

# MEET PROCESSING WASTEWATER



## THE MEET PROCESSING WASTEWATER TREATMENT

ADVENTECH SOLUTION

CASE STUDY

# TREATMENT OF INDUSTRIAL WASTEWATER: GENERAL PRINCIPLES

## COMPLEXITY & CONCENTRATION

Industrial Wastewater are in most cases more complex and much more polluted than domestic wastewater.

The multiple unit operations performed in the industry generate multiple wastewater feeds with very different characteristics.

Many times the mixture of these different wastewater feeds generates chemical reactions and sub-products, increasing the complexity of the wastewater and the difficulty of the treatment.

## BIODEGRADABILITY

Industrial Wastewater have many time low Biodegradability. Biodegradability running tests should be accomplished.

In case of low Biodegradability, strategies to increase it should be adopted. These strategies include the use of conventional separation processes like flotation or Advanced Oxidation Processes like catalytic ozonation.

## TOXICITY

Most of the Industrial Wastewater contain some compounds with more or less toxicity for the biological processes. The Limit of Tolerable Toxicity should be evaluated for each type of Industrial Wastewater.

# TREATMENT OF INDUSTRIAL WASTEWATER: GENERAL PRINCIPLES

## VARIABILITY

Unlike domestic wastewater, the Industrial Wastewater is highly variable in composition due to the multiple unit operations performed in the facilities which are different day by day.

Long Term tests and Sampling should be adopted.

## SPACE REQUIREMENT & VISUAL IMPACT

Available space to install the Treatment Plant is many times one of the data that should take into account. Being the available space limited in many industrial facilities, this data have many times a significant impact on the design of the plant and consequently on the efficiency of the treatment.

Visual impact should also take into account and can also have impact on the design of the plant.

## CUSTOM MADE TREATMENT PLANTS

Taking into account the referred previously, the treatment of Industrial Wastewater should be designed case to case and custom made. Every industrial facility, event in the same sector, have distinct wastewater depending not only the type of production but also other parameters such as the disinfection/cleaning procedures.

# THE MEAT PROCESSING WASTEWATER



## MAIN CHARACTERISTICS

- Highly polluted and highly variable depending the processes involved in the meat processing (2 m<sup>3</sup>/ton meet < Water Use < 60 m<sup>3</sup>/ton meet ; 2.000 mg/L < COD < 15.000 mg/L);
- Each meat processing industry have a distinctive wastewater;

