

# Nan Ya Plastics Corp. (Jing Hsin) Co-generator Power Plant



# Appearance



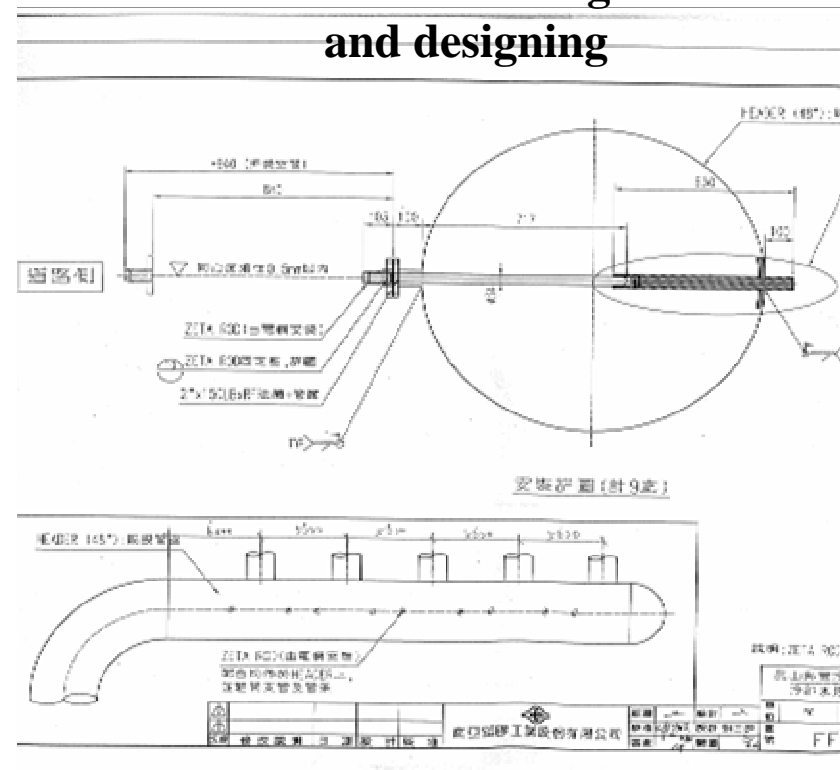
# System explain

Capacity : 10,000 RT, 48 " pipeline

Power generator , air compressor , hydraulic press ,  
complementing machine



## Rod installing and designing

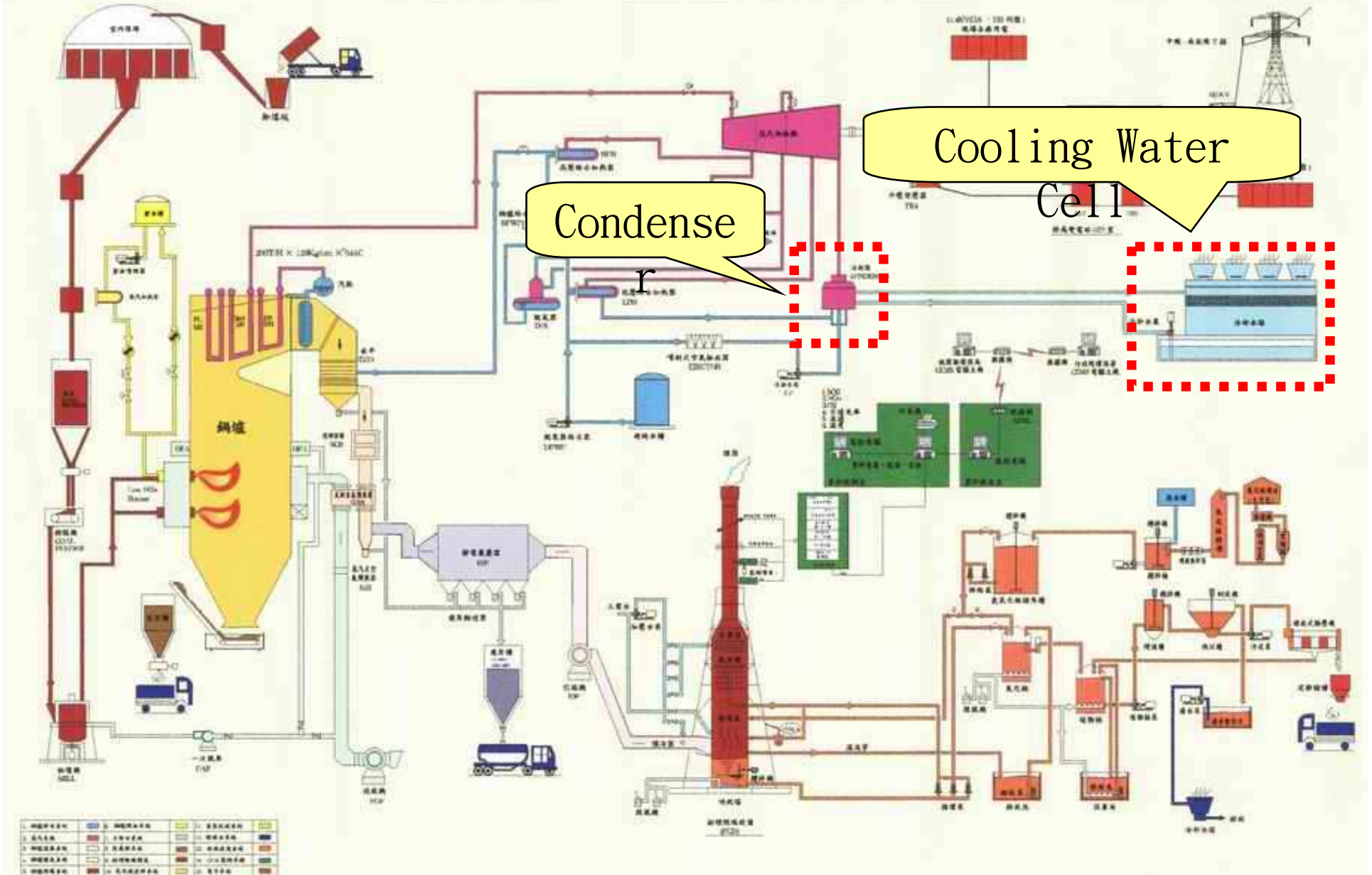


# Cooling tower factor

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- ❑ Circulation: 7,800 ton/h
- ❑ Hot water temperature: 43 °C
- ❑ Cold water temperature: 34 °C
- ❑ Wet ball temperature: 29 °C
- ❑ Total horsepower: 150 Hp \* 4 =600 Hp
- ❑ Windage loss. : 0.001 circ.
- ❑ Evaporate losses: 1.38 %
- ❑ The total height of water tower: 11.6 M
- ❑ Install rod quantity : 19 × ZR 36S

