J&Y International Enterprise Limited

P4125 Kumwell Wastewater Treatment

In collaboration with HiCOP Energy, Thailand

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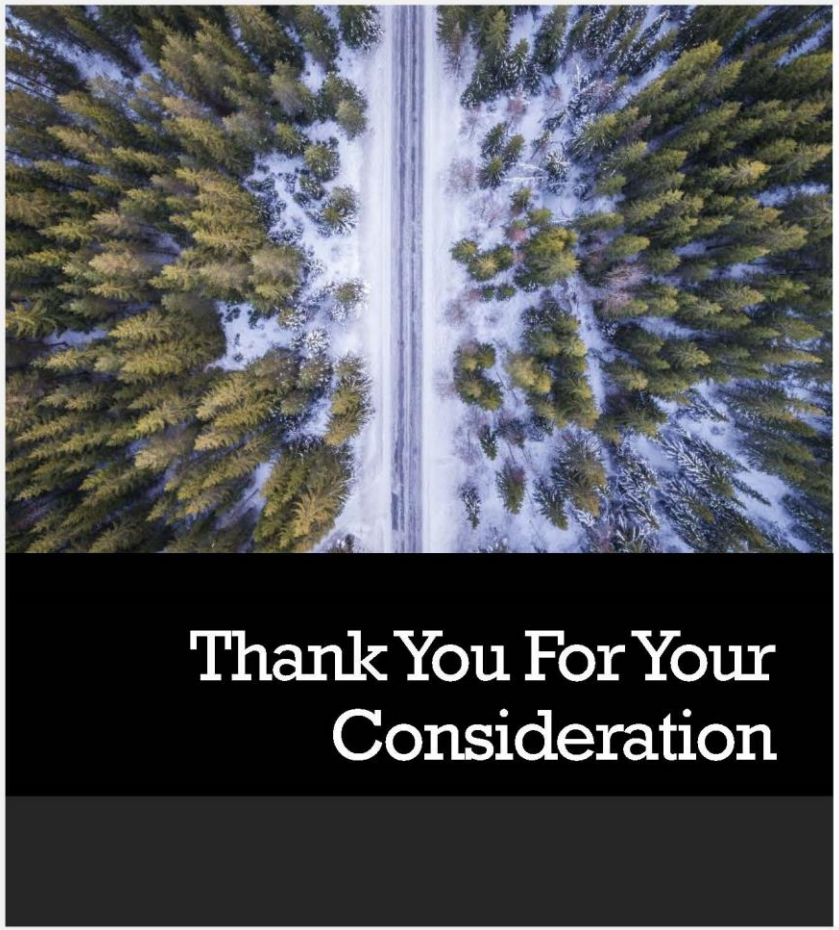
Introduction

I. Message from Our Chairman



Dear Customer,

At J&Y International, we understand you have many choices. Our goal is to provide you with a quality water treatment solution that you can be proud of.

Our dedicated team of engineers and evaporator designers have developed this solution for you. We are confident it will meet your needs.

Our philosophy is the bring the best value for your money. We hope to cooperate with you on this project and service you in the future.

J&Y International Enterprise Limited
Founder and Chairman

II. Company History

Throughout J&Y's rich 20 year history, we have built up a reputation as a leader in the water treatment industry providing design, engineering, manufacturing and service. Our patented technology can be found in systems around the world for municipalities and large companies such as AECOM(NYSE:ACM), China National Offshore Oil Corporation (0883.hk), Nestle(SWX:NESN), AB Mauri, Dongjiang Environmental(0895.hk), TCL (1070.hk).

Our technology is used in many applications including chemical concentration, industrial wastewater, power plant desulfurization, seawater desalination, landfill leachate, pharmaceutical wastewater, alcohol wastewater juice concentration etc. Using specially design processes, we are able to achieve customer needs in concentration all the way to Zero Liquid Discharge (ZLD). We employ different advanced separation technologies to solve your application needs without bias including evaporators, membrane, various filtration, ion exchange, biological, combination of these processes.

Our goal is to solve your water treatment problems with the most straight forward treatment processes, offering the most stable equipment and minimum operation cost.

Water Innovation

J&Y

In collaboration with HiCOP Energy, Thailand

III. Executive Summary

With collaboration with HiCOP Energy, J&Y is proud to be able to develop a water recovery solution helping Kumwell achieve their wastewater needs.

