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# Wastewater discharges in receiving bodies of Mexico's Federation: analysis of the legal framework in light of the new obligations in 2023 and the international context

This paper presents a brief analysis of the legal framework that regulates wastewater discharge permits in receiving bodies under Mexico's federal jurisdiction (Discharge Permits), in light of the recent publication of NOM-001-SEMARNAT-2021 and the GUIDELINES (defined below), including the obligations of the regulated entities. Likewise, a brief review of the national and international context is made, particularly what the United Nations (UN) has identified and established as goals in terms of water sanitation.

## 1. Introduction

One of the biggest water problems in Mexico is poor sanitation. Companies, among other relevant actors (such as municipal governments and water utilities), have an obligation to sanitize the water used in their activities, so that such wastewater is discharged into receiving bodies and generates a minor or tolerable impact on the ecosystem and subsequent reuse.

For various reasons, water is not adequately treated, and wastewater discharges are intrinsically related to the outbreak of diseases and damage to health, resulting in the contamination of soil, air, and water, as well as the loss of biodiversity and increased generation of greenhouse gases such as carbon dioxide and methane.

In Mexico, at the federal level, *NOM-001-ECOL-1996*<sup>1</sup> published in the DOF 6-I-1997 had not been modified since then— in force until March 11, 2023—, so that, due to various factors, such as population growth and economic activities, recent scientific findings, international regulatory developments, and technological advances that allow the use of other metric parameters, led to the modification of this standard.

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<sup>1</sup> Mexican Official Standard *NOM-001-ECOL-1996*, which establishes the maximum permissible limits for pollutants in wastewater discharges into national waters and property. Published in the DOF on January 6, 1997.



In the DOF 11-III-2022, NOM-001-SEMARNAT- 2021 was published,<sup>2</sup> which replaces *NOM-001-SEMARNAT-1996*.<sup>3</sup> In accordance with the fourth transitory provision of NOM-001-SEMARNAT-2021, the GUIDELINES WERE published in the DOF 5-XII-2022.<sup>4</sup>

NOM-001-SEMARNAT-2021 and the GUIDELINES imply a change in the rules for those holders of a Discharge Permit. This technical standard brought with it diverse and mostly stricter parameters and indicators to be complied with compared to its predecessor standard, including: **(i)** a structure for sampling in accordance with best practices; **(ii)** a new toxicity parameter for discharged water; **(iii)** new pollutant and parasitic pathogens; **(iv)** stricter temperature parameters for wastewater discharge; and **(v)** a new true color parameter (turbidity). These will be described in more detail below.

## 2. International context related to the discharge of polluted water

Clean Water and Sanitation" represents Sustainable Development Goal 6 (SDG 6) set by the United Nations to be achieved by 2030.<sup>5</sup> Among the goals of SDG 6, it states that:

[6.3] "By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing the release of chemicals and hazardous materials, halving the percentage of untreated wastewater, and significantly increasing recycling and safe reuse globally."<sup>6</sup>

In this sense, the UN has identified the importance of minimizing the emission of chemical substances and hazardous materials, warning of the pernicious effects on humanity and the environment, which represents a great challenge in our country.

The UN has identified that wastewater accounts for between 3% and 7% of the generation of greenhouse gases. In addition, it is estimated that between 80% and 90% of polluted water discharges worldwide are released without any treatment.<sup>7</sup> These two situations are alarming for three main reasons:

- (i)** first, because fresh water is affected, and consequently ecosystems and life, through the discharge of toxic substances and pathogens into receiving bodies, such as surface and groundwater,<sup>8</sup> and soils;
- (ii)** second, because improper wastewater treatment contributes to the climate crisis, since in addition to the damage to soils and bodies of water, gases are generated, mainly methane, which contributes to the generation of the greenhouse effect;

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<sup>2</sup> "Norma Oficial Mexicana, NOM-001-SEMARNAT-2021, Que establece los límites permisibles de contaminantes en las descargas de aguas residuales en cuerpos receptores propiedad de la Nación". Its entry into force is March 11, 2023, in accordance with the first transitory article, with exceptions.

<sup>3</sup> In 2003, the nomenclature change to NOM-001-SEMARNAT-1996 was published in the DOF. Prior to this change, the nomenclature of this standard was nom-001-ECOL-1996.

<sup>4</sup> "Guidelines that establish the General Administrative Provisions for the presentation of the Programs for Compliance established in the fourth transitory article of the Mexican Official Standard NOM-001-SEMARNAT-2021 That establishes the permissible limits of pollutants in wastewater discharges into receiving bodies owned by the Nation".

