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StandardGuide for Terminology and Indices to Describe Oiling Conditions on Shorelines[1]

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1. Scope

1.1 This guide covers the standardized terminology and types of observational data and indices appropriate to describe the quantity, nature, and distribution of oil and physical oiling conditions on shorelines that have been contaminated by an oil spill.

1.2 This guide does not address the mechanisms and field procedures by which the necessary data are gathered; nor does it address terminology used to describe the cultural resource or ecological character of oiled shorelines, spill monitoring, or cleanup techniques.

1.3 This guide applies to marine shorelines (including estuaries) and may also be used in freshwater environments (rivers and lakes).

1.4 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

F1686 Guide for Surveys to Document and Assess Oiling Conditions on Shorelines

3. Terminology

3.1 *Definitions:*

3.1.1 *asphalt pavement*—a naturally formed cohesive mixture of weathered oil and sediments. Sediments in the mixture are usually in the sand/granule/pebble size range. In appearance, natural asphalt pavement may resemble the mixture artificially created to surface roads.

3.1.2 *shore zones*—the land-water interface is typically subdivided into across-shore zones as follows:

Tidal Environments

Lower Intertidal Zone—the lower approximate one-third of the intertidal zone
Mid Intertidal Zone—the middle approximate one-third of the intertidal zone
Upper Intertidal Zone—the upper approximate one-third of the intertidal zone
Supra-Tidal Zone—the area above the mean high tide that occasionally experiences wave activity; also known as the splash zone

Non-Tidal and Lake Environments

Lower Swash Zone—the area between the mean annual water level and the lowest annual water level, the lower approximate one-half of the zone of wave activity
Upper Swash Zone—the area between the highest annual water level and the mean annual water level; the upper approximate one-half of the zone of wave activity
Supra-Swash Zone—the area above the highest annual water level that occasionally experiences wave activity, for example, during a surge or a storm event

River Environments

Lower Bank—exposed only during low flow conditions
Midstream—areas exposed in a channel that are separated from the river bank
Upper Bank—under water only during bank-full river stage
Overbank—flood plain-inundated only by over-bank flow during flood conditions

3.1.3 *weathered oil*—the oil that has had an alteration of physical or chemical properties, or both, through natural processes such as evaporation, dissolution, oxidation, emulsification, and biodegradation.

4. Significance and Use

4.1 In order to ensure data consistency, it is important to use standardized terminology and definitions in describing oiling conditions.[3] This guide provides a template for that purpose.

4.2 Data on oiling conditions at a shoreline are needed to provide an accurate perspective of the nature and scale of the oiling problem and to facilitate spill-response planning and decision making. Data on oiling conditions would be used in assessing the need for cleanup actions, selecting the most

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Owens, E. H. and Sergy, G. A., *The SCAT Manual: A Field Guide to the Documentation and Description of Oiled Shorelines,* Second Edition, Environment Canada, Edmonton, AB, 2000.

appropriate response technique(s), determining priorities for cleanup, and evaluating the endpoint of cleanup activities.[4,5]

4.3 Mechanisms by which data are collected may vary (see Guide F1686). They may include aerial video surveys or ground-level assessment surveys. The composition and responsibility of the survey team will depend on the response organization and objectives. The magnitude and type of data sets collected may likewise vary with the nature of the spill and operational needs.

4.4 Consistent data sets (observations and measurements) on shoreline oiling conditions are essential within any one spill in order to compare the data between different sites or observers, and to compare the data against existing benchmarks or criteria that have been developed to rate the nature or severity of the oiling. To the extent possible, consistency is also desirable between different spills, in order to benefit from previous experiences and cleanup decisions.

4.5 It is recognized that some modifications may be appropriate based on local or regional geographic conditions or upon the specific character of the stranded oil.

5. General Considerations

5.1 Shoreline conditions can be described in terms of the length, width, depth, distribution, quantity, and character of oil contamination. These six different types of data are collected by direct measurement or direct visual estimates calibrated against existing scales or indices. Standard definitions and descriptors of these data have been developed (Sections 6 and 7). Second-order applications of the basic data are further used to aid response planning (Sections 8 and 9).

