



正力集团
ZHENGLI GROUP

ZI PetroChemicals Co., Ltd
ZL EOR Chemicals Co., Ltd. (Canada)



ZL PETROCHEMICALS CO.LTD

Trust in us, we will exceed your expectations!

Over 90% of EOR Polymer made and
consumed in China!

Over 400,000 Tonnes consumed in
China's EOR market Alone.

>15% of China's oil production is from
PAM flooding tech!

ZL

#1 PAM Privately owned
producer in China for
EOR industry



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- 15 years experiences in CEOR industry
- Tier One supplier of Sinopec for 7 consecutive years

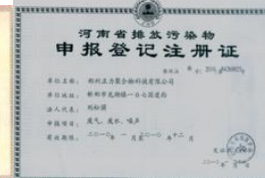
ZL is a Leading Chinese Producer of High-Quality Polyacrylamide (PAM) for EOR applications



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Qualified business over 15 years operation history





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Technology

Services

Products

Market





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New Products

Nano Agent

- A new displacement agent for the next generation of oil extraction technology

PAM III

- Resistant to higher temperatures and salt

PAM II

- Salt resistant

PAM I

- Used in normal oil fields without mineral complexities or high temperatures

**ZL: Best Technology in
Salinity/Temperature
resistant chemical
flooding!**



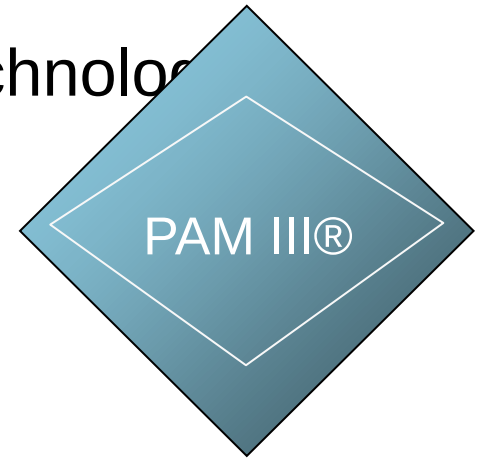
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Salinity/temperature Resistant polymer technology

Why the research?

- Limitation of Current polymer technology;
- Fresh water usage restrictions;
- Large reservoir of high temp high saline reservoir.



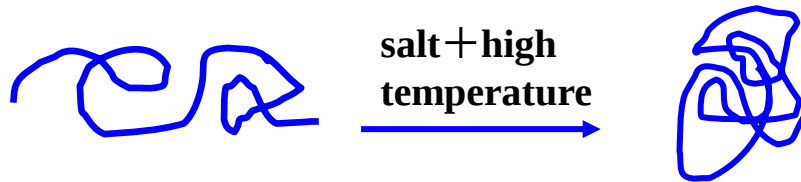
Enabled produced water re-injection at economical cost



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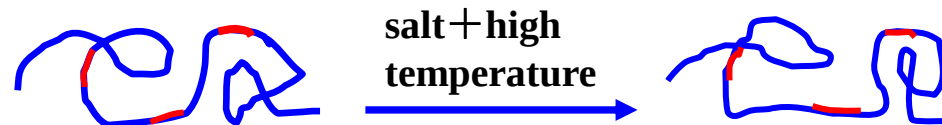
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Normal
HPAM



Tangled randomly, Hydrodynamic volume decreased

PAM III



Rigidity increased and the hydrodynamic volume maintained

Performance much better in High Salinity reservoir.





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■ Offshore polymer

CHARACTERISTICS

Fast Dissolving

Salinity Resistant

Temperature Resistant

RESULTS

Dissolving equipment on offshore platform

Sea water direct mixing and injecting

Long term thermal stability/Economical cost



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■ Case Study: Double-Tube Model

Tube	L : 60 cm , D : 3.8 cm , A : 11.3 cm ² , V : 680 ml
Filled sand	the produced sand of Shengli oilfield
Permeability of High Perm. tube	~ 2500mdc
Permeability of Low Perm. tube	~ 400mdc
Pressure measurement points	a total pressure measurement point ahead of the tubes and two pressure measurement points along each tube
Temperature	85°C
The viscosity of the crude oil	85°C , 60mPa.s
The concentration of PAM	1.5g/L solved in the simulated Shengli oilfield produced water at 35,000ppm TDS.
The injection volume of PAM	0.4PV
The injection rate	0.5ml/min



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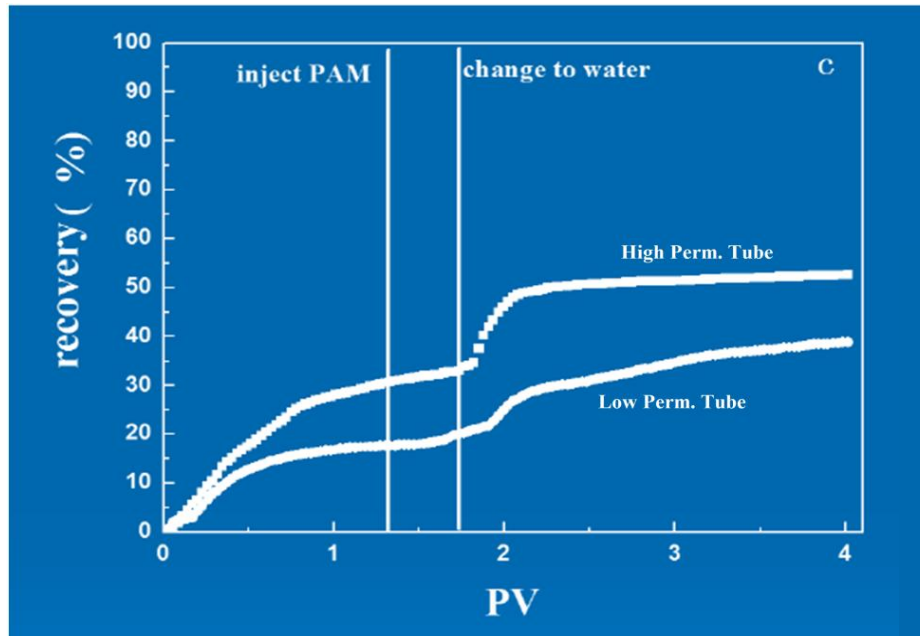
Table 1: The apparent viscosity of the PAM solution

