



Standard Practice for Minimum Geospatial Data for Postmining Land Uses¹

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1. Scope

1.1 This practice describes minimum data required to locate and identify a postmining land use for a surface coal mining and reclamation operation. Statutory language and definitions are found in Federal regulations 30 CFR 816/817.133 and 30 CFR 701.5.

1.1.1 These postmining land use designations reflect coal mining reclamation practices relative to the standards set forth in the Surface Mining Control and Reclamation Act of 1977 (SMCRA).² Geospatial data associated with postmining land use shall be obtained from each regulatory authority (RA), which are authorized under SMCRA to regulate surface coal mining operations (SCMO) and reclamation activities within their borders. Each RA shall be the authoritative data source (ADS) for coal mining geospatial data.

1.2 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.

1.3 This practice is limited to permitted coal mining operations after the passage of SMCRA.

1.4 SMCRA identifies land use categories for surface coal mining permits, such as cropland, pasture/hayland, grazing land, forest, residential, fish and wildlife habitat, developed water resources, public utilities, industrial/commercial, and recreation.

1.5 Postmining land uses for mountaintop removal and steep slope mining operations with approximate original contour (AOC) variances include the following:

1.5.1 A mountaintop removal AOC variance may only be granted if the applicant proposes to remove the entire coal seam or seams running through the upper fraction of the hill, ridge, or mountain creating a level plateau or gently rolling contour with no highwalls remaining, and capable of supporting the following postmining land uses.

1.5.2 The proposed postmining land use for a mountaintop removal operation with an AOC variance is limited to industrial, commercial, agricultural, residential, or public facility use.

1.5.3 The proposed use constitutes an equal or better economic or public use compared with the pre-mining use.

1.5.4 The proposed use will be compatible with adjacent land uses and existing state and local land use plans.

1.5.5 County commissions and other state and federal agencies were provided an opportunity to review and comment on the proposed postmining land use.

1.5.6 The application contains a specific plan and assurances that the proposed postmining land use will be:

1.5.6.1 Compatible with adjacent land uses; practicable with respect to financing and completing the proposed use; supported by commitments from public agencies where appropriate;

1.5.6.2 Planned pursuant to a schedule attached to the reclamation plan so as to integrate the mining operation and reclamation with the postmining land use;

1.5.6.3 Designed by a registered professional engineer to assure the stability, drainage, and configuration necessary for the intended use of the site.

1.6 Units—The values stated in either SI units or inchpound 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 nonconformance with the standard.

1.7 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

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



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 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.

1.8 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:³

- D653 Terminology Relating to Soil, Rock, and Contained Fluids
- D5254 Practice for Minimum Set of Data Elements to Identify a Ground-Water Site
- D5911 Practice for Minimum Set of Data Elements to Identify a Soil Sampling Site
- 2.2 ANSI Standards:⁴
- 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:⁵
- 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:⁶

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:⁷

3.2.1 *active SCMO*—a SCMO that has ongoing coal production or reclamation activities or both.

3.2.2 *attribute*—a defined characteristic of a feature.

3.2.3 *attribute value*—a specific quality or quantity assigned to an attribute.

3.2.4 *authoritative data source*—a recognized source as defined in SMCRA.

 7 The terms defined here are consistent with those defined in 30 CFR Part 700 and SMCRA, though not verbatim.

3.2.5 *feature*—geographical representation of a discrete real world phenomena. For this standard the geographical representation is usually realized in a digital information system such as a GIS represented as points, lines, and polygons.

3.2.6 *National ID*—permit ID assigned to SCMO by RA, prefixed with state or tribal abbreviation.

3.2.7 *National Map Data Steward*—the OSM designated liaison by the RA.

3.2.8 *permit*—written authorization to conduct surface coal mining and reclamation operations issued by an RA to a permittee.

3.2.9 *permit ID*—unique identifier assigned by the RA for administrative purposes.

3.2.10 *permit status*—to identify between active, inactive SCMO revoked, or final bond release (termination of jurisdiction).

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

3.2.12 *polygon*—a representation of a geographical area, consisting of a connected, non-intersecting, sequence of line segments, forming a ring, that represents the outer boundary of the area to be described. Polygons may include any number of additional interior rings representing the boundaries of areas to be excluded.

