



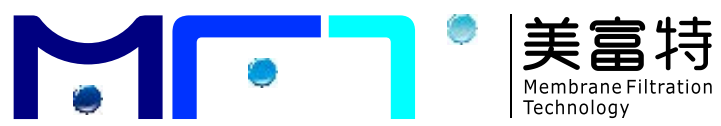
**MEIFUTE MEMBRANE TECHNOLOGY CO.,LTD.**

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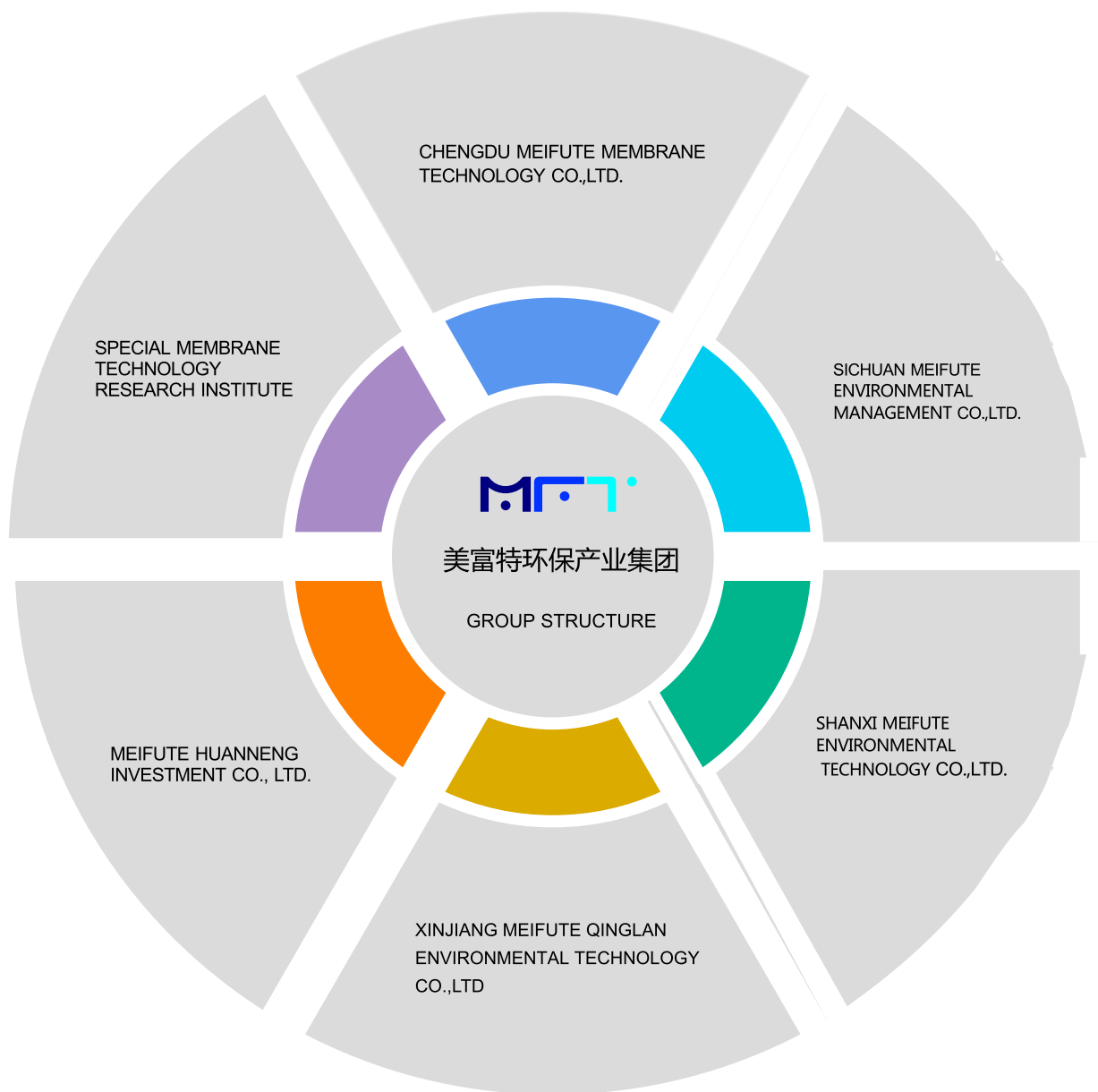




**ZERO LIQUID DISCHARGE , WATER REUSE, INDUSTRIAL WASTEWATER TREATMENT,  
MUNICIPAL WASTEWATER TREATMENT, WATERSHED TREATMENT**

ENVIRONMENTAL PROTECTION SERVICE

# COMPANY INTRODUCTION





## WATER TREATMENT SPECIAL MEMBRANE LEADER

Chengdu Meifute Membrane Technology Co., Ltd, dedicating to the sewage treatment nearly 20 years, is the sole high-tech enterprise which owns the full range products of special membrane RO, NF, UF, MF.

Meifute provides the most cost-effective solution to the clients aiming at water-pollution prevention and treatment and resource use, keeping the special membrane technology as the core, and integrating the traditional Physico-chemical, biochemical techniques.

### Business Range:

Zero liquid discharge/Water reuse

Industrial Wastewater Treatment

Municipal Wastewater Treatment

Watershed Treatment



# RESEARCH AND DEVELOPMENT

## Research Ability :

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Covering an area of 50,000 square meters in Chengdu Environmental Industrial Park , Meifute has the largest special membrane research and development production base, as well as the special wastewater Key Laboratory and special membrane technology research institute.

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Meifute keeps close contact and interaction with research institutions in Germany.

In China, We cooperate with many famous universities ,such as Sichuan University, Tianjin Polytechnic University and other institutions.

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## R & D innovation achievement :

### 200 independent intellectual properties

### More than 20 Scientific Research Achievements

- 1、 The integration equipment of special membrane which disposes oil and gas field waste water.
  - 2 、 The integration equipment of special membrane which disposes landfill leachate.
  - 3、 The technology of special membrane which applied in reused water and zero emissions.
  - 4 、 The technology of special membrane which disposes electroplating effluent.
  - 5 、 The technology of special membrane which disposes hazardous waste liquid.
  - 6 、 The disc MBR membrane module.
  - 7 、 The waste water treatment integration equipment of disc MBR membrane.
  - 8 、 The pilot plant test vehicle of special membrane which treats industrial waste water.
- 





## ENTERPRISE HONOR



The chairman of Meifute visited to Europe with the Sichuan provincial party committee secretary Wang Dongming



The chairman of Meifute taken part in Germany's chancellor, Angela Merkel reception.



Ferris orchid provincial experts in Holland visited Meifute group



Meifute attended many international exhibitions, such as Aquatech China, IE expo. Engineers communicated with the foreign customers at the exhibitions.



TUV Rheinland Certification  
 “China Environmental Innovative Brand”  
 “Oil & Gas Cleaning Key Technology”  
 “China Environmental Modal Company”  
 “Famous Brand”  
 “The Annual Customer Satisfaction Brand”

# CORE PRODUCTS

What is Special membrane ?

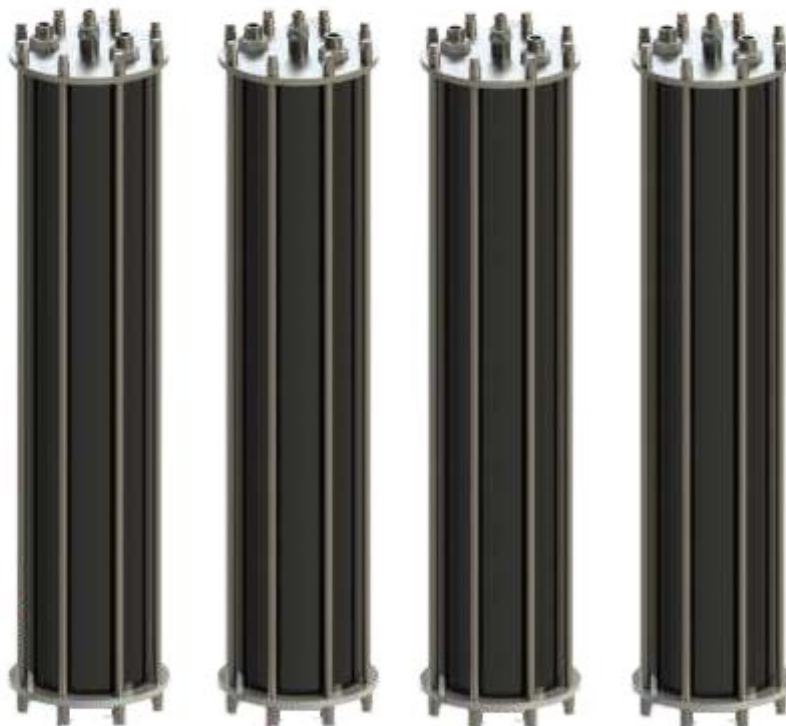
----Used for wastewater reuse.

