

**GOLD FIELDS**



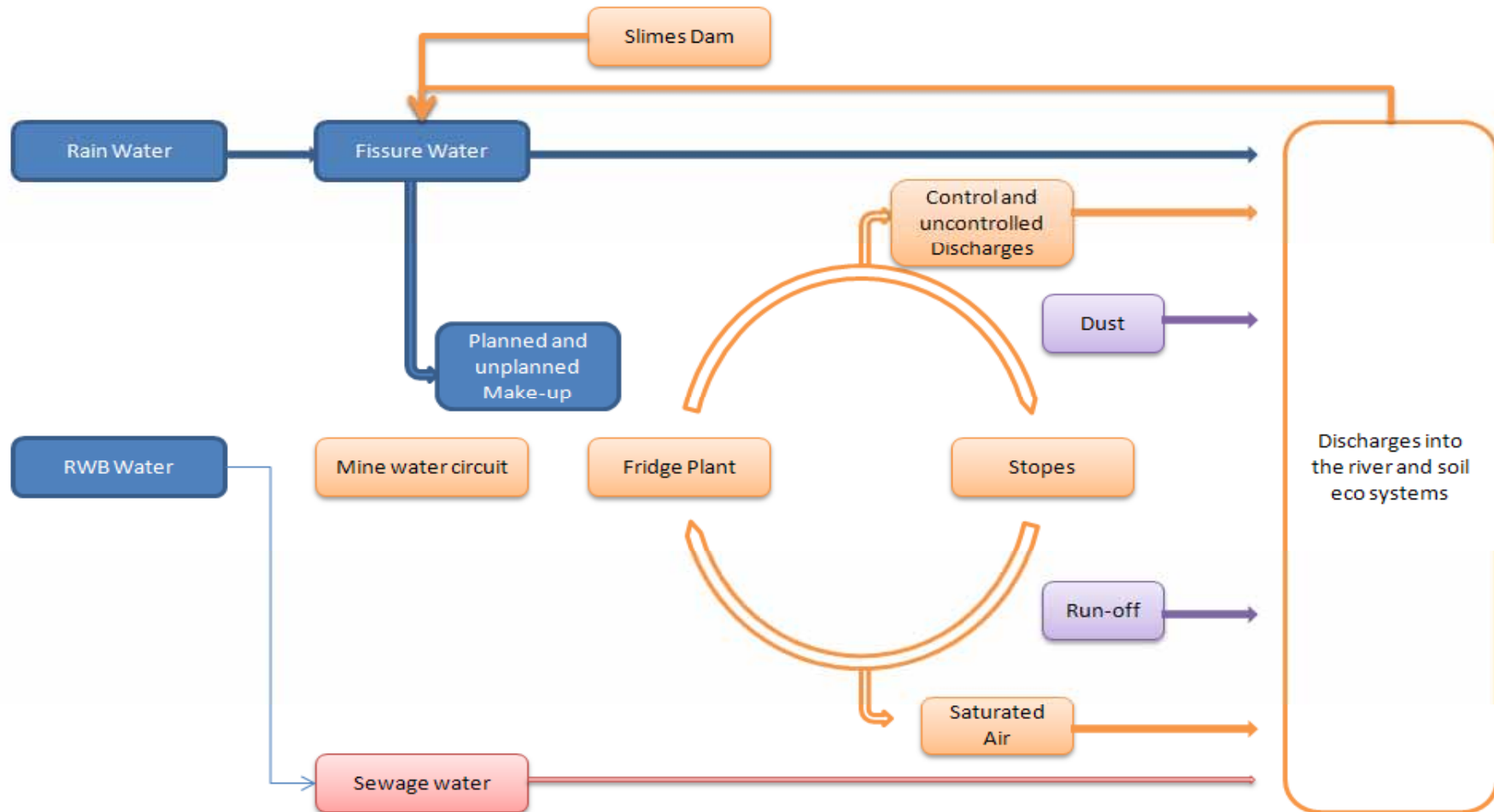
**GOLD FIELDS**

# Mine Water Quality Control

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July 2009

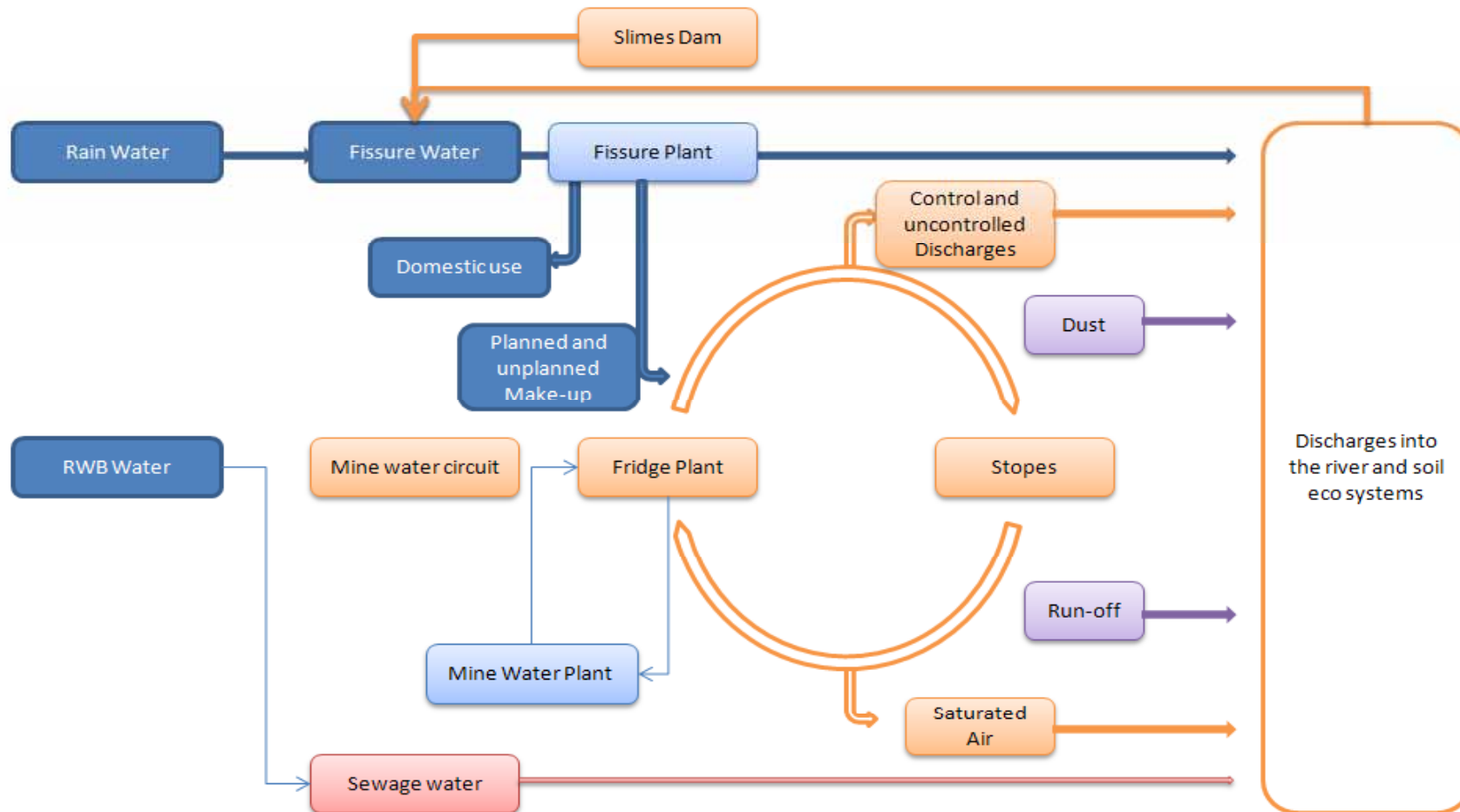


- **Consumption and Costs in Mine Process Water Circuit**
- **Environmental Pressure**
- **Contamination**
  - **Suspended Solids and Organics**
  - **Heavy Metals**
  - **Dissolved solids (Salts)**
  - **Temporary Hardness**





- Zero liquid effluent streams
- Use Fissure water as top-up water in Mine Process circuit
- Improve the quality of water
- No- waste production
- Comply with environmental and legal regulations