Sample	ZL 32151	MO-4000
Concentration	1.5g/L	1.5g/L
Temperature	85°C	85°C
Apparent viscosity	16.1 mPa.s	8.3 mPa.s



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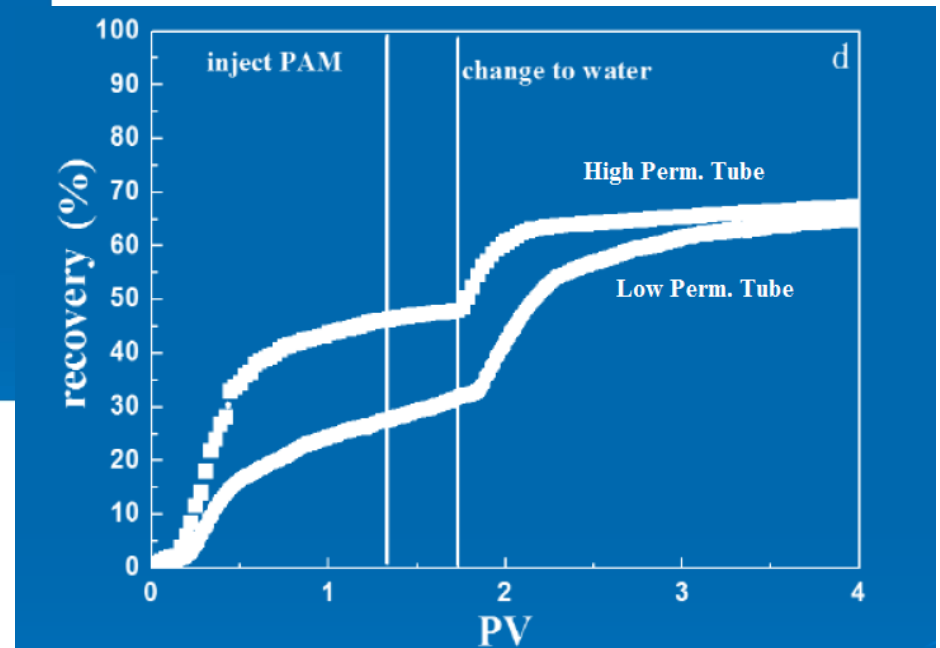
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MO-4000

The effect of inject volume (PV) on the recovery

ZL 32151





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MO-4000

	High Perm. tube%	Low Perm. tube%	average%
Flooding by water	30.51	17.6	24.1
Flooding by PAM	22.04	21.25	21.65
Total	52.55	38.85	45.75

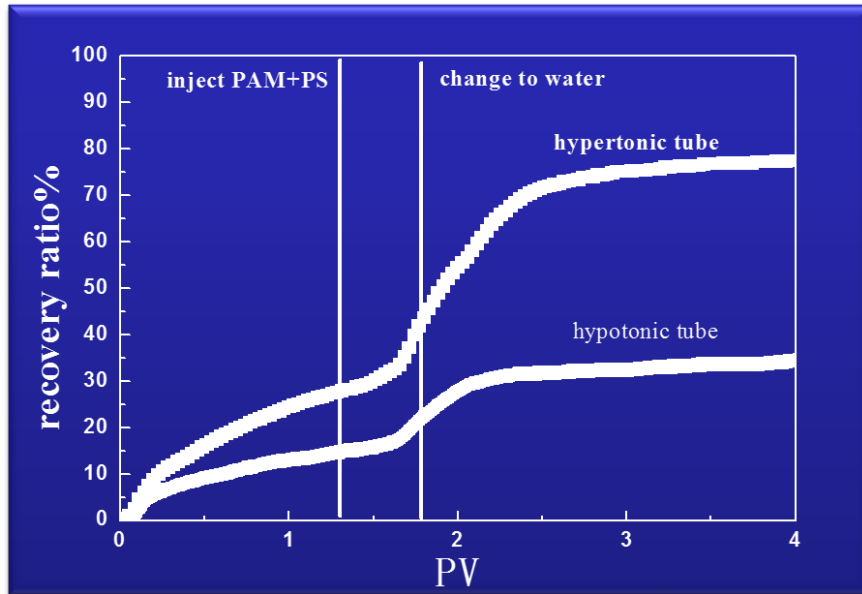
ZL 32151

	High Perm. tube%	Low Perm. tube%	average%
Flooding by water	46.21	27.38	36.8
Flooding by PAM	21.34	37.83	29.58
Total	67.55	65.21	66.38



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The enhanced recovery by 32151+PS

C(PAM)=1.5g/L, C(PS)=0.25%, the permeability of the tubes are about 400mdc and 2500mdc

32151 and petroleum sulfonate have a good synergy, the recovery ratio of High Perm. tube was promoted up to 50%.

	High Perm. tube%	Low Perm. tube%	average%
Flooding by water	27.31	14.36	20.84
Flooding by 32151+PS	50.18	20.02	35.1
Total	77.49	34.39	55.94



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- To work in deep reservoir;
- To activate oil reserves in low Perm areas;
- To restore energy level in reserves.
- To unlock potential reserves that water floods/polymers can not reach.

Situations for Nano-sphere application:

- Water flood fields;
- Offshore/places with limitations for construction;
- High Salinity fields (TDS upto 300,000ppm);
- Big Permeability differentials (E.g: 0.1mD v.s. 5000 mD);
- High Temperatures; (Product had been injected for fields @130C, and tested under 300C in lab);
- High water content;
- Heterogeneous Field.
- Bottom water / Side water problems.



