

ANTON 安東



Introduction of Environmental Technology

东方智慧 全球分享
Oriental wisdom , Global sharing

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- 01** Company Profile
- 02** Core Technology
- 03** Project Management
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Company Profile

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Anton Oil (Technology) Group Co., Ltd. is a leading oilfield technology service company in the global oil and gas development emerging market. With international advanced technology, we have a full range of products and services. And also we have comprehensive supporting service capabilities such as R&D and design center, raw material production base, service equipment and on-site construction organization. We have formed a strong combination of high-tech and low-cost services. Competitive advantage. The service base is located in China, the Middle East, Central Asia, Africa, South America, North America and other regions, forming a global service support system that can respond quickly.



**Drilling
service**

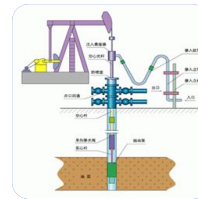
**Completion
tool**

**Down
hole
operation**

**Oil production
service**

**Inspection
and repair
service**

**Oilfield
environmental
protection**



In 2011, Anton began to engage in oilfield environmental protection services, And spent 100 million yuan (\$15 million) in 2014, registered and established a specialized company in Chengdu, Sichuan, China, and successively obtained the qualifications and access to the relevant national environmental protection business. Now it has a relatively complete oilfield environmental protection technology and product system, which is available at home and abroad that shows The ability of oil and gas fields to solve environmental problems.



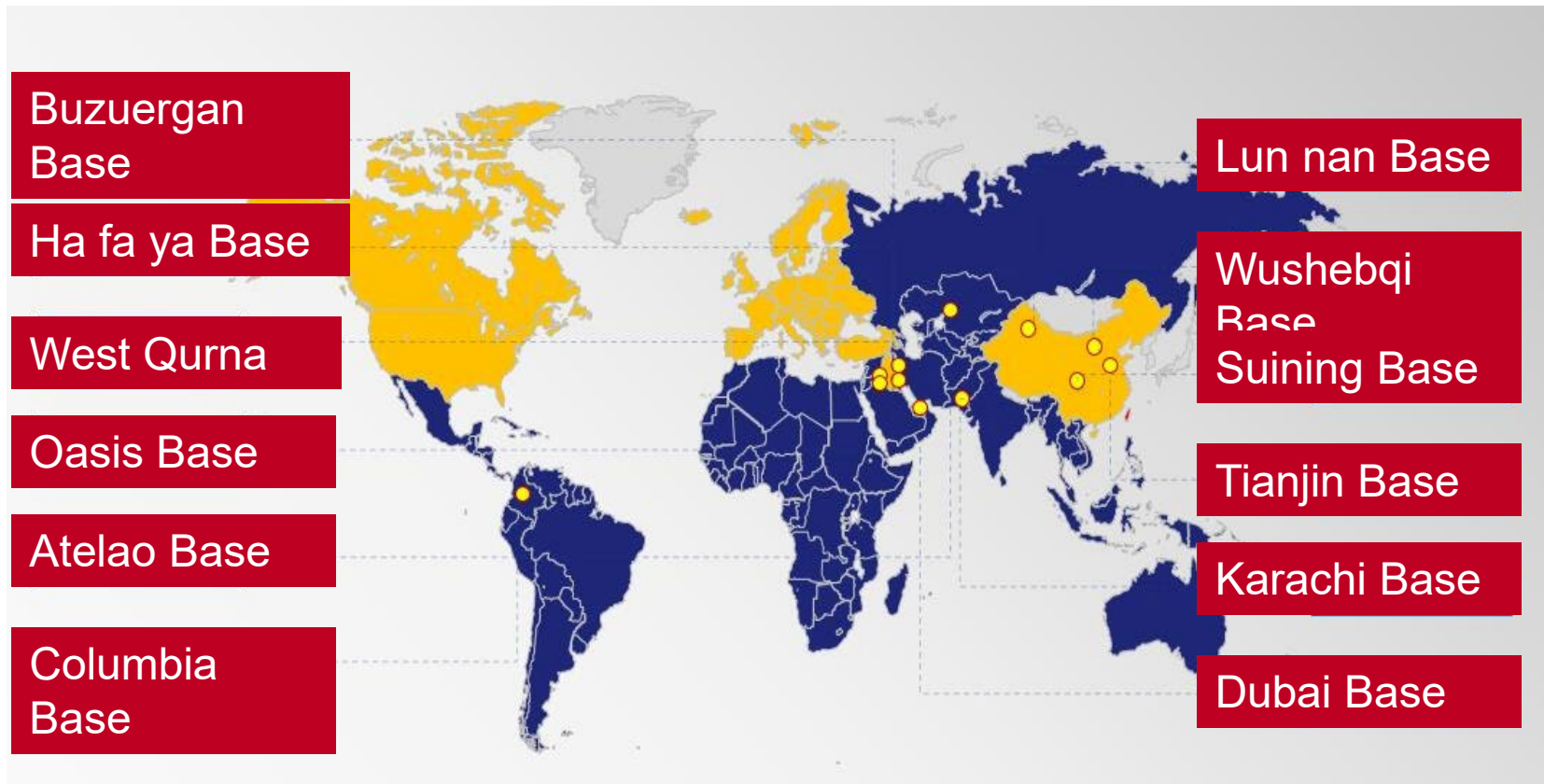
➤ Research Center



- ◆ Environmental protection equipment maintenance base in Wushenqi, Suining
- ◆ Water treatment center station and equipment base in Baicheng
- ◆ Oil - based drilling cuttings processing center in Fulin
- ◆ Daqing, Tianjin and other bases



➤ Base support



➤ Cooperative partner



CHINA KUNLUN ENGINEERING
CO., LTD.



LIAONING HUAFU ENVIRONMENTAL
ENGINEERING CO., LTD.

Focus on areas: oil and gas fields and
environmental protection.



SCHLUMBERGER

A world-class oilfield technology service
company.



SWACO

A subsidiary of Schlumberger,
specializing in solid control and related
technical services.



