conceptual design for chlor-alkali and valuable materials production from oilfield brine

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ND Oil & Gas Research Program,

ND Industrial Commission

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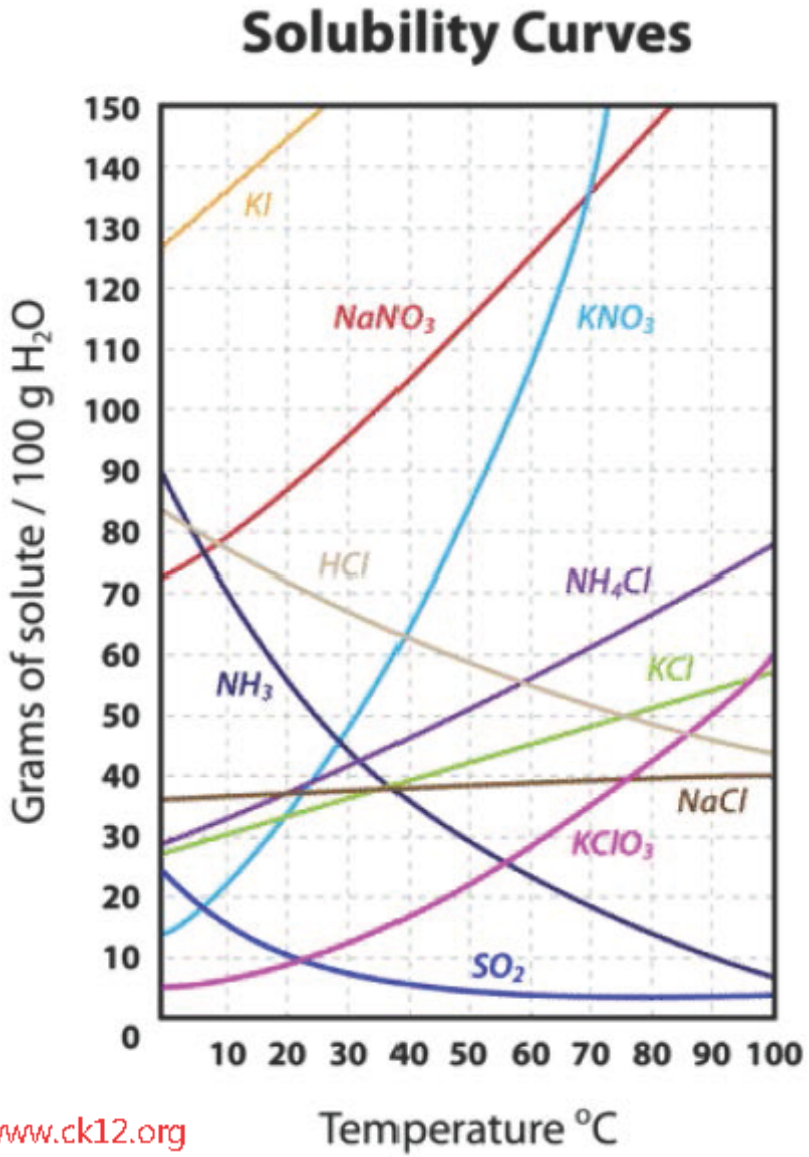
valuable products from produced water

produced water from the Bakken Formation is saturated with NaCl and includes the following constituents:

- potassium
- calcium
- magnesium
- bromine
- lithium



saltwater brine is a feedstock for valuable chemicals:

- chlorine gas
- hydrochloric acid
- sodium hypochlorite
- sodium hydroxide
- bromine
- magnesium metal
- lithium

proposed technologies are well established:

