



Designation: D7629/D7629M – 10

## Standard Practice for Minimum Geospatial Data for Representing Coal Spoil and Refuse Features<sup>1</sup>

This standard is issued under the fixed designation D7629/D7629M; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This practice defines a set of terms, procedures, and data elements required to develop a national spatial dataset of features associated with excess spoil and refuse materials produced by coal mining operations. These features include excess spoil structures, coal preparation plants, and coal refuse structures.

1.1.1 *Excess Spoil Structures*—are created when the total spoil produced during mining exceeds the volume of material that can be utilized for reclamation. This occurrence is common in steep slope areas, where the final grade of reclaimed slopes is limited by stability requirements. It also occurs where overburden volume is significantly larger than the volume of minable coal. Spoil also exhibits a net increase in volume due to the introduction of void spaces in fragmented rock when overburden is removed to expose underlying coal seams. The production of excess spoil requires the creation of disposal structures that extend outside the mined area. These structures usually take the form of out-of-pit spoil piles, side-hill fills, or valley fills (See Fig. 1).

1.1.2 *Coal Preparation Plants*—are facilities where coal is separated from non-combustible materials, and potentially crushed, resized, and blended with other grades of coal. Preparation plants produce refuse as a byproduct.

1.1.3 *Refuse*—is a waste byproduct of coal processing, generally categorized as either coarse or fine. Fine coal refuse often is handled as a slurry containing a blend of water, fine coal, silt, sand, and clay particles.

1.1.4 *Impounding Refuse Structures*—create a holding area for slurry that allows solids to settle out and water to be recovered. Cross-valley and diked impoundments utilize an embankment, often constructed of coarse coal refuse, which forms a basin for slurry retention, as shown in Fig. 2 and Fig. 3 respectively. Incised impoundments dispose of slurry in an excavated area below the natural surface and do not utilize a significant embankment for slurry retention (See Fig. 4).

1.1.5 *Non-Impounding Refuse Structures*—may contain slurry that has been dewatered and stabilized prior to disposal. Non-impounding structures also may utilize slurry cells to dispose of fine refuse. Methods that significantly reduce the water content of fine coal refuse may allow a refuse structure to avoid being classified as an impoundment.

1.2 This practice addresses coal mining geospatial data relative to the Surface Mining Control and Reclamation Act of 1977 (SMCRA).<sup>2</sup> SMCRA authorizes state and tribal Regulatory Authorities (RAs) to regulate surface coal mining operations (SCMO). Each RA shall be the authoritative data source (ADS) for coal mining geospatial data associated with its area of responsibility.

1.3 This standard is one of several that have been approved or are in development related to SMCRA approved coal mining operations. Also under development is a terminology standard. Initial development of these standards is being done on an individual basis; however, they may be consolidated to reduce repetition of information between them.

1.4 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the 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 regulator limitations prior to use.*

1.6 This practice offers a set of instructions for performing one or more specific operations. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this practice may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.01 on Surface and Subsurface Characterization.

Current edition approved May 15, 2010. Published June 2010. DOI: 10.1520/D7629\_D7629M-10.

<sup>2</sup> Public Law 95-87, the Surface Mining Control and Reclamation Act of 1977 (SMCRA), passed August 3, 1977, as amended.

a project's many unique aspects. The word "Standard" in the title of this document means only that the document has been approved through the ASTM consensus process.

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>3</sup>

**D653 Terminology Relating to Soil, Rock, and Contained Fluids**

### 2.2 ANSI Standards:<sup>4</sup>

**ANSI INCITS 61-1986 (R2002) Geographic Point Locations for Information Interchange, Representation of (formerly ANSI X3.61-1986 (R1997))**

**ANSI INCITS 320-1998 (R2003) Information technology—Spatial Data Transfer**

### 2.3 Federal Geographic Data Committee Standards:<sup>5</sup>

**FGDC-STD-001 Content Standard for Digital Geospatial Metadata**

**Project 1574-D Information Technology—Geographic Information Framework Data Content Standard, Part 5 Governmental Unit and Other Geographic Area Boundaries**

### 2.4 Code of Federal Regulations:<sup>6</sup>

**30 CFR Part 700, et seq.**

## 3. Terminology

3.1 Except as listed or noted below, all definitions are in accordance with Terminology **D653**.

### 3.2 Definitions of Terms Specific to This Standard:<sup>7</sup>

3.2.1 *attribute*, *n*—a defined characteristic of a feature.