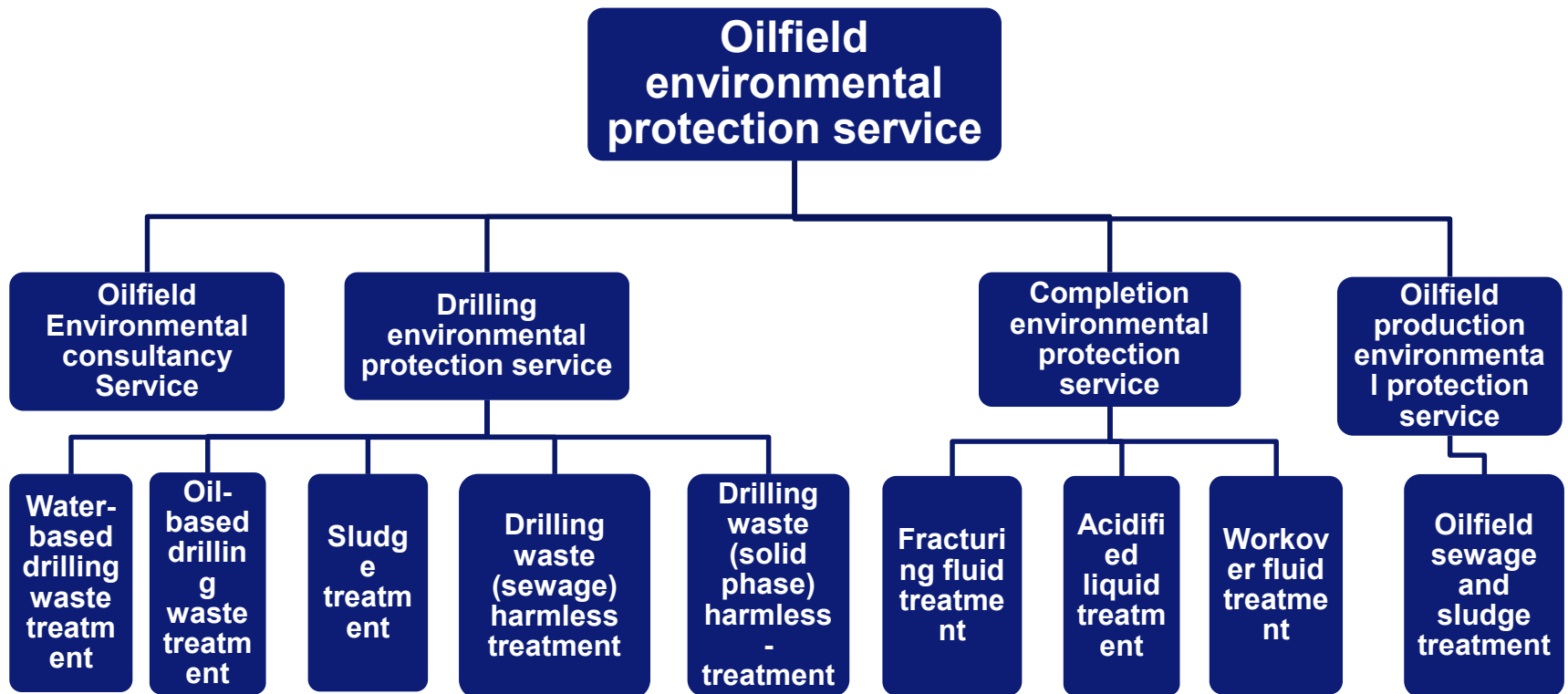
SICHUAN AGRICULTURAL
UNIVERSITY



SOUTHWEST PETROLEUM
UNIVERSITY



YANGTZE UNIVERSITY



Anton can provide a full set of equipment and technical services required for oilfield environmental protection, and can systematically solve environmental protection problems in oil, gas field drilling, mining and other links.

Technical requirements and indicators

- Realizing the collection, treatment and resource utilization of drilling fluid, drilling cuttings and sewage;
- Developing integrated solutions to ensure the normal implementation of drilling operations, cost reduction and efficiency increase.

Treatment Type	treatment process	Processing Standard
Drilling Sewage	Physical, Chemical and Biochemical	■ Standard for mud reuse (pH, density, solid content, viscosity, etc.) ■ National level I emission standards
Drilling cuttings	Physical, Chemical and Biochemical	■ Making bricks and paving roads ■ Safe landfill
Oil-base drilling cuttings	Physical drying/extraction/thermal desorption	■ Reuse oil-based mud ■ Making bricks and paving roads ■ Safe landfill
Waste water of Oil field	Physical, Chemical and Biochemical	■ Reuse slurry and fracturing fluid ■ Cleaning equipment ■ reinjection ■ National level I emission standards

➤ Certifications



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➤ Oilfield sewage

- Sewage source: The main treatment targets are cuttings, drilling waste slurry, production wastewater, completion waste liquid, workover waste liquid (including acid liquid), oily wastewater, mechanical sewage, flushing sewage, cementing sewage, acidification of sewage, on-site oil scattered, natural rainfall intrusion.
- Composition: clay, weighting materials, various chemical treatment agents, sewage, sewage oil.
- Characteristics: The water pollution is complex, containing a large amount of chemical materials such as inorganic salts, organic matter, synthetic polymers, surfactants, and oil. The pollution source is scattered and the hazard is large. Due to the characteristics of high salt and high COD, such wastewater has natural degradation, and the pollution has persistence, stability, and self-cleaning characteristics.

Process: pretreatment + evaporation crystallization + biochemical treatment + RO process

➤ Pretreatment

Reducing the hardness of water by double alkali method, After the hardness reaching the requirement, the oil separation process would be used to remove most of the oil from the sewage. It is mainly used for degreasing the first and second grades of oil production sewage, removing free oil from water, synchronously removing perceptible particles, and assisting degreasing agent to remove emulsified oil if necessary. Usually, the separation precision is 20~50 μm , and the effluent oil content is 10~20mg/L. The oil-removal technology is mainly based on natural settlement, inclined plate settlement and coalescence and degreasing, dissolved air flotation and so on. Gravity flow or pressure flow can be used depending on the overall process design. Support the necessary auxiliary heating and rinsing device without clogging.



➤ Evaporation crystallization process

The electric energy or heat energy is used to evaporate the softened and degreased sewage, and the original unsaturated solution would gradually becomes a saturated solution. After heat recovery of the solvent, sewage treated as a unit enters next biochemical treatment.



➤ Biochemical process

A large number of microorganisms are cultured in this system by simulating the self-cleaning process of natural sewage. A process for removing organic contaminants from sewage by utilizing the metabolism of microorganisms.



➤ **Reverse osmosis (RO process)**

It is a water filtration method that uses a semi-permeable membrane to separate and purify impurities such as salt and heavy metals under the action of a pressure difference. It is opposite to the natural infiltration direction, also known as reverse osmosis.

The reverse osmosis membrane is a semi permeable membrane made of a special polymer material through a special process. It only allows water molecules and less small molecular salts to pass through, and does not allow impurities to pass.



- Fine filter material filter**

use the most fine water treatment filter material to improve the processing precision of the media filter

- Treatment effect**

SS(suspended solids) of water is less than 2mg/L, and the median diameter is less than 1.5 microns.

Suitable for the original A2 water quality requirements.

- Technical features**

Ultra-fine filter material with a specific gravity of 4.7 and a diameter of 0.1mm, has high precision of suspension separation.

Special water and air screen, easy to wash back

As Pre-treatment security filtration for ultra filtration membranes

➤ **Ultra-high pressure reverse osmosis (RO)**

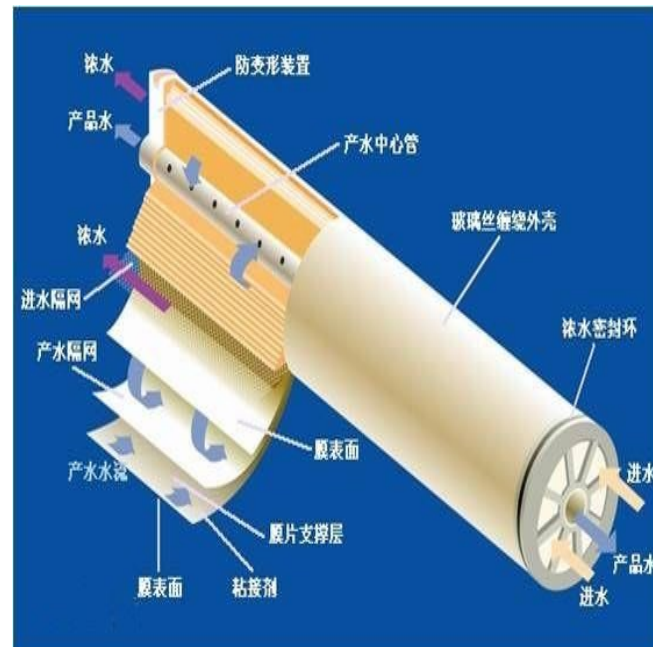
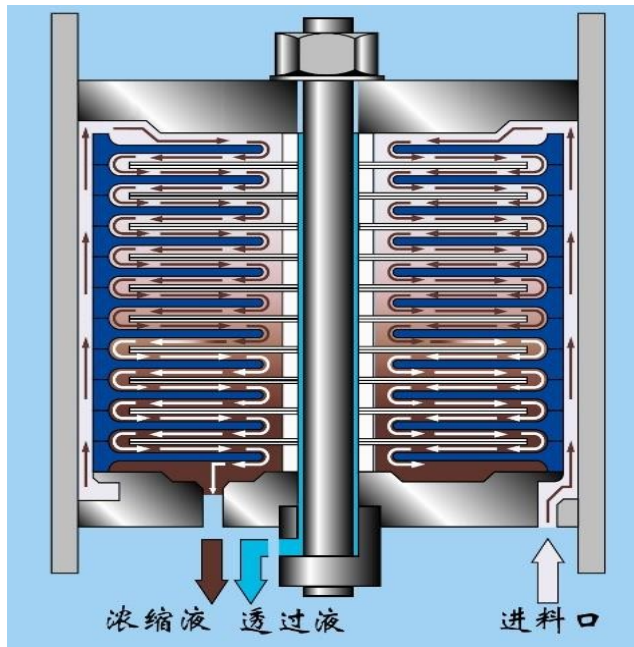
The traditional desalination method mainly adopts the conventional spiral-wound RO technology. The spiral-wound RO has high requirements for wastewater pretreatment and poor adaptability to wastewater salinity. When the wastewater salinity (TDS) is 10000mg/L, water production rate of The spiral-wound RO is only 50%; and water production rate of the ultra-high pressure RO is 85%.