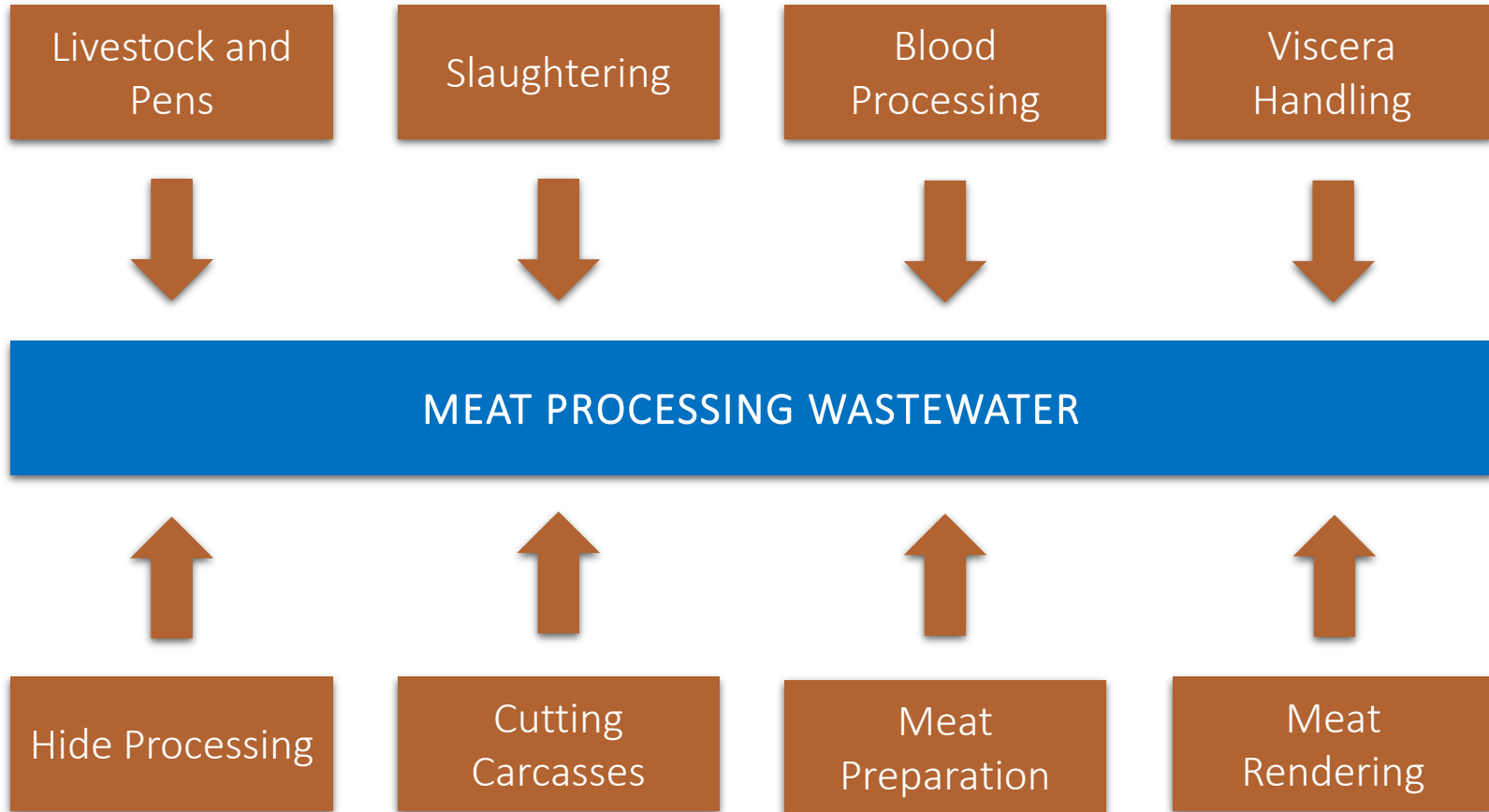
Parameter	Range
pH	4 – 9
BOD <sub>5</sub> (mg O <sub>2</sub> /L)	600 – 5.000
COD (mg O <sub>2</sub> /L)	2.000 – 15.000
TSS (mg/L)	300 – 3.000
N (mg N/L)	50 - 900
P (mg P/L)	25 - 200

- In some cases, high quantities of greases and solids from the viscera handling and cutting operations;
- Presence of several chemical disinfectants from the cleaning processes.

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## MAIN SOURCES



→ Meat Processing Industries can have all or only part of these sources / operations.

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## CHALLENGES IN THE TREATMENT

### Variability of the flowrate and concentration

The quantity of wastewater generated per ton of meat processed varies not only from industry to industry but also in the same meat processing industry during the same year.

Same occurs with the concentration of pollutants.

Very big differences on the flowrate and concentration according the meat being processed and according the operations on the meat.

→ The Plant should have some flexibility and should be capable to absorb these variations even during the same day.

### Odour Control

One of the characteristics of the meat processing wastewater is the presence of blood and Nitrogen which quickly originates smelly compounds.

→ Residence time on the reception pit as well as operating conditions on the Equalization Tank should be take into consideration.

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### Reception of the Raw Wastewater

- Adequate residence time on the reception pit to prevent the reduction process and strong smells;
- Automatic fine screening (1mm) adapted to the effective removal of peels and seeds.

### Pre-Equalization

- Adequate residence time of Pre-Equalization Tank to absorb the daily peaks;
- Optimized aeration process and operating conditions in order to avoid the chemical reduction process and smells;
- Correction of the values of pH for the subsequent Flotation process;



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### Flotation Process

- Physical separation of the suspended solids, greases and colloidal substances by Flotation;
- This step have an high efficiency and remove more than 50% of the COD. Removal of suspended solids, colloidal substances and greases is higher than 99%;
- Clarified wastewater is sent to Equalization Tank while the floating sludge obtained is sent to the Sludge Tank for subsequent dehydration;
- Work at constant rate with automatic start-up and shutdown. Integrated CIP.

