

DYNAMIC RESULTS FOR OPENLOOP

(Results from Matlab/Simulink implementation by Dr Ulf Jeppsson, IEA, Lund University, Sweden, May 21 2009 based on Matlab R2008b (ver 7.7.0))

SUMMARY OF PLANT PERFORMANCE

The plant was simulated in openloop for 500 days to achieve steady state using the CONSTANTINPUT file.

Then the DRYWEATHER file was used to simulate the dynamics during 14 days and set up the plant for the dynamic simulations.

The results of this simulation was used as initial values for the actual plant performance calculations using the different dynamic input files.

* DRYWEATHER FILE *

Overall plant performance during time 7 to 14 days

Effluent average concentrations based on load

Effluent average flow rate = 18061.3325 m3/d

Effluent average SI conc = 30 mg COD/l

Effluent average SS conc = 0.97352 mg COD/l

Effluent average XI conc = 4.5794 mg COD/l

Effluent average XS conc = 0.22285 mg COD/l

Effluent average XBH conc = 10.2208 mg COD/l

Effluent average XBA conc = 0.54217 mg COD/l

Effluent average XP conc = 1.7572 mg COD/l

Effluent average SO conc = 0.74639 mg (-COD)/l

Effluent average SNO conc = 8.8238 mg N/l

Effluent average SNH conc = 4.7589 mg N/l (limit = 4 mg N/l)

Effluent average SND conc = 0.72901 mg N/l

Effluent average XND conc = 0.015691 mg N/l

Effluent average SALK conc = 4.4562 mol HCO3/m3

Effluent average TSS conc = 12.9917 mg SS/l (limit = 30 mg SS/l)

Effluent average Kjeldahl N conc = 6.7448 mg N/l

Effluent average total N conc = 15.5686 mg N/l (limit = 18 mg COD/l)

Effluent average total COD conc = 48.2958 mg COD/l (limit = 100 mg COD/l)

Effluent average BOD5 conc = 2.7746 mg/l (limit = 10 mg/l)

Effluent average load

Effluent average SI load = 541.84 kg COD/day

Effluent average SS load = 17.583 kg COD/day

Effluent average XI load = 82.7093 kg COD/day

Effluent average XS load = 4.025 kg COD/day

Effluent average XBH load = 184.6007 kg COD/day

Effluent average XBA load = 9.7924 kg COD/day

Effluent average XP load = 31.7369 kg COD/day

Effluent average SO load = 13.4807 kg (-COD)/day

Effluent average SNO load = 159.3704 kg N/day

Effluent average SNH load = 85.9513 kg N/day

Effluent average SND load = 13.1668 kg N/day

Effluent average XND load = 0.28341 kg N/day

Effluent average SALK load = 80.4845 kmol HCO3/day

Effluent average TSS load = 234.6482 kg SS/day

Effluent average Kjeldahl N load = 121.8197 kg N/d

Effluent average total N load = 281.1902 kg N/d

Effluent average total COD load = 872.2873 kg COD/d
Effluent average BOD5 load = 50.1124 kg/d

Other effluent quality variables

Influent Quality (I.Q.) index = 42042.8149 kg poll.units/d (original BSM1 version)
Effluent Quality (E.Q.) index = 7065.6121 kg poll.units/d (original BSM1 version)
Influent Quality (I.Q.) index = 52081.3952 kg poll.units/d (updated BSM1 version)
Effluent Quality (E.Q.) index = 6690.1049 kg poll.units/d (updated BSM1 version)

Sludge production for disposal = 17049.83 kg SS
Average sludge production for disposal per day = 2435.69 kg SS/d
Sludge production released into effluent = 1642.5377 kg SS
Average sludge production released into effluent per day = 234.6482 kg SS/d
Total sludge production = 18692.3677 kg SS
Total average sludge production per day = 2670.3382 kg SS/d

Total aeration energy = 45332.784 kWh (original BSM1 version)
Average aeration energy per day = 6476.112 kWh/d (original BSM1 version)
Total aeration energy = 23389.7067 kWh (updated BSM1 version)
Average aeration energy per day = 3341.3867 kWh/d (updated BSM1 version)