Our extensive experience in electroplating wastewater allows us to propose a system to best match your goals. We are able to provide a system to Zero Liquid Discharge.

In our Zero Liquid Discharge scenario, the only two effluents are distilled water which meets Thailand Effluent standards and a solid. No wastewater will exist. The distilled water may potentially be reused in your processes saving you money!

Our partner HiCOP Energy in Thailand has provided the support and testing required to provide us with the data required to achieve this feat. Using a data and lab testing approach, we identified specific characteristics in your wastewater. Our experience and big data collected from our thousands of worldwide installations and research units allow us to identify the particular patented technologies to apply to you system.

Our unique patented designs of provide our customers:

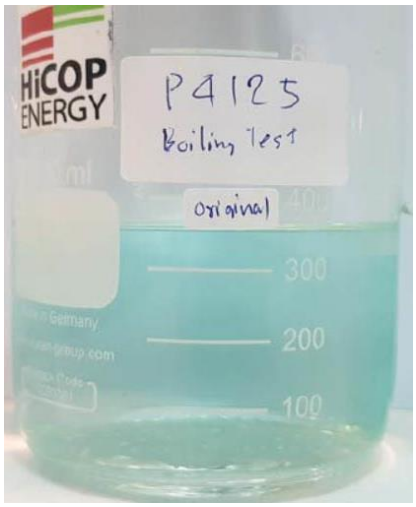
a) Skid mount - One Stop Shop Solution – No Need for multiple vendors
b) Scale suppression technology
c) Reduced footprint
d) Ease of maintenance
e) AI Automated-based Operations
f) Low install costs

We hope to bring ZLD to your company soon.

Process Development

I. Influent Data

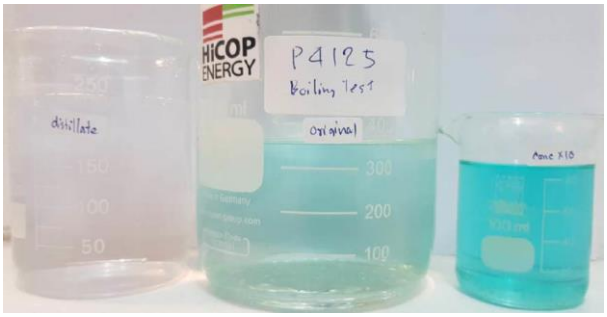
Per the data provided by our partner HiCOP Energy, the influent consists of a wastewater stream with the following properties:



No.	Parameter	Unit	Value
1	pH		5.23
2	TDS	mg/L	4900
2	Electrical Conductivity	uS/CM	5270
3	Color		Sky Blue
4	Chlorides	mg/l	530
5	COD	mg/l	238

II. Lab Experiment Results

We performed extensive laboratory analysis on your wastewater. We were able to determine the physical characteristics of the wastewater during the evaporation process. This lab data gives us a basis for evaporator design.



No.	Parameter	Unit	Value
1	pH		6.63
2	Electrical Conductivity	uS/CM	12,5
3	Color		Clear

III. Process Selection

Our philosophy is to find the most economical solution to achieve the desired result of our customers. Our experience has given us a multitude of tools able to provide the best value for our customer.

As such, in determining the process, we strive to treat the wastewater with the lowest possible capital expenditure and operating cost. Based on the lab data, we developed a solution that would best fit the needs of Kumwell.

We evaluated several technologies based on the lab data analysis. We considered membrane technologies, chemical treatment technologies as well as evaporation technologies.

For many technologies such as membrane and chemical treatment, the concentrated liquor still needs to be managed. Because this concentrated liquor cannot be discharged, either a third party provider is required to properly dispose of the concentrate or Zero Liquid discharge is required.

We have specially designed an evaporator system to provide ZERO LIQUID DISCHARGE. This means the resultant distillate meets Thailand Environmental Standards and is free to discharge or is able to be reused in operations. The contaminants will be dried to a solid for disposal.

