A GENERALIZED OIL AND GAS REGULATORY DATA MAPPING PORTAL

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INTRODUCTION

The oil and gas regulatory data mapping portal was introduced to New Mexico in 2009. The purpose of the mapping portal was to help oil and gas operators, natural resource environmental managers, and other related sector professionals evaluate natural resources and man-made features within a subject area. While initially designed for the New Mexico Pit Rule, the data provided by the portal has proven to be useful for other applications and beyond the borders of New Mexico. The mapping portal has been expanded to include data for surrounding states. Mapped natural resources include, but not limited to: depth to water and ground water elevation from USGS gauging stations; topography; aerial photos, digital elevation models; surface geology; karsts; and surface water. In addition, the mapping portal includes spatial search capabilities that allow querying data to determine proximity of natural resources to a subject site. The mapping portal is available at http://saturn.nmt.edu.

BACKGROUND

The beta version of the oil and gas regulatory data mapping portal was designed to help oil and gas operators comply with the New Mexico Pit Rule (Form C-144). Before the inception of the mapping portal, obtaining the required data described in the Siting Criteria (see NMOCD's Form C-144) in Sections 10 and 17 was not an easy task. To determine whether a proposed oil or gas site meets the Siting Criteria, the operator would have to invest many hours gathering the data from a variety of online and offline sources. The mapping portal solved this problem by compiling the majority of data required by the Siting Criteria into one location that is accessible via the internet. Users can access this information using any standard web browser and view the data on a variety of base maps.

THE GENERALIZED MAPPING PORTAL

The purpose of the generalized mapping portal is to expand the beta mapping application to include data beyond the borders of New Mexico. The concept behind the generalized mapping portal is to function as an online geographical information system (GIS). In simple terms, a GIS is: a computer mapping application that displays spatial information on a map of the earth rather than in tables and spreadsheets; and allows queries and statistical analysis that displays the results on a map.

For example, a GIS can plot point and vector data (i.e., oil and gas wells; water wells with chemistry and ground water measurements; air quality monitoring stations; wind direction) and display the data on aerial photographs, USGS topographic maps, and many other types of imagery such as a water table map, karst topography, geologic map, soils types, etc.

Currently, the generalized mapping portal shows the following national data: USGS topographic maps; USGS aerial photos for 1996-98 and 2008; aerial photography, terrain, and streets from Google Maps; street data from OpenStreetMaps; karst areas; major rivers, streams, and water bodies; elevation, and geology. While USGS ground water data; oil and gas wells; detailed river, stream, and water bodies; and domestic water supply wells are available for New Mexico. The generalized mapping portal will expand the detailed surface and groundwater data; oil and gas wells; and local geology and soil data into Texas, Oklahoma, Colorado, Utah, Arizona, and Wyoming. After these states are mapped, the detailed data will further expand into the Gulf States.

In addition to viewing the above listed data, the mapping portal allows the user to enter a location and perform spatial queries. For example, a user can enter a location and perform a query to determine the distance to the nearest river or stream. The mapping portal can then return the result in tabular format and/or highlight the selected feature(s) on the map. Or the user can perform a query to return a list of all water wells within a given distance and gives the user an option to highlight these features on the map. Figure 1 shows a top-level map of the GIS showing political boundaries and topography.

To further conceptualize how the mapping portal can be used in the oil and gas industry, the following example is presented: an operator wants to drill an oil well at Latitude: 32.36909 Longitude: -103.88245 in southeastern New Mexico. However, the oil and gas regulations do not allow a well to be drilled within a karst area nor within 1,000 feet of a watercourse. Using the mapping portal, the operator can quickly locate this well (Figure 2), zoom to the location, select the appropriate layers to display (Figure 3), and determine if the subject location will pass the regulatory requirements. As shown in Figure 4, the subject location is near, but not within a karst area (gray shading at left in figure), and is not within 1,000 feet of a watercourse (dotted lines representing intermittent streams). Therefore, location passes the two regulatory requirements presented in the example. The map can then be printed and submitted as an attachment to the appropriate forms and the map can be easily verified by a regulator using the same online system.

The generalized oil and gas mapping portal is available at http://saturn.nmt.edu. The beta version of the mapping portal for the New Mexico Pit Rule is available at http://pitrule.source3.com.