Core Technology

Oilfield wastewater treatment technology

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The ultra-high pressure RO membrane column has an open, short and wide channel, and strong anti-pollution performance, and is more suitable for the complex and variable salt content environment of oil and gas field wastewater.



1 Oilfield wastewater treatment technology

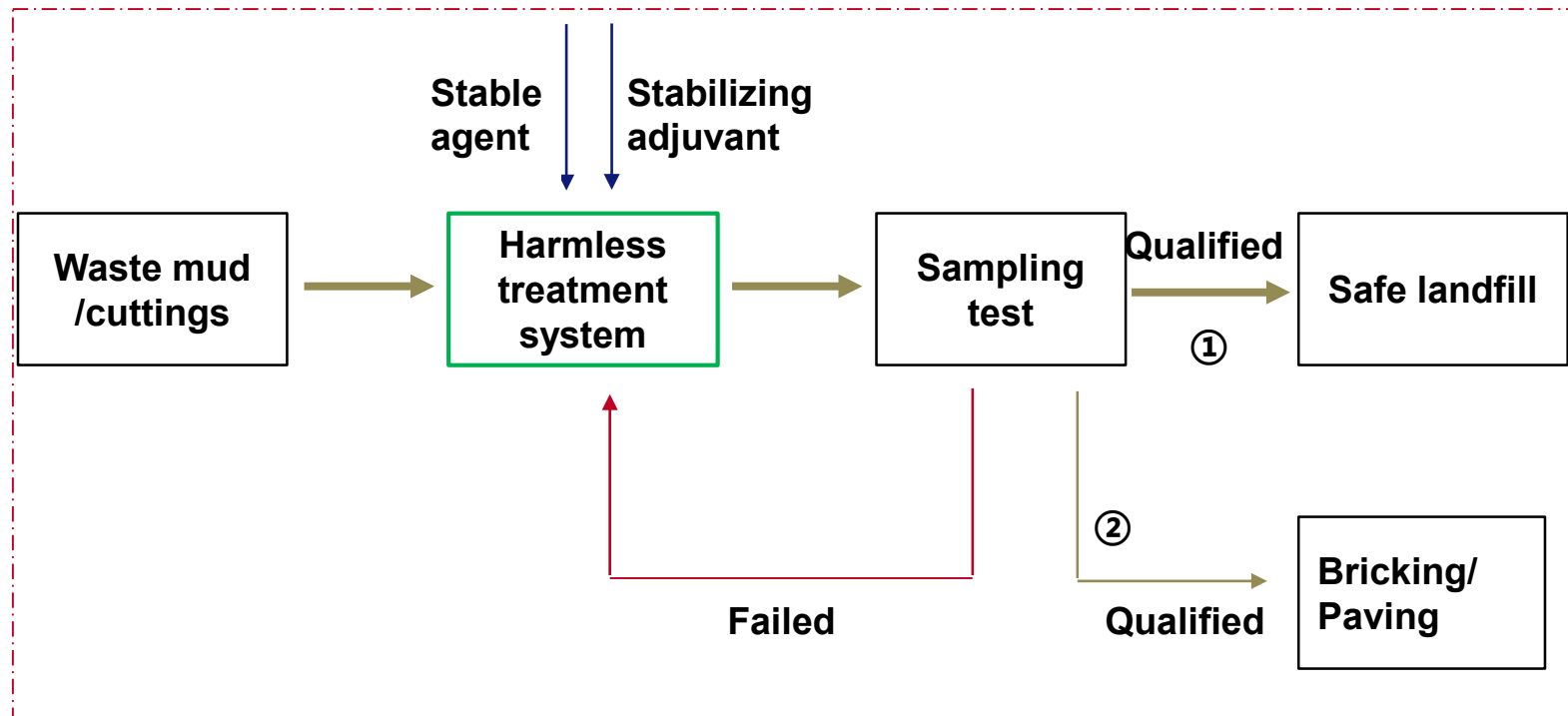
2 Solid waste treatment technology

3 Oily solid waste treatment technology

4 Mud Non-landing technology

5 Centralized processing station

➤ Technological process



Waste mud/Cuttings Processing Flow Chart

➤ Closed-loop treatment of drilling waste



➤ Biodegradable

Biological treatment technology has the advantages of energy saving, low investment, low operating cost, etc., and is currently receiving attention from people in the environmental protection industry at domestic and overseas. as a final treatment of solid waste treatment, Biodegradation does not require the addition of chemicals, consumes less energy, and is environmentally friendly.

•Treatment process



➤ Processing effect

The biodegraded soil can be planted with preferred plants, and the rhizosphere microorganisms further directly or indirectly absorb, volatilize, separate or degrade pollutants, and restore and reconstruct the natural ecological environment and vegetation landscape.



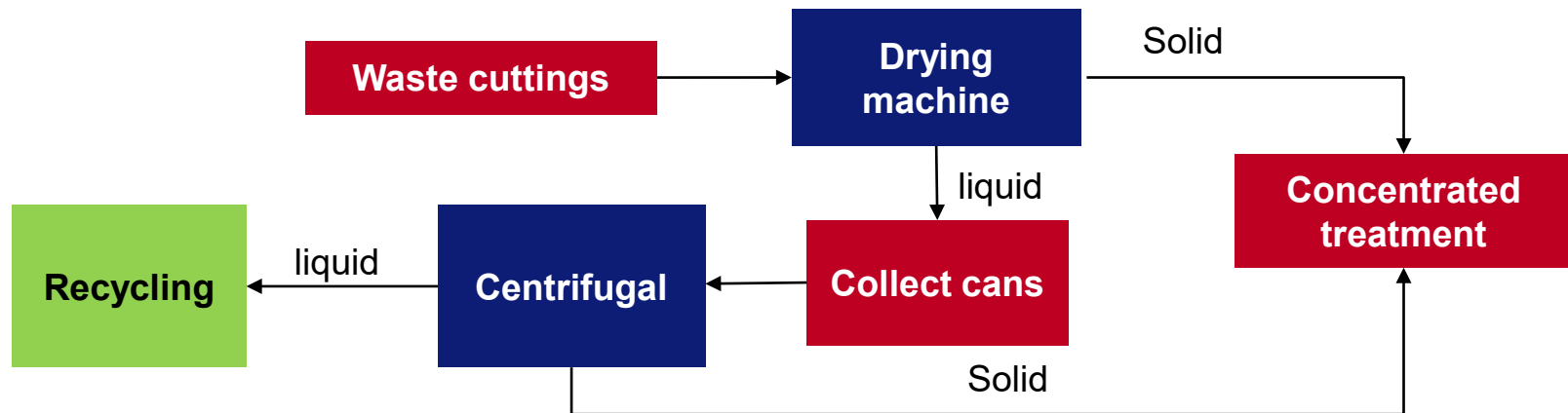
Core Technology

Oily solid waste treatment technology

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➤ Oil-based mud (drilling cuttings) treatment technology

