

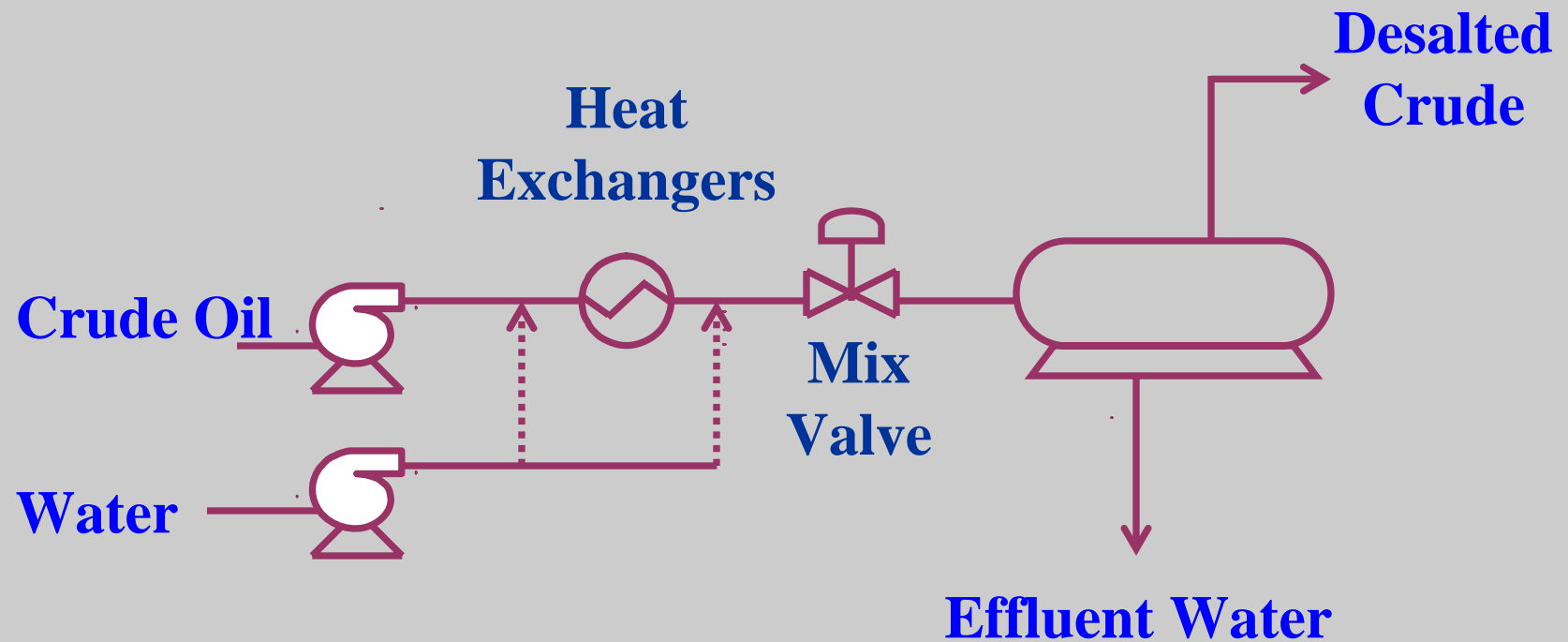


# CRUDE OIL CONDUCTIVITY

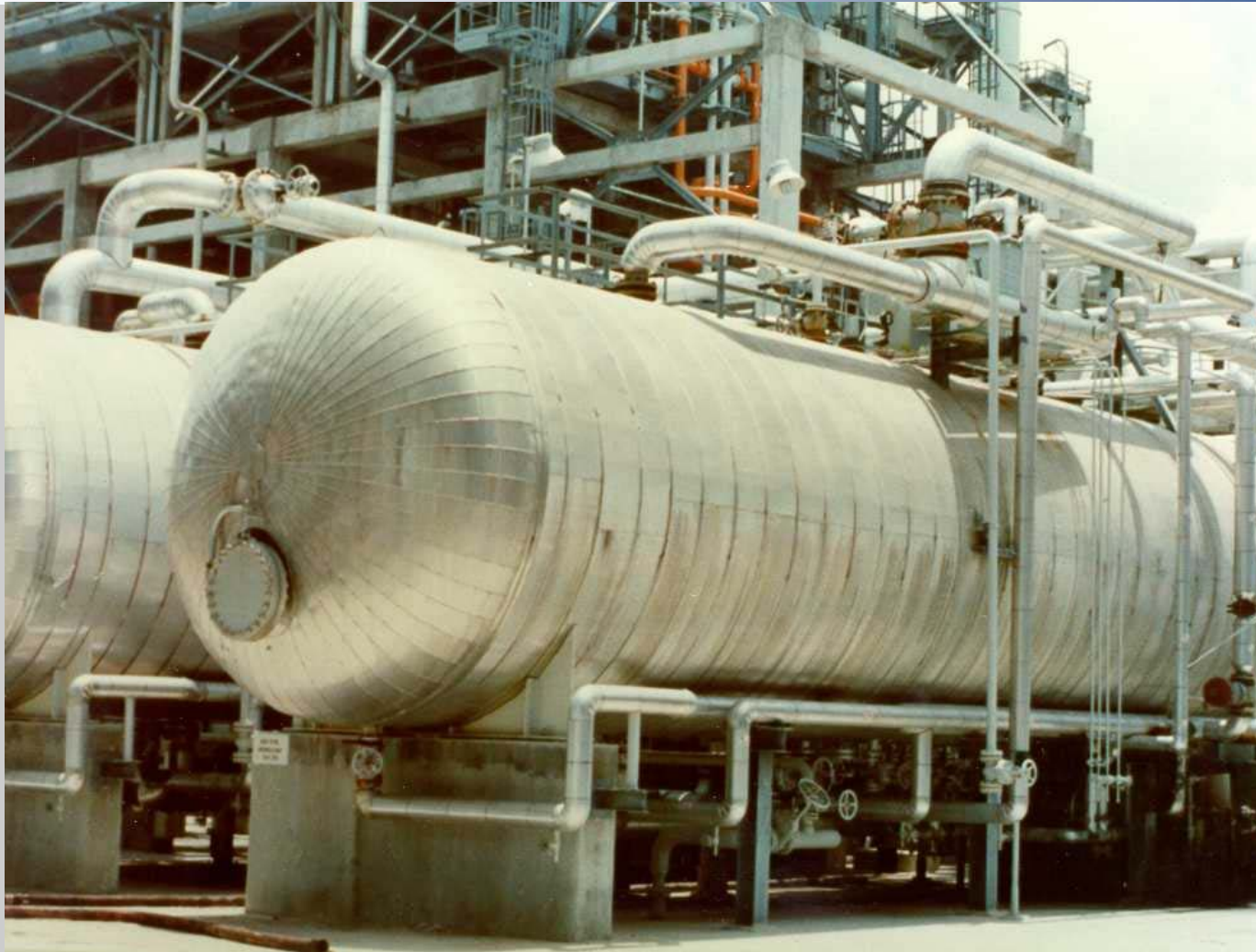
**NALCO ENERGY  
SERVICES**

A.C. POTTER

February 8, 2007



# CRUDE OIL DESALTER



$$V = \frac{KD^2(\rho_w - \rho_o)}{\mu}$$