### Equalization

- Adequate residence time of Equalization Tank to absorb daily and weekly peaks;
- Optimized aeration process and operating conditions in order to avoid the chemical reduction process;
- Correction of the values of C (carbon), N (nitrogen) and P (phosphorus) to the Biological Treatment;



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### Biological Treatment

- Aerobic/Anoxic Treatment in SBR [Sequential Batch Reactor(s)]. Proven to be the most stable and robust for industrial wastewater;
- Optimized aeration process with several oxidation stages. Specific for meat processing wastewater. Variable.
- Typical 4 phase of SBR process (filling, aeration, settling and discharge) are highly flexibles in order to adapt the variations of the meat processing wastewater;
- Variable working capacity of the Biological Reactor;

### Sludge Treatment (Tank + Decanter)

- Sludge from Flotation Unit and Biological Process are collected in a Sludge Tank;
- This tank is aerated and the operating conditions inside the tank are controlled in order to guarantee the homogenization of the sludge, promote the mineralization and avoid smells;
- Sludge is removed by dehydration in a conventional centrifuge unit (decanter).

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### Control of the Process

- Very stable and robust process developed and optimized for meat processing wastewater treatment plant;
- Highly flexible and customizable;
- 10 years of development and tuning;
- Installed in more than 30 plants;
- Include remote assistance and monitoring.

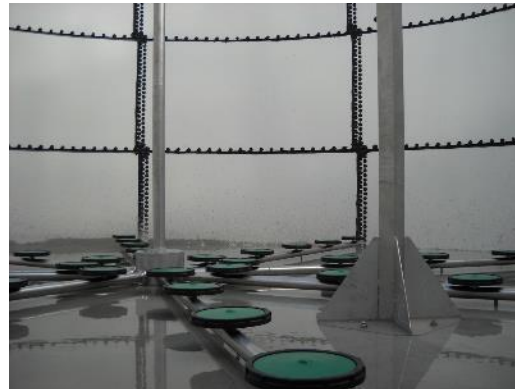
### Equipment's and Instrumentation

- All the equipment's and instrumentation used in the plant are designed for heavy duty industrial wastewater;
- Simplicity, robustness and stability are the core properties of all equipment's and instrumentation;
- First grade brands and models.

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# CASE STUDY



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## DATA

Daily Flowrate peak: 200 m<sup>3</sup>/d

Discharge: To River

Parameter	Range
pH	4 – 9
BOD <sub>5</sub> (mg O <sub>2</sub> /L)	< 5.000
COD (mg O <sub>2</sub> /L)	< 15.000
TSS (mg/L)	< 3.000
N (mg N/L)	< 900
P (mg P/L)	< 200

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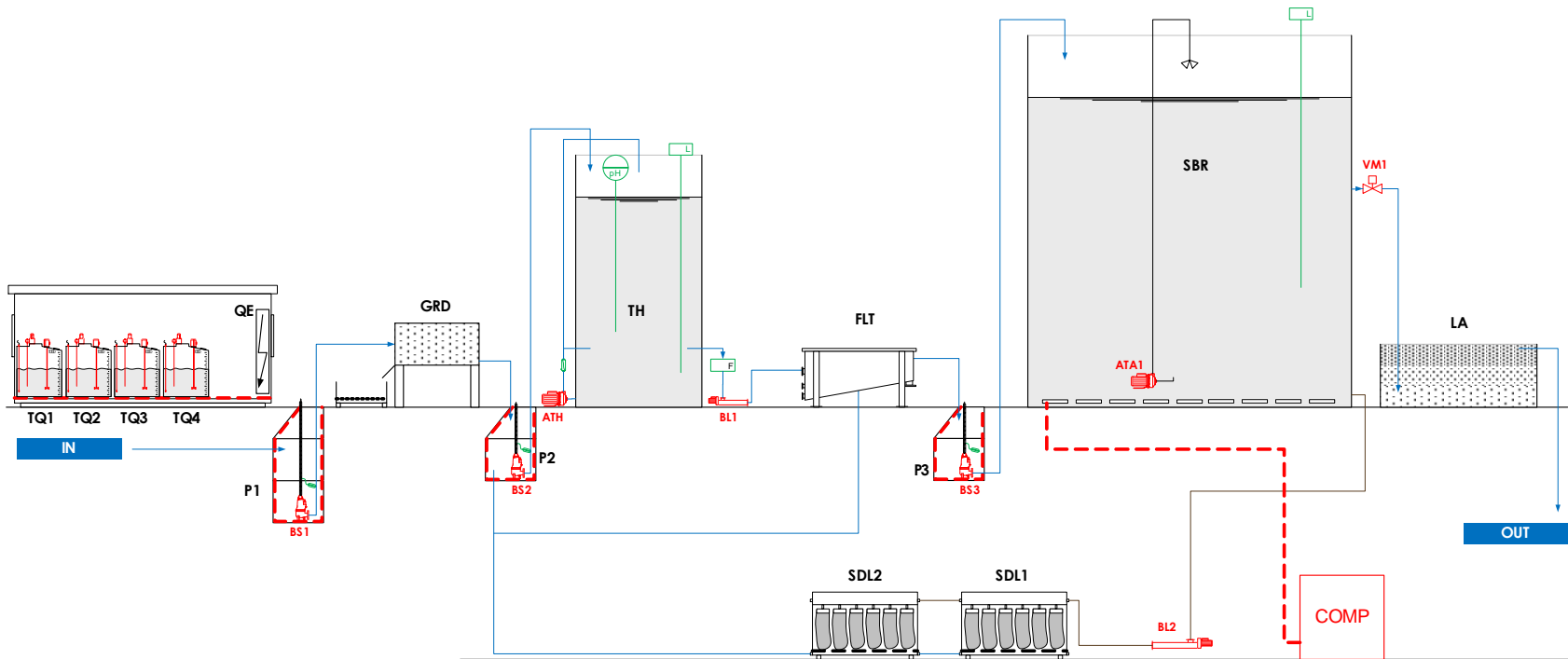
## REGULATIONS / CLIENT REQUIREMENTS

