

Chapter 2 Methods

2.1 Estimation of resource potential and potential for development

The resource potential of the eastern Valle Vidal Unit was estimated based on analyses of oil and gas plays using a petroleum system approach. An extensive body of literature was reviewed in order to evaluate and document the existence of source rock, thermal maturation, reservoir strata possessing permeability and/or porosity, potential migration pathways, and traps for each play. The method and timing of development of each play were determined based upon the current and possible future regulatory and economic climate, and upon current industry best practices in similar plays in the Rocky Mountain region. Each play type is ranked as to its potential for occurrence and development during the 20-year life of the RFDS. Discussions can be found in Chapter 4 of this report.

2.2 Production analysis and estimation

The objectives of production analysis are to: (1) analyze current well performance and determine, if possible, the estimated ultimate recovery (EUR) and other production characteristics of the Raton Basin coalbed methane play that is currently being developed adjacent to the Valle Vidal Unit, and (2) to identify any interference, if there is evidence that interference occurs, in the production response between wells and thus qualitatively determine drainage area.

The scope of the study consisted of analyzing and comparing historical gas and water production from different producing regions within the New Mexico portion of the Raton Basin; and then narrowing the focus of the analysis to individual well performance of strategic regions in proximity to the Valle Vidal Unit. All production data through May 2003 was obtained from public domain data in the New Mexico Oil Conservation Division's ONGARD data set available from the New Mexico Petroleum Recovery Research Center GOTTECH web site at <http://octane.nmt.edu/>

Well production data analysis utilized conventional decline and log-log type curve matching techniques to estimate recovery and drainage area. The unique behavior of coals complicates both the analysis and the interpretation. Therefore, identification of various production responses was undertaken to differentiate between coalbed methane response and conventional (low-permeability) behavior. Subsequently, wells that exhibited conventional production decline were analyzed for reservoir/production properties. Detailed discussion of the findings from this work can be found in Chapter 5 of this report.

2.3 Prediction of surface occupancy and disturbance

Prediction of surface occupancy (Chapter 6) was based upon an estimate of the number of viable subsurface reservoir cells. Once the number of subsurface reservoir cells was established, two scenarios for surface occupancy and disturbance were derived. The first is based on regulations applied in the Jicarilla District of the Carson National Forest. The second is based on common industry practices in the vicinity of the Valle Vidal Unit. It also considered how much of this activity could reasonably be expected to occur in the twenty-year life of the RFDS.

2.4 Operator survey and processing

In order to test base assumptions of the RFDS analyses, a group of oil and gas operators was consulted through a concise and confidential survey. The direct benefit was to tap into the wealth of experience available and obtain currently perceived development strategy for their properties. The industry survey was distributed to all operators of record in the Raton Basin in both New Mexico and Colorado (total of eight). In addition, the survey was made available to the New Mexico Oil and Gas Association and Colorado Oil and Gas Association for distribution to interested members. Operators were given thirty days to respond to the survey. An example of the survey including cover letter is included as Appendix 1.

Chapter 7 contains a summary of the results. These results were compared to our independent analysis, and for any discrepancies identified, further investigation was done to develop an explanation for these differences. The number of returned responses totaled four, which included three from the Raton Basin Operators and one non-Raton Basin response. This response rate seems low unless one considers that the only current operator in the New Mexico part of the Raton Basin has a virtual monopoly through mineral ownership of much of the potential acreage in the basin and controls the only pipeline, perhaps discouraging other operators from having an interest in participating.

2.5 GIS project platform and databases

Data sources utilized and assembled for this RFDS were public domain resources. Examples are well-specific data compiled by the New Mexico's Oil Conservation Division and Bureau of Geology and Mineral Resources, and geographic information made available by the Carson National Forest. Data from oil and gas wells and coal mine information for Colfax County were entered into Microsoft ACCESS databases (see accompanying CD-ROM). The public domain data was formatted to be accessed and displayed using the ARCGIS

platform. This software platform was chosen because it is widely utilized by land-use professionals and it accepts and integrates data that was acquired in a variety of formats and projection methods. The purpose of the GIS project was to provide all contractors of the EIS with a common platform early in the process of work.

Data that was collected and integrated into the ARCGIS project include:

- Well and mine location, drilling, testing and completion data compiled from the New Mexico Bureau of Geology and Mineral Resources (NMBGMR) petroleum records and coal data libraries.
- Surface geologic mapping information compiled from the digital and published 1:500,000 scale maps by the NMBGMR.
- The State of New Mexico's ONGARD well production database maintained by the New Mexico Petroleum Recovery Research Center and accessible via the GOTECH web site at <http://octane.nmt.edu/>
- Geographic data from U.S. Department of Interior's PLSS system and the Carson National Forest including land grid, detailed roads, surface feature boundaries, U. S. Geological Survey DRG topographic maps, and surface waters. Other data from RGIS, the New Mexico Resource Geographic Information System.

The product of this compilation effort, as delivered to the Carson National Forest, is archived on an accompanying CD-ROM.