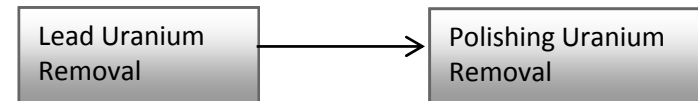




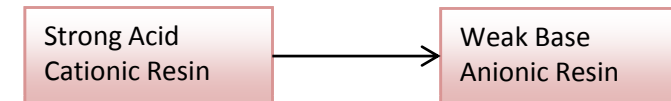
## Pre-treatment



## Heavy Metal Removal

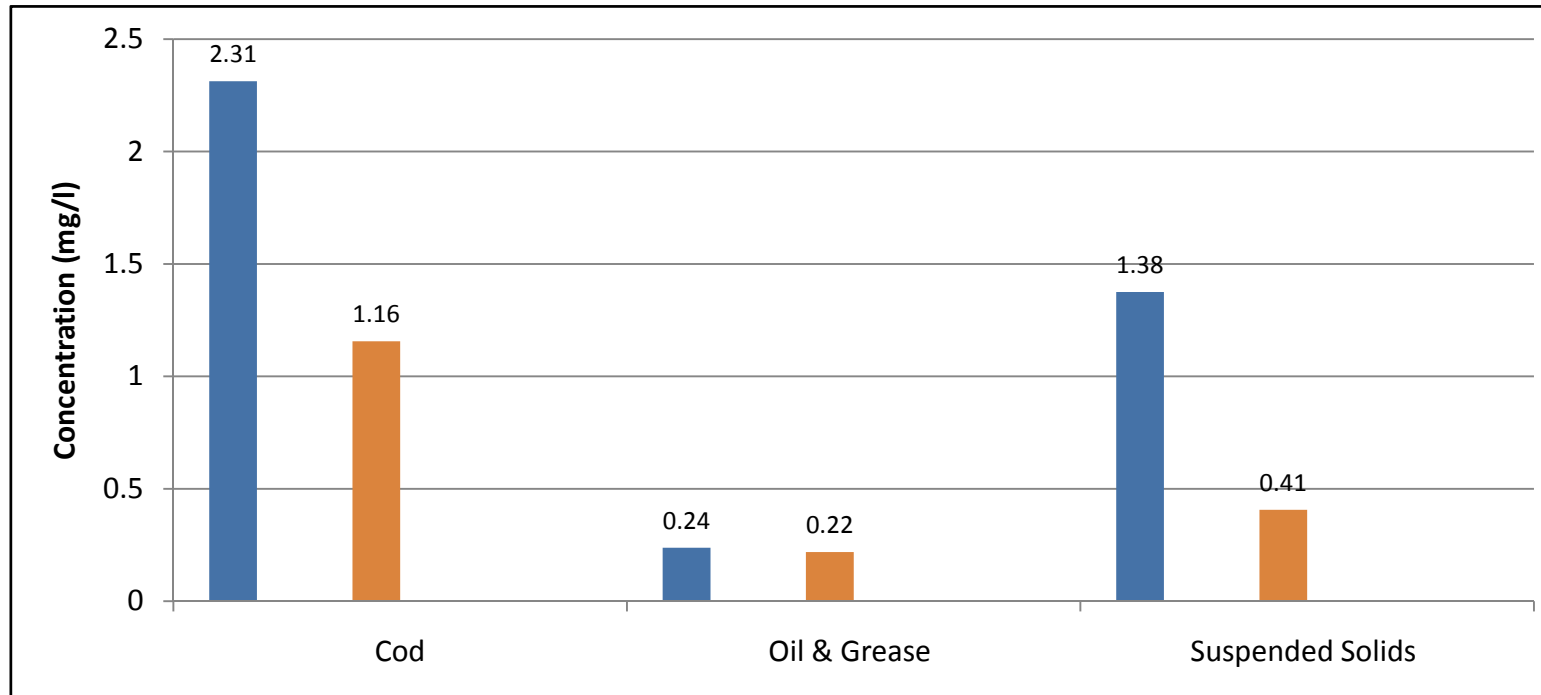