# 汽電共生設備及環保設施流程圖



# The rod install position Lay-Out

Cooling Water Cell Inlet 4xST

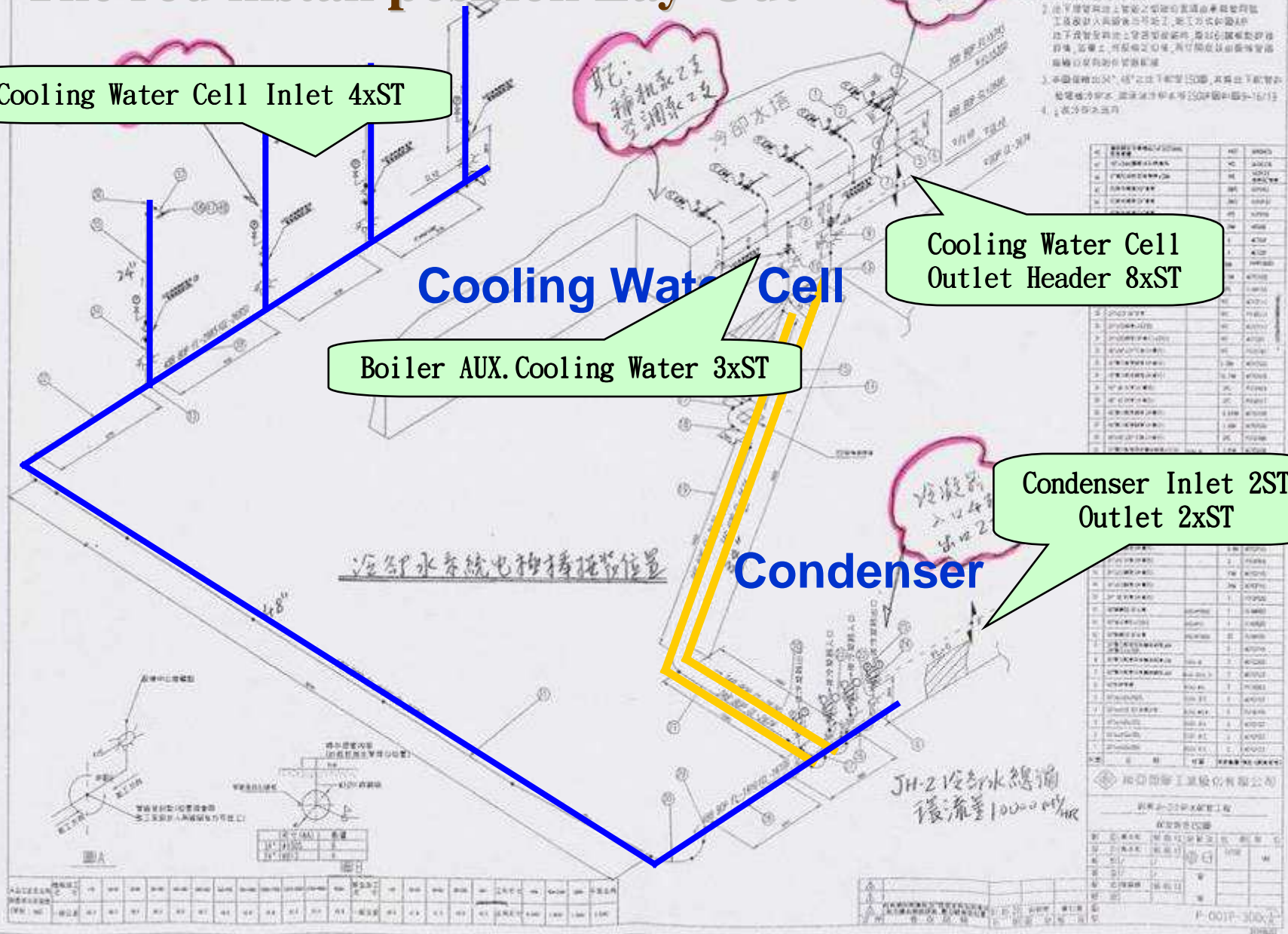
Cooling Water Cell

Cooling Water Cell  
Outlet Header 8xST

Boiler AUX. Cooling Water 3xST

Condenser Inlet 2ST  
Outlet 2xST

Condenser



- 1. 本工程所有之材料均應由專業廠商供應
- 2. 地下工程與地上工程之配合應由專業廠商負責
- 3. 本工程所有之材料均應由專業廠商供應
- 4. 本工程所有之材料均應由專業廠商供應

| 序號 | 名稱 | 單位 | 數量    | 備註 |
|----|----|----|-------|----|
| 1  | 鋼管 | kg | 1000  |    |
| 2  | 鋼管 | kg | 2000  |    |
| 3  | 鋼管 | kg | 3000  |    |
| 4  | 鋼管 | kg | 4000  |    |
| 5  | 鋼管 | kg | 5000  |    |
| 6  | 鋼管 | kg | 6000  |    |
| 7  | 鋼管 | kg | 7000  |    |
| 8  | 鋼管 | kg | 8000  |    |
| 9  | 鋼管 | kg | 9000  |    |
| 10 | 鋼管 | kg | 10000 |    |

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# Tower appearance



# Zeta-Rod is installed : Pipes





# Zeta-Rod is installed



# Medicines decrement

## ( Chemical Reduction Schedule)

| Date<br>Name                   | First stage (%) |           |           | Second stage (%) |             |             |
|--------------------------------|-----------------|-----------|-----------|------------------|-------------|-------------|
|                                | 5/10~6/10       | 6/10~7/10 | 7/10~8/10 | 8/10~9/10        | 9/10 ~10/10 | 10/10~11/10 |
| H <sub>2</sub> SO <sub>4</sub> | <b>100%</b>     | <b>75</b> | <b>50</b> | <b>50%</b>       |             |             |
| Corrosion inhibitor            |                 | <b>75</b> | <b>50</b> | <b>25</b>        | <b>10</b>   | <b>0</b>    |
| NaOCl                          |                 | <b>75</b> | <b>50</b> | <b>50%</b>       |             |             |
| Dispersing Agent               |                 | <b>50</b> | <b>30</b> | <b>20</b>        | <b>10</b>   | <b>0</b>    |

# Chemical dosage improving

| Name \ Item                        | Per day Dose Kg | price NT/kg | Per day payment | percent | Decrement target |
|------------------------------------|-----------------|-------------|-----------------|---------|------------------|
| <b>H<sub>2</sub>SO<sub>4</sub></b> | 200             | 1.4         | 280             | 3 %     | 50 %             |
| <b>NaOCl</b>                       | 500             | 3.0         | 1500            | 18 %    | 50 %             |
| <b>Corrosion inhibitor</b>         | 75              | 66          | 4950            | 58 %    | 0 %              |
| <b>Dispersing Agent</b>            | 20              | 88          | 1760            | 21 %    | 0 %              |