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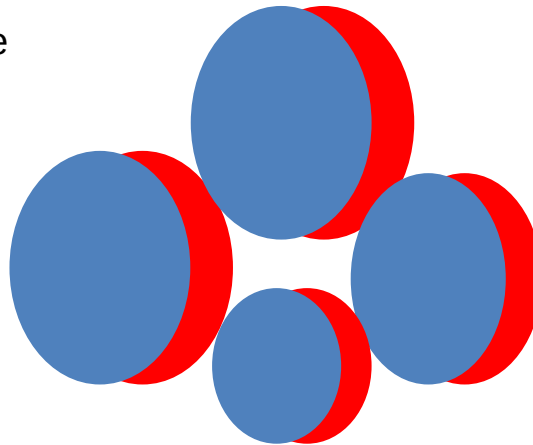
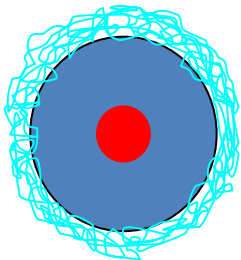


The Micro-sphere combines with each other, getting larger, stopped on the surface of rocks, forms something similar to concrete structure

After 4 days in water

The occurrence of obvious reunion, cross-linked

Using large-size core structure



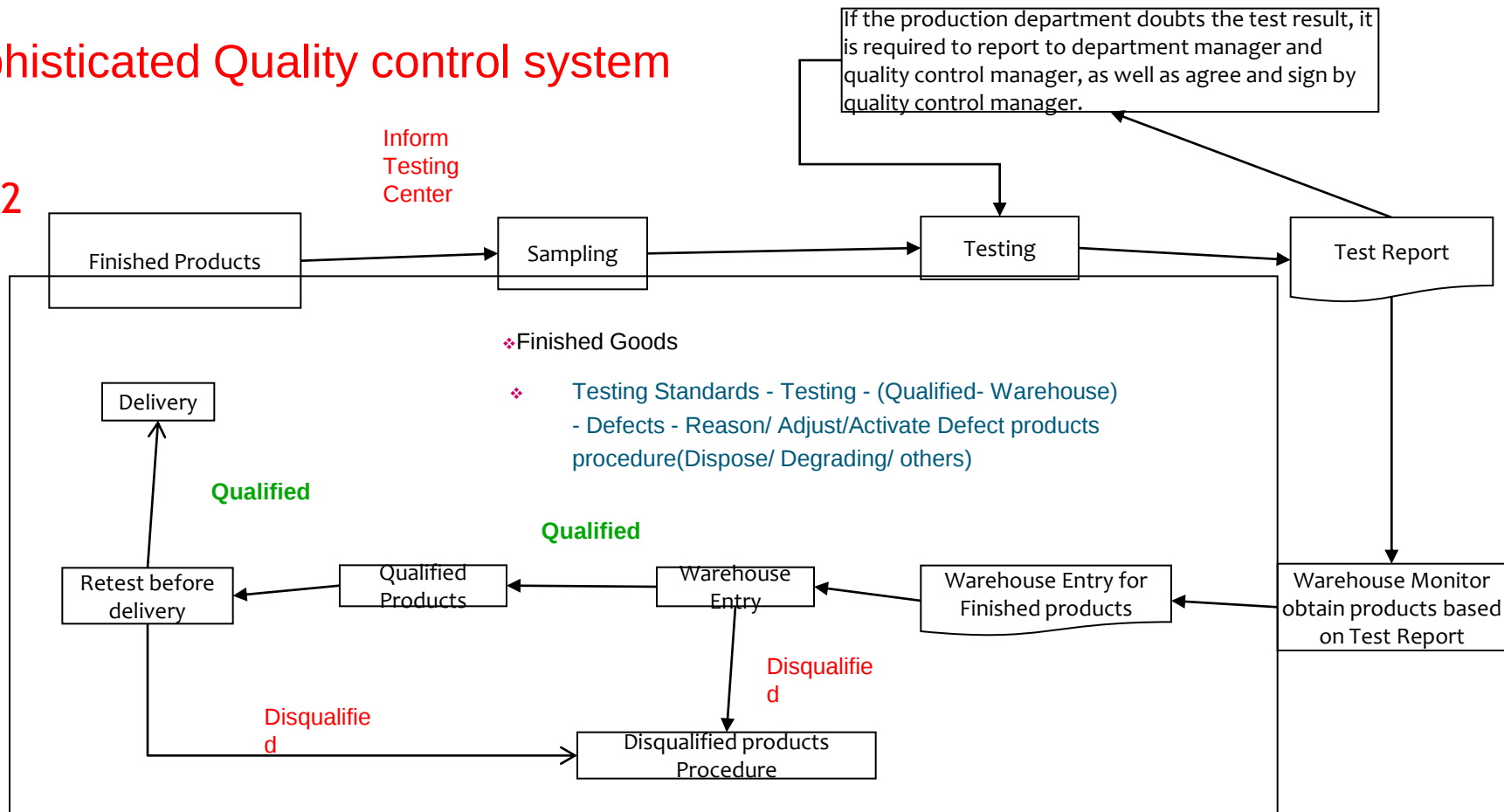


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Sophisticated Quality control system