IV. Process Description

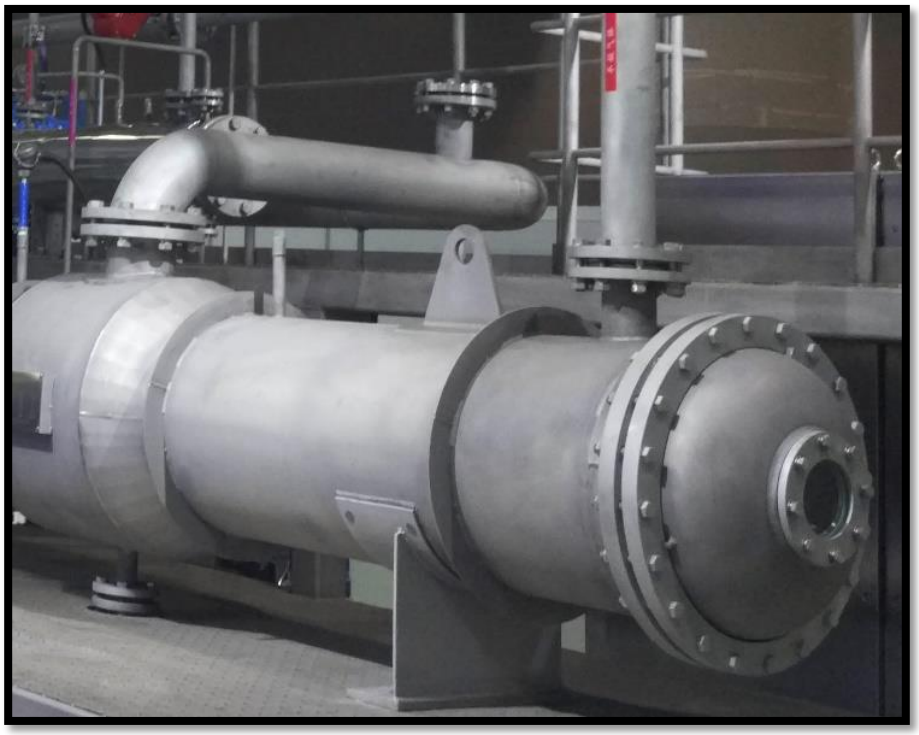
J&Y has numerous technologies it can employ to concentrate advanced wastewater. These various technologies can be used based on the wastewater characteristics and based on customer preference.

Zero Liquid discharge can only be achieved using evaporation technologies. For wastewater similar to the one from Kumwell, We recommend our J&Y sMVR STE© evaporator model number **HJY-MVR-IM-10-316L.** Our sMVR STE© is our smallest footprint, energy saving evaporator for low quantity and low TDS influent.

V. Process Flow Description

Preheating Stage

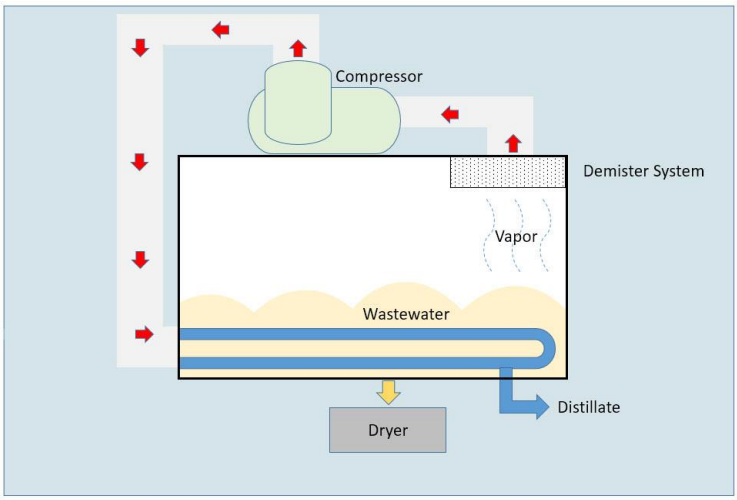
The feed is introduced to the system and enters our preheating phase. Wastewater passes through our Henergy© recovery system comprising of a set of uniquely designed heat exchangers, up to 98% of the energy used in the evaporation process can be recovered making the system ultra-energy efficient.



Process Development

Evaporation Stage

Preheated wastewater enters into the evaporator body based on designed perimeters. Wastewater is on the outside of the tube bundles while hot steam circulates on the inside of the tube bundles. As heat is transferred to the wastewater, steam is generated.



