Technologies for industrial wastewater treatment

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Treatment of Industrial Wastewater

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www.tia-abwasser.de
Technologies for Industrial wastewater treatment

Founded in February 1987

Located in the north of Germany, near Hamburg

Partnerships and alliances in several European countries

Worldwide partnerships for specific products and clients

Consultation for wastewater and recycling projects

Turnkey projects for Industries and Municipalities

Optimisation of existing plants

Services
Municipal Treatment Plant

TIA COMPACT SYSTEM for municipal applications, 300 to 150,000 p.e.

In-Direct Discharge

TIA Pre-Treatment & TIA Flotation

Direct Discharge or Recycling or irrigation after biological treatment

Municipal Treatment Plant

TIA COMPACT System for industrial applications

15cope of work
TIA – Wastewater – Treatment – Plants (turn-key projects only)
Treatment of Industrial Wastewater

1. Management of Industrial wastewater

2. Processes for treatment and conception (using the example of the Kuwait Central Industrial Wastewater Treatment Plant)

3. Management and Operation of wastewater treatment plants
Treatment of Wastewater from industrial production processes always needs a specific **Pre-Treatment** and a final **biological treatment** (few exceptions):

**Pre-Treatment**

Very specific treatment depending on the origin: screening, ph-regulation, heavy metal removal, oil-and grease removal ... All depending deeply on the kind of production

Pre-treatment is necessarily to be done before any further treatment, even before transportation in a sewer

**Biological Treatment**

Biological treatment is always the final treatment before discharge into environment. Industrial effluents need other concepts than municipal, fluctuation is much higher.

Some industrial wastewater can be treated together with municipal wastewater after pre-treatment – but municipal rate on organics should be more than 70%.
How to deal with industrial wastewater?
- Infrastructure (what is possible?)
- Responsibility (community or industry?)
- Costs
- Competition + fairness

Reuse/Recycling saves costs for water
Extensions of production and wastewater treatment in hands of the company
Cheap for big companies – expensive for small companies
Deposit of primary sludge necessary to care
Deposit of biological sludge necessary to care
Personnel for wastewater treatment necessary
1. Management of Industrial wastewater

Reuse/Recycling saves costs for water
Extensions of production and wwtp in hands of the company
Cheap for big companies – expensive for small companies
Deposit of primary sludge necessary to care
Deposit of biological sludge necessary to care
Personnel for wwtp necessary

Less equipment necessary
Less care of personnel
Cheap for big companies – expensive for small companies
No direct reuse of water possible
All expansions must be agreed with authorities
Deposit of primary sludge necessary to care
Personnel for wwtp necessary
1. Management of Industrial wastewater

Reuse/Recycling saves costs for water
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Not allowed (with few exceptions):
Problems in the sewer:
Stench, corrosion, blocking
Problems in municipal wwtp:
Peaks, Fat oil & grease, pH, toxic substances etc.
1. Management of Industrial wastewater

- Low specific costs if many companies can be integrated
- The same costs for big and for small companies
- All environmental demands can be controlled
- Well trained personnel is possible, costs are shared
- Deposit of primary sludge necessary to care
- Deposit of biological sludge necessary to care
- No recycling possible
- **Transportation costs additional**

**Special pre-treatment for different kinds of wastewater**

**Biological Treatment**
1. Management of Industrial wastewater

3 Opportunities in principal:

• Complete treatment by the companies

• Pre treatment by companies and final (biological treatment) together with the domestic wastewater

• Central treatment of industrial water (Transportation by tankers)

-> To be taken into account:

• Where to go with the residuals of the treatment processes?

• How to finance the investment, operation and disposal of residuals?

• Who takes responsibility to keep the rules?
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2. Processes for treatment and conception
The Situation until May 2010

2. Processes for treatment and conception
Characteristics for the KUWAIT CIWTP:

max. 7500 m³/day
Tankers per day: 300 to 400
No dilution with domestic wastewater

Assumptions for Kuwait:

Logistics should be facilitated. Not too much different lines for acceptance.

Simple and safe discharge of the tank lorries in concrete channels, fast evacuation.

An efficient and flexible (pre-) treatment should be installed.

Biological treatment is a “must” to meet the requirements. It must be designed to ensure a biota meeting the industrial wastewater (high sludge age, ARS)

All requirements for sludge disposal, odour control, effluent limits should agree with the high standards of Kuwait EPA.