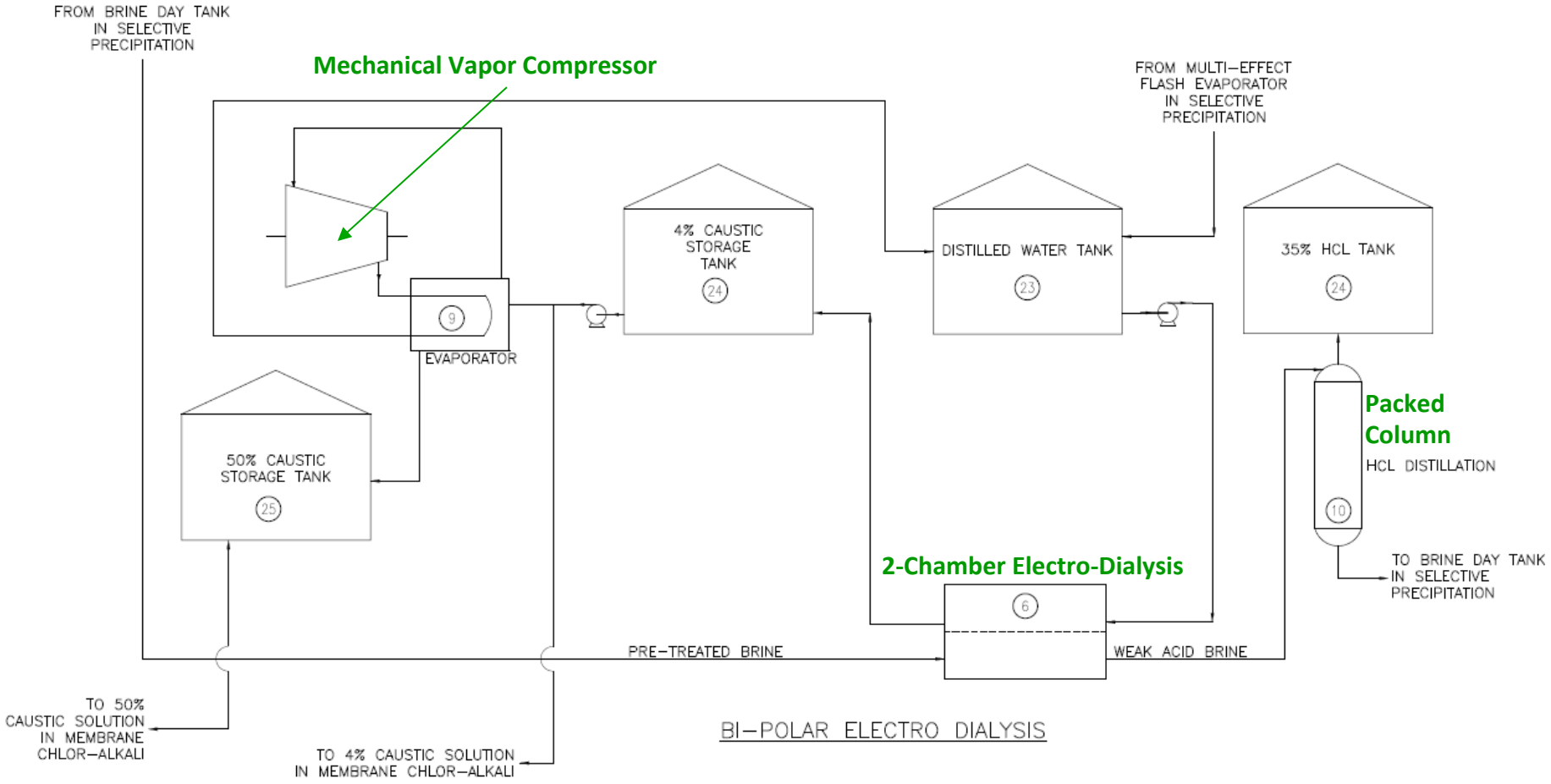
- traditional chlor-alkali technology uses mercury cells – is being phased out
- brine is being used in Texas to produce hydrochloric acid
  - HCl will be used in oil & gas wells
  - feedstock is RO reject from municipal water

chemicals represent a huge value-added opportunity

- requires large amounts of low-cost natural gas and electricity
- better margins for chemicals and plastics than for the raw materials
- North Dakota chemical industry is presently about the same size as wood products

