

# **Environmental management plan (EMP) for outfall systems in the metropolitan area of Buenos Aires**

P. Girardi\*, C. A. Palumbo\*, and J. C. Van Der Horden\*

\* Environment and Development Management, Agua y Saneamientos Argentinos, 752 Tucuman St. 17th Fl., Buenos Aires City, Argentina.  
(E-mail: [patricia\\_girardi@aysa.com.ar](mailto:patricia_girardi@aysa.com.ar); [cpalumbo@aysa.com.ar](mailto:cpalumbo@aysa.com.ar), [juan\\_c\\_vander\\_horden@aysa.com.ar](mailto:juan_c_vander_horden@aysa.com.ar))

## **Abstract**

The proposed technical work is to obtain the technical guidelines for the preparation of the Environmental Management Plan (EMP), proposes an operational management tool for evaluating environmental performance during operation of outfall systems in the metropolitan area of Buenos Aires, built on the coast of Rio de la Plata and the dynamics of the outfall of the Rio de la Plata through time to implement an early warning system, monitoring and control for operation of the systems.

## **Keywords**

Environmental Management Plan (EMP); outfalls systems, metropolitan area, Río de la Plata, Integrated Environmental Information System (SIIA)

## **ENVIRONMENTAL MANAGEMENT PLAN (EMP)**

The Environment and Development Management (DMAyD) primary mission is to assist the various areas of the company regarding the evaluation and control of environmental quality, the analysis and promotion of technologies, processes and environmental services, and contribute actions to prevent and control pollution.

In this regard, from the environmental baseline done on the project area for the construction of the outfalls, has developed this document that will evaluate the environmental performance during operation of the outfall systems.

The approach is based on potential environmental impacts from the outfall systems as part of compliance with current regulations for discharge into receiving bodies.

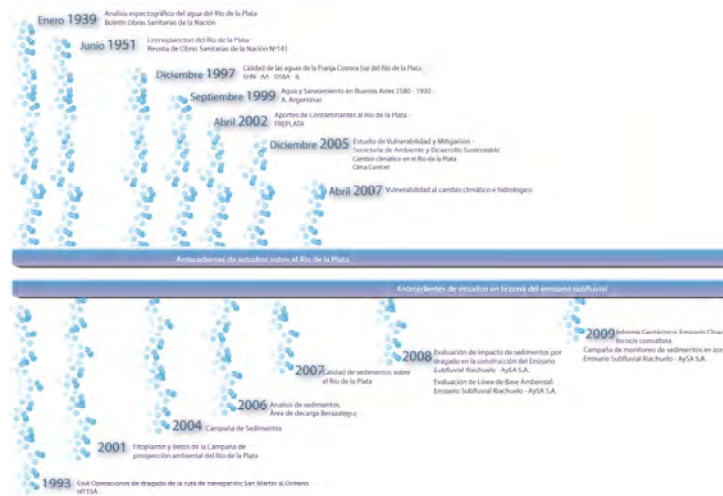
The Plan was conceived in three stages of evolution, described below:

### **- Diagnosis - Developing the Baseline:**

At this stage, conducted an exhaustive study of history and bibliography on studies of the Rio de la Plata. In this framework, quality campaigns also made on different points of interest, and analyzed case studies on international experiences.

The figure below outlines the timeline of the background analysis and bibliography on studies of the Rio de la Plata:

**Figure 1**



### - Planning:

From the planning stage, a preliminary document was drafted with the objective, scope, responsibilities and development of EMP from there develop operational quality limits, which allow examination of the performance during the operation of the outfalls and treatment of deviations produced. The main contents of the version:

Baseline, Control Objectives, Components of the Monitoring Plan, Phases of the Monitoring Plan, Monitoring Plan Methodology, Monitoring of effluent (outfall chamber entry), Monitoring of the water column, Monitoring of benthic communities and phytoplankton, Monitoring of sediment, Monitoring of fish, Analysis of information obtained, Verification and control.

