

REGIONAL SOIL GAS SURVEY CHASE CARBONATE GAS TREND, BYERLY AND BRADSHAW FIELDS HUGOTON EMBAYMENT, SW KANSAS

A large detailed regional soil gas survey is available for sale in the prolific Permian Chase Carbonate Gas Trend of the Hugoton Embayment of SW Kansas. The seven-foot soil gas survey covers an area of about 210 square miles and consists of 923 soil gas sites (Figure 1). The soil gas survey was sampled on a box grid pattern with a one-half mile distance between samples. An average section (640 acres) contains nine soil gas sample sites.

This regional soil gas survey is located in Greeley and Wichita Counties, Kansas to the west and north of Byerly (47.3 BCFG) and Bradshaw (334 BCFG) Gas Fields. A portion of the soil gas survey was conducted over the northwest half of Byerly Field for calibration purposes. The Permian Carbonate Gas Play (Chase and Council Grove Groups) in the Hugoton Embayment is the most prolific and important hydrocarbon play in this petroleum province. This area of SW Kansas is also referred to as the Hugoton gas area (Figure 2). The major gas fields of this area – Hugoton, Panoma, Greenwood, Bradshaw, and Byerly have produced a total cumulative of 27 TCFG.

Byerly and Bradshaw Gas Fields, together, have a total cumulative production of 381 BCFG from the Chase Carbonate reservoir. Byerly Field was discovered in 1968. Development drilling at Byerly Field (Figure 3) progressed rapidly through the 1970's up to 1985 when the field reached a maximum development of 55 wells. There was a hiatus in development drilling from 1986 until 1990. Since 1990 there have been 14 Chase Carbonate completions at Byerly Field. There are currently 46 producing gas wells in the field of which 20% have been completed since 1995. Interpretation of the analytical data from the soil gas survey within NW Byerly Field indicates that there some additional areas for further development drilling within the field area.

The natural gas accumulations at Byerly Field are due to stratigraphic entrapment caused by a facies change in the Permian Chase Carbonate reservoir where it grades from limestones and dolomites in the east to nonmarine red beds in the west (Figure 2). Regional dip of the Chase Carbonate is to the east-southeast. The upper seal for the gas reservoirs are provided by anhydrites and shales of the overlying Sumner Group. Average drill depths of the gas reservoir at Byerly Field range from about 2750 to 2900 feet. Porosity and permeability in the Chase Carbonate are highly variable as evidenced by the cumulative gas production from individual wells (Figure 3). Cumulative gas production from wells in Byerly Field range from 30 MMCFG to 3,572 MMCFG.

The stratigraphic entrapment of the gas, relatively shallow depth, and highly variable porosity and permeability of the reservoir are factors which favor the application of surface soil gas surveys as an important exploration method to reduce risk in this play.

The purpose of the regional soil gas survey was threefold: (1) calibration of the survey to the gas production at Byerly Field, (2) to aid in possible further exploitation/development drilling at Byerly Field, and (3) to determine other areas along trend that exhibited anomalous soil gas microseepage and would therefore indicate areas of exploration potential.

The variability of the cumulative gas production from individual wells at Byerly Field is illustrated in Figure 3. There is a pronounced northeast-southwest orientation of porosity and permeability development in the Chase Carbonate at Byerly Field. As evidenced by the cumulative gas production (Figure 3), there are three porosity/permeability fairways at Byerly Field. An ethane concentration contour map, constructed from soil gas magnitude analytical data in the northwest half of Byerly Field, is shown in Figure 4. There is very good correlation between areas of maximum cumulative gas production (Figure 3) and anomalous ethane soil gas concentrations in Byerly Field (Figure 4). The trends of microseepage anomalies, indicated by the contour map of ethane magnitudes, exhibits the same northeast-southwest orientations as seen in the contour map of cumulative gas production. Since there are many more soil gas data points than development wells at Byerly Field, the soil gas anomalies, indicated by the contour map, provides a more realistic depiction of the porosity/permeability trends in the Chase Carbonate at Byerly Field.