Costs for investment and operation should be minimized (of course)

Plant must be extendable

2. Processes for treatment and conception
Complicated, high requirement on chemical/physical pre-treatment expected

Food industry, oil and grease containing

Organics, no oil and grease, no precipitation

Heavy metal containing

1. Processes for treatment and conception

2. Processes for treatment and conception

3. Processes for treatment and conception

4. Processes for treatment and conception

7500 m³/day

3 x 150 m³/h, 3 x 3600 m³/d
2. Processes for treatment and conception
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- Sand & Fat Trap
- Precip./Flocc.
- Scrubber / odour control
- Sludge Treatment
- Flotation
- 6/8 Blowers

Pre -Treatment- Hall
8 x 37,5 m³/h
The whole Plant 250,000m²

2. Processes for treatment and conception
Taking data about quantity + quality comparison of alternatives, concept, cost estimation, decision

Detailed design & engineering

Manufacturing

Delivery

Civil Works

Assembly on site

Commissioning and putting on stream

1 year from decision to completion!

2. Processes for treatment and conception
Example:
Central Industrial Waste Water Treatment Plant Kuwait, May 2010

7500 m³/day
400 Tankers
All kinds of Industry...

Civil Works: 8/09 - 1/10 (4/10)
Installation: 2/10 – 4/10

Putting on Stream: 4.5.2010
Running in: 8 weeks

Transfer
Training of personnel
Running in

Management (TIA Germany)
Staff by client (India, Indonesia)

Operation
(Management)
Process control
Maintenance
logistics
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3. Management and Operation of wastewater treatment plants
COD Reduction in Kuwait CIWWTP

3. Management and Operation
3. Management and Operation

COD Reduction in Kuwait CIWWTP

Acceptance
Control of Tankers
Conditions for Acceptance
Direction to the different lines

Logistics/Chemicals
Preventive maintenance
Process Control
Optimization (cost reduction)
Primary sludge removal + treatment

Biological Journal (electronic)
Preventive maintenance
Process Control
Biological sludge removal + treatment
“Technical Aspects” of M&O

“Human Aspects” of M&O

Management & Operation ......
Requirements to the Technique, design of the wwtp!

Wie soll die Anlage aussehen?

Clearly structured plant
Einfacher, klarer Aufbau

Marking
Eindeutige Kennzeichnungen (auch: Probenahmenstellen, keine Freiheitsgrade)

No sophisticated devices
Keine zu anspruchsvollen Instrumente

Direct visual control of the sensible points must be possible (Not only by SCADA)
direkte optische Kontrolle der sensiblen Punkte muß möglich sein

Reduced number of control devices – self adjustment!
Geringe Anzahl von Regelmöglichkeiten – Selbstjustierung!

Understandable functions
Nachvollziehbare Funktionen
Preventive Maintenance ..... 
machines, measurement technique, laboratory equipment, polymere 
stations etc ..... have to be attended regularly ...

Acceptance ..... 
Control of the incoming tankers. Direction of the tankers.

Logistics ..... 
Chemicals have to be on site, materials for analyses, sludge 
transportation has to be regulated ..... 

Operation ..... 
Who takes care that the incinerator is operated properly, heated in 
time, cleared of the ashes?

Process control ..... 
..watching the chemical dosage in pre treatment, control of biology 
(biological dairy), analysis and diagnosis of parameters in feed, after 
pre-treatment, in biology, .....
A wastewater treatment plant NEEDS to be operated reliably, accurately and with responsibility! Bad or careless operation (can) induce malfunction and total collapse!
Human aspects of Management & Operation

Management requirements

- Delegation of responsibility
- Public reporting
- Clear instructions
- Extended controlling technique + process
- Adapted Management
- Angepasstes Management

- Interest in work, rewarding responsibility
- Logistics: chemicals + spare parts
- Process control routine (daily, weekly …)
- Maintenance routine (daily, weekly …)
- Biological Diary

MAO Management
Necessary Services for M&O of a plant …

- Training of management and personnel

- Individual Handbooks as “picture story”–not made for “juristic hedging”

- Individual development of routines (technical + process control)

- Individual development of protocols (adapted to the plant)

- Individual program or table concerning the “health of biology”

- Management backing for the first time of operation

- Practical courses for management + operation in existing plants
Treatment of Industrial Wastewater

