This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

Designation: F1687 – 22

Standard Guide for Terminology and Indices to Describe Oiling Conditions on Shorelines and Other Terrain[1]

This standard is issued under the fixed designation F1687; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

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

1.4 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

F1686 Guide for Surveys to Document and Assess Oiling Conditions

F2204/F2204M Guide for Describing Shoreline and Inland Response Techniques

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 *habitat types and zones*—the land-water interface is typically subdivided into across-shore zones. Dry land terrain is typically distinguished by climate, altitude, and species. From Guide F2204/F2204M;

3.1.2.1 *Discussion*—Marine and estuarine shorelines, river banks, and lake shores will be collectively referred to as shorelines, shores, or shore-zones.

3.1.2.2 *Discussion*—Shore types include a range of impermeable (bedrock, ice, and manmade structures), permeable (flats, beaches, and manmade), and coastal wetland (marshes, mangroves,) habitats.

3.1.2.3 *Discussion*—Other non-shoreline, inland habitats include wetlands (pond, fen, bog, swamp, tundra, and shrub) and drier terrains (grassland, desert, forests), and will be collectively referred to as either wetlands or terrains, respectively

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 Waters 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

Dry Land Terrains

[1] This guide is under the jurisdiction of ASTM Committee F20 on Hazardous Substances and Oil Spill Responseand is the direct responsibility of Subcommittee F20.17 on Shoreline and Inland Countermeasures.

Current edition approved Sept. 1, 2022. Published October 2022. Originally approved in 1996. Last previous edition approved in 2016 as F1687 – 16. DOI: 10.1520/F1687-22

[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.

Copyright © ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959. United States

Desert—arid lands with little precipitation, of which there are four broad types: hot and arid, semi-arid, coastal, and cold
Forest—treed lands of which there are three broad types: tropical, temperate, and boreal/taiga
Grassland—grass-dominated lands of which there are two broad types: tropical and temperate
Tundra—cold, treeless areas of far northern latitudes or alpine altitudes, of which there are two broad types: arctic and alpine.

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 (**1**)[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 appropriate response technique(s), determining priorities for cleanup, and evaluating the endpoint of cleanup activities.(**2-3**)

4.3 Mechanisms by which data are collected can vary (see Guide F1686). They can 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 can 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 Terrain conditions can be described in terms of the length, width, depth, distribution, quantity, and character of stranded oil. Recognizing that a terrain segment can have distinct oiled zones, oiling conditions are documented on a zone-by-zone basis. The six different types of oiling 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.

5.2.3 Dry land terrain zonation can be described in terms of discrete areas of similar slope, substrate, and vegetation. Zonation can also be described in terms of polygons that relate to areal changes in habitat type or oiling conditions, or both.

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 areas with fine sediments (that is, pebble, granule, sand, and mud), the subsurface layers 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 (Fig. 1). However, the oiled interval would still be shown as 0 to 20 cm.

5.5 For areas with coarse sediments (that is, cobble and boulder), the subsurface layers begin 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 (diameter) are as follows:

Boulder >256-mm
Cobble 64 to 256-mm
Pebble4 to 64-mm
Granule 2 to 4-mm
Sand 0.06 to 2-mm
Mud/silt/clay <0.06-mm

