

WATER TECH 2014

BANFF, ALBERTA, CANADA

PRODUCED WATER TREATMENT SYSTEM

By:

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J.K. Engineering Ltd.

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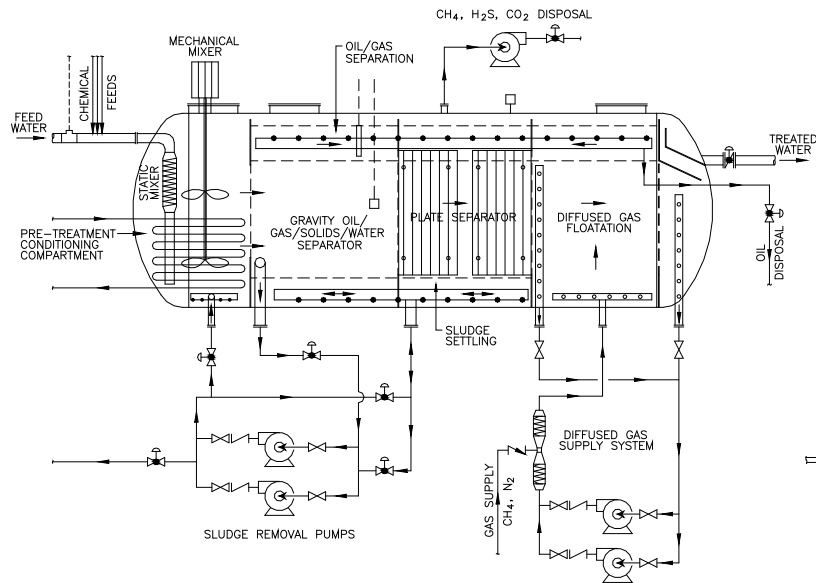
INTRODUCTION

- J.K. BACKGROUND
 - Established in 1987 in Alberta
 - Licenced in Alberta, BC, Ontario
- AREAS OF CONSULTING SERVICES
 - Water Supply
 - Wastewater Disposal
 - Storm Drainage Management
 - Groundwater Development
 - Site Development
 - Environmental Site Monitoring
- SCOPE OF CONSULTING SERVICES
 - Preliminary Investigations
 - Feasibility Studies
 - Detailed Design
 - Construction Services
 - Post-Construction Services
- EQUIPMENT SUPPLY
 - Water Treatment Package Systems
 - Wastewater Treatment Package Systems
 - Water Well Operation Monitoring
- APPLIED RESEARCH AND DEVELOPMENT
 - Water Treatment Systems
 - Wastewater Treatment systems
 - Water Well Monitoring Systems
 - Environmental Site Monitoring

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PRODUCED WATER TREATMENT SYSTEM COMPONENTS

1. FOUR PHASE SEPARATOR BASIC TREATMENT



2. OXIDATION AND FILTRATION SYSTEM POLISHING TREATMENT

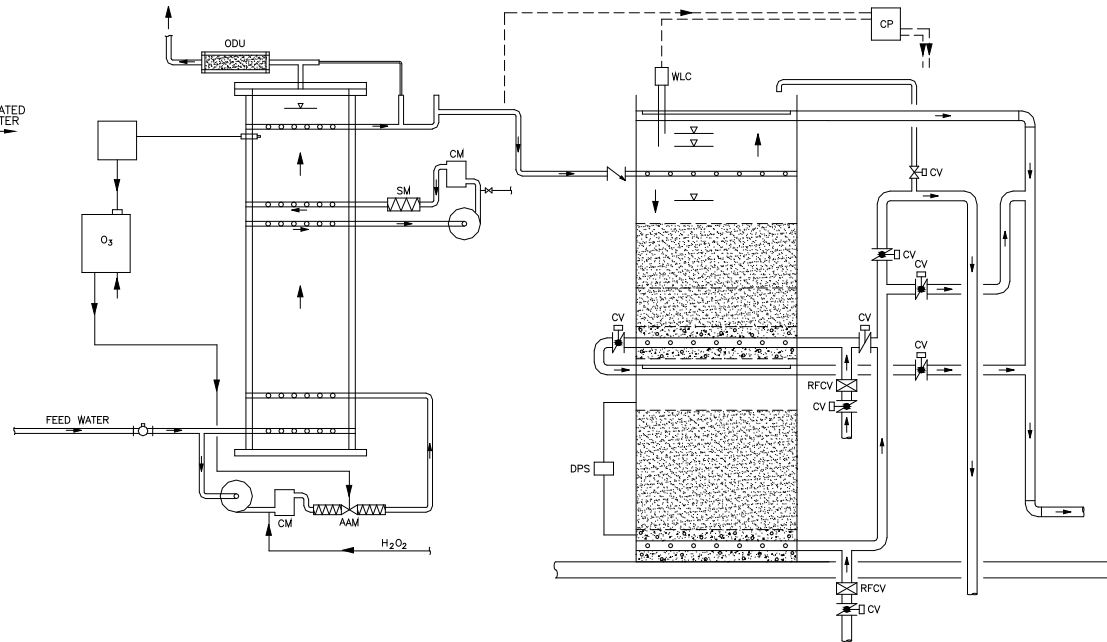


FIG. 1

J.K. ENGINEERING LTD.