From the environmental baseline done on the project area for the construction of the outfall, has developed this tool that will evaluate the environmental performance during operation of the outfall system.

The approach is based on potential environmental impacts from the outfall system as part of compliance with current regulations for discharge into receiving bodies.

The monitoring is concentrated around the area defined as Near Field and the most likely location of the area called the Far Field analysis of the quality events that may influence the Río de la Plata in the area of influence of regional ecosystems.

**Figure 2**



The plan also includes special studies of sediment transport, and the study of benthic nutrient flux.

**Figure 3**



The key objectives of control for the EMP are:

- Verification of compliance with the parameters of the Regulatory Framework, in particular those relating to the Standards for Sewage discharge to the receiving body.
- Check the hipotetic impact of the discharge into the environment is within the bounds of control provided by EMP.
- Determine whether the deviations in the system exceed the limits of confidence.

*Components of the Monitoring Plan.* The proposed monitoring plan has a comprehensive view of the Rio de la Plata as a system, integrating natural factors, anthropogenic and operation of the Outfall System.

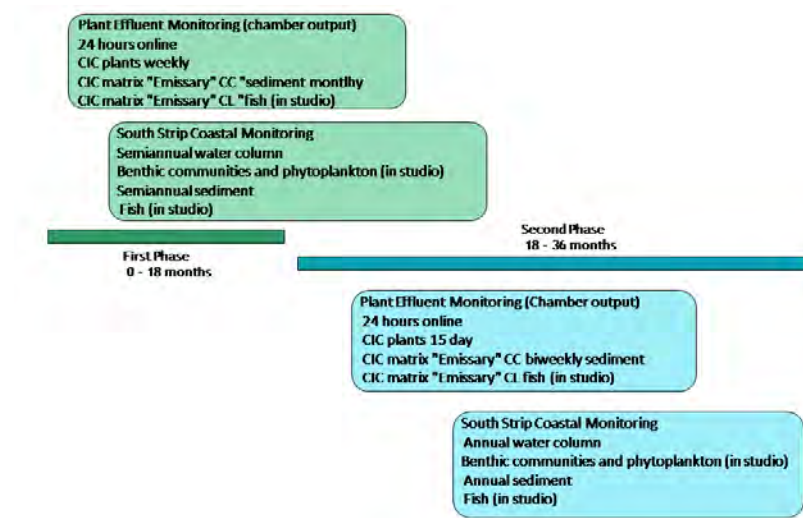
In this context it is proposed to characterize the monitoring based on five components of action:

- Monitoring of effluent (outfall chamber entry)
- Monitoring of the water column
- Monitoring benthic communities and phytoplankton
- Monitoring sediment
- Monitoring of fish (in study)

The analysis of information obtained from the five components, will provide an evolution of the data and provide additional information to any possible diversion of the system, clarifying the natural variability in a complex environment such as the dynamics of the Río de la Plata.

*Monitoring Plan Phases.* The monitoring plan is designed in two stages, each characterized by the sampling frequency is proposed for the first phase with more intensive monitoring of all components during the initial 18 months of operation outfall system, and from the analysis of field data obtained agree to a monitoring frequency doubling the time initially considered for each component of the analysis unless the need arises to set conditions, analytical techniques, and / or any other variable that could be vital to ensure representativeness required information.

