



# Spirulina Algae Bioreactors

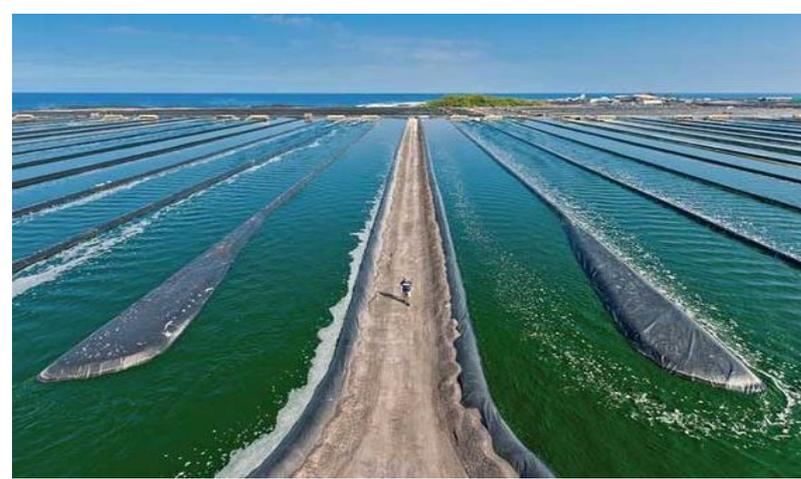


ep.spiru

Organic Process Cultivation  
for Medical & Food Grade  
Quality Spirulina Algae

# Spirulina Algae, ..... the Mother Nature

Spirulina Algae, the  
Microalgae-  
Cianobacteria  
Arthrospira are  
growing naturally in  
water sources  
worldwide



Due to its nutritional  
and therapeutic  
qualities, Spirulina  
Algae is also  
cultivated worldwide  
in controlled systems  
as well

# Spirulina Algae, ..... Why

Spirulina Algae were used as food for centuries. However, only a few decades ago, research on their nutritional value showed their unique composition, e.g., elevated content of high biological quality proteins, minerals, lipids containing essential unsaturated fatty acids, high content of folates, phenols, vitamin E and carotenoid pigments, especially, beta carotene.

# Spirulina Algae, the Bioreactors.....Why

Today, Spirulina Algae are either naturally grown in open lakes and water sources or artificial cultivated in open ponds and lagoons.



The prospective directions for optimization of economics to cultivate Spirulina Algae, especially for food and medical applications, led to the essence of effective and controlled use of light, media, ambient conditions and fertilizers.

Controlled Spirulina Algae cultivation process is available in two configurations:

Tubular Bioreactors



Tankage Bioreactors

# Spirulina Algae, the Bioreactors vs. Open Ponds

	Bioreactor	Open Ponds
Total Area Requirements	√	X
Consistant Product Quality	√	X
Total Investment	√	X
Energy Consumptions	√	X
Working Flexibility	√	X
Easy Installation	√	X
Easy Operation	√	X
Fixed Capitals	√	X
Operating Capitals	√	X
Profitability	√	X

**Total Area Requirements:** EPECO.USA, Spirulina Algae Bioreactor EP.SPIRU 1200, for instance, can produce 35 Tons/Year from plants installed on 1200 sq. meters. The same amount can be produced in 32, perfectly operated open ponds installed on 22000 sq. meters. EP.SPIRU 1200 needs Total Area 5% of equivalent Open Pond Farm.

**Product Quality:** EPECO.USA, Spirulina Algae Bioreactors EP.SPIRU, is totally isolated-by design, from the surrounding environment. From seeding to final packaging, Spirulina Algae will never be in contact with the surrounding environment, including ambient conditions or operators. Du to strict control of the cultivation parameters, EP.SPIRU Bioreactor will always produce consistent quality products.In rare, but possible cases of contaminated seeding, easy disposal, flushing and cleaning of the EP.SPIRU Bioreactor with minimum losses of media or time.

**Total Investment:** EPECO.USA, Spirulina Algae Bioreactors EP.SPIRU, can be installed in or outdoor with no special arrangement. No ambient cooling or heating is required. No pipework or cabling passages or conduits are construct. The Total Investment is normally 30% less than the equivalent open pond.