- Processing and equipment



Feeder system



Drying machine system



Centrifugal system

• Effects and features

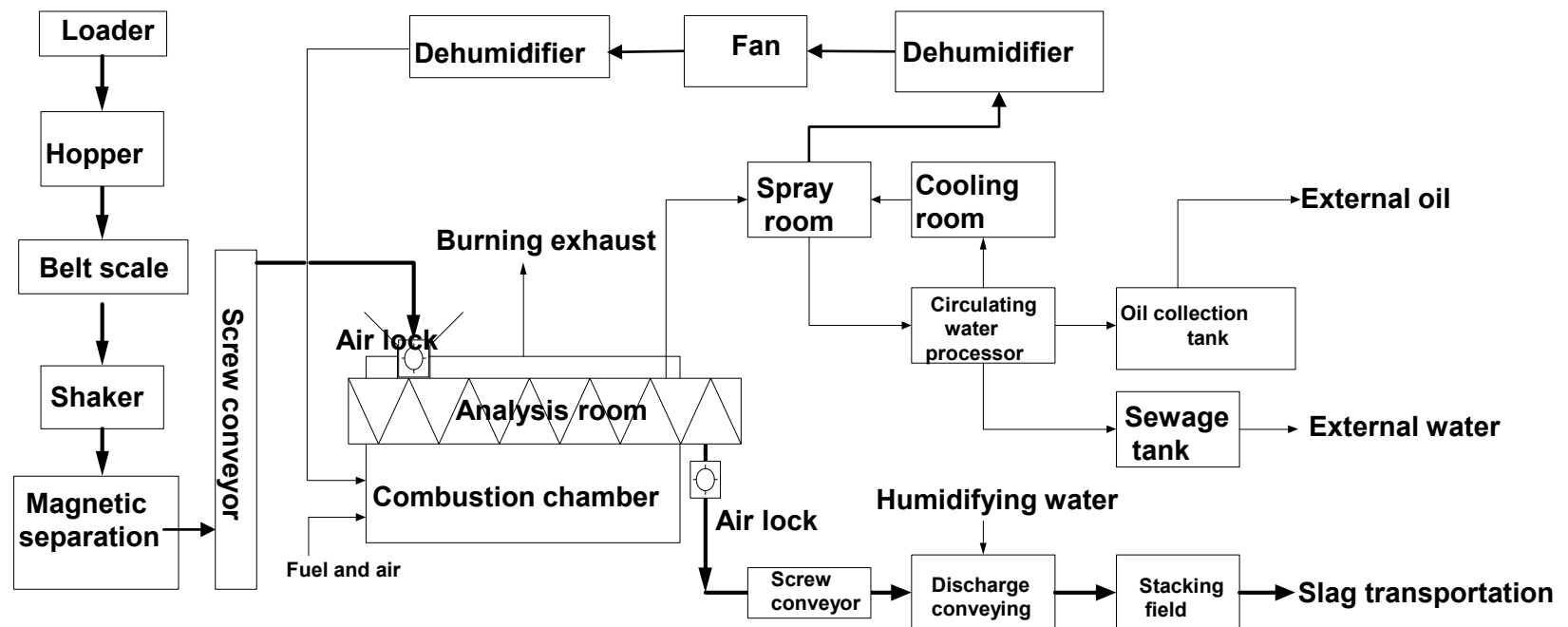


- ◆ The equipment is convenient for installation, disassembly transportation and operation.
- ◆ Maximum capacity of 30 tons per hour, and recyclable mud , saving cost.
- ◆ The cuttings oil content is 3%-7% after treatment, which is convenient for transportation and saves cost.
- ◆ Energy saving and emission reduction, resource reuse.

➤ Thermal desorption

• Technological process

The liquid phase was gasified by heating, and the oil content in the solid phase would be less than 0.3% after treatment



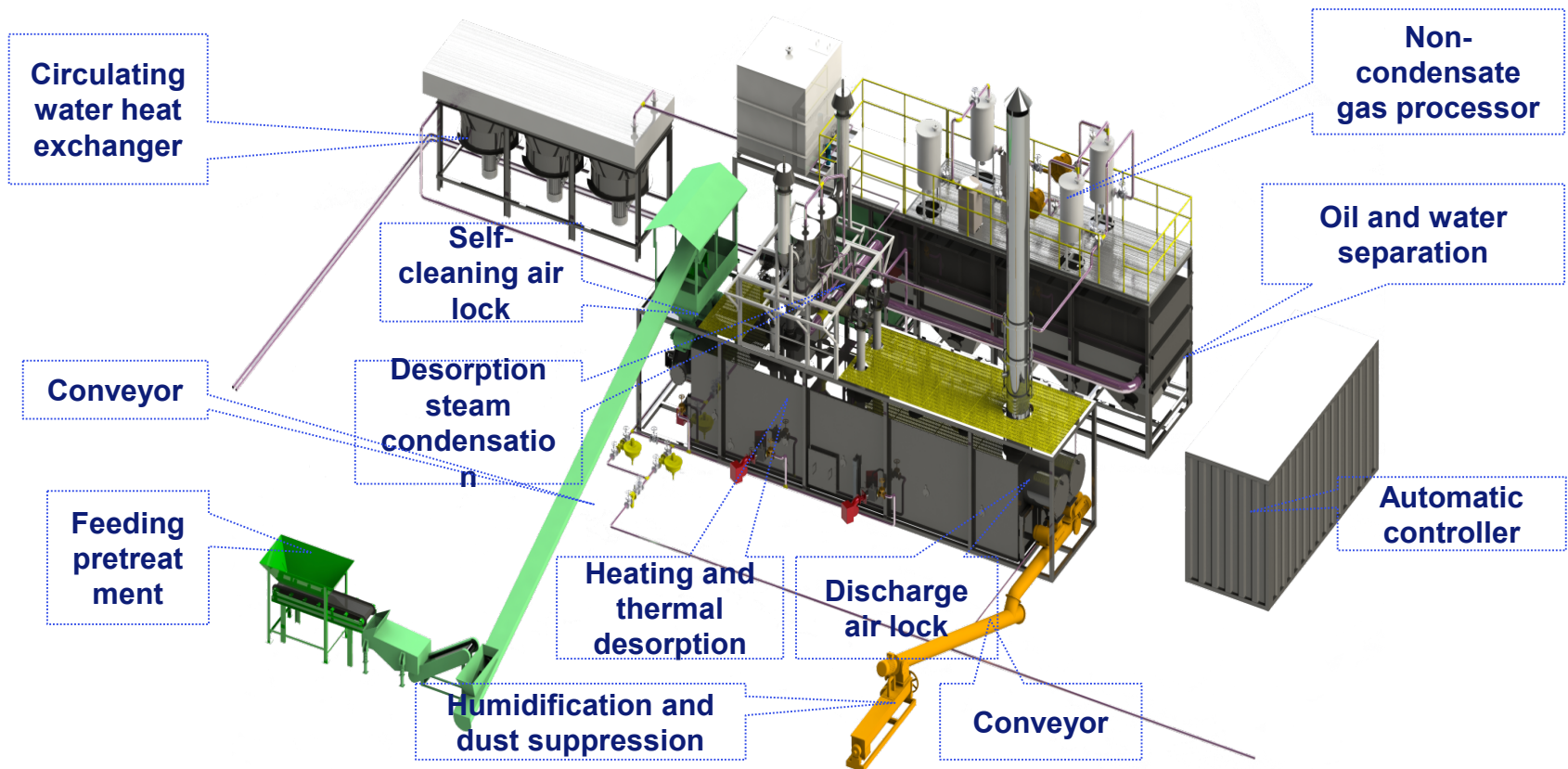
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Oily solid waste treatment technology

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- **Product structure and characteristics**

Skid-mounted, modular, automated.



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Oily solid waste treatment technology

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➤ Effects



Sludge to be treated



Recycled oil



**Processed product -
muck**



Slag brick



**Methane brick
demonstration**



**Methane planting
demonstration**

- Composition of waste drilling mud: Waste drilling fluid, Drilling cuttings, Drilling wastewater

Waste drilling fluid

- Produce: drilling solid control equipment discharge.
- Composition: clay, weighting materials, various chemical treatment agents, sewage, sewage oil.

Drilling cuttings

- Produce: Rock debris that is cut from the formation during drilling.
- Composition: Rock fragments

Drilling wastewater

- Drilling fluid sewage, mechanical sewage, rinsing sewage, cementing operation sewage, acidification operation sewage, on-site oil material scattering, natural rainfall intrusion.

