Appendix 3

Federal Land Status Preparation

A3.1 Sources Of Data

Federal lands mapping for Phases I and II of the inventory was completed based upon detailed research of multiple sources of information that describe the nature and extent of Federal surface and mineral interests. Spatial data themes were created that define various ownership characteristics and categories for lands within the study area boundaries. The final data sets were rendered to delineate both surface and subsurface U.S. rights. Ownership cases were extracted from the BLM's LR-2000 Database, processed, and used to create polygon themes for the project. The primary digital datasets processed and mapped include LR-2000 Status, Case Recordation, Legal Land Description, and various competitive oil and gas lease sales. In the Appalachian Basin study area, data from the "Site Log" were obtained from the BLM's Milwaukee Field Office and supplemented by other records from Federal, state and county governments. Digital land title records were supplemented with paper maps, land ownership ledgers, resource management plans and other miscellaneous real property records. The primary BLM land record databases are shown on the following schematic in Figure A3-1.[1]

In the Public Land Survey System (PLSS) states, the BLM's Geographic Coordinate Data Base (GCDB), where available, was utilized as the survey framework to create Federal land ownership and parcel boundaries. In areas where GCDB was not available, alternate sources were used to establish the positions of PLSS corners and subdivisions. In the Eastern states where only non-rectangular surveys exist, the best data available from Federal, state and county sources were used. Geographic coordinates were not available in all cases and therefore may be somewhat generalized.

A3.2 Data Preparation

Polygon themes were created for over 180,000 individual ownership cases within the study areas that were extracted from the BLM's LR-2000 Database.

The Surface Management Agency (SMA) and ownership polygon boundaries reflect parcel geometry as described by the legal land description maintained in the electronic records. All land descriptions were processed, including minor subdivisions where available down to and including 2.5 acres or lower. Lands described by lot, tract or special surveys where GCDB was not available were processed against the BLM Legal Land Description (LLD) file to convert the lot references to nominal aliquot descriptions. Depending on the actual survey type and special survey geometry, the resulting polygon may contain a degree

[1] Information is available at ***http://www.geocommunicator.gov*** which provides searching, accessing and dynamic mapping of data for Federal land stewardship, land and mineral use records, and land survey information. It also provides spatial display for land and mineral cases from BLM's LR2000 system.

