

INNOVATIVE GREEN TECHNOLOGY

TOG TelferTech "TOG" System



"it Matters" **TelferTech Sdn Bhd** (685066-M)

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"it Matters"

The “TOG” System

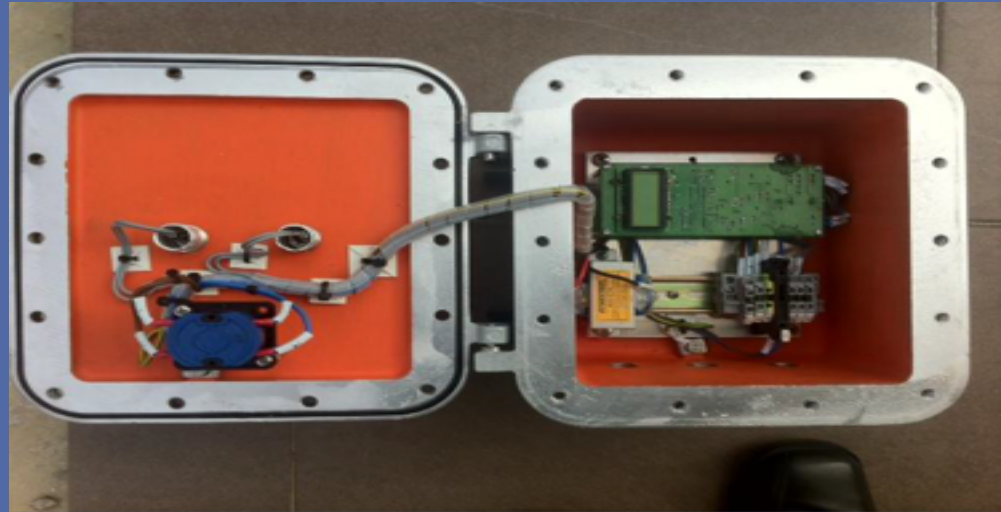
TelferTech “TOG” System

- **TOG** is a TelferTech System incorporating Anti Bio technology (microchip), Patent No. PO6886, uses sound (range 2 – 5 kHz) to treat matter
- **TOG** is specifically designed for the treatment of Marine Fouling and Water

Each **TOG** system consists of:

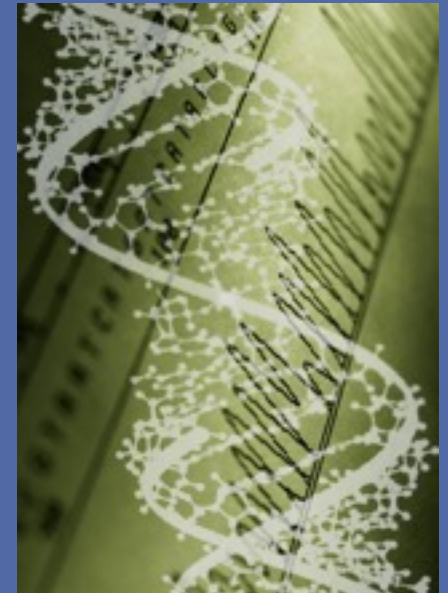
- A **Control Unit**, it is Modular & Scalable; and
- **Activators**