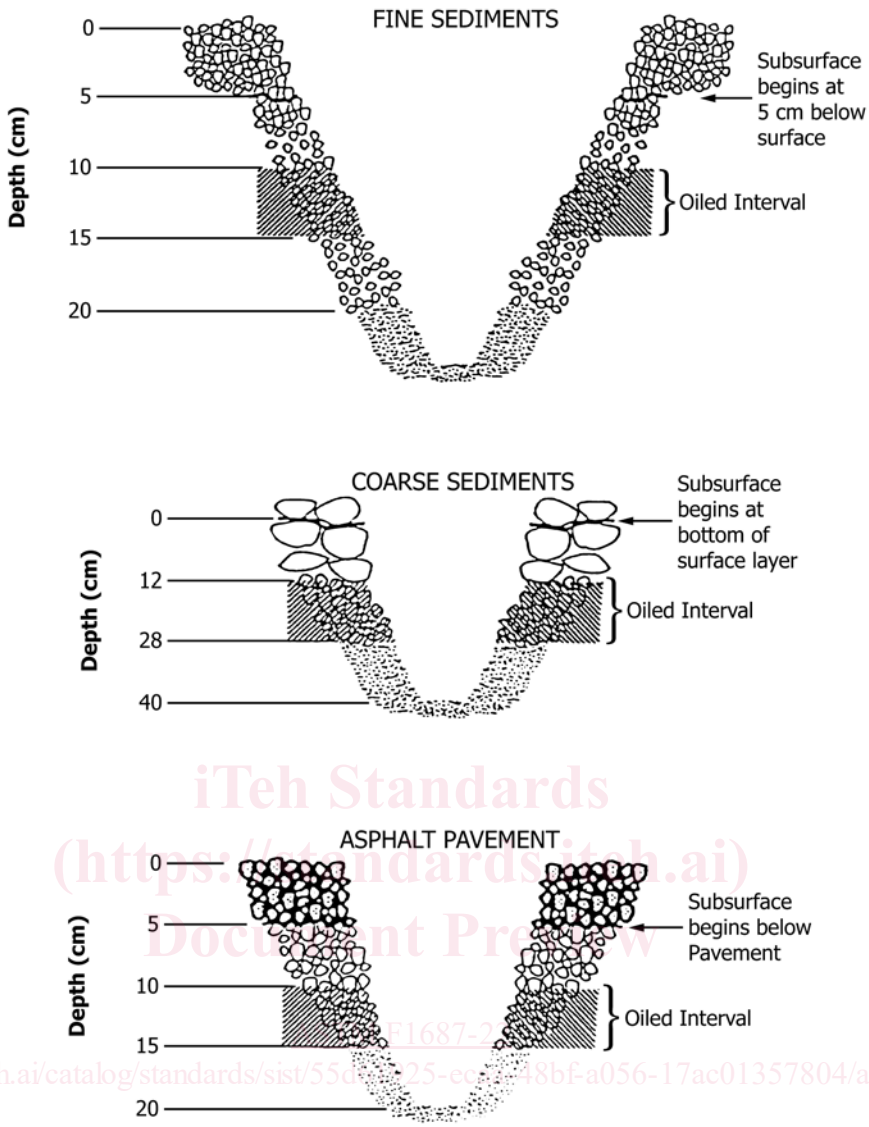
5.8 Terms and abbreviations used to describe ice and snow conditions are as follows; (**4-5**)

Snow (SNW)
Frozen Swash (FSW)
Frozen Spray (FSP)
Ice Foot (IFT)
Ice-push Ridge (IPR)
Grounded Ice Floes (GFL)
Glacier Ice (GLC)
Fresh Water Ice (FWI)

6. Description of Terrain Surface-Oiling

6.1 *Oil Length*—This refers to the length of oil impacted area.

[3] The boldface numbers in parentheses refer to a list of references at the end of this standard.



iTeh Standards
(https://standards.iteh.ai)
Document Preview
https://standards.iteh.ai/catalog/standards/sist/55d...F1687-22...-ec...48bf-a056-17ac01357804/astm-f1687-22

FIG. 1 Subsurface Boundaries for Various Beach Types (1, 4)

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 oil impacted area, which is the length of any single continuous oiling deposit and which is keyed to a specific location;

6.1.2.2 The total length of oiled-affected area, which is the sum of the individual continuous oil zones; or

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

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

6.2.1 If multiple bands or areas occur, 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 On sloping shorelines, the width of the oiled band or oiled area is affected by the tidal range. Oil width can be categorized based on tidal range or shoreline environment. **(6)**

	Small tidal range (< 2m), lake or river shoreline	Large tidal range (> 2m)
Wide	> 2 m	>6 m
Medium	1–2 m	3 to 6 m
Narrow	0.3–1 m	0.5 to 3 m
Very narrow	<0.3 m	0.5 m

6.2.3.2 The “small tidal range” would be applicable for areas with micro-tidal environments (for example, the Great Lakes or the Gulf of Mexico), whereas a “large tidal range” would be applicable in macro-tidal environments (for example, Bay of Fundy or Cook Inlet).

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

zone. In the event of multiple bands, distribution refers to the estimated percentage that best represents the collective bands within an oil zone.

6.3.1 In the event of multiple bands, distribution refers to the estimated percentage that best represents the collective area.

6.3.2 Distribution should be described by the representative percentage oil cover that was observed within the oil zone.

6.3.3 Where a descriptive expression is required, or for the purpose of aggregation of the actual value, use the following classification for surface oil cover:

Trace	<1 %
Sporadic	1 to 10 %
Patchy	11 to 50 %
Broken	51 to 90 %
Continuous	91 to 100 %

6.4 *Surface-Oil Quantity*—This describes the amount of oil on surface sediments. The quantity is usually expressed as thickness (or concentration in the case of oil tar balls and patties, or if oil chemical analyses are used).

6.4.1 Direct measurement of oil thickness can be made for very thick and larger deposits of oil. Visual estimates of the thickness of oil on the surface sediments can be used in the field. The dominant oil thickness within an oil zone can be described as:

6.4.1.1 *Pooled or Thick Oil (TO),* generally consisting of fresh oil or mousse accumulations >1-cm thick.

