ALL MAP SUBMITTALS

Mine maps shall utilize the following KOMSL Standard Data Block:

OFFICIAL USE ONLY - SCAN FILE NAME STICKER

Kentucky Office of Mine Safety and Licensing
Mine License Map

State File No: SFN Map Scale: SCALE Sheet No. INDEX of COUNT

Federal ID No.: FED_ID Map Covers Period Ending: MAP_DATE

Mine Entry Location.: Latitude: LAT Longitude: LONG

Entry Point Quadrangle: QUAD

Nearest Named Stream: STREAM

KDMM Seam Name	Average Thickness	Average Elevation
SEAM1	THICK1	ELEV1
SEAM2	THICK2	ELEV2
SEAM3	THICK3	ELEV3
SEAM4	THICK4	ELEV4
SEAM5	THICK5	ELEV5
SEAM6	THICK6	ELEV6
SEAM7	THICK7	ELEV7

DSMRE Permit No(s).
DSMRE1
DSMRE2
DSMRE3
DSMRE4
DSMRE5
DSMRE6
DSMRE7
DSMRE8
DSMRE9
DSMRE10
DSMRE11
DSMRE12
DSMRE13

OFFICIAL USE ONLY - SFN STAMP

OFFICIAL USE ONLY - LICENSING STICKER

Map Georeferencing Information:

Datum: ☐ NAD27 ☐ NAD83 ☐ None (Local)

Mapping Projection:

State Plane: ☐ Single Zone ☐ North Zone ☐ South Zone ☐ Other: _____

UTM: ☐ Zone 16 ☐ Zone 17

Local System (Name): _____

Units: ☐ Foot ☐ Meter

Control Network or Grid Accuracy Classification:

☐ GPS Class C or Better (> 1 : 10,000)
☐ SCN Class B or Better (> 1 : 5,000)
☐ SCN Class C (< 1 : 5,000)
☐ DGPS (+/- 1 Meter)
☐ WAAS (+/- 3 Meters)
☐ AGPS (+/- 10 Meters)
☐ Digital Mapping 1 : _____
☐ Kentucky DOQ
☐ Kentucky KRG

(Shown Actual Size)

Notes on the Standard Data Block:

1. The above standard data block is 4.9” wide by 8.15” high. Text in parenthesis indicating dimensions of reserved areas shall not appear on the map. Text indicating OFFICIAL USE ONLY shall appear on the map, preferably in a visible shade of gray.
2. The block may be modified as required to meet font preferences and increase or decrease the number of lines available for seam names, however, the dimensions of the various areas labeled “OFFICIAL USE ONLY” shall be maintained as they appear above, including size and dimensions (an AutoCad DXF file of the block in R14 format may be downloaded from the KOMSL web site at http://www.dmm.ky.gov/library/minemappingtech.htm).
3. The upper right corner of the standard data block shall coincide with the upper right corner of the map border.
4. All text and attribute definitions in the standard data block shall meet the metric requirements outlined below.

All mine maps shall provide the information as required on the Map Transmittal Letter and utilize the format of the Certification Block and standard symbols. All seals shall be stamped in ink.

Allowable Sheet Size:

The overall mapped area shall not exceed 46 inches by 70 inches, shall be bounded by a linear border having a line weight of not less than 0.010” (0.25 mm), and there shall be a minimum 1” margin between the map border and the outer edge of the mapping media in all directions. The maximum dimension of the map sheet media shall not exceed 48 inches by 72 inches.

Mapped areas that are too large to cover with one sheet at nominal scale shall include match lines on the required mosaic sheets indicating the location of contact or overlap between them. A small index map shall be included on each sheet indicating the respective sheet’s position relative to the overall mapped area.

Seam Names

Coal seam names shall conform with standardized seam names as correlated to the mine’s position within the regional stratigraphic column as specified on the relevant USGS Geologic Quadrangle or the listing of Kentucky Coal Seams available from the Kentucky Mine Mapping web site at http://minemaps.ky.gov/seamsearch2.htm

Mined Out Areas

All mined out areas shall be shown in detail on all mine maps.

