



أرامكو السعودية
Saudi Aramco



Sludge Dewatering Using Decanter- Centrifuges

Mahmoud Moaikel

Desmond Chan



Outline

• **Background**

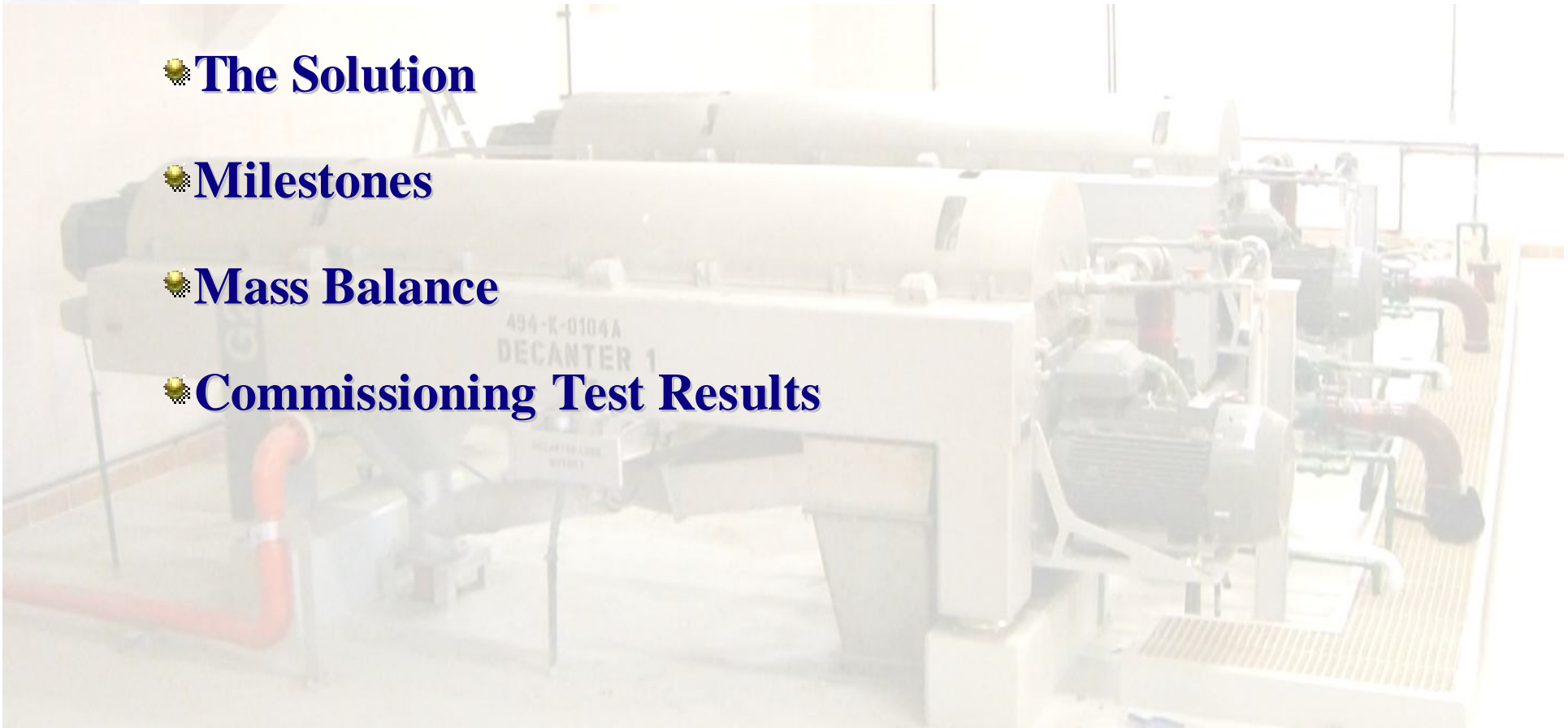
• **The Problem**

• **The Solution**

• **Milestones**

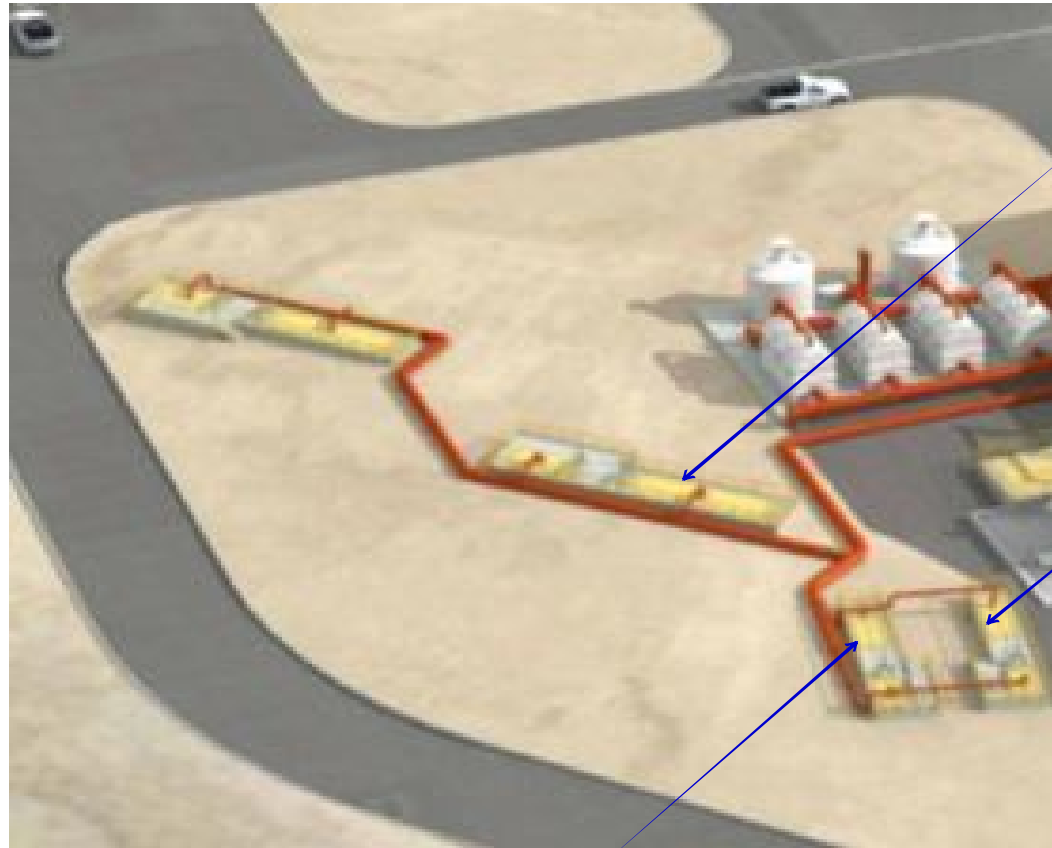
• **Mass Balance**

