

TECHNICAL REPORT

Analysis of BOD5 results from the water-quality monitoring in the river

1. INTRODUCTION

This report was prepared with the objective of presenting an exploratory analysis of the data collected during the water-quality sampling campaigns in the river since the start-up of the plant, in particular in relation to the parameter BOD5, in order to analyze the possible incidence of the effluent discharge downstream of the discharge point.

This analysis is motivated by what was raised in the Reference Report of the Environmental Control Department, in which notice is served to the company that it may be subject to sanction for exceeding the limits established for the parameter BOD5 in the final effluent and water quality; in particular, for exceeding the maximum admissible concentration in the river during the campaigns of May, June, and August 2025.

2. OBSERVED SITUATION

According to what is set out in the Reference Report, and as confirmed in the available water-quality sampling data, during the campaigns corresponding to the months of May, June, and August 2025, exceedances of the maximum value established in the plant's AAP for the parameter BOD5 (1.9 mg/L) were recorded exclusively at stations located downstream of the discharge, particularly in the vicinity of the mixing zone. The data corresponding to those monitoring campaigns are summarized in Table 1, which also includes the BOD5 concentration in the plant's final effluent.

Table 1: Water-quality monitoring results for the parameter BOD5, in mg/L, in campaigns that exceed the maximum value in the year 2025 (values shown in red)

Sampling station	May 25 (5/5/25)	Jun 25 (4/6/25)	Aug (6/8/25)
C2A.R2A S	1.6	0.6	1.1
C2A.R2A F	1.9	1.4	1.4
L1-1	1.2	1.1	1.3
L2-1	1.9	1.3	1.4
M1 S	2.7	0.5	1.5
M3 S	2.0	1.1	1.6
M3 F	3.6	1.2	1.4
M2 S	2.4	0.6	1.5
C2B.R2B S	4.6	2.9	1.9
C2B.R2B F	4.9	3.5	4.1
Final effluent	13.4	13.4	11.3

That report states the following regarding the identified exceedances:

- In the cases corresponding to the June and August 2025 samplings, these exceed the established limit value without there being an upstream condition that could justify it.
- Likewise, although during the May 2025 monitoring campaign relatively high BOD5 concentrations were also verified at stations located upstream of the discharge (without exceeding the AAP value), the increase observed downstream relative to the upstream values was up to 3 mg/L (R2B surface and bottom), with that increase by itself exceeding the maximum limit contemplated in the AAP. In turn, increases of such magnitude have not been frequently

observable during the baseline period nor during the operational stage of the project prior to these events.

- By contrast, during the campaigns corresponding to the months of July and September 2025, no exceedances of the reference value were recorded at any of the monitoring stations. Although in January and September 2025 there were exceedances of the BOD5 discharge limits in the effluent, the conditions existing in the river upstream of the discharge and the high circulating flows would explain why those exceedances were not reflected in the river downstream of the discharge. In that sense, it has been observed that the dynamics of the river's flow (including extreme events or prolonged periods of maximum or minimum flows, 80 m³/s) significantly condition the concentration of the compounds discharged with the effluent recorded at the sampling stations.

Finally, that report concludes that these exceedances have no motivation other than the very existence of the discharge, which, moreover, in some of those cases has presented values higher than those foreseen in the granted environmental authorizations.

In view of the arguments and conclusions raised by DINACEA, an analysis of the available data was carried out, as set out below.

3. PROPOSED METHODOLOGY

To analyze the BOD5 data in the river downstream of the discharge, the following methodology is proposed, which takes into consideration the methodology used to carry out the analysis of the outfall's operation. In general terms, it is proposed to:

1. Estimate the dilution factor of the effluent in the receiving body using conductivity values as a proxy for a conservative tracer that represents the mixing conditions, taking into account the conditions measured upstream and downstream of the discharge, and of the discharge itself.
2. Once the dilution factor is defined, calculate the BOD5 concentration expected downstream of the discharge, taking into account the values measured in the river upstream and in the discharge conditions.
3. Finally, compare the calculated BOD5 value with the value measured downstream of the discharge, which under ideal conditions should coincide. Significant differences between the two values evidence the existence of other causes not associated with the plant's discharge to explain the BOD5 increases detected between upstream and downstream of the discharge (including possible errors or lack of representativeness in the sampling process and in the analysis).