3.2.13 Office of Surface Mining Reclamation and Enforcement (OSM)—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 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.

3.2.14 *preferred domain*—a finite list (or range) of permissible values for a specified attribute.

3.2.15 *state*—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.

3.2.16 *tribe*—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.

3.2.17 *reclamation*—those actions taken to restore mined land to the postmining land use approved by the RA.

3.2.18 *regulatory authority*—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

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³ 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.

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

⁵ Available from Federal Geographic Data Committee, 590 National Center, Reston, VA 20192, www.fgdc.gov.

⁶ 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.

under a program approved by the Secretary of the United States Department of the Interior.

3.2.19 *residential*—single and multi-family housing (other than apartment houses) with necessary support facilities. Support facilities may include commercial services incorporated in and comprising less than five (5%) of the total land area of housing capacity, associated open space and minor vehicle parking and recreation facilities supporting the housing.

3.2.20 *undeveloped land*—land that is undeveloped, or, if previously developed, has been allowed to return naturally to an undeveloped state.

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 GIS—Geographic Information System

3.3.7 MSHA-Mine Safety and Health Administration

3.3.8 *NAD*—North American Datum

3.3.9 OSM-Office of Surface Mining Reclamation and Enforcement

3.3.10 RA-Regulatory Authority

3.3.11 *SCMO*—Surface Coal Mining Operation(s)

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

4. Significance and Use

4.1 Within its area of exclusive jurisdiction, each RA is the authoritative data source (ADS) for coal mining spatial data that it creates and uses to implement SMCRA. These standards will help ensure uniformity of coal mining geospatial data used in internal business practices, exchanged among business partners within the coal mining community, and contributed by each ADS in future efforts to create national datasets describing coal mining operations in the United States. This geospatial data standard will help with the uniformity of data contributed by each RA and assist organizations in efforts to create, utilize, and share geospatial data relative to the SMCRA. Use of this standard will result in organized and accessible data to support programmatic decisions and work plan development, increased awareness of the permitted coal mining operations throughout the United States and better communication between the RA, other governmental entities, the public, and industry.

4.2 Coal mining geospatial post mining land use data shall be obtained from state, tribal, or federal regulatory authorities for each SCMO. The coal mining community encompasses all entities directly and indirectly affected by coal mining activities, including industry, environmental groups, the general public, and the government at all levels within the United States. Use of this standard will help create consistent maps and increase understanding of SCMO sites throughout the United States. This standard promotes the creation of well organized and easily accessible surface coal mining data, and it will facilitate better communication between state and federal offices, the public, industry, and environmental groups.

4.3 Within its area of exclusive jurisdiction, each RA is the ADS for coal mining spatial data that it creates and uses to regulate mining activity.

4.4 This geospatial data standard will help ensure uniformity of data contributed by each RA and assist organizations in efforts to create, utilize, and share geospatial data relative to SMCRA and it will lead to better communication between state, tribal, and federal regulatory offices, the public, and industry.

4.5 The appropriate postmining land use for land that has been previously mined and not reclaimed shall be determined on the basis of the land use that existed prior to any mining. If the land cannot be reclaimed to its premining land use, the appropriate postmining land use shall be documented on the basis of the highest and best use that can be achieved and which is compatible with surrounding undisturbed areas.

4.6 Federal regulations do not provide explicitly for compilation of standardized land use databases that would facilitate monitoring and analysis of mining activity at regional or national levels. This standard is in response to a need for a national database which can serve as a starting point for inquires and analysis related to the locations of postmining land uses.

4.7 Within its area of exclusive jurisdiction, each RA is the ADS for coal mining and reclamation spatial data that it creates and uses to regulate mining activity. These standards will help ensure uniformity of coal mining geospatial data used in internal business practices, exchanged among business partners within the coal mining community, and contributed by each ADS in future efforts to create national datasets describing surface coal mining in the United States.

4.8 Participation in the compilation of spatial data is not uniform across RAs, which may affect completeness, both in terms of spatial data, and associated attributes.

4.9 This standard conforms to the definition of a Data Content Standard as promulgated by the U.S. Federal Geographic Data Committee (FGDC). Terminology and definitions for identifying geographical features and describing the data model has been adopted from ANSI INCITS 320-1998 (R2003) and FGDC Project 1574-D.