----High anti-fouling and high recovery.

Product model: SUPER RO/SUPER NF

**SUPER RO**

**SUPER NF**



## MEMBRANE FILTRATION:



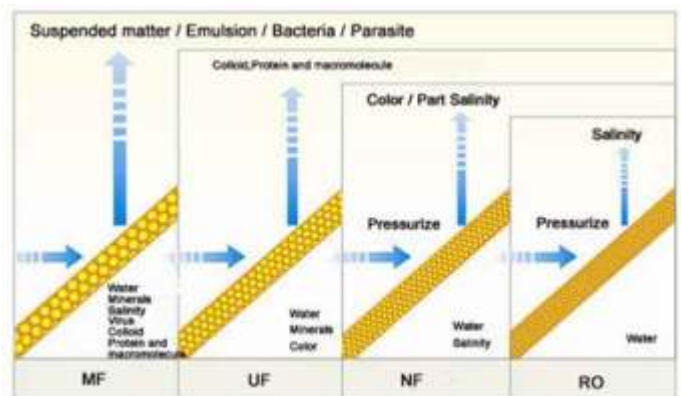
### MF&UF Features:

- used for macromolecules filtration, almost no rejection of COD.
- as a pretreatment of NF / RO membranes, almost no interception effects for small organic molecules and salinity.

### NF&RO Features:

Traditional NF and RO, are mainly used for desalination, brackish water, cooling water areas, water purification etc, desalting and rejecting small organic molecules.

- poor stain resistance
- low water recovery
- high cleaning frequency
- short life



# SUPER MODULE

## Core Parts Of The SUPER MODULE:

filter membranes, guide plates, central pull rod, high pressure resistant vessel, flange at both ends, sealing elements and connecting bolts.

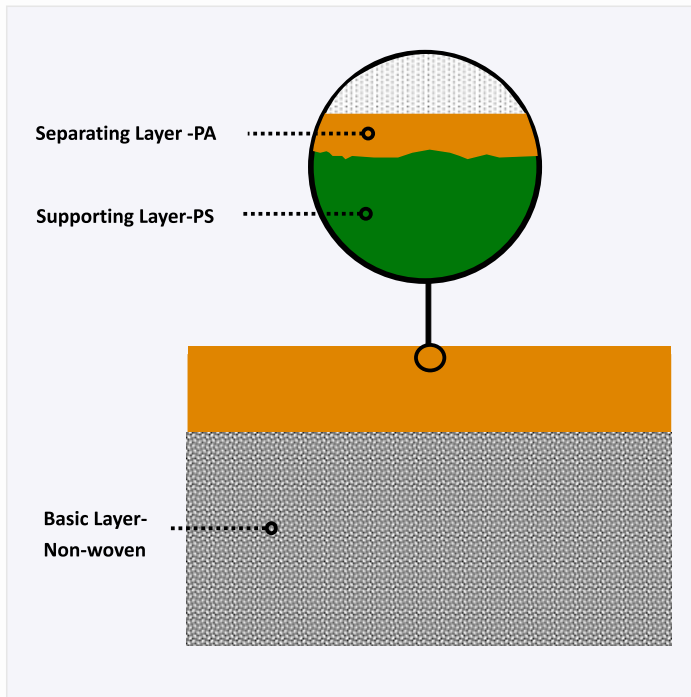
Special Membrane Sheet

Structure Design  
Innovative Disc



# SUPER RO/NF

## Membrane Sheet Characteristics:



### MEMBRANE CHARACTERISTICS

### MEMBRANE CHARACTERISTICS

#### **Membrane sheet characteristics:**

**Thicker Separating Layer ---- Longer Life**

**Denser Supporting Layer ----- better compressive performance**

**Smoother Membrane Surface ----Better Anti-fouling**

**Electrically neutral membrane Surface ----Not easy to absorb Microorganisms**

**Better hydrophilic ----Larger Membrane Flux**



# MEMBRANE CHARACTERISTICS

<< Improved Supporting Layer-All Membranes are sensitive to pressure.

Typical Pressure Limit(bar)

| Product            | Standard | Special |
|--------------------|----------|---------|
| Super ROMembrane   | 90       | 160     |
| Other RO Membranes | 41       | 83      |



<<Thicker Separating Layer-Longer Life

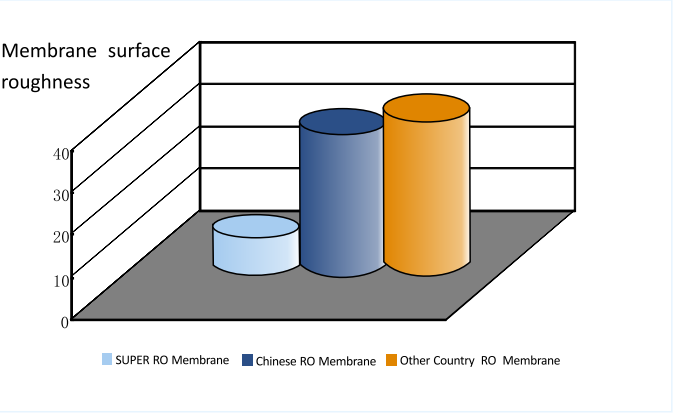
| Product            | Separating Layer Thickness(μm) | Remarks           |
|--------------------|--------------------------------|-------------------|
| Super RO Membrane  | About 0.3                      | Can supply 0.4 μm |
| Other RO Membranes | About 0.2                      |                   |



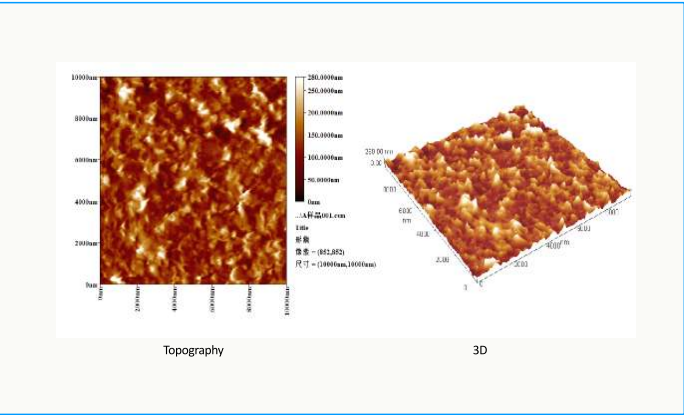


<< Smoother Membrane Surface - Better Anti-fouling

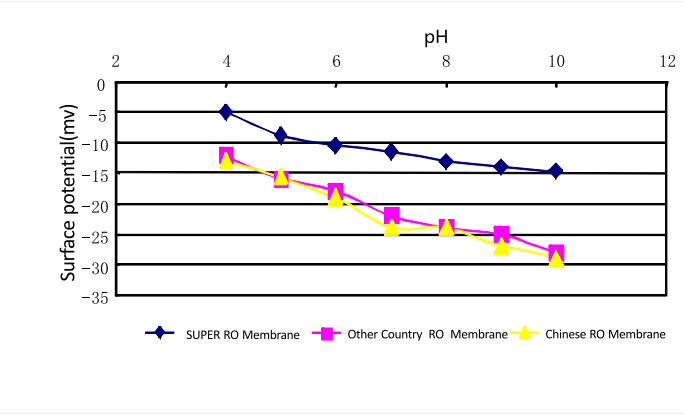
Smoothness Comparison Chart of Different Membrane :



Super RO Membrane AFM Picture :



<< Electrically neutral membrane surface -----Not easy to absorb microorganisms



| Product                   | Hydrophilic Angel |  |
|---------------------------|-------------------|--|
| SUPER RO Membrane         | 45.8              |  |
| Chinese RO Membrane       | 47.6              |  |
| Other Country RO membrane | 46.5              |  |

<< Better hydrophilic ----Larger Membrane Flux  
The greater the flux of membrane, the lower project investment cost is .