The calculations are carried out using the available flow data of the receiving course and of the discharge, as well as the BOD5 and conductivity concentrations measured upstream and downstream of the discharge point, together with those corresponding to the discharged effluent, for those days on which water-quality monitoring results are available since the start-up of the plant.

The methodology is described in greater detail below.

Conductivity

As with what was proposed for the analysis of the outfall's operation, in the present analysis the conductivity value is used as a proxy for a conservative tracer, considering for this the following hypotheses:

1. The conductivity value downstream of the outfall has a linear relationship with the effluent concentration in the water of the receiving body.
2. Within the range of conductivity values measured, conductivity holds a linear relationship with the total concentration of compounds in solution in the water. The relationship is assumed to be the same both for the measurement in the effluent and for the measurement in the receiving body.
3. It is assumed that conductivity measurements in the receiving water body and in the effluent are directly comparable, despite being made with different instruments.

It is understood that what has been formulated can be taken as a reasonable first approximation for the calculation of dilutions in the river.

Dilution

For the purposes of this report, dilution will be defined as the ratio between the volume of water of the receiving body and the volume of effluent, within a given control volume, which can be expressed as:

$$(1) \quad D = V_{CR} / V_E$$

where “D” is the dilution, “V_CR” the volume of water of the receiving body, and “V_E” the volume of effluent. In turn, considering the mass balance of the concentration of a tracer, present both in the effluent and in the receiving body, the following equation is obtained:

$$(2) \quad V_M \times C_M = V_{CR} \times C_{CR} + V_E \times C_E$$

where “V_M” is the volume of the mixture (with $V_M = V_{CR} + V_E$), “C_M” the tracer concentration in the mixture, “C_CR” the tracer concentration in the receiving body, and “C_E” the tracer concentration in the effluent. Based on the above, we then have:

$$(3) \quad D = V_{CR} / V_E = (C_E - C_M) / (C_M - C_{CR})$$

According to the hypotheses considered for conductivity, it presents a linear relationship with a given conservative tracer, which can be expressed in the following form:

$$(4) \quad C = \alpha C_d + \beta$$

where “C” is the tracer concentration, “ α ” is the constant of proportionality between the concentration “C” and the conductivity “C_d”, and “ β ” is the independent term. Substituting equation (4) into equation (3), the following is obtained:

$$(5) \quad D = (C_{d_E} - C_{d_M}) / (C_{d_M} - C_{d_{CR}})$$

where “C_{d_E}” is the conductivity of the effluent, “C_{d_M}” the conductivity of the mixture, and “C_{d_CR}” the conductivity of the receiving body. Therefore, with the previous equation an approximation of the dilution of the effluent in the water of the receiving body can be obtained.

For the purposes of the present analysis, only positive dilution results with positive dividend and divisor will be taken, as these are the ones that represent the dilution of interest.

BOD5 calculated on the basis of the dilution factor

Once the dilution factor has been estimated from conductivity, the BOD5 concentration of the mixture is calculated, which is the one expected in the receiving body downstream. For this, the same mass balance of equation (2) is applied to the BOD5 concentrations, assuming that this parameter can be considered as a conservative tracer at the scale of this problem (times and distances sufficiently short so that there are

no significant variations in BOD5 due to the consumption of organic matter, relative to the variation due to dilution).

Based on the definition of dilution defined in equation (1), it is possible to express the BOD5 concentration in the mixture as:

$$(6) \quad C^{\text{BOD}}_{\text{M}} = C^{\text{BOD}}_{\text{CR}} + (C^{\text{BOD}}_{\text{E}} - C^{\text{BOD}}_{\text{CR}}) / (D + 1)$$

where $C^{\text{BOD}}_{\text{M}}$, $C^{\text{BOD}}_{\text{CR}}$ and $C^{\text{BOD}}_{\text{E}}$ correspond to the BOD5 concentrations in the mixture, in the receiving body, and in the effluent, respectively.