The water droplets are removed through a specially designed set of demisters and only pure vapor is allowed to pass through. Pure vapor free of contaminants is compressed with our steam compressor and reintroduced into the tube bundles.

As the compressed steam is cooled by the wastewater, pure distillate is formed. This distillate can be reused in operations or discharged.

Solid Separation System:

The amount of dissolved solids is currently below the level of detection. However, after being concentrated to the design value, ultra-concentrated liquor is released in little quantity and dried in our dryer system.

Solid content is can be removed from the dryer for baggage.

Zero Liquid Discharge is achieved.

Distillate Polishing

The wastewater data performed by a third party supplied by the customer and the data obtained by lab testing had some variation in influent characteristics. Particularly pH, COD, and other readings were different.

Additional testing should be done to determine the actual characteristics of the influent. If VOCs exist in the wastewater, additional polishing of the distillate may be necessary.

Technical Details

I. Energy Consumption

Based on the preliminary data provided to J&Y, we expect the total energy consumption of the system to be about:

Item	Per hour		Unit price	THB/h
Electric Power	20	kWh	THB 5	THB 100
Total				
*Energy is based on supplied influent data, Consumption is subject to change with fluctuations in influent parameters. Energy consumption may change with further design changes as more data becomes available.				

II. Chemical Consumption

Based on the preliminary lab data, we do not expect chemicals to be required during the evaporation process.

Additional testing should be done to analyze the COD parameter. If the organic component of the COD affects the foaming aspect of distillation, anti-foam may be added to ensure foaming does not affect the distillate quality.

III. System Cleaning

Our system is designed to prolong the period needed for system cleaning. The requirement for system cleaning is dependent on a number of factors

- System Operations
- Preventative Maintenance Schedule
- Influent fluctuations
- System stability

As the influent data indicates very low levels of TDS. Based on our AI simulation software, we recommend cleaning to be done every 1-2 months to ensure top performance of the evaporator. This may vary based on the factors noted above.

Our system is designed to facilitate ease of cleaning for the operators. The tube bundles are modular and are interchangeable. They can be removed from the system for easy cleaning. Optional spare tube bundles are available to limit downtime while cleaning the primary set.

IV. Manpower Requirement

Our system are designed to be fully automatic with little operator intervention. Our recommendation is minimum one operator per shift. With the assumption of eight hour shifts, we recommend at least three operators.

V. Installation and Commissioning

Upon equipment arrival at facility site, J&Y will arrange for specialists to supervise installation done by local workers. Commissioning will commence when installation is complete and testing will be done to ensure system meets specifications.

VI. Training

J&Y shall provide on-site training (if any required) to owner operators and technicians or relevant personnel when specialists are at site for installation supervision.

VII. Documentation

J&Y shall provide user manual and relevant maintenance drawings upon commissioning of the system. The documentation will be in English.

VIII. Project Plan and Execution Guideline

Purposes- To execute projects with utmost efficiency, we develop project plans to organize the work load. Our philosophy follows the ISO 9001 guidelines ensuring the work schedule, work procedures, quality standards and safety objectives are met.

Basic Guideline – Through our company's 20 year history, we've developed a specific Project Execution Guideline which is the foundation for proper project management. Our mantra is to have First-Class Scientific Management, First Class Technical Set Up, First Class Quality and First Class Speed.
Set-up Basis - Based on job organization, preparation, work flow and management, we will assemble a high caliber team to address the intricacies of your project. The setup details the responsibilities on all participants.

Project Team Selection – We know Engineering, Manufacturing and Installation is complex. But the expertise and experience of our staff makes it easy for you. Our team of project managers are able to navigate and coordinate the various components of this process and ensure you receive the best our company can offer.

Overall Plan – As this project is a manufacturing job coupled with installation. There are three work teams to the set up:

- Engineering Team, responsible for process design and drawings.
- Equipment Production Team, responsible for the non-standard equipment fabrication.
- On-site Installation Team, responsible for site installation supervision and Training

IX. Factory Acceptance Testing

All machinery is skid mounted and pre-assembled at J&Y Facilities before shipment. J&Y will perform testing with utility water to ensure all components are operational and automated system functions as designed. We invite our customers to witness this complete system testing.

Subsequent to the complete system test, we will disassemble the equipment and prepare the unit for shipment. Our experience ensures our packaging is seaworthy.