Total pumping energy (for Q_{intr} , Q_r and Q_w) = 20767.32 kWh (original BSM1 version)
Average pumping energy per day (for Q_{intr} , Q_r and Q_w) = 2966.76 kWh/d (original BSM1 version)
Total pumping energy (for Q_{intr} , Q_r and Q_w) = 2717.19 kWh (based on BSM2 principles)
Average pumping energy per day (for Q_{intr} , Q_r and Q_w) = 388.17 kWh/d (based on BSM2 principles)

Total mixing energy = 1680 kWh (based on BSM2 principles)
Average mixing energy per day = 240 kWh/d (based on BSM2 principles)

Total added carbon volume = 0 m³
Average added carbon flow rate = 0 m³/d
Total added carbon mass = 0 kg COD
Average added carbon mass per day = 0 kg COD/d

Operational Cost Index

Sludge production cost index = 12178.45 (using weight 5 for BSM1)
Aeration energy cost index = 6476.112 (original BSM1 version)
Updated aeration energy cost index = 3341.3867 (updated BSM1 version)
Pumping energy cost index = 2966.76 (original BSM1 version)
Updated pumping energy cost index = 388.17 (based on BSM2 principles)
Carbon source addition cost index = 0
Mixing energy cost index = 240 (based on BSM2 principles)
Total Operational Cost Index (OCI) = 21861.322 (original BSM1 version)
Updated Total Operational Cost Index (OCI) = 16148.0067 (using new aeration and pumping costs)

Effluent violations

95% percentile for effluent SNH (Ammonia₉₅) = 8.8818 g N/m³
95% percentile for effluent TN (TN₉₅) = 18.5332 g N/m³
95% percentile for effluent TSS (TSS₉₅) = 15.7415 g SS/m³

The maximum effluent total nitrogen level (18 mg N/l) was violated

during 0.57292 days, i.e. 8.1845% of the operating time.
The limit was violated at 5 different occasions.

The maximum effluent ammonia nitrogen level (4 mg N/l) was violated during 4.375 days, i.e. 62.5% of the operating time.
The limit was violated at 7 different occasions.

Qualitative criteria for settling problems

The plant has experienced high (>0.8) risk for the development of filamentous bulking due to N deficiency during 0 days, i.e. 0% of the operating time.
...and risk for the development of filamentous bulking due to N deficiency 100% of the operating time.
average risk 0.00011765

The plant has experienced high (>0.8) risk for the development of aerobic (low DO) filamentous bulking during 0.57292 days, i.e. 8.1845% of the operating time.
...and risk for the development of aerobic (low DO) filamentous bulking 96.2798% of the operating time.
average risk 0.32341
The most dangerous situation was between days 8.4479 and 8.5729

The plant has experienced severe (>0.8) risk for the development of low F/M filamentous bulking during 2.9688 days, i.e. 42.4107% of the operating time.
...and risk for the development of low F/M filamentous bulking 100% of the operating time.
average risk 0.74557
The most dangerous situation was between days 12.0104 and 12.4375

The plant has experienced high (>0.8) risk for the development of low F/M foaming during 0 days, i.e. 0% of the operating time.
...and risk for the development of low F/M foaming 100% of the operating time.
average risk 0.53855

The plant has experienced high (>0.8) risk for the development of foaming due to high Ss/Xs fraction during 0 days, i.e. 0% of the operating time.
...and risk for the development of foaming due to high Ss/Xs fraction 99.256% of the operating time.
average risk 0.025602

The plant has experienced high (>0.8) risk for the development of rising sludge during 2.3854 days, i.e. 34.0774% of the operating time.
...and risk for the development of rising sludge 100% of the operating time.
average risk 0.68191
The most dangerous situation was between days 13.4688 and 13.8229

Overall risk

The plant has experienced severe (>0.8) risk for (integrated) BULKING during 3.5417 days, i.e. 50.5952% of the operating time.
...and risk for the development of (integrated) Bulking 100% of the operating time.
average risk 0.81015
The most dangerous situation was between days 12.0104 and 12.4375

The plant has experienced severe (>0.8) risk for (integrated) FOAMING during 0 days, i.e. 0% of the operating time.
...and risk for the development of (integrated) Foaming 100% of the operating time.
average risk 0.54695

The plant has experienced high (>0.8) risk for the development of RISING SLUDGE during 2.3854 days, i.e. 34.0774% of the operating time.
...and risk for the development of rising sludge 100% of the operating time.
average risk 0.68191
The most dangerous situation was between days 13.4688 and 13.8229