**Figure 4**

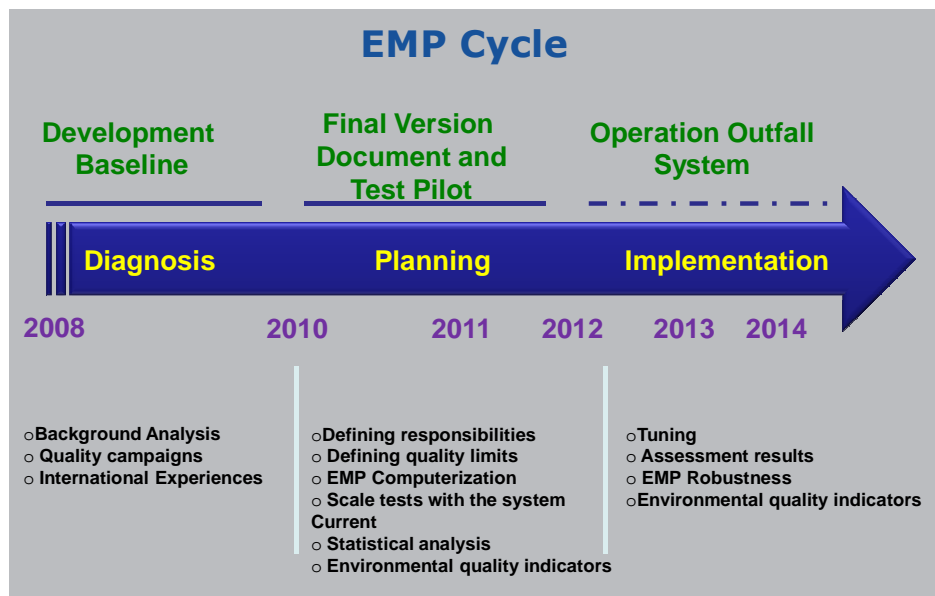


*Monitoring Plan Methodology.* The implementation of the monitoring plan, be conducted with the equipment and resources, depending on the different areas of AySA described below:

- Technical and Technological Development - Integrated Pollution Control (CIC): Direct control of industries within the coverage area AySA and indirect control over river sewage micro and macro.
- Technical and Technological Development - Central Laboratory: Technical support for the analysis of water, liquid waste (sewage and industrial) and sediment.
- Technical and Technological Development - Resource Control Systems and Continuous Quality Measurement: Technical and logistical support in the hydrometeorological data collection and quality in the Río de la Plata.
- Sanitation - Quality Control in sewage plants: Systematic control parameters of sewage purification process.
- Environment and Development– South Strip Coastal Campaigns and Discharges at Rio de la Plata: Technical and logistical support in collecting data on the southern coastline and coastal discharges to the Rio de la Plata. Preparation of special studies (modeling relating to verify any environmental impacts)

We performed a database and monitoring for the EMP and develop tests to scale with the current system.

**Figure 5**



## - Implementation

In this step, a EMP tuning, evaluating the results produced with the aim of analyzing the robustness of the system and the frequency, magnitude and importance of the deviations produced.

*Analysis of information obtained.* The quality information collected will be incorporated into a dashboard, allowing us to detect any deviations and / or which may become chronic in some negative environmental impact on the environment, which requires contingency measures, mitigation or monitoring and control. It will also be incorporated into the mathematical model to enrich the quality database.

The trend internationally is the development of indicators to bring together different characteristic parameters of the quality of a sewage effluent, in order to establish a comprehensive diagnostic approach.

During the implementation phase, based on collected data, identifying indicators of environmental quality (ICA) that will examine whether the concentration detected in any of the parameters monitored in one of the checkpoints, according to the ICAs defined needs immediate action, or in the short and medium term.

The definition of the ICAs is to provide an analytical tool for environmental diagnosis, rapid and precise monitoring of the outfalls systems.

This methodology allows the laboratory analysis on line coupled to control the system compared with the ICAs identified and establish control limits and alert limits to determine whether intervention is necessary or perform specific actions on any area of the network.