X. Performance Testing

Upon finalization of installation activities, the system will be commissioned during which time the installation will be checked and system optimized for wastewater conditions. After successful commissioning, a performance test will be demonstrated for performance test personnel from the customer, in accordance with the conditions stipulated herein.

Performance test period will typically have a duration of 24hours. During the course of the test for the fore mentioned duration at the noted influent conditions, the performance of the system is verified in relation to the output capacity.

Performance test will be done with the system under “clean conditions.” Without scaling or fouling of any heat exchange surface. If during commissioning, any scaling or fouling is found, cleaning would be performed prior to test commencement.

During the performance test, feed and utilities shall be provided by the customer on a constant basis at the quality and quantity required or as prescribed in the influent conditions.

The performance test shall take place within a period of 6 months from delivery of equipment, should this not be done then the system shall be deemed to have passed the performance test with no further obligations from the supplier.

XI. Performance Guarantee

Based on the Lab Test performed by Hicop Energy, we noted specific characteristics in the wastewater as noted in the table below. Performance testing will be done with the stable water quality with maximum conditions noted below used for the design conditions.

ALS

LABORATORY ACCREDITATION BLA-DSS

TESTING
No.0009

Analysis / Test Report

Client : HiCOP Energy Co., Ltd.
290, Rimkhlongpapa Rd., Bangsue, Bangsue, Bangkok Thailand 10800
P/O :
Project Name : Original WasteWater Kumwell P4125
Project Location :

Lot ID: 2113846
Date Received : Jan 30, 2021
Date Reported : Feb 04, 2021
Report Number : 1893273-1

Sample Number	2113846-1
Sample Description	Wastewater
Location	Original high TDS water from Kumwwell (P4125)
Date Analysis Commenced	Feb 01, 2021
Condition of Sample	Contained in one plastic bottle (client container)

Analyte	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
Metals Testing						
Calcium	mg/L	0.01	0.10	76.6	Based on US EPA, Method 200.7, Revision 4.4	Bangkok
Copper	mg/L	0.00003	0.0001	1035	Based on APHA (2017), 3125	Bangkok
Sodium	mg/L	0.01	0.10	570	Based on US EPA, Method 200.7, Revision 4.4	Bangkok
Water Testing						
Ammonia Nitrogen *	mg/L	-	0.06	0.87	Based on APHA (2017), 4500-NH3 (B), (F)	Bangkok
Bicarbonate Alkalinity as CaCO3 *	mg/L	-	1	<1	Based on APHA (2017), 2320 B	Bangkok
Carbonate Alkalinity as CaCO3 *	mg/L	-	1	<1	Based on APHA (2017), 2320 B	Bangkok
Chloride *	mg/L	0.15	0.5	530	ISE Application	Bangkok
COD	mg/L	1.5	5	238	Based on APHA (2017), 5220 D	Bangkok
Conductivity at 25 degree C *	micromhos/cm	-	0.5	5270	Based on APHA (2017), 2510 B	Bangkok
Fluoride as F *	mg/L	0.15	0.5	2.7	Based on APHA (2017), 4500-F (C)	Bangkok
Nitrate as N *	mg/L	0.06	0.2	Not Detected	Based on APHA (2017), 4500-NO3 (E)	Bangkok
pH at 25 degree C		-	-	4.5	Based on APHA (2017), 4500-H (B)	Bangkok
Silica as SiO2 *	mg/L	0.2	0.5	173	Based on APHA (2017), 4500-SiO2(C)	Bangkok
Sulfate *	mg/L	0.5	2	2685	Based on APHA (2017), 4500-SO4(E)	Bangkok
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	4900	Based on APHA (2017), 2540 C	Bangkok
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	142	Based on APHA (2017), 2540 D	Bangkok
Turbidity *	NTU	-	0.1	53.6	APHA (2017), 2130 B	Bangkok

Remark :
- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
- Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.

Approved by

Sawitree N.

