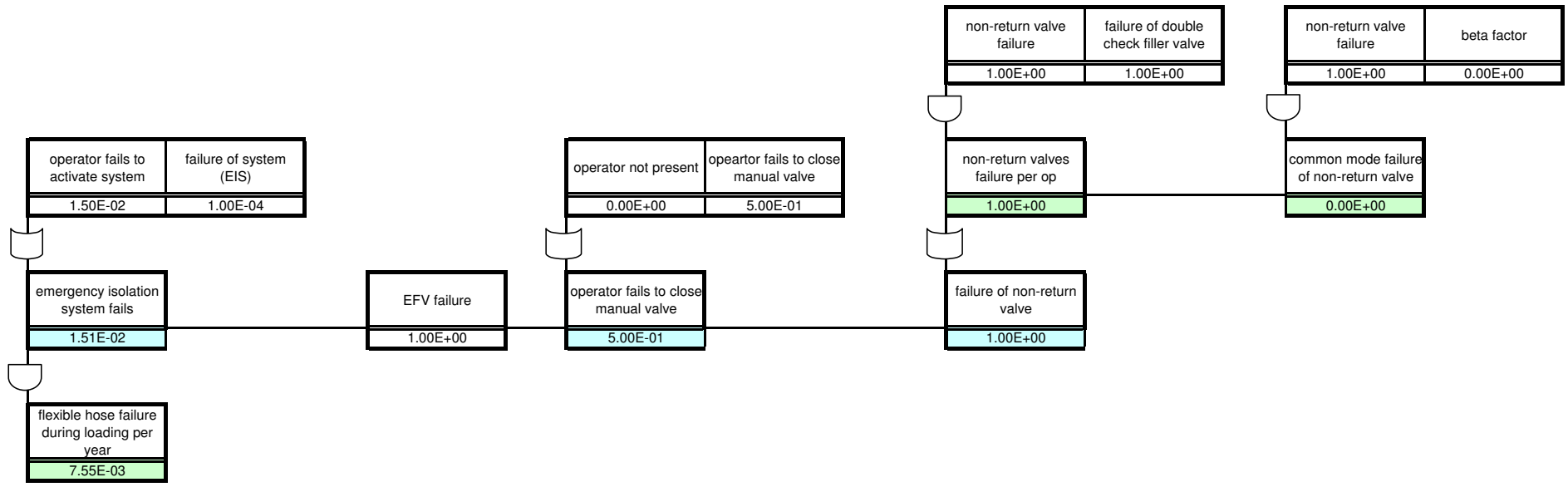
 AND gate   
  OR gate


**Partial Failure for Flexible Hose (Shell Depot)**



**Partial Failure for Gas Outlet Pipeline (Shell Depot)**





 AND gate
  OR gate

**Failure to Isolate (flexible hose)**