In this sense, the BOD5 concentration in the mixture is expressed as a function of the concentration in the receiving body and of the contribution of the effluent affected by the dilution, which allows estimating the BOD5 increase attributable to the discharge.

The BOD5 values thus obtained are compared with the concentrations measured downstream, in order to evaluate the consistency between the theoretical and observed results, and to analyze the incidence of the discharge on the quality of the water course.

4. AVAILABLE INFORMATION AND DATA USED

The data used to carry out the calculations of the methodology defined in point 3 are detailed below.

River water quality

In this report, all the water-quality sampling campaigns in the river carried out within the framework of the plant's PGMA from the start-up (May 2023) until December 2025 are analyzed. The location of the sampling points taken as reference are those established in that PGMA.

The sampling points considered for the analysis are the following:

- To approximate the concentrations of the receiving body (C_{CR}), the data from stations C2A.R2A S and C2A.R2A F located upstream of the discharge, surface and bottom respectively, were considered.
- To approximate the concentrations of the mixture (C_{M}), the data from stations C2B.R2B S and C2B.R2B F located downstream of the discharge at the edge of the mixing zone, surface and bottom respectively, were considered.

The parameters considered at those sampling points are:

- Conductivity.
- BOD5.

For both, the values correspond to the results of grab samples taken on the sampling days.

River flows

For the flows of the receiving body, the data of the total flow released from Reservoir 1 were considered, taking the values corresponding to the time of the water-quality sampling and up to about 4 hours before. The data of the total flow released by Reservoir 2 were also analyzed, in order to account for the general flow conditions of the reach.

This information is obtained from the portal of the electricity market operator, for the days of the water-quality samplings.

Discharged effluent quality

The discharged-effluent quality data used to determine the concentration in the effluent (C_E), for the two parameters of interest (conductivity and BOD5), are those that arise from the final-outlet monitoring carried out within the framework of the plant's PGO, corresponding to the water-quality sampling days.

In the case of the conductivity value, which is measured continuously with a time step of 1 minute, the daily mean value corresponding to the sampling day is taken. It is clarified that the resulting value does not vary significantly if a nearby time window is considered.

In the case of BOD5, the result of the 24-hour composite sample corresponding to the water-quality sampling period (taken from 7:00 to 6:59 AM) is taken.

Discharge flow

For the effluent flows, the data of the final-outlet flow were considered, which arise from a continuous measurement with a time step of 1 minute, and the daily mean value is taken for the same period as the 24-hour composite sampling (from 7:00 to 6:59 AM).

5. DATA ANALYSIS AS A FUNCTION OF DILUTION IN THE RIVER

Flows and theoretical dilution factor

First, the following table presents the flow data of the river and of the discharge, and the complete-mixing dilution factor that arises from the flow ratio (Q_{CR}/Q_E), for each of the water-quality sampling days. This information allows seeing the flow regime of the river on the sampling days.

Table 2: Flows of the receiving body and of the discharged effluent, and theoretical dilution factor

Date	Reservoir 1 flow (m ³ /s)	Reservoir 2 flow (m ³ /s)	Discharge flow (m ³ /s)	Theoretical D factor
08/05/23	90	0	1.07	84
07/06/23	92	0	1.22	76
03/07/23	85	0	1.33	64
07/08/23	93	0	1.35	62
04/09/23	483	0	1.37	353
02/10/23	521	0	1.20	434
06/11/23	102	539	1.22	84
07/12/23	85	0	1.41	60
08/01/24	83	0	1.39	60
01/02/24	675	831	1.43	471
06/03/24	691	830	1.00	691
08/04/24	500	0	1.36	369
05/06/24	718	463	1.36	529
08/07/24	653	880	0.87	750
07/08/24	83	0	0.64	129
04/09/24	656	541	1.23	532
09/10/24*	522	881	1.33	389
10/10/24*	519	0	1.34	521
06/11/24	696	869	0.75	927