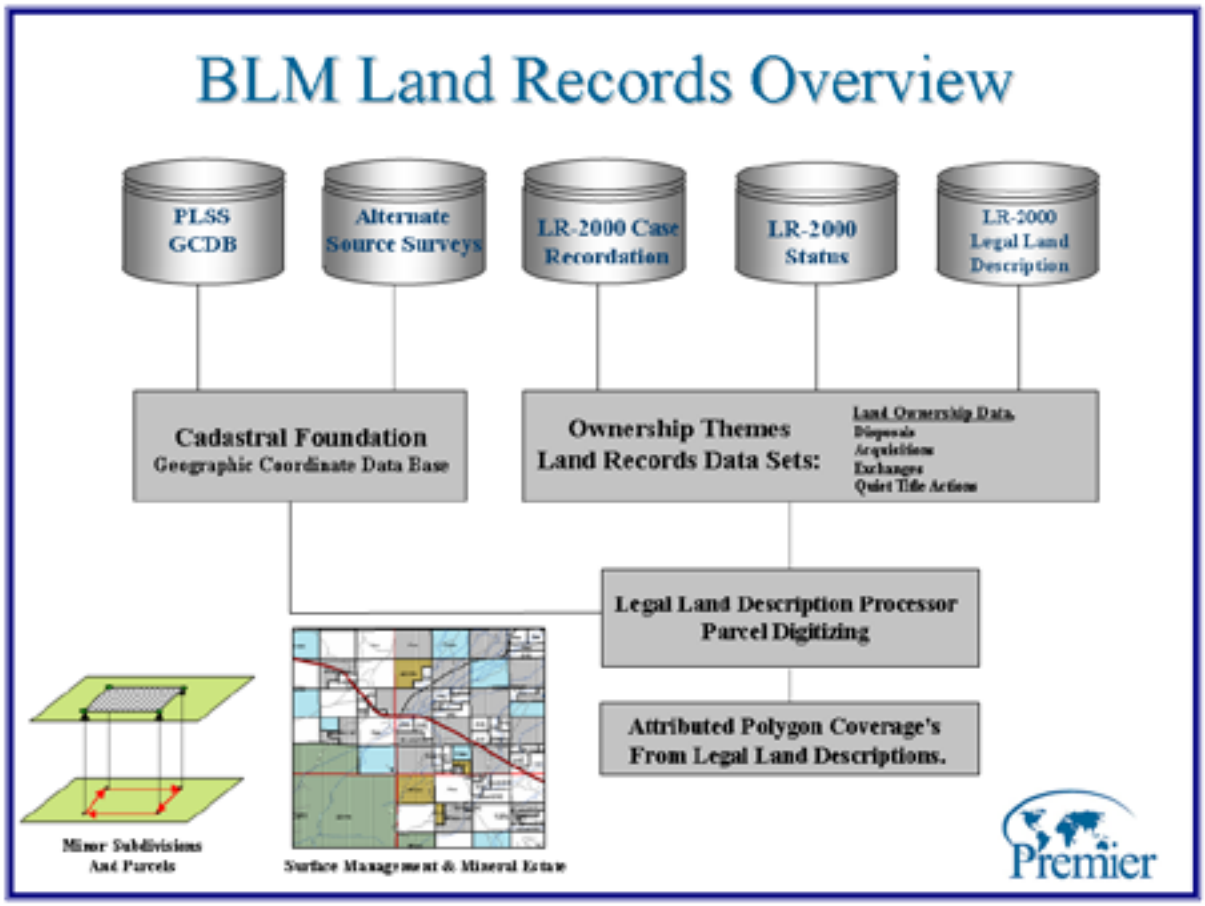


Figure A3-1. Schematic of BLM's Primary Land Records Databases

of generalization. Additionally, the BLM record systems do not contain individual records for public domain lands. The location of these lands was determined through various subtractive polygon-processing steps.

The primary information that defines U.S. ownership are data elements associated with various title transactions and business events recorded and maintained within the LR-2000 Database. Case records that fall within the following four general categories were extracted and mapped.

1. Land Disposals, including patents, grants, deeds, land sales and all other transactions that conveyed ownership rights in lands from the Federal government.

2. Acquired Lands, including lands that were re-acquired by the United States under various legal authorities.

3. Land Exchanges, including lands exchanged between the Federal government and other parties.

4. Quiet Title Cases, including all records established to cure title and quiet adverse claims.

These four major categories formed the basis to extract the desired records from the BLM's databases. The four queries were

processed against both the Status and Case Recordation datasets. Due to formatting differences between the two databases, the resulting polygon attributes contained in the GIS shape files varied slightly. Additionally, in some records extracted from the Case Recordation system, U.S. Rights were not readily available but were determined as accurately as possible through interpretation from land records obtained at BLM state and field offices.

The following attribute fields shown in Table A3-1 lists the data elements contained in the shape files produced from each of the LR-2000 datasets:

Table A3-1. Polygon Attributes from the LR-2000 Datasets

Status Attributes	Case Recordation Attributes
Shape Meridian Township Range Section Survey Type Aliquot Adminagenc County State Serialnumb Docid Patent_num Case_type Usright1 Usright2 Usright3 Usright4 Patentissu (mm/dd/yy) Patentiss1 (year) Acres Patentee Id **Note: Data fields will be populated if data are entered in the Status dataset. If U.S Rights are recorded in the U.S Rights field, they will be included in the Commodity field.**	Meridian Township Range Section Surveytype Aliquot Serialnumb Surveynumb Name Percentint Price Acres Dispositio Casetype Commodity Expiredate Expireyear Effectdate Royaltyrt Geoname Hbp Or Id **Note: Data fields will be populated if data are entered in the Case Recordation dataset. If US Rights are entered, they will be included in the Commodity field.**

In the Western study areas, the data simplification process was completed through numerous steps that combined data associated with each of the four broad record categories described above.

A general discussion of the processing steps is described below:

1. The GCDB or alternate source PLSS data was used as the cadastral reference framework. The PLSS grid contains data elements and coordinates that define both townships, sections, and 1/16 subdivisions. Where legal descriptions described parcels less than 40 acres, CartéView software was used to map the minor aliquot parts down to 2.5 acres or smaller.[2]

2. After the PLSS base was loaded, a master polygon (Figure A3-2) was created to represent the original U.S. land purchases and annexations. For example, lands that fall within the geographic extent of the Denver Basin study area were acquired in 1803 through the Louisiana Purchase. All surface and subsurface rights were claimed by the United States of America.