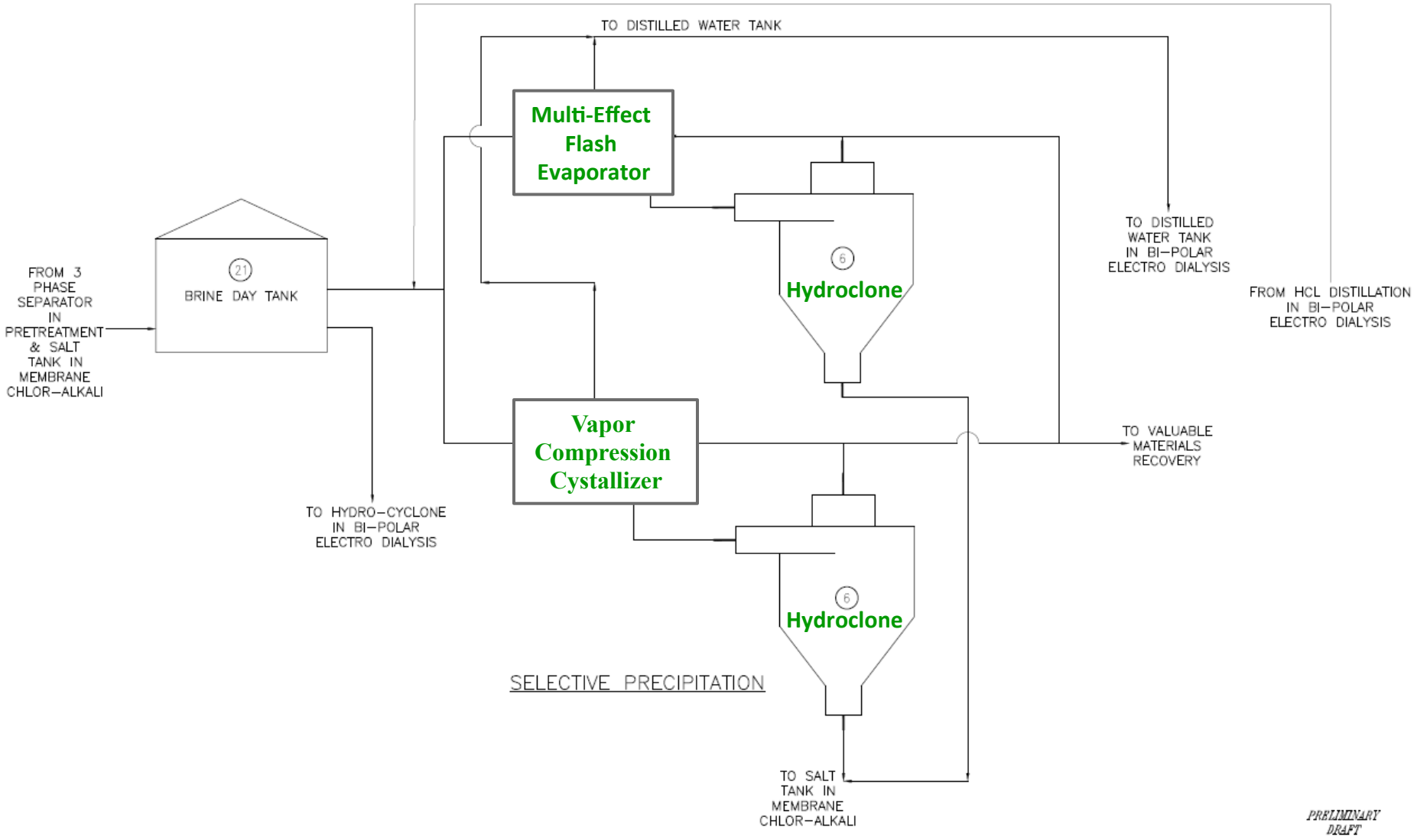
this project will prove the feasibility:

- all the pieces are well established individually
- ready local market for HCl, NaOH, NaOCl
- very attractive economics
- does not require process water