Parameter	Range
pH	6 – 9
BOD <sub>5</sub> (mg O <sub>2</sub> /L)	< 40
COD (mg O <sub>2</sub> /L)	< 150
TSS (mg/L)	< 60
N (mg N/L)	< 15
P (mg P/L)	< 10

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## PROJECT 2D

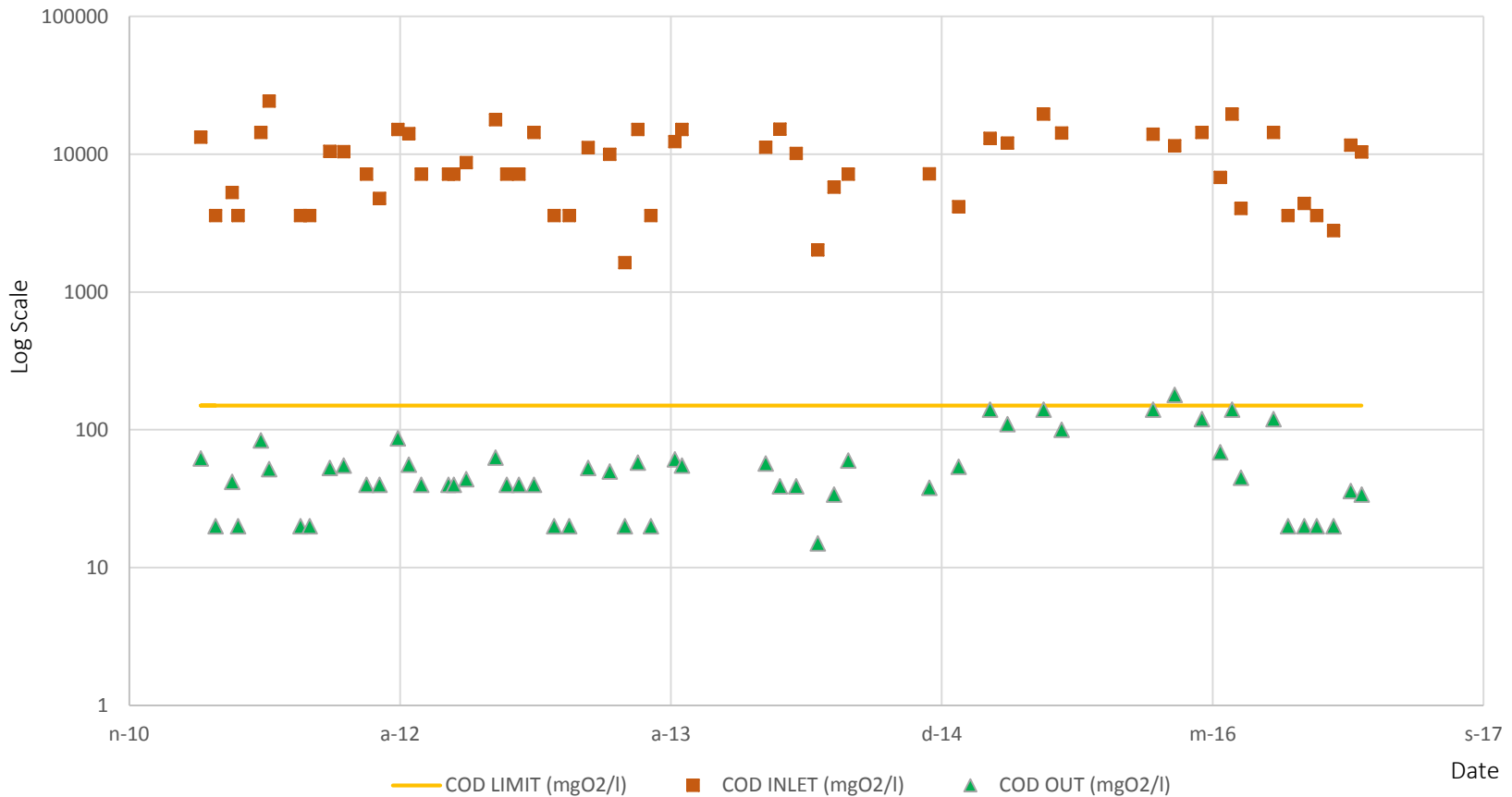


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## RESULTS

COD (mg O<sub>2</sub>/L)