5. Procedure

5.1 *Introduction*—The list of postmining land use attributes represent the minimum data elements necessary to develop and maintain a nationwide geospatial data set depicting the location of each coal mining operation approved postmining land use or uses. The datasets may be served as layers, for example, in The National Map (http://nationalmap.gov), an online, interactive map service sponsored by a consortium of US Federal, State, and local partners and hosted by the U.S. Geological Survey (USGS).⁸ The National Map provides a consistent framework for high-quality, geospatial data and information from multiple partners to enhance America's ability to access, integrate, and apply current, accurate, and nationally consistent digital data at global, national, and local scales.

5.2 *Coordinates and Related Data*—Coordinates and related geospatial data allow coal mining features to be accurately positioned on the earth's surface in a variety of recognized datum, grid systems, and geographic projections. The

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⁸ USGS National Center, 12201 Sunrise Valley Drive, Reston, VA 20192, www.usgs.gov.



coal mining features are compiled from various SMCRA state and tribal data resources that utilize different datum, coordinate, and projection systems. All data will have identified datum, coordinate, and projection systems with associated precision values, accuracy values, or both, and will be reprojected to match the spatial reference parameters utilized in The National Map. The North American Datum of 1983 (NAD 83) should be used as the datum. Many states have legislated the use of NAD 83. ANSI INCITS 61-1986 (R2002) provides guidance on representation of coordinates.

5.3 A designee within the OSMRE will serve as the data steward for the national SMCRA dataset that complies with this standard. This designee will coordinate with individual RAs for submission of state or tribal data that adhere to this standard.

5.3.1 *X-Coordinate*—Universally longitude, however, most coordinate systems are convertible to longitude (See Practices D5254 and D5911).

5.3.2 *Y-Coordinate*—Universally latitude, however, most coordinate systems are convertible to latitude (See Practices D5254 and D5911).

5.3.3 Size Measurements—Distance in feet or meters, or land area in acres or hectares, derived from the X and Y coordinate positions for length and width of a surface coal mining boundary.

5.3.4 *Character Limitation*—Use no special characters or blanks in the layer name.

5.3.5 Consistent and Unique Naming Conventions—Use consistent and unique layer names.

5.3.6 Origin of Postmining Land Use Geometries—The feature geometry must originate from the most recent RA-approved map and supporting information.

5.3.7 *Geometry Type*—Required geometry is closed polygon and vector feature type.

5.3.8 *Data Type*—Data can be provided as a shapefile, coverage, geodatabase feature class, or .xml recordset. RAs are strongly encouraged to adopt enterprise geodatabase methods where practicable to maximize efficiency.

5.3.9 *Datum and Projection*—Datum (for example, NAD27, NAD83, WGS84) and projection (for example, Lambert Conformal, Transverse Mercator) specified in metadata record; provide the projection file, if available.

5.3.10 *Metadata*—Metadata documentation meets FGDC standards such as FGDC-STD-001 and is in .txt, .xml, or .sgml format. Metadata is generally created in a FGDC text format; data in shapefile or coverage format can generate metadata documentation in .xml format.

5.4 *SMCRA Entities*—State and tribal regulatory entities established under SMCRA and recognized by a national governmental agency for the purpose of regulating a land area upon which coal mining operations are conducted.

5.4.1 *Introduction*—A description of SMCRA governmental divisions helps in identification and location of postmining land uses associated with coal mining operations.

5.4.2 Office of Surface Mining Reclamation and Enforcement (OSM)—OSM, within the United States Department of the Interior (DOI), is the federal bureau established under Title II of SMCRA. The SMCRA provides OSM a legal basis for assigning primary responsibility for regulation of coal mining operations to the states, Indian tribes, or to OSM. Twenty-four coal resource states have been granted primacy and have been recognized as the RA, for the exclusive implementation of SMCRA. On federal lands, some Indian lands, and in the coal producing states that do not have regulatory programs of their own (Tennessee and Washington), OSM issues the coal mine permits, conducts the inspections, and handles the enforcement responsibilities.

5.4.3 *Primary State*—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.

5.4.4 *Tribe*—Any Native American or Alaska 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 regulation of SCMOs on Native American lands. The recognized Indian tribes, as of early 2009, which expressed interest in assuming primacy in being the RA include Navajo, Hopi, and Crow.