## FLOW GUIDE PLATE CHARACTERISTICS



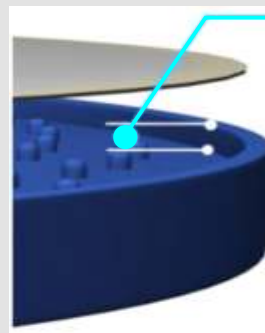
Flow guide plate characteristics

----Wider Passageway

----Salient Point Array

----Vortex Concentrated Water Flow Design

Avoid passageway blockage .  
Decrease the operating cost.

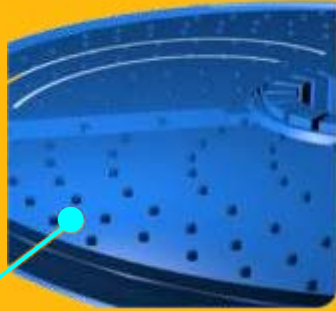


2.5mm

No easy to be blocked  
with patented design

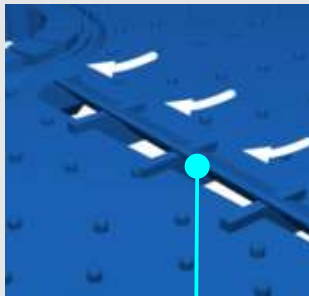
Unique salient Point Design

$Re > 2500$



Better Self-cleaning .  
Decrease membrane fouling  
Reduce concentration polarization

Slot design



Make the liquid swirl spiral.  
Reduce the pressure loss (pressure  
dropping =  $0.1 - 0.2 \text{ bar/m}^2$ ).

# SUPER MODULE 1.2

## INTRODUCTION

### SUPER MODULE MODE :

-----

SUPER RO

SR-11-9

SR-11-16

-----

SUPER NF

SN(100)-11-9

SN(300)-11-9

SN(100)-11-16

SN(300)-11-16



### SUPER RO PARAMETER:

| Product Name             | SR-11-9 、 SR-11-16                               |
|--------------------------|--|
| Membrane Material        | Compound polyamide                               |
| Max Operating Pressure   | 90 bar /160 bar                                  |
| Membrane Area per module | 11 m <sup>2</sup>                                |
| Membrane sheet number    | 147  |
| Guide plate number       | 148  |
| Membrane module height   | 1.4m   |
| Membrane shell height    | 1.2m   |
| Influent Flow            | 1300-1500 L/H                                    |
| *Recovery Rate           | Each module <45%, depending on the water quality |
| Chlorine Tolerance       | < 0.1 ppm  |

### Application:

Applicable to the high concentration of pollutants, high salinity, difficult to treat, high effluent quality requirements, and recycling water processing field.

SUPER NF PARAMETER:

|                          |   |                            |  |
|--------------------------|---|----------------------------|--|
| Product Name             | SN(100)–11-9、 SN(300)–11-9、<br>SN(100)–11-16、 SN(300)–11-16                           | Operating Temperature      | < 45℃  |
| Membrane Material        | Compound polyamide  | *Recovery Rate             | Each module <45%, according to the water quality |
| Molecular Weight Cutoff  | 100/300   | Chlorine Tolerance         | < 0.1 ppm  |
| Membrane Area per module | 11 m <sup>2</sup>   | Concentrated Water Channel | Bump height: 2.5 mm                              |
| pH                       | Best Operating: 6.5-7.0<br>Normal Operating: 3.0-11.0<br>Cleaning Operating: 2.0-11.5 | Max Operating Pressure     | 90bar/160bar                                     |

| Model      | Rejection rate       | Recovery Rate |
|------------|----------------------|---------------|
| SN(100)–11 | 95% (Bivalent salts) | 80～90%        |
| SN(300)–11 | 80% (Bivalent salts) | 80～90%        |



Application:

Zero Emission water reuse, High Concentration Wastewater Standardized Discharge, Oil Gas Filed Waste water, Leachate, Dangerous effluent, printing and dyeing wastewater, electroplating waste water, etc.



# APPLICATION

Meifute introduces, digests, absorbs and innovates Germany technology . Currently, the special membrane technology is widely applied in industrial wastewater treatment, municipal sewage treatment and other fields.

Meifute has built up multiple model projects.

These projects were rated as the model demonstration projects, and through identification of scientific and technological achievements.





# 01.

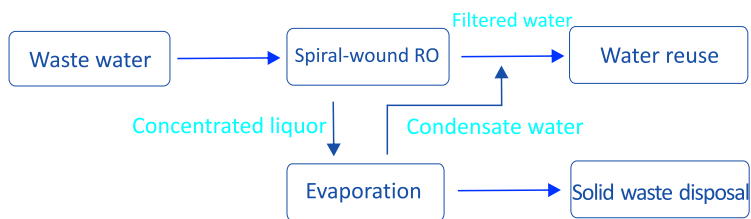
## THE ZERO LIQUID DISCHARGE

### The zero liquid discharge:

Removing the salts and pollutants in the each stage of production sewage ,meeting production and recycling requirements, all recycled, no waste liquid to rule out factory.

The salt and pollutant which are concentrated into solid or liquid at high magnification are treated separately in the form of solid waste.

### Traditional Membrane Technology:



### The Traditional Technology disadvantages:

»The structure characteristics of spiral-wound RO :

- Stain resistance is not high.
- Operating pressure is limited.
- Recovery rate can only reach 50% ~ 60%

»The evaporation process defects:

Concentrated liquor need to deal with the evaporation.

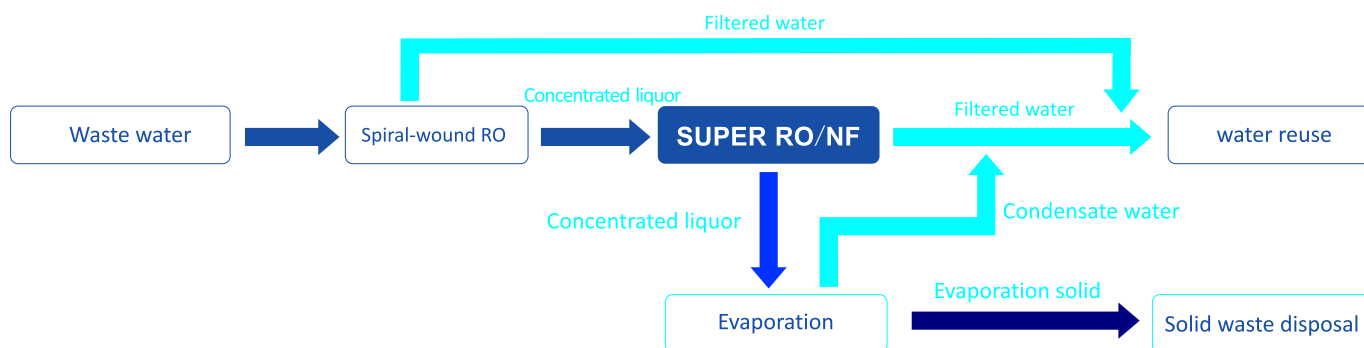
- High investment (above \$ 3100 /ton water, dual phase steel material).
- High energy consumption (\$ 9.3/ton water. 0.4 tons of fresh steam/ton of water, \$ 23.26 /ton of fresh steam).