## **Spirulina Algae, the Bioreactors vs. Open Ponds..... cont'd**

**Energy Consumption:** EPECO.USA, Spirulina Algae Bioreactor EP.SPIRU 1200, for instance, requires a power supply of 20 KWHs, with installed power 30 KWHs while equivalent Open Pond installed Power is 70 KWHs and average 35 KWHs. EP.SPIRU 1200 will save nearly 40% of the power consumption and 20% of the installation cost.

**Working Flexibility:** EP.SPIRU, cleaned, sterilized, and restarted in just one hour.

**Easy Installation:** EP.SPIRU, is manufactured, assembled, tested and delivered to the site ready for operation. Only flat land areas with regular infrastructure facilities (fresh water supply, waste water disposal and electric power) were required to install EP.SPIRU Bioreactor.

**Easy Operation:** EP.SPIRU, is designed in PLUG & PLAY mode with minimum Human interference. Trouble shooting or change in working parameters is carried out using only PUSH Buttons and/or VALVES.

**Fixed Capitals:** EP.SPIRU, has no special arrangements for installation or operation. Limited space, equipment and machinery, interconnecting pipework and cable requirements will reduce the capital expenditure by approximately 35% compared to the Opened Ponds.

**Operating Capitals:** EP.SPIRU, is wasting no-water, fertilizers, energy, or time. Accordingly, EP.SPIRU proved 40% less operating cost compared to the equivalent Opened Ponds.

**Profitability:** With minimum installation, operation and services costs, efficient management of water, fertilizers, energy and time will secure 35% higher profitability compared to the equivalent Open Ponds.

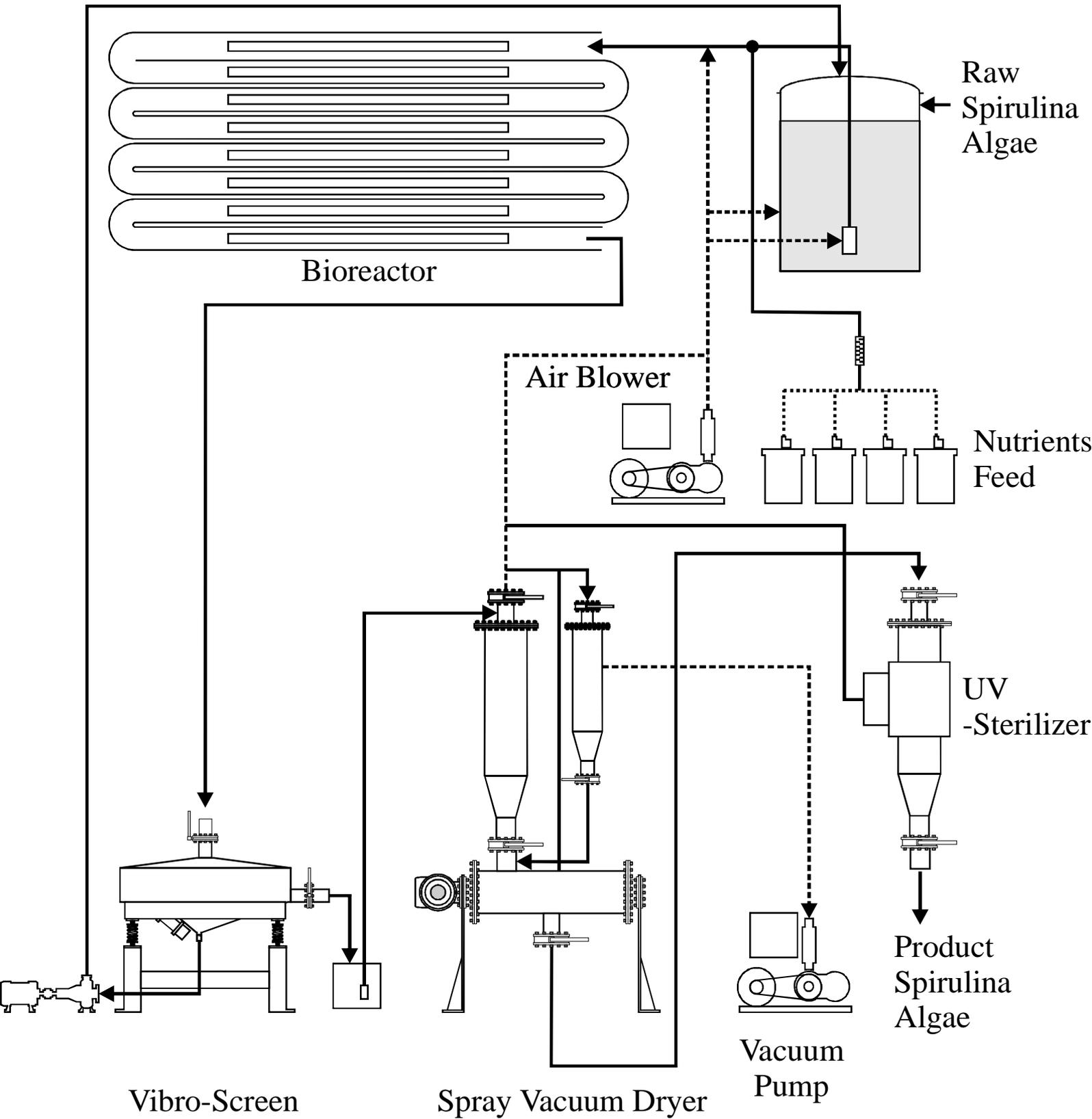
# **Spirulina Algae, the Tubular Bioreactors.....**



