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Final Technical Report

National Geological and Geophysical Data Preservation Program
(NGGDPP)

**Population of the National Geological and Geophysical Data Catalog
with New Mexico Data**

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Abstract

From September 1, 2008 through August 31, 2009 the New Mexico Bureau of Geology and Mineral Resources, a Division of the New Mexico Institute of Mining and Technology and the state geological survey of New Mexico, uploaded data/metadata from six of our high-priority collections into the National Geological and Geophysical Data Catalog. These six collections are:

1. P743 – Rock cores
2. P744 – Rock cuttings
3. P745 – Rock core chips
4. P746 – Uranium drill hole logs
5. P747 – Petroleum (oil & gas) well logs
6. P1100 – Sidewall cores.

These six collections contain more than 85,000 data elements. Data/metadata were uploaded into the National Catalog for more than 90% (78,000) of the data elements in these six collections.

Work during the project year included completing internal digital (Access format) catalogs for these six collections and adding data/metadata required for the National Catalog which, for our case, were latitude and longitude coordinates for each data element. After these data were added to our internal catalogs, the data/metadata entries for each catalog were converted into the NGGDPP flat-file format required by the National Catalog. Once in the flat-file format, the data/metadata were uploaded into the National Catalog. Uploaded data were checked for errors and omissions.

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Introduction

The project “Population of the National Geological and Geophysical Data Catalog with New Mexico Data” began on September 1, 2008 and ended on August 31, 2009. The work on this project was undertaken under the auspices of the U.S. Department of the Interior, U.S. Geological Survey Assistance Award Number 08HQGR0112 to the New Mexico Bureau of Geology and Mineral Resources, a Division of the New Mexico Institute of Mining and Technology. The New Mexico Bureau of Geology and Mineral Resources is the state geological survey of New Mexico. Total obligated funds under this award were \$30,522.50, of which \$15,261.25 is the federal share and \$15,261.25 is the

non-federal share provided by the New Mexico Bureau of Geology and Mineral Resources.

The goal of the work performed under this contract was to upload into the National Geological and Geophysical Data Catalog data/metadata for geological and geophysical collections at the New Mexico Bureau of Geology and Mineral Resources. The 46 major collections at the New Mexico Bureau of Geology and Mineral Resources were specified in the 2007 NNGDPP Inventory of Geological and Geophysical Data Collections. We anticipate constructing data/metadata catalogs for all of our collections and uploading them into the National Catalog will be a multiyear project.

For 2008-2009, our first NNGDPP project year for catalog development and data uploading, we chose six high-priority collections with more than 85,000 data elements for which we had already constructed substantial internal digital data/metadata catalogs. During the 2008-2009 project year, we worked on completing the internal catalogs for these high priority collections, adding data/metadata required by the National Catalog (for example, latitude and longitude coordinates), converted our internal digital catalogs into the NNGDPP flat file format, uploaded the collection data/metadata into the National Catalog, and checked our uploaded data for errors and omissions. Data/metadata for more than 90% (78,000) of the data elements in the six high-priority collections were uploaded during the 2008-2009 project year.

Methodology

Catalogs of geological and geophysical data collections at the New Mexico Bureau of Geology and Mineral Resources were uploaded into the National Catalog using the NNGDPP flat file template made available on the NNGDPP website at <http://datapreservation.usgs.gov/catalog.shtml> . Preparation of the flat files and uploading into the National Catalog utilized the following procedure:

1. Our internal databases are in Access format. A query was made in our Access databases to supply the information required by the NNGDPP flat file template. Data fields that are considered optional in the NNGDPP flat file template/National Catalog were also supplied in the query where the optional data are available.
2. Results of the Access query were exported into Excel.
3. The resulting Excel files were saved in .csv format as a flat file.
4. The flat file was uploaded into the National Catalog on the NNGDPP website.
5. The uploaded files were opened up on the NNGDPP website and examined for errors, missing data/metadata and other problems.
6. If the above examination revealed that the flat file did not upload correctly into the National Catalog, the Excel .csv file was re-imported into Access, saved as a separate table in Access, and then exported out as a text file using either commas or pipe characters as the field separators, depending on which was appropriate for the way the file was constructed.
7. The newly uploaded file was re-examined on the NNGDPP website for errors and problems which were then rectified, if present.