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## MFT SPECIAL MEMBRANE TECHNOLOGY



### MFT special membrane technology features:

Special membrane is used in traditional spiral-wound RO water enrichment again, and improving the concentration ratio, decreasing concentrate.

----Excellent water production can recycle.

----High concentration, saving energy and reducing consumption.

----Reduce the evaporator investment and operating cost.

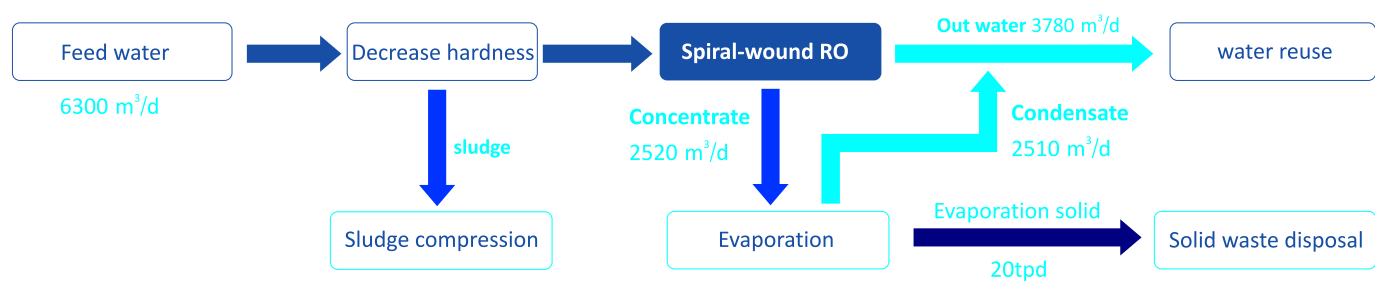
# CASE ANALYSIS

Inner Mongolia Chang Sheng pharmaceutical CO., LTD., which is engaged in antibiotic medicine research and development production, is one of the largest antibiotic production enterprises in China.



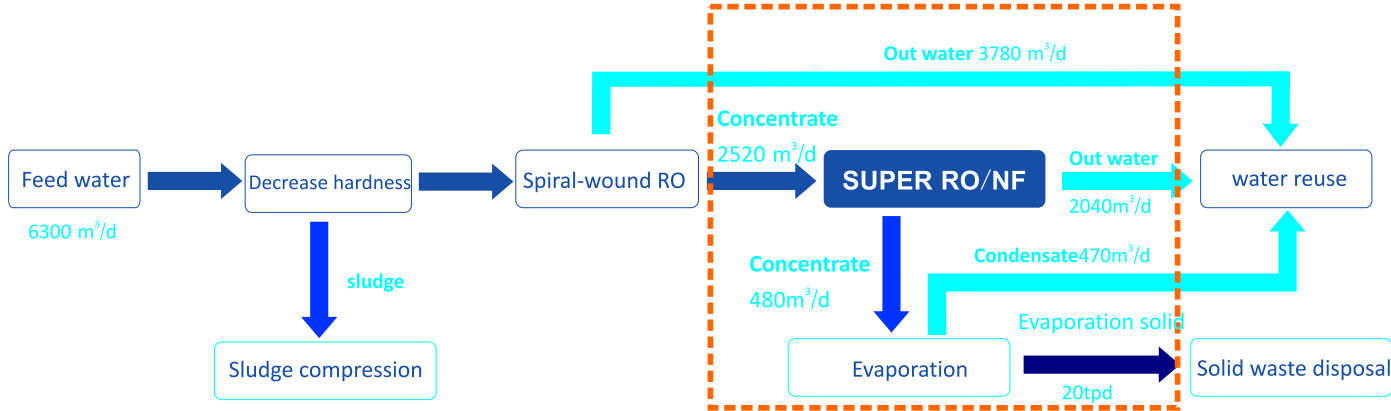
| Water type and scale                  | Raw water inlet water quality indicators | Feed Water indicators | Out water indicators |
|---------------------------------------|--|-----------------------|----------------------|
| Antibiotic wastewater<br>( 6300 m³/d) | Conductivity ( $\mu$ s/cm )              | 14000                 | 500                  |
|                                       | The total salt ( mg/L )                  | 8000                  | 300                  |
|                                       | Total hardness ( $\text{CaCO}_3$ ) mg/L  | 580                   | 200                  |
|                                       | Alkalinity ( mg/L )                      | 333                   | 150                  |
|                                       | COD mg/L                                 | 260                   | 50                   |
|                                       | $\text{Cl}^-$ ( mg/L)                    | 3200                  | 100                  |

Conventional membrane process diagram of water balance



The recovery rate of spiral-wound RO is only around 60%.  
2520 m³ / d of water need to be evaporated.

Special membrane process diagram of water balance



Only 480 m³ / d concentrate water need to be evaporated.

### The economic indicator of traditional technology (RO concentrate section)

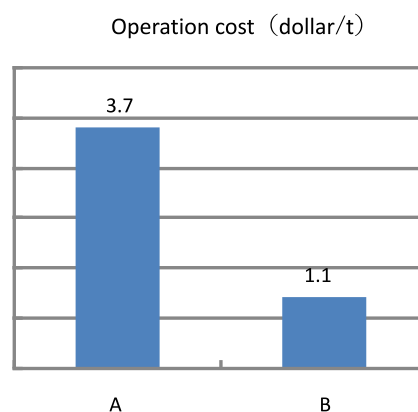
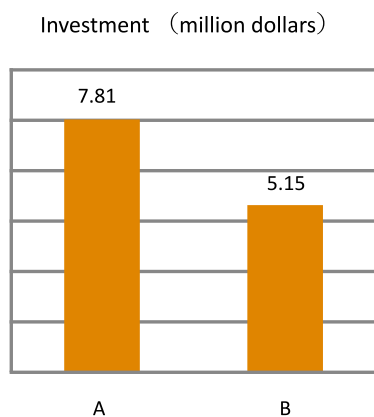
| Project | Treat water | Total cost     |             | Operating costs |            | Used area         | Note                     |
|---------|-------------|----------------|-------------|-----------------|------------|-------------------|--------------------------|
| MED     | 2520t/d     | \$ 7.81million | \$ 3100.8/t | \$ 9.3/t        | \$ 23442/d | 600m <sup>2</sup> | Multi-effect evaporation |
| Total   | 6300t/d     | \$ 7.81million | \$ 1240/t   | \$ 3.7/t        | \$ 23442/d | 600m <sup>2</sup> |                          |

### The economic indicator of Special membrane technology (RO concentrate section)

| Project  | Treat water | Total cost     |             | Operating costs |           | Used area         | Note                     |
|----------|-------------|----------------|-------------|-----------------|-----------|-------------------|--------------------------|
| SUPER RO | 2520t/d     | \$ 3.59million | \$ 1426/t   | \$ 0.92/t       | \$ 2266/d | 350m <sup>2</sup> | Reuse 75%                |
| MED      | 500t/d      | \$ 1.55million | \$ 3100.9/t | \$ 9.3/t        | \$ 4652/d | 200m <sup>2</sup> | Multi-effect evaporation |
| Total    | 6300t/d     | \$ 5.15million | \$ 821.7/t  | \$ 1.1/t        | \$ 6917/d | 550m <sup>2</sup> |                          |

### RO concentration section economic contrast

(A conventional membrane process; B special membrane process):





Electroplating wastewater project pictures :





# 02.

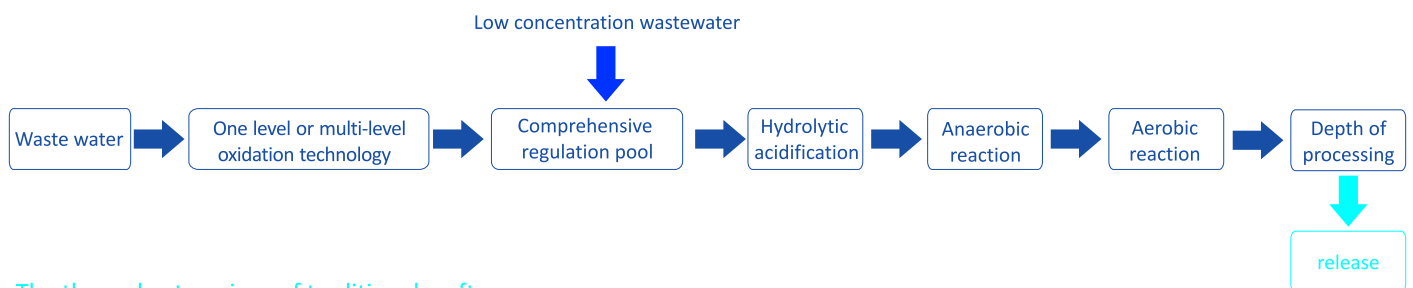
## HIGH DIFFICULT WASTEWATER TREATMENT

### High difficult wastewater feature:

- High concentration organic contamination and inorganic pollutants,
- Complex composition,
- Water quality is not stable,
- Poor biochemical.