Sawitree Noisangiam
Assistant Manager

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ALS LABORATORY GROUP (THAILAND) CO., LTD. Part of the ALS Group

Technical Details

Effluent Conditions

The requirement as noted by the customer is Zero Liquid Discharge. As such the only effluent from the unit is a solid and distillate. From the data provided, wastewater treatment system will be able to achieve at minimum the following standard:

No.	Parameter	Unit	Value
1	Flowrate	t/d	10
2	pH		6-9
3	TDS	mg/L	<150
4	Color		Clear
5	COD	mg/l	<100

Should the system fail to meet this performance guarantee, J&Y shall correct deficiency. Should the system fail to meet the performance guarantee even after exhausted attempts to make good, J&Y will pay liquidated damages of:

1) 0.5% of the purchase price excluding options, for each full percentage the capacity measured as evaporated water is lower than the guarantee
2) Total maximum penalties inclusive of all penalties not to exceed 5% (five percent) of the purchase price excluding options.

XII. Main Equipment List

Main Equipment		Model/Specification	Qty.	Unit
1	Evaporator Vessel	Material: Evaporator Body - Duplex 2205 Tube Bundle: 50m2 - Ta2 Demister - 316 SS	1	Set
2	Vapor Compressor	Roots Type Capacity：420kg/h, Temperature：95℃-108℃ Material: 316L	1	Set
3	Preheater	Capacity：0.5 m3/h	1	Set
4	Concentrated Liquor Dryer	Capacity：3 kg/H Material: Liquor Facing Titanium	1	Set
5	Insulation	Per Manufacturer Standard	1	Set
Pumps				
1	Distillate Pump	Flow：0.5 m3/h Head: 30 m， Power：1.5kW	1	Set
Control System				
1	PLC	PLC (Per Manufacturer Standard)	1	Unit
2	Cabinet	Cable,Bridge, Touch Screen	1	Set
MCC				
1	Variable Frequency Drive Unit	Per Manufacturer Standard	1	Unit
2	Motor Starter	Per Manufacturer Standard	1	Unit
3	System wiring/cabling	Per Manufacturer Standard	1	Set
Structure				
1	Skid	Carbon Steel Surface Skid	1	Set
2	Paint	Epoxy Under Coats and Epoxy Top Coats per Manufacturer Standard	1	Set

Commercial Proposal

Pricing

The total lump sum price for the Equipment including installation and commissioning is _____. The system will be Delivered at Place (Incoterm 2010). Price excludes import duty and VAT. Customer will pay for import duty and VAT to customs directly.

The purchase price for the Equipment is inclusive of all documentation, packaging freight, insurance and excludes civil work and piping or electrical outside the skid as noted in the responsibility matrix.

Also included is expenses related to witnessing the Factory Acceptance Testing (Airfare, accommodation inland transportation, and business meal) for 2 designated individuals of the customer.

The price and rates shall not be subjected to any escalation for 30 days.

I. Payment Terms

- Down Payment 30%
- Upon Factory Acceptance Test and before Shipment 50%
- Upon Testing and Commissioning 20%

Other Terms are to be negotiated.

II. Shipping Terms

DAP – Customer Facility. (Incoterm 2010)

J&Y will be responsible for land shipment from J&Y factory to suitable China seaport and sea travel from China seaport to Thailand seaport. Hicop Energy will facilitate for local customs clearing and local transportation to the customer site. J&Y will procure and maintain insurance for the Equipment during the seatravel.

Customer will be responsible for import duties and VAT. Shipping documents will be based on customs code HS84212100.

Copy of Commercial Invoice, Packing List, Bill of Lading and Certificate of Origin will be provided by supplier to facilitate customs related activities upon shipment.

