



# EEC + ECO SYSTEM PILOT REPORT

**Electro Coagulation for Silica, calcium – magnesium  
and bacteria Removal**

**Philippines**

**19<sup>th</sup> – 20<sup>th</sup> of May 2016**



Reported By

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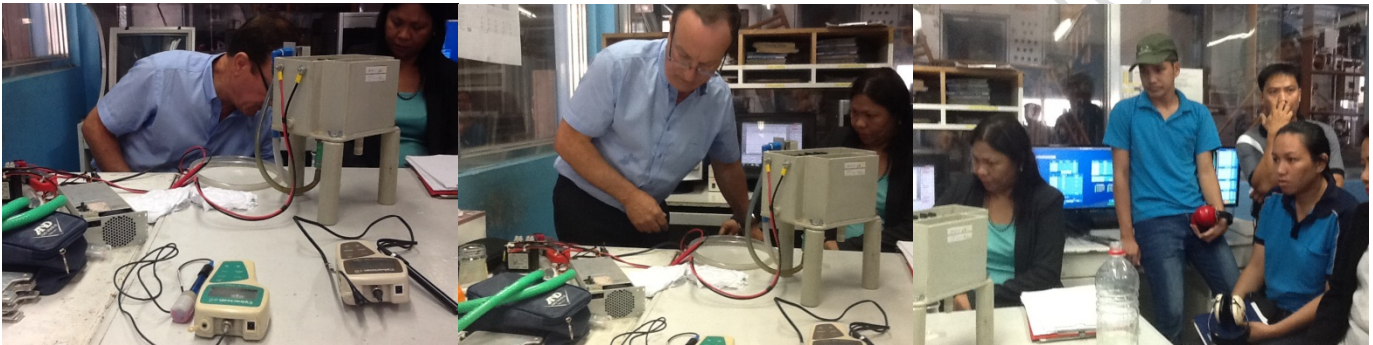
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### EEC Pilot report Philippines.

On Thursday May 19-20, 2016 we did the following pilot tests in Philippines.

The test unit is a 1 ltr. EEC unit. We can place aluminum – steel (ferro1-2-3) or titanium anodes.



### Set up of EEC pilot at TIPCO

We can control flow (pump) current to optimize results, either by aluminum – titanium – Ferro anodes.

ECO is a EEC but with 2 compartments. One compartment with Titanium anode and 1 compartment with aluminum or Ferro anodes, with this combi ECO we can treat bacteria with titanium and silica with aluminum anodes.

### 19<sup>th</sup> May - TIPCO paper industry.

At TIPCO the water is from Deep Well and the tested water was white paper and brown paper and CT water. All data on the water was carefully tested.

Before the tests the water contains high amount of silica – calcium – magnesium – and bacteria. Target is to remove the silica and to re-use more water as much as possible.

We firstly showed EEC can produce free chlorine. We installed the titanium anodes, inserted water and inserted some NaCl(salt) and immediately free chlorine is formed and clearly smell able.

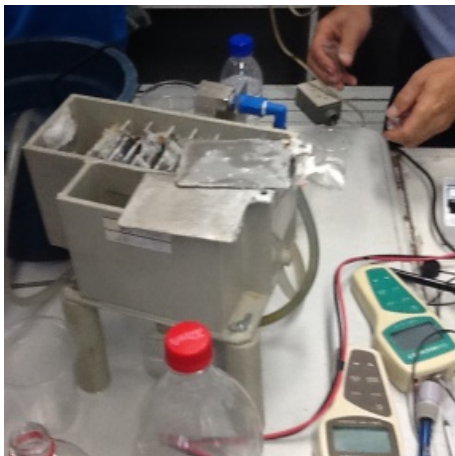
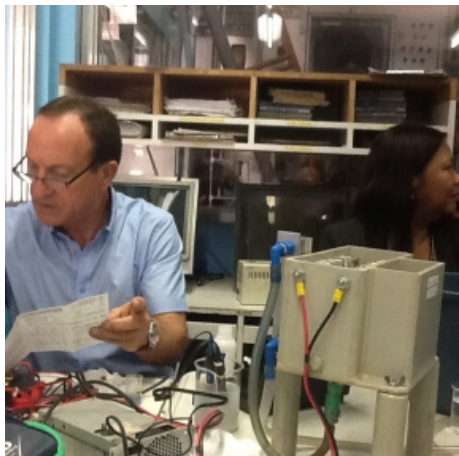
Following we changed the anodes to aluminum. Once EEC was activated oxidation and coagulation resulted in foam forming. After several minutes the water became clear and was analyzed again on silica, magnesium, calcium. All 3 were reduced. Silica was removed up to 98 %, water was clear and re-suable for process while magnesium and hardness reduced by more than 50%

Conclusion; Due to the high silica in the MU of 86 ppm Tipco would be best off with installing EEC or even ECO. It would solve the huge silica problems, bacteria (foam) and EEC or ECO would save huge amounts of water as most water would be re-usable for process such as CT's.