### Traditional process diagram:



### The three shortcomings of traditional craft:

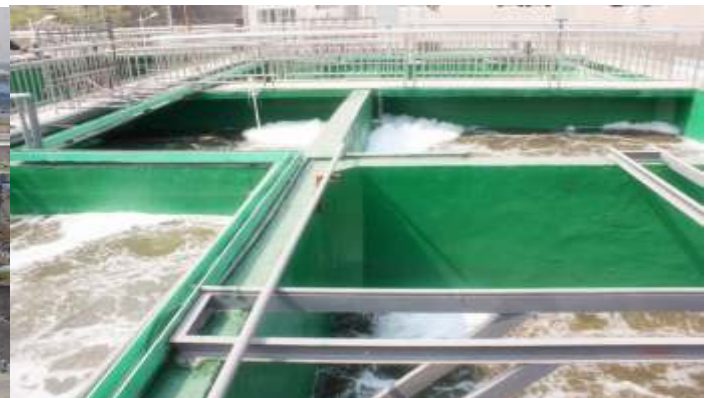
Processing is not to standard

High investment

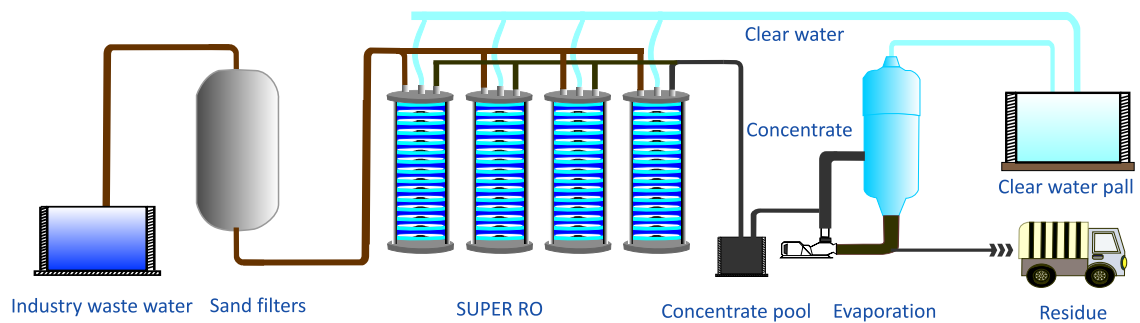
High operating cost

The commonly oxidation technology: FENTON, micro electrolysis, electro catalysis, microwave catalytic, ozone and chlorine dioxide catalytic, etc.

These technologies investment is high, processing cost is high and the treatment effect is very limited.



### HRE process:



### HRE process feature:

#### 1 High removal rate of pollutants

Maximum operating pressure of up to 160 bar, on the removal rate of COD in waste water and salt can be as high as 90% . Effluent water can be introduced into biochemical system or direct discharge.

#### 2 The system has high reliability

Because most of the pollutants is resolved by membrane section, greatly reduces the biochemical system load, at the same time reduce the residence time of biochemical processes, ensure the stability of the system out of the water.

#### 3 The better economic effect

The multiple oxidation section can be reduced, , the system total investment can save more than 20% compared with traditional process. Without adding a large number of agents, processing fee is only a small amount of electricity, membrane cleaning and depreciation cost. compared with the traditional process, every ton water treatment cost can be reduced by 60% ~ 70%.



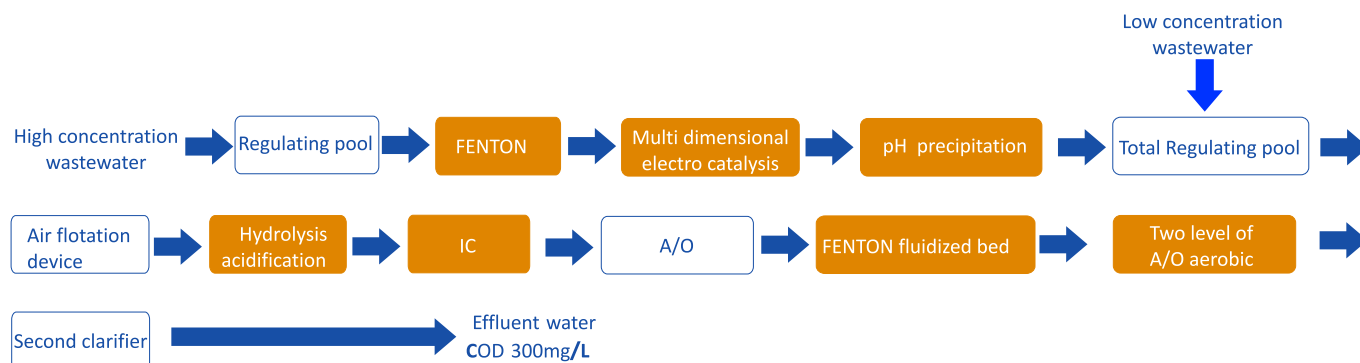
## TYPICAL CASE ANALYSIS

Erythromycin production enterprises, with an annual output of 1000 tons of erythromycin thiocyanate, sewage treatment plant design processing capacity of 3,000 m<sup>3</sup> / d.

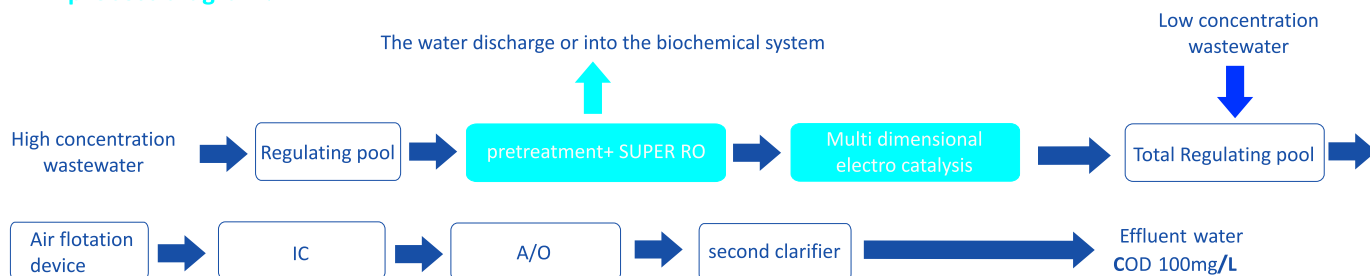
Water quality situation as follows:

| Project                       | Water yield               |           | COD        |          |
|-------------------------------|---------------------------|-----------|------------|----------|
|                               | unit ( m <sup>3</sup> /d) | Percent % | unit(mg/l) | Percent% |
| High concentration wastewater | 500                       | 16.7%     | 50000      | 78.1%    |
| Low concentration wastewater  | 2500                      | 83.3%     | 3000       | 21.9%    |

## The conventional physicochemical and biochemical technology process diagram



## HRE process diagram:



Special membrane technology combined with evaporation technology, to replace the traditional process of multiple physical and chemical process section, shorten the process and reduce the structure area, at the same time, reduce the pollution load of biochemical system, so as to reduce investment and operating cost.