• **Commissioning Test Results**



Background

☀ Dhahran Wastewater Treatment Operations

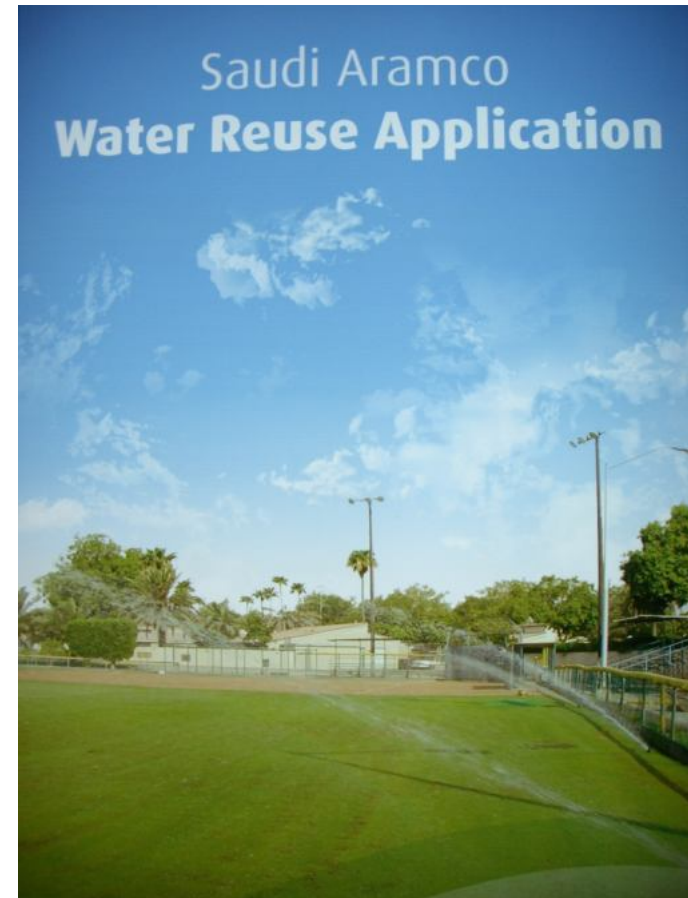
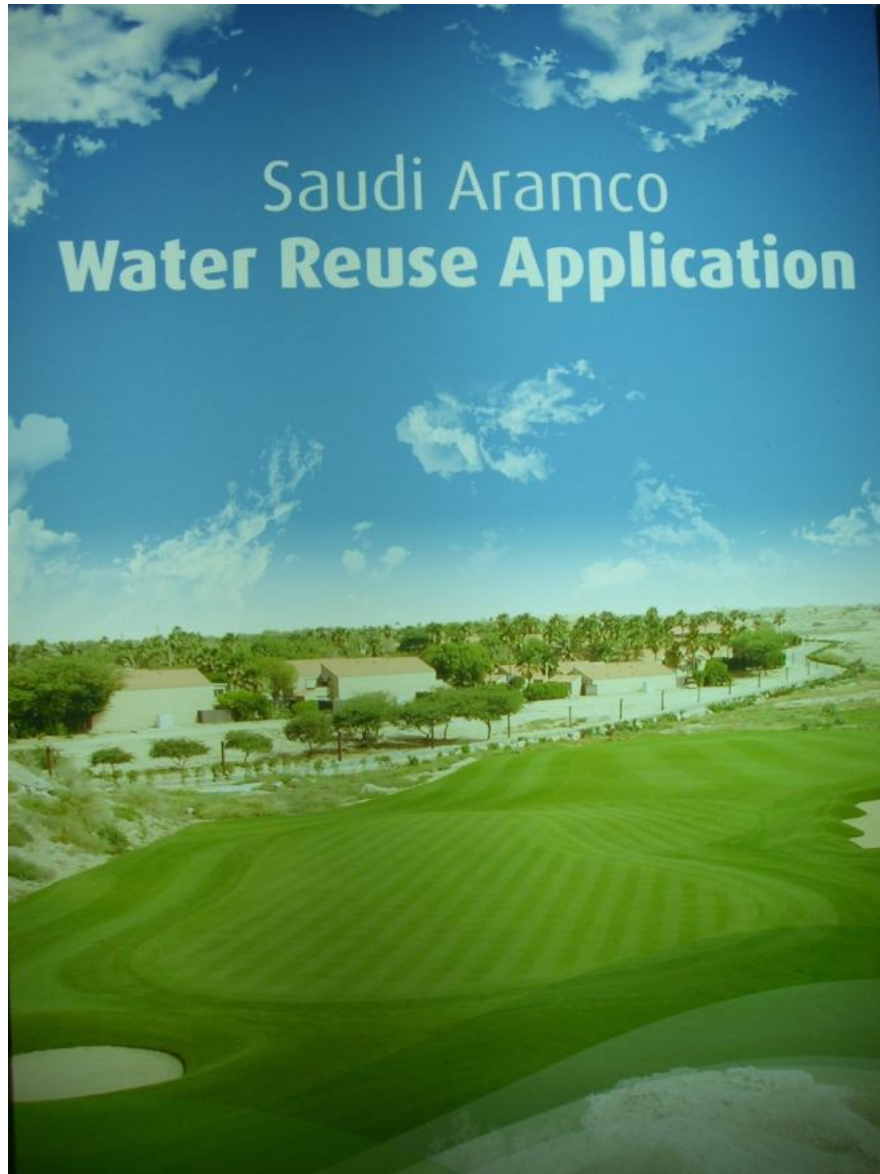