3. The next step involved processing textual legal land descriptions against the PLSS framework file by subdividing according to the survey rules embedded in the CartéView software. The data shown in Table A3-2 shows a typical input file.

4. After the records from the Status and Case Recordation datasets were processed, the resulting polygon themes

[2] CartéView is the proprietary software of Premier Data Services, Englewood, CO.

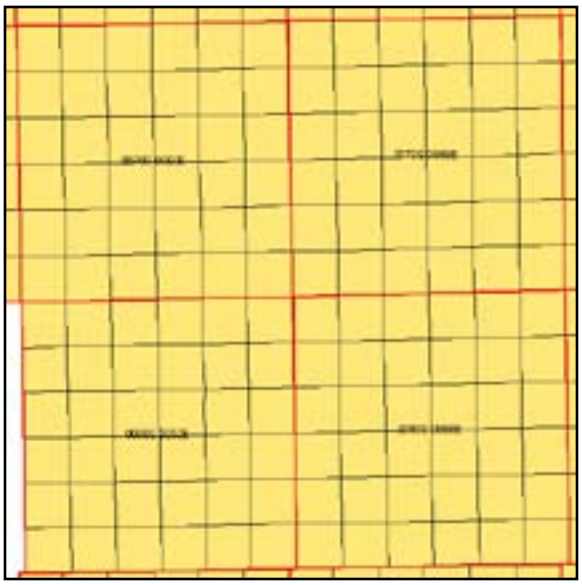


Figure A3-2. Master Polygon

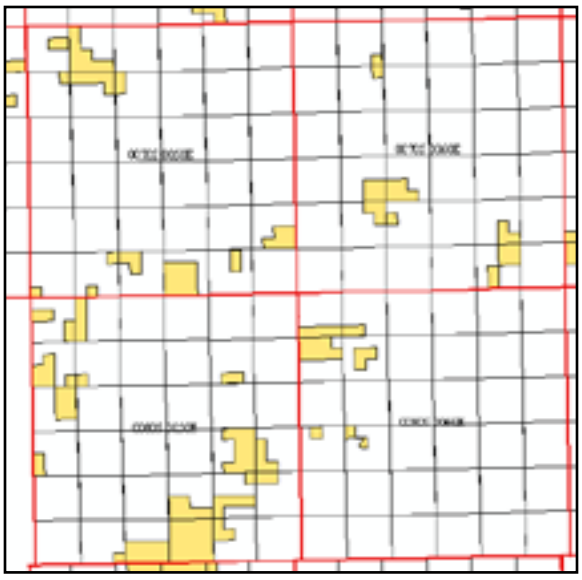


Figure A3-3. Public Domain Lands

were re-attributed to facilitate merging them together. These polygons were then overlaid on the Master Polygon to establish the location of lands where ownership left the Federal government by virtue of patent, grant or other title transfer authority. The resulting coverages are represented in the following graphic, Figure A3-3.

The yellow polygons shown on the above map represent lands in the public domain where surface and subsurface rights are managed by the BLM.

5. The next step involved constructing a series of queries of the U.S. rights data associated with lands that were disposed through various title transfers. This query process, (Figure A3-4) involved a very complex analysis against the

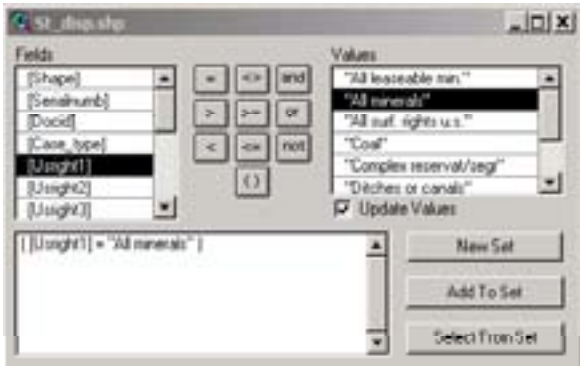


Figure A3-4. Query of U.S. Rights Data

attribute tables in the spatial datasets. The results of these processes delineate all lands where subsurface oil and gas mineral rights are owned by the United States.