- ❑ Total Chemical Cost down : from NT\$254,700 to 26,700 (NT/Month)
- ❑ Save 89 % Chemical Cost

# Corrosion rate standard.

unit : mpy

| Standard<br>material   | Best | Good | Acceptable | Bad  | Worst | Note |
|------------------------|------|------|------------|------|-------|------|
| <b>Carbon Steel</b>    | 1↓   | 1~3  | 3~5        | 5~10 | 10↑   |      |
| <b>Copper</b>          | 0.3↓ | 0.5  | 0.5~1.0    | 1↑   |       |      |
| <b>Stainless Steel</b> | 0.1↓ |      | 0.1~0.3    |      |       |      |

**Note: mpy (mil per year), 1 mil = 0.001 inch**

# Distinct system std.

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| <b>Unit</b>                                      | <b>Material</b>            | <b>Cooling water percent</b> | <b>Control std. (mpy)</b>      |
|--|----------------------------|------------------------------|--------------------------------|
| <b>(Turbine Condenser)</b>                       | <b>SUS</b>                 | <b>85 %</b>                  | <b>&lt;0.1</b>                 |
| <b>(Generator Water Cooler &amp; Oil Cooler)</b> | <b>Copper alloy</b>        | <b>5 %</b>                   | <b>&lt;1</b>                   |
| <b>(Boiler Auxiliary Machine Water Cooler)</b>   | <b>CS<br/>Copper alloy</b> | <b>10 %</b>                  | <b>CS &lt; 3<br/>Cu &lt; 1</b> |

# Water quality analysis report

| 日期   | pH 值  | 導電度<br>$\mu s/cm$ | 濃縮倍數 | 濁度<br>NTU | 殘餘氯<br>ppm | 鈣硬度<br>ppm | 微生物測試   | 每週排放量 | 腐蝕率<br>mpy(鐵) | 腐蝕率<br>mpy(銅) | 腐蝕率<br>mpy(SUS) |
|------|-------|-------------------|------|-----------|------------|------------|---------|-------|---------------|---------------|-----------------|
|      | 8-8.5 | <2500             | <10  | <20       | <0.5       | <500       | <100000 |       | <3            | <1            | <0.1            |
| 5/8  | 8.04  | 1414              | 5.03 | 5.9       | 0.35       | 380        | 10000   | 1237  | 1.5064        | 0.3431        | --              |
| 5/11 | 8.56  | 1781              | 6.85 | 3.68      | 0.46       |            |         |       |               |               |                 |
| 5/15 | 8.43  | 1963              | 8.11 | 3.75      | 0.43       | 460        | 10000   | 1283  |               |               |                 |
| 5/18 | 8.39  | 1745              | 7.62 | 2.15      | 0.40       |            |         |       |               |               |                 |
| 5/22 | 8.41  | 1728              | 7.17 | 2.65      | 0.40       | 480        | 10000   | 1332  | 2.728         | 0.3867        | 0.025           |
| 5/25 | 8.34  | 1974              | 8.12 | 2.83      | 0.36       |            |         |       |               |               |                 |
| 5/29 | 8.32  | 1898              | 7.90 | 3.02      | 0.29       | 490        | 10000   | 1295  |               |               |                 |
| 6/1  | 8.30  | 1517              | 6.37 | 2.44      | 0.30       |            |         |       |               |               |                 |
| 6/5  | 8.26  | 1765              | 7.35 | 2.88      | 0.32       | 495        | 10000   | 1170  | 2.178         | 0.8343        | 0.0296          |
| 6/8  | 8.42  | 2018              | 9.12 | 3.96      | 0.30       |            |         |       |               |               |                 |
| 6/12 | 8.50  | 1792              | 7.8  | 2.44      | 0.30       | 409        | 10000   | 1120  |               |               |                 |
| 6/15 | 8.46  | 2012              | 9.4  | 2.69      | 0.29       |            |         |       |               |               |                 |
| 6/19 | 8.43  | 2116              | 8.78 | 2.88      | 0.31       | 493        | 10000   | 1090  | 2.307         | 0.843         | 0.0775          |
| 6/22 | 8.50  | 2112              | 9.68 | 3.12      | 0.26       |            |         |       |               |               |                 |
| 6/26 | 8.44  | 2075              | 9.83 | 2.86      | 0.27       | 512        | 10000   | 1122  |               |               |                 |
| 6/29 | 8.43  | 1893              | 9.18 | 3.69      | 0.24       |            |         |       |               |               |                 |
| 7/3  | 8.42  | 2245              | 9.75 | 2.98      | 0.26       | 530        | 10000   | 1209  | 1.484         | 0.843         | 0.0207          |
| 7/6  | 8.43  | 2269              | 9.88 | 3.12      | 0.24       |            |         |       |               |               |                 |





