

**Data Structure for the Digital  
Geomorphic Surface Map and  
Geographic Database of the  
Southern Animas Creek Valley,  
Hidalgo County, New Mexico**

**by**

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1 CD-ROM

## INTRODUCTION

This document describes the database structure for the Digital Geomorphic Surface Map and Geographic Database of Southern Animas Valley, Hidalgo County, New Mexico. This is a digital version of the maps in New Mexico Bureau of Mines and Mineral Resources Open-File Report No. OF-429, Geomorphic Surface Maps of Southern Animas Valley, Hidalgo County, New Mexico, by Kirk R. Vincent and P. Reed Krider.

That project, funded by the U.S. Forest Service, was initiated as part of a study aimed at linking surface geomorphology and geology with high desert grassland ecology. This was done to assist U.S. Forest Service personnel in establishing ecological associations between plant cover and geological substrate or geomorphic environment and thereby provide a scientific basis for land-use management tools.

The purpose of this document is to provide a written description of (1) the procedures used to create the digital dataset; (2) the structure of the dataset; and (3) the feature codes used to attribute the data. It is assumed that the reader is familiar with the basics of Arc/Info data organization.

## DIGITIZING PROCEDURE

This digital dataset was digitized from the fourteen 1:24,000-scale, mylar base maps of Vincent and Krider (1998) using Arc/Info v.7.1.1 and a Calcomp Drawingboard II table digitizer. The map projection of the coverages is Universal Transverse Mercator (UTM), zone 12 and the map units are meters. Arcs were digitized using a weed tolerance of 5.08 meters. Ornamented lines were digitized such that the ornamentation is on the right side of the line as the line is traversed in the direction that the line was digitized. Editing, edge-matching, and joining of coverages were done using ArcEdit. Attributing of polygons, arcs, and points was done using ArcView v.3.1. Additional tables were created using ArcView v.3.1. The metadata was built using the TK Metadata Editor by Peter Schweitzer of the USGS in Reston, VA.

## COVERAGES

The coverages below comprise the Digital Geomorphic Surface Map and Geographic Database of Southern Animas Valley, Hidalgo County, New Mexico. These coverages, and the user-defined features included in their feature attribute tables, are summarized in Table 1. Field definitions are in parentheses. I is an integer field, C is a character field, and the number indicates the width of the field.

### Animas Coverage

The Animas coverage is a polygon and arc coverage that includes the contacts, faults, and drainage divide lines that define the boundaries between map units.

#### Polygon features

The PAT for this coverage contains three fields.

- UNIT: Character, width 6. Strings are equivalent to unit labels on source maps. This feature is included to make symbolizing and viewing a 'standard' visualization of the map relatively simple. Domain: values enumerated and defined in the coverage's metadata, field 5.2.1, and in the *units.dbf* table.
- GPOLYID: Integer, width 8. Field contains a value unique to each polygon in this coverage. Domain: >0 and <10<sup>8</sup>.

- COVID: Integer, width 8. Field contains value unique to the polygon features of this geology coverage. All polygons in the coverage will have the same value. Domain >0 and <10<sup>8</sup>.

Table 1. Summary of coverages or shapefiles and their associated database tables. Field definitions are in parentheses. I is an integer field, C is a character field, and the number indicates the width of the field.

Coverage	Type	Attributes	Related tables	Notes
Animas	Poly	Unit (C,6) GpolyID (I,8) CovID (I,8)	units.dbf (related to poly coverage on “UNIT” field)	Coverage for geomorphic surface units. Related table, units.dbf, contains information about each unit. (see Other Tables)
Animas	Arc	Type (I,4), Accuracy (I,8), Descriptor (I,3) Class_ID (I,3) GlineID (I,6) Fault# (I,8) CovID (I,8)	adjacent.dbf (joined with arc coverage on “GLINEID” field) faultage.dbf (joined with arc coverage on “FAULT#” field) faultmov.dbf (joined with arc coverage on “GLINEID” field)	Coverage includes faults, contacts, and drainage divide boundary. Related table, adjacent.dbf, contains information about units adjacent to each arc. Related table, faultage.dbf, contains information about the general age of each distinctive fault. Related table, faultmov.dbf, contains information about the vertical movement on measured faults. (see Other Tables)
Animas_ p	Point	Type (I,4) Class_ID (I,3) CovID (I, 8) GpointID (I, 8)	soilpits.dbf (joined with point coverage on “GPOINTID” field)	Includes points defining location of soil pits. Related table, soilpits.dbf, contains general information about each soil pit. (see Other Tables)

### Arc features

The AAT for this coverage contains seven fields.

