LB Procesos Ambientales S.A. de C.V.

Sustainable solutions for the treatment of wastewater

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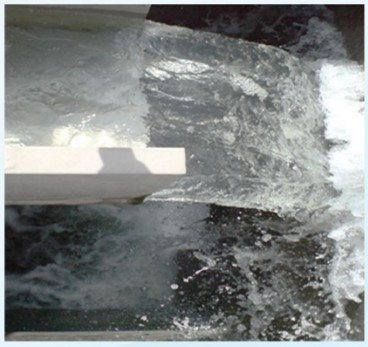
PATENTED PROCESS



LB procesos ambientales, SA de CV

Company officially incorporated in Hermosillo, Sonora with 22 years of experience in: executive projects, structural analysis, design, construction, equipment, commissioning and operation of sewage and wastewater treatment plants through the process of a **SIMPLIFIED EXTENDED AERATION**, it's a patented process named 322360 where it has developed a refined technique that allows the removal of stabilized sludge (ashes) every 20 or 30 days for its systemic recirculation.

In the process are obtained large profits by reducing phosphorus and nitrogen in the discharge of treated water to the desired parameters.

Another benefit is that the initial investment is very competitive with any other process, it requires a small area for construction, it doesn't use any chemical product (100% biological) and no odors are emitted due to the peculiarity of our process in the treatment of sludge.

The operating cost (per m3 of water produced) is very competitive and it complies excessively the official Mexican standard for discharge of treated water with direct contact **NOM-003-SEMARNAT-1997 and for sludge NOM-004-SEMARNAT-2002, class B.**

Regarding the quality of water in the discharge of sewage and wastewater treatment plants, we guarantee the following parameters:

- **DBO_5 ----- 0 a 10 mg/Liter** (Biochemical oxygen demand)
- **SST ------- 0 a 10 mg/Liter** (Suspended solids)
- **Fecal coliforms from 0 to 100 NMP/ 100 ml of water.**

We have the technical capacity to design and build sewage and wastewater treatment plants in industries, businesses, municipalities, subdivisions, hospitals, schools, and different developments in both public and private sectors. The capacity of each plant is according the necessity.

SE
SECRETARÍA DE ECONOMÍA

Instituto Mexicano de la Propiedad Industrial

TÍTULO DE PATENTE NO. 322360

Titular(es): HERIBERTO LAGUNA GARCÍA

Domicilio: Cadenera 80, Los Naranjos, 83060, Hermosillo, Sonora, MÉXICO

Denominación: PLANTA Y METODO PARA TRATAR SIMULTANEAMENTE, AGUAS RESIDUALES Y LODOS GENERADOS.

Clasificación: Int.Cl.8: C02F11/12; C02F3/20; C02F9/00

Inventor(es): HERIBERTO LAGUNA GARCÍA

SOLICITUD

Número: MX/a/2010/009549

Fecha de presentación internacional: 25 de Febrero de 2008

PRIORIDAD

País:

Fecha:

Número:

Vigencia: Veinte años

Fecha de Vencimiento: 25 de febrero de 2028

La patente de referencia se otorga con fundamento en los artículos 1°, 2° fracción V, 6° fracción III, y 59 de la Ley de la Propiedad Industrial.

De conformidad con el artículo 23 de la Ley de la Propiedad Industrial, la presente patente tiene una vigencia de veinte años improrrogables, contada a partir de la fecha de presentación de la solicitud internacional y estará sujeta al pago de la tarifa para mantener vigentes los derechos.