Figure A3-5 illustrates the distribution of split estate mineral ownership within a four township area. The parcels shaded gray

Table A3-2. Typical CarteView Input File

	A	B	C	D	E	F	G	H	I	J	K	L
1	Status	Generic	USRight	SerialNumber								
2	Meridian	Township	Range	Section	SurveyTy	Allquot	County	State	SerialNumber	DocID	Case_Type	USRight
1348		6.0160N	092.0W	29	T	NWNW,NWSW,SWNW,	7	WY	WYC 0001269	165770	HE ORIGINAL	Coal
1349		6.0160N	092.0W	29	T	NENE,NESE,NWNE,NWSE,SENE,SW	7	WY	WYC 0001269	165770	HE ORIGINAL	Coal
1350		6.0160N	092.0W	20	T	NESE,NWSE,SESE,SWSE,	7	WY	WYC 0001270	163048	HE ORIGINAL	Coal
1351		6.0160N	092.0W	21	T	NWSW,SWSW,	7	WY	WYC 0001270	163048	HE ORIGINAL	Coal
1352		6.0160N	092.0W	28	T	NWNW,	7	WY	WYC 0001270	163048	HE ORIGINAL	Coal
1353		6.0160N	092.0W	29	T	NENE,NWNE,	7	WY	WYC 0001270	163048	HE ORIGINAL	Coal

Figure A3-5. Federal Split Estate Oil and Gas Ownership

Figure A3-6. Defining Ownership

represent patented lands where the United States retained rights to the oil and gas mineral estate.

6. The last step in the spatial query and overlay process was to define any other Federal management agencies or state surface ownership. These determinations were made by completing a series of queries against the ownership fields in the parcel base. The results of this query are shown in Figure A3-6.

The parcels shaded blue represent lands that were granted to the State of South Dakota.

7. The final processing step was to dissolve the individual parcels into ownership categories that define the surface and mineral estates. The view in Figure A3-7 shows the surface management agencies and how land ownership is distributed within an area of the Denver Basin in South Dakota.

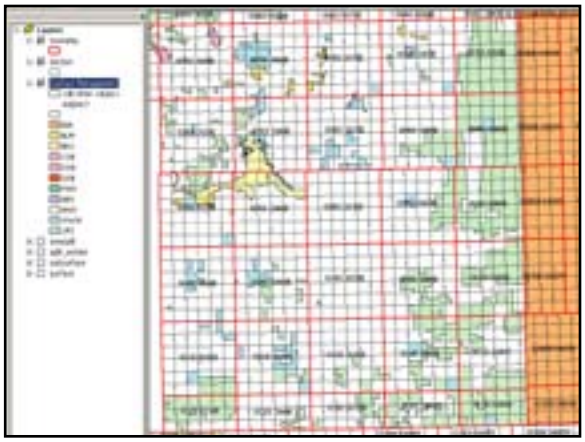


Figure A3-7. Surface Management View

In contrast to the surface management view, the mineral estate in the view shown in Figure A3-8 covers the same area and yields a much different picture. The yellow areas represent lands where the Federal government manages oil and gas rights.

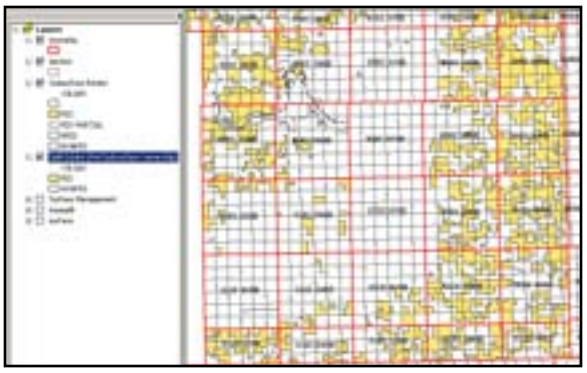


Figure A3-8. Subsurface Oil and Gas Ownership View

Eastern Study Areas Data Collection Summary

Ownership data for Eastern basins was collected by researching a range of sources that include the BLM's LR-2000 Database, Site Log, the USGS National Atlas, state and local governments and other land title records. All data sources are referenced in the metadata associated with each map theme. The data obtained from the numerous agencies varied dependant upon the knowledge base of local office personnel, technological capabilities and ability to release data. Therefore, county and state datasets were obtained when possible to support known missing Federal properties.