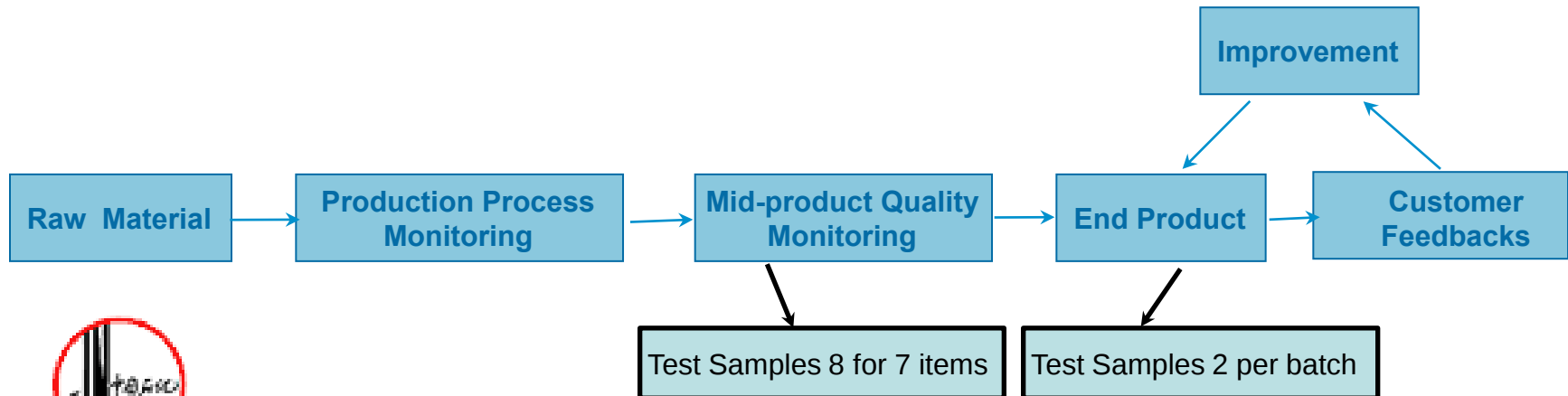
6 σ
ISO9002





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- **Tier One supplier** of Sinopec since 2005
- **10+ years** experience working with Sinopec and petrochina
- **The largest PAM supplier** for Sinopec Henan oil fields (**85%** of its total consumption)



Zhengli's **high-quality** products have been proven by its strong performance in viscosity, solubility, and high oil extraction rates, as well as its status as Tier One Supplier for Sinopec





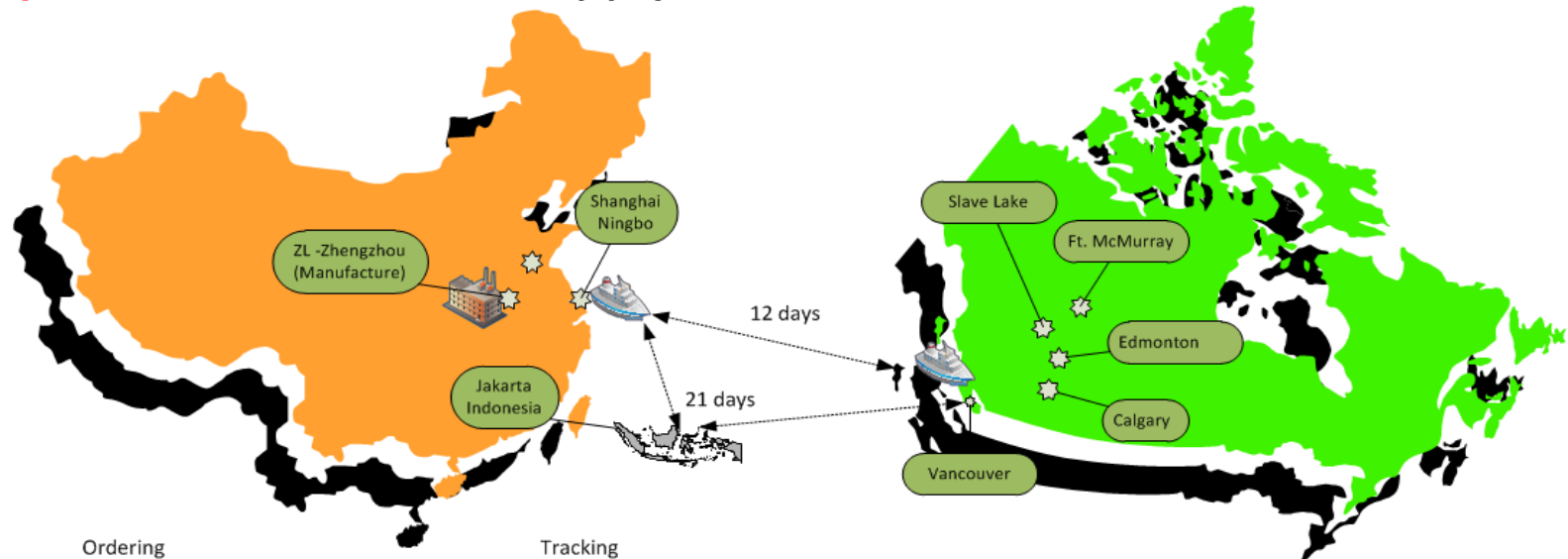
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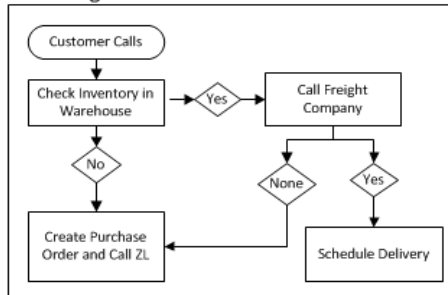
Sample

ZL Petrochemical Basic Supply Chain Model

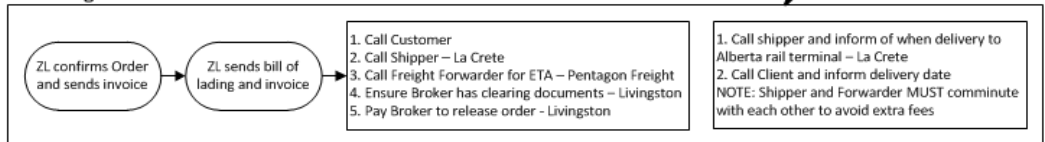
Importer of record – ZL Petrochemicals
Broker – Livingston International Ltd.
Freight Forwarder – Pentagon Freight Ltd.
Freight – La Crete