Date	Reservoir 1 flow (m ³ /s)	Reservoir 2 flow (m ³ /s)	Discharge flow (m ³ /s)	Theoretical D factor
04/12/24	83	249	1.02	81
13/01/25	680	665	1.25	543
05/02/25	680	775	1.02	682
12/03/25	720	510	1.15	628
09/04/25	83	0	1.20	69
05/05/25	468	533	1.28	392
04/06/25	500	444	1.32	377
07/07/25	461	500	1.26	416
06/08/25	80	0	1.16	69
10/09/25	83	240	1.17	72
06/10/25*	947	400	1.25	281
07/10/25*	350	400	1.25	320
03/11/25	386	510	1.25	319
03/12/25	702	566	1.13	615

NOTES:

(*) In this sampling campaign, the upstream sampling was done on a different day than the downstream sampling, so the flow data for both days are presented. These samplings were not included in the data analysis.

From the data presented, it is observed that there are different flow conditions in the receiving body, from the most critical from the point of view of mixing—which is Reservoir 1 releasing the minimum flow (80 m³/s) and Reservoir 2 closed—to other conditions with both reservoirs releasing a significant flow.

Estimation of dilutions on the basis of conductivity

Taking into account the methodology proposed in point 3, the dilution was calculated on the basis of conductivity for each of the water-quality sampling days in the river, and for the surface and bottom points separately. The results are presented in the following table. The complete-mixing dilution factor that arises from the flow ratio (Q_{CR}/Q_E) is also included, in order to verify the consistency of the data.

Table 3: Results of the dilution calculation from conductivity

Date	Point (*)	Cond. CR (μS/cm)	Cond. M (μS/cm)	Cond. effluent (μS/cm)	Calculated D factor	Theoretical D factor
08/05/23	S	100	128	1748	58	84
08/05/23	F	100	117	1748	96	84
07/06/23	S	87	100	3815	286	76
07/06/23	F	86	98	3815	310	76
03/07/23	S	111	193	4480	52	64
03/07/23	F	113	199	4480	50	64
07/08/23	S	99	192	4102	42	62
07/08/23	F	99	199	4102	39	62
04/09/23	S	100	111	4290	380	353
04/09/23	F	100	111	4290	380	353
02/10/23	S	55	57	3875	1909	434

Date	Point (*)	Cond. CR (µS/cm)	Cond. M (µS/cm)	Cond. effluent (µS/cm)	Calculated D factor	Theoretical D factor
02/10/23	F	55	58	3875	1272	434
06/11/23	S	64	116	4552	85	84
06/11/23	F	64	160	4552	46	84
07/12/23	S	70	90	4814	236	60
07/12/23	F	70	147	4814	61	60
08/01/24	S	72	85	4573	345	60
08/01/24	F	72	276	4573	21	60
01/02/24	S	68	80	4136	338	471
01/02/24	F	68	80	4136	338	471
06/03/24	S	69	80	4446	397	691
06/03/24	F	69	80	4446	397	691
08/04/24	S	68	74	3736	610	369
08/04/24	F	68	74	3736	610	369
05/06/24	S	54	58	4509	1391	529
08/07/24	S	62	71	4057	443	750
08/07/24	F	62	71	4057	443	750
07/08/24	S	72	110	5153	133	129
07/08/24	F	72	121	5153	103	129
04/09/24	S	68	81	5067	384	529
04/09/24	F	68	83	5067	332	529
06/11/24	S	76	79	4580	1500	927
06/11/24	F	76	80	4580	1125	927
04/12/24	S	82	99	5271	304	81
04/12/24	F	81	143	5271	83	81
13/01/25	S	80	91	4498	401	542
13/01/25	F	80	91	4498	401	542
05/02/25	S	83	95	5201	425	668
05/02/25	F	83	94	5201	464	668
12/03/25	S	84	95	4580	408	627
12/03/25	F	83	96	4580	345	627
09/04/25	S	90	129	4720	118	69
09/04/25	F	91	142	4720	90	69
05/05/25	S	86	105	4842	249	365
05/05/25	F	86	104	4842	263	365
04/06/25	S	89	99	3168	307	377
04/06/25	F	89	98	3168	341	377
07/07/25	S	92	105	4874	367	366
07/07/25	F	92	106	4874	341	366
06/08/25	S	113	222	5158	45	69
06/08/25	F	112	200	5158	56	69
10/09/25	S	92	147	4166	73	71