Quien suscribe el presente título lo hace con fundamento en lo dispuesto por los artículos 6° fracciones III y 7° bis 2 de la Ley de la Propiedad Industrial (Diario Oficial de la Federación (D.O.F.) 27/06/1991, reformada el 02/08/1994, 25/10/1996, 26/12/1997, 17/05/1999, 26/01/2004, 16/06/2005, 25/01/2006, 06/05/2009,06/01/2010, 18/06/2010, 28/06/2010, 27/01/2012 y 09/04/2012); artículos 1°, 3° fracción V inciso a), sub inciso iii) 4° y 12° fracciones I y III del Reglamento del Instituto Mexicano de la Propiedad Industrial (D.O.F. 14/12/1999, reformado el 01/07/2002, 15/07/2004, 28/07/2004 y 7/09/2007); artículos 1°, 3°, 4°, 5° fracción V inciso a), sub inciso iii), 16 fracciones I y III y 30 del Estatuto Orgánico del Instituto Mexicano de la Propiedad Industrial (D.O.F. 27/12/1999, reformado el 10/10/2002, 29/07/2004, 04/08/2004 y 13/09/2007); 1°, 3° y 5° inciso a) y antepenúltimo párrafo del Acuerdo que delega facultades en los Directores Generales Adjuntos, Coordinador, Directores Divisionales, Titulares de las Oficinas Regionales, Subdirectores Divisionales, Coordinadores Departamentales y otros subalternos del Instituto Mexicano de la Propiedad Industrial. (D.O.F. 15/12/1999, reformado el 04/02/2000, 29/07/2004, 04/08/2004 y 13/09/2007).

Fecha de expedición: 7 de julio de 2014

SUBDIRECTOR DIVISIONAL DE EXAMEN DE FONDO DE PATENTES, ÁREAS MECÁNICA, ELÉCTRICA Y DE REGISTROS DE DISEÑOS INDUSTRIALES Y MODELOS DE UTILIDAD

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MX/2014/74559

Competitive Advantages

- 22 years of experience in the field.
- More than 150 plants built in Mexico.
- Proprietary technology with world-class standards.
- Patented process, 100% biological and odor free.
- Automated process with minimal operator personnel.
- Guarantee in the quality of treated water and sludge generated.
- Competitive investments and operating costs.
- Adaptable design to the geography of the place.
- Requires a small area for construction.
- Project offer "Key in hand".
- No cost in consulting and support.

Type of work

- Ecological, environmental conservation, sustainable development and public health. .

Required Surface

- 0.4 Ha per each 100 L.P.S of plant capacity.

Operating Cost

- Between ____ and ___ per $m^{3,}$ depends of the plant capacity.
- It is self-sustainable in their operation to receive bonus from the federal government as well as the sale of treated water.

Competitive advantages of our Wastewater Treatment Plants

Sludge Stabilization

- It occurs in the process fully stabilized and mineralized, no odor, complying with the standard NOM-004-SEMARNAT-2002, class "B" for direct contact.

Peculiarities of the process

- Our treatment is most reliable, with no risk of contamination, replaces the use of water in irrigation of green areas, construction, industrial use, infiltration into the ground, etc.
- Complies to access CONAGUA programs of bonus to the operation of plants that comply with the Official Standard: "NOM-003-SEMARNAT-1997".
- Also, it doesn't produce greenhouse gases as: Methane, Carbon dioxide, hydrogen sulfide, etc. (CO_2, CH_4 y H_2S), considered factors that cause global warming.
- Complies with the standard for groundwater recharge and any use in direct contact.
- The operating cost is competitive due to the minimal operator personnel.
- it doesn't use any chemical products in the process.
- Quality guarantee on the treated water through a National Surety.
- Response time to any urgent need, (24 hours).

Main Customers

CUSTOMERS		
www.**gig**.mx	www.**elga**.mx	www.**japac**.gob.mx
www.jumapam.gob.mx	www.**oomapasnogales**.gob.mx	www.**empalme**.gob.mx
www.**ceasonora**.gob.mx	www.**homex**.com.mx	www.**derex**.com.mx
www.**aguadehermosillo**.gob	www.**oomapasn**.gob.mx	www.**oomsapaslc**.gob.mx

Among others.