<sup>5</sup> On September 25, 2015, the UN General Assembly adopted resolution 70/1 containing the agenda "*Transforming our world: the 2030 Agenda for Sustainable Development*". On July 6, 2017, the same body adopted Resolution A/RES/71/313 establishing the *Global Indicators Framework for the Sustainable Development Goals and targets of the 2030 Agenda for Sustainable Development*.

<sup>6</sup> Available at <https://www.un.org/sustainabledevelopment/es/water-and-sanitation/>

<sup>7</sup> Available at <https://news.un.org/es/story/2020/03/1471492>

<sup>8</sup> According to UN data, groundwater stores approximately 99% of the planet's total freshwater, so its care, development and sustainable use is essential for the preservation of life.



- (iii) the third, as a consequence of the two previous ones, because improper treatment, at the end of the day, has repercussions in the absence of guarantees and satisfaction of basic needs and non-observance of human rights, such as access to drinking water, which in turn accentuates food insecurity and poverty.

According to the United Nations World Water Development Report 2022 (WWDR 2022), nitrates, pesticides and agrochemicals, among other substances, have already infiltrated even into subway water bodies. This invites us to reflect on the amount of pollutants and pathogens that can be found in seas, rivers, estuaries, basins, soil, subsoil, and any other water receiving body, causing negative effects on life on the planet.

Finally, it is noted that the National Water Program 2020-2024 published in the DOF 30-XII-2020 establishes as a challenge to establish the human right to water and sanitation related to the achievement of the SDGs.<sup>9</sup>

### 3. Legal framework for wastewater discharge permits in receiving bodies under federal jurisdiction

The CONAGUA monitors various bodies of water for contamination levels, and there is evidence that there are areas with severely polluted aquifers and bodies of water.<sup>10</sup> For its part, the Greenpeace organization has pointed out that the waters of rivers where wastewater from various productive activities is discharged are those that present various toxins such as "Persistent Organic Compounds", "Volatile Organic Compounds" or heavy metals.<sup>11</sup>

The obligation of sanitation is also found in the CPEUM, related to the human right to a healthy environment, for which reason it is convenient to briefly describe the applicable legal framework that regulates wastewater discharges into bodies under federal jurisdiction:

<b>Political Constitution of the United Mexican States Article 4</b>	<b>paragraph 5°→ Recognizes the human right to a healthy environment; it establishes that those who cause environmental damage and deterioration are liable.</b>
<b>General Law on Ecological Balance and Environmental Protection<sup>12</sup> articles 117, 118 and 123</b>	<b>paragraph 6°→ Establishes the right to access to sufficient, safe, acceptable and affordable water for personal and domestic uses.</b>
	<b>arts. 7, 8 and 9→ Powers are distributed among the states, municipalities and Mexico City.</b>
	<b>art. 117→ Criteria are established for the prevention and control of water pollution, e.g., prevention and control of water pollution; responsibility for treatment of discharges, participation and co-responsibility of society.</b>
	<b>art. 118→ The types of standards and regulatory bodies in which the aforementioned prevention and control criteria must be considered are established.</b>

<sup>9</sup> Decree approving the National Water Program 2020-2024.

<sup>10</sup> The CONAGUA through the "RED NACIONAL DE MEDICACION DE LA CALIDAD DEL AGUA" (NATIONAL NETWORK FOR WATER QUALITY MEASUREMENT) performs the monitoring. See: <https://www.gob.mx/conagua/articulos/calidad-del-agua#:~:text=The%20results%20for%202021%20showed%20good%20quality%20to%20strongly%20polluted%20>.

<sup>11</sup> Cfr. Terras, Pierre, "Ríos Tóxicos", Greenpeace, Mexico, 2012. Article available at [https://www.greenpeace.org/static/planet4-mexico-stateless/2018/11/93c3b859-93c3b859-rios\\_toxicos.pdf](https://www.greenpeace.org/static/planet4-mexico-stateless/2018/11/93c3b859-93c3b859-rios_toxicos.pdf)

<sup>12</sup> Likewise, the Regulation of the General Law of Ecological Balance and Environmental Protection regarding the Registration of Pollutant Emissions and Transfers is applicable. This regulatory body defines "Reportable Establishment" as those facilities that must report their emissions and transfer of pollutants generated by their industrial activities.