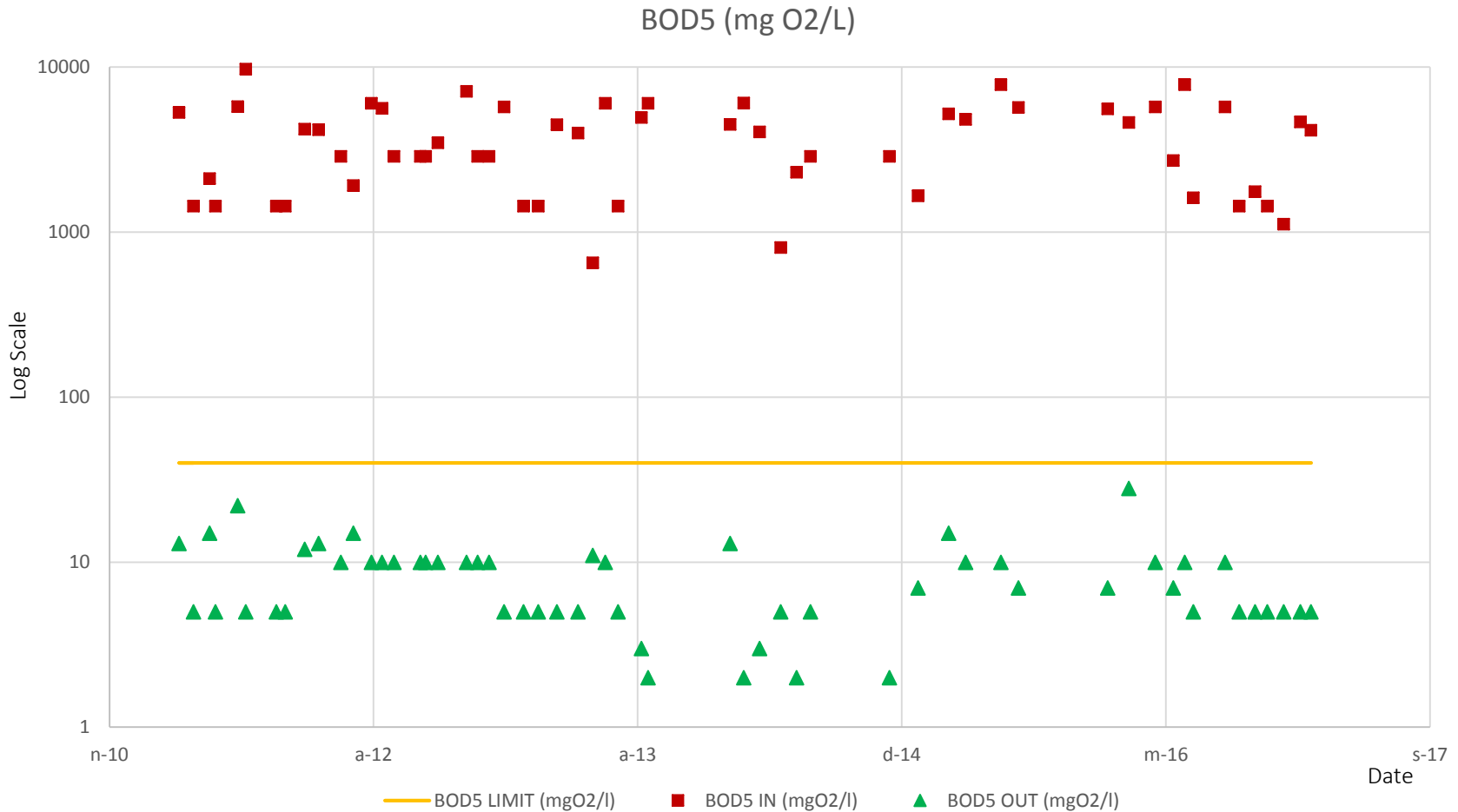




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## RESULTS

