

Sustainability in Water

- **Innovations in Waste Water Treatment and Recovery**
- **ELITA India Represents SCALENE Innovative products & Services in Water, Energy, Telecom, Healthcare Management**
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Today ...

“...Water, water, everywhere, And all the boards did shrink; Water, water, everywhere, Nor any drop to drink.”

**Samuel Taylor Coleridge,
The Rime of the Ancient Mariner**

- **70% of the earth's surface is covered with water**
- **97% percent of the water on the earth is salt water**
- **2% percent of the water on earth is glacier ice at the North and South Poles**
- **Less than 1% is fresh water that we can actually use**
- **Application : Drinking – Transportation - Heating – Cooling – Industry -Agriculture**

Water Issues Today

- In developing countries, 70 % of industrial waste is dumped without treatment - *World Development Report (WDR) of 2003*
- **Industries consume water but also pollute it...**
- **Each liter of wastewater pollutes about 5–8 litres of water (CSE , 2004) raising industrial use to 35-50%**
- **Wastewater treatment systems are installed to meet the wastewater discharge norms (concentration based)**
- **Industry meets required standards by diluting waste water with clean water – A counter-productive and not a cost-effective solution**



AQUATRON™

Fine Particle Shortwave Thrombolytic
Agglomeration Reactor (**FPSTAR**)