5.2 Descriptions of shoreline oiling conditions are typically referenced to the lateral (seaward to landward) shoreline zonation. The location of the stranded oil within the intertidal zone affects operational access time and oil persistence.

5.2.1 Tidal zonation is described in terms of the supra-tidal, upper/mid/lower intertidal, and sub-tidal zones.

5.2.2 Non-tidal shoreline zonation is described in terms of the supra/upper/lower swash zone for lacustrine (lake) environments and the over/upper/lower bank or midstream for riverine (river) environments.

5.3 Oil persistence and the choice of cleanup options will be different for subsurface oil as opposed to surface oil. Descriptions of shoreline oiling conditions should distinguish between the oiling of surface sediments from that on the subsurface sediments (vertical zonation). On coarse sediment beaches, it can be difficult to differentiate the vertical boundaries. Fig. 1 illustrates an approach for discriminating those boundaries.

5.4 For beaches with fine sediments (that is, pebble, granule, sand, and mud), the subsurface begins at 5 cm below the surface. If a pit were to reveal oiling in sand from the surface down to 20 cm, the upper 5 cm would be classified as surface oil and the remainder as subsurface. However, the oiled interval would still be shown as 0 to 20 cm.

5.5 For beaches with coarse sediments (that is, cobble and boulder), the subsurface begins at the bottom of the surface material (that is, where the top layer of cobbles or boulders contact the underlying layer of sediments).

5.6 Where asphalt pavement exists on the surface, the subsurface begins at the bottom of the pavement.

5.7 Definitions of the inorganic sediments based on size are as follows:

Boulder	(>256-mm diameter)
Cobble	(64 to 256-mm diameter)
Pebble	(4 to 64-mm diameter)
Granule	(2 to 4-mm diameter)
Sand	(0.06 to 2-mm diameter)
Mud/silt/clay	(<0.06-mm diameter)

6. Description of Shoreline Surface-Oiling

6.1 *Oil Length*—This refers to the along-shore length of oiled shoreline.

6.1.1 The length should be described in numeric terms, as the actual measured or estimated value.

6.1.2 The length value must clearly indicate a reference to one of three different delineations:

6.1.2.1 The length of oiled-shoreline, which is the length of any single continuous oiling deposit and which is keyed to a specific shoreline location;

6.1.2.2 The total length of oiled-shoreline, which is the sum of the individual continuous oilings; or

6.1.2.3 The total length of affected shoreline, which is the total length of shoreline in the spill path (the distance between the two extreme strike points) and includes non-oiled sections of shoreline as well as oiled shoreline.

6.2 *Oil Width*—This refers to the average across-shore width of the oil band or oiled area.

6.2.1 If multiple bands or areas occur across-shore, the width represents the sum of their widths.

6.2.2 The width should be described by the actual numeric (measured or estimated) value.

6.2.3 Where a descriptive expression is required or for the purpose of aggregation of the actual data, use a simplified classification scheme.

6.2.3.1 Most marine shorelines can use the following definitions:

Wide	>6 m
Medium	>3 to ≤6 m
Narrow	>0.5 to ≤3 m
Very narrow	≤0.5 m

6.2.3.2 Areas of micro-tidal (for example, Great Lakes) or macro-tidal (for example, Bay of Fundy or Cook Inlet) exposure will require an adjustment based on the width of the shoreline.

6.3 *Oil Distribution*—This refers to the percentage of the shoreline surface sediments that are covered with oil, within a fixed area.

[4] Owens, E. H. and Sergy, G.A., A Shoreline Response Decision-Making Process, Proceedings, International Oil Spill Conference, American Petroleum Institute, Washington, DC, 2008, pp. 443–449.

[5] Sergy, G. A., and Owens, E. H., Selection and Use of Shoreline Treatment Endpoints for Oil Spill Response, Proceedings, International Oil Spill Conference, American Petroleum Institute, Washington, DC, 2008, pp. 847–854.