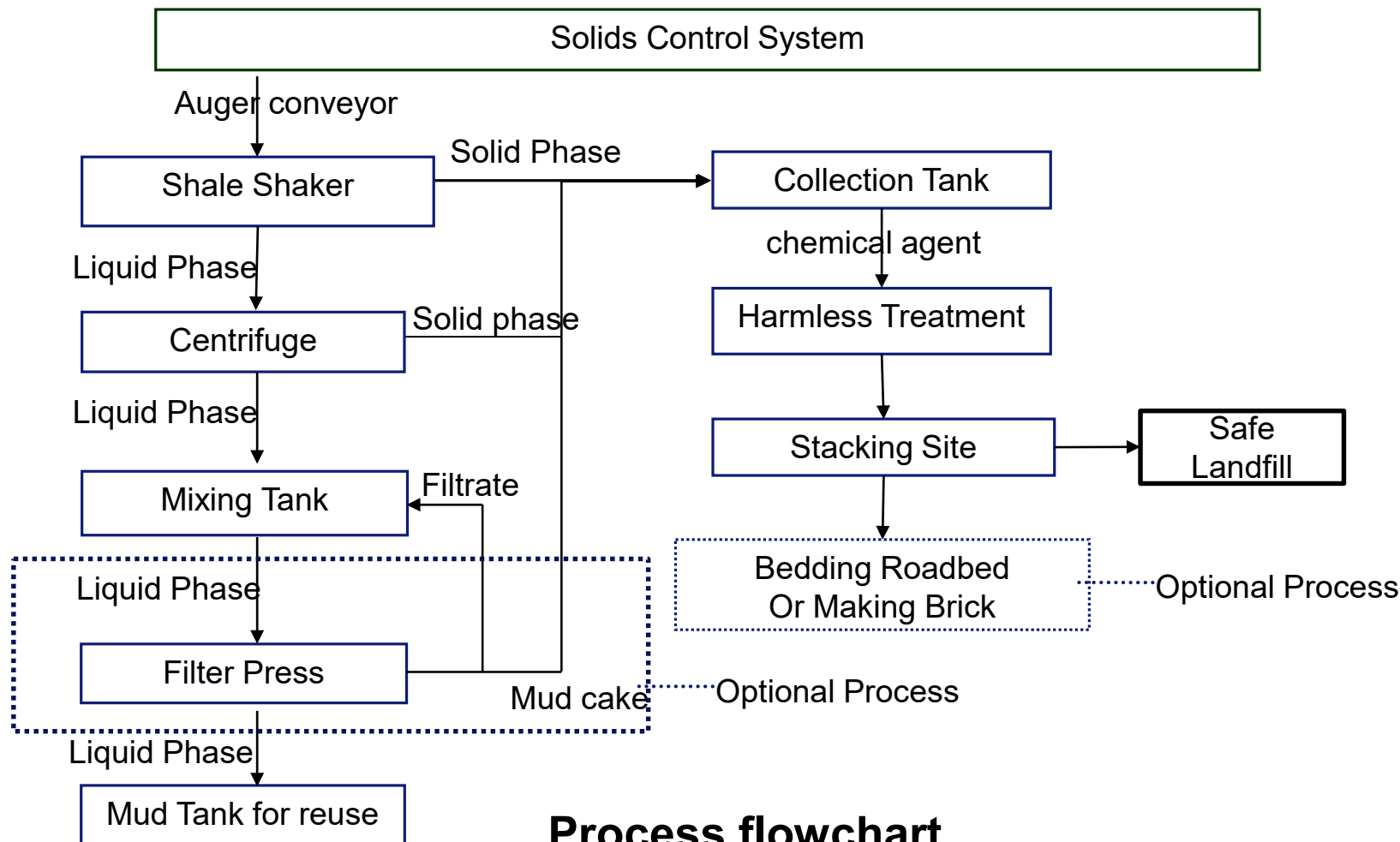
Core Technology

Mud Non-landing Technology

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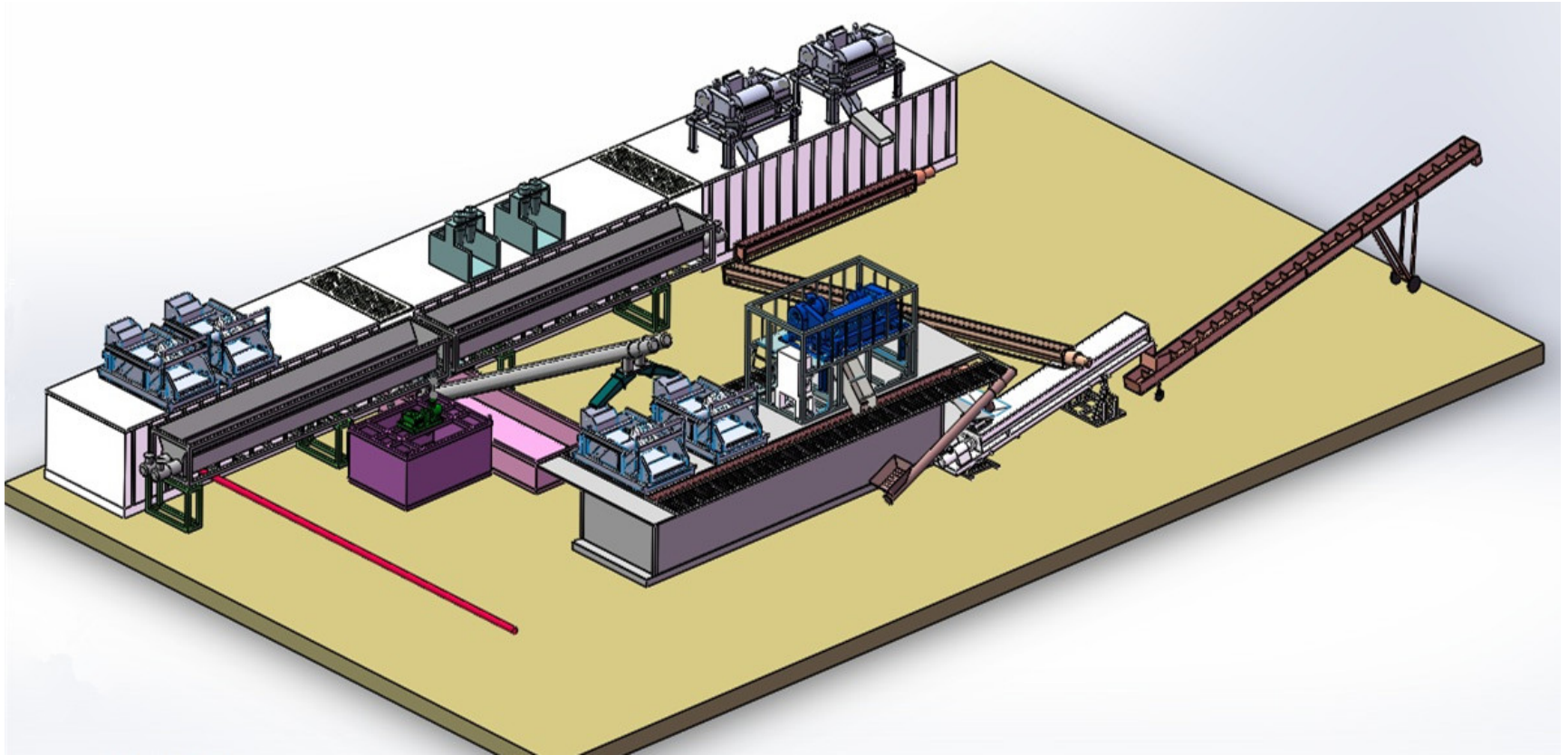
processing mode	Technological introduction	Notes
Collecting and treatment with mud non-landing while drilling	Vibration, centrifugal, pressure filtration process. Firstly, the wastes are collected through the spiral conveyor, and then through the three-stage solid-liquid separation. Finally, the liquid phase is reused, and the solid phase is harmlessly treated on site or directly transferred to the central station. Collection with open tank and transportation process. After the waste is collected by the open tank, the liquid phase is transported to the centralized treatment point for treatment, and the solid phase on-site harmless treatment or on-site pretreatment is transported to the centralized station for further treatment.	According to the actual situation to determine the process, different process costs are different
Central treatment	Establish temporary treatment stations. The waste generated on site shall be classified and collected, and the waste of different opening times and mud systems shall be classified and transported to the centralized treatment station for classification and treatment.	Cuttings from Surface, water slurry, Bantu slurry after treated can be making bricks, paving; Cuttings from polymer and polyclone system slurry after treated can be safely buried in landfills.