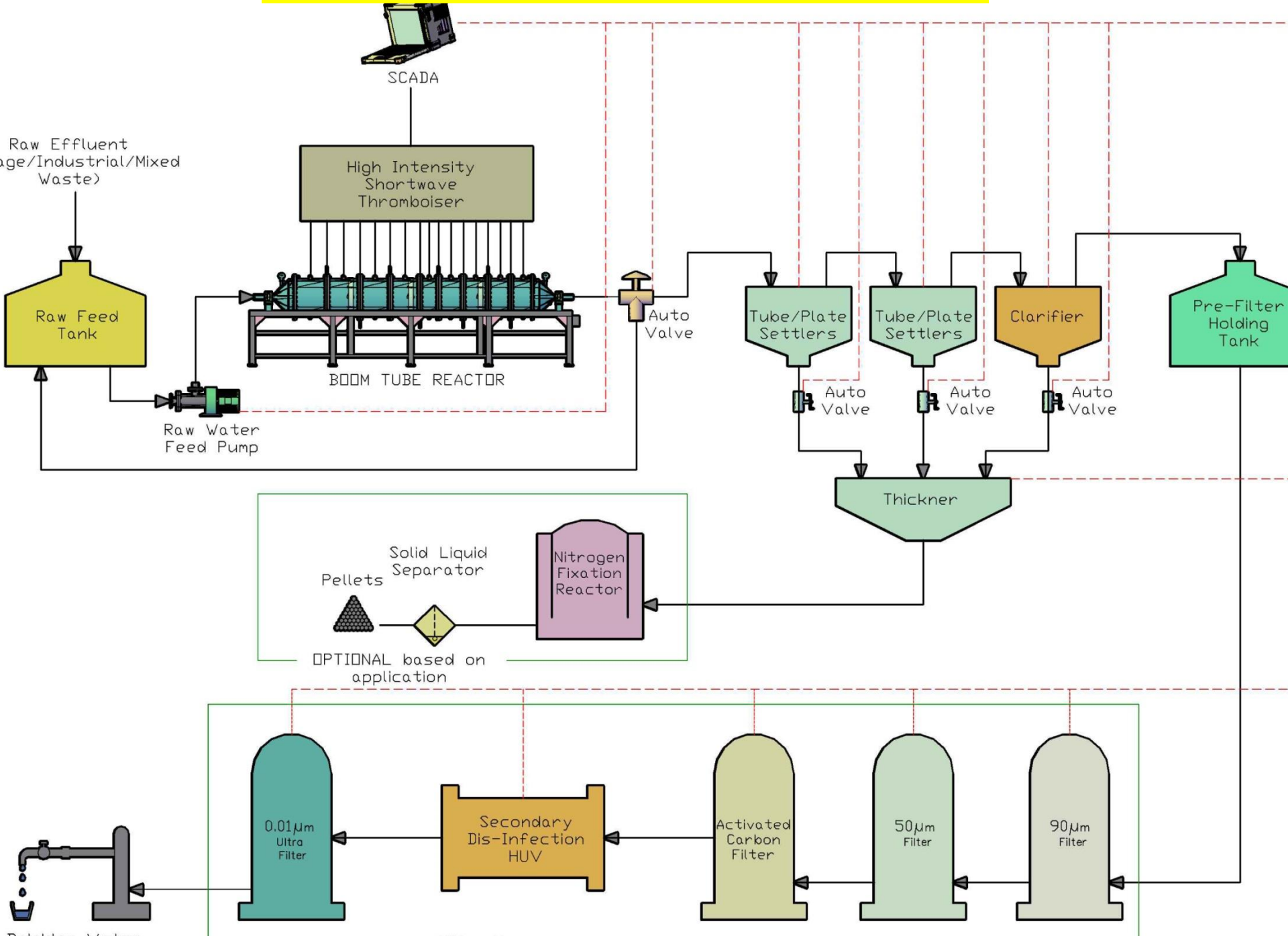


A **State of the Art Technology** for
Water Recovery and **Management**

AQUATRON™ FPSTAR – Boom Tube Reactor System



Schematic Process Flow Diagram

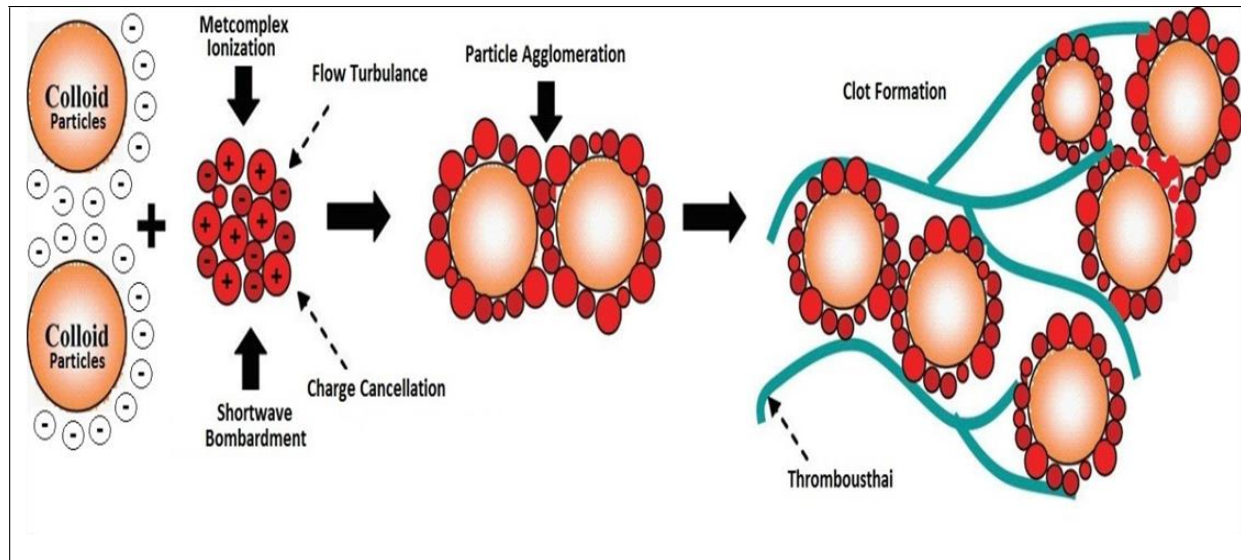


FPSTAR Technology

- FPSTAR reactor **mimics** a similar mechanism, found in **nature...**
- Fine **particles** in liquids **behave** in the same way **as the fibrinogen** in the blood, with a 'sticky' portion at the center and a negative charge along the periphery.
- The charge here is clipped off by applying **high intensity shortwave Resonance** through a specialized system called **Boom Tube Reactor**.
- **The Boom Tube Reactor** is made up of **complex alloys** consisting of Aluminum, Magnesium, Zinc, Copper, Manganese, Titanium etc. **depending on the particle composition** and the waste water to be recovered.
- The **water** to be treated **is pulse fed** through the Boom Tube Reactor, with a suitable pulsating pump
- **Flow turbulence** caused by **Continuous circular motion** of the Boom Tube Reactor.