## TYPICAL CASE ANALYSIS

The conventional physicochemical and biochemical technology process diagram :

| Project                                 | COD(mg/L) | NH <sub>3</sub> -H(mg/L) | chromaticity |
|---|-----------|--------------------------|--------------|
| Effluent water for traditional process  | 300       | 15                       | 150          |
| Effluent water for HRE optimize process | 100       | 12                       | 15           |

Two kinds of process operation cost analysis :

| Traditional process operating costs |                               |                       | HRE process operating costs |                               |                        |
|-------------------------------------|-------------------------------|-----------------------|-----------------------------|-------------------------------|------------------------|
| pretreatment<br>Reagent cost        | other                         | total                 | HRE system running costs    | other                         | total                  |
| \$ 1.16/m <sup>3</sup>              | \$ About 1.01 /m <sup>3</sup> | \$2.17/m <sup>3</sup> | \$ 0.7/m <sup>3</sup>       | \$ About 0.93 /m <sup>3</sup> | \$ 1.47/m <sup>3</sup> |



Two kinds of technology investment cost analysis :

| Traditional process engineering investment |   |  |                | HRE process engineering investment |                       |  |                |
|--|---|--|----------------|------------------------------------|-----------------------|--|----------------|
| Preprocessing part                         | Sulfur red liquid and recycling the solvent pretreatment part | Comprehensive wastewater biochemical treatment | Total          | Pretreatment unit                  | Special membrane unit | Comprehensive wastewater biochemical treatment | Total          |
| \$ 1.32million                             | \$ 1.21 million   | \$ 4.9 million                                 | \$ 7.43million | \$ 1.74 million                    | \$ 1.58 million       | \$ 1.91 million                                | \$ 6.0 million |

# 03.

## OIL AND GAS FIELD WASTE WATER

Oil Field Waste Water Type:

|                         |                  |                      |  |
|-------------------------|------------------|----------------------|--|
| Oilfield Produced Water | Fracturing Fluid | Drilling Waste Water | Others (rain, domestic waste water etc.) |
|-------------------------|------------------|----------------------|--|

Gas Filed Waste Type:

|                 |                  |                      |                               |                    |
|-----------------|------------------|----------------------|-------------------------------|--------------------|
| Formation Water | Fracturing Fluid | Drilling Waste Water | Purification Plant Wastewater | Others (rain etc.) |
|-----------------|------------------|----------------------|-------------------------------|--------------------|

Oil and Field Waste Water Characteristics :

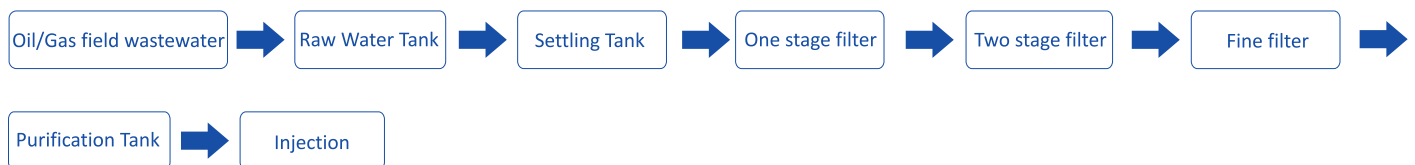
- 1) Complex content, high concentration
- 2) High suspended matter content, high fine particles, settle down slowly
- 3) High pollution load. COD up to tens of thousands, deep shade, high content of suspended solids, and contain a variety of heavy metals. Direct discharge without treatment, it will cause pollution to the environment.

The current state of the wastewater treatment:

|             |                       |
|-------------|-----------------------|
| Reinjection | Standardized emission |
|-------------|-----------------------|



Typical Injecting Treatment Process:



| Advantage                             | Disadvantage  |
|---------------------------------------|---|
| Low operating cost, mature management | High one-time project investment;<br>Affect the oil filed and reservoir around;<br>Directly affect the groundwater;<br>Not allowed by governmental rules-- After 《Environmental Laws》 was issued, the enterprises have to meet the standards. |

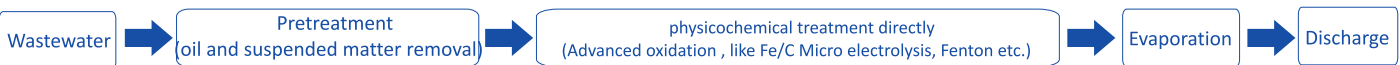
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According to the discharge standard, the main purpose of oil/gas filed treatment is: remove suspended matter, oil, salinity and organic matter. Now the regular treating process as below:

Regular Treating Process 1:



Regular Treating Process 1:



Advantage and Disadvantage of the Regular Treating Process 2

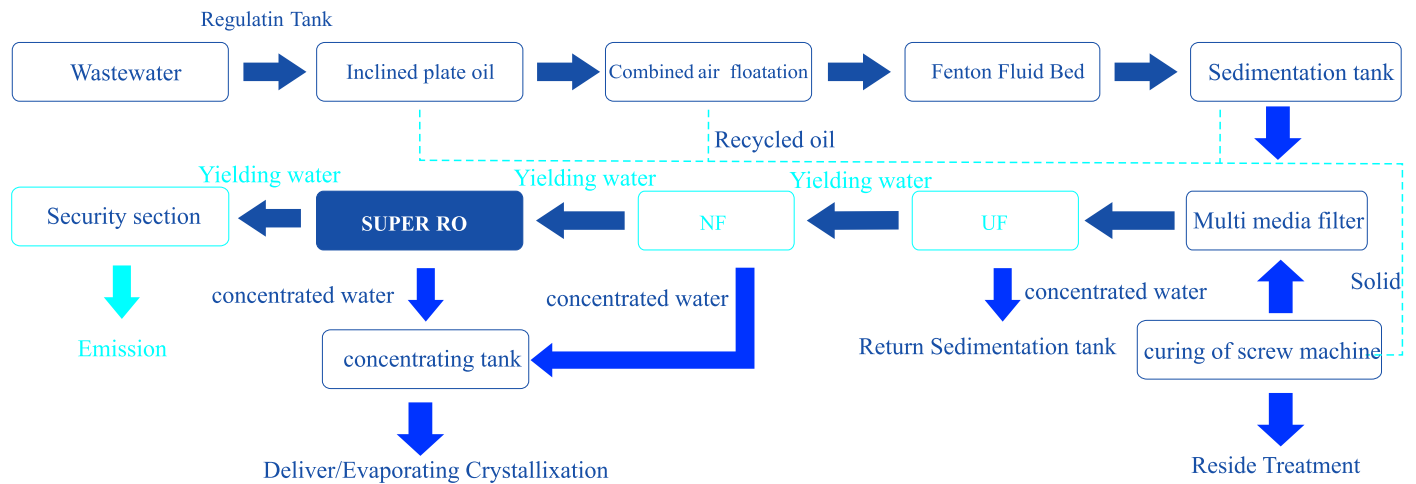
| Advantage  | Disadvantage   |
|--|--|
| Lower operating cost than the process 2, mature management | High operating cost. Normally the operating cost is up to USD15.65/ton for different water quality; No removal of the salinity can not meet the environmental requests; Amount of chemicals cause secondary pollution. |

Advantage and Disadvantage of the Regular Treating Process 2

| Advantage  | Disadvantage  |
|--|---|
| Meet the standard in some cases; Technology process is simple. | Evaporation can solve the salinity problem, but the operating cost is high; Condensed liquid may not meet standard on COD; Amount of new chemicals cause secondary pollution. |

## OIL AND GAS FIELD WASTE WATER

Special Module Oil/Gas filed wastewater treating technology process SOW/SGW:



## 1<sup>st</sup> main Stage: Oil Removal

Choose the most mature air floatation technology(the pressurized jet flow combined with air floatation), and higher efficient dissolved gas + advection technology.

- 1)The system is packaged, small footprint and easy for shipping.
- 2)High automatically, easy to operate, low management lost.
- 3)Wide application.