**V = Settling Velocity**

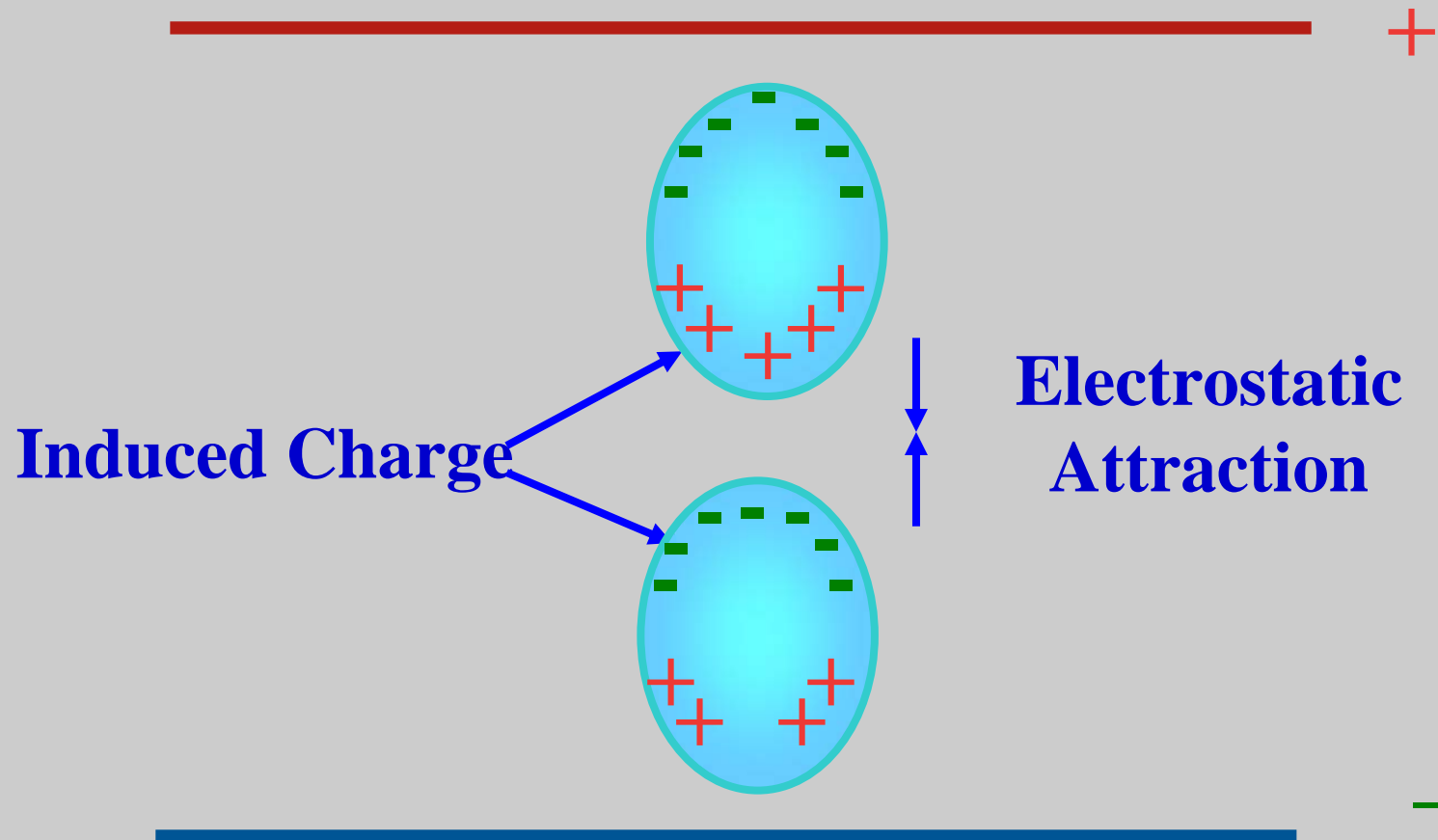
**K = A Constant**

**D = Diameter of Water Droplet**

**$\rho_w$  = Density of Water**

**$\rho_o$  = Density of Oil**

**$\mu$  = Viscosity of Oil**



$$F = \frac{CV_0^2 D^6}{d^4}$$

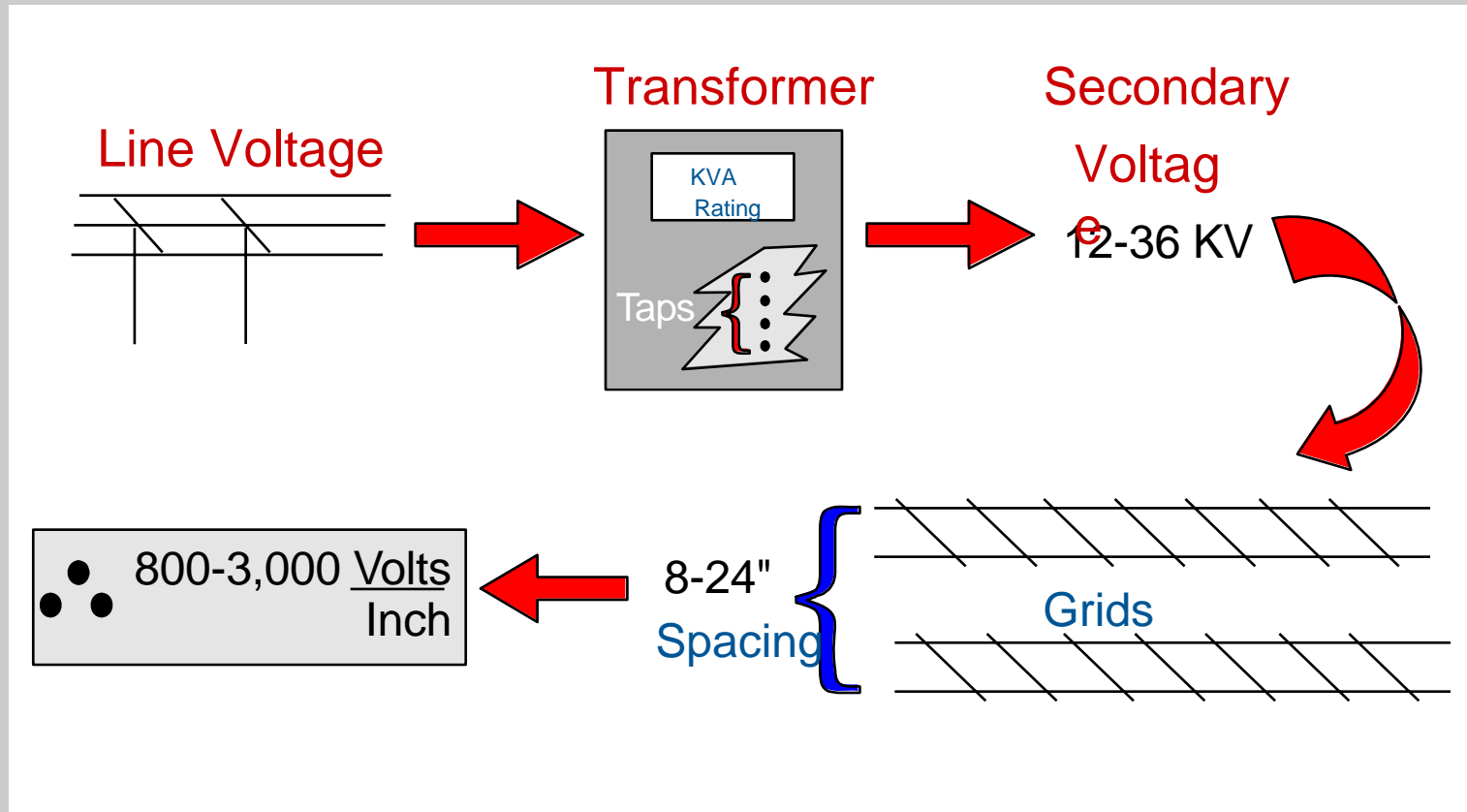