Mechanism of Action

- High energy **shortwave Resonance** of different frequencies is delivered to these structures, **depending on the composition** of the waste water
- They form **soluble monomeric** and **polymeric complexes**
- The **hydro complexes** formed **depend on the alloy** chosen for a particular characteristic of the particles that needs to be clotted and the **resonating frequency** of the dissolved particles **and their sizes**.
- The complexes stick together, beginning **the formation of clots**, like the fibrins in the blood. Particle aggregation happens due to **Van der waals** forces.



Difficult Constituents

- **FPSTAR can also clot materials that do not otherwise form precipitate...**
- **Sodium and Potassium and non-flocculating or non-coagulating materials like benzene, toluene or similar complex organic compounds can also be thrombulated and removed**
- **Tough to remove substances like lignin can also be thrombulated and removed by the FPSTAR Process by pre-treating it with extra high tension millimeter wave bombardment prior to the FPSTAR process**

Process Benefits

- Reduces COD and BOD by >90 % . Meets Applicable laws
- Low cost of total CAPEX and OPEX compared to conventional methods of water treatment / recovery.
- Extremely fast reaction time, processes water on line and clean water available for recycle immediately
- Arsenic, Nitrates, Heavy Metals and Fluoride content reduced
- Very small space requirements and modular in installation
- Extremely effective in removal of Color, TOC, NOM and DBP precursors
- Higher sludge concentrations resulting in lower sludge disposal costs
- Non-hazardous environmental sludge residue
- A “NON” Chemical NON Biological process

Process Benefits

- Fully Automated controls and easy to operate
- Agglomerate particles as small as 15 nm to agglomerates of 100 μm to 1.5 mm that can be filtered through conventional aids
- Softening Solids as fast sedimentation Aid
- Very effective in the removal of high and low turbidity
- Works over a wide pH range
- Compatible and beneficial with many land application residue programs and farming, depending on the source of original water.
- A “NON” Chemical NON Biological process

Efficacy

| Constituents | % Removed |
|---|------------------|
| Suspended Solids | > 99% |
| Oil /Grease / Hydrocarbons | > 95% |
| Heavy Metals | > 96% |
| Arsenic / Cyanide | > 96% |
| Calcium, Magnesium, Potassium | > 90% |
| Bacteria /Fungus / Algae / Larvae and their spores | > 99% |
| Chemical Oxygen Demand (COD) | > 90% |
| Biological Oxygen Demand (BOD) | > 90% |
| Carbon, Ammonia and Sulphur Compounds | > 98% |
| Nitrites and Fluorides | > 96% |
| Naturally Occurring Radio Active Materials (NORM) | > 94% |

Applications

Industry Verticals

DOMESTIC WASTE WATER

- Landfill Leachate Anaerobic Digestate Sewerage Water
- Municipal waste Autoclave discharge
- Car wash waste water
- Apartments & Commercial Complex

DRINKING WATER

- From contaminated Lakes, Rivers, Sea

FOOD PROCESSING

- Process Water from all kind of food industries
- Recovery of fats, oils and greases

DISTILLERIES, BREWERIES AND WINERIES

- Process Effluent Spent Wash Cooling Water

CHEMICAL PRODUCTION

- Process and Waste Water

POWER GENERATION

- Process and Wash Water

Applications

OIL AND GAS

- Drilling platform waste water and flow back water
- Refinery process storage and ground water
- Distribution depot's wash water

MINING AND ORE PROCESSING

- Mine Discharge Water and Tailing Ponds
- Minerals and precious metals recovery

MINERALS AND METALS PROCESSING

- Process and Cooling Water
- Mineral and Precious Metals Recovery from process discharge

MARINE AND SHIPPING

- Tanker and ship bilge water
- Ballast water from tankers
- Cruise Liner wash and waste water

SCALENE ENERGY RESEARCH INSTITUTE (SERI)



One of the Premier Energy Research Institutes, with two World Class Laboratories in Bangalore, India and The Hague, The Netherlands

Thank You

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