## 2<sup>nd</sup> main stage: Oxidative gel breaking

Choose physiochemical technology with the strongest oxidation - Fenton, and combine with high quality filling to make package fluidized bed equipment.

- 1) Unique structure can increase efficiency for mass transfer.
- 2) Shorten reaction time, reduce chemical consumption, and reduce operating cost.
- 3) Treat all the waste water, sludge and remaining, no environmental problem left.



## Core stage: Desalinization and COD removal

Choose SUPER RO technology, which is specially designed for wastewater, and can solve the high concentrated wastewater problem.

### 1)Anti-fouling, anti-clogging.

It can directly treat high concentrated wastewater with COD up to tens of thousands of mg/L, making up the traditional membrane deficiency.

### 2)Stand high pressure

Operate under high pressure (most up to 160 bar), small concentrated water volume, reduce investment and operating cost for concentrated liquid treatment.

### 3)Stable effluent quality

SUPER RO's rejection rate to COD is more than 90%, to inorganic salt more than 97%, which can make sure effluent quality.

### 4)Simply technical process

The wastewater can be into membrane system after simple pretreatment, in this way the environment construction cost and wastewater treatment cost are highly reduced.



## Core stage: Desalinization and COD removal

Good quality of product-water, make sure standardized discharge;

Low investment and operating cost;

Automatically operate, low management cost.



# 03.

## OIL AND GAS FIELD WASTE WATER

### TYPICAL CASE ANALYSIS

#### Oil Filed Wastewater Treatment Case by CNPC in Chad, Africa

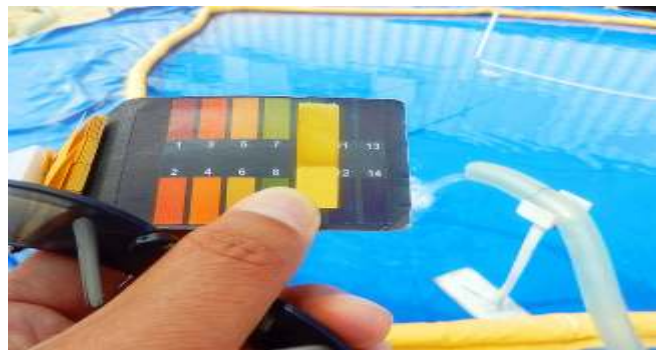
Chad is the ninth oil producing country, and also CNPC important project base in Africa. In this project, CNPC invested 5 billions, including oil extraction, oil refinery and environment related supporting facilities. Meifute participated in the designing and installation of the wastewater treatment package membrane plant with CNPC engineering company.



This package treatment plant was installed in September 2014, and it works normally. The effluent meets the EU water environment emission standard 1 grade (extremely good quality), which is tested by HSE. The module system gets good reviews from CNPC Chad project leaders. The study groups from Italy, Canada etc. inspect this project, and local TV stations report the details. The module system and the effluent quality are highly evaluated and awarded the NO. 1 wastewater treatment project in Africa.

#### Water table:

| Type                       | Designing Scale               | Raw Water Quality                    | Effluent Quality                      |
|----------------------------|-------------------------------|--------------------------------------|---------------------------------------|
| Oil Filed mixed wastewater | 600m <sup>3</sup> /d (3 sets) | COD 6000mg/L                         | COD ≤ 100mg/L                         |
|                            |                               | Electrical Conductivity 27000 μ s/cm | Electrical Conductivity ≤ 6000 μ s/cm |



#### The operating cost:

| Stage                   | Comprehensive Treatment | Fenton fluidized bed | UF+NF | SUPER RO | Sludge Solidification | evaporating crystallization | Average Operating Cost |
|-------------------------|-------------------------|----------------------|-------|----------|-----------------------|-----------------------------|------------------------|
| Operating Cost (USD/T)  | 0.62                    | 3.12                 | 0.47  | 1.25     | 0.62                  | 6.25                        | 7.62                   |
| Treating Quantity (T/D) | 220                     | 220                  | 220   | 180      | 15                    | 60                          | 200                    |

### Heba Gas Field Wastewater Treatment Project

This project is in Sichuan province. It started to extract in 2007, and now the gas producing and formation water production are stable. In this area it produces large amount of wastewater by extracting. The wastewater contains COD, oil etc. Discharge directly will pollute seriously.



Cooperating with CNPC, Meifute made a 15-days testing by SUPER RO in December 2013, and finally designed the most reasonable Special Membrane Wastewater treatment technology basing on the testing result and the project actual condition. It is highly evaluated after the project application.

| Stage                | Designing Scale                         | Raw Water Quality                    | Effluent Quality                     |
|----------------------|---|--------------------------------------|--------------------------------------|
| Gas filed wastewater | Designing influent 250m <sup>3</sup> /d | COD 1000mg/L                         | COD≤100mg/L                          |
|                      |   | Electrical Conductivity 27000 μ s/cm | Electrical Conductivity ≤6000 μ s/cm |
|                      |   | Total oil≤10 mg/L                    | Total oil≤5 mg/L                     |
|                      |   | Cl <sup>-</sup> 20000 mg/L           | Cl <sup>-</sup> 200 mg/L             |



### The operating cost:

| Stage                   | Comprehensive Treatment | Fenton fluidized bed | UF+NF   | SUPER RO | Sludge Solidification | evaporating crystallization | Average Operating Cost |
|-------------------------|-------------------------|----------------------|---------|----------|-----------------------|-----------------------------|------------------------|
| Operating Cost (USD/T)  | USD0.47                 | USD1.25              | USD0.14 | USD1.48  | USD0.62               | USD6.25                     | USD5.42                |
| Treating Quantity (T/D) | 280                     | 280                  | 280     | 240      | 15                    | 75                          | 200                    |

# 04.

## The Landfill Leachate Standard Discharge

### Types of waste leachate

refuse landfill waste leachate

waste incinerator waste leachate

### Main sources of re use landfill waste leachate

- 1、Water in waste.
- 2、Decomposition water of the organic components.
- 3、Rainfall and runoff in land fill plant.

Rainfall is the main source of waste leachate.

0.15-0.3 ton waste leachate will be generated in each 1 ton waste.



### Main sources of waste incinerator waste leachate

The garbage before the fire,

Must store in trash pits fermentation and drain out water, drain the water is the leachate.

### Waste Leachate Quality (Land Filing Plant)

| COD <sub>Cr</sub><br>( mg/L ) | B/C      | NH <sub>3</sub> -N<br>( mg/L ) | pH  | SS<br>( mg/L ) | Salty  |
|-------------------------------|----------|--------------------------------|-----|----------------|--------|
| 1000~20000                    | 0.15~0.5 | 200~3000                       | 5~9 | 500~2000       | 0.5~2% |

### Waste Leachate Quality (Land Filing Plant)

| COD <sub>Cr</sub><br>( mg/L ) | B/C     | NH <sub>3</sub> -N<br>( mg/L ) | pH    | SS<br>( mg/L ) | Salty  |
|-------------------------------|---------|--------------------------------|-------|----------------|--------|
| 40000~80000                   | 0.4~0.8 | 200~3000                       | 5~6.5 | 1000~5000      | 0.5~2% |

### Leachate Main Features:

- 1、High concentration of organic matter.
- 2、High salt content.
- 3、High ammonia and nitrogen content.
- 4、C/N/P Microorganism nutrition ratio disorders.

The water quality, volume and temperature will also change, and the heavy metal content is complicated.