Some of our projects

CUSTOMER	LOCATION	YEAR	CAPACITY L.P.S.	OBSERVATIONS
Constructora CIG	“Real del lago”, Ixtlahuacán de los Membrillos, Jalisco.	2016	40	Design, construction, equipment and commissioning. (In 2 phases of 20 each)
Constructora CIG	“Monte Verde”, Mazatlán Sinaloa”.	2015	4	Design, construction, equipment and commissioning. (Cap. 12.5 LPS in 3 phases)
Constructora CIG	“Valle Imperial”, Zapopan Jalisco.	2015	20	Design, construction, equipment and commissioning.
Constructora ELGA	“La Joya” Hermosillo, Sonora	2015	3.0	Equipment, installation and commissioning.
DEREX DESARROLLO RESIDENCIAL	“Misión residencial” Nogales, Sonora.	2014	15	Design, construction, equipment ,commissioning and operation. (Cap. 180 LPS in 12 phases of 15 LPS)
DEREX DESARROLLO RESIDENCIAL	“Lomas de Anza” Nogales, Sonora.	2014	30	Design, construction, equipment, commissioning and operation.
OOMAPASN	“Río Mayo” Navojoa, Sonora.	2014	300	Design, construction, equipment, commissioning and operation.

Some of our projects

CUSTOMER	LOCATION	YEAR	CAPACITY L.P.S.	OBSERVATIONS
Municipio de Empalme	"Pitic" Empalme, Sonora.	2013	10	Design, construction, equipment, commissioning and operation.
Municipio de Empalme	"Emisor" Empalme, Sonora.	2013	40	Design, construction, equipment, commissioning and operation..
Municipio de Empalme	"Sport Unit" Empalme, Sonora.	2013	10	Design, construction, equipment, commissioning and operation..
Agua de Hermosillo	"La Sauceda" Hermosillo, Sonora.	2012	50	Design, construction, equipment, commissioning and operation..
Agua de Hermosillo	"Los arroyos, 4ta. Etapa." Hermosillo, Sonora.	2012	130	Design, construction, equipment, commissioning and operation..
Agua de Hermosillo	"Multi-Purpose Center" Hermosillo, Sonora.	2012	3	Design, construction, equipment, commissioning and operation..
Grupo Inova	"Golf Camp" León Guanajuato	2011	20	Design, construction, equipment, commissioning and operation.

Some of our projects

CUSTOMER	LOCATION	YEAR	CAPACITY L.P.S.	OBSERVATIONS
Desarrolladora de casas del noroeste SA de CV	"Mesa Colorada" Cabo San Lucas, B.C.S.	2011	150	Design, construction, equipment, commissioning and operation.
OMSAPAS	"San José del Cabo" B.C.S.	2011	150	Design, construction, equipment and commissioning.
DEVIPSA	"Industrial Park" Grupo Luva, Hermosillo, Sonora.	2011	17	Design, construction, equipment and commissioning.
VIVECONSA	"Las Bellotas" Nogales, Sonora	2010	20	Design, construction, equipment and commissioning.
Grupo LUVA	"Industrial Park" Hermosillo, Sonora.	2010	1	Design, construction, equipment and commissioning.
Grupo INOVA	"Golf Camp" León Guanajuato"	2010	20	Design, construction, equipment and commissioning.
DYNAMICA	"Unión del cuatro" Tlajomulco de Zúñiga, Jalisco.	2010	30	Design, construction, equipment and commissioning.
FICAMEX	"Fraccionamiento Las Lomas" Cabo San Lucas B.C.S.	2009	5	Design, construction, equipment and commissioning.

