EARTH SYSTEMS
Environment | Water | Sustainability

CAPABILITY STATEMENT

TreatSIM

Water Quality Modelling & Treatment Simulation

Earth Systems has developed a water quality software tool (TreatSIM) to rapidly simulate a range of water quality treatment and mixing scenarios. The tool uses equilibrium thermodynamic software to model the outcomes of water treatment, assessing reagent types, mass requirements and suitability, water chemistry outcomes as a function of pH, likely treatment precipitates / sludges and water quality outcomes. TreatSIM is also capable of modelling the outcomes of reacting multiple water sources to assist with assessing blending as a water quality management option.

Identifying water treatment options for wastewater and process water streams to meet water quality outcomes to enable reuse or discharge can be a complex, costly and time-consuming process. Being able to quickly focus on optimum treatment reagents and/or potential mixing rations to meet regulatory or site water quality targets can substantially lower costs and minimise time delays in dealing with site water quality issues.

TreatSIM is a spreadsheet-based tool for modelling pH correction for the purpose of treating acid water and and/or the lowering of dissolved metal concentrations. TreatSIM uses the USGS developed equilibrium modelling software package PHREEQC (Parkhurst and Appelo, 2013), to conduct multiple aqueous geochemical mixing calculations. Each calculation represents a step in a treatment process that identifies resultant changes in water quality parameters (e.g. pH, acidity), chemical speciation and potential mineral precipitates (sludge composition). Based on the outcomes of these calculations the optimum reagent composition and amount of reagent can be quickly identified to reach the desired water quality outcomes.

TreatSIM can also be used to examine the resultant water quality outcomes of reacting or blending two or more water sources, providing an alternative water quality management option to treatment.

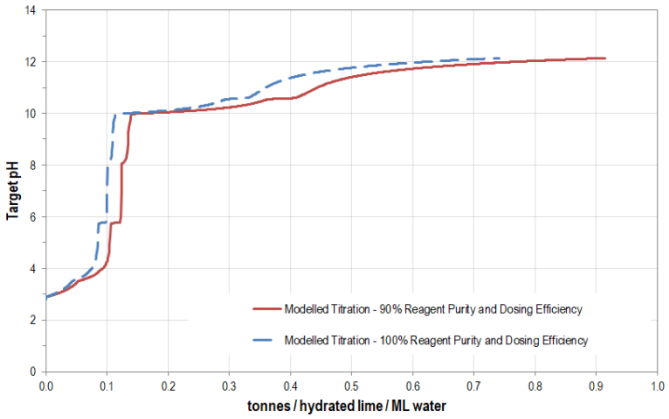
USING TreatSIM

TreatSIM uses the following field and laboratory measured water quality parameters as the input for modelling.

- Temperature, pH, Electrical conductivity (EC) and Oxidation Reduction Potential (ORP).
- Dissolved major and trace cation metal concentrations.
- Sulfate, chloride, ±nitrate, ±phosphate, ±fluoride.
- Alkalinity / acidity.

Outputs include;

- Assessment of initial water quality, including mineral saturation, calculated acidity and scaling potential.
- Water quality and aqueous speciation across a range of pH's during treatment.
- Types and masses of reagent requirements, at a range of purity and mixing efficiencies, to achieve key pH targets.
- Likely treatment sludge compositions and volumes.
- Mineral saturation indices across a range of pH's.
- Scaling potential (carbonate, gypsum, iron oxide).
- Key plots including treatment titration curve (reagent addition vs. pH), Treatment precipitate/sludge generation (Treated pH vs. sludge composition / concentrations), Evolution of dissolved metal concentrations.



BENEFITS OF TreatSIM

TreatSIM can be used to optimise reagent selection and use, predict treatment water quality outcomes and sludge generation, design full scale treatment plants, assist with the design of treatment plants and upgrade treatment plant efficiency.

Earth Systems can assist in selecting appropriate water quality parameters based on site and regulatory requirements, including any additional parameters currently not included as part of routine monitoring program.

Contact Earth Systems (enviro@earthsystems.com.au) for more information.