III. Scope and Responsibility Matrix

NO	ITEM	DESCRIPTION	J&Y	OWNER	NOTES
		ENGINEERING			
1	BASIS FOR DESIGN	**Establish and issue design criteria, basic design requirements**	X		
2		**Provide field engineering as necessary for all design not completed in design office and which is necessary for construction of the project.**	X		**With Assistance from Owner**
3	PROCESS DESIGN	**Determine appropriate treatment process for achieving desired effluent**	X		
4	DRAWING and DETAILED ENGINEERING	**Develop 3D drawing of equipment based on approved treatment process and breakdown necessary drawings for manufacturing.**	X		
		MANUFACTURING			
5	PRODUCTION	**Manufacture Equipment using materials specified in engineering documents. QC to ensure product meets J&Ys strictest quality standards.**	X		
6	PROCESS AUTOMATION	**Develop process control strategy and programming necessary including PLC, HMI and instrumentation to ensure full automation of system**	X		
7	PROCESS CONTROL	**Develop process control strategy and programming necessary to provide full automation including PLC, HMI etc.**	X		
8	DOCUMENTATION	**Develop operating manual in English**	X		
	FACTORY ACCEPTANCE TESTING	**Perform testing with utility water before shipment. Ensure all components are operational and automated system functions as designed. We invite our customers to witness this complete system testing.**	X		
		SHIPPING			
9	PACKAGING AND SHIPPING	**DAP (Incoterm 2010)** **J&Y to prepare Equipment with Seaworthy packaging. J&Y will be responsible for land shipment from J&Y factory to suitable China seaport and sea travel from China seaport to Thailand seaport. J&Y will arrange for local customs clearing and local transportation to the customer site. J&Y will procure and maintain insurance for the Equipment during this time.**	X		
		START UP			
10	INSTALLATION and COMMISSIONING	**Installation and Commissioning to be done by local Thailand team with specialist supervision provided by J&Y**	X	X	
		FACILITY SITE PREPARATION			
11	SITE REQUIREMENTS	**Identify applicable local, provincial, or national codes that may impact design and ensure compliance**		X	
12		**Local Facility piping to ensure feed water to system**		X	
`		**Distillate Discharge to be piped to destination specified by owner**		X	
14		**Owner provide electrical cable to J&Y supplied electrical panel.**		X	
15		**Owner to provide city water to system**		X	
16		**J&Y will provide foundation requirement drawings, work completed by owner.**		X	
17		**Owner responsible for site security during installation and commissioning electricity and chemicals**		X	

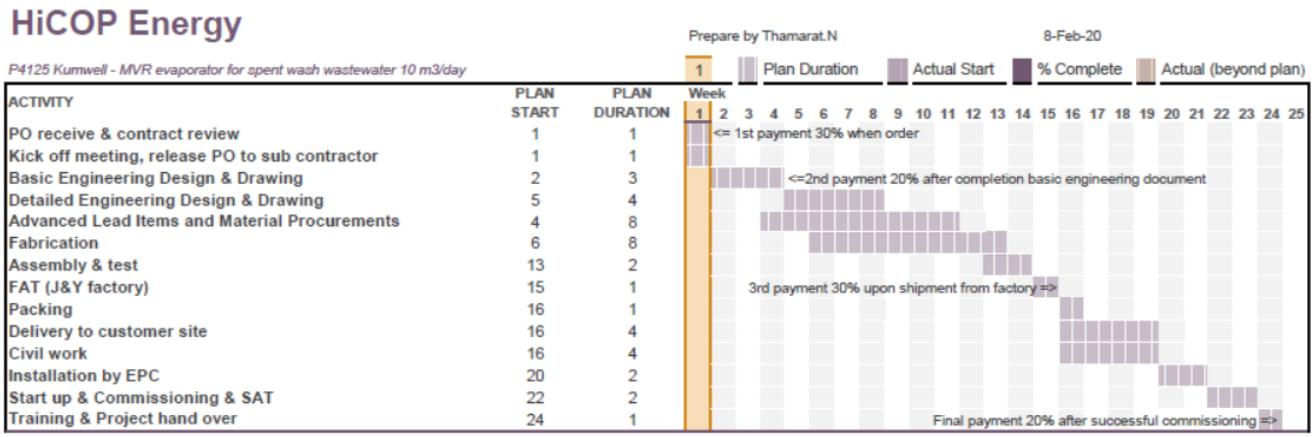
IV. Warranty

Warranty Period is 12 months after commissioning or 18 months after shipment whichever comes first. J&Y warrants that the equipment shall comply with all descriptions as required by the final contract. The equipment will be free from defects in design, material and workmanship. J&Y shall correct all such non-compliant items and defects without costs for parts, travel, or labor to the owner.

V. Preliminary Timeline for Delivery

Typical procurement to delivery is 24 weeks.

All our units are skid mounted and pre-assembled at our facilities before shipment. As such disassembly is done for shipment and can easily be reassembled with limited skill level. Assembly and commissioning is usually completed within 20 days.



J&Y International Enterprise Limited

Meeting the world's needs.

Thailand Partner

HiCOP Energy Co., Ltd

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