**Mr. Elgressy**

**Insert Aluminum Anodes**

**Scraping of the foam**



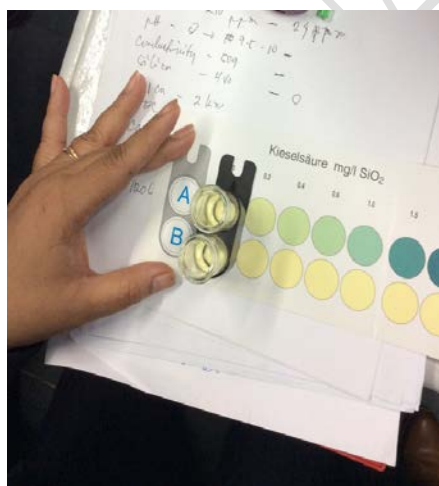
**EAGLE CEMENT**

Eagle Cement has 2 water sources. Deep Well and Lake water. Eagle Cement currently only uses the Deep Well water. The deep well water has high silica and calcium and therefore Eagle Cement intends to use also the lake water. We tested this Lake Water. Surprisingly this water contains high amount of silica as well. Only EEC can be solution here. Big advantage is the water is re-usable for process / RO / CT and boiler + the drain water will flow in the lake or can be re-used for irrigation as it is Green & Clean.

**Silica Test**

**Sample Lake water before test**

**Lake water after test**



## Test result

PARAMETERS	BEFORE TREATMENT	AFTER TREATMENT
pH	7.06/10.7	10.2
Conductivity	610	315
Total Hardness	302.60 ppm	17.8 ppm
Calcium	210 ppm	15 ppm
Silica	500 ppm	2 ppm

So for Eagle Cement there are HUGE SAVINGS: WIN – WIN – WIN – WIN – WIN –WIN –WIN-WIN

WIN because they can use the Lake Water – WIN because they use water after EEC for R/O. WIN because they can use water after EEC for boiler – WIN because they can use water after EEC for Cooling Towers, WIN because they save a lot of energy – WIN because they save a lot money for maintenance (membrane cleaning) – WIN because they save a lot of rejected w R/O water –WIN because they can use the water for process – WIN because they can push all drain water back to the lake and re-use again – WIN because THE ENTIRE PROCESS IS GREEN & CLEAN.

## LUEN THAI

Textile factory. They witnessed the EEC results and we can conclude that EEC will solve their huge amounts of dyeing waste water. The water after EEC can be re-used for process, such as bleaching and even dyeing.

Friday May 20

## UNILEVER - Ice Factory - Manila

This is ICE factory. There are big problems with the waste water treatment. The smell (odor) of the waste water is causing huge complaints which they could not solve so far and causes complaints from the neighborhood. As a result they cannot extend the intended capacity. After ECO is installed this problem will be solved and production extensions can be realized.



**Test result Ice factory parameters after treated by EEC system**

	BEFORE TREATMENT	AFTER TREATMENT
pH	3.8 / 9.0	8.8
Conductivity		2.25 $\mu$ S/cm
Total Hardness		53.4 ppm
Calcium		6 ppm
Silica		0 ppm
TDS	154	53.4

We tested the water, and we concluded that with ECO (EEC with 1 x aluminum and 1 x titanium compartment) will solve all the problems. The Ice Waste Water color becomes clear, re-usable for R/O and process, and odor (smell) is totally neutral. With EEC Unilever not only can continue the production but now also has ability to extend the planned and needed production capacity.

Unilever has also several CT's which can be run with ECO treated water.

2 x 942 TR – EST 25-3-25

1 x 500 TR – EST 10-2-12 or EWT

1 x 576 TR – EST 10-2-12 or EWT

1 x 374 TR – EST 10-2-12 or EWT

Conclusion; UNILEVER will most likely soon purchase 10 m<sup>3</sup>/hr. ECO and will consider to purchase EST's for the CT's as well.

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## UNILEVER – CAVITE

Here we tested: with aluminum and titanium anodes.

1. Mayonnaise waste water
2. Mayonnaise waste water with vinegar
3. Make up waste water with alcohol

**Mayonnaise water before treatment**      **Before EEC filtering**



**Foam to be removed with automatic foam scraper.**



In all tests the results were very positive. Smell disappeared, water became clear and re-usable. Unilever has other waste water which will be sent soon to Israel for testing.

## BOYSEN – Paint factory

Unfortunately we cannot treat this waste water as it contains high amount of Latex, which will clog EEC during processing.

Elgressy electrocoagulation is the distinct economical and environmental choice for meeting water treatment discharge standards and compliance requirements. Recover capital and operating costs by eliminating discharge fees and fines, harvesting resources, and significantly reducing water replacement costs.

### System Capabilities

- Removes heavy metals as oxides that pass TCLP.
- Removes suspended and colloidal solids
- Breaks oil emulsions in water
- Removes fats, oil, and grease
- Removes complex organics
- Destroys & removes bacteria, viruses, and cysts
- Processes multiple contaminants

### Benefits

- Low capital costs
- Low operating costs
- Low power requirements – ~ 0.5 to ~1 Kw/hr per m<sup>3</sup> depending on conductivity.
- No chemical additions
- Low maintenance
- Minimal operator attention
- Handles a wide variation in the waste stream
- Consistent and reliable results
- Sludge minimization
- Treats multiple contaminants
- Water reuse- resulting in zero discharge
- EEC and ECO are self cleaning by by-polar system, changing current from anode to cathode.

EEC system **Capacities: EEC and ECO are modular: 1 m<sup>3</sup>/h - 20 m<sup>3</sup>/h +**

**All systems are custom-made**, based on:

- Application
- Location and environment
- Water source, properties and volume
- Desired treated water properties and volume
- Users:** Industries, commercial enterprises and utilities companies that treat, process and utilize water, wastewater and sewage

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