"TOG" – Control Unit



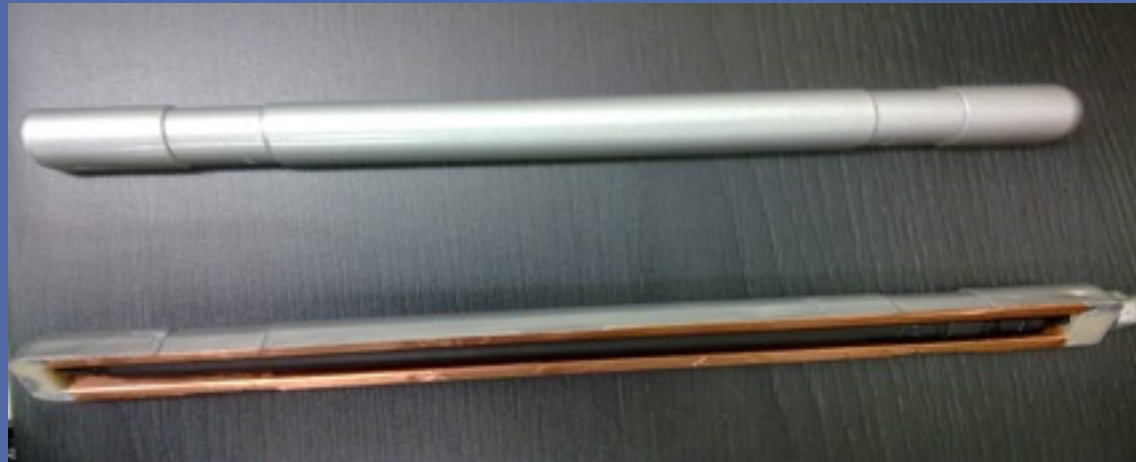
Powered by a low voltage power pack, AC 10 VOLT 1 AMP. Houses a circuit board incorporating a pre-programmed microchip to transmit more than 10 million sets of sonic waves to the activators.

The sound emission generated creates Sweeping Sound Frequencies (SSF) pattern which are then transmitted to the area of treatment via the activators.



Activators

- ▣ Devices made of ferrite rod, wrapped in heat-shrink
- ▣ External protective shield casing in demanding weather conditions
- ▣ Typical dimension: L – 200 mm; D – 9.5mm
- ▣ Mounted on the external side of pipe-works, emitting SSF to areas to be treated



Compliance - Sound

All TelferTech “TOG” System has been tested and complied with all regulatory sound emission laws and electrical compliance approvals.

- ❖ C Tick compliance
- ❖ UL compliance
- ❖ CE compliance
- ❖ D Mark compliance



Compliance – Ex-proof

- Scalable, depending site requirement
- Fitted in Certified EE'xd cast aluminum alloy enclosures (copper free)
- Exe Terminal Block complete mounting with Din Rail
- Exde Breather Gland
- Eexe/Eexd Brass Nickel Plate Cable Gland
c/w Locknut, Earth Tag, Nylon Washer and PVC Shroud

Science behind TOG

The technology has been researched and developed through field sites attaining anecdotal evidence and the following institutions attaining scientific evidence.