**F = Attractive Force**

**C = A Constant**

**V<sub>0</sub> = Voltage Gradient**

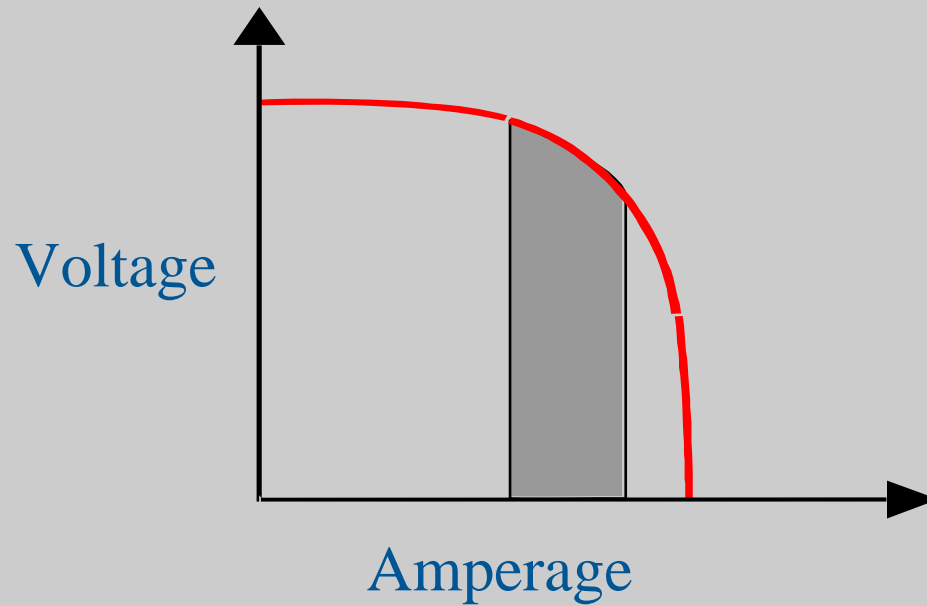
**D = Droplet Diameter**


**d = Distance Between Drops**



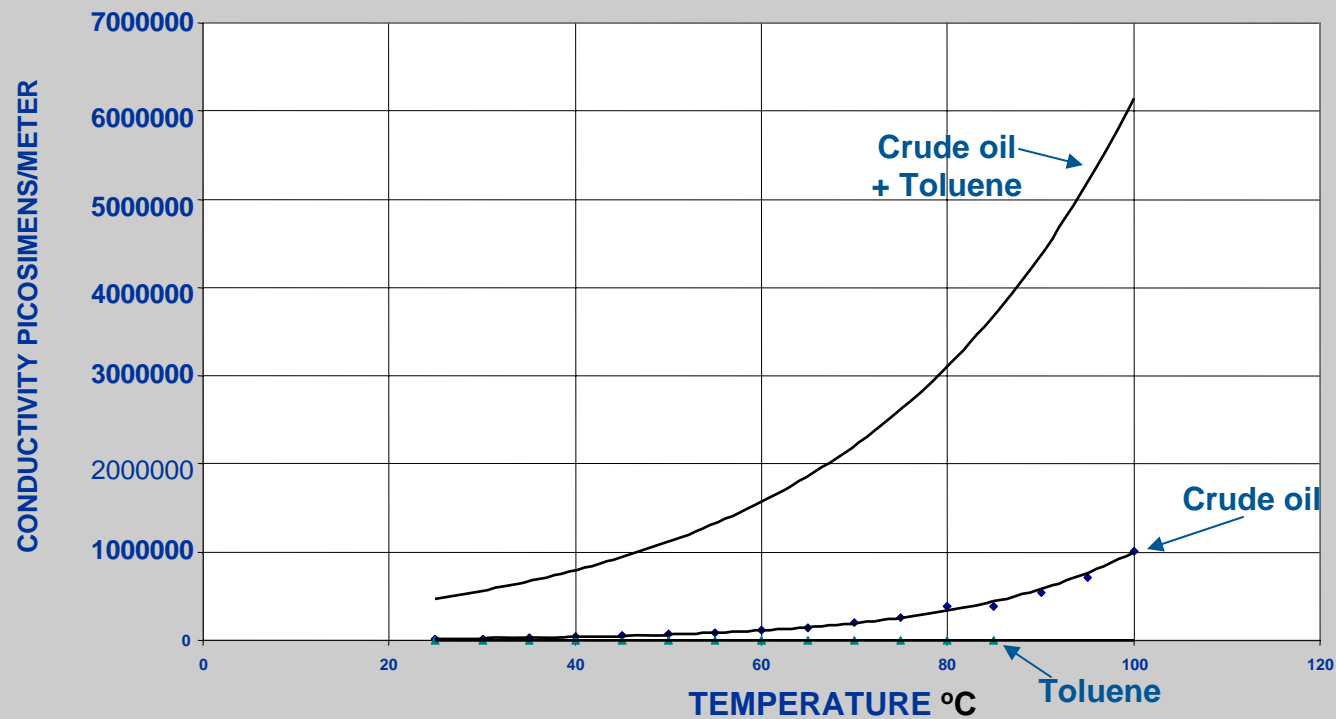