After the BLM records (LR-2000 and Site Log) were processed, USGS 1:24,000 quadrangle maps and the Geographic Names Information System (GNIS) provided the next level of detail for research and initial data collection. Various recreation atlases were also used to identify Federally owned lands for follow-up verification.

A3.3 Data Limitations

The data sets created from the processes described above reflect the legal land descriptions contained in the BLM databases. There was no attempt to analyze and review all of the error logs that were generated from the parcel generation process. If legal land descriptions were not properly entered and formatted according to BLM's published LR-2000 standards, an error log was generated.

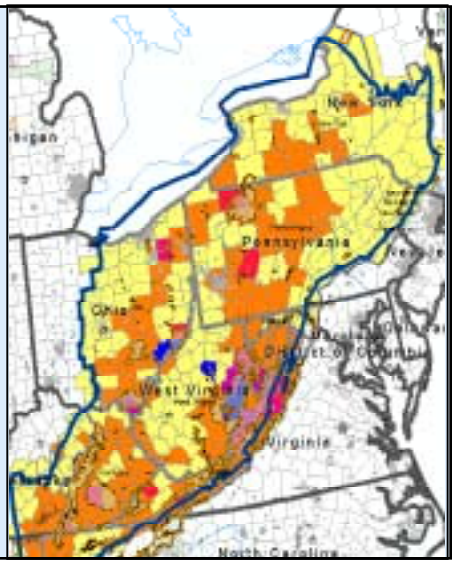
Other limitations:

- The BLM Case Recordation System is not consistently populated with U.S. Rights data. The split estate ownership

In order to collect the most complete data possible, several steps were taken to determine where prior mineral activities have been recorded. The initial step was to map all of the BLM's LR-2000 mineral ownership and use authorization records and render maps that identified the counties where these activities were recorded. After the records were mapped, each record was reviewed to identify the surface management agency to contact.

In areas where land ownership patterns were highly complex, parcels that contained an area of less than 40 acres were excluded.

This map shows all counties in the Appalachian Basin study area where mineral activities were recorded in the LR-2000 System. The darker colors represent higher densities of activity.



generated from LR-2000 was verified by contacting BLM State and Field Offices. These data may carry a minor degree of generalization.
- The Interagency Steering Committee advised against processing certain withdrawal cases from the BLM's Status and Case Recordation datasets. This decision made it necessary to integrate Surface Management Agency information from GIS coverages obtained from multiple sources. During the spatial processing and merging of this data, sliver polygons were created. These sliver polygons were not edited and may be present in certain ownership themes.
- The PLSS data were not edge matched across state boundaries.

A3.4 Data Source by Agency

Data were provided by agencies as described below:

- Bureau of Land Management: Digital land records, hard copy maps and GIS shapefiles of Federal mineral ownership
- United States Forest Service: Hard copy maps and digital polygon files showing surface and subsurface ownership. Verbal confirmation for individual polygons overlapping other agency datasets
- Fish and Wildlife Service: Hard copy maps and digital shapefiles
- National Park Service: Digital shapefiles
- United States Army Corps of Engineers (COE): Hard copy maps, aerial photos, digital shapefiles of ownership polygons, county and municipal parcel datasets
- Department of Defense: Hard copy maps and digital shapefiles of ownership polygons. State, county and local datasets provided boundaries, verbally confirmed by direct contact with installation. BLM and COE also provided ownership boundaries by hard copy maps
- Department of Energy: Hard copy maps from the BLM and digital data provided by county and municipal datasets
- Department of Homeland Security: Digital shapefiles of ownership polygons, local county and municipal parcel datasets
- Department of Justice: Local tax GIS datasets. Federal prisons were verified by phone and digitized from hard copy maps
- Department of Labor: Local tax GIS datasets
- Department of Veterans Affairs: Hard copy maps from the BLM and digital polygons provided by county and municipality datasets
- Federal Aviation Administration: County and municipal parcel datasets
- General Services Administration: Local tax GIS datasets
- National Aeronautics and Space Administration: Hard copy maps from the BLM
- Tennessee Valley Authority: Digital shapefiles provided by the primary administrative and local agency offices
- United States Department of Agriculture (other): Local tax GIS datasets

Merging of datasets for Federal surface and subsurface ownership followed three basic rules in order of priority:

- Data extrapolated from deed records were considered have the highest confidence level
- Newer data and map publication dates were used over older sources
- Verbal verification by agency was obtained