Griffith University,

School of Environmental Engineering

Dr. Helen Stratton

Microbial Ecologist PhD

Griffith University

Radio Science Laboratory

School of Microelectronic Engineering

Dr. Steven. G. O'Keefe

Gold Coast City Council

Scientific Services - Biological Testing

Manager Quality & Performance

Gold Coast Water

Biotech Laboratories Pty Ltd

Microbiological Analysis

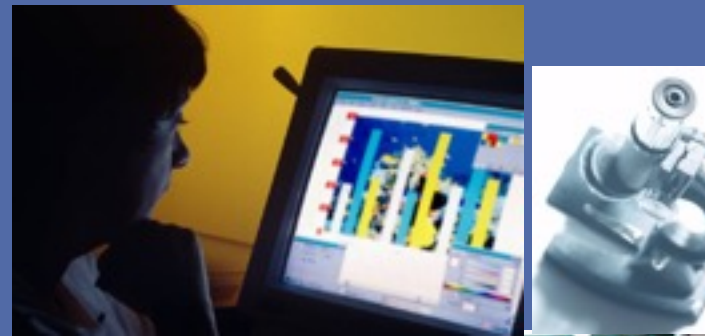
NATA Endorsed

EML Consulting Services Pty Ltd

Dr. Ed Stuttard

B.SC. M.A.S.M. AAIFST

Microbiologist



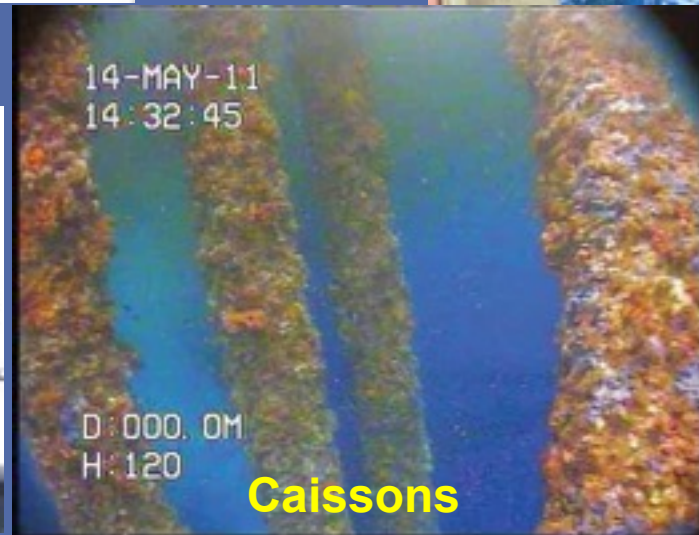
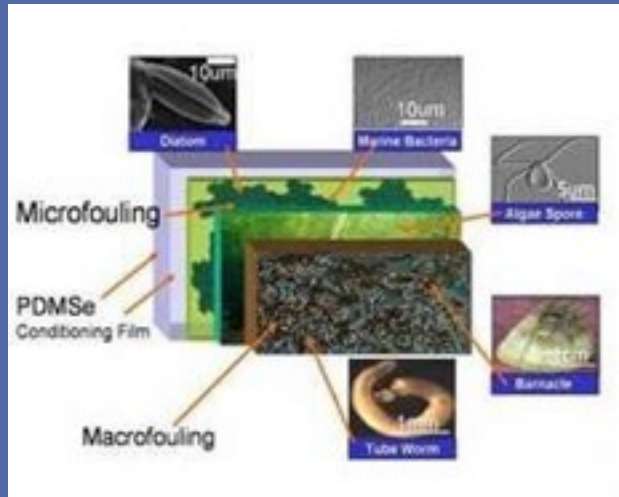
How “TOG” works

- ✓ The technology uses patented ‘sweeping sound frequency’ to effectively
 - ✓ Reduce particle reproduction
 - ✓ Retard and detach formation of Biofilm
- ✓ Sweeping Sound interferes with the reproduction of cells
- ✓ Sweeping Sound puts these organisms under stress – they are not able to feed and/or reproduce; retard their normal damaging activities
- ✓ Sweeping Sound negate the “pull factor” for surface attachment by neutralising opposite charges between organisms & substrates; prevent any “attachment” from growing into threatening colonies
- ✓ Treating the root cause – preventing micro fouling, minimising “attack” of macro fouling
- ✓ Over 10 million sets of alternate frequency transmitting at random intervals – inhibit immunity of microorganism; it works today, it works 10 years from now

HSE – Our Paramount Focus

- Environmental friendly – ZERO Chemicals
- Easy install (online installation most cases)
- Free from any hazardous handling classifications
- No high temperature
- No high pressure
- Only low frequency sonic waves working 24/7
- Almost zero maintenance – eliminating unnecessary potential accidents

Nature's Wonder – Marine Fouling



Human Inheritance

Root of Problem

The World of Biofilm

- 2 Forms of Marine Fouling
 - 1st - Micro Fouling
 - 2nd - Macro Fouling
- When microorganisms have grown into colonies
- Biofilm is the main culprit of many root problems
- Biofilm is the core ingredient or food chain for many organisms to harbor onto.
- By taking away the chances for initial surface attachment of microorganisms from growing into colonies, we therefore have taken away the “home” for many substances to nest on or reproduce - **troubles**

Human Intervention

SOLUTION?