## Demineralization

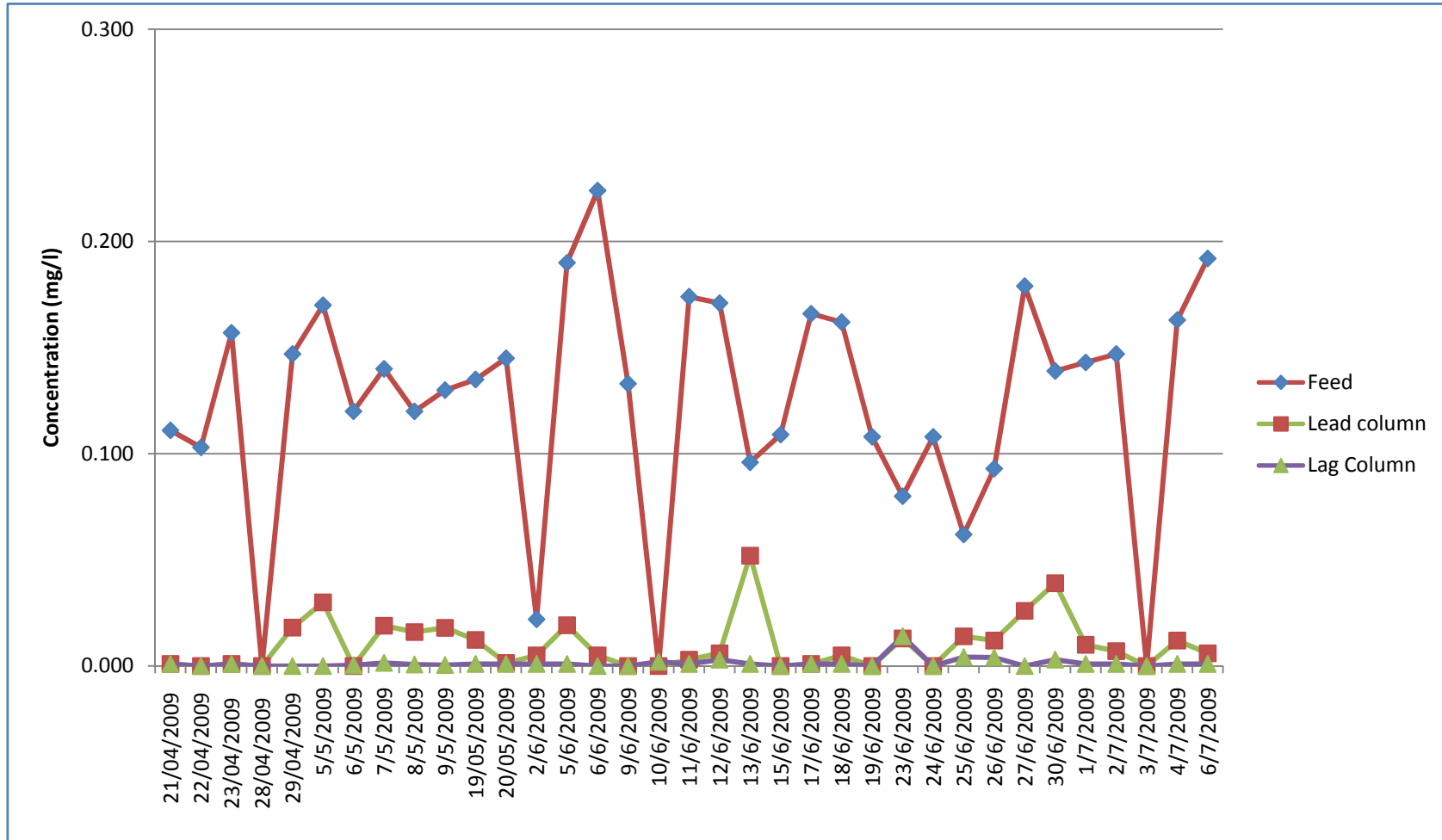


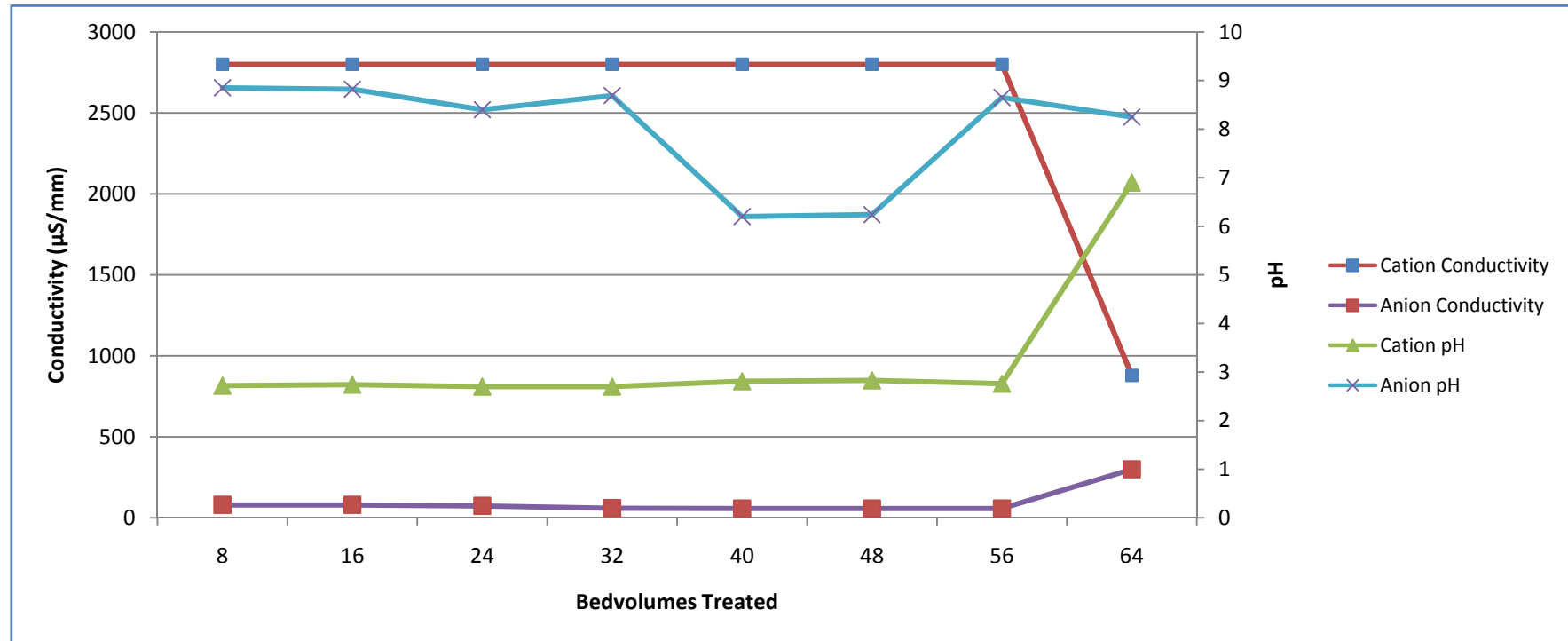


- Operating capacity of 2 m<sup>3</sup>/h.
- Operated 24hours per day.



- Average oil and grease content is very low.