➤ Vibrating screen + Centrifuge process



Process flowchart

➤ Vibrating screen + Centrifuge process



Three-dimensional diagram

Collecting system (auger conveyor)



Integrated equipment for treatment



Frequency centrifuge



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Mud Non-landing Technology

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Filter press



Cuttings solidification stabilization system & Cold brick making machine



➤ Completion mud treatment

1. Centrifuge (frequency conversion)

The completion mud is separated from the solid and liquid by the high-frequency centrifuge, and the liquid phase is reused next well, and the solid phase is solidified.

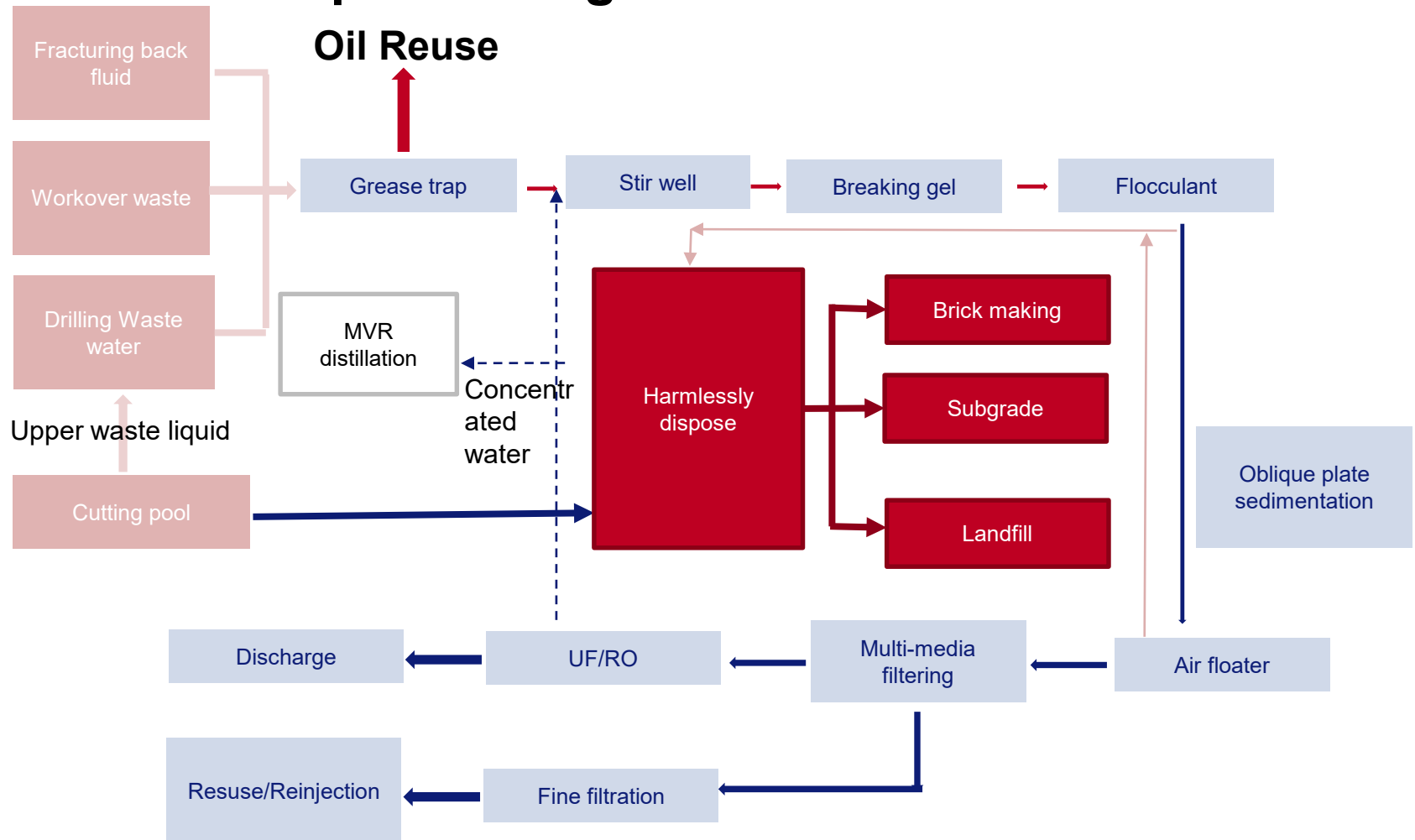
2. Centrifuge (frequency conversion) + filter press

the liquid phase produced by the centrifuge cannot be reused, that shall be flocculated and oxidized by chemical method. Then fresh water through pressure filtration can be recycled or transported to the place designated for recycling/reinjection, and the filter cake shall be cured.

3. Centralized treatment station

The parts that cannot be reused are directly transported to the central processing station.