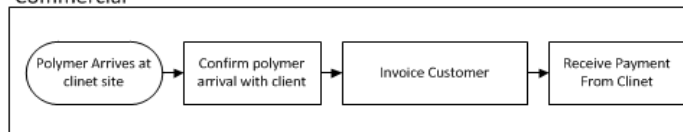
Ordering



Tracking



Commercial





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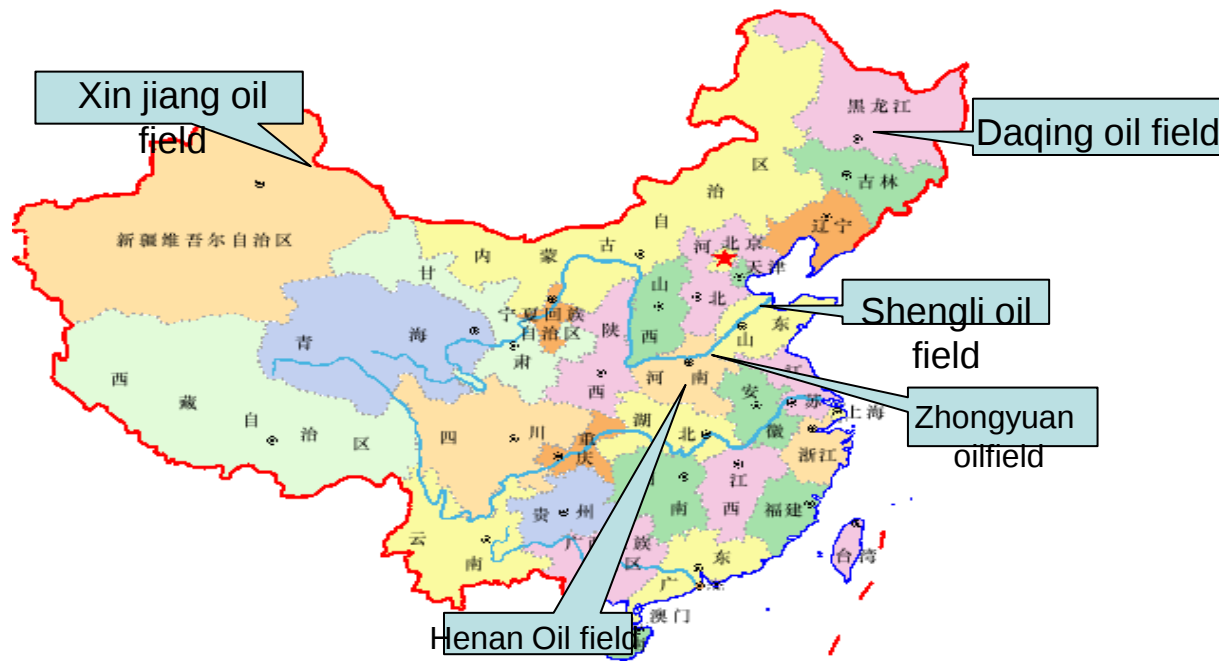


**ZL's technology had been successfully evaluated and injected
worldwide**



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China Application



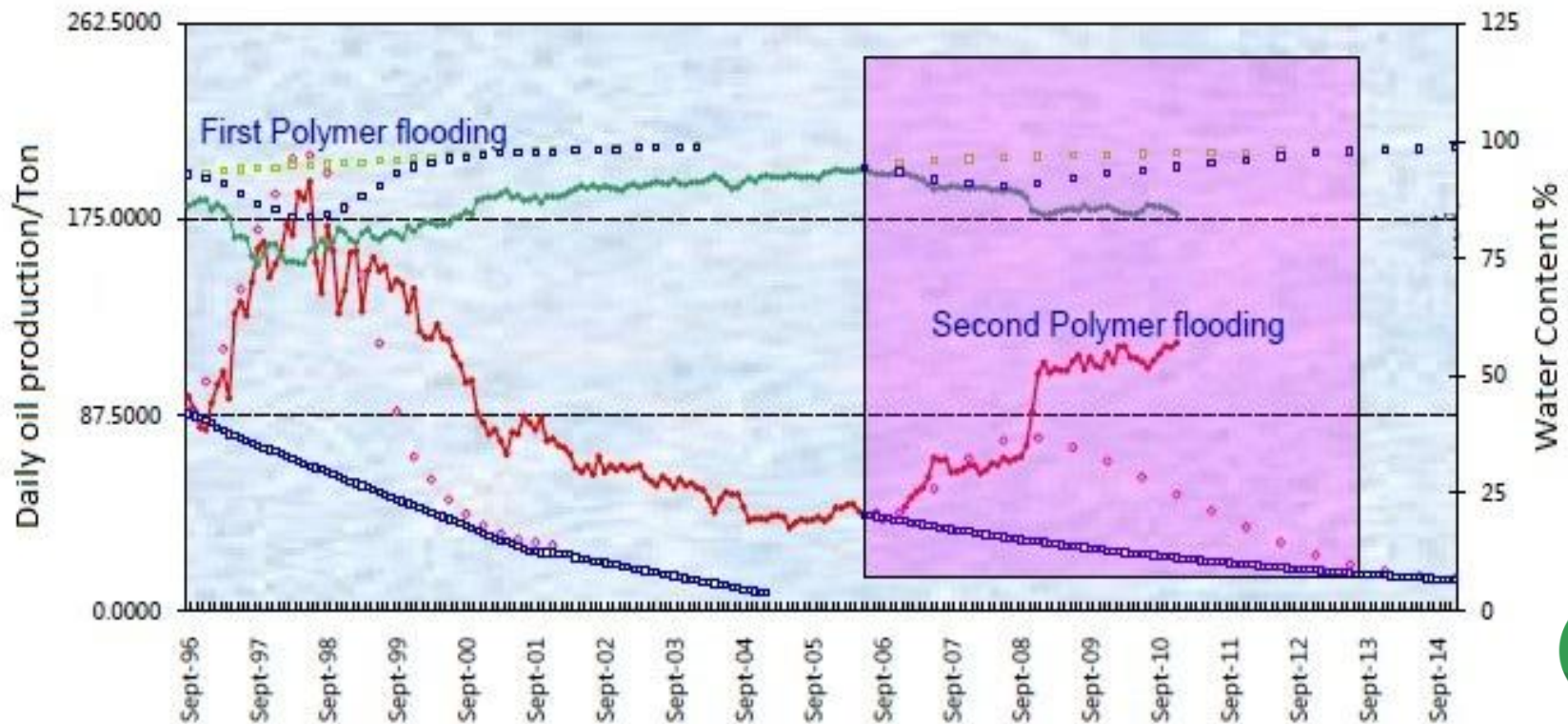
**ZL had been successfully evaluated and injected in five oil fields from
Sinopec and PetroChina**