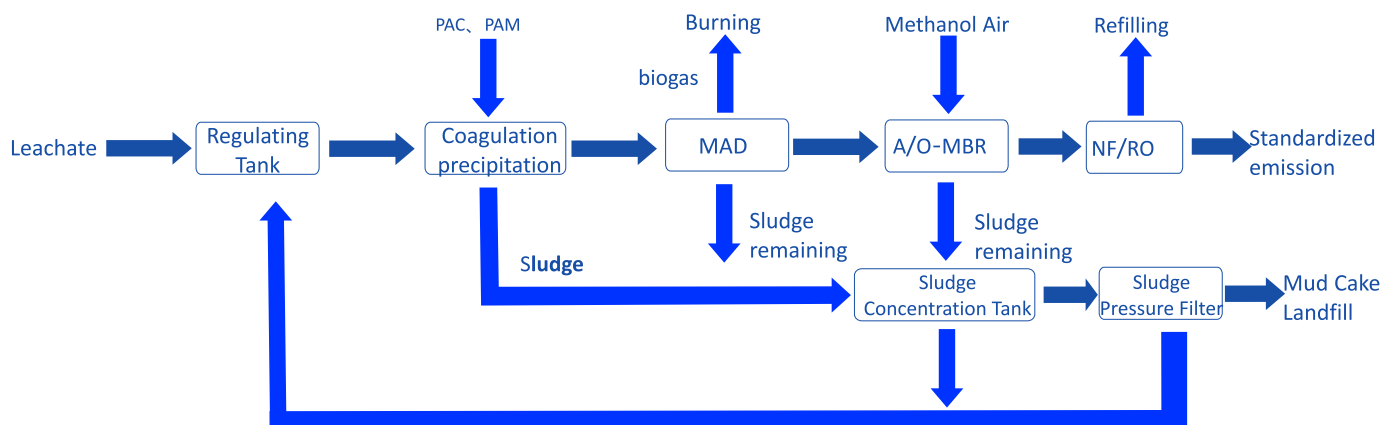
### Garbage leachate discharge requirements of China

| COD <sub>Cr</sub><br>( mg/L ) | NH <sub>3</sub> -N<br>( mg/L ) | TN<br>( mg/L ) | SS<br>( mg/L ) | Color Degree<br>( Dilution Multiple ) |
|-------------------------------|--------------------------------|----------------|----------------|---------------------------------------|
| ≤100                          | ≤25                            | ≤40            | ≤30            | ≤40times                              |



## Traditional Dispose Method :

| Regular Treatment Methods      | type  | Application status   |
|--------------------------------|---|--|
| Biochemical                    | Anaerobic: anaerobic sludge bed, anaerobic immobilized bioreactor, mixed reactor and anaerobic stabilization pond.<br>Aerobic: activated sludge, aeration oxidation pond, aerobic stable pond, biological turntable and MBR, etc. | High concentrations of pollutants<br>Up to standards difficult |
| Physical-Chemical              | Advanced oxidation,<br>activated carbon adsorption, membrane separation, etc.   | Direct do mark<br>The cost is too high                         |
| Biochemical +Physical-Chemical | Anaerobic+Aerobic+Membrane Separation   | The most widely used   |



## Disadvanges of Regular Waste Leachate Treatment Techniques:

### 1) Spiral NF/RO poor anti-fouling

Due to the complexity of leachate, biochemical effluent COD is about 1000mg/l. The general requirements of the influent COD is less than 100mg/l,. Waste leachate COD is out of the range of the spirial NF/RO.

### 2) Poor System Stability

Due to high concentration of pollutants in leachate, the biochemical system stability is poor. And the biochemical system is susceptible to external factors, especially anaerobic system is particularly sensitive to temperature.

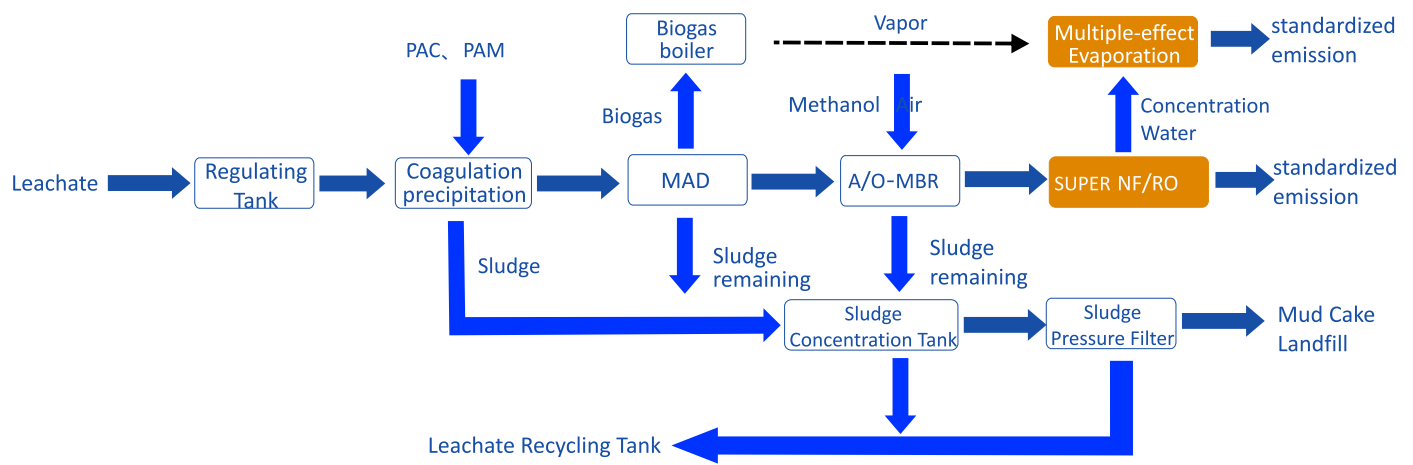
### 3) Concentrated Water Recirculation

Due to the low recovery rate spiral NF/RO, the regular spiral RO recovery rate is less than 60%, and the spiral NF is less than 70%.

# 04.

## The Landfill Leachate Standard Discharge

Landfill Plant Leachate Regular Treatment Techniques:



## Features

### 1) Super NF/RO High Anti-fouling

Membrane is not easy clogged, and the system is with good stability.

Not affected by the effect of biochemical treatment .

Longer service life.

### 2) Super NF/RO High Recovery Rate

The operating pressure of Super NF/RO is higher, and with higher recovery rate up to 90-95%. It will yield less concentrated water and reduce the concentrated water treating cost.

### 3) Concentrated water evaporation treatment

Thoroughly solve the problem of pollutant enrichment caused by concentrated water reuse, so that the biochemical system and membrane system can maintain long-term and efficient operation .

Project reference:

| Case Name                                  | Add.            | Type                     | Scale                 | Super RO | Finished Time | Effluent Requests  |
|--|-----------------|--------------------------|-----------------------|----------|---------------|--|
| Kunming lanCang Landfill Leachate Project  | Yunnan lanCang  | Landfill Leachate        | 80m <sup>3</sup> /d   | 49pcs    | 2014          | 《Civil Waste Land Filling Plant Pollutants Controlling Standard》 GB 16889-2008 |
| Kunming Jingdong Landfill Leachate Project | Yunnan Jingdong | Landfill Leachate        | 50 m <sup>3</sup> /d  | 31pcs    | 2014          | 《Civil Waste Land Filling Plant Pollutants Controlling Standard》 GB 16889-2008 |
| Hekou Landfill Leachate Project            | Yunnan Hekou    | Landfill Leachate        | 100 m <sup>3</sup> /d | 52pcs    | 2014          | 《Civil Waste Land Filling Plant Pollutants Controlling Standard》 GB 16889-2008 |
| Nanjing Environment                        | Nanjing         | Ash Leachate             | 60m <sup>3</sup> /d   | 20pcs    | 2014          | 《Civil Waste Land Filling Plant Pollutants Controlling Standard》 GB 16889-2008 |
| Longgang Hazardous waste leachate          | Shenzhen        | Hazardous waste leachate | 200 m <sup>3</sup> /d | 46pcs    | 2014          | 1st emission standard  |
| Jiangmen Hazardous waste leachate          | Shenzhen        | Hazardous waste leachate | 400m <sup>3</sup> /d  | 100pcs   | 2015          | 1st emission standard  |
| Shajin Hazardous waste leachate            | Shenzhen        | Hazardous waste leachate | 360m <sup>3</sup> /d  | 80pcs    | 2015          | 1st emission standard  |



MF

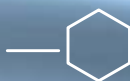
UF

NF

RO



洁净每一滴水  
CLEAN EVERY DROP OF WATER



— H<sub>2</sub>O