Some of our projects

CUSTOMER	LOCATION	YEAR	CAPACITY L.P.S.	OBSERVATIONS
Desarrolladora de casas del noroeste SA de CV	Bahía de Banderas, Nayarit.	2009	20	Design, construction, equipment and commissioning.
DYNAMICA	Tarimbaro, Michoacán	2009	15	Design, construction, equipment and commissioning.
Princesa de Peñasco	Pto. Peñasco, Sonora.	2009	20	Design, construction, equipment and commissioning.
Princesa de Peñasco	Pto. Peñasco, Sonora.	2008	40	Design, construction, equipment and commissioning.
Impulsora habitacional de Nogales SA de CV	“La mesa” Nogales, Sonora.	2008	70	Design, construction, equipment and commissioning..
JAPAC	“Costa Rica” Culiacán, Sinaloa.	2008	100	Design, construction, equipment and commissioning.
JAPAC	“Zona Sur” Culiacán, Sinaloa.	2008	300	Design, construction, equipment, commissioning and operation.
JAPAC	Arenitas Culiacán, Sinaloa.	2008	8	Design, construction, equipment and commissioning..

Some of our projects

CUSTOMER	LOCATION	YEAR	CAPACITY L.P.S.	OBSERVATIONS
JAPAC	Culiacancito Culiacán, Sinaloa.	2008	40	Design, construction, equipment and commissioning.
Pueblo bonito	Touristic development Esmeralda Bay Mazatlán, Sinaloa.	2008	7.5	Design, construction, equipment and commissioning.
Dos mil ingeniería SA DE CV	Fiscal Precinct Precos Querobabi, Sonora	2007	2.5	Design, construction, equipment and commissioning.
Oradel	Industrial Park Oradel, Nuevo Laredo.	2008	10	Design, construction, equipment and commissioning.
Desarrolladora de casas del noroeste SA de CV	HOMEX León, Guanajuato.	2007	10	Design, construction, equipment and commissioning.
JAPAC	Pueblos Unidos Culiacán, Sinaloa.	2005	30	Design, construction, equipment and commissioning.
JAPAC	“El diez” Culiacán, Sinaloa.	2005	20	Design, construction, equipment and commissioning.
Reserva Territoriales	Nuevo Laredo, Tamaulipas.	2005	40	Design, construction, equipment and commissioning.

Table showing the water quality

Treated Water	Fecal Coliforms NMP/100 ml	Helminths (h/l)	Grease & Oils (mg/l)	DBO5 (mg/l)	SST (mg/l)
NOM 003-SEMARNAT-1997	240	1	15	20	20
LB PROCESOS AMBIENTALES	0-5	0	0-5	0-10	0-10

Comparison of samples:
Entrance of raw water to the plant VS.
Treated water.