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- Hxx Second polymer flooding recovery trend



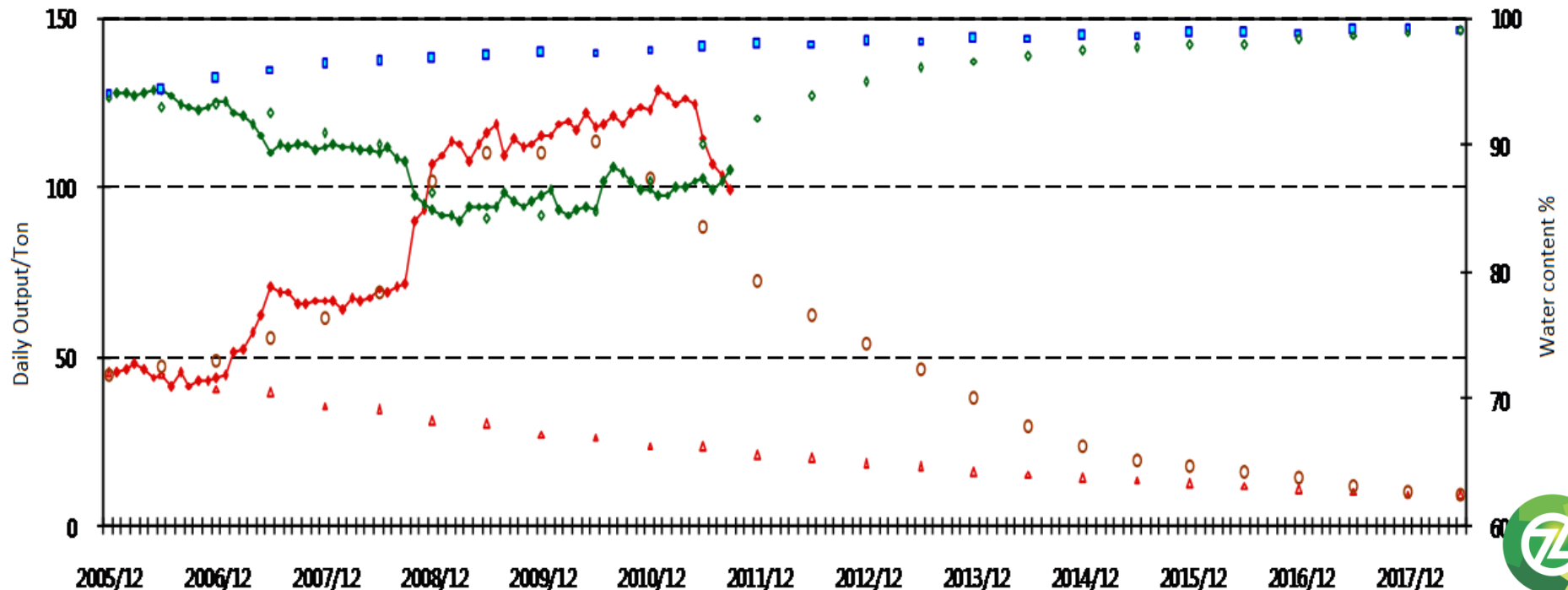


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Cases

—▲— Daily Oil Production of Water flooding —○— Daily Oil Production of Second Polymer flooding —◆— Daily Output —□— Water content of Water flooding —◇— Water content of Second Polymer flooding