	<b>art. 123</b> → It provides for the obligation of discharges into bodies of water or soil, to meet the provisions of the Mexican official standards and, where appropriate, particular conditions of discharge.
<b>National Water Law<sup>13</sup> articles 85 and 88 bis</b>	<b>art. 85</b> → It is established that persons, including agencies and organizations that exploit, use or exploit national waters for any use or activity must take the necessary measures to prevent their contamination and, if necessary, to return the waters to adequate conditions. <b>art. 88 bis</b> → It provides that persons discharging into federal receiving bodies must: <b>(i)</b> have a discharge permit; <b>(ii)</b> treat the wastewater prior to discharge into receiving bodies; <b>(iii)</b> pay the corresponding federal fee; <b>(iv)</b> install and maintain in good condition the measuring devices and accesses for sampling the concentrations of parameters provided for in the discharge permits.
<b>Federal Law of Rights</b>	It is emphasized that, in addition to the costs for the analysis and issuance of the corresponding permits, the law establishes those fees that must be paid according to: <b>(i)</b> the characteristics of the discharged water; <b>(ii)</b> the classification of the receiving body used (type A, B and C receiving bodies); <b>(iii)</b> the degree of utilization of the receiving body (cubic meters of water discharged). Even private lands where wastewater is discharged that may damage the soil, subsoil and/or aquifers, are obliged to pay the corresponding fees <sup>14</sup> , without prejudice to other liabilities to which they may be subject, in the event of causing soil contamination <sup>15</sup> .

Broadly speaking, the above legal and regulatory framework provides the basis for complying with wastewater discharge obligations.

Finally, it is worth noting that holders of Discharge Permits must comply with discharge conditions.<sup>16</sup> Such additional parameters may be foreseen on a case-by-case basis and the authority should tend to demand, for certain processes and industries, stricter parameters than those foreseen in the above-mentioned regulations, in order to preserve water quality.

#### 4. Obligations as of publication of NOM-001-SEMARNAT-2021

The five major changes made by the new NOM-001-SEMARNAT-2021 are as follows:

1. For the measurement of pollutant load in waters with concentrations of more than 1000 mg/L of chlorides, the "Total Organic Carbon" measurement parameter will be used instead of the "Chemical Oxygen Demand" one, so this parameter is now foreseen

<sup>13</sup> The Regulations of the National Waters Law are applicable, which, among other more specific obligations, establish the requirements that an application must have in order to request a discharge permit.

<sup>14</sup> Cfr. SCJN Thesis (JURISPRUDENCE): WASTEWATER DISCHARGE FEES. THE CLASSIFICATION OF RECEIVING BODIES TO CAUSE THIS CHARGE INCLUDES LAND THAT IS NOT PROPERTY OF THE NATION, WHEN IT CAN CONTAMINATE THE SOIL, SUBSOIL OR AQUIFERS. Digital record: 2010686; PC.XXII. J/3 A (10a); Instance: Plenos de Circuito; Tenth Epoch; Book 25, December 2015, Volume I, page 709.

<sup>15</sup> To this end, the soil contamination regime set forth in the General Law for the Prevention and Integral Management of Waste, its Regulations and official Mexican standards will be applicable.

<sup>16</sup> That, in terms of the Regulations of the National Water Law, they are defined as "the set of physical, chemical and biological parameters and their maximum permitted levels in wastewater discharges, determined by "The Commission" for a user, for a specific use or group of users or for a specific receiving body, in order to preserve and control water quality in accordance with the Law and these Regulations";



because it allows greater reliability in the results and a better characterization of the wastewater.

2. Specifications are defined to comply with best sampling practices.
3. Toxicity is included as an integrating parameter to identify substances harmful to human health. Previously, this parameter was not considered.
4. The concept of "true color" should be considered in the characterization of wastewater color. This is important because, in terms of the recitals of the same NOM-001-SEMARNAT-2021, it allows characterizing water with color, which can come from different sources, such as organic metal ions, humus and/or dissolved organic matter.<sup>17</sup>
5. Discharges are expected to occur at maximum temperatures of 35 degrees Celsius. Previously they were at maximum temperatures of 40 degrees Celsius.

As with all Mexican Official Standards, conformity assessment is required, which can be performed by authorized verification units. In this sense, we must keep in mind that this Mexican Official Standard will be governed by the provisions of the Quality Infrastructure Law.

Finally, the following important dates are mentioned in the transitory articles:

1. On March 11, 2023, with exceptions, NOM-001-SEMARNAT-2021 BECOMES effective.
2. On April 3, 2023, the parameters and permissible limits of table 1 (Permissible Limits) and table 2 (Permissible Limits for Metals and Cyanides), as well as the "normative appendix", come into effect. (Continues to apply NOM-001-SEMARNAT-1996).
3. On March 11, 2026, the parameters and permissible limits for: (i) true color; (ii) acute toxicity (Table 1) come into force.

## 5. The Guidelines

The purpose of the Guidelines is to establish the requirements, deadlines and procedures for the presentation and voluntary registration of "compliance programs" by the holders of a Discharge Permit. Thus, the Guidelines constitute a regulatory instrument that provides facilities for compliance with the parameters established in the new NOM-001-SEMARNAT-2021 and allows regulated entities to propose progressive compliance programs until March 2027 (provided that such improvements, replacement of equipment, supplies, etc., are duly justified).