➤ Centralized processing

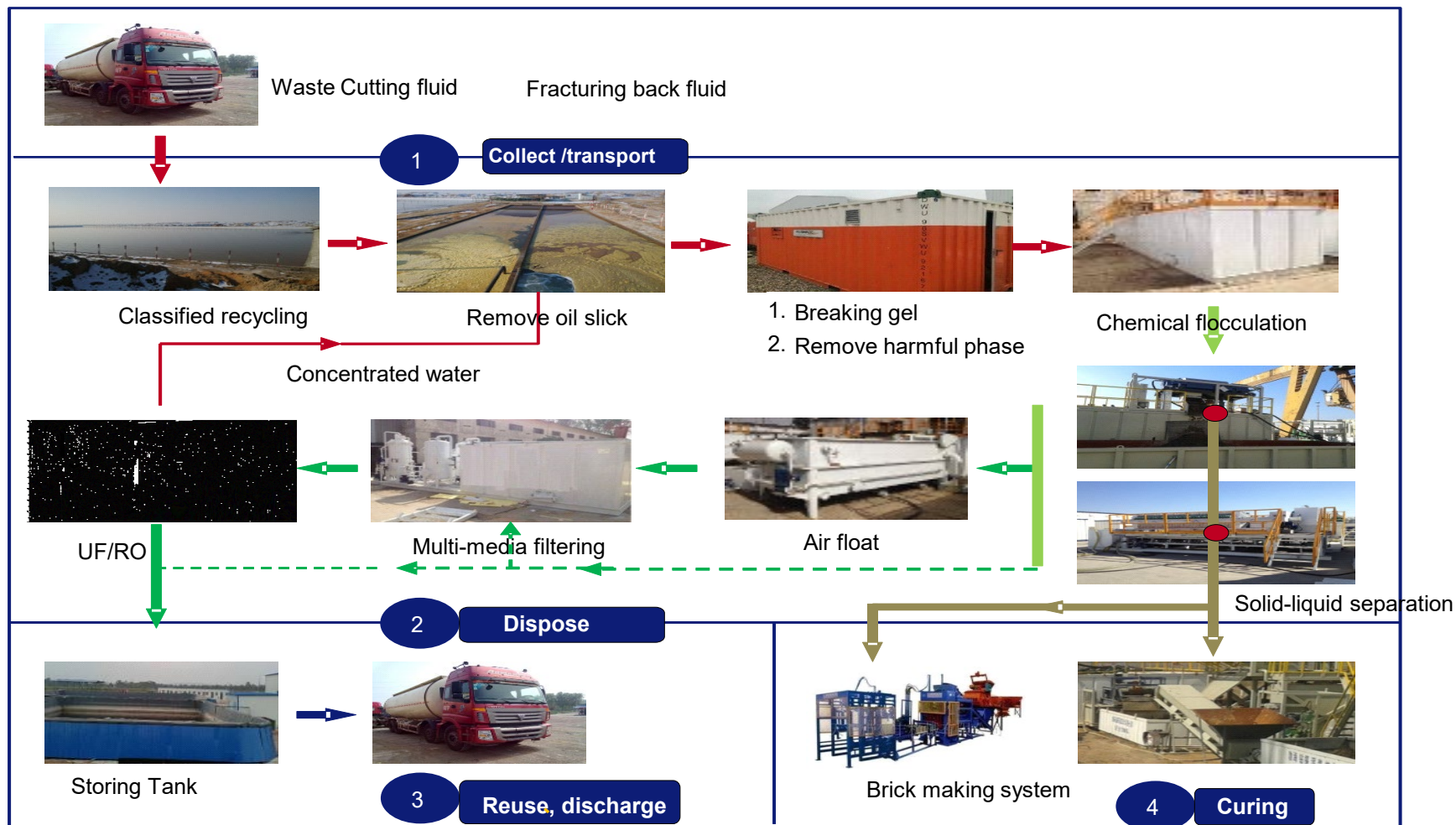


Core Technology

Centralized processing station

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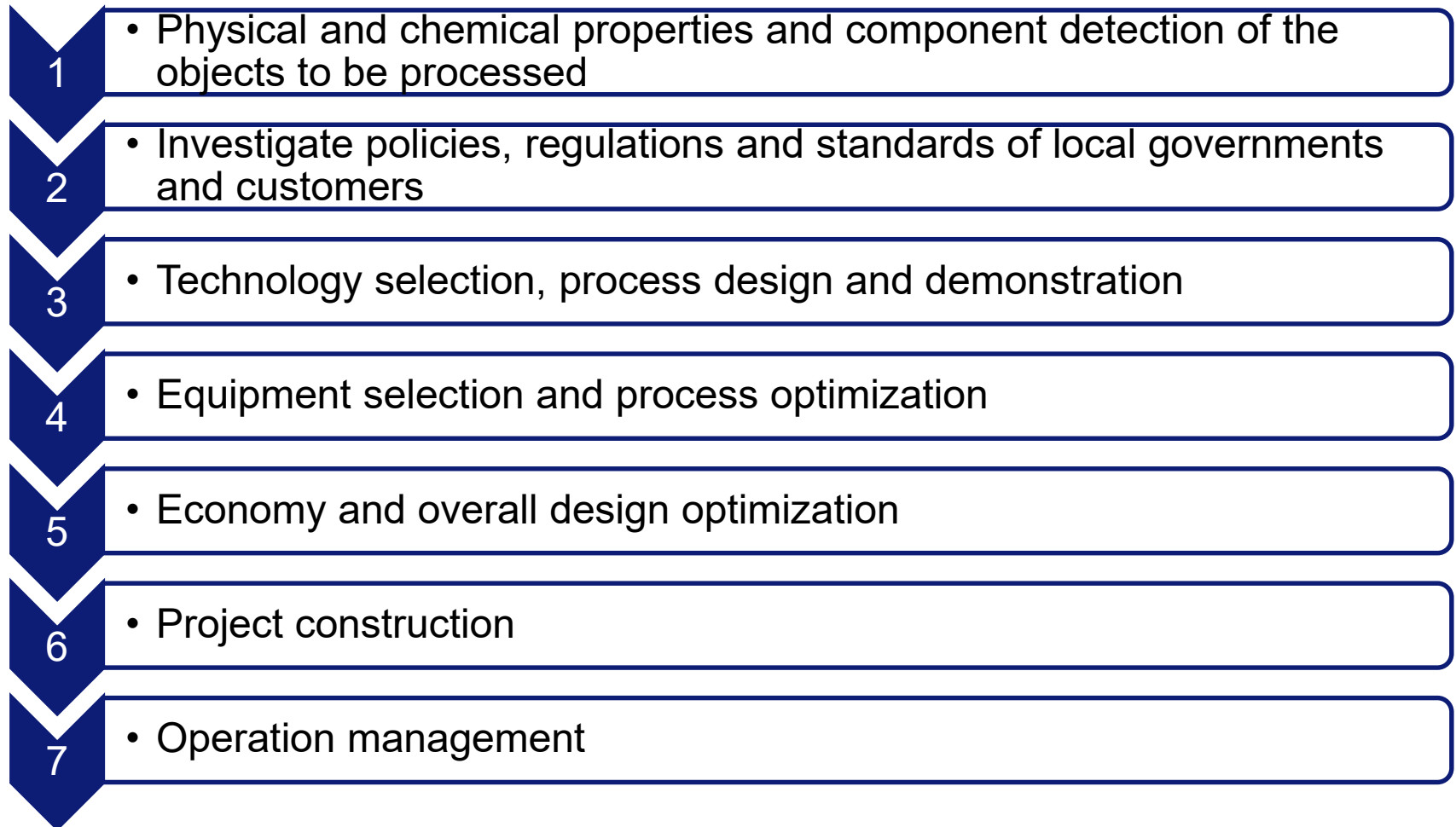
➤ The flow chart



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➤ Main steps



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The main results

No	Project name	Performance
1	Zhong yuan oilfield environment protection service project	Completion
2	Jiang Han company oil base drilling cuttings harmless treatment project	Completion
3	Sheng LI company oil base drilling cuttings harmless treatment project	Completion
4	Nong lin chu company oil base drilling cuttings harmless treatment	Completion
5	Puy ang sanl i oil base drilling cuttings harmless treatment	Completion
6	H4 oil drilling cuttings drying project	Completion
7	H6 oil drilling cuttings drying project	Completion
8	H8 oil drilling cuttings drying project	Completion
9	Chuan dong oilfield environment protection service project	Completion
10	Da qing qi chang oil base drilling cuttings harmless treatment	Completion
11	Da qing ba chang oil base drilling cuttings harmless treatment	Completion
12	Cnooc cuttings dispose project	Completion
13	Jidong water base drilling cuttings harmless treatment	Completion

The main results

No	Project name	Performance
14	Zhejiang oilfield environment protection service project	Completion
15	Zhejiang water base drilling cuttings harmless treatment	Completion
16	Chang qing fracturing fluid treatment project	Completion
17	Chang qing di san cai qi chang Mud does not fall sound project	Completion
18	Chang qing di si cai qi chang Mud does not fall sound project	Completion
19	Xi bu fracturing fluid treatment project	Completion
20	Xi bu Mud does not fall sound project	Completion
21	Bohai Mud does not fall sound project	Completion
22	402 well base drilling cuttings harmless treatment	Completion
23	Ethiopia drilling cuttings treatment project (18 well)	Completion
24	Ethiopia workover fluid treatment project (20 well)	Completion
25	Iraq project	Completion
26	Da wan qi project	Completion
27	Chang ni project	Completion
28	JY1-3X well project	Completion

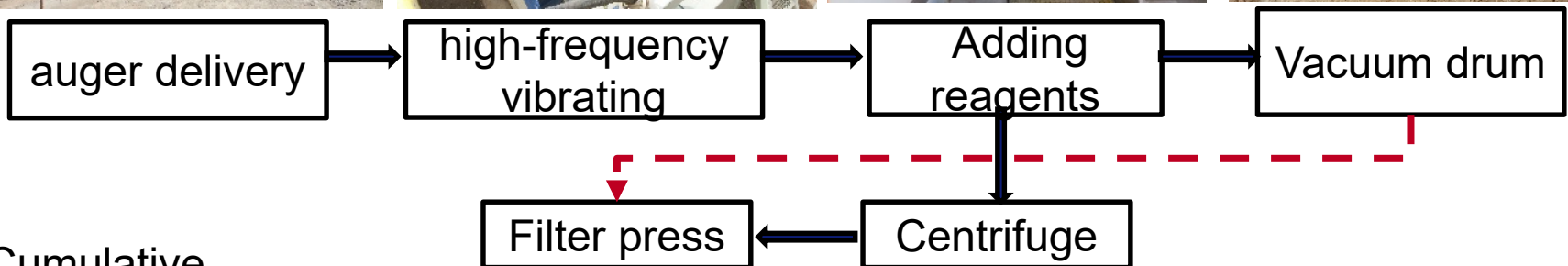
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➤ Sludge treatment plant in china