Prevention is better than Cure

Current Solutions

| | SOLUTIONS | Environmental Friendliness | Effectiveness | Maintenance | Damage to Structure |
|---|------------------|----------------------------|---------------|-------------|---------------------|
| 1 | Chemicals | Hazardous | Inconsistent | High | Corrosive |
| 2 | Hypo-chlorinator | Hazardous | Inconsistent | High | Corrosive |
| 3 | Cathode/ Anode | No | Inconsistent | High | Nil |
| 4 | Physical | Yes | Inconsistent | Low | Abrasive |
| 5 | Elaf & others | n/a | Inconsistent | n/a | Nil |
| 6 | TOG | Yes | Effective | Almost nil | Nil |

Prevention is better than Cure



Conventional Cure



Smart Innovative Preventative Cure - TOG

Steel Plate Validation – equipment setup



Control Plate



Test Plate – with Activators

Validation at Baronia Platform “SKO”

Two 12" x 8" carbon steel plate - one Controlled, one Test were positioned 3 meters below water surface on February 2nd, 2009 for monitoring purposes.



1st Inspection – one month



Control Plate



Test Plate – with Activators –
power cable broken.

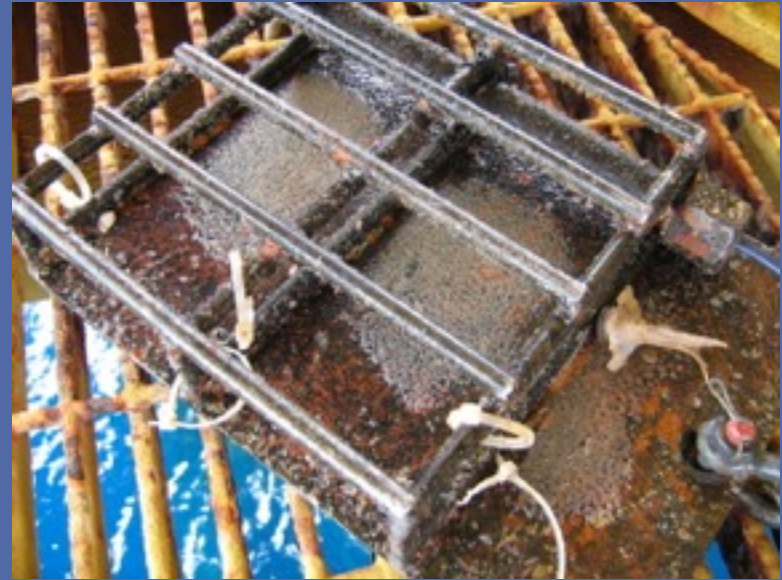
Test Plate's electrical wire broken, water gets into activator shield, triggered reverse effect. Engineers on-site do good the wires, activators & shields.

Evidence of beginning growth of baby barnacles, barnacle colonization begin to develop on both Plates.

2nd Inspection – 3 months



Control Plate



Test Plate

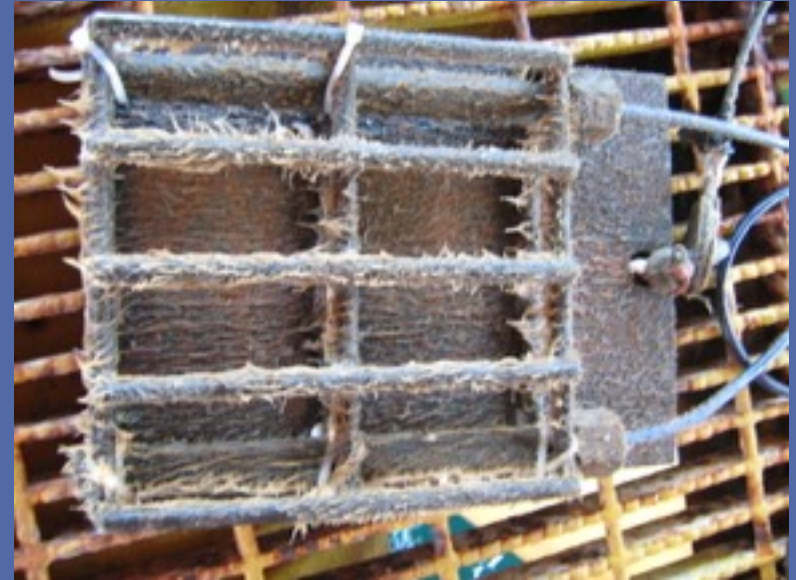
Baby barnacles on Control Plate are getting matured and growing into colonies.