5.5 OSM will coordinate with the National Map Data Steward (NMDS) to make available a service containing access to a national dataset of surface coal mining boundaries. This national dataset will have the minimum attributes specified in Table 1. Extraneous attributes or fields will be removed. The NMDS will perform a format check to determine if the submittal meets the standard. The NMDS also will conduct a technical review of the data to assess the accuracy and characteristics of the data files. If errors are found or questions about the data arise, interaction between OSM and the NMDS may be needed to resolve issues before the process can be continued.

5.6 *SMCRA Entities*—State and tribal regulatory entities established under SMCRA and recognized by the OSM for the purpose of regulating a land area upon which coal mining operations are conducted.

6. Keywords

6.1 coal mining; commercial; cropland; fish and wildlife habitat and recreation lands; forestry; grazing land; hayland or pasture; heavy industry; light industry; postmining land uses; premining land uses; public services; reclamation; residential; SMCRA; surface mining; undeveloped land



TABLE 1 Approved Postmining Land Uses^{A,B}

Pasture or hay land
Grazing land
Forest land
Residential
Fish and wildlife habitat
Developed water resources
Public utilities/facilities
Industrial and commercial services
Recreation

^AThe postmining land use terms defined here are consistent with those defined in 30 CFR Part 701.5, and CFR 816.133/817.133, although not verbatim.

^BThe criteria for steep slope mining operations with AOC variances are set forth at 30 CFR 816.133(d). The approved postmining land uses are the same as for mountaintop removal operations, except agriculture is not an acceptable use; the approval criteria are different as well.

TABLE 2 Postmining Land Uses Attributes^{A,B,C,D}

Postmining Land Use Boundary Attribute	Definition	Example	Data Type	Preferred Domain	Clarification
Permittee	To whom the permit is issued	ACME Coal Mining Co., Inc.	Text		
Permit ID	Unique identifier	1201834	Text		
Reported Area	RA reported area of postmining land use(s) (acres)	23, 398	Numeric		For comparison with calculated area value
Calculated Area	System calculated area of postmining land use(s) (acres)	23,400	Numeric		For comparison with reported area value
Contact	Regulatory Authority for permit	West Virginia Department of Environmental Protection (WVDEP)	Text		
National ID	State/tribal abbrev. + permit ID	VA12011834	Text		
Edit Date	Last edit date	01/30/07	Date		To determine last update of data
Land Use Type ^E	Identifies the approved postmining land use type	Forest land	Text	Refer to Table 1	
Comment	Any additional comments as reported by the RA		Text		

^APost-mining Land Use on Mountaintop Removal and Steep Slope Mining with an AOC Variance Mountaintop Removal AOC variance criteria.

^BA mountaintop removal AOC variance may only be granted if the applicant proposes to remove the entire coal seam or seams running through the upper fraction of the hill, ridge, or mountain creating a level plateau or gently rolling contour with no highwalls remaining, and capable of supporting the permit post-mining land use. ^CThe proposed post-mining land use of AOC variance permits are limited to industrial, commercial, woodland, agriculture, residential or public (facility) use.

^DThe proposed use constitutes an equal or better use compared with the pre-mining use.

^EPasture or Hayland—Land used primarily for the long term production of forage plants to be grazed by livestock.

Forestland-Land with at least a twenty-five percent (25 %) tree canopy or land at least ten percent (10 %).

Residential-Single and multi-family housing (other than apartment houses) with necessary support facilities.

Fish and Wildlife Habitats-Wetlands, fish and wildlife habitat, and areas managed.

Public Utilities/Services—Schools, hospitals, churches, libraries, water treatment facilities, solid waste disposal facilities.

Cropland—Land use primarily for the production of cultivated and close-growing crops for harvest.

Commercial Forestry-Where forest cover is managed for commercial production of timber products.

Heavy Industry-Manufacturing facilities, power plants, airports or similar.

Light Industry and Commercial Services-Office buildings, stores, parking facilities, apartment houses, hotels.

Developed water resources (Impoundments of Water)-Land used for storing water such as irrigation, fire protection, recreation or water

supply

Recreational Uses—Any appropriate recreational use of land uses.



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