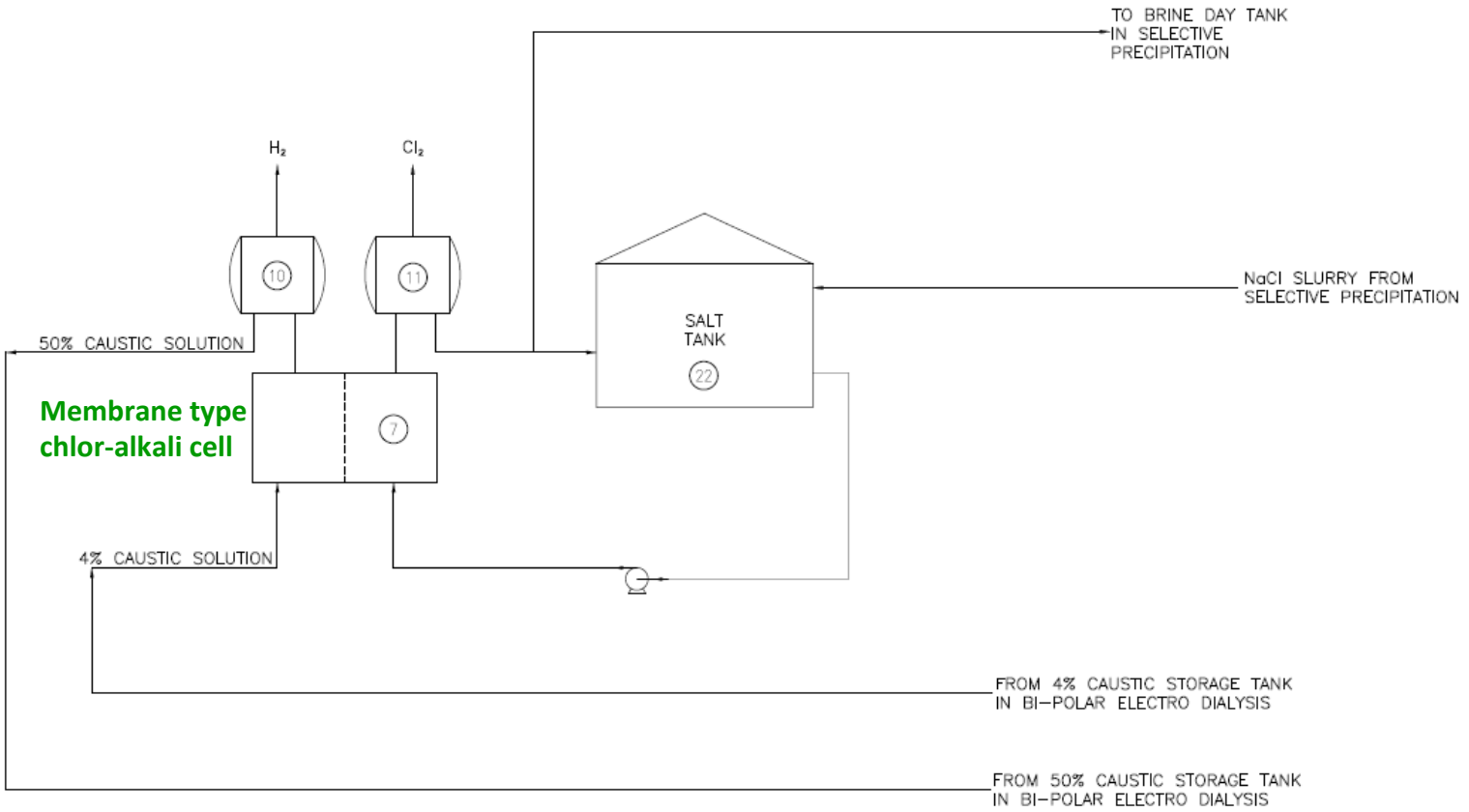
uses multiple proven components in an innovative configuration:

- electrodialysis & distillation to make HCl



uses multiple proven components in an innovative configuration:

- distillation to make purified salt and distilled water



MEMBRANE CHLOR–ALKALI

uses multiple proven components in an innovative configuration:

- chlor-alkali to make Cl_2 and NaOH

chlorine production from Bakken brine opens the door for plastics using ethane:

- too much ethane in the state, can't get rid of it
- chlorine + ethane = PVC
- shipping PVC resin by rail is easy
- $10 billion ethane cracker being built near Pittsburgh, PA
- diversify economy

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questions?