➤ Reduction treatment test project XX Well of Xinjiang



Cumulative treatment of water-based waste 2690m³; Cumulative treatment of oil-based waste: 171m³, 60% reduction;



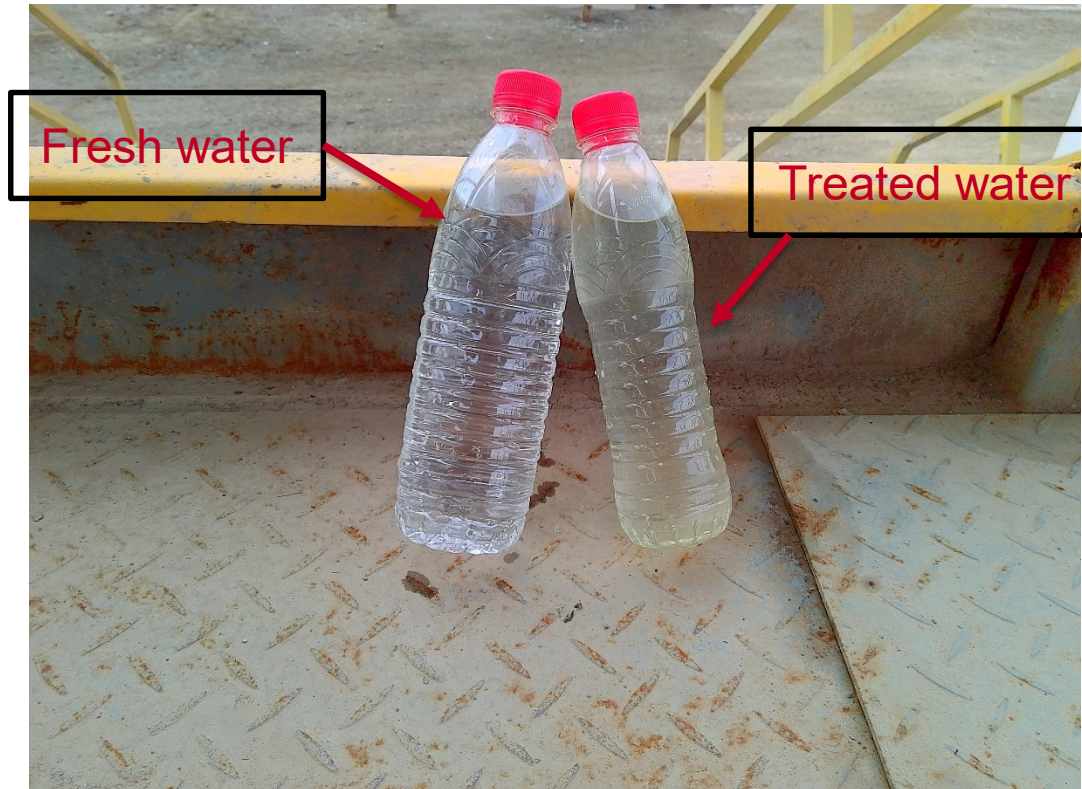
◆ Treatment effect of high-frequency vibrating screen



◆ Effect after vacuum drum treatment



◆ Treated water



The treated water is used to flush the tank, mud preparation and prepare the medicine for the well team. Zero release.

➤ Ethiopia project



➤ Ethiopia project

- Accumulated treatment of 20,000 m³ of drilling waste (17 Wells) and 250 m³ of waste liquid (16 Wells' workover and acidizing waste liquid)

		Company Name: Ethiopian Construction Design & Supervision Works Corporation Research, Laboratory & Training Center Laboratory Testing Process Tel: 0116 - 61 45 01 / 0116 - 61 01 05 ; Fax: 251 - 116 - 61 53 71/61 08 98; e-mail w.w.d.s.e@ethionet.et ; P.O Box 2561	
Title: Water Quality Testing Report		Document No: OF/RLTC/605	Issue No. 1 Page No. 1 of 1
Lab No.:- 893/2011		Client Ref:- Lab/02/wg/339/19	
Client/Project:- Baw Huaging		Date of Collection:- 16/1/2019	
Client ID:- Graden-1		Source of Sample:- Waste Water	
Location:- -		Date of Received:- 16/1/2019	
Reported Date:- 31/01/2019			

No	Tests	Test Results	Test Method	Ethiopian Enviromental Standard (mg/L)
1	pH	6.43	Potentiometric	6.0-9.0
2	Ammonia (mg/L NH ₃ -N)	0.40	Nessler	5.0
3	Total Nitrogen (mg/L N)	7.46	Keldjahl	80.0
4	Total Phosphorus (mg/L P)	9.00	Ascorbic acid	10.0
5	BOD ₅ (mg/L)	11.30	5 Day incubation(Azide Modification)	80.0
6	COD (mg/L)	65.00	Open Reflux	250.0

REMARK:- The test result can be compared with the Ethiopian Environmental Standard maximum allowable concentration (mg/L) presented on the right column. The water sample is collected and submitted to the laboratory by the client.

Reported by: CH Lab Expert
 Checked by: [Signature] Senior Water Quality Expert
 Approved by: [Signature] Water Quality S/P Manager

Among the major services rendered by the Water Quality Laboratory Testing S/Process of Ethiopian Construction Design & Supervision Works Corporation are: Testing all the Physico-Chemical and Bacteriological analysis of potable or drinking water Bottled drinking water, wastewater, water for construction and irrigation uses and sampling of water and wastewater.

施工区域5米以内有无垃圾、油渍以及散落的废屑、泥浆污水等。 Within 5 meters around treatment area, there is whether any rubbish, oil spillage and discarded mud etc. or not	HSSE OF GCL Operations Department OF GCL Ethiopia's Mining Ministry	qualified
其它安全环保是否合格。 Whether the other else HSE issues satisfied or not.	HSSE OF GCL Operations Department OF GCL Ethiopia's Mining Ministry	qualified
整改或处罚意见 Correction or punishment	Not have	
安东代表签字: <u>[Signature]</u> Anton representative signature: <u>[Signature]</u> 埃塞矿业部代表签字: <u>[Signature]</u> The representative signature: <u>[Signature]</u> HSSE 部代表签字: <u>[Signature]</u> The representative signature: <u>[Signature]</u> 作业部代表签字: <u>[Signature]</u> The representative signature: <u>[Signature]</u>		

2019年2月15日

Acceptance inspection

➤Iraq project

- An oilfield environmental protection project in Iraq - the station. The treated water output index is superior to the national sewage treatment highest standard level A stander. The local squid was placed in the on-site production pond for live biological observation, and the carp lived in good condition. The treated water is used for greening and industrial production.



- Processing capacity for treatment of water-base mud, drilling cuttings and workover flowback fluid is designed as per 300m³/d, > 90000m³/year.
- Total inflow of waste slurry water and workover liquid is 180m³/d. Time of flushing, washing and the like of membrane part shall be considered in the operating process of membrane system. Allowance has been considered in the total inflow, so it will not be considered in the design process of the scheme.
- Comprehensive rate of recovery of waste water in the Project: comprehensive rate of recovery of the device is ≥80%.
- Oasis environmental protection station serves 5 well teams, 4 workover machines and 2 coiled tubing equipment at the same time.
- As of February 12, 2018, a total of 91848.5 cubic meters of waste mud and 64586.3 cubic meters of cuttings have been processed.

➤ Iraq project

Iraqi oil ministry experts and other companies visited the site.



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THANKS!

Helping others succeed...