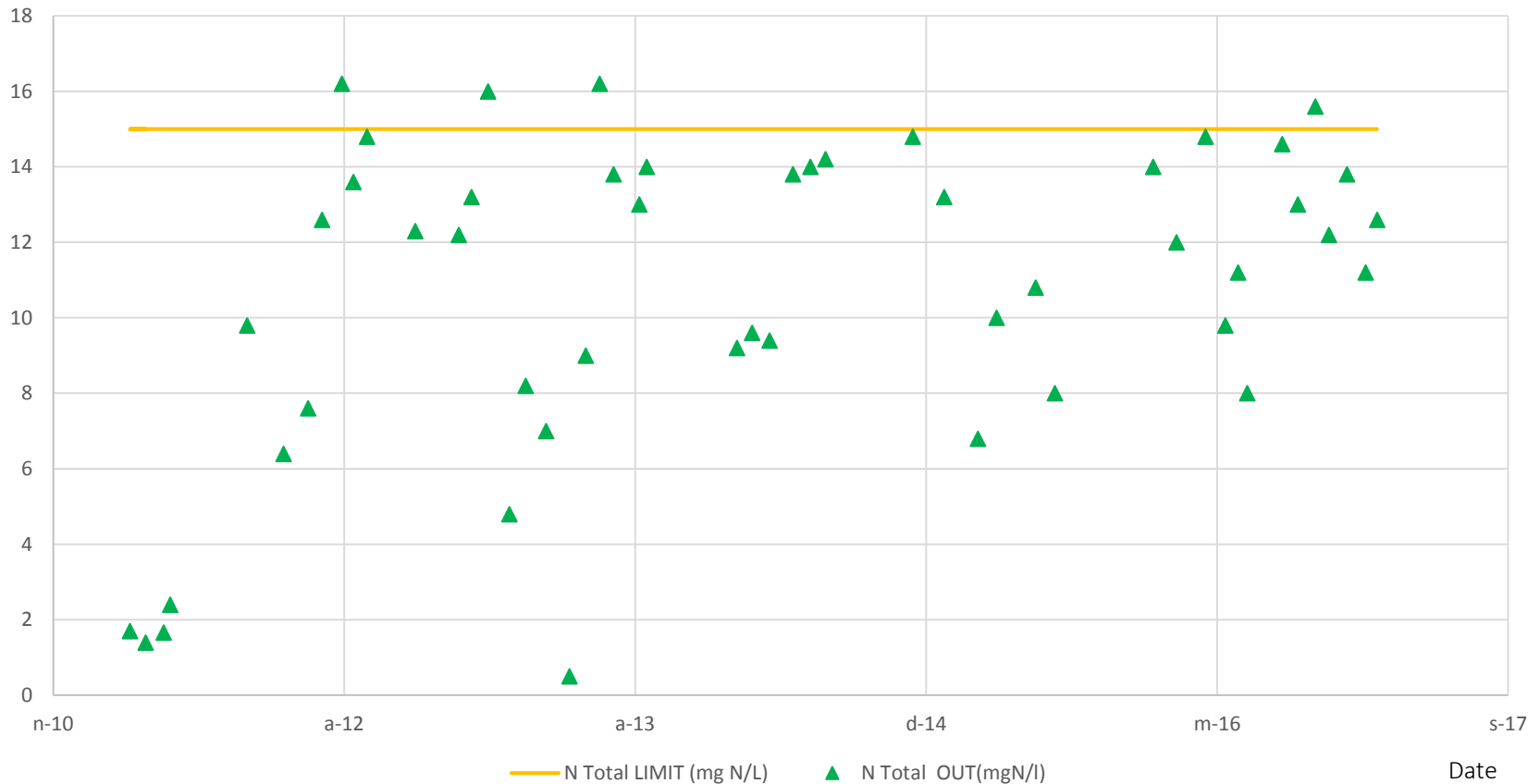


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## RESULTS

N Total (mg N/L)