1. **What to do with industrial wastewater**
   - complete treatment (recycling)
   - pre-treatment + discharge
   - central treatment
   - disposal of residuals

2. **Processes for treatment**
   - using the example of the Kuwait Central Industrial Wastewater Treatment Plant

3. **Management and Operation of wastewater treatment plants**

SHUKRAN, DANKE, THANK YOU
COD Reduction in Kuwait CIWWTP

Dr. Norbert Mueller-Blanke, 11/2011
Slaughterhouses and Meat Processing

- Agropapuk **Serbia**
- Big Bull **Serbia**
- Briese
- Crailsheimer Darmsortierung
- Dohr
- Düringer Fleischkontor
- D & S Fleisch
- Gocksch
- Hellwig
- Klein
- Michiels **Belgium**
- Pantomarket **Montenegro**
- Schwarz-Cranz
- Stolle
- Sutter Gau-Bickelheim
- Sutter Wörrstadt
- Vion Food, NL Bad Bramstedt
- Vion Food, NL Emstek
- Vion Food, NL Lübeck
**Nahrungsmittel / Food Industry**
- Artur Heymann Fischkonserven / fish
- Baharan Gol Speiseeis/Icecream, **IRAN**
- Brüggen Getreideprodukte / cereals
- Brueggen Getreideprodukte / cereals **France**
- Carl Kühne Mayonnaise / mayonnaise
- Fine Food Feinkost
- Fuchs Gewürze / spice
- Gieco Speiseöl / Oil **Dubai**
- Gummi Bear Factory Boiz. Süßwaren / sweets
- Gummi Bear Factory Hag. Süßwaren / sweets
- Langnese Speiseeis / ice cream (UNILEVER)
- Lubeca Lübecker Marzipan-Fabrik / sweets
- Mecklenburger Kartoffelveredelung / potatoes
- Sensient Food Colors / Lebensmittelfarben
- Steinhaus Gemüseverarbeitung / Vegetables
- Wefers Menüfertigung / convenience products
- Winsenia Brotaufstrich / spread

**Milch und Käse / Milk and cheese**
- Goldschmidt
- Hochwald Wohratal
- Kalleh **Iran**
- Mertens
- Roubana **Syria**
- Satro
- Swedmilk **Macedonia**

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- Bauer Fruchtsaft
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- Coca Cola Ghana
- Coca Cola Urbach
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- Juice Fruit Iran
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- Mineralbrunnen Niederlichtenau
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- Oppacher Mineralquellen
- Owocowe Koncentraty Poland
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**Brauereien und Wein / Breweries and Wineries**

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- ROMAQUA, Sebes, Romania
- Rostocker Brauerei
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- Goldschmidt
- Hochwald Wohratal
- Hochwald Hungen
- Kalleh Dairy, Iran
- Mertens
- Roubana Syria
- Satro
- Swedmilk Macedonia

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Kommunen / Municipalities

- Kläranlage Cochem
- Kläranlage Khangiran Iran
- Kläranlage Güster
- Kläranlage Köthel
- Kläranlage Krummesse
- Kläranlage Mölln
- Kläranlage Tramm
- Kläranlage ZWA Biesern
- Hotel Hessenmühle
- LANU Flintbek
- Krankenhaus Sebha Libya
- Krankenhaus Tajoura Libya
- Krankenaus / Hospital Al-Bab Syria
- Krankenhaus / Hospital Eazaz Syria
- Deponie Georgswerder
- Deponie Schönberg
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- Airbus Industries über / via WAT
- Bamb. Kaliko Textilveredelung / textile finishing
- Breiding Bettfedern / feathers
- Central Industrial WWTP Kuwait
- Danfoss Kompressoren / cooling compressors
- Fahrzeugwerkstätten Falkenried paint shop
- Formosa BP Raffinerie / refinery Taiwan
- Mewa Textilreinigung / textile cleaning
- Orledop Recycling Netherlands
- Phoenix Gummprod. / rubber products
- PN Bioethanol Energiegewinnung / energy generation
- PowerOil Rostock Energiegewinnung / energy generation
- Rasselstein Bleche / tinplate manufacturer Thyssen-Krupp
- Sasol Chem. Industrie / chemical industry
- Steinkühler Spedition / forwarding
- Thompson electronic industry Malaysia

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Alle Branchen / All branches

- CIWWTP Kuwait

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