The NNGDPP requirements for collections include the following required and optional data fields:

1. **Collection ID:** This is the collection ID number as assigned by the USGS to each of our collections after they were entered into the 2007 NGGDPP Inventory of Geological and Geophysical Data Collections.
2. **Title:** This is our internal title for each data element in each of our data collections. As an example, *Core_1* indicates that the data element is the first data element from our rock core collection.
3. **Alternate title:** For oil and gas wells (drill holes), this is the API number. For collection P746 (Uranium well logs), this is the database well ID number for that well spot. For other data types (e.g. water wells) there is no API number or other Alternate internal identifier and this field is left blank.
4. **Abstract:** This readable text contains the operator or company name for drill holes, the well name and number, the type of well (e.g. petroleum, mineral water, etc.), oil-gas pool name or mining district, number of related items, and the source of the latitude/longitude coordinates. See Table 1 below for a description of sources and calculation methods for latitude/longitude coordinates.
5. **Data type:** This is the USGS data type as specified for the NGGDPP.
6. **Supplemental information:** Primary and secondary contact information for the data element and accompanying collection were entered in this field.
7. **Coordinates:** This is the geographic location of the sampled site in decimal degrees latitude and longitude. For almost all of the samples in our collections, latitude and longitude coordinates are derived (calculated) from the alternate geometry (described below) and are not coordinates measured in the field with a GPS, although GPS-rendered coordinates will be increasingly more available for new samples. The method of calculation or other source of latitude/longitude is described in the Abstract. In most cases, latitude and longitude are calculated from the Federal Public Land Survey System (PLSS) section-township-range coordinates using the Geographix Exploration System and digital land grid. However, relatively large areas of New Mexico have not been surveyed with the PLSS, for example the Spanish Land Grants and many of the Native American Reservations; digital land grids are not available for these unsurveyed areas. Other methodologies were developed or used to calculate latitude/longitude for these unsurveyed areas and are summarized in Table 1. A substantial portion of our work during the 2008-2009 project year included calculation of latitude and longitude coordinates for data items uploaded into the National Catalog.
8. **Alternate geometry:** This is the PLSS township-range-section and location within the section given as either surveyed footage from the section lines or in the quarter/quarter/quarter section system. For Spanish Land Grants or Native American Reservations with no PLSS Survey, petroleum and mineral exploration drill holes are formally (officially) located within the non-PLSS area by either a recognized non-governmental survey (for example the Martin and Border Survey for certain areas in northern New Mexico) or by projecting the PLSS survey grid into the unsurveyed area from adjacent surveyed areas. Many large-scale U.S. Geological Survey and U.S. Bureau of Land

Management digital and paper maps indicate projected township and range boundaries in unsurveyed areas.

9. **Online resources:** No URL pointers are presently available for our collections. Entries are listed as “none”.
10. **Browse graphics:** No URL pointers are presently available for our collections. Entries are listed as “none”.
11. **Dataset reference date:** Meaningful dates for the data element. For collections we have uploaded thus far, only collection P746, Uranium well logs, has entries in this field. For data elements in collection P746, the dataset reference date is the date of the logging run, as indicated on the log.

Table 1. Methodologies used to calculate or derive latitude and longitude for New Mexico collection elements.

Calculation method for latitude and longitude (abbreviation used in our entries in the National Catalog)	Brief description of calculation methods or source of latitude/longitude values
GES	The Geographix Exploration System Landgrid and Wellbase modules used to calculate lat/long values based on a digital Landgrid referenced to the 1927 North American datum.
GESest	Same as GES above, but if sample/well locations were not exact the lat/long values were extended to only 3 decimal places.
GESqtr	Same as GES above but the latitude/longitude values mark the center of the quarter section the well sample is in. This method was used if sample/well locations are only specified to a quarter section and if surveyed footages from section boundaries are not available, or if multiple surveyed footages exist in our records that all indicate location within a quarter section but otherwise differed.
GESCntr	Same as GESQtr, but the lat/long location is in the center of a section. This method was used if sample/well location does not specify a location more exact than a section in a specified township and a specified range.
PRRC	The latitude/longitude coordinates for oil and gas wells as made available on the website of the New Mexico Petroleum Recovery Research Center (PRRC) at New Mexico Institute of Mining and Technology. In general, these values agree with ones calculated by our GES system (described above) to four decimal places.
PRRCestQtr	Same as PRRC above, but latitude/longitude accuracy is only to a quarter of a section. This method was used if some aspect of the well location (e.g. surveyed footage

