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## **MEXICO'S SEMARNAT ISSUES NEW SITE CHARACTERIZATION AND REMEDIATION STANDARD FOR HYDROCARBON CONTAMINATED SOIL**

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The Secretariat of Environment and Natural Resources (SEMARNAT) issued Official Mexican Standard NOM-138-SEMARNAT/SS-2003, "Maximum Permissible Limits of hydrocarbons in soil and the specifications for their characterization and remediation" on March 29, 2005 in the Official Gazette. The NOM (for its Spanish acronym) became effective on May 30, 2005.

This standard replaced the previous Emergency Standard NOM-EM-138-ECOL-2002, "Maximum Permissible Limits of soil contamination by hydrocarbons, site characterization and remediation procedures", which was published on August 20, 2002, and expired in August of 2003.

The purpose of the present NOM is to provide those responsible for contamination with certainty as to their characterization and remediation actions. The NOM is mandatory in the country for those resulting responsible for soil contamination by hydrocarbons.

The NOM defines a spill as "any discharge, release, overflow, draining or pouring of hydrocarbons that appears in soil".

The NOMs most important contributions are to:

1. Establish Maximum Permissible Limits for hydrocarbon fractions, and specific hydrocarbons in soil that constitute contamination.
2. Establish characterization procedures for contaminated soil, including the analytical methods found as attachments to the standard.
3. Establish the remediation rationale and cleanup targets in the event the MPLs are exceeded.

With respect to the MPLs, it establishes numeric levels for light (gasoline), medium (diesel), and heavy (polynuclear aromatics) fraction hydrocarbons in three land use types

– agricultural, residential, and industrial. The following table lists the MPLs along with the corresponding analytical methods:

| Hydrocarbon fraction | Predominant Land Use (mg/kg dry basis) |             |            | Analytical methods       |
|----------------------|--|-------------|------------|--------------------------|
|                      | Agricultural                           | Residential | Industrial |                          |
| Light                | 200                                    | 200         | 500        | EPA 8015B gasoline range |
| Medium               | 1,200                                  | 1,200       | 5,000      | EPA 8015B diesel range   |
| Heavy                | 3,000                                  | 3,000       | 6,000      | EPA 9071B/EPA 1664       |

Agricultural land use includes forest, recreational, and conservation uses, while industrial also includes commercial land use. For mixed use land, the lowest numerical value specification must be applied.

The NOM also includes MPLs for specific hydrocarbons, such as Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX), as well as some Polynuclear Aromatic Hydrocarbons (PNAs). However, PNAs must only be determined in cases where demonstrating compliance with the MPLs is desired. The following table shows the MPLs for specific hydrocarbons, and their analytical methods:

| Specific Hydrocarbons   | Predominant Land Use (mg/kg dry basis) |             |            | Analytical methods    |
|-------------------------|--|-------------|------------|-----------------------|
|                         | Agricultural                           | Residential | Industrial |                       |
| Benzene                 | 6                                      | 6           | 15         | EPA 8260B or EPA 8021 |
| Toluene                 | 40                                     | 40          | 100        |                       |
| Ethylbenzene            | 10                                     | 10          | 25         |                       |
| Xylenes (all isomers)   | 40                                     | 40          | 100        |                       |
| Benzo[a]pyrene          | 2                                      | 2           | 10         | EPA 8310 or EPA 8270C |
| Dibenzo[a,h]anthracene  | 2                                      | 2           | 10         |                       |
| Benzo[a]anthracene      | 2                                      | 2           | 10         |                       |
| Benzo[b]fluoranthene    | 2                                      | 2           | 10         |                       |
| Benzo[k]fluoranthene    | 8                                      | 8           | 80         |                       |
| Indeno (1,2,3-cd)pyrene | 2                                      | 2           | 10         |                       |

A site characterization study is required both in the case of a recent spill or a previously contaminated site, referred to as an “environmental liability”. The site characterization must include the following elements, at a minimum:

- Site and affected area description
- Sampling strategy
- Sampling plan
- Report

The sampling plan must include the location and number of sampling points, depth, sample volume, sampling equipment, technique, quality assurance procedures, and safety plan.

For recent spills, the responsible party must indicate the approximate quantity and type of spilled material. For environmental liability cases, a historical background on previous site activities and events that caused the contamination must be included.

Sampling strategies may be directed or statistical, as long as the results allow delineating the horizontal and vertical extent of contamination.

When using directed sampling, the NOM establishes the minimum number of samples to collect based on the surface area. For sites under 1,000 square meters, four samples are required, and between 20 and 30 samples are needed in areas from one to four hectares, respectively, according to a table.

The site characterization report must contain the analytical results, methods used, interpretation of findings, and corresponding chain of custody.

If the hydrocarbon concentration in all analyzed samples is equal to or less than the MPLs, no remediation is necessary. Any soil that presents hydrocarbon levels above the MPLs, must be restored to comply with the standard.

The NOM takes into consideration the background levels in the affected site. These are defined as “the soil concentration of regulated hydrocarbons that are not attributable to the source of contamination under consideration, and that are found naturally or were generated by an anthropogenic source separate from the one under consideration”. If the presence of other hydrocarbons distinct from the contamination problem under evaluation is suspected, samples may be taken to establish background levels.

If the hydrocarbon background levels are greater than the MPLs established in the NOM, the remediation may be limited to reaching the background levels.

In environmental liability and other justifiable cases, an environmental and health risk assessment must be conducted to determine the site-specific remedial actions. The human health risk assessment will be based on a methodology accepted by the competent authority.

The environmental and health risk assessment must have the objective of establishing any of the following site-specific options:

- a) Remedial actions based on specific levels,
- b) Remedial actions to reduce risks and exposure to contaminants
- c) Monitoring actions

The NOM also contains specification for the site remediation projects. For example, only organic matter may be added as substrate when it is part of the remediation technique, and the use of genetically modified microorganisms is not allowed.

One of the most significant changes in this NOM compared to the previous emergency Standard is to establish that the procedure for compliance evaluation will be conducted by Verification Units (VUs), and accredited and approved laboratories. Only in their absence will the evaluation be conducted by the competent authority. Also, SEMARNAT will accept the analytical results sampled and analyzed by an accredited laboratory using the methods established in this NOM.

Although the NOM does not define Verification Units, it does establish that during an evaluation site visit, the UV or the competent agency will verify that the standard's requirements are being followed.

These guidelines simplify the process of evaluating and responding to spills, as well as the remediation of hydrocarbon contaminated sites, as prior authorization from the agency is not required to implement corrective measures, as long as the NOMs requirements are followed and documented.

This shift appears to recognize the agency's lack of technical and administrative resources needed to evaluate, approve, and inspect remediation studies and actions in contaminated sites, and that SEMARNAT's and its compliance arm, PROFEPA's previous command and control strategy has complicated and hindered these projects, particularly in the case of commercial and industrial property transaction operations with environmental liability issues.

The NOM's attachments include the EPA reference methods for analyzing the various hydrocarbon fractions, and a general sampling strategy decision flow diagram.

If you have questions about how this article or other health, safety or environmental issues, please contact us at (619) 297-1469 or send us an email at [emedina@pulse-point.com](mailto:emedina@pulse-point.com).

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