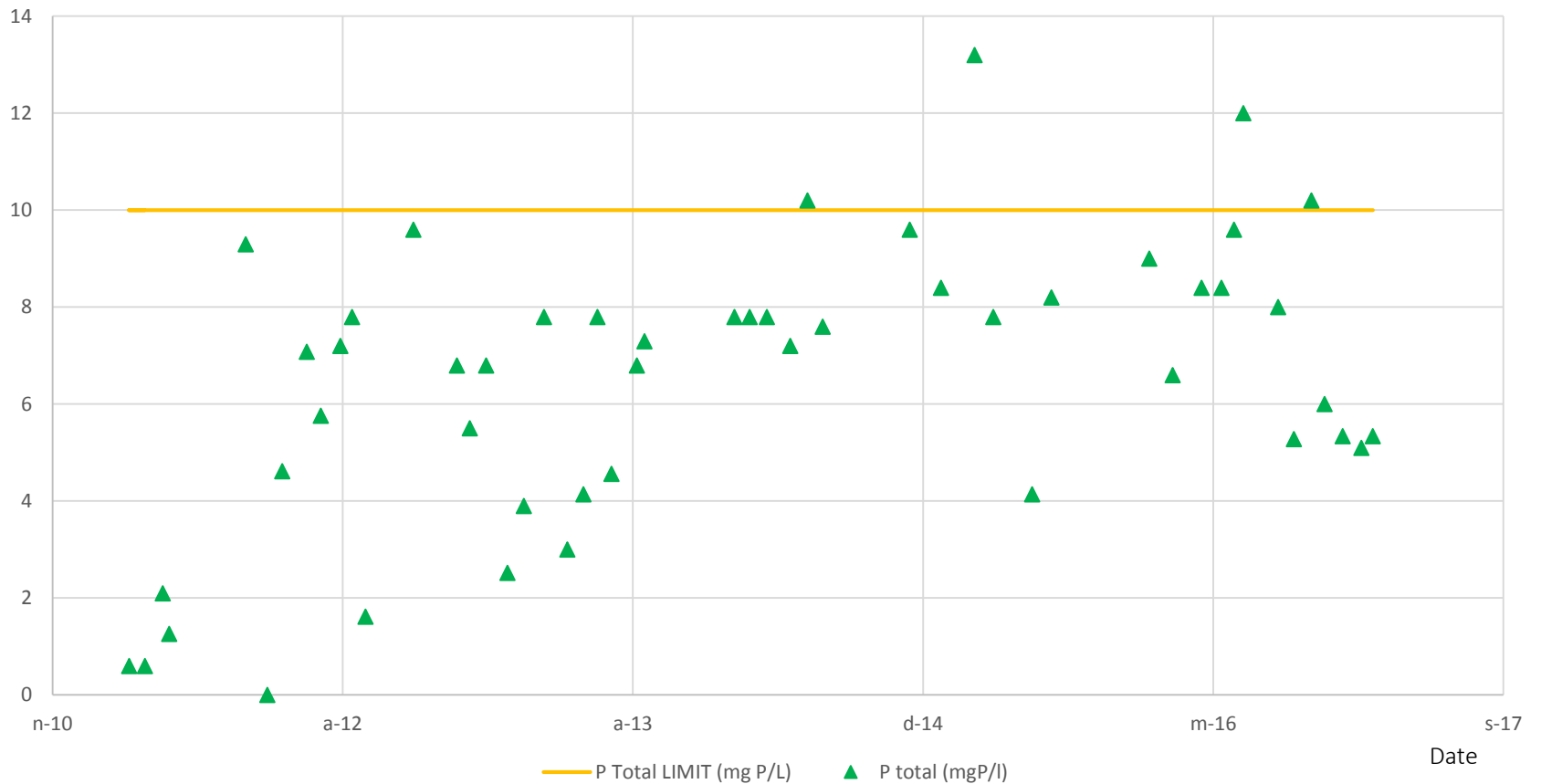


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## RESULTS

P Total (mg P/L)