HOA'S

Dhahran

KFUPM

Background



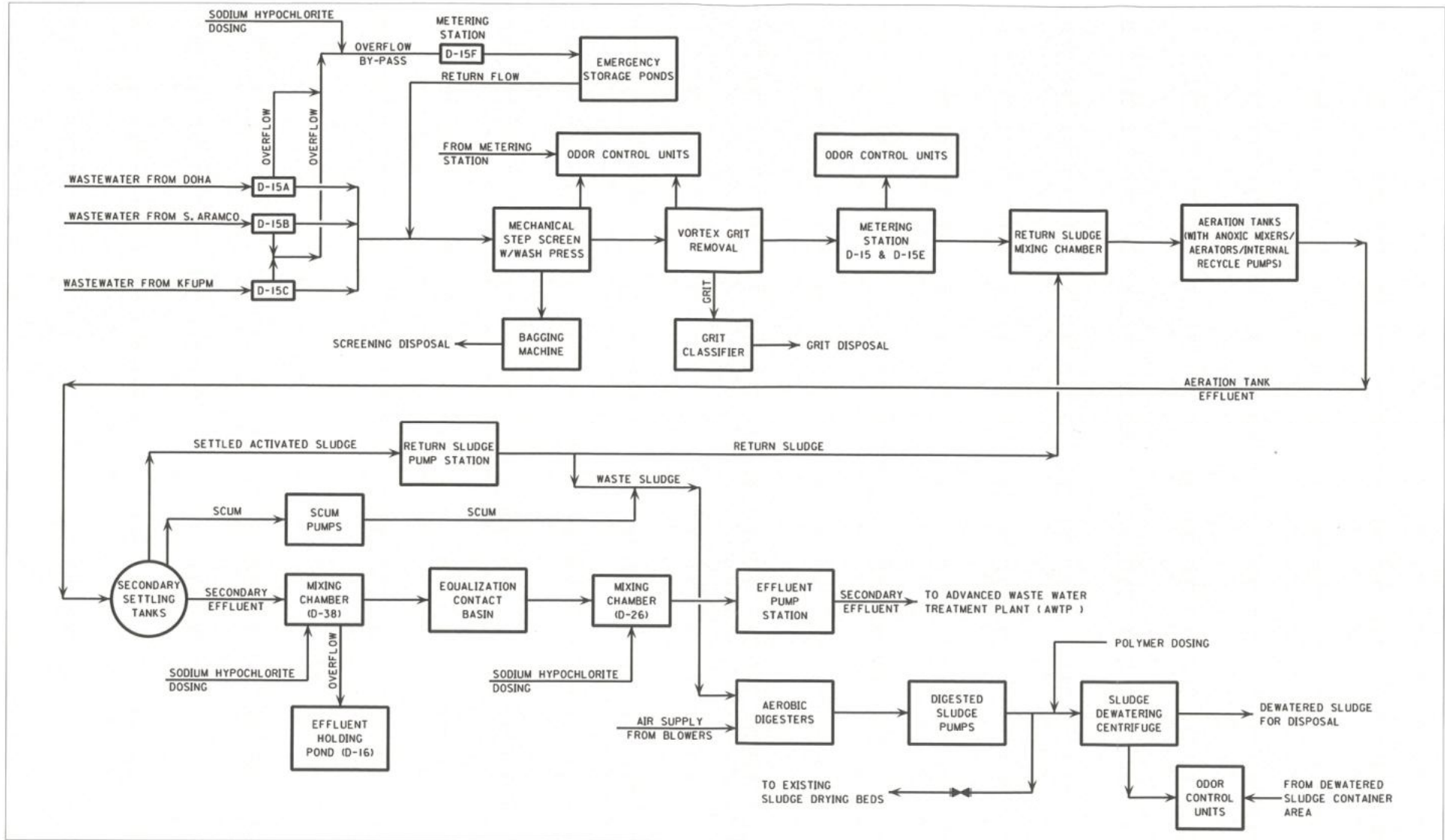
Background

North Wastewater Treatment Plant



Background

Process Flow Diagram





Outline

• Background

• **The Problem**

• The Solution

• Milestones

• Mass Balance

• Commissioning Test Results

The Problem

☀ **Urbanization**

☀ **Increased Capacity**

☀ **Reduced Footprint**





Outline

• Background

• The Problem

• **The Solution**

• Milestones

• Mass Balance

• Commissioning Test Results

The Solution

- **Alternate Means of Decanting**
- **Installation of Odor Control**





Outline

• Background

• The Problem

• The Solution

• **Milestones**

• Mass Balance

• Commissioning Test Results



Milestones

- Aug 2007: Alfa Laval (ALME) met Dar Al Riyadh and Aramco
- Nov 2007: main contractors bidding
- Feb 2008: contract awarded to Al Suwaidi Industrial Services Ltd. (SIS)
- Jul 2009: equipments delivered
- Oct 2009: operators training
- Dec 2009: initial site testing / commissioning
- Feb 2010: hands-on training & decanters put into operation (semi-automatic)
- Mar 2010: decanters fully commissioned and handed-over



Outline

• Background

• The Problem