Date	Point (*)	Cond. CR (µS/cm)	Cond. M (µS/cm)	Cond. effluent (µS/cm)	Calculated D factor	Theoretical D factor
10/09/25	F	91	159	4166	59	71
03/11/25	S	96	133	6799	180	309
03/11/25	F	96	129	6799	202	309
03/12/25	S	97	106	4429	480	623
03/12/25	F	97	105	4429	540	623

NOTES:

¹ Those campaigns that did not have complete data (05/06/2024 F) were not included in the data analysis.

In general terms, it is observed that the calculated dilutions are lower than the theoretical dilutions, and of the same order, which is reasonable.

On the other hand, in some cases the downstream conductivity value turned out to be slightly lower than the baseline conductivity, so the calculation of the dilution with the equations set out is not applicable (it generates negative values). These data were discarded from the subsequent analysis.

Comparison of calculated BOD5 and measured BOD5

Taking into account the methodology proposed in point 3, from the dilution factor determined in the previous point, the BOD5 downstream of the discharge was calculated for each of the water-quality sampling days in the river, and for the surface and bottom points separately. The results are presented in the following table. The measured value of the downstream BOD5 and the absolute difference between the two values are also included.

Table 4: Results of the BOD5 calculated downstream from the dilution factor and its comparison with the measured value

Date	Point	BOD5 CR (mg/L)	BOD5 effluent (mg/L)	Calculated D factor	BOD5 M calculated (mg/L)	BOD5 M measured (mg/L)	Difference
08/05/23	S	0.50 (1)	7.0	58	0.6	0.50 (1)	0.1
08/05/23	F	0.50 (1)	7.0	96	0.6	0.50 (1)	0.1
07/06/23	S	0.88	14.0	286	0.9	0.80	0.1
07/06/23	F	0.50 (1)	14.0	310	0.5	0.60	-0.1
03/07/23	S	1.30	6.4	52	1.4	1.80	-0.4
03/07/23	F	0.69	6.4	50	0.8	2.00	-1.2
07/08/23	S	2.80	10.5	42	3.0	1.90	1.1
07/08/23	F	2.60	10.5	39	2.8	2.00	0.8
04/09/23	S	0.58	7.0	380	0.6	0.64	0.0
04/09/23	F	0.66	7.0	380	0.7	0.81	-0.1
02/10/23	S	1.00	6.7	1909	1.0	0.67	0.3
02/10/23	F	0.99	6.7	1272	1.0	0.78	0.2
06/11/23	S	0.92	10.3	85	1.0	0.66	0.4
06/11/23 (2)	F	1.10	10.3	46	1.3	0.62	0.7
07/12/23 (2)	S	2.90	13.40	236	2.9	1.50	1.4
07/12/23	F	2.70	13.40	61	2.9	2.40	0.5