The Tubular Spirulina Algae Bioreactors model EP.SPIRU 400 &700 are built on one standard 40” container frame containing the Cultivation and Preparation Equipment. Models 800 & 1200 are built on two standard 20” &40 containers frames.

All EP.SPIRU Systems can be installed freely in plant room upon client’s request.

# Tubular Bioreactors....the Process.



# Tubular Bioreactors EP.SPIRU

## .....the Scope of Supply

Bioreactor: consisting of transparent acrylic tubes, polypropylene fittings and insert light source.

Air Blower: of positive displacement root type.

Nutrients Feed Station: for fertilizers and pH control media.

Raw Spirulina Algae Receiving Tank: fit with Air Lift Pump

Water Heater (Optional)

Water Cooler (Optional)

Control Panel: including PLC System

Instruments:for pH, O<sub>2</sub>, CO<sub>2</sub>, Ammonia, Temperature and Light Control

Pipeworks: all in metal or composite food grad application.

Cables

Frame: Stainless Steel 304 L

# Preparation EP.SPIRU

## .....the Scope of Supply

Vibro-Screen: complete with Spirulina Air Lift Pump and Filtrate System,complete with Air Lift Pump.

Combined Low Temperature Spray + Vacuum Dryer, ,complete with Air Lift Pump.