Baby barnacles on Test Plate from 1st inspection has fallen off and no further growth was observed.

3rd Inspection – 5 months



Control Plate



Test Plate

Colonies on Control Plate are getting more matured and dense.

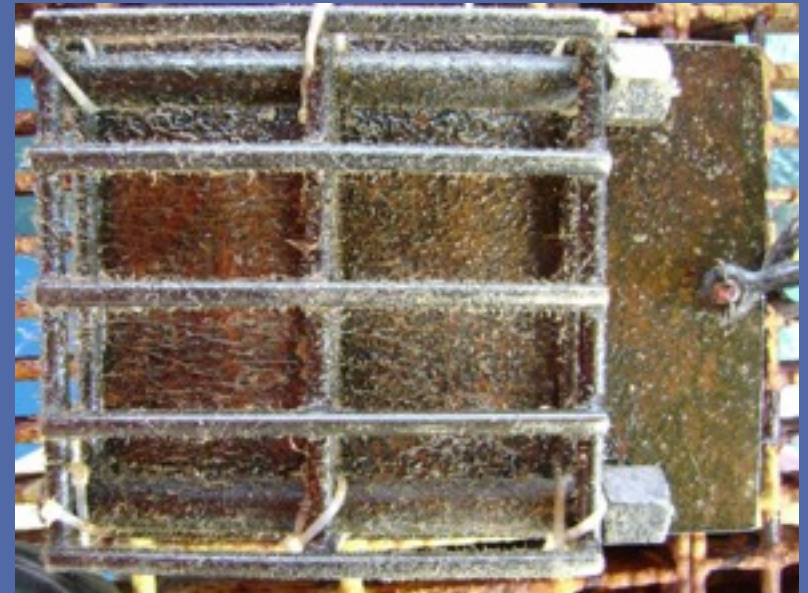
Test Plate still CLEAN except minor biological growth which is normal under the sea.

Final Inspection – 5.5 months



The point where wire sling broke off. Severe corrosion was observed along the wire sling.