The plant has experienced OVERALL severe (>0.8) risk for OVERALL SETTLING PROBLEMS during 4.5729 days, i.e. 65.3274% of the operating time.
...and risk for the development of OVERALL SETTLING PROBLEMS 100% of the operating time.
average risk 0.88848
The most dangerous situation was between days 8.3958 and 13.4375

* RAINWEATHER FILE *

Overall plant performance during time 7 to 14 days

Effluent average concentrations based on load

Effluent average flow rate = 23808.1775 m3/d
Effluent average SI conc = 22.8388 mg COD/l
Effluent average SS conc = 1.1343 mg COD/l
Effluent average XI conc = 5.6388 mg COD/l
Effluent average XS conc = 0.34475 mg COD/l
Effluent average XBH conc = 12.8565 mg COD/l
Effluent average XBA conc = 0.64285 mg COD/l
Effluent average XP conc = 2.068 mg COD/l
Effluent average SO conc = 0.8471 mg (-COD)/l
Effluent average SNO conc = 6.9597 mg N/l
Effluent average SNH conc = 4.9819 mg N/l (limit = 4 mg N/l)
Effluent average SND conc = 0.8156 mg N/l
Effluent average XND conc = 0.023595 mg N/l
Effluent average SALK conc = 5.1431 mol HCO3/m3
Effluent average TSS conc = 16.1632 mg SS/l (limit = 30 mg SS/l)

Effluent average Kjeldahl N conc = 7.3634 mg N/l
Effluent average total N conc = 14.3231 mg N/l (limit = 18 mg COD/l)
Effluent average total COD conc = 45.524 mg COD/l (limit = 100 mg COD/l)
Effluent average BOD5 conc = 3.4746 mg/l (limit = 10 mg/l)

Effluent average load

Effluent average SI load = 543.7504 kg COD/day
Effluent average SS load = 27.0062 kg COD/day
Effluent average XI load = 134.2493 kg COD/day
Effluent average XS load = 8.2078 kg COD/day
Effluent average XBH load = 306.0893 kg COD/day
Effluent average XBA load = 15.305 kg COD/day
Effluent average XP load = 49.2359 kg COD/day
Effluent average SO load = 20.1678 kg (-COD)/day
Effluent average SNO load = 165.697 kg N/day
Effluent average SNH load = 118.61 kg N/day
Effluent average SND load = 19.4179 kg N/day
Effluent average XND load = 0.56175 kg N/day
Effluent average SALK load = 122.4481 kmol HCO3/day
Effluent average TSS load = 384.8155 kg SS/day

Effluent average Kjeldahl N load = 175.3103 kg N/d
Effluent average total N load = 341.0073 kg N/d
Effluent average total COD load = 1083.8439 kg COD/d
Effluent average BOD5 load = 82.7242 kg/d

Other effluent quality variables

Influent Quality (I.Q.) index = 42042.8149 kg poll.units/d (original BSM1 version)
Effluent Quality (E.Q.) index = 8839.0693 kg poll.units/d (original BSM1 version)
Influent Quality (I.Q.) index = 52081.3952 kg poll.units/d (updated BSM1 version)
Effluent Quality (E.Q.) index = 8935.2016 kg poll.units/d (updated BSM1 version)

Sludge production for disposal = 16467.1313 kg SS
Average sludge production for disposal per day = 2352.4473 kg SS/d
Sludge production released into effluent = 2693.7084 kg SS
Average sludge production released into effluent per day = 384.8155 kg SS/d
Total sludge production = 19160.8397 kg SS
Total average sludge production per day = 2737.2628 kg SS/d

Total aeration energy = 45332.784 kWh (original BSM1 version)
Average aeration energy per day = 6476.112 kWh/d (original BSM1 version)
Total aeration energy = 23389.7067 kWh (updated BSM1 version)
Average aeration energy per day = 3341.3867 kWh/d (updated BSM1 version)

Total pumping energy (for Q_{intr} , Q_r and Q_w) = 20767.32 kWh (original BSM1 version)
Average pumping energy per day (for Q_{intr} , Q_r and Q_w) = 2966.76 kWh/d (original BSM1 version)
Total pumping energy (for Q_{intr} , Q_r and Q_w) = 2717.19 kWh (based on BSM2 principles)
Average pumping energy per day (for Q_{intr} , Q_r and Q_w) = 388.17 kWh/d (based on BSM2 principles)