- TYPE: Integer, width 4. Classifies line to general type (contact, fault, etc.). Domain: Permitted values are enumerated in Table 2.
- ACCURACY: Integer, width 8. Domain: >numerical precision of data and <10<sup>8</sup> or <0. Spatial uncertainty in location of a feature, in meters. For example, a value of 10 for a line feature indicates that the geologic entity represented by the line is within 10 meters of the mapped feature. The uncertainty must be greater than the numerical precision of the X,Y coordinates that locate a point (i.e. the accuracy can not exceed the precision). This value is used to determine the line style used to represent the line using standard solid, dashed and dotted lines. For most existing maps, this length will be based on standard map accuracy, i.e. the geologic entity is located within the width of the line shown on a map for a solid line. A value <0 indicates that accuracy is not defined, for example in the case of cartographic lines (map boundaries) or scratch contacts.
- DESCRIPTOR: Integer, width 3. Additional code to classify TYPE into sub-types. Meaning varies according to TYPE. Domain: Permitted values are enumerated in Table 2.

- CLASS\_ID: Integer, width 8. Link to classification object table; identifies cartographic object used to symbolize the line on a map. This feature is included to make symbolizing and viewing a 'standard' visualization of the map relatively simple. Domain: Values enumerated in Table 3.
- GLINEID: Integer, width 8. Field contains a value unique to each arc in this coverage. Domain: >0 and <10<sup>8</sup>.
- FAULT#: Integer, width 8. Field contains a value for all arcs of TYPE = 6010. This value is unique to groups of contiguous fault segments and is used to identify discrete faults. Domain: >0 and <10<sup>8</sup>.
- COVID: Integer, width 8. Field contains a value unique to the arc features of this coverage. All arcs in the coverage will have the same value. Domain: >0 and <10<sup>8</sup>.

Table 2. AAT codes for the TYPE and DESCRIPTOR fields in the Animas and Animas\_p coverages.

<b>Type</b> [geotype.dbf]		<b>Descriptor</b> [geofault.dbf]	
code	feature	code	descriptor
6001	Contact	028	High-angle normal fault
6010	Fault	029	High-angle normal fault with geomorphic scarp
3333	Border		

Table 3. Classification object table for the CLASS\_ID field in the Animas and Animas\_p coverages. The associated pens and markers used with each line or symbol on this map are in the azgs\_pal.avp palette.

<b>Class_ID</b> [class_ID.dbf]			
CLASS_ID	DEFINITION	THICKNESS	COLOR
603	solid line	0.50	Black
604	dashed line	0.50	Black
639	dashed line with two dots	0.50	Black
599	solid line	1.50	Black
600	dashed line	1.50	Black
618	dotted line	1.75	Black
602	queried solid line	1.50	Black
607	queried dashed line	1.50	Black
643	hatchured solid line	1.50	Black
644	hatchured dashed line	1.50	Black
645	hatchured dotted line	1.50	Black
641	dashed line with three dots	0.50	Black
646	solid line	2.50	Black
647	dashed line	2.50	Black
627	circle with x inside	user defined	Red

#### Related tables

The related Units table, ***units.dbf***, contains eleven fields.

- UNIT: A character string with the abbreviation of the unit name. This field is used to join with UNIT in *animas.pat*.
- COUNT: An integer string showing the number of polygons associated with each particular unit name.
- ORIGIN: A character string with the abbreviation of the sedimentary or erosional environment that formed the geomorphic surface. This field is used to join with IDSTR in the *origin.dbf* lookup table.
- AGECLASS: A character string with the abbreviation for the geologic age of the map unit. This field is used to join with IDSTR in the *age.dbf* lookup table.
- LANDFORM: A character string with the abbreviation for the type of geomorphic landform of the map unit. This field is used to join with IDSTR in the *landform.dbf* lookup table.
- SURFACE: A character string with the abbreviation for the surficial geologic deposit that forms the map unit. This field is used to join with IDSTR in the *surface.dbf* lookup table.
- SOILTEXT: A character string with the abbreviation for the soil texture of the surficial geologic deposit that comprises the map unit. This field is used to join with IDSTR in the *soiltext.dbf* lookup table.
- SOIL\_CA: A character string with the abbreviation for types of calcium carbonate soils. This field is used to join with IDSTR in the *soil\_ca.dbf* lookup table.
- OVERLIES: A character string with the abbreviation for the field in *units.dbf* that the underlying sediments are defined by. This field is used to join with IDSTR in the *overlies.dbf* lookup table.
- SUBSURFACE: A character string with the abbreviation from the *units.dbf* field designated by the OVERLIES field that describes what lies beneath the surface unit. The definition of each string can be looked up through the lookup table from the field with which it is associated.
- DESCRIPTION: A character string with a short formation description for the map unit.