	from section boundaries) on the PRRC website differed from that in our records, but placed the well in the same quarter section as our records.
PRRCest	As above, but only locations of center of section were used if PRRC data and our data placed the well in different section quarters.
BLMest	The U.S. Bureau of Land Management's online website (http://www.geocommunicator.gov/GeoComm/index.shtm) was used to estimate the latitude and longitude of a sample or drill hole. The accuracy of this method is the center of a quarter-quarter section.
BLMQter	Same as BLMest except that the latitude/longitude coordinates were estimated only to the center of a quarter section. This method was used most often in unsurveyed areas of the state using the BLM-projected township-range boundaries.
BLMsec	Same as BLMest except that the latitude/longitude coordinates were estimated only to the center of a section. This method was used most often in unsurveyed areas of the state using the BLM-projected township-range boundaries and where data did not warrant using the more exact BLMQtr method.
Scoutcard	Latitude/longitude coordinate data was obtained from an oil and gas well scout card. Data source is unknown but is most likely a GPS-based survey obtained when the well location was staked.
Hoffman	Latitude/longitude coordinates calculated by New Mexico Bureau of Geology Senior Coal Geologist Gretchen Hoffman for her project work.
Hoffmanest	Latitude/longitude coordinates calculated by New Mexico Bureau of Geology Senior Coal Geologist Gretchen Hoffman for her project work in unsurveyed areas using well spots referenced to USGS topographic maps.
Broadhead	Latitude/longitude coordinates calculated by New Mexico Bureau of Geology Senior Petroleum Geologist Ron Broadhead for his project work in unsurveyed areas using well spots referenced to USGS topographic maps.
Calc	Latitude/longitude coordinates calculated for miscellaneous projects as New Mexico Bureau of Geology and Mineral Resources.
NMBGMR	Latitude/longitude coordinates obtained from data files at New Mexico Bureau of Geology and Mineral Resources. Calculation or measurement method unknown.
Other	Unknown latitude/longitude coordinates associated with data files at New Mexico Bureau of Geology and Mineral Resources.

Progress and Measures of Success

The data collections that had data/metadata uploaded into the National Catalog during the 2008-2009 project year are listed in Table 2 along with the number of data elements uploaded during the project year and the percentage of data elements in each collection with data/metadata that were uploaded. Detailed information regarding data/metadata fields are described below.

Table 2. Collections with data/metadata uploaded into National Catalog during 2008-2009 project year, number of entries (items) with uploaded data/metadata, and percent of items in collection with entries uploaded into National Catalog.

Data Collection ID	Brief description Of collection	Number of entries uploaded	Percent of collection items with entries uploaded into National Catalog
P743	Rock cores	1578 (see Fig. 1)	75%
P744	Rock cuttings	14250 (see Fig. 2)	92%
P745	Rock core chips	541	90%
P746	Uranium well logs	17740 (see Fig. 3)	87%
P747	Petroleum (oil & gas) well logs	44190 (see Fig. 3)	98%
P1100	Sidewall cores	163	90%

During 2008-2009 we uploaded metadata for more than 90% of the data elements in our highest priority collections (Table 2). Work during the year included:

1. entry of data/metadata into our internal catalogs (where not already done);
2. calculation and derivation of latitude and longitude geographic coordinates for each data element that was uploaded (required for entry into the National Catalog);
3. verification of data entry and latitude/longitude calculations;
4. translation of our internal catalogs into the NGGDPP flat file format using the method described above;
5. upload of prepared flat files into the National Catalog;
6. verification of correct uploads into the National Catalog.

Given that we have generated and uploaded data/metadata for more than 90% of our highest priority collections, we believe that we have successfully concluded the 2008-2009 project.

Some (<10%) data elements in some of the high priority collections were not included in the uploads because not all the metadata required by the National Catalog were available. In almost all cases, the required data are the latitude/longitude coordinates. For some of the cores and cuttings in our collections, usually those related to

water wells or mineral exploration drill holes, we have acquired the cuttings or cores without any exact location information and we are in the continually ongoing process of obtaining exact locations. In the other cases, the drill holes are located in areas without a digital land grid (non-PLSS areas – Spanish Land Grants or Native American Reservations) and latitude/longitude must be calculated manually from hand-spotted well locations on paper maps or by manually locating the wells on digital maps provided on the US BLM website which are extremely time-consuming processes; again we are in the continually ongoing process of calculating exact locations as time permits and will upload data/metadata into the National Catalog in upcoming years upon completion of latitude/longitude calculations for samples/drill holes in each reservation or land grant.

Personnel employed on the New Mexico NGGDPP project during 2008-2009

The following personnel were employed on the NGGDPP New Mexico project during the 2008-2009 project year:

1. Ron Broadhead, Principal Petroleum Geologist at New Mexico Bureau of Geology and Mineral Resources and Project PI.
2. Amy Trivitt-Kracke, Petroleum Computer Specialist at New Mexico Bureau of Geology and Mineral Resources
3. Annabelle Lopez, Petroleum Information Coordinator at New Mexico Bureau of Geology and Mineral Resources
4. Adela Magallanes, part-time student employee and undergraduate biology major at New Mexico Institute of Mining and Technology
5. Tod Landis, part-time student employee and undergraduate computer science major at New Mexico Institute of Mining and Technology.