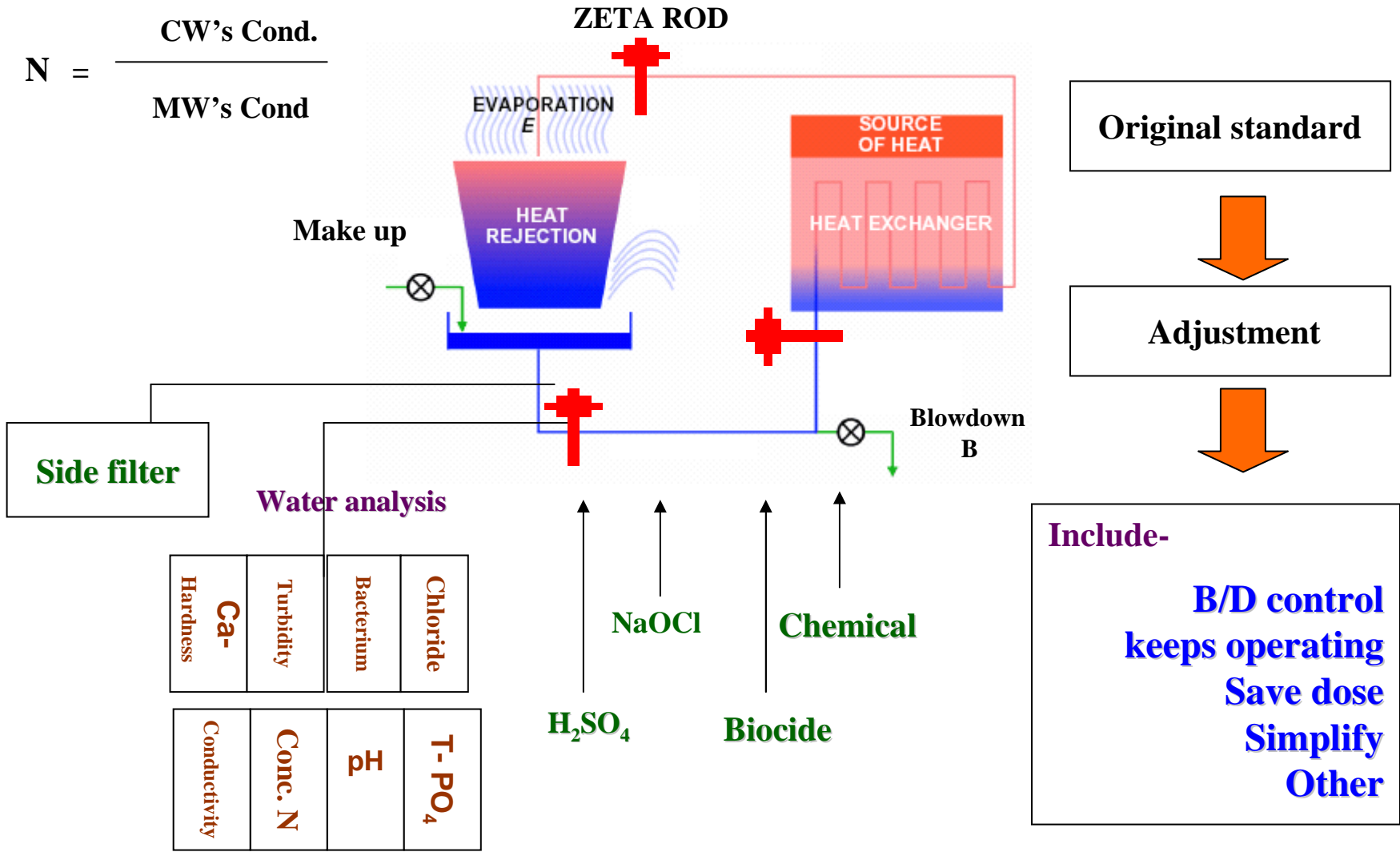
After 6 weeks later, sludge on the tower packing will be remove





# Cooling system install distribution

$$N = \frac{\text{CW's Cond.}}{\text{MW's Cond}}$$



# Benefits of Zeta Rod - Conclusion

- **Biofouling & Deposit Control - Turbidity ↓**
- **Enhance chemical efficiency .**
- **Reduction of chemical additives,**
- **Water conservation and recycle.**
- **Improved Health & Safety working environment.**
- **Prevent scale deposits.**
- **Increased Production with reduced operation costs.**
- **Elimination of biofilm and lower bacteria counts.**