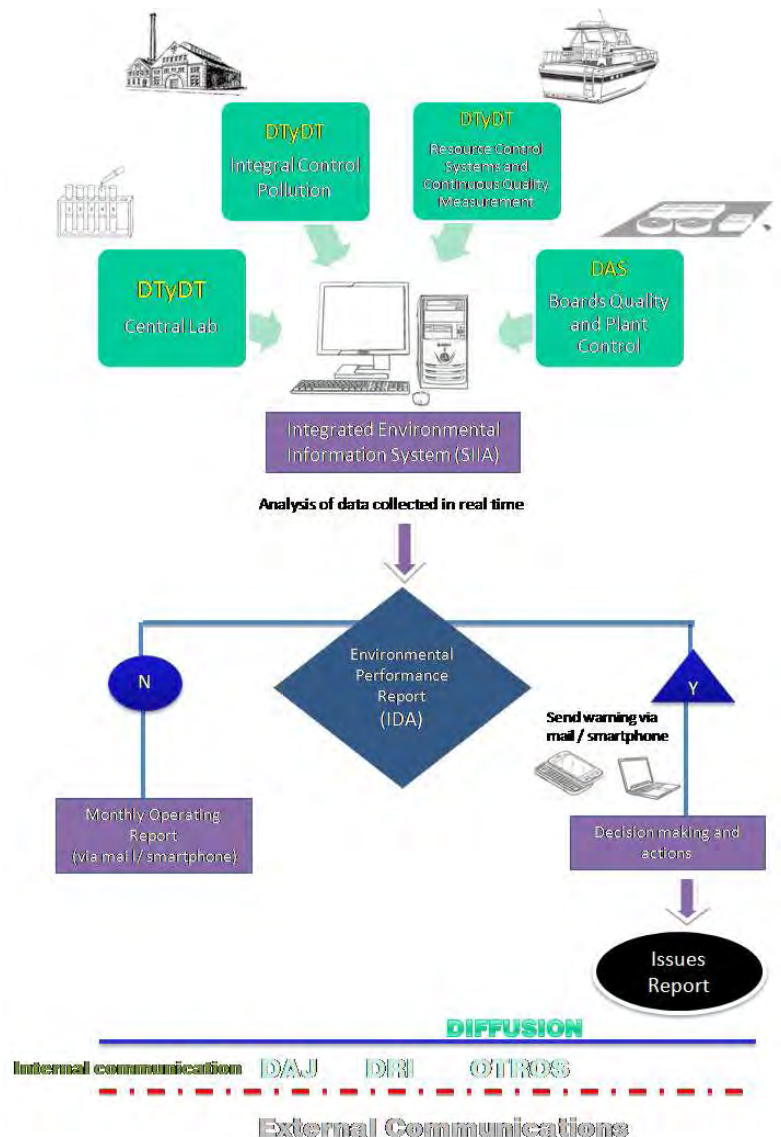
The sewage system which is currently operating, has a systematic monitoring carried out from different areas of the company, thus providing an important database of quality (more than ten years old), this base is added to new monitoring that are in progress designed outfalls specifically for the new systems.

Study is currently in the definition of quality issues related to the Communities and benthic monitoring phytoplankton and fish (type of species to consider, sampling area, sampling frequency).

It should be noted that although there are indicators of environmental quality at international level are not comparable, since each outfall system has its own ecosystem and environmental dynamics, and despite the development of human activities (for dredging to maintain navigation channels, commercial shipping, etc.) is similar to other river systems in the world each river area has characteristics that distinguish it from other systems (such as the estuary of the Rio de la Plata, despite being a river is influenced by the regime tide in the Argentine Sea, as well as by weather typical of the area with an annual recurrence, such as the event called "Sudestada" - strong and steady winds in the southeast, driving the Rio de la Plata on the coast-).

*Management of environmental management plan.* The DMAyD through a database managed by the developments in real time during operation of the outfall systems, analyzing the results and actions to consider in each case with representatives of each area involved.

**Figure 4**





The EMP will be made on a computer platform to receive quality information from:

- Specific analysis from the central laboratory
- Data quality industrial and sewage basins from the Integrated Pollution Control
- Information related to the quality of the Río de la Plata (meteorology, satellite tracking, water quality, quality events) from Resource Control and Continuous Quality Measurement Systems,
- Data quality on-line process from Quality and Plant Control Boards.

This set of information will be stored, linked and processed by the Integrated Environmental Information System (SIIA).

From design quality indicators (ICAs) and the control limits and alert limits the system often generates an Environmental Performance Report (IDA).

The SIIA will initially have a reference for each specific area, with access to the computer system and for establishing operating profiles, data entry and query.