- Pre-treatment is essential for ion exchange processes.

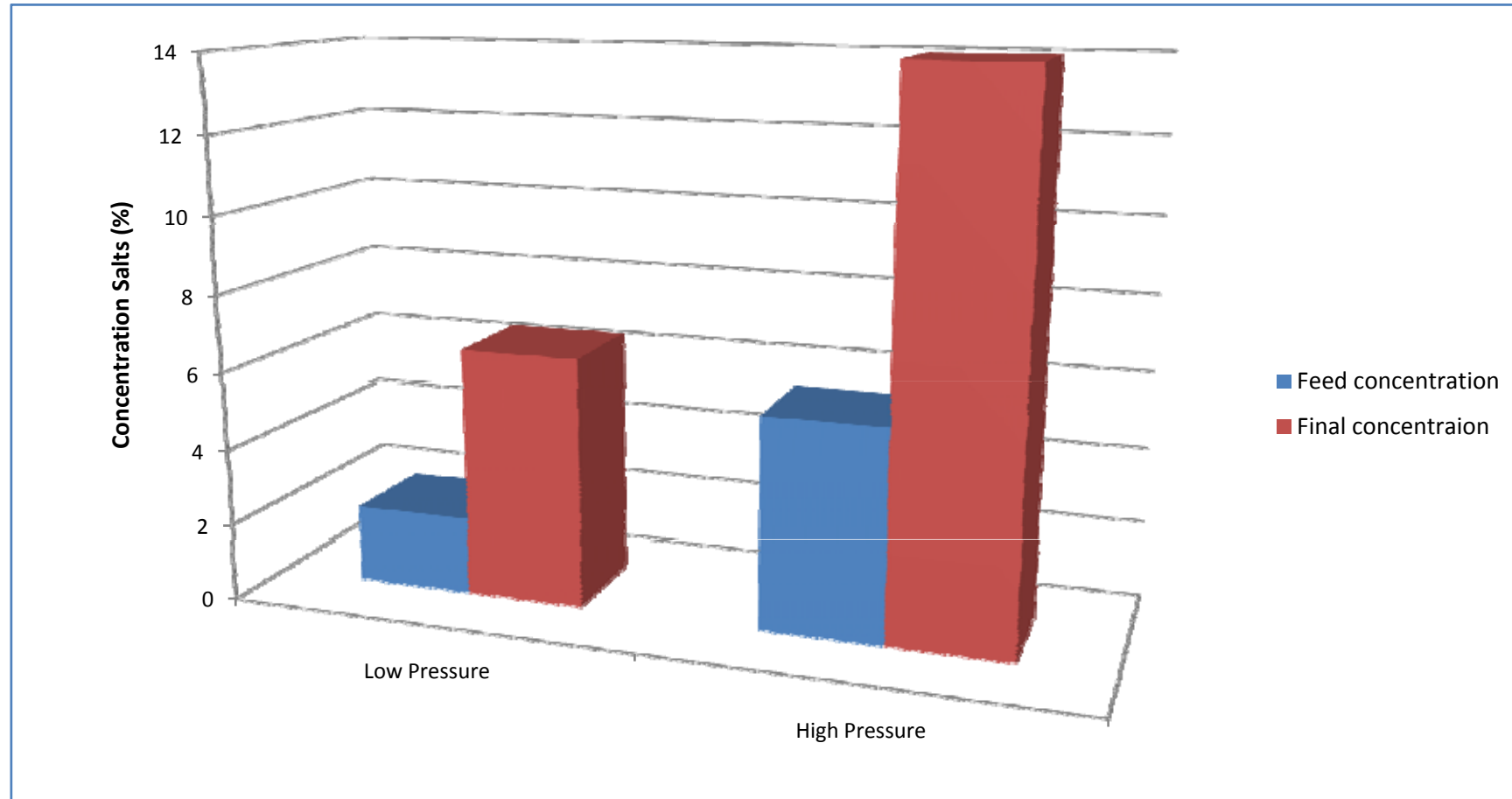




- Feed: total dissolved solids = 700 mg/l
- Final Water Quality: total dissolved solids < 50 mg/l