Underground Mines

Auger and highwall miner holes and areas of surface disturbance associated with mine operations shall be shown in detail on all mine maps. Underground mine map dates shall be shown clearly indicating the period the works were mined. In cases where various mined out areas overlay one another, separate map sheets or separate map frames on the same sheet shall be utilized.

Surface Mines

All old surface mine works relevant to coal removal must be clearly mapped and dated for the time period the respective areas were mined with separate colors or patterns indicating the various coal seams mined. In cases where various mined out areas overlay one another, separate map sheets or separate map frames on the same sheet shall be utilized.

Elevations shall be provided for the bottom of any pits. Bottom contours on 10 ft intervals shall be indicated as the mining operation progresses.

12 month projections and the permit boundary shall also be clearly shown in separate and distinguishable colors, line types, and/or patterns.

Text Metrics, Graphic Elements, and Sheet Orientation

The minimum allowable text size shall be 0.06" (1.50 mm) as plotted to the final mapping scale, and the maximum allowable line weight for all text shall be 1/6 the applicable text height. In no case shall the line weight of a text object be wide enough to fill the closed loop of any character, number or symbol when plotted to the nominal mapping scale.

Tables 1a and 1b, Text Metric Requirements

Minimum Text Heights for Various Scales	
Mapping Scale	Minimum Text Height[1]
1" = 50'	3 feet
1" = 100'	6 feet
1" = 200'	12 feet
1" = 300'	18 feet
1" = 400'	24 feet
1" = 500'	30 feet
1" = 1000'	60 feet
1" = 2000'	120 feet

Maximum Allowable Line Weights for Various Text Heights	
Text or Symbol Height	Maximum Line Weight[2]
0.06"	0.010" (0.25 mm)
0.08"	0.012" (0.35 mm)
0.10"	0.016" (0.40 mm)
0.15"	0.025" (0.65 mm)
0.20"	0.031" (0.70 mm)
0.25"	0.042" (1.00 mm)
0.30"	0.050" (1.25 mm)
0.40"	0.062" (1.55 mm)

1. Values are given in mapping units based on 0.06" height at mapping scale.
2. Rounded to next lowest value based on AutoCad standard settings.

All text and map symbols shall be of a size and nature such that fonts and symbolization are clear, sharp, and legible when plotted to the nominal mapping scale. The map shall contain a north arrow and graphic linear scale, both of which shall not be less than three inches in length when plotted to the nominal mapping scale.

The map shall be oriented such that the due north direction is upward and orthogonal to the edges of the sheet.

Georeferencing

Mine maps shall be georeferenced by one of the following methods, in their order of preference:

1. The native survey control network for the mine is based on a the Kentucky State Plane Coordinate System (SPC) or the Universal Transverse Mercator (UTM) system on the North American Datum of 1927 (NAD27) or North American Datum of 1983 (NAD83), and the map contains an adequately annotated grid indicating northing and easting values for the grid lines, or the map contains at least five annotated registration points evenly distributed about the entire mapped area. The map shall contain a statement indicating the datum, zone, and basis for linear units of measure. This information shall be located below the standard data block in the upper right corner of the map.
2. The survey control network is based on a custom geodetically referenced mapping datum and projection and the map contains either an adequately annotated grid indicating northing and easting values of the grid lines or a minimum of five annotated registration points evenly distributed about the entire mapped area. The map shall also contain a statement describing all parameters required to define the resulting coordinate system including ellipsoid parameters, central meridian, central scale factor for Mercator projections or north and south standard parallels for Lambert projections, the base parallel, the false northing and easting values, and the basis of linear units of measure. This information shall be located below the standard data block in the upper right corner of the map.
3. The survey control network is based on an SPC or UTM system that has been modified to match local ground conditions and the map contains either an adequately annotated grid indicating northing and easting values of the grid lines or a minimum of five annotated registration points evenly distributed about the entire mapped area. The map shall also contain a statement describing the translation, rotation, and scale factors applied to modify the SPC system and the coordinates of the position about which rotation and scaling was applied. This statement shall be located just below the standard data block located in the upper right corner of the map.
4. The survey control network is based on a local arbitrarily defined coordinate system and the map contains either an adequately annotated grid indicating northing and easting values of the grid lines or a minimum of five annotated registration points evenly distributed about the entire mapped area. To orient the grid geodetically, a minimum of five control points evenly distributed about the mine extents shall be provided and annotated with coordinates in both the native (local) coordinate system and their corresponding latitude/longitude or state plane coordinate values. Tables in lieu of direct annotations are acceptable. A note must also be provided indicating the datum and SPC zone utilized. The establishment of positions for the control points shall meet GPS Class C, Order 3 accuracy standards as specified in Table 3 below.