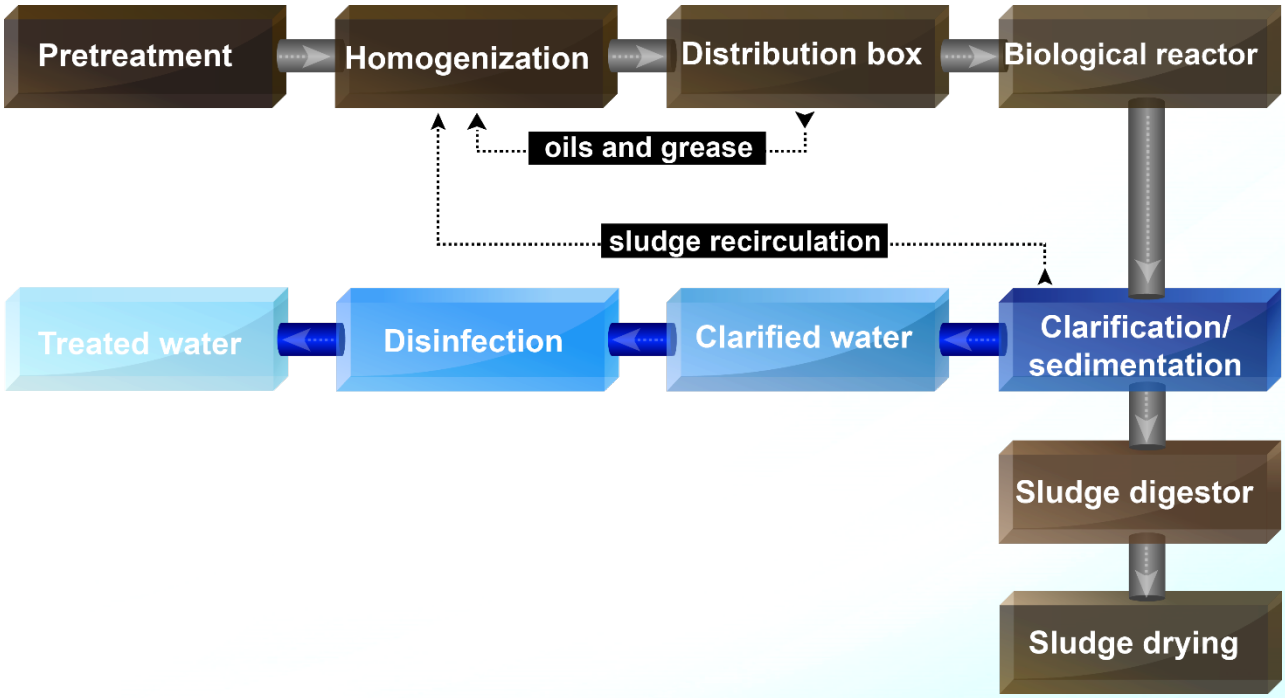
Table showing the sludge quality

BIOLOGICAL SLUDGES	Fecal Coliforms NMP/100 ml	Salmonella NMP/g in a dry base	Helminths
NOM-004 SEMARNAT 2002 Class A	Less than 1000	Less than 3	Less than 1
LB PROCESOS	De 0 a 100	0	0

Sludge drying samples.

Process Diagram

Diagram that shows the process of our wastewater treatment.



Process description

Arrival Transmitter

- It’s where you receive the expense that arrives to the sewer sanitary system to the treatment system.

Pretreatment

- Begins with the screening system with different openings, this operation is used to remove coarse material, usually floating "trash", sand contained in the raw sewage, which can clog or damage pumps, pipes and equipment for treatment plants.
- Then we have the grit chamber tank and the skimmer pipe, this unit is pre-oxygenated to separate on one hand the fats and on other the oils that rise to the surface and are designed to remove this material.
- Water is constantly flowing underneath the screens interleaved meeting others that reach the floor to retain settleable solids sands and gravel which are extracted by pneumatic, this is achieved in a single tank built of reinforced concrete.

Homogenization

- The water flows are pre-treated and balanced, since a treatment plant is subject to temporary fluctuations in both quantity and quality of the water.

Distribution Box

- System in which the pretreated water is received, separating the fats and oils, recirculating the homogenizer tank and on other side the pretreated water discharge is performed from the biological reactor.

Process description

Biological Reactor

The simplified extended aeration process is designed to remove the organic matter, in terms of DBO_5 (Biochemical oxygen demand) of the wastewaters. The removal of DBO_5 is achieved by biological conversion, in the presence of molecular oxygen by microorganisms of DBO_5 in CO_2 and H_2O and in new cells of microorganisms, also, the nitrogen and phosphorus is removed, as other compounds in the same unit. The wastewater treatment plants are built entirely with reinforced concrete material.

Biodegradable solids that are product of purging the carbonaceous matter have a cell residence time to degrade to simple elements formers of cells, such as, carbon, hydrogen, nitrogen and oxygen, so that all the DBO5is reduced to the simple elements that form it, to turn them into mineral ashes. In the simplified extended aeration process, it's possible to remove up to 99% of the organic matter.

Clarifier – Settler

The sludge "Biomasa", formed in the biological reactor, are separated by gravimetric sedimentation. These are fully exploited for the continuing process until the end of cellular time, when they are removed then they are sent to the digester tank to complete their removal process until the mineralization of the same. In the water line, that is completely clarified, continues to flow to the disinfection system.

Clarified Water

The effluent from this process complies and exceeds the official standard NOM-003-SEMARNAT-1997. Quality to be used in direct contact without any risk to health or pollution in: irrigation of green areas, industry, construction, unrestricted agriculture and groundwater recharge, etc.