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PRODUCED WATER FOUR-PHASE SEPARATION SYSTEM SCHEMATIC

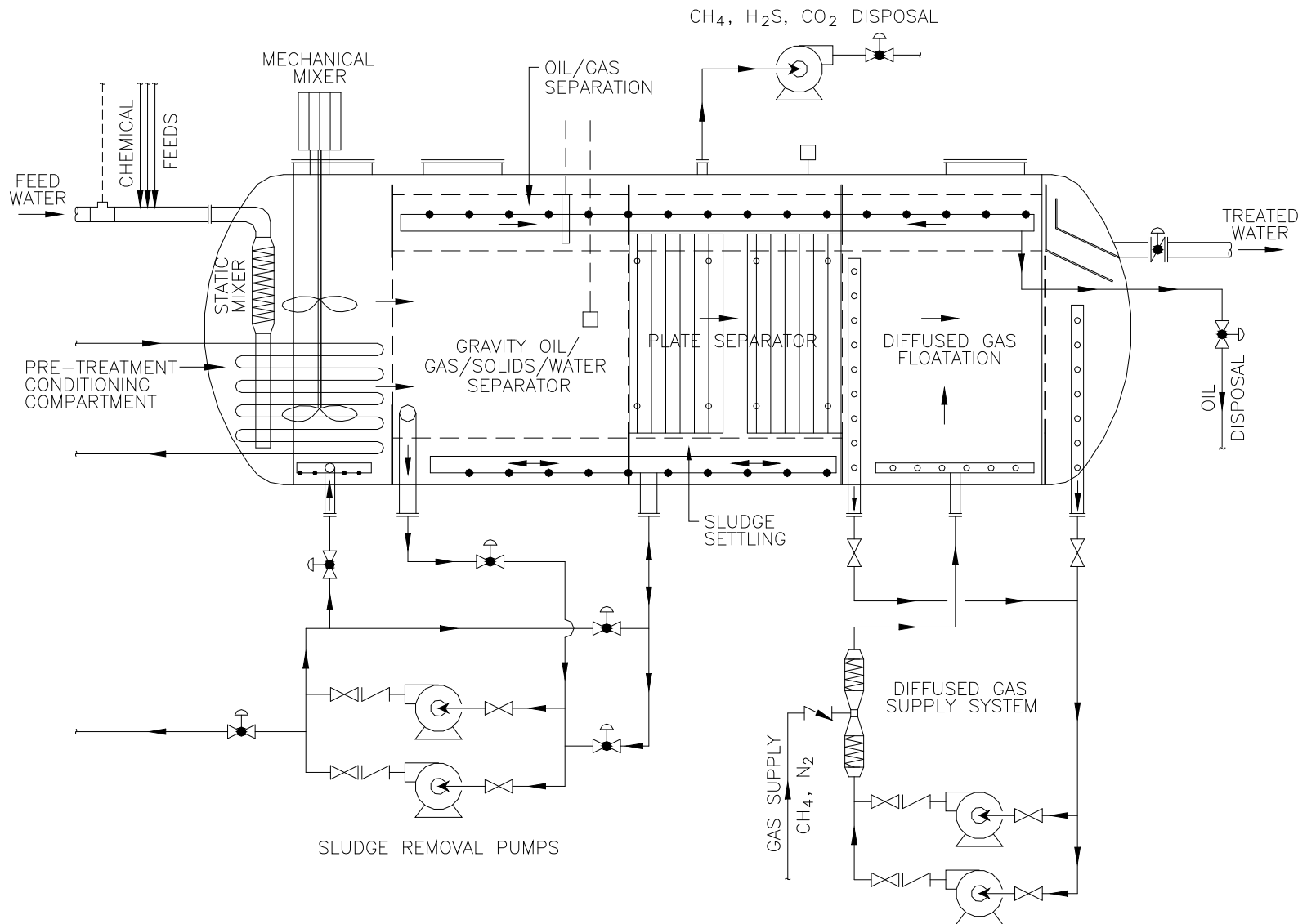


FIG. 2

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FOUR PHASE SEPARATOR

SEPARATION PHASE

- Solids (silt, clay, organics)
- Oil (may contain some solids)
- Gas (CO_2 , H_2S , NH_4 , N_2 -diffused gas)
- Water (may contain dissolved metals; iron, manganese)

FOUR PHASE SEPARATOR

SEPARATOR COMPONENTS

- Pre-treatment conditioning compartment
- Gravity separator compartment
- Plate separator compartment (parallel corrugated plates)
- Diffused gas flotation compartment (NH_4 , N_2 , AIR)
- Treated water compartment
- Sludge removal system
- Diffused gas supply system
- Oil recovery system
- Gas recovery system
- Instrumentation

FOUR PHASE SEPARATOR

FEED WATER PRE-TREATMENT CONDITIONING

- pH adjustment
- Temperature rise (in cold areas)
- Coagulants / Flocculants / Demulsifiers