5. Allowable for surface mines only: A minimum of five well defined discreet topographic features or registration points evenly distributed about the entire mapping area shall be annotated with their corresponding latitude and longitude values given to a minimum precision of one tenth of an arc second.

The recommended basis for registration points specified in methods 4 and 5, whether in part or in whole, shall be existing gas and oil wells, however, the geodetic positions given for those particular wells must have been re-observed and established by the mine engineer or land surveyor to a positional accuracy of one meter or less for surface mines, or as specified in method 4 for underground mines. Latitude and longitude values specified above may be replaced with their corresponding northing and easting values on the grid provided the basis of the coordinate grid is adequately documented. Coordinate precision these purposes shall be no coarser than of 0.1 ft or 0.001 arc second.

Standard Referencing Symbol, Grid Lines, and Usage

The standard referencing symbol shall consist of a plus mark centered about a square box such that the line segments forming the plus extend outside the box by a one-half the box size. The minimum overall symbol dimension shall not be less than 0.10” when plotted to the nominal mapping scale. The line weight restrictions applicable to text metrics shall apply to the standard referencing symbol. In the case where the position indicated by the referencing symbol coincides with a grid intersection, the line weight of the symbol shall be a minimum of two times that of the grid lines and the symbol shall be of the height specified by the line weight used (see Table 1b).

Standard Referencing Symbol

Latitude and longitude values shall be presented in the Degrees, Minutes, and Decimal Seconds (DD MM SS.ddd) format as follows (in their order of preference):

36° 45’ 23.456” or **36 45 23.456**

All coordinate system grid lines shall be of a solid line type and color (no screening applied) and have a line weight not less than 0.010” (0.25 mm). Grid lines shall be of adequate darkness and opaqueness such that the grid lines appear clear and sharp when plotted to nominal scale, but do not obscure underlying or overlying graphical objects and annotations.

Underground Mines

The location of the mine portal or entry point shall be indicated by the standard referencing symbol and annotated with its corresponding latitude and longitude values given to a minimum precision of one tenth of an arc second.

Surface Mines

The location of the mine shall be indicated by the standard referencing symbol and annotated with its corresponding latitude and longitude values given to a minimum precision of one tenth of an arc second. This position

shall be established where the main access road meets the lowest seam within the permitted mine area.

Georeferencing Classification

Mine maps shall indicate the accuracy classification applicable to the method of map georeferencing registration based on the codes provided in Tables 2 and 3. The purpose of this requirement is to document the method utilized to achieve georeferencing and the resulting accuracy. The level of accuracy to be achieved shall be determined by the engineer and/or surveyor in responsible charge.

Notes: Scaling off published map products to achieve georeferencing shall be based on geodetically referenced digital imagery only. All photogrammetrically derived images used for map georeferencing shall be orthorectified.

Manual scaling from paper maps is no longer acceptable.

The accuracy classifications provided in Table 2 and Table 2 on the following pages are for informational purposes only. Specifications and other surveying requirements shall be determined by applicable statutes, regulations, and other considerations between the professional(s) in responsible charge and their client(s). It is not the intention of these classifications to establish legal standards pertaining to survey control networks.