3.2.2 *attribute value*, *n*—a specific quality or quantity assigned to an attribute.

3.2.3 *basin*, *n*—for purposes of this standard, the area where slurry is deposited in an impoundment.

3.2.4 *coal preparation*, *n*—chemical or physical processing and the cleaning, concentrating, or other processing or preparation of coal.

3.2.5 *coarse coal refuse*, *n*—a solid waste material separated from coal during processing, consisting primarily of fragments of shale, siltstone, and claystone rock, with lesser amounts of sandstone and limestone. Coarse coal refuse can vary widely in size, from silt to cobble, but is distinguished from fine coal refuse in that it is handled and disposed of as a dry solid, often in an embankment.

3.2.6 *cross-valley impoundment*, *n*—a type of slurry impoundment formed by constructing an embankment across the

downstream side of a catchment area, allowing slurry to be retained upstream of the embankment (see **Fig. 2**).

3.2.7 *diked impoundment*, *n*—a type of impoundment in which slurry is retained by constructing an enclosing embankment. On flat terrain, the embankment may encircle the slurry basin completely. Alternatively, the embankment may be omitted on one side in gently sloping terrain (See **Fig. 3**).

3.2.8 *domain*, *n*—a finite list (or range) of permissible values for a specified attribute.

3.2.9 *durable rock fill*, *n*—the most commonly-constructed type of valley fill, durable rock fills advance from the head of a valley downstream by gravity segregation of dumped durable overburden. Durable overburden is classified as consisting of at least 80 percent durable rock on a unit volume basis, or rock that can pass certain strength and weathering tests, such as a slake durability test.

3.2.10 *embankment*, *n*—a man-made deposit of earth or coarse coal refuse, that is raised above the natural surface of the land. For the purposes of this standard, embankments are a component of an impoundment used to retain slurry.

3.2.11 *excess spoil*, *n*—spoil material disposed of in a location other than the mined-out area, excluding spoil material used to achieve the approximate original contour or to blend the mined-out area with the surrounding terrain.

3.2.12 *feature*, *n*—a geographical representation of either a discrete real-world phenomenon, such as a building, or an abstract concept, such as a governmental boundary.

3.2.13 *feature class*, *n*—a collection of similar features having the same geometry type, coordinate system, and a common set of descriptive attributes.

3.2.14 *fine coal refuse*, *n*—waste material that is hydraulically separated from coal during processing. Particle size varies from clay or very fine silt to fine sands. Solids are suspended in a water solution, or slurry, and usually transported through a pipeline.

3.2.15 *head-of-hollow fill*, *n*—a type of valley fill, in which the top surface of the fill, when completed, is at approximately the same elevation as the adjacent ridge line, and no significant area of natural drainage occurs above the fill draining into the fill area.

3.2.16 *impoundment*, *n*—a structure created for the retention of slurry, consisting of a basin where slurry is deposited, and usually an embankment.

3.2.17 *incised impoundment*, *n*—an impoundment formed by excavation below the original surface elevation (See **Fig. 4**).

3.2.18 *national ID*, *n*—permit ID assigned to SCMO by RA, prefixed with state or tribal abbreviation.

3.2.19 *Office of Surface Mining Reclamation and Enforcement (OSM)*, *n*—OSM is the federal government bureau established under Title II of SMCRA, found within the United States Department of Interior (DOI). The SMCRA provides OSM a legal basis for assigning primary responsibility for regulation of coal mining operations and reclamation of abandoned mine land to the states and Indian tribes. Twenty-four coal resource states have been granted primary regulatory

<sup>3</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>4</sup> Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

<sup>5</sup> Available from Federal Geographic Data Committee, 590 National Center, Reston, VA 20192, [www.fgdc.gov](http://www.fgdc.gov).

<sup>6</sup> Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, <http://www.access.gpo.gov>.

<sup>7</sup> The terms defined here are consistent with those defined in 30 CFR Part 700, et seq., though not verbatim.

authority, also known as “primacy,” and the exclusive jurisdiction of the implementation of SMCRA. In coal states that do not have primacy, and some federal and Indian lands, OSM issues the coal mine permits, conducts the inspections, and handles the enforcement and reclamation responsibilities.

3.2.20 *overburden, n*—consolidated or unconsolidated material of any nature which overlies a coal deposit, excluding topsoil.

3.2.21 *permit, n*—written authorization to conduct coal mining and reclamation operations issued by an RA to a permittee.