Total mixing energy = 1680 kWh (based on BSM2 principles)
Average mixing energy per day = 240 kWh/d (based on BSM2 principles)

Total added carbon volume = 0 m³
Average added carbon flow rate = 0 m³/d
Total added carbon mass = 0 kg COD
Average added carbon mass per day = 0 kg COD/d

Operational Cost Index

Sludge production cost index = 11762.2367 (using weight 5 for BSM1)
Aeration energy cost index = 6476.112 (original BSM1 version)
Updated aeration energy cost index = 3341.3867 (updated BSM1 version)
Pumping energy cost index = 2966.76 (original BSM1 version)
Updated pumping energy cost index = 388.17 (based on BSM2 principles)
Carbon source addition cost index = 0
Mixing energy cost index = 240 (based on BSM2 principles)
Total Operational Cost Index (OCI) = 21445.1087 (original BSM1 version)
Updated Total Operational Cost Index (OCI) = 15731.7933 (using new aeration and pumping costs)

Effluent violations

95% percentile for effluent SNH (Ammonia₉₅) = 9.4632 g N/m³
95% percentile for effluent TN (TN₉₅) = 17.79 g N/m³
95% percentile for effluent TSS (TSS₉₅) = 21.6868 g SS/m³

The maximum effluent total nitrogen level (18 mg N/l) was violated during 0.30208 days, i.e. 4.3155% of the operating time.
The limit was violated at 3 different occasions.

The maximum effluent ammonia nitrogen level (4 mg N/l) was violated during 4.4271 days, i.e. 63.244% of the operating time.
The limit was violated at 7 different occasions.

Qualitative criteria for settling problems

The plant has experienced high (>0.8) risk for the development of filamentous bulking due to N deficiency during 0 days, i.e. 0% of the operating time.
...and risk for the development of filamentous bulking due to N deficiency

100% of the operating time.
average risk 0.00011765

The plant has experienced high (>0.8) risk for the development of aerobic (low DO) filamentous bulking during 0.73958 days, i.e. 10.5655% of the operating time. ...and risk for the development of aerobic (low DO) filamentous bulking 96.5774% of the operating time.
average risk 0.3011
The most dangerous situation was between days 8.4583 and 8.6146

The plant has experienced severe (>0.8) risk for the development of low F/M filamentous bulking during 2.8125 days, i.e. 40.1786% of the operating time. ...and risk for the development of low F/M filamentous bulking 100% of the operating time.
average risk 0.68264
The most dangerous situation was between days 12.0104 and 12.4375

The plant has experienced high (>0.8) risk for the development of low F/M foaming during 0 days, i.e. 0% of the operating time. ...and risk for the development of low F/M foaming 100% of the operating time.
average risk 0.42036

The plant has experienced high (>0.8) risk for the development of foaming due to high Ss/Xs fraction during 0 days, i.e. 0% of the operating time. ...and risk for the development of foaming due to high Ss/Xs fraction 99.5536% of the operating time.
average risk 0.050998

The plant has experienced high (>0.8) risk for the development of rising sludge during 1.6667 days, i.e. 23.8095% of the operating time. ...and risk for the development of rising sludge 100% of the operating time.
average risk 0.59843
The most dangerous situation was between days 12.8125 and 13.1146

Overall risk

The plant has experienced severe (>0.8) risk for (integrated) BULKING during 3.5521 days, i.e. 50.744% of the operating time. ...and risk for the development of (integrated) Bulking 100% of the operating time.
average risk 0.78673
The most dangerous situation was between days 12.0104 and 12.4375

The plant has experienced severe (>0.8) risk for (integrated) FOAMING during 0 days, i.e. 0% of the operating time. ...and risk for the development of (integrated) Foaming 100% of the operating time.
average risk 0.45276

The plant has experienced high (>0.8) risk for the development of RISING SLUDGE during 1.6667 days, i.e. 23.8095% of the operating time. ...and risk for the development of rising sludge 100% of the operating time.
average risk 0.59843
The most dangerous situation was between days 12.8125 and 13.1146

The plant has experienced OVERALL severe (>0.8) risk for OVERALL SETTLING PROBLEMS during 4.4583 days, i.e. 63.6905% of the operating time.
...and risk for the development of OVERALL SETTLING PROBLEMS 100% of the operating time.
average risk 0.8485
The most dangerous situation was between days 8.375 and 13.4271