Control Plate



Test Plate

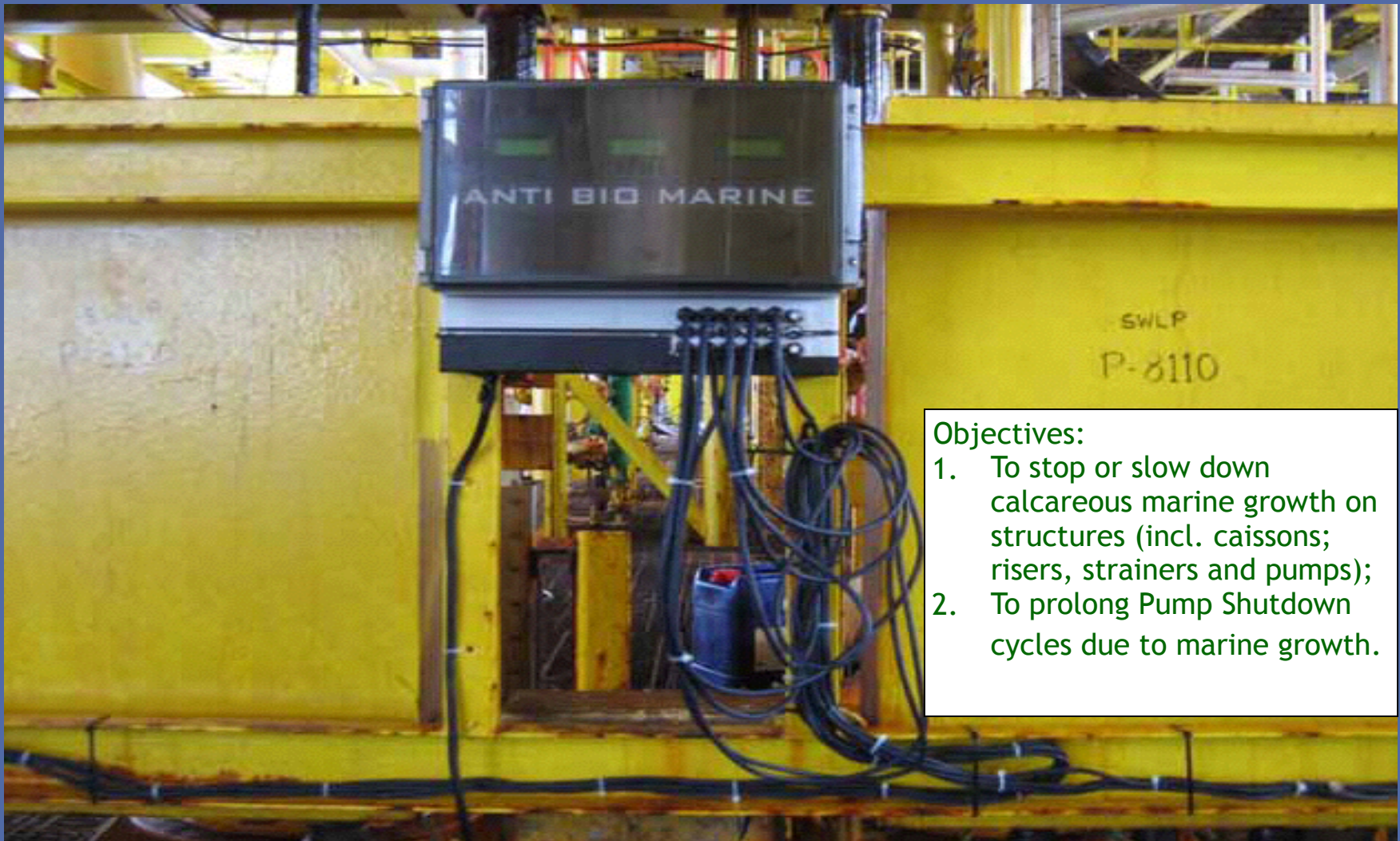
Stainless steel sling holding Control Plate was broken due to corrosion, load and expanded surface area. Control Plate has lost in the ocean that's unfortunate.

Fortunately Test Plate was still intact and was observed the Plate is still CLEAN.

TOG has successfully proven its claim – effectively mitigating Marine Growth.

From Steel Plate to Live Structure

Two sea water lifting pumps (SWLP) were "treated" by TOG
Each caisson with 5 Activators



Objectives:

1. To stop or slow down calcareous marine growth on structures (incl. caissons; risers, strainers and pumps);
2. To prolong Pump Shutdown cycles due to marine growth.