Table 2, Georeferencing Horizontal Accuracy Classifications

Classification	Estimated Accuracy at 95 Percent Confidence Level	
GPS	See Table 3. Must indicate order and class. (e.g. GPS Class C, Order 3)	
SCN	Class A	Closure greater than 1:10,000
	Class B	Closure of 1:5,000 to 1:10,000
	Class C	Closure less than 1:5,000
DGPS	1 meter (approx. 3 feet)	
WAAS	3 meters (approx. 10 feet)	
AGPS	10 meters (approx. 33 feet)	
DM *scale ratio*	1/50th Mapping Units in Inches	
DOQ	6 Meters (approx. 20 feet)	
KRG	20 Meters (approx. 66 feet)	

GPS Geodetic and Survey Grade Global Positioning System methods.

SCN Terrestrial based survey control network established by conventional traverse.

DGPS Post-processed Differentially Corrected GPS.

WAAS Hand held GPS receiver with Wide Area Augmentation Service enabled and active during observation.

AGPS Autonomous GPS with no corrections or post-processing applied and selective availability turned off.

DM[1] Scaled from a digital mapping product meeting National Mapping Accuracy Standards (http://mapping.usgs.gov/standards/) for the nominal scale applicable to that product, thus DM-6000 means 1:6000 (1"=500') where the accuracy at the 95% confidence level is <= 10 feet. Note: scale ratio for feet is mapping scale in feet x 12.

DOQ[1] Scaled from 1:12,000 Digital Ortho Quadrangles available through the Kentucky Office of Geographic Information (http://gis.ky.gov) or the KYMARTIAN download center (http://kymartian.ky.gov).

KRG[1] Scaled from available 1:24,000 Kentucky Raster Graphics available through the KYMARTIAN download center (http://kymartian.ky.gov), or 1:24,000 Digital Raster Graphics available through the Kentucky Office of Geographic Information (http://gis.ky.gov) or KYMARTIAN (http://kymartian.ky.gov).

1. Use of these products within a CAD or GIS environment with the georeferencing parameters as contained in the GEOTIFF header or world file applied to the inserted image(s). Registration points shall coincide with discreet and clearly identifiable features that occur on both the mine map and the digital product used.

Table 3, Geodetic and Survey Grade GPS Accuracy Classifications

Survey Categories	Order and Class	(95 percent confidence level)		
		Minimum Geometric Accuracy Standard		
		Base Error	Line-Length Dependent Error	
		e (cm)	D (ppm)	a (1:a)
Global-regional geodynamics; deformation measurements	AA	0.3	0.01	1 : 100,000,000
National Geodetic Reference System,"primary" networks; regional-local geodynamics; deformation measurements.	A	0.5	0.1	1 : 10,000,000
National Geodetic Reference System, "secondary" networks; connections to the "primary" NGRS network; local geodynamics; deformation measurements; high-precision engineering surveys.	B	0.8	1	1 : 1,000,000
National Geodetic Reference System, (terrestrial based); dependent control surveys to meet mapping, land information, property, and engineering requirements.	(C) 1 2-I 2-II 3	1.0 2.0 3.0 5.0	10 20 50 100	1 : 100,000 1 : 50,000 1 : 20,000 1 : 10,000

Note: For ease of computation and understanding, it is assumed that the accuracy for each component of a vector base line measurement is equal to the linear accuracy standard for a single-dimensional measurement at the 95 percent confidence level. Thus, the linear one-standard deviation (s) is computed by:

$$s = \pm \frac{\left[\sqrt{e^2} + (0.1d \cdot p)^2\right]}{1.96}$$

Where, d is the length of the baseline in kilometers.

Source: *Geometric Geodetic Accuracy Standards and Specifications for Using GPS Relative Positioning Techniques*, 1988, Federal Geodetic Control Subcommittee, Rear Adm. Wesley V Hull, Chairman, http://www.ngs.noaa.gov/FGCS/tech_pub/GeomGeod.pdf

Note: This source is provided for reference and informational purposes only and is not to be interpreted as additional requirements or specifications applicable to these standards.