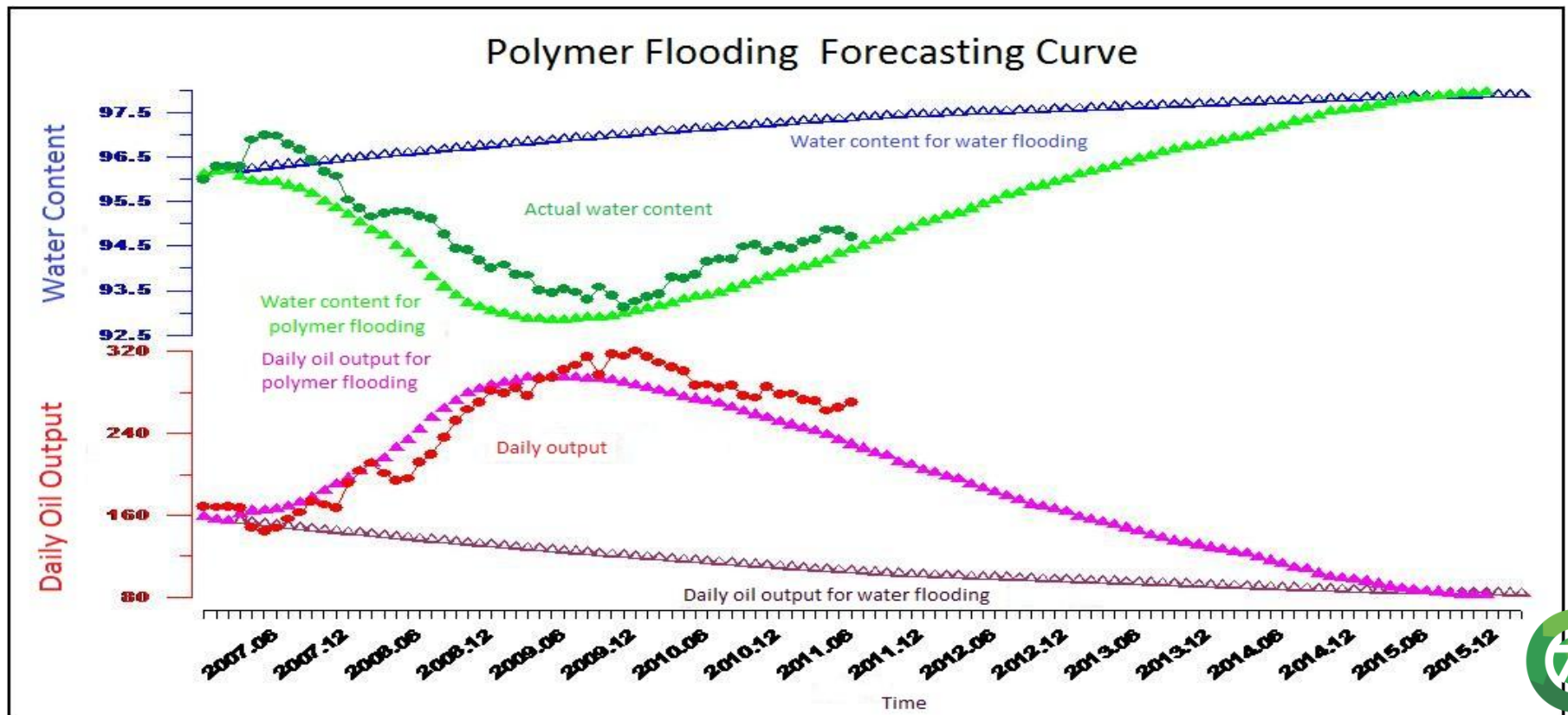




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Cases

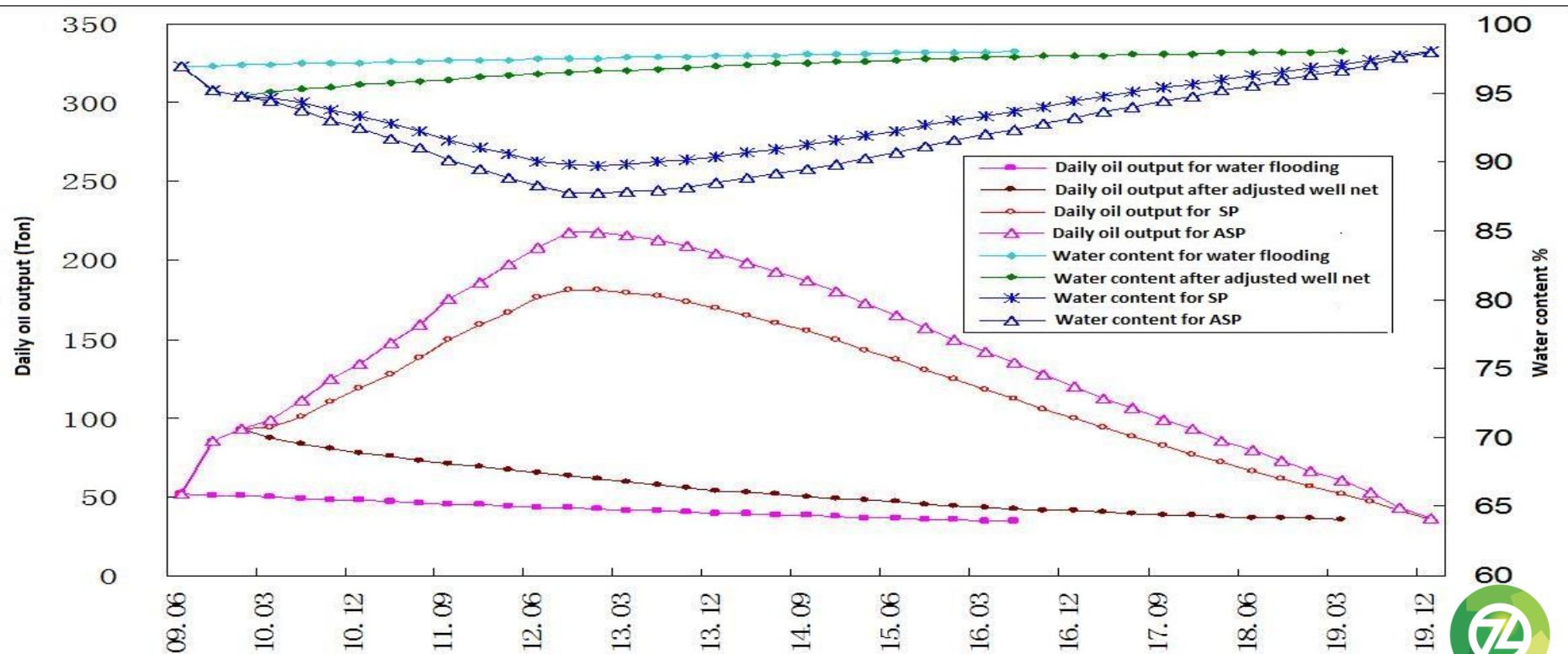




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Cases





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How to work with our customer to select the best technology for the reservoir?

At Zhengli, we believe Services lead sales!



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R&D Team:

Dr. Wu, Head of R&D Department:

-Chemist from Beijing Normal University, Doctor degree from Tokyo University, 11 years experiences in EOR industry. Area of Focus: Salinity and temperature polymer technology, Nano technology. Worked closely on several R&D projects with Henan Oil fields. Shengli oil fields, Daqing oil fields. And several CNOOC's offshore projects.