ACKNOWLEDGEMENTS

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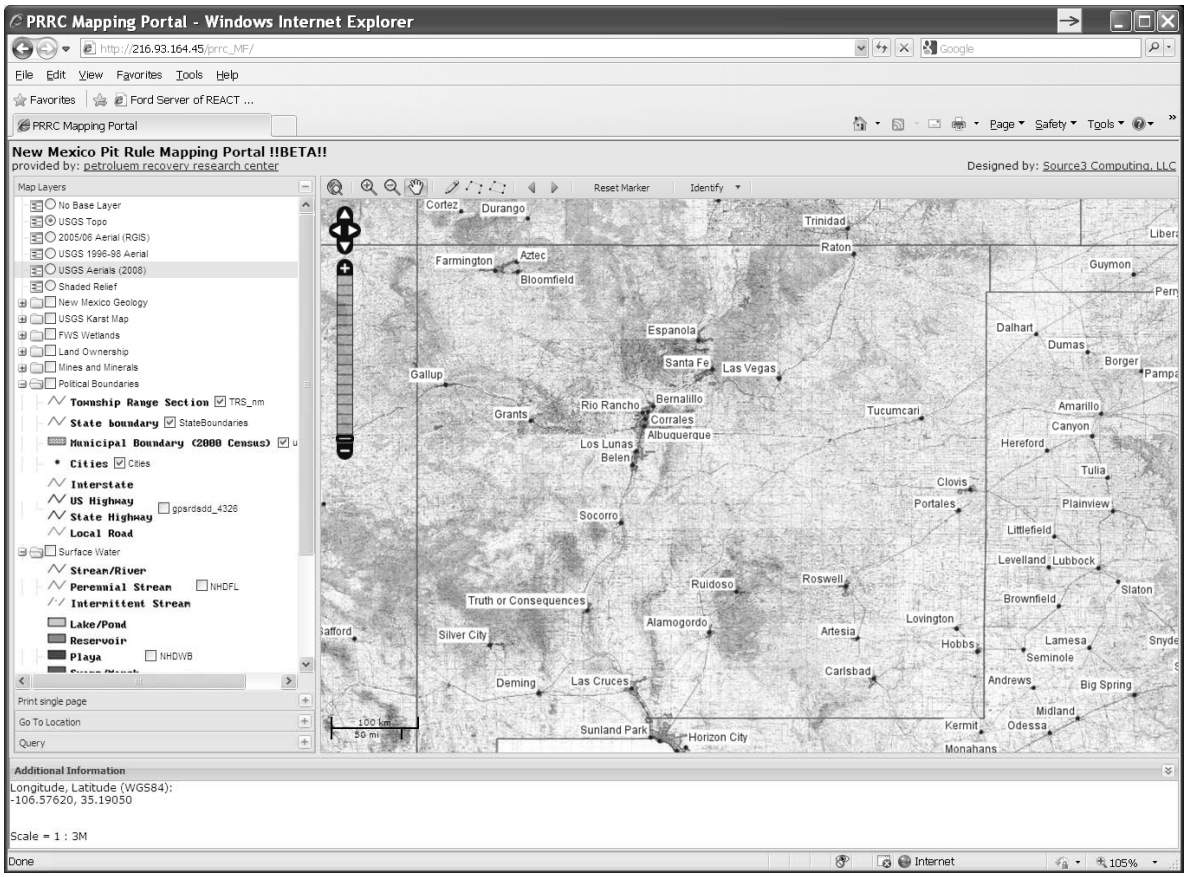

Figure 1 - Top-level view of mapping portal web page.

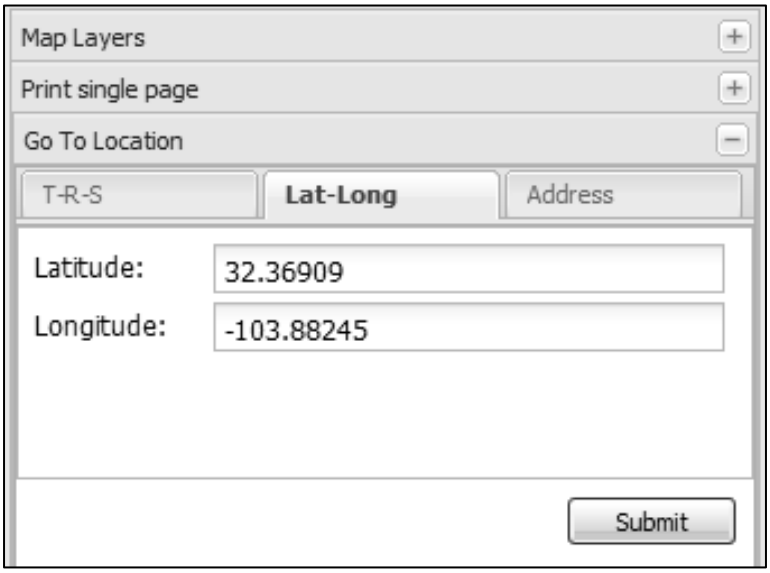

Figure 2 - Zoom to location input box from the mapping portal.