The related Adjacent Unit table, ***adjacent.dbf***, contains five fields.

- GLINEID: An integer string with the identification number of each arc. This field is used to join with GLINEID in *animas.aat*.
- LGPOLYID: An integer string with the GPOLYID of the polygon to the left of the arc specified by the GLINEID.
- LUNIT: A character string with the abbreviation of the map unit specified by the LGPOLYID and is included to simplify map composition. This field must be updated if GPOLYID or polygon labels are reclassified.
- RGPOLYID: An integer string with the GPOLYID of the polygon to the right of the arc specified by the GLINEID.
- RUNIT: A character string with the abbreviation of the map unit specified by the RGPOLYID and is included to simplify map composition. This field must be updated if GPOLYID numbers or polygon labels are reclassified.

The related Fault Age table, ***faultage.dbf***, contains three fields.

- FAULT#: An integer string with the identification number of each discrete fault. Classification of discrete fault traces is subjective. Faults are younger than the age of the youngest unit cut by the fault. This field is used to join with FAULT# in *animas.aat*.
- AGE: A character string with the age of the fault.
- DESCRIPTION: A character string with a brief explanation of the age relations of the fault.

The related Fault Movement table, *faultmov.dbf*, contains two fields.

- **FAULT\_ID:** An integer string with the identification number of the fault segment assigned a fault movement value. This field is used to join with **GLINEID** in *animas.aat*.
- **THROW:** A character string with the measured value of offset for the associated fault segment.

## Animas\_p Coverage

The Animas\_p coverage is a point coverage showing the location of soil pits.

### Point features

The PAT for this coverage contains four fields.

- **TYPE:** Integer, width 4. Animas\_p coverage only contains information about the location of soil pits. Domain: 004.
- **CLASS\_ID:** Integer, width 8. Link to classification object table; identifies cartographic object used to symbolize the line on a map. This feature is included to make symbolizing and viewing a 'standard' visualization of the map relatively simple. Domain: Values enumerated in Table 3.
- **GPOINTID:** Integer, width 8. Field contains a value unique to each point in this coverage. Domain: >0 and <10<sup>8</sup>.
- **COVID:** Integer field that contains value unique to this coverage. All points in the coverage will have the same value. Domain: >0 and <10<sup>8</sup>.

### Related tables

The related Soil Pits table, *soilpits.dbf*, contains nine fields.

- **GPOINTID:** An integer string containing a value unique to each point in this coverage. This field is used to join with **GPOINTID** in *animas\_p.pat*.
- **ORDER:** An integer string used to allow arrangement of soil pits into the same order as they appear in the accompanying open-file report text.
- **IDENTIFIER:** A character string with the identification label of each soil pit.
- **SURFACE:** A character string with the abbreviation of the geomorphic surface at the soil pit location.
- **SITE\_LANDFORM:** A character string with the abbreviation of the type of landform at the soil pit location.
- **QUADRANGLE:** A character string with the name of the USGS 7<sup>1</sup>/<sub>2</sub> minute quadrangle that the soil pit is located in.
- **LOCATION:** A character string giving Township/Range directions for soil pit location.
- **ELEVATION\_METERS:** An integer string giving the elevation of the soil pit in meters.
- **SLOPE\_DEGREES:** A character string giving the degree of slope of the surface that the soil pit is located on.
- **ASPECT:** A character string giving the aspect of the surface that the soil pit is located on.

## OTHER TABLES

These lookup tables are for the Digital Geomorphic Surface Map and Geographic Database of Southern Animas Valley, Hidalgo County, New Mexico and define the codes used in *units.dbf*, *animas.aat*, and *animas\_p.pat*.

### Origin.dbf

Defines the codes used to describe the process that formed the current geomorphic surface.