Date	Point	BOD5 CR (mg/L)	BOD5 effluent (mg/L)	Calculated D factor	BOD5 M calculated (mg/L)	BOD5 M measured (mg/L)	Difference
08/01/24 (2)	S	1.40	13.4	345	1.4	0.91	0.5
08/01/24	F	0.69	13.4	21	1.3	1.00	0.3
01/02/24	S	0.64	17.5	338	0.7	0.71	0.0
01/02/24	F	0.82	17.5	338	0.9	0.98	-0.1
06/03/24	S	0.52	9.4	397	0.5	0.73	-0.2
06/03/24	F	0.50 (1)	9.4	397	0.5	0.65	-0.1
08/04/24	S	0.50 (1)	7.8	610	0.5	0.50 (1)	0.0
08/04/24	F	0.50 (1)	7.8	610	0.5	0.50 (1)	0.0
05/06/24	S	0.80	9.1	1391	0.8	0.70	0.1
08/07/24	S	0.81	12.6	443	0.8	0.80	0.0
08/07/24	F	1.10	12.6	443	1.1	0.96	0.2
07/08/24	S	0.50 (1)	13.4	133	0.6	0.65	-0.1
07/08/24	F	0.62	13.4	103	0.7	0.68	0.1
04/09/24	S	0.80	11.3	384	0.8	0.90	-0.1
04/09/24	F	1.10	11.3	332	1.1	1.00	0.1
06/11/24	S	0.50	9.8	1500	0.5	0.98	-0.5
06/11/24	F	0.78	9.8	1125	0.8	1.30	-0.5
04/12/24	S	0.72	13.4	304	0.8	1.70	-0.9
04/12/24	F	0.93	13.4	83	1.1	1.40	-0.3
13/01/25	S	3.9	22.6	401	3.9	4.0	-0.1
13/01/25	F	3.4	22.6	401	3.4	4.3	-0.9
05/02/25	S	1.5	42.7	425	1.6	1.4	0.2
05/02/25	F	1.2	42.7	464	1.3	1.3	0.0
12/03/25 (2)	S	1.20	9.9	408	1.2	0.75	0.5
12/03/25	F	0.76	9.9	345	0.8	1.20	-0.4
09/04/25	S	0.62	15.4	118	0.7	0.50 (1)	0.2
09/04/25	F	0.50 (1)	15.4	90	0.7	0.50 (1)	0.2
05/05/25	S	1.6	13.4	249	1.6	4.6	-3.0
05/05/25	F	1.9	13.4	263	1.9	4.9	-3.0
04/06/25	S	0.6	13.4	307	0.7	2.9	-2.2
04/06/25	F	1.4	13.4	341	1.4	3.5	-2.1
07/07/25	S	0.60	14.4	367	0.6	0.60	0.0
07/07/25	F	0.70	14.4	341	0.7	0.70	0.0
06/08/25	S	1.1	11.3	45	1.3	1.9	-0.6
06/08/25	F	1.4	11.3	56	1.6	4.1	-2.5
10/09/25 (2)	S	0.85	10.4	73	1.0	0.54	0.4
10/09/25	F	0.69	10.4	59	0.9	0.55	0.3
03/11/25	S	0.84	12.3	180	0.9	1.30	-0.4

Date	Point	BOD5 CR (mg/L)	BOD5 effluent (mg/L)	Calculated D factor	BOD5 M calculated (mg/L)	BOD5 M measured (mg/L)	Difference
03/11/25	F	1.10	12.3	202	1.2	1.50	-0.3
03/12/25	S	0.50 (1)	11.3	480	0.5	0.50 (1)	0.0
03/12/25	F	0.50 (1)	11.3	540	0.5	0.50 (1)	0.0

NOTES:

¹ BOD5 result reported as Non-Detectable which, for the purposes of the calculations, was considered with a value equal to the detection limit, which is 0.5 mg/L.

² Sampling discarded from the data analysis because the upstream BOD5 value is greater than the downstream value, taking into account the accumulated uncertainty of both measurements, which is 20 % in each case.

In order to compare the calculated BOD5 value with the value measured downstream of the discharge, both values were represented graphically, which under ideal conditions should represent a 1:1 slope line passing through the origin. The corresponding graph is shown below, where the 1:1 slope line is also shown for reference.

Figure 1: Calculated BOD5 vs measured BOD5 downstream (C2B) – All data [fit line: $y = 0.6613x$; $R^2 = 0.7855$]

The linear regression for the data series considered has a slope of 0.66, significantly lower than 1, with an R2 of 0.79.

It is observed that some points fall below the expected trend. Below, the same graph is presented, but removing the 5 points corresponding to the May, June, and August 2025 campaigns that exceeded the established maximum value of 1.9 mg/L, and which coincide with the 5 points that fall markedly below the observed trend.