* STORMWEATHER FILE *

Overall plant performance during time 7 to 14 days

Effluent average concentrations based on load

Effluent average flow rate = 20658.1003 m³/d
Effluent average SI conc = 26.2999 mg COD/l
Effluent average SS conc = 1.1129 mg COD/l
Effluent average XI conc = 5.6369 mg COD/l
Effluent average XS conc = 0.3226 mg COD/l
Effluent average XBH conc = 11.8801 mg COD/l
Effluent average XBA conc = 0.58845 mg COD/l
Effluent average XP conc = 1.9137 mg COD/l
Effluent average SO conc = 0.76351 mg (-COD)/l
Effluent average SNO conc = 7.481 mg N/l
Effluent average SNH conc = 5.3493 mg N/l (limit = 4 mg N/l)
Effluent average SND conc = 0.80342 mg N/l
Effluent average XND conc = 0.022646 mg N/l
Effluent average SALK conc = 4.8722 mol HCO₃/m³
Effluent average TSS conc = 15.2564 mg SS/l (limit = 30 mg SS/l)

Effluent average Kjeldahl N conc = 7.6259 mg N/l
Effluent average total N conc = 15.107 mg N/l (limit = 18 mg COD/l)
Effluent average total COD conc = 47.7547 mg COD/l (limit = 100 mg COD/l)
Effluent average BOD5 conc = 3.2267 mg/l (limit = 10 mg/l)

Effluent average load

Effluent average SI load = 543.3052 kg COD/day
Effluent average SS load = 22.9912 kg COD/day
Effluent average XI load = 116.4481 kg COD/day
Effluent average XS load = 6.6643 kg COD/day
Effluent average XBH load = 245.4213 kg COD/day
Effluent average XBA load = 12.1563 kg COD/day
Effluent average XP load = 39.534 kg COD/day
Effluent average SO load = 15.7727 kg (-COD)/day
Effluent average SNO load = 154.5437 kg N/day
Effluent average SNH load = 110.5074 kg N/day
Effluent average SND load = 16.5972 kg N/day
Effluent average XND load = 0.46781 kg N/day
Effluent average SALK load = 100.6509 kmol HCO₃/day
Effluent average TSS load = 315.168 kg SS/day

Effluent average Kjeldahl N load = 157.5375 kg N/d
Effluent average total N load = 312.0813 kg N/d
Effluent average total COD load = 986.5204 kg COD/d
Effluent average BOD5 load = 66.6567 kg/d

Other effluent quality variables

Influent Quality (I.Q.) index = 43758.1149 kg poll.units/d (original BSM1 version)
Effluent Quality (E.Q.) index = 7991.7949 kg poll.units/d (original BSM1 version)
Influent Quality (I.Q.) index = 54061.497 kg poll.units/d (updated BSM1 version)
Effluent Quality (E.Q.) index = 8021.7327 kg poll.units/d (updated BSM1 version)

Sludge production for disposal = 18195.5132 kg SS
Average sludge production for disposal per day = 2599.359 kg SS/d
Sludge production released into effluent = 2206.1758 kg SS
Average sludge production released into effluent per day = 315.168 kg SS/d
Total sludge production = 20401.689 kg SS
Total average sludge production per day = 2914.527 kg SS/d

Total aeration energy = 45332.784 kWh (original BSM1 version)
Average aeration energy per day = 6476.112 kWh/d (original BSM1 version)
Total aeration energy = 23389.7067 kWh (updated BSM1 version)
Average aeration energy per day = 3341.3867 kWh/d (updated BSM1 version)

Total pumping energy (for Q_{intr} , Q_r and Q_w) = 20767.32 kWh (original BSM1 version)
Average pumping energy per day (for Q_{intr} , Q_r and Q_w) = 2966.76 kWh/d (original BSM1 version)
Total pumping energy (for Q_{intr} , Q_r and Q_w) = 2717.19 kWh (based on BSM2 principles)
Average pumping energy per day (for Q_{intr} , Q_r and Q_w) = 388.17 kWh/d (based on BSM2 principles)

Total mixing energy = 1680 kWh (based on BSM2 principles)
Average mixing energy per day = 240 kWh/d (based on BSM2 principles)