Regulated entities must submit their Compliance Programs from March 12, 2023, to April 3, 2023. To do so, they must register such programs on the official website<sup>18</sup> by using the e-signature of the permit holder company.<sup>19</sup>

In this sense, it is through such compliance programs that the parameters and permissible limits of pollutants to be complied with progressively by the regulated entities as the equipment and inputs used are replaced, as presented in the official format included in the publication of the Guidelines.

It is important to note that **a Compliance Program must be submitted for each of the discharge points foreseen in the respective wastewater discharge permits** (those whose technical characteristics and location are described at the end of these, as annexes), issued by the CONAGUA.

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<sup>17</sup> Cf. "Industrial wastewater may contain lignins, tannins, dyes, and other organic and inorganic chemicals that cause color." Baird, Rodger B., et. al., *Standard Methods for the Examination of Water and Wastewater*, 24th, American Public Health Association, American Water Works Association, Water Environment Federation, 2017, p.1. Translation is ours.

<sup>18</sup> Official site <https://programasnom001.conagua.gob.mx/>

<sup>19</sup> That granted by the Tax Administration Service (Section III, of Article 2 of the Guidelines).



Finally, each licensee must submit progress on compliance with the programs within the first 5 working days of March and September of each year, from the date of registration of its programs (Article 17 of the Guidelines).

## 6. Challenges in water sanitation

Although the new NOM-001-SEMARNAT-2021 represents a relevant regulatory advance, we must keep in mind that the accelerated pace at which industrial technology develops increasingly complex and diverse substances makes it difficult to properly characterize and regulate potential water pollutants. Hence, the five-year review of the standard in question should really reflect, within the Consultative Committee for Standardization of the Environment and Natural Resources (COMARNAT) and its working groups, the regulatory needs of these new pollutants.

The above, without detriment to the industry assuming a proactive role towards the adoption of better practices to return wastewater of increasingly better quality (far exceeding the standard).

Among others, it should be remembered that industries such as "petroleum, steel and mining represent the greatest risk for the release of heavy metals, toxic compounds, persistent and bioaccumulative substances."<sup>20</sup>

On the other hand, it is common to hear in forums or magazines specialized in environmental matters about the impact of microplastics and nanoplastics, which, due to their own characteristics, their measurement and characterization is extremely complicated, in addition to the fact that scientific studies in our country and in the world are still scarce.<sup>21</sup>

Finally, we must bear in mind that, in accordance with Article 115 of the CPEUM, the municipalities are responsible for providing sanitation services to the population, however, as the Water Program itself warns, "many of them lack the technical and managerial capacities to provide services adequately, in addition to the fact that at the municipal level there are still problems of simulation, transfer of public goods to private companies and waste."<sup>22</sup>

The development of infrastructure, investment, and the collaboration and commitment of regulated entities to not only meet the economic benefits of their productive activities, but also to generate social awareness, is fundamental to achieve the SDGs and make the right to a healthy environment effective.

## 7. Conclusions

The sanitation of water discharges is a fundamental axis to guarantee access to drinking water (and other human rights), an area in which Mexico faces an important challenge and a commitment on the part of companies.

In order to comply with the SDGs and the aforementioned regulation, it is imperative that both authorities and regulated entities assume their role in verifying and complying, respectively, with the new parameters set forth in NOM-001-SEMARNAT-2021.

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<sup>20</sup> Cfr. National Water Program 2020-2024

<sup>21</sup> <https://www.gob.mx/imta/articulos/contaminacion-por-microplasticos>

<sup>22</sup> Cfr. National Water Program 2020-2024



We believe that the publication and eventual application of the Guidelines may be a useful tool to achieve this objective. Regulated entities must submit their Compliance Programs from March 12, 2023 until April 3, 2023. This allows regulated entities to submit progressive compliance programs until March 2027 (provided that such improvements, replacement of equipment, supplies, etc., are duly justified).

Additional efforts should be made around wastewater remediation, especially on the following fronts:

- (i) in the five-yearly review and update of the parameters foreseen in the official Mexican standard in question, for additional monitoring and compliance of novel contaminants (including pesticides and persistent organic compounds);
- (ii) in strengthening the capacities of local authorities (especially, as noted above, municipal authorities) to comply with official Mexican standards;
- (iii) in the updating of regulations associated with wastewater discharges, such as NOM-002-SEMARNAT-1996 (for sewage discharge);
- (iv) to implement programs that provide for market and tax incentives that motivate the regulated entities to carry out wastewater treatment that goes far beyond the provisions of the regulations (as was contemplated at the time by the former "PROSANEAR"); and,
- (v) in social commitment and more proactive collaboration on the part of industries to improve the quality of discharged water.

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