A number of untested soil gas anomalies exist in the remainder of the soil gas survey to the west and north. These anomalous gas microseeps are not random, isolated points, but rather tend to cluster in groups of gas microseep points that are on trend with established Chase Carbonate gas production at Byerly and Bradshaw Fields.

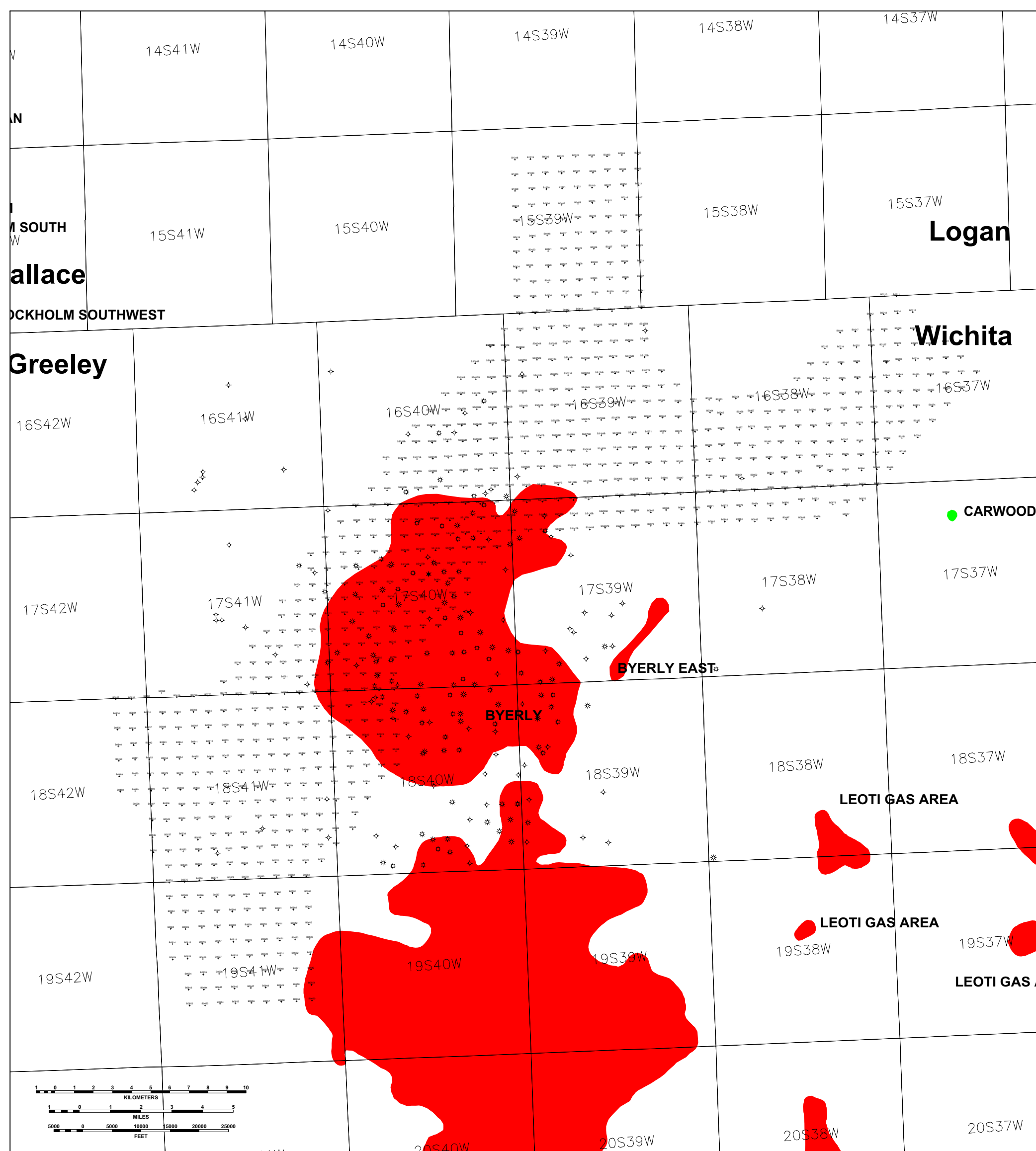
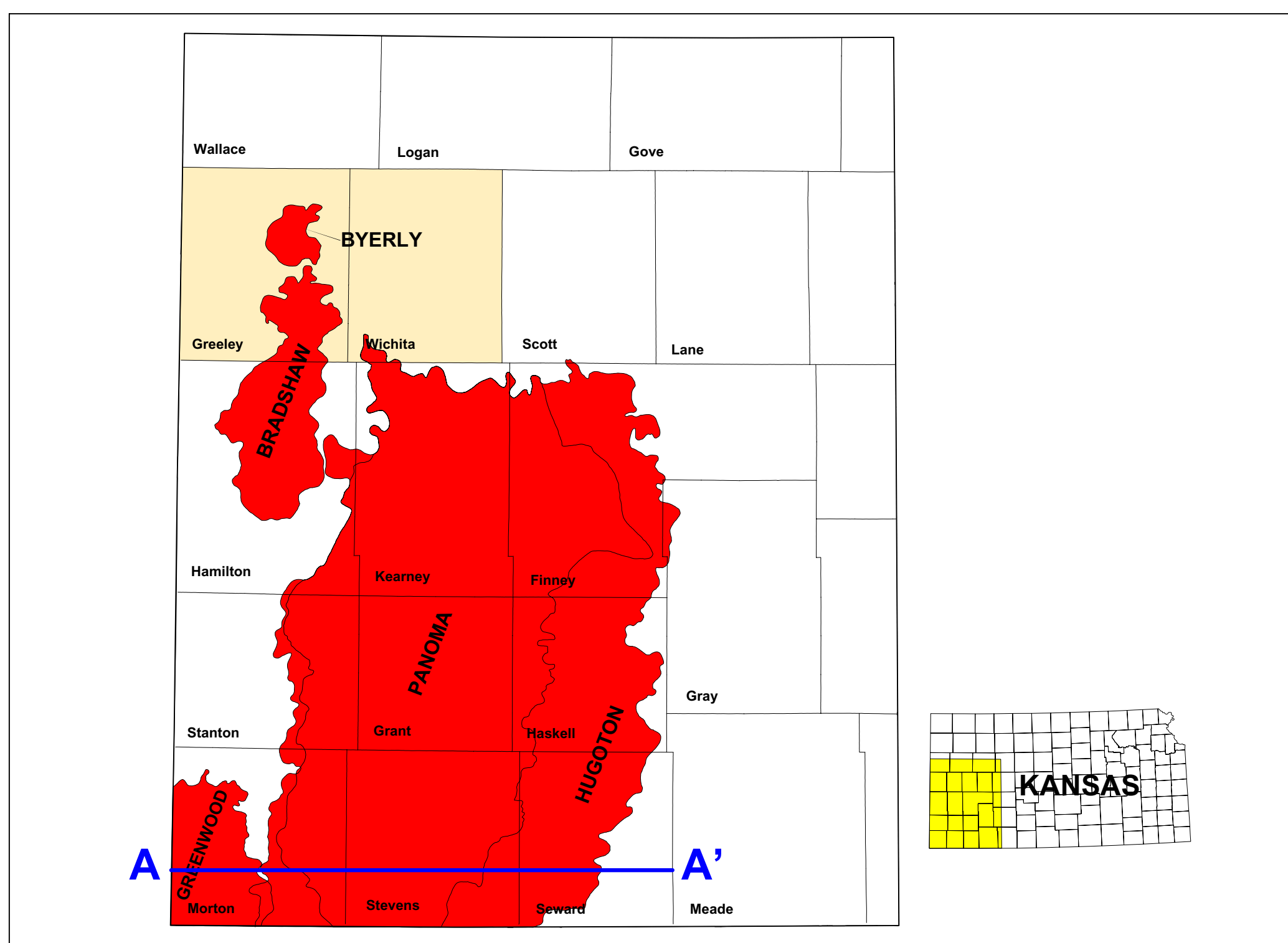


FIGURE 1. LOCATION MAP, REGIONAL SOIL GAS SURVEY



GENERAL LOCATION MAP, CHASE CARBONATE GAS TREND