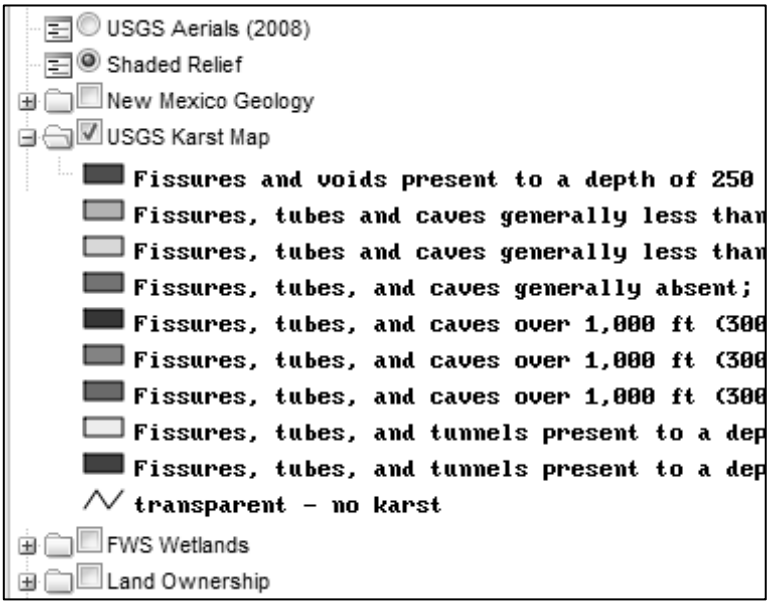

Figure 3 - Some of the available layers in the mapping portal.

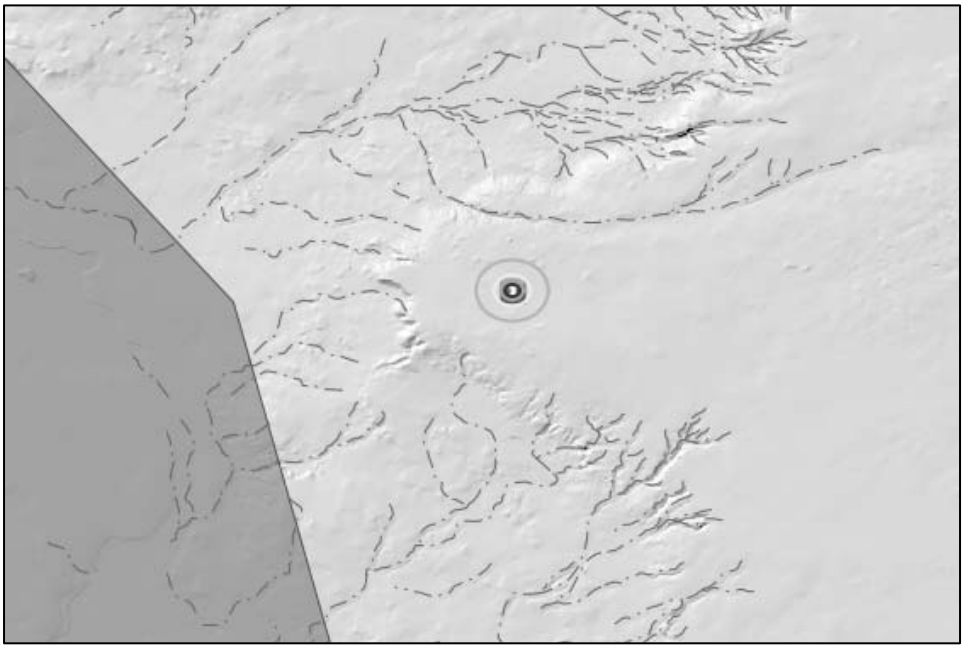

Figure 4 - Proposed oil well location plotted in the mapping portal showing that the subject site is not within 1,000 feet of a watercourse or within a karst area. The dark gray shading (left) represents a karst area. The dotted lines represent intermittent streams. The marker in the middle represents the subject location. The outer ring around the site marker represents a distance of 1000-feet from the subject site.