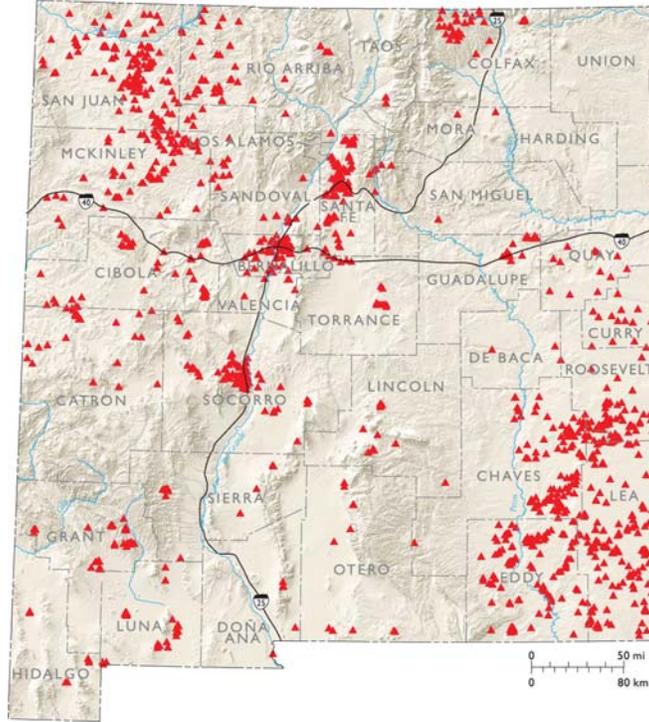


Figure 1. Locations of drill holes with rock cores at the New Mexico Bureau of Geology and Mineral Resources (collection P743) entered into the National Catalog.

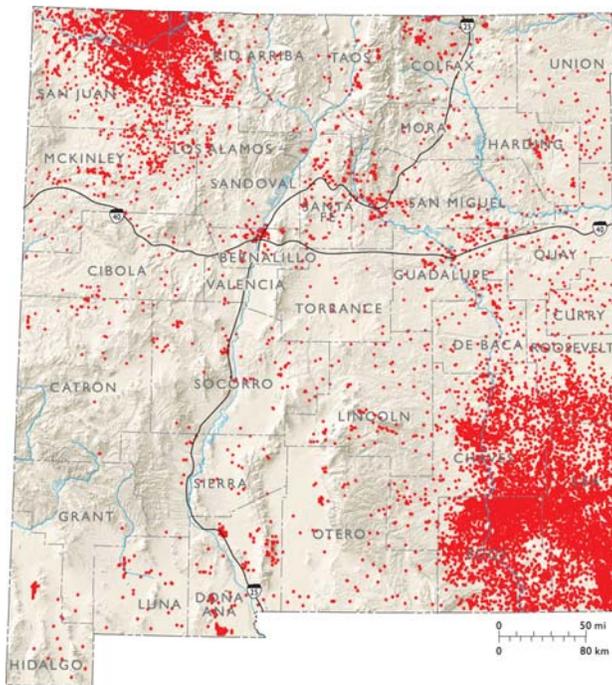


Figure 2. Locations of drill holes with rock cuttings at the New Mexico Bureau of Geology and Mineral Resources (collection P744) entered into the National Catalog.

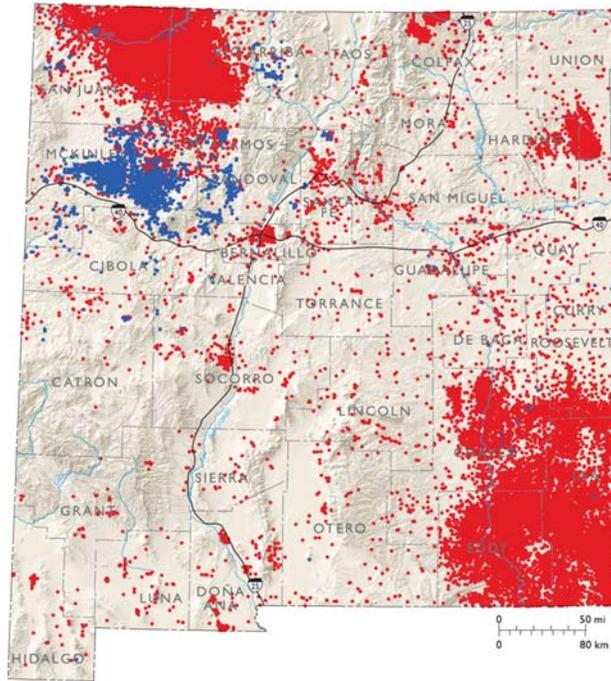


Figure 3. Locations of well logs at the New Mexico Bureau of Geology and Mineral Resources entered into the National Catalog. The red dots are the locations of logs for oil and gas wells (collection P747). The blue dots are the locations of logs for uranium drill holes (collection P746).