3.2.22 *permit area, n*—the area of land, indicated on the latest map approved by the RA, upon which the permittee may conduct coal mining and reclamation operations.

3.2.23 *permit ID, n*—unique identifier assigned by the RA for administrative purposes.

3.2.24 *permit status, n*—to identify between active and inactive SCMO.

3.2.25 *permittee, n*—an entity to whom a permit has been issued by an RA to conduct coal mining and reclamation operations.

3.2.26 *point, n*—a geometry type that specifies a geographic location.

3.2.27 *polygon, n*—a geometry type that specifies the boundaries of a geographic area.

3.2.28 *preparation plant, n*—a facility where coal is subjected to chemical or physical processing or cleaning, concentrating, or other processing or preparation. It includes facilities associated with coal preparation activities, including, but not limited to the following: loading facilities; storage and stockpile facilities; sheds; shops and other buildings; water-treatment and waterstorage facilities.

3.2.29 *reclamation, n*—those actions taken to restore disturbed land to the post-mining land use approved by the RA.

3.2.30 *regulatory authority, n*—entity(s) with jurisdiction over the regulation of coal or non-coal mining or both and reclamation operations or mitigation or both of AML problems under a program approved by the Secretary of the United States Department of the Interior.

3.2.31 *side hill fill, n*—a controlled earth and rock fill other than a valley fill or head-of-hollow fill that forms a stable, permanent storage space for excess spoil.

3.2.32 *slurry, n*—a waste product from processing coal, consisting of a mixture of water, fine coal refuse, silt, sand, and clay particles, which is most commonly disposed of in an impoundment.

3.2.33 *slurry cell, n*—a disposal method in which slurry is placed in isolated troughs constructed from coarse coal refuse. After the moisture content reaches a specified level, the consolidated material is covered with additional coarse refuse, encapsulating the cell.

3.2.34 *spoil, n*—overburden that has been removed during coal mining operations.

3.2.35 *state, n*—a state of the United States of America. The twenty-four “primacy” states include Alabama, Alaska, Arkansas, Colorado, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Mississippi, Missouri, Montana, New Mexico, North Dakota, Ohio, Oklahoma, Pennsylvania, Texas, Utah, Virginia, West Virginia, and Wyoming.

3.2.36 *tribe, n*—Any Native American or Alaskan Native tribe, band, group, or community having a governing body recognized by the DOI Secretary that has assumed full regulatory authority over the administration and enforcement of coal mining operations or abandoned mine lands on Native American lands. Navajo, Hopi, and Crow tribes have initiated efforts to assume primacy in being the RA.

3.2.37 *valley fill, n*—an excess spoil structure consisting of any material, other than organic material, that is placed in a valley where side slopes of the existing valley, measured at the steepest point, are greater than 20 degrees, or where the average slope of the profile of the valley from the toe of the fill to the top of the fill is greater than 10 degrees (See Fig. 1).

### 3.3 Acronyms:

3.3.1 *ADS*—authoritative data source

3.3.2 *CAD*—computer aided design

3.3.3 *CFR*—Code of Federal Regulations

3.3.4 *DOI*—U.S. Department of the Interior

3.3.5 *FGDC*—Federal Geodetic Data Committee

3.3.6 *GIO*—Geospatial Information Officer within OSM, oversees compilations of SMCRA-related data

3.3.7 *GIS*—geographic information system

3.3.8 *MSHA*—Mine Safety and Health Administration

3.3.9 *NAD*—North American Datum

3.3.10 *NAVD88*—North American Vertical Datum of 1988

3.3.11 *OSM*—Office of Surface Mining Reclamation and Enforcement

3.3.12 *RA*—regulatory authority

3.3.13 *SCMO*—surface coal mining operation(s).

3.3.14 *SI*—International system of units

3.3.15 *SMCRA*—Surface Mining Control and Reclamation Act of 1977 as amended

3.3.16 *TOJ*—termination of jurisdiction

## 4. Significance and Use

4.1 Failures associated with coal refuse structures have resulted in loss of life, destruction of property, and extensive environmental damage. Notable examples include the 1972 failure of a slurry impoundment on Buffalo Creek in Southern West Virginia that killed 125 people and rendered over 4,000 people homeless. In 2001, an impoundment near Inez, Kentucky broke through underground mine passages, releasing approximately 250 million gallons of slurry into adjacent waterways, causing extensive damage to property and habitat along 75 miles of streams.

4.2 Surface mining in steep slope areas has created thousands of valley fills, burying hundreds of miles of potential