# NALCO TRANSFORMER CHARACTERISTICS

## AC Transformer Response

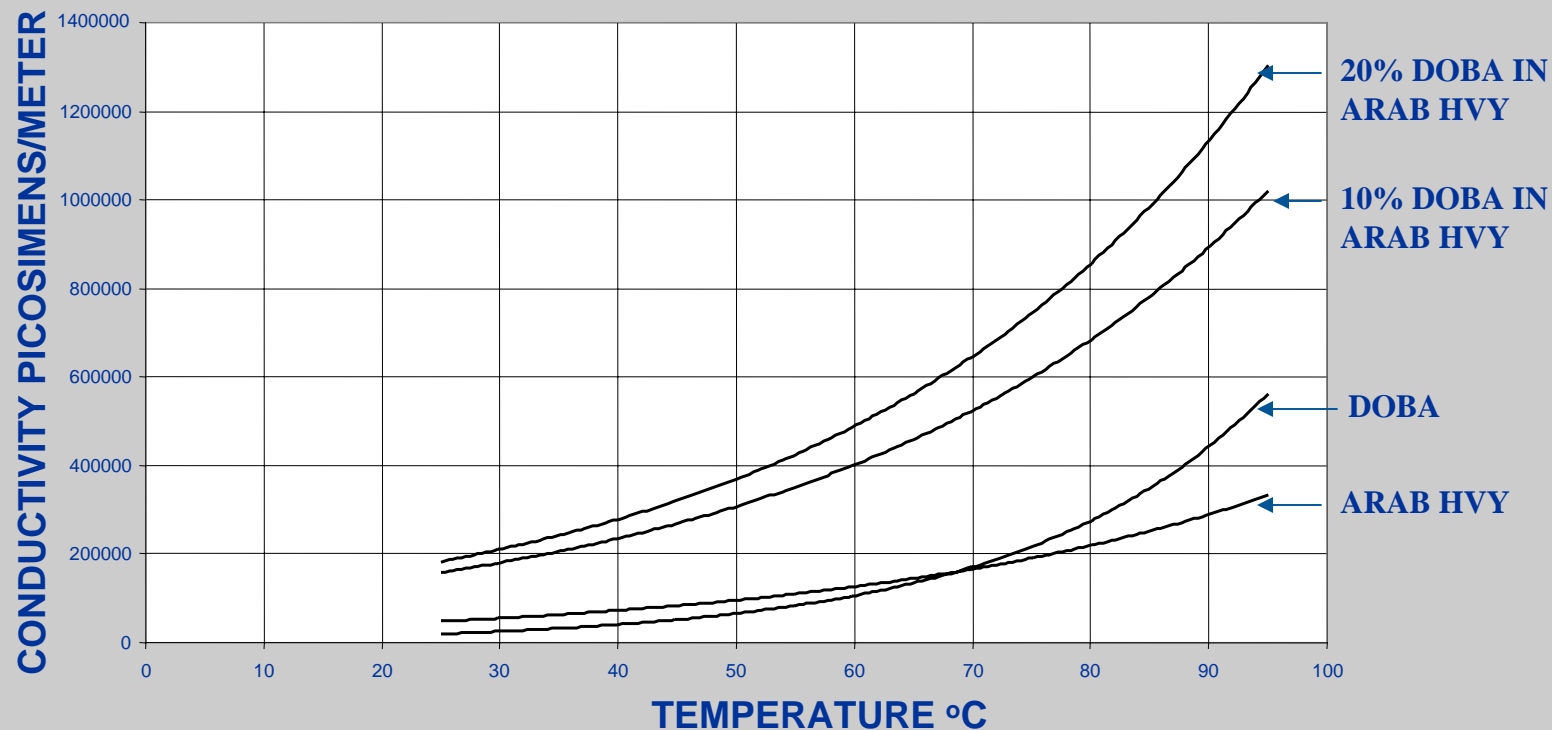


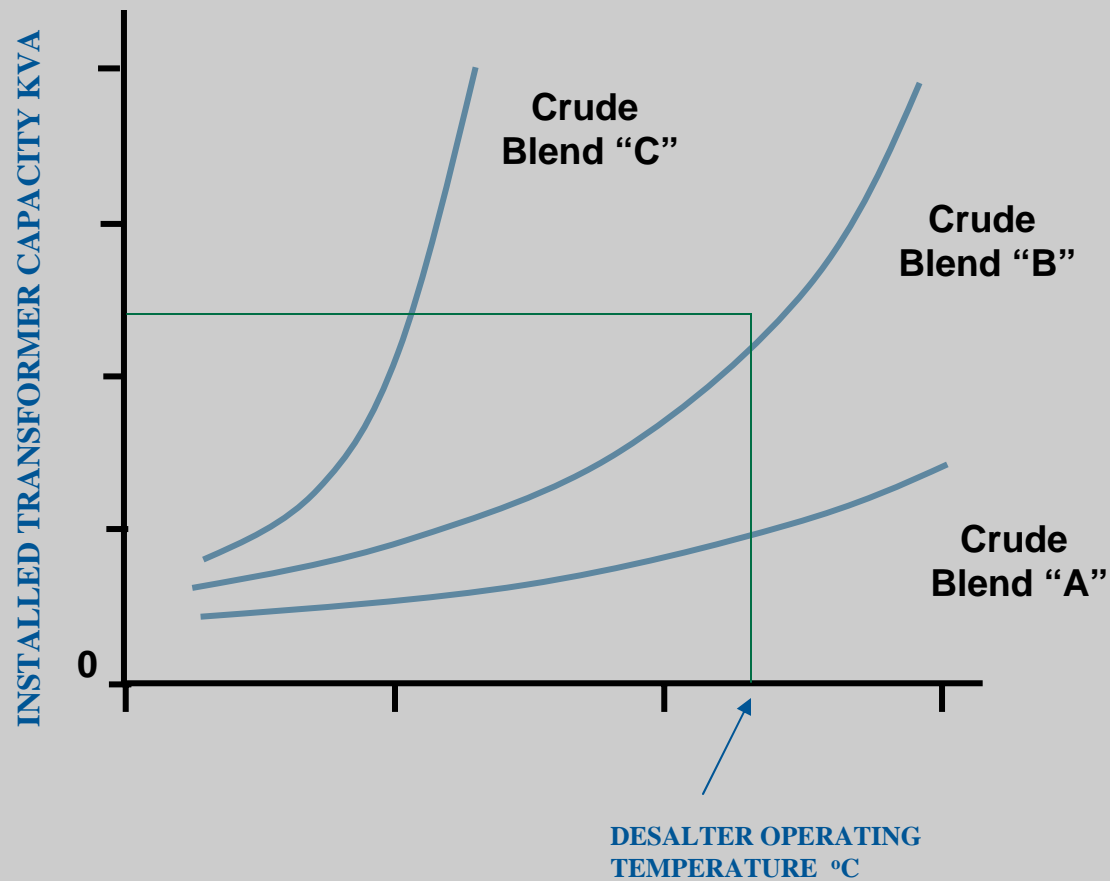
<u>Crude Oil</u>	<u>Resistance (Ohm-cm)</u>	
West Texas	3.0	 INCREASING CONDUCTIVITY
Arabian Light	1.5	
Arabian Heavy	1.1	
Alaskan North Slope	1.0	
Maya	0.95	
BCF 17	0.9	
Lloydminster B	0.6	

Source: Howe Baker Engineers



## ARAB HVY / DOBA CRUDE BLENDS





- CONDUCTIVITY

**TEMPERATURE**

**WATER IN CRUDE**

**CONTANIMANTS**

**CRUDE OIL**

**COMPOSITION**

**PRODUCTION**

**ADDITIVES**

- **TEMPERATURE**
  - INCREASES CONDUCTIVITY
- **WATER IN CRUDE OIL**
  - INCREASES CONDUCTIVITY
  - DESALTER DESIGNED FOR % QUANTITIES
- **CONTANIMANTS**
  - CONDUCTIVE SPECIES (eg: Metals)
- **CRUDE OIL**
  - COMPOSITION (?)
  - FORMATION RELATED (?)
  - ADDITIVES USED (?)

## CRUDE QUALITY PARAMETERS FOR DESALTING OPERATION

- SPECIFIC GRAVITY OF CRUDE SLATE
- WATER CONTENT OF CRUDE SLATE
- VISCOSITY OF CRUDE SLATE
- CHLORIDE CONTENT OF CRUDE SLATE
- SOLIDS CONTENT OF CRUDE SLATE
- CRUDE CONDUCTIVITY CRUDE SLATE