Mr. Jia, Polymer alteration engineer

-Over 10 years experience in Polymer manufacture industry.

Mr. Yang, Senior Chemical Engineer - Polymer evaluation

-Over 17 years working experience in EOR evaluation lab for Sinopec Henan oil fields.

Mrs. Dai, Senior Reservoir Engineer -Dynamic Modelling

-Over 15 years working experience in Sinopec for Dynamic Modelling

Mr. Jin Senior Reservoir Engineer

- Over 10 years experience with Sinopec and 5 years with PetroChina.

Mr. Ding Senior Facility Engineer;

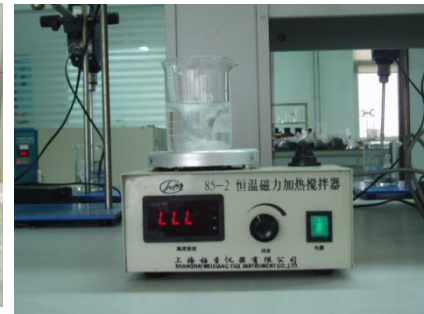
-- Over 10 years experiences with Sinopec for polymer injection plant.



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Trust in us, we will exceed your expectations!

Chinese national certified lab for EOR analysis.





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Chinese national certified lab for EOR analysis.



**MASS 4920
rheometer**



Micro EOR laboratory



RS-75 rheometer



**HITACHI Z-5000 atomic
absorption spectroscopy
equipment**



**the long core test
facility**



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Customer training on
Polymer performance
evaluation methods

Troubleshooting/Consulting
for field injection

Performance following
up/adjustment

Products evaluation and Selection

Other Services

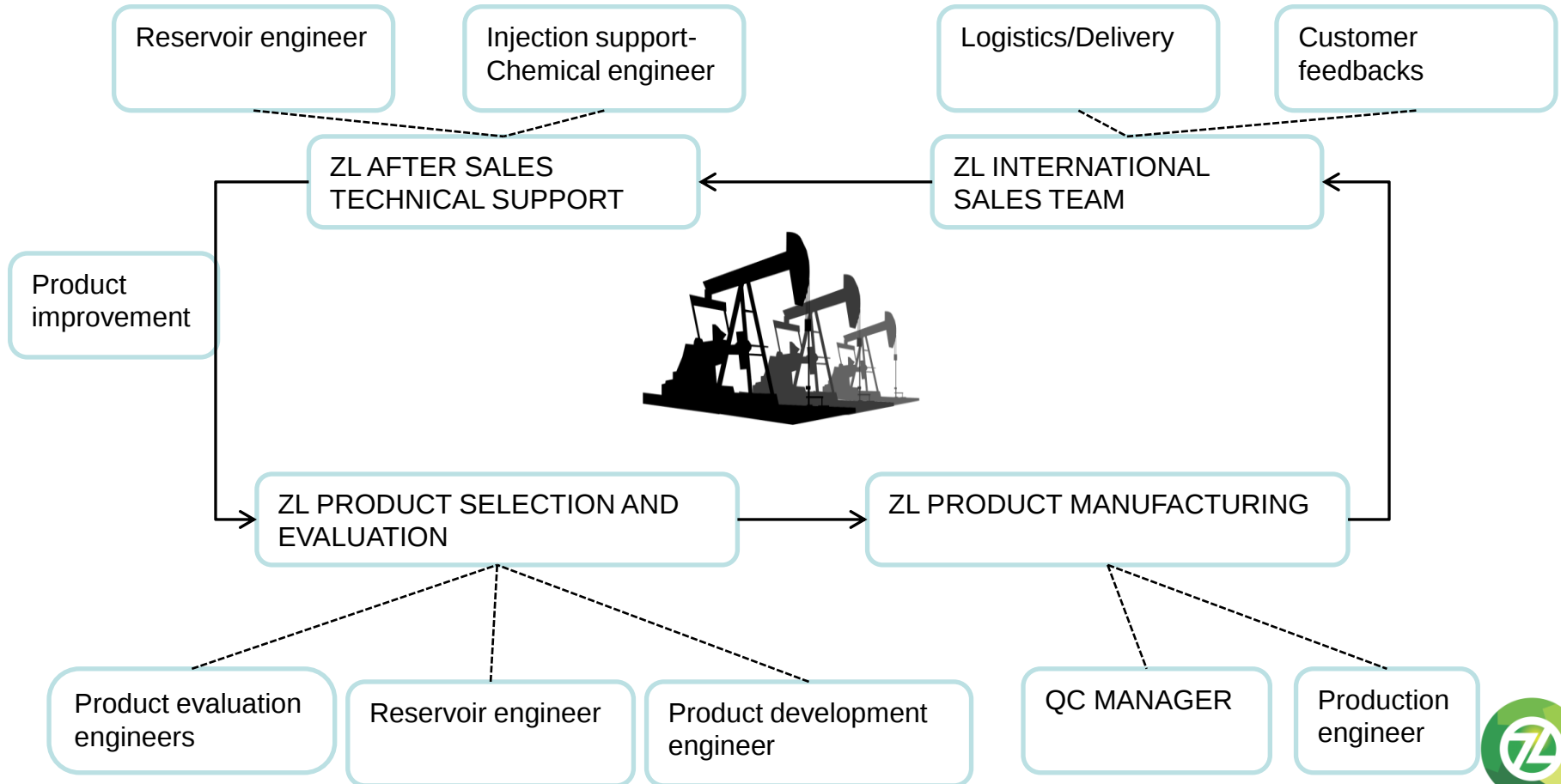
- ❖ Customers tailored systemic solutions can make sure the appropriate application of PAM, and to provide customers with specialized advice and services according to specific situations.
- ❖ Project Evaluation , Reservoir viability, Optimize polymer selection, Pilot Test, Full field implementation





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Please contact us for more information



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www.zlpam.com

Info@zlpam.com