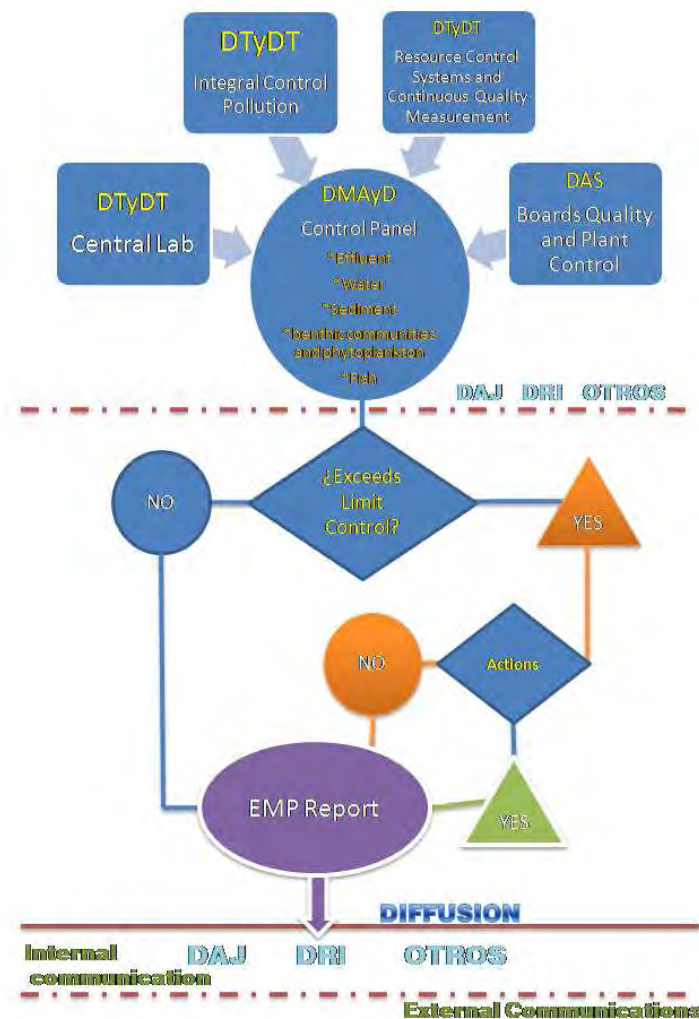
From IDA if not detected any abnormality, the SIIA makes a monthly operating report by e-mail to the contacts of each area.

However, if there is any deviation that lie within the control area or alert, the reporting system issues a warning via mail / Smartphone, with a description of the diversion and suggested actions according to the protocol of actions defined within EMP. From this, the assessed regarding decisions or actions to take in order to verify the alert.

Actions / decisions assessed a report will be issued outlining the activities to specific areas initially involved in the EMP (Legal Issues, Institutional Relations, Other possible) within the internal communication, if necessary Institutional Relations and Legal Issues coordinated external communication to the public interest.

Initially, the SIIA is considered how strategic areas, areas of Legal Affairs for issues related to legal presentations to various agencies and control agencies, the Institutional Relations department who coordinates matters relating to internal and external communication of the company, the area of Technical and Technological Development for the important role it has on technical aspects how the analysis of data in the central laboratory and the laboratory ship "Orion", as well as aspects related to the collection of hydrometeorological data on the Río de la Plata; the area of sanitation related aspects of online control on the process of treatment may eventually in the future consider other areas of the company (eg a specific region).

**Figure 5**



The SIIA's function is to provide a comprehensive diagnostic tool and operational monitoring, accessible from different areas of the company to monitor and track environmental performance of the outfalls systems, with the possibility of issuing reports unify information from different areas of the company generating an Environmental Performance Report system.

The DMAYD prepare the following reports:

- A summary report with the main results of EMP (Environmental Performance Report, detours and state)
- A report containing the positions of the sites, activities, major milestones that deserve to be included as consideration for its likely impact on a deviation detected.