Process description

Sludge Digester

Following the line of sludge, this tank it's used to conclude with the removal of biological sludge that started in the biological reactor when they are sent to the digester tank, there is a lower percentage of young sludges who did not reach their removal in the biological reactor so the digester tank concludes with the total mineralization of the sludges. This tank is built of reinforced concrete.

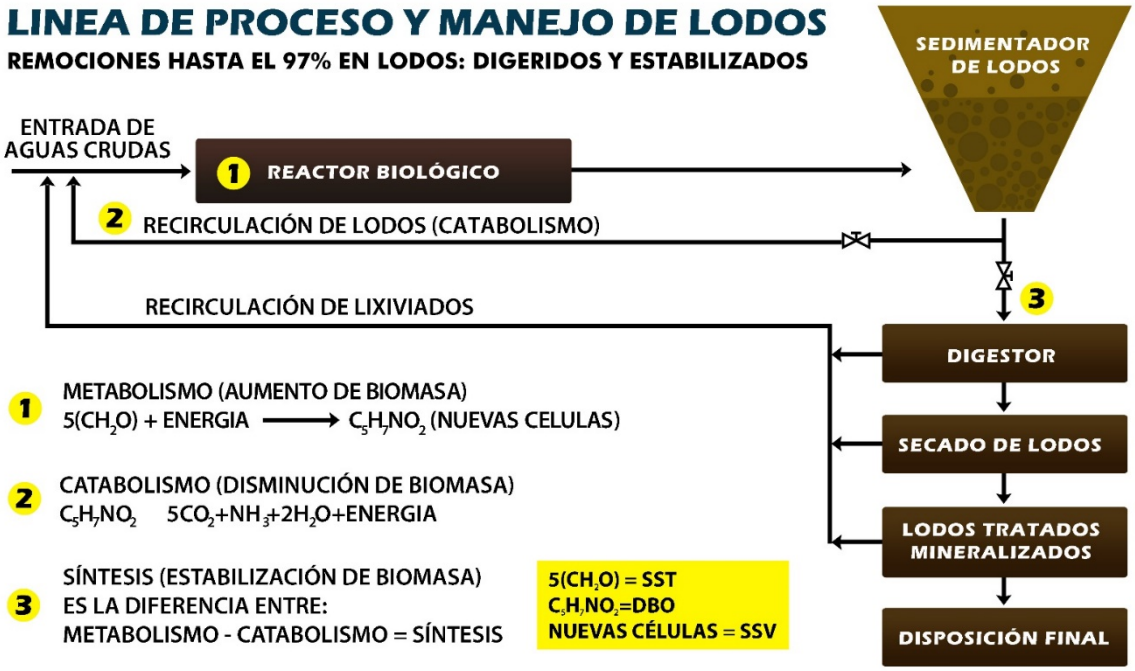
Sludge drying

(Centrifuge / sludge dehydrator / band filter / drying beds)
Mineralized sludges are removed from the digester through a special progressive cavity pump and sent to the centrifuge machine where it is extracted up to 90% of the water in order to remove solids to its place for immediate reuse, (example; land improver) without any risk since it is a natural fertilizer for the nitrogen and phosphorus already stabilized.