- IDSTR: A character string used to join with the abbreviations in the ORIGIN field of the *units.dbf* table.
- NAME: A character string containing the specific name that the IDSTR string references.
- DESCRIPTION: A character string that defines the IDSTR string abbreviation.

Table 4. Codes for the ORIGIN field in the Units table [*units.dbf*].

IDSTR	NAME	DESCRIPTION
A	Alluvial	Alluvial fan remnants, stream terraces (well-preserved depositional surfaces only), and flood plains
L	Lacustrine	Lacustrine depositional landforms and erosional shorelines
W	Wind-deposited	Wind-blown depositional landforms
H	Hillslope	Hillslopes that are eroded or eroding

### Age.dbf

Defines the codes used to describe the geologic age of the current geomorphic surface.

- IDSTR: A character string used to join with the abbreviations in the AGECLASS field of the *units.dbf* table.
- NAME: A character string containing the specific name that the IDSTR string references.
- DESCRIPTION: A character string that defines the IDSTR string abbreviation.
- ORDER: An integer string used to allow chronological arrangement of age classes.

Table 5. Codes for the AGECLASS field in the Units table [*units.dbf*].

IDSTR	NAME	DESCRIPTION
af	active floodplain	actively aggrading, or being constructed and maintained, by fluvial processes over decadal time scales
ah	active hillslope	actively being eroded by hillslope processes over century time scales
Y	young	late Holocene age to Active (<10 Ka) surfaces
Y+M	mixed young and medium – young dominates	late Holocene age to Active (<10 Ka) surfaces mixed with early Holocene age (~30 - 10 Ka) surfaces - late Holocene age to Active surfaces are dominant
M+Y	mixed medium and young – medium dominates	early Holocene age (~30 - 10 Ka) surfaces mixed with late Holocene age to Active (<10 Ka) surfaces - early Holocene age surfaces are dominant
M	medium	latest Pleistocene to early Holocene age (~30 - 10 Ka) surfaces
M?	medium – uncertain	probably early Holocene age (~30 - 10 Ka) surfaces
M3	medium – younger	younger erosional terrace of latest Pleistocene to early Holo-

	terrace	cene age (~30 - 10 Ka) surfaces
M4	medium – older terrace	older erosional terrace of latest Pleistocene to early Holocene age (~30 - 10 Ka) surfaces
O	old	late Pleistocene age ( ~150 - 100 Ka) surfaces
O?	old - uncertain	probably late Pleistocene age ( ~150 - 100 Ka) surfaces
O5	old – younger surfaces	younger late Pleistocene age ( ~150 - 100 Ka) surfaces
O6	old – older terrace	older erosional terrace of late Pleistocene age ( ~150 - 100 Ka) surfaces
V	very old	early to middle Pleistocene age ( ~750 - 500 Ka) surfaces
V?	very old - uncertain	probably middle Pleistocene age ( ~750 - 500 Ka) surfaces
n	uncertain	probably middle to late Pleistocene age (~750 - 100 Ka) surfaces, possibly modified by subsequent stream or hillslope processes
u	undefined	undifferentiated age, but contains surfaces that may range from early Pleistocene to Active

### Landform.dbf

Defines the codes used to describe the geomorphic landform of the current geomorphic surface.

- IDSTR: A character string used to join with the abbreviations in the LANDFORM field of the *units.dbf* table.
- NAME: A character string containing the specific name that the IDSTR string references.
- DESCRIPTION: A character string that defines the IDSTR string abbreviation.

Table 6. Codes for the LANDFORM field in the Units table [*units.dbf*].

IDSTR	NAME	DESCRIPTION
ap	Animas Creek floodplain	the floodplain (see floodplain description) along Animas Creek
c	ciénaga	seepage or spring-fed marshes along major creeks
as	alluvial swale	alluvial surfaces inset less than a few meters into the surrounding piedmont and therefore are not flanked by alluvial hillslopes
hm	hillslope mantle	thick, moderately steep colluvial (and alluvial) layer at the base of steep hillslopes covered by thin colluvium and transitional between alluvial and hillslope deposits
b	bottom	dry lake bottom
s	spit and berm	lake spit and lake-shore depositional berms formed by latest Pleistocene lake 1 (level > 5175' and <5180') and modified by early Holocene lake 2 (level at 5175'), or formed by lake 2
e	shoreline	wave-cut shoreline features
d	delta or bench	lake-shore delta or depositional benches formed by middle to late Holocene lakes
d3	delta or bench – lake 3	lake-shore delta or depositional benches formed by the middle to late Holocene lake 3 at level 5160'
d4	delta or bench – lake 4	lake-shore delta or depositional benches formed by the middle to late Holocene lake 4 at level 5150'