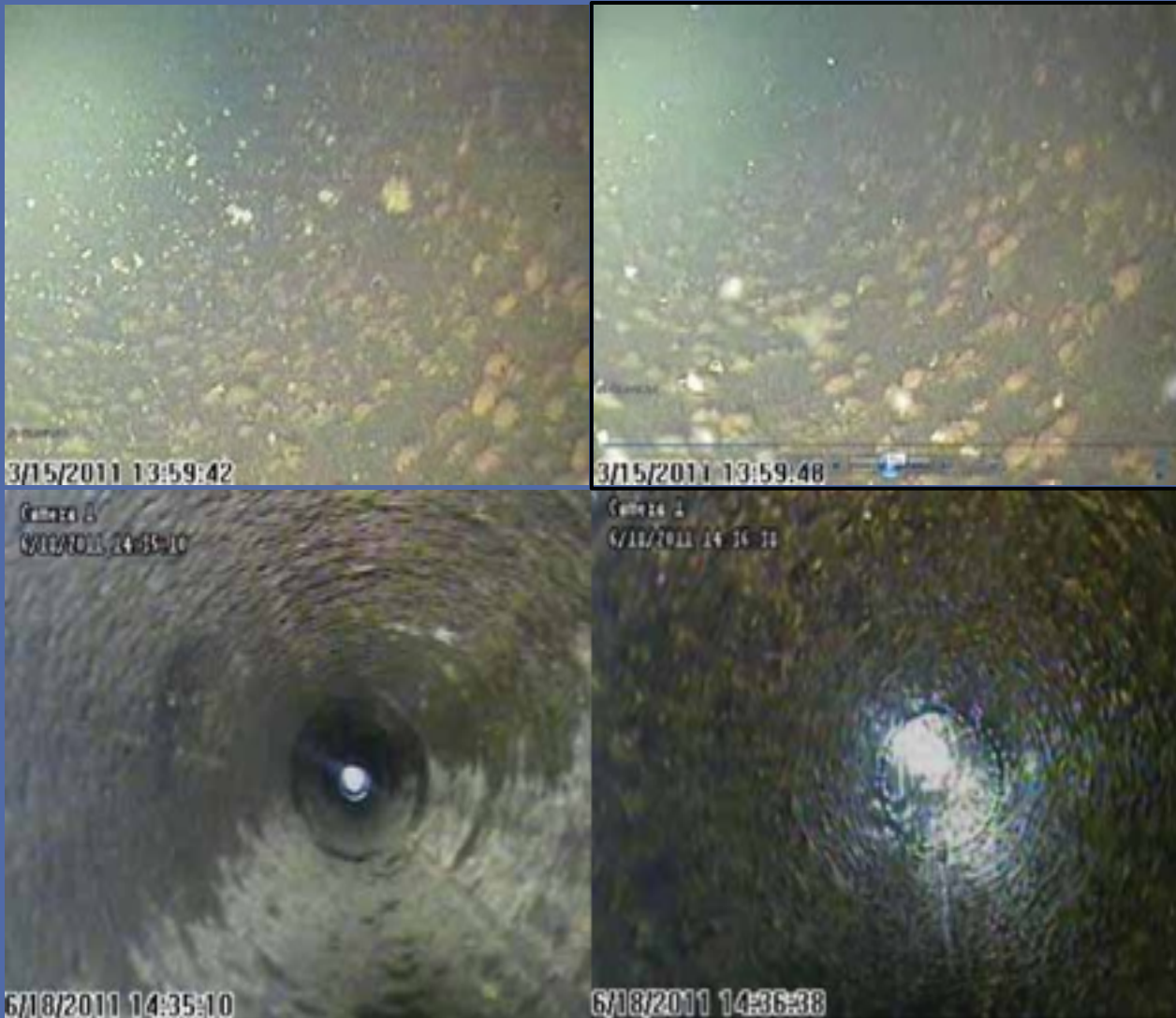
Installation of Activators

Live Structure - SWLP



Activators are housed in protective shields circum-mounted approximately equal distance apart on outside of caisson, on the cellar deck.

Monitoring Pictures



No evidence of continued growth of barnacles from March 2011 to June 2011 with **TOG** installed.

Monitoring – Unique Phenomena



Abundance of “loose particles” floating in the water column believed was from detachment of “existing growth” and particles in water that are not able to attach to substrates.

A “phenomenon” that was never seen before in the long history of the platform, commented by platform engineers.

Monitoring – Another Phenomena



Most parts of the Strainer are visible, loose patches of slimy biological growth falls off easily by just running finger over

No evidence of calcareous growth after TOG installed

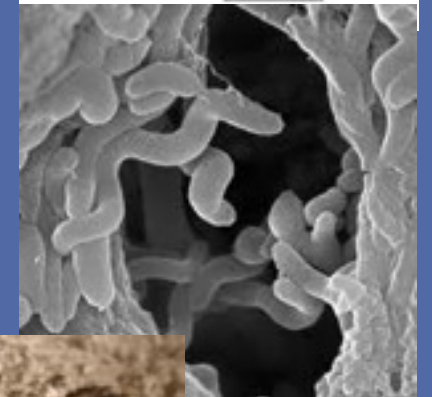
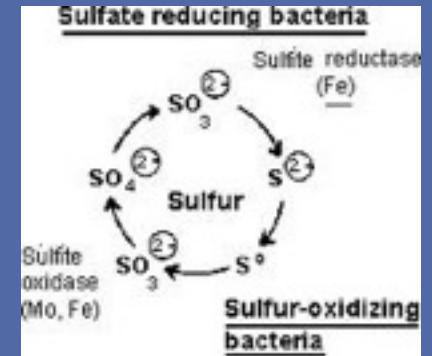
Before TOG – high powered jet was used to ‘remove’ rock-solid calcareous growth on the Riser