Total added carbon volume = 0 m³
Average added carbon flow rate = 0 m³/d
Total added carbon mass = 0 kg COD
Average added carbon mass per day = 0 kg COD/d

Operational Cost Index

Sludge production cost index = 12996.7951 (using weight 5 for BSM1)
Aeration energy cost index = 6476.112 (original BSM1 version)
Updated aeration energy cost index = 3341.3867 (updated BSM1 version)
Pumping energy cost index = 2966.76 (original BSM1 version)
Updated pumping energy cost index = 388.17 (based on BSM2 principles)
Carbon source addition cost index = 0
Mixing energy cost index = 240 (based on BSM2 principles)
Total Operational Cost Index (OCI) = 22679.6671 (original BSM1 version)
Updated Total Operational Cost Index (OCI) = 16966.3518 (using new aeration and pumping costs)

Effluent violations

95% percentile for effluent SNH (Ammonia₉₅) = 9.78 g N/m³
95% percentile for effluent TN (TN₉₅) = 18.7193 g N/m³
95% percentile for effluent TSS (TSS₉₅) = 20.7868 g SS/m³

The maximum effluent total nitrogen level (18 mg N/l) was violated during 0.59375 days, i.e. 8.4821% of the operating time.
The limit was violated at 4 different occasions.

The maximum effluent ammonia nitrogen level (4 mg N/l) was violated during 4.5104 days, i.e. 64.4345% of the operating time.
The limit was violated at 7 different occasions.

The maximum effluent total suspended solids level (30 mg SS/l) was violated during 0.010417 days, i.e. 0.14881% of the operating time.
The limit was violated at 1 different occasions.

Qualitative criteria for settling problems

The plant has experienced high (>0.8) risk for the development of filamentous bulking due to N deficiency during 0 days, i.e. 0% of the operating time.
...and risk for the development of filamentous bulking due to N deficiency 100% of the operating time.
average risk 0.00011765

The plant has experienced high (>0.8) risk for the development of aerobic (low DO) filamentous bulking during 0.84375 days, i.e. 12.0536% of the operating time.
...and risk for the development of aerobic (low DO) filamentous bulking 97.0238% of the operating time.
average risk 0.32106
The most dangerous situation was between days 8.8229 and 9.0313

The plant has experienced severe (>0.8) risk for the development of low F/M filamentous bulking during 2.9583 days, i.e. 42.2619% of the operating time.
...and risk for the development of low F/M filamentous bulking 100% of the operating time.
average risk 0.72683
The most dangerous situation was between days 13 and 13.4375

The plant has experienced high (>0.8) risk for the development of low F/M foaming during 0 days, i.e. 0% of the operating time.
...and risk for the development of low F/M foaming 100% of the operating time.
average risk 0.50137

The plant has experienced high (>0.8) risk for the development of foaming due to high Ss/Xs fraction during 0 days, i.e. 0% of the operating time.
...and risk for the development of foaming due to high Ss/Xs fraction 99.1071% of the operating time.
average risk 0.034847

The plant has experienced high (>0.8) risk for the development of rising sludge during 1.9896 days, i.e. 28.4226% of the operating time.
...and risk for the development of rising sludge 100% of the operating time.
average risk 0.63631
The most dangerous situation was between days 12.4583 and 13.125

Overall risk

The plant has experienced severe (>0.8) risk for (integrated) BULKING during 3.8021 days, i.e. 54.3155% of the operating time.
...and risk for the development of (integrated) Bulking 100% of the operating time.
average risk 0.81851
The most dangerous situation was between days 13 and 13.4375

The plant has experienced severe (>0.8) risk for (integrated) FOAMING during 0 days, i.e. 0% of the operating time.
...and risk for the development of (integrated) Foaming 100% of the operating time.
average risk 0.51564

The plant has experienced high (>0.8) risk for the development of RISING SLUDGE during 1.9896 days, i.e. 28.4226% of the operating time.

...and risk for the development of rising sludge 100% of the operating time.

average risk 0.63631

The most dangerous situation was between days 12.4583 and 13.125

The plant has experienced OVERALL severe (>0.8) risk for OVERALL SETTLING PROBLEMS

during 4.6563 days, i.e. 66.5179% of the operating time.

...and risk for the development of OVERALL SETTLING PROBLEMS 100% of the operating time.

average risk 0.8836

The most dangerous situation was between days 8.3958 and 13.4375