• The Solution

• Milestones

• **Mass Balance**

• Commissioning Test Results

Mass Balance

Mass Balance Calculation



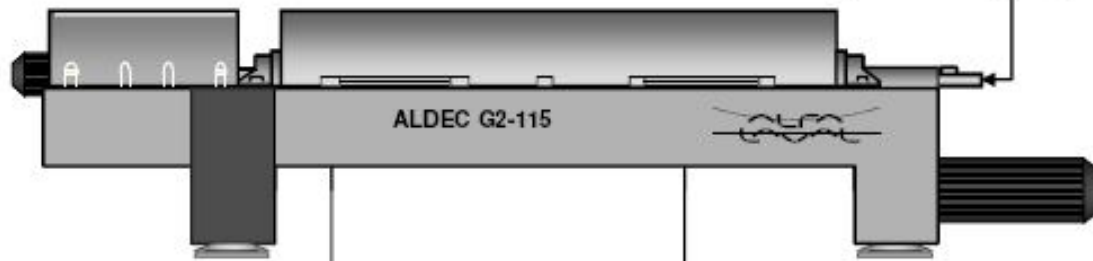
Customer	Saudi Aramco
Project name	North STP, Dhahran
Duty	Dewatering
Type of sludge	aerobically digested
Operation	24 h/d
Total sludge	
No. of Duty Units	2 (1 duty + 1 standby)

Sludge Feed	
Flow rate	50.00 m ³ / h
DS % in	1.25 % wt
Density	1.05 kg / l
Mass flow	656.25 kg / h

Diluted Solution	
Flow rate	2.08 m ³ / h
Active concentration	0.25 %

Dilution Water	
Flow rate	1.04 m ³ / h

Polyelectrolyte Dose	
Concentration of solution	0.50 %
Activity (trade product)	100.00 %
Active concentration	0.50 %
Density (trade product)	1.00 kg / l
Dosing rate (100% active)	8.00 kg / t DS
Total flow rate (PE + water)	1.05 m ³ / h
Water flow rate	1.04 m ³ / h
Mass flow (trade product)	5.25 kg / h
Flow rate (trade product)	5.25 l / h
Mass flow (active polymer)	5.25 kg / h



Liquid Outlet (Centrate)	
DS % out	0.02 % wt
Suspended solids	200 mg / l
Flow rate	46.92 m ³ / h
Recovery SS	99.97 %
Mass flow SS	9.38 kg / h

Solids Outlet (Sludge Cake)	
DS % out	22.00 % wt
Flow rate	2.96 m ³ / h
Mass flow	652.12 kg / h