GRAVITY SEPARATION OF WELL CONDITIONED FEED WATER

- Most of suspended solids removal
- Most of oil removal

PARALLEL PLATE SEPARATION

- Substantial removal of remaining solids
- Substantial removal of remaining oil

DIFFUSED GAS SEPARATION

- Final removal of remaining oil with very fine solids
- Removal of gases

SLUDGE REMOVAL

- Sludge scouring by reversal flow
- Sludge removal – pumping out

FOUR PHASE SEPARATOR

OIL REMOVAL

- Gravity, automatic oil removal to adjacent oil tank
- Pumped oil transfer to a remote oil tank

SELF CLEANING

- Self cleaning of all compartments by jet flashing
- Automatic or manually activated self cleaning

INSTRUMENTATION

- Fully automatic operation with:
 - Feed water flow monitoring
 - Chemical dosing
 - Sludge level monitoring
 - Oil/water interface monitoring
 - Gas removal pressure control
 - Sludge removal operation
 - Self cleaning operation
 - Oil removal system

ADVANCED TREATMENT WITH OXIDATION AND FILTRATION

- Removal of dissolved metals; iron, manganese, arsenic, uranium
- Naturally occurring dissolved organic matter

OXIDATION AND FILTRATION SYSTEM

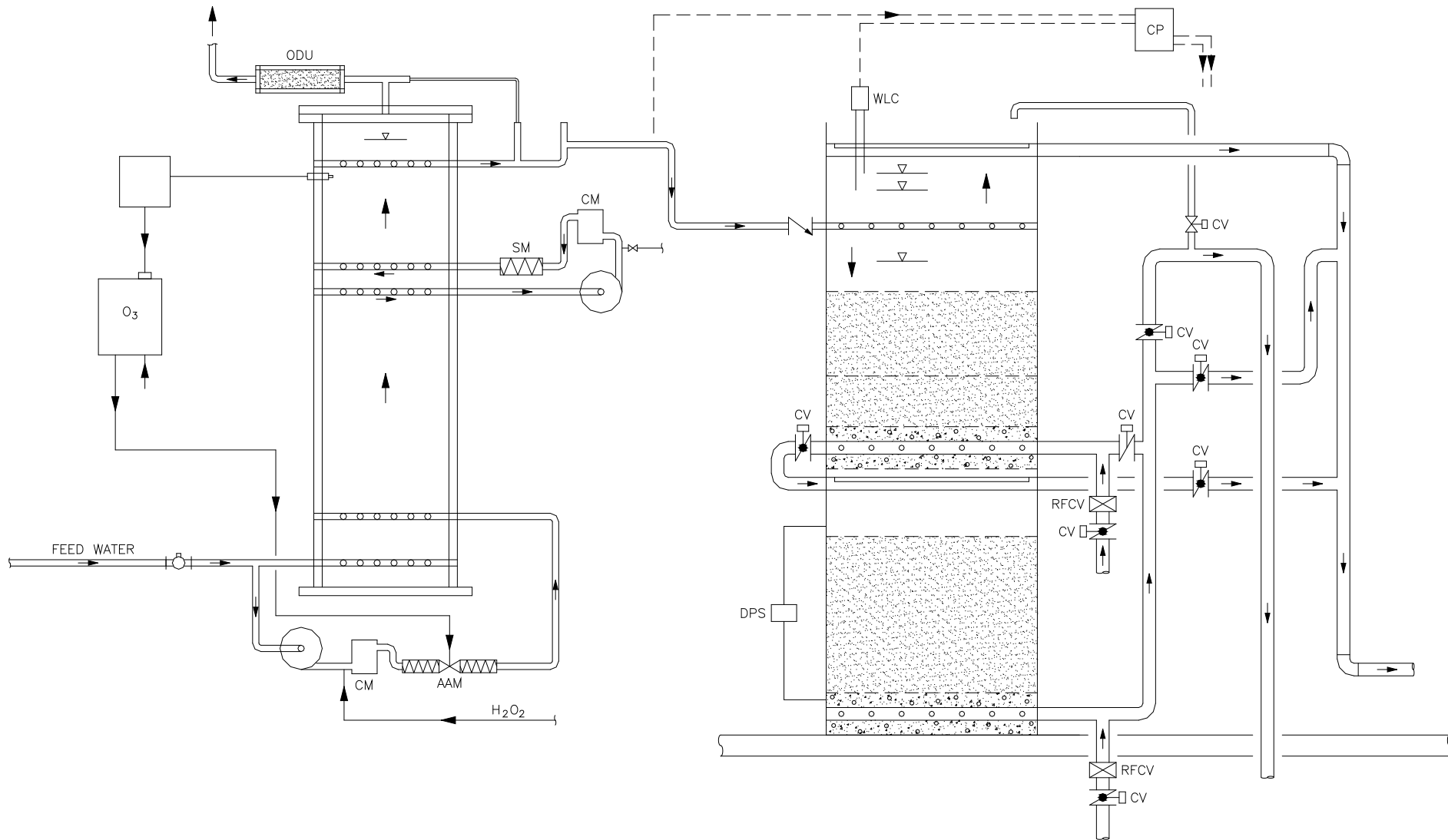


FIG. 3

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