UV Sterilizer

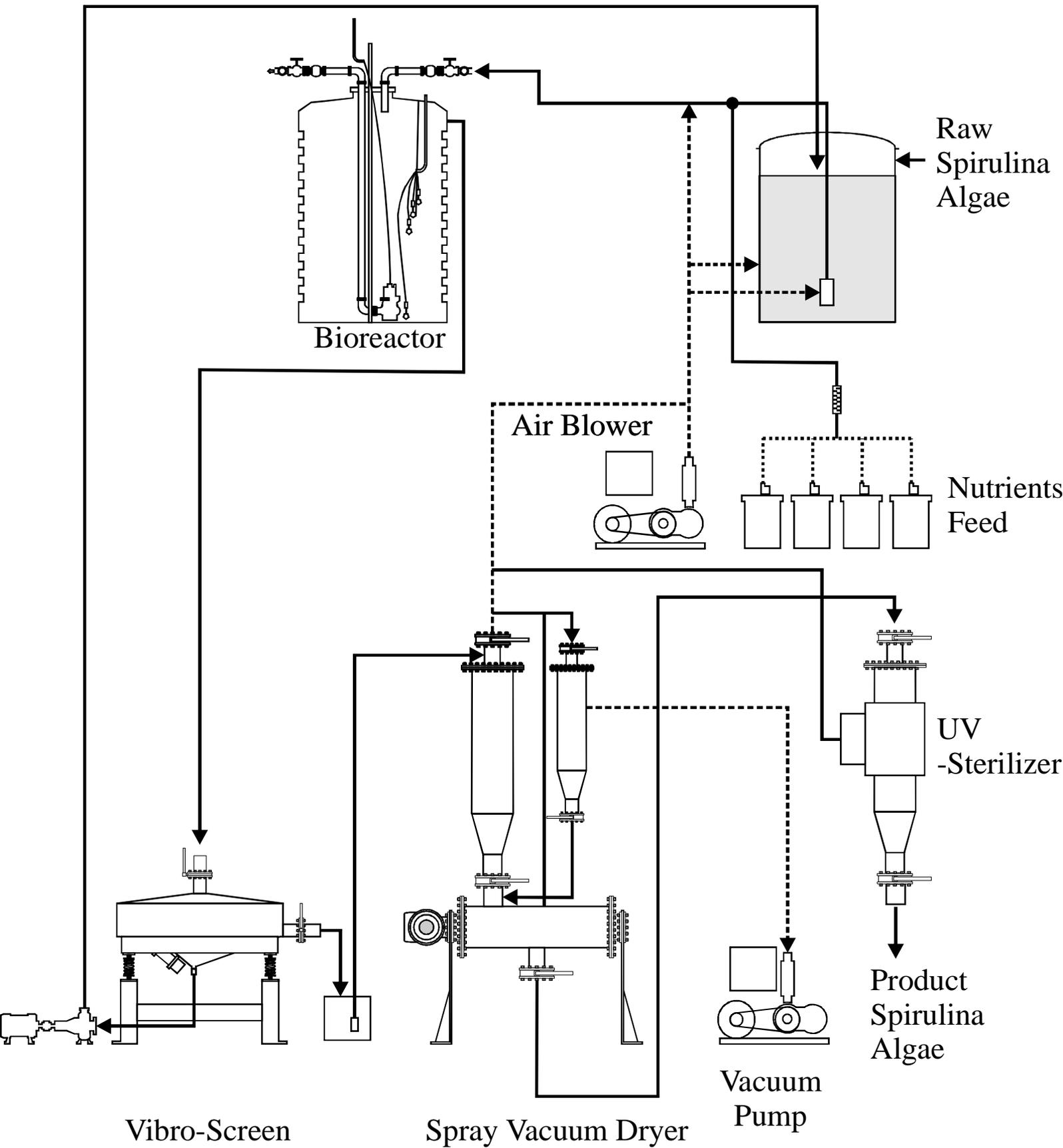
Vacuum Pump, of positive displacement root type.

# Spirulina Algae, the Tankage Bioreactors.....



The Tankage Spirulina Algae Bioreactors, EP.SIRU are built either in transparent or opaque polyethylene tanks for above ground installation. Optional underground installation in opaque tanks is available. Central gathering, treatment and drying station is normally centralized in the plant.

# Tankage Bioreactors....the Process.



# Tankage Bioreactors.....the Scope of Supply

Bioreactor: consisting of transparent acrylic or opaque tanks for above ground installation. Opaque tanks for underground installation are available as an option. Insert light source and control instruments are also included.

Air Blower: of positive displacement root type.

Nutrients Feed Station: for fertilizers and pH control media.

Raw Spirulina Algae Receiving Tank: fit with Air Lift Pump

Water Heater (Optional)

Water Cooler (Optional)

Control Panel: including PLC System

Instruments:for pH, O<sub>2</sub>, CO<sub>2</sub>, Ammonia, Temperature and Light Control

Interconnecting Pipeworks: all in composite food grade application.

Interconnecting Cables

## Preparation EP.SPIRU

## .....the Scope of Supply

Vibro-Screen: complete with Spirulina Air Lift Pump and Filtrate System,complete with Air Lift Pump.

Combined Low Temperature Spray + Vacuum Dryer, ,complete with Air Lift Pump.

UV Sterilizer

Vacuum Pump, of positive displacement root type.

# **Spirulina Algae, ..... Other Services**

EPECO.USA is providing the following services:

- Detailed design and engineering works for Spirulina Algae Farms.
- Procurement and supply of associated process equipment.
- Supervision of installation, commissioning and start-up tests at site.
- Supervision of operation and maintenance of Spirulina Algae Farms.
- Training of operators.
- warranty of equipment and material against manufacturing defects and bad workmanship.
- Performance guarantee of Spirulina Algae Farms.
- Marketing and sales of products.
- Upgrading of existing Spirulina Algae Farms.

# EPECO.USA, ..... Other Products

Wastewater  
Treatment & Reuse



Water Treatment  
for Battle Field



Wastewater  
Treatment for Ships  
& Marine



Seawater  
Desalination  
Plants



Hazardous Waste  
Thermal Oxidizers