SRB (Sulphate Reducing Bacteria):

- PRSB lab validation success
- Post PCSB_SKO discussion July 10, 2012

Pre TOG – Confirmed etching marks of SRB on Impellers

Post TOG – NO signs of SRB etching marks on Impellers



Offshore Platforms

Common Problem Areas

1. Pump Caissons
2. Conductors
3. Boat Landings
4. Jacket Legs
5. VDMs and
6. Horizontal Braces
down to 2nd Bracing Level



TOG - Applications

| Item | Application | Industry | Status |
|------|-----------------|-----------------|------------|
| 1. | Marine Fouling | Oil & Gas | Sales Mode |
| 2. | Marine Fouling | Marine/Shipping | R&D |
| 3. | Water Treatment | Oil & Gas | Sales Mode |
| | Water Treatment | Petrochemical | R&D |
| 4. | SRB | Oil & Gas | R&D |
| | | | |

Water Treatment – TWM

Activators are on the outside of pipe work near the filtration system



No part of the system touches the water

1. Effectively removes biofilm
2. Improves filtration efficiency
3. Prolongs filter media lifespan
4. Help to balance pH
5. Significantly reduces chemical usage
6. Mitigate scale formation
7. Improves water quality
8. Reduces backwash cycle frequency & backwashing time – saving on water & chemical
9. Lowering overall operating and maintenance expenditures



"it Matters"

TelferTech Sdn Bhd (685066-M)

Reference sites:

SBO – 2 Units; Semarang Platform – Pump Caissons

SKO – 4 Units; Tukau Platform – Pump Caissons

Coming up: PTTEP – Jacket Legs, April 2016
(Paid Trial; Rental Model)

Testimony - SKO



Our Ref. : SKO/BIE5/APR/2014/23
Date : 29th April 2014

TO WHOM IT MAY CONCERN

Dear Sir /Madam,

This letter is served as a request from the exclusive agent **Sonorous Sdn Bhd** for **TelferTech Anti-Marine Fouling System (TOG)** to confirm the installation and trial application of the unit at our offshore facilities.

PCSB Sarawak Operations has carried out an extensive trial by installing and applying the TelferTech Anti-Marine Fouling System or TOG at Tukai Living Quarters on July 7th, 2011 as a supplementary solution to the then problematic sea water lift pumps i.e P70A and P70B. The original intention was to keep marine growth from settling at the caissons, while waiting for permanent solution by RCFA team.

Before the installation of the unit, the pumps had Mean Time Before Failure (MTBF) of less than three months each for the past three years (2007-2010). The total repair cost for the pumps during the 3 years period was about RM 200K. On top of that, Maintenance team had to conduct caisson cleaning which cost about RM80K.

After successful installation of the TOG units, the pumps had zero downtime until today. Initial plan to clean the caissons every two years is now not necessary to be carried out since both pumps are performing as expected.

Overall, PCSB Sarawak Operations is very satisfied with the performance of the TOG units. On top of that, we have purchased another two units of TOG for TKQ-A Firewater pumps (P71 A and P71B).

Should you have any question, please do not hesitate to contact Mr Ruzlan Hashim at +6085-475688 or ruzlanh@petronas.com.my for further clarification.

Respectfully,
For **PETRONAS CARIGALI SDN BHD**

RUZLAN BIN HASHIM
MANAGER,
INSPECTION AND ASSURANCE,
INTEGRITY AND ENGINEERING DEPARTMENT,
PETRONAS CARIGALI SDN BHD – SARAWAK OPERATIONS

ANY QUESTIONS?