6.4.1.2 *Cover (CV),* 0.1 cm and ≤1-cm thick.

6.4.1.3 *Coat (CT),* >0.01 cm to 0.1-cm thick coating. This can be scratched off on coarse sediments or bedrock.

6.4.1.4 *Stain (ST),* less than or equal to 0.01-cm thick. An oil residue discoloration on the sediment surface. It cannot be scratched off easily on coarse sediments or bedrock.

6.4.1.5 *Film (FL),* transparent or translucent thin layer or sheen.

6.4.2 The oil concentration for tar balls/patties can be expressed as number per length of affected area. Alternatively (not usually done in SCAT), oil concentration can be determined by chemical analytical methods and is expressed as the weight of oil to weight of surface sediment.

6.5 *Oil Character*—This refers to properties or form of the oil residue on the affected terrain.

6.5.1 Qualitative descriptors of oil character can be developed to suit the circumstances of the spill. Typical descriptors are as follows:

6.5.1.1 *Freshlike (FR),* having a black, shiny, fluid, non-oxidized appearance.

6.5.1.2 *Tarry (TC),* having a tacky, tar-like, often weathered, semi-solid consistency.

6.5.1.3 *Surface Oil Residue (SR),* consisting of non-cohesive oiled, surface sediments, either as continuous patches or in coarse-sediment interstices.

6.5.1.4 *Mousse (MS),* emulsified oil (oil and water mixture) existing as patches or accumulations, or within interstitial spaces

6.5.1.5 *Tar Balls or Mousse Patties (TB),* discrete balls or patties on a beach or adhered to rock or coarse-sediment shoreline. Tar ball diameters are generally <0.1 m and patties are ≥0.1 to 1 m.

6.5.1.6 *Asphalt Pavement (AP),* cohesive mixture of weathered oil and sediments.

6.5.1.7 *Sheen (SH),* a very thin transparent or translucent oil layer ranging in color from silver to rainbow to light brown, of approximate thickness of 0.0001 to 0.001 mm

6.5.2 Physical and chemical analytical characterization of the oil residues can be used on selected samples to determine oil properties.

7. Description of Subsurface-Oiling

7.1 *Depth*—This refers to the depth of penetration or burial of the oil into the subsurface sediments, or both. It is the distance measured from the ground surface to the bottom of the oiled zone, or to the bottom of a discrete lens of oil that exists beneath the surface. In the latter case, the thickness of the oil lens is also measured, that is, top and bottom boundaries.

7.2 *Subsurface-Oil Quantity*—This refers to the amount of oil in the subsurface sediments (see 5.3 for guidance on vertical zonation). The quantity can be expressed in descriptive terms or by measurements of concentration. Qualitative descriptions facilitate rapid field estimates of oil volume and may also reflect actual spill conditions. Typical descriptors may include the following:

7.2.1 *Oil-Filled Pores (OP)*—Pore spaces in the sediment matrix completely filled with oil. They are often characterized by oil flowing out of the sediments when disturbed.

7.2.2 *Partially Filled Pores (PP)*—Pore spaces filled with oil, but it generally does not flow out when exposed or disturbed.

7.2.3 *Cover or Coat or Stain or Film* (see 6.4.1)—Oil residue on larger grained-sized sediments.

7.2.4 *Trace (TR)*—A discontinuous film or spots of oil on sediments, or an odor or tackiness with no visible evidence of oil.

7.2.5 *Asphalt Pavement (AP)*—Cohesive mixture of weathered oil and sediments situated completely below a surface sediment layer (note thickness).

7.2.6 Chemical analytical methods can be used on selected samples to determine the oil quantity as a concentration (expressed as the weight of oil to weight of sediment at a specified subsurface location).

7.3 *Subsurface-Oil Length or Width*—This refers to the along-shore length or across-shore width of oiled subsurface sediment at a specific location (see 6.1 and 6.2).

8. Other Calculations

8.1 *Total Oiled Area = Length × Width Data* (6.1 and 6.2)—This refers to the total surface area within which there is oil (of varying distribution). This value can be used in planning cleanup operations and in monitoring changes through time.

8.2 *Surface Oil Cover = (Length × Width) × Distribution Data* (6.1, 6.2, and 6.3)—This is a measure of the actual surface area that is covered by oil, that is, the total oiled area × % coverage (also known as equivalent area oiled). This value is useful when trying to quantify the degree of oiling or to monitor changes and oil removal rates.

iTeh Standards
(https://standards.iteh.ai)
Document Preview
ASTM F1687-22
https://standards.iteh.ai/catalog/standards/sist/55d61925-ecaa-48bf-a056-17ac01357804/astm-f1687-22