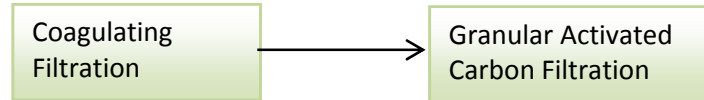


- Carbon reused in metallurgical plant.
- Solids recovery from backwash sent to metallurgical plant.
- Uranium regenerant donated to Uranium recovery plant.
- Cation regenerant (Calcium Nitrate) produce liquid fertilizer
- Anion regenerant (Ammonium Sulphate) produce liquid fertilizer

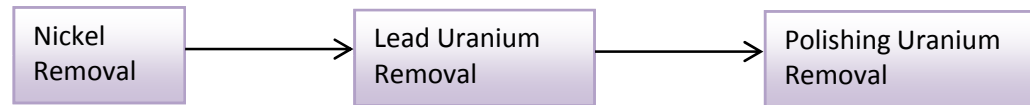




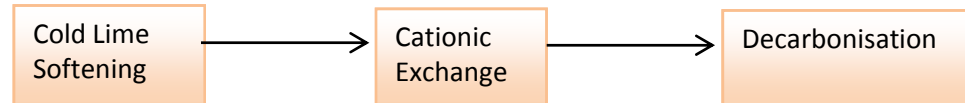
## Pre-treatment



## Heavy Metal Removal



## Softening



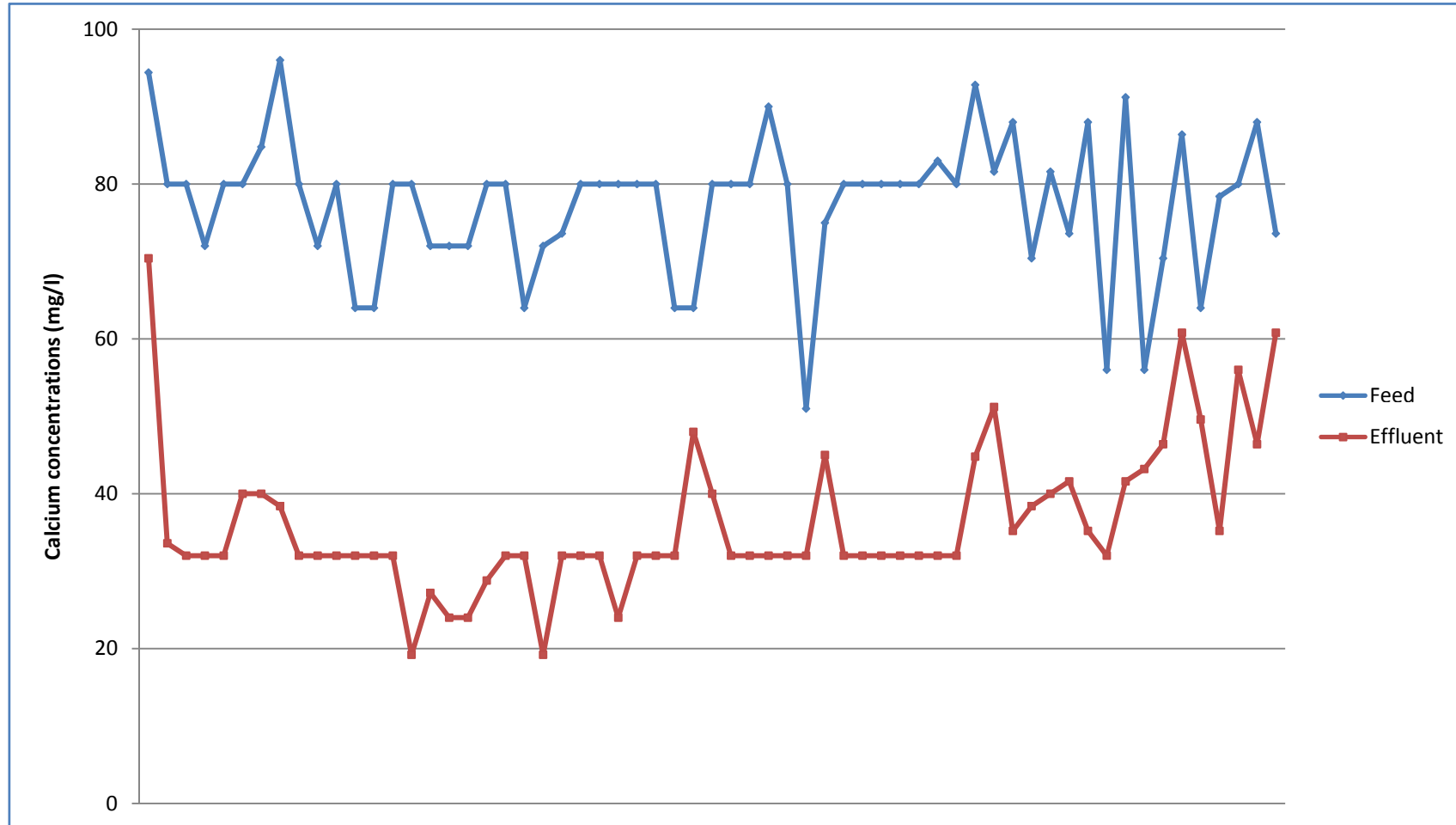


- Operating capacity of 20 m<sup>3</sup>/h.
- Operated 24 hours per day.



## Crystalactor

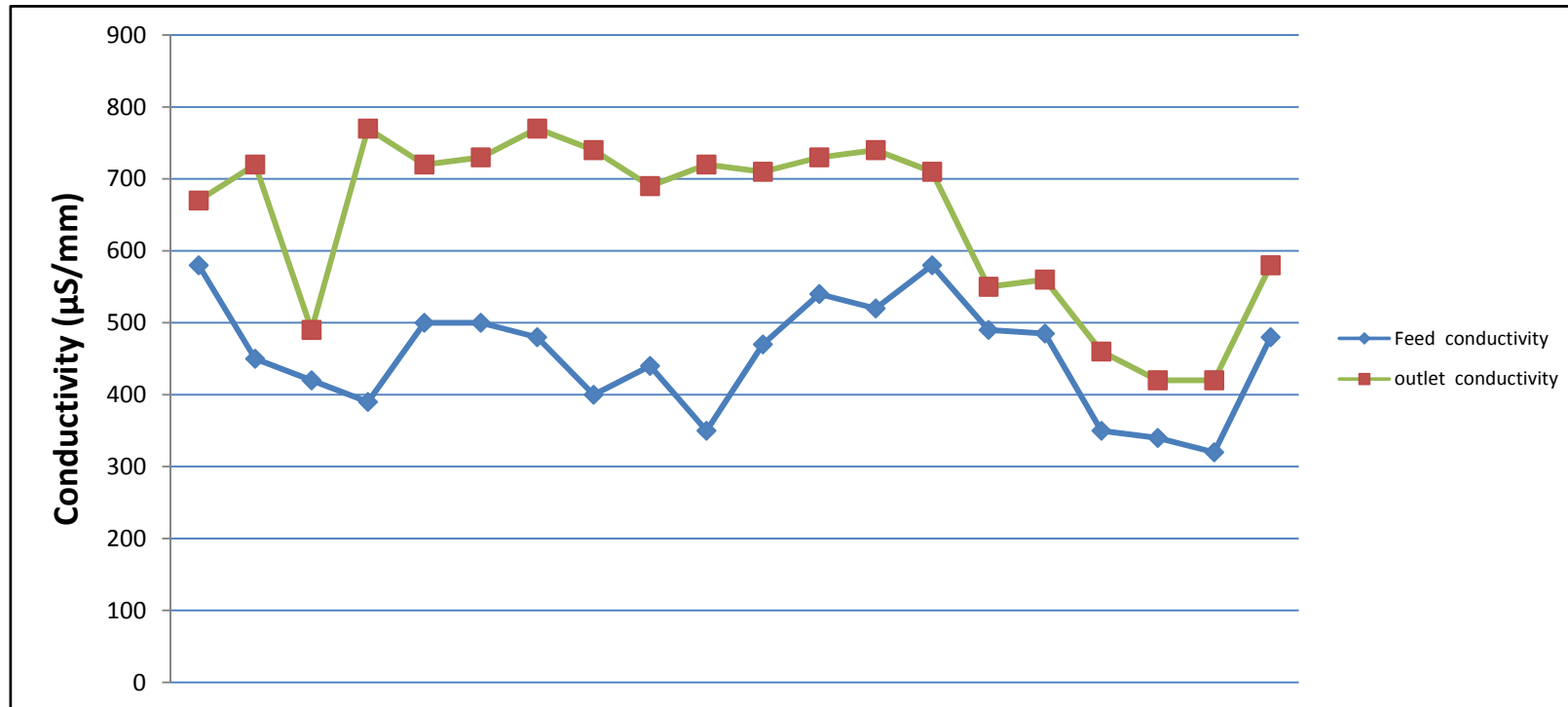
- Fluidised bed reactor
- $\text{CaCO}_3$  precipitate as high purity pebbles
- Producing softened water as overflow