ss	sand sheet	sheet of wind-blown sand
sd	sand dunes	stabilized sand dunes
r	fan remnant	the incised remains of alluvial fan surfaces (see fan description)
n	inset terrace	a stream terrace formed when downcutting strands the former valley floor as remnants on one or both sides of the new valley floor
tt	tributary fill terrace	remnants of an alluvial valley floor built by aggradation that are located in incised drainages tributary to Animas Creek
p	floodplain	the smooth, low gradient alluvial material adjacent to a river channel, constructed by the present river, and covered with water when the river overflows its banks
pt	floodplain and fill terrace	mixed floodplain (see floodplain description) and fill terrace (see fill terrace description) deposits
ptn	floodplain, fill terrace, and inset terrace	mixed floodplain (see floodplain description), fill terrace (see fill terrace description), and inset terrace (see inset terrace description) deposits
tf	tributary fan	a fan (see fan description) formed where a tributary drainage enters onto the Animas Creek floodplain
u	undifferentiated	landform not identifiable because of lack of aerial photo coverage or ground access
f	fan	a low, gently sloping mass of alluvial material, shaped like a segment of a cone, deposited at the mouth of a stream where it emerges from the mountain front or onto a larger stream's floodplain
am	alluvial mantle	low gradient layer of alluvium covering pedimented bedrock that is transitional to alluvial deposits and hillslope deposits.
t	fill terrace	remnants of an alluvial valley floor built by aggradation
h	hillslope	steep hillslopes composed of thin colluvium covering bedrock or sedimentary deposits, or locally exposed bedrock without colluvial cover

### Surface.dbf

Defines the codes used to describe the geologic deposit that comprises the current geomorphic surface.

- IDSTR: A character string used to join with the abbreviations in the SURFACE field of the *units.dbf* table.
- NAME: A character string containing the specific name that the IDSTR string references.
- DESCRIPTION: A character string that defines the IDSTR string abbreviation.

Table 7. Surficial geologic deposit codes for the SURFACE field in the Units table [units.dbf].

IDSTR	NAME	DESCRIPTION
a	alluvium	nonconsolidated stream deposits of various textures
g	gravel	moderately cemented, rounded to subrounded rock clasts in a sandy matrix
c	conglomerate	indurated, coarse-grained clastic sedimentary rock composed of rounded to subangular gravel clasts set in a sand and clay matrix

v	volcaniclastic rocks	silicic rock composed of volcanic rock fragments without regard to origin or environment
r	rhyolite	extrusive igneous rock, equivalent in composition to granite, with phenocrysts of quartz and alkali feldspar in a glassy groundmass
l	latite	a porphyritic extrusive rock, equivalent in composition to monzonite, with nearly equal amounts of plagioclase and K-feldspar, little quartz, and a glassy groundmass
d	dacite	a fine-grained, extrusive rock, equivalent in composition to granodiorite, with less Ca-plagioclase and more quartz than andesite
n	andesite	a dark-colored, fine-grained extrusive rock, equivalent in composition to diorite, characterized by zoned Na-plagioclase and one or more mafic minerals
b	basalt	a dark-colored, fine-grained, mafic igneous rock composed primarily of Ca-plagioclase and clinopyroxene
n-r	mixed volcanic rocks	mixed andesite, latite, and rhyolite
u	undifferentiated	undifferentiated bedrock, but probably silicic volcanics
q	limy sandstone	a medium-grained clastic sedimentary rock composed of angular to rounded sand fragments set in a Ca-rich, fine-grained matrix
e	limestone	a fine-grained sedimentary rock composed primarily of calcium carbonate in the form of calcite
a+o	mixed alluvium and colluvium	nonconsolidated stream deposits mixed with nonconsolidated hillslope deposits formed by sheetwash and downslope creep (alluvium dominant)
o+a	mixed colluvium and alluvium	nonconsolidated hillslope deposits formed by sheetwash and downslope creep mixed with nonconsolidated stream deposits (colluvium dominant)
s	sand	a rock or mineral particle ranging in size from 0.1-1 mm
t	silt	a mineral particle ranging in size from 0.01-0.1 mm
y+t	mixed clay and silt	clay (see clay description) mixed with silt (see silt description)
s+g	mixed sand and gravel	mixed sand (see sand description) and gravel (see gravel description)
y	clay	a mineral particle of any composition that is smaller than a silt particle
r?	rhyolite - ID uncertain	identification uncertain but possibly rhyolite (see rhyolite description)
v?	volcaniclastic rocks - ID uncertain	identification uncertain but possibly volcaniclastic rocks (see volcaniclastic rocks description)
o	colluvium	subrounded to angular rock fragments with clay, silt, and sand (see clay, silt, and sand descriptions) in varying proportions, and ranging from nonconsolidated to moderately indurated