Figure 2: Calculated BOD5 vs measured BOD5 downstream (C2B) – Without 2025 deviations [fit line: $y = 0.929x$; $R^2 = 0.9183$]

The linear regression for the data series considered, without the data corresponding to the May, June, and August 2025 campaigns that exceeded the established maximum value of 1.9 mg/L, has a slope of 0.93, closer to 1, and an R2 of 0.92, which shows a better fit.

It is found that, by removing these points, the trend of the data series better approximates the expected behavior, significantly improving the linear fit.

This evidences that the results corresponding to the samplings carried out in May, June, and August 2025, and only in these samplings, are not due to or are not explained exclusively by the BOD5 discharge of the plant, given the conditions of the discharge and of the receiving body on those days.

On the other hand, it should be noted that in the sampling scenario analyzed, both days of minimum flow in the river (Reservoir 1 releasing 80 m³/s and Reservoir 2 closed) and days in which both reservoirs are releasing greater flows are included, and that does not affect the general trend or behavior observed regarding the dilution of the effluent in the receiving body. That is, although the dilution conditions are more unfavorable —and that is reflected in the values of the dilution factor, which can change by more than one order— the dilution foreseen for that condition is nonetheless reached, and it would not be a factor that explains the significant BOD5 increases downstream.

6. OTHER CONSIDERATIONS

Beyond the analysis carried out, the following considerations are raised based on the BOD5 results obtained in the samplings, which are striking and for which it is recommended to treat them with caution for the purposes of drawing any kind of conclusion:

For the May 2025 sampling:

- The BOD5 results at station C2B.R2B, surface and bottom, are significantly higher than at stations M1, M2, M3, and L2, which are located upstream closer to the discharge.
- That increase in BOD5 is not reflected in the COD results, which are all lower than the DL or QL. Nor is it reflected in any of the other parameters analyzed.
- On the other hand, the difference in the BOD5 results between bottom and surface at station M3 is significant, and is not reflected in any of the other parameters analyzed.

For the June 2025 sampling:

- The BOD5 results at station C2B.R2B, surface and bottom, are significantly higher than at stations M1, M2, M3, and L2, which are located upstream closer to the discharge.
- That increase in BOD5 of more than 100 % is not reflected in the COD results, which are all lower than the DL or QL. Nor is it reflected in any of the other parameters analyzed.

For the August 2025 sampling:

- The BOD5 result at station C2B.R2B, bottom, is significantly higher than at stations M1, M2, M3, and L2, which are located upstream closer to the discharge, and than the result at the same station but at the surface.
- That increase in BOD5 is not reflected in the COD results (in the case of station C2B.R2B the values were similar, 13.7 mg/L at the surface and 14.3 mg/L at the bottom). Nor is it reflected in any of the other parameters analyzed.

7. CONCLUSIONS

In this report, an exploratory analysis was carried out of the data collected during the water-quality sampling campaigns in the river since the start-up of the plant, in particular in relation to the parameter BOD5, in order to analyze the possible incidence of the effluent discharge downstream of the discharge point.

The dilution factor of the effluent in the receiving body was estimated using conductivity values as a proxy for a conservative tracer that represents the mixing conditions, taking into account the conditions measured upstream and downstream of the discharge, and of the discharge itself. Once the dilution factor was defined, the BOD5 concentration expected downstream of the discharge was calculated, which was compared with the measured value, which under ideal conditions should coincide, in order to evaluate the consistency between the theoretical and observed results, and to analyze the incidence of the discharge on the quality of the water course.

From the data analysis carried out following the proposed methodology, taking into account all the water-quality sampling campaigns in the river carried out within the framework of the plant's PGMA from the start-up (May 2023) until December 2025, it is found that only the results corresponding to the samplings carried out in May, June, and August 2025 that exceeded the established maximum value of 1.9 mg/L fall significantly outside the expected behavior, which is indeed verified at the rest of the points.

This evidences that those values are not due to or are not explained exclusively by the BOD5 discharge of the plant, given the conditions of the discharge and of the receiving body on those days. In this sense, no arguments are identified that support the conclusion that these exceedances have no motivation other than the very existence of the discharge.