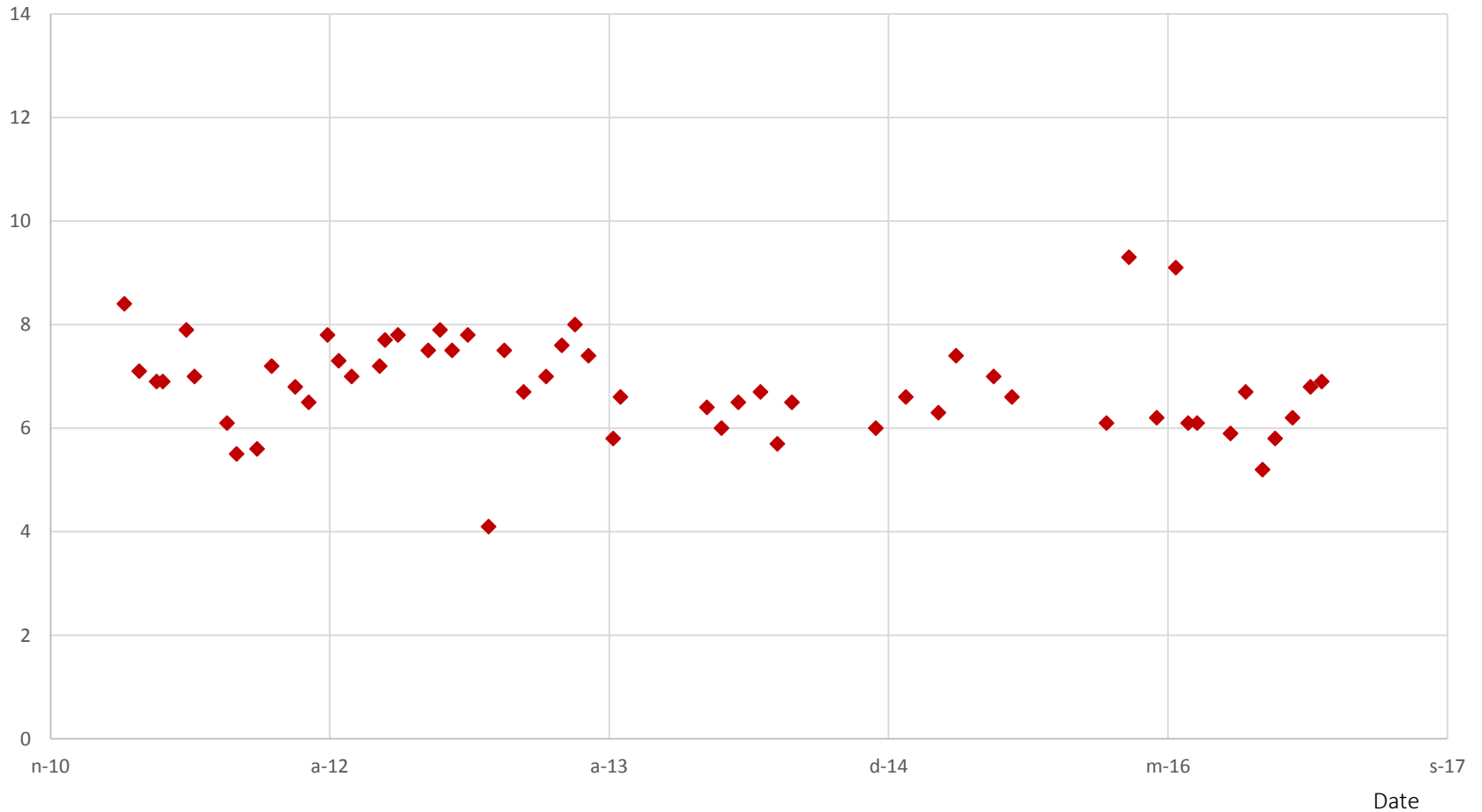


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## RESULTS

pH



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