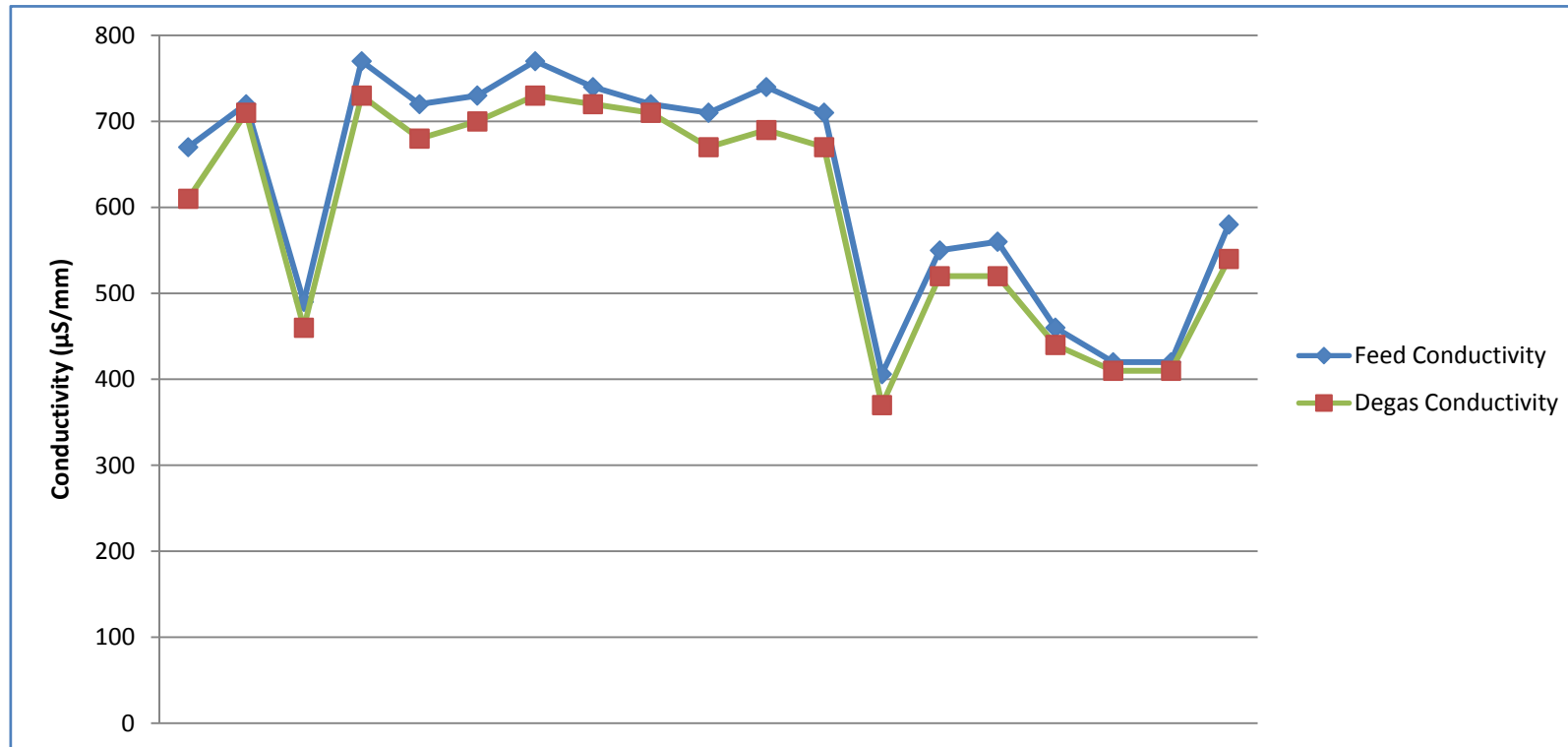


## Uses Of High Purity CaO

- Agriculture and Steel industries
- Re-used in Crystalactor
- Use in Met Plant
- HTH Production



- Weak Acid Cationic Resin used.
- Removal of Mg, Ca



- Due to physical constraints only small reduction in conductivity was achieved.



- Carbon reused in metallurgical plant.
- Solids recovery from backwash sent to metallurgical plant.
- Uranium regenerant donated to Uranium recovery plant.
- Cation regenerant (Calcium Nitrate) produce liquid fertilizer
- $\text{CaCO}_3$  pebbles calcined to produce  $\text{CaO}$ .



- Environmental Impact Assessment
- Water Licensing
- Feasibility Study
- Detailed design and construction