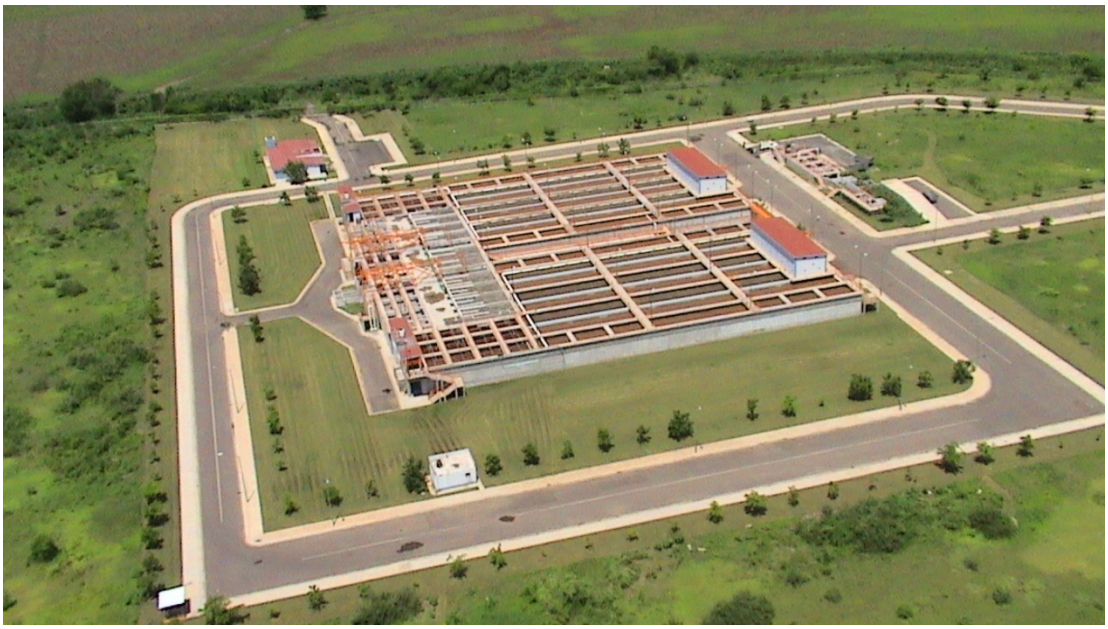
Drying beds (for low cost plants, until 30 L.P.S.)

The mineralized sludges are sent to the drying bed in order to extract the water to return it to the reactor of the Wastewater Treatment Plant. The drying is made by the evaporation of water through the sun; once the mineralized sludge is dry they're removed and can be used for soil improvement, fertilizer plants without any risk since it is a natural fertilizer.

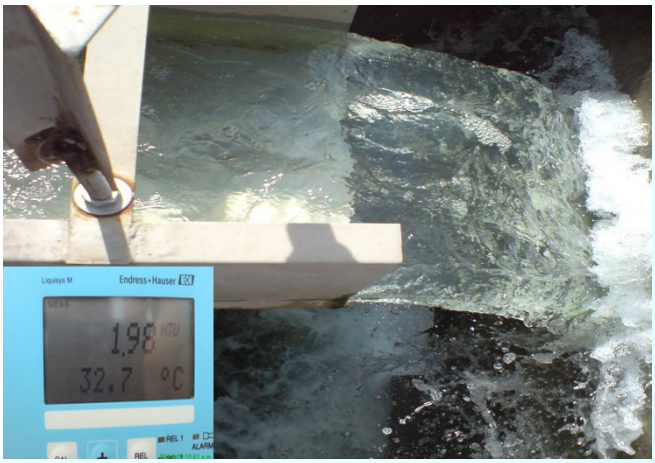
Process line and Sludge Handling



Treatment Plant “Zona sur” Culiacán, Sinaloa.



Panoramic View:
Plant capacity of 300 l.p.s.



Treated water discharge:
1.98 NTU (Nephelometric Turbidity Units)

Treatment Plant “Sauceda” Hermosillo, Sonora.

Panoramic View:
Plant capacity of 50 l.p.s.

Discharge channel :
Treated water.

Treatment Plant “Deportiva” Empalme, Sonora.

Panoramic View:
Plant capacity of 10 l.p.s.

Discharge channel :
Treated water.

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Treatment Plant "C.U.M." Hermosillo, Sonora.

Panoramic View:
Plant capacity of 3.0 l.p.s.

Discharge channel :
Treated water.

Treatment Plant “Emisor” Empalme, Sonora.

Panoramic View:
Plant capacity of 40 l.p.s.

Discharge channel :
Treated water.

Treatment Plant “Río Mayo” Navojoa, Sonora.

Panoramic View:
Plant capacity of 300 l.p.s.

Discharge channel :
Treated water.

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