### SoilText.dbf

Defines the codes used to describe the soil texture of the surficial material of the current geomorphic surface.

- IDSTR: A character string used to join with the abbreviations in the SOILTEXT field of the *units.dbf* table.
- NAME: A character string containing the specific name that the IDSTR string references.
- DESCRIPTION: A character string that defines the IDSTR string abbreviation.

Table 8. Soil texture codes for the SOILTEXT field in the Units table [*units.dbf*].

IDSTR	NAME	DESCRIPTION
x	extremely coarse grained	contains large boulders
f	very fine to fine grained	particle size is less than 0.1 mm
m	medium to coarse	particle size is greater than 0.1 mm
pc	poorly sorted - coarse	mixed grain size but weighted toward coarse-grained sediment
pf	poorly sorted - fine	mixed grain size but weighted toward fine-grained sediment

### Soil\_Ca.dbf

Defines the codes used to describe the presence and type of calcium carbonate in the soils of the current geomorphic surface.

- IDSTR: A character string used to join with the abbreviations in the SOIL\_CA field of the *units.dbf* table.
- NAME: A character string containing the specific name that the IDSTR string references.
- DESCRIPTION: A character string that defines the IDSTR string abbreviation.

Table 9. Codes for theSOIL\_CA field in the Units table [*units.dbf*].

IDSTR	NAME	DESCRIPTION
k	calcic soil	soil contains more calcium carbonate than type-section soil
k+	calcrete	soil derived from limestone alluvium consists of calcrete

### Overlies.dbf

Defines the codes used to describe which field in *units.dbf* is referenced by the string in the SUBSURFACE field. The SUBSURFACE field then describes the sediments beneath the current geomorphic surface.

- IDSTR: A character string used to join with the abbreviations in the OVERLIES field of the *units.dbf* table.
- NAME: A character string containing the specific name that the IDSTR string references.
- DESCRIPTION: A character string that defines the IDSTR string abbreviation.

Table 10. Codes for the OVERLIES field in the Units table [*units.dbf*].

IDSTR	NAME	DESCRIPTION
/u	overlies unit	unit overlies the specified deposit or soil in the subsurface
/a	overlies age class	unit overlies a deposit or soil of the specified age class designation in the subsurface
/o	overlies origin	unit overlies a deposit or soil of the specified origin designation in the subsurface
/l	overlies lithology	unit overlies a deposit or soil of the specified bedrock type in the subsurface
/p	overlies pediment	unit overlies a pediment, carved into an unspecified rock type, in the subsurface

### General Lookups

This report contains codes used in all coverages distributed as digital geologic maps by the Arizona Geological Survey. These tables have been modified and converted to lookup tables to be used with this database. The figure below shows the relationship between the lookup file, the coverage, and table in this report.

Table 11. Lookup files for *animas.aat* and *animas\_p.aat*.

FILE	COVERAGE	ITEM	TYPE	TABLE
geotype.dbf	animas.aat	TYPE		part of Table 2
geofault.dbf	animas.aat	DESCRIPTOR	faults	part of Table 2
class_ID.dbf	animas.aat animas_p.aat	CLASS_ID	(all TYPES)	Table 3

### **REFERENCES**

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- USGS, 1995, Cartographic and digital standard for geologic map information (Draft): U. S. Geological Survey, Open-File Report 95-525, unpaginated.
- Vincent, K.R., and Krider, P.R., 1998, Geomorphic surface maps of the southern Animas Creek valley, Hidalgo Co., New Mexico: New Mexico Bureau of Mines and Mineral Resources Open-File Report OF-429, 14 plates at 1:24,000 scale, 59 p.