Outline

• Background

• The Problem

• The Solution

• Milestones

• Mass Balance

• **Commissioning Test Results**

**Solids discharge
(21 ~ 24 % dryness)**



**Liquid discharge
(50 ~ 220 mg/l TSS)**

Mar 2010 Commissioning Test Results

*(average of 14 test-runs * Note)*

- Sludge Flow = 49.09 m³/h
- Polymer Flow = 1.12 m³/h at 0.5%
- Feed Sludge = 1.26 TS %
- Centrate quality = 220.86 mg/l TSS
- Cake dryness = 21.93 TS %
- Polymer Dosage = 9.20 kg/t TS
- Solids Recovery = 98.24 %

***Note: 12 runs at 2900 rpm (3061xG), 2 runs at 2500 rpm (2275xG)**

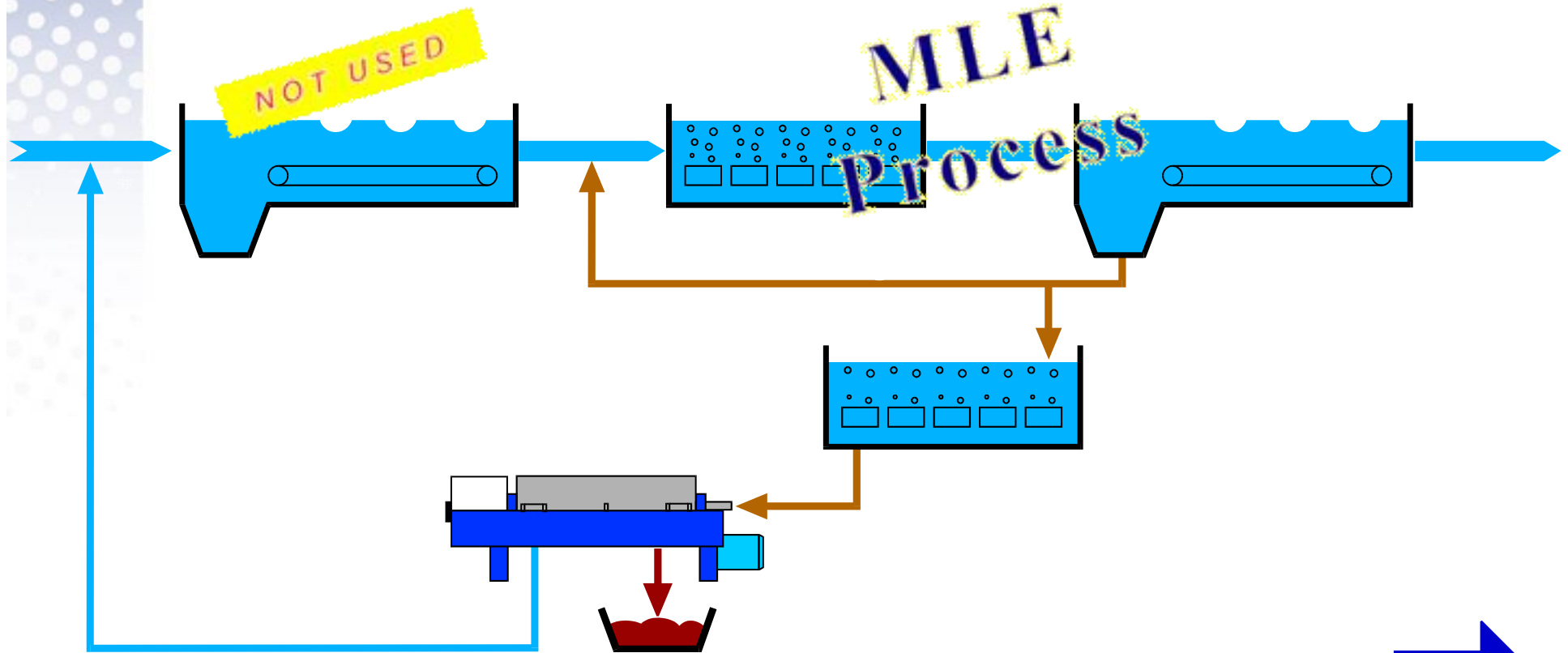


أرامكو السعودية
Saudi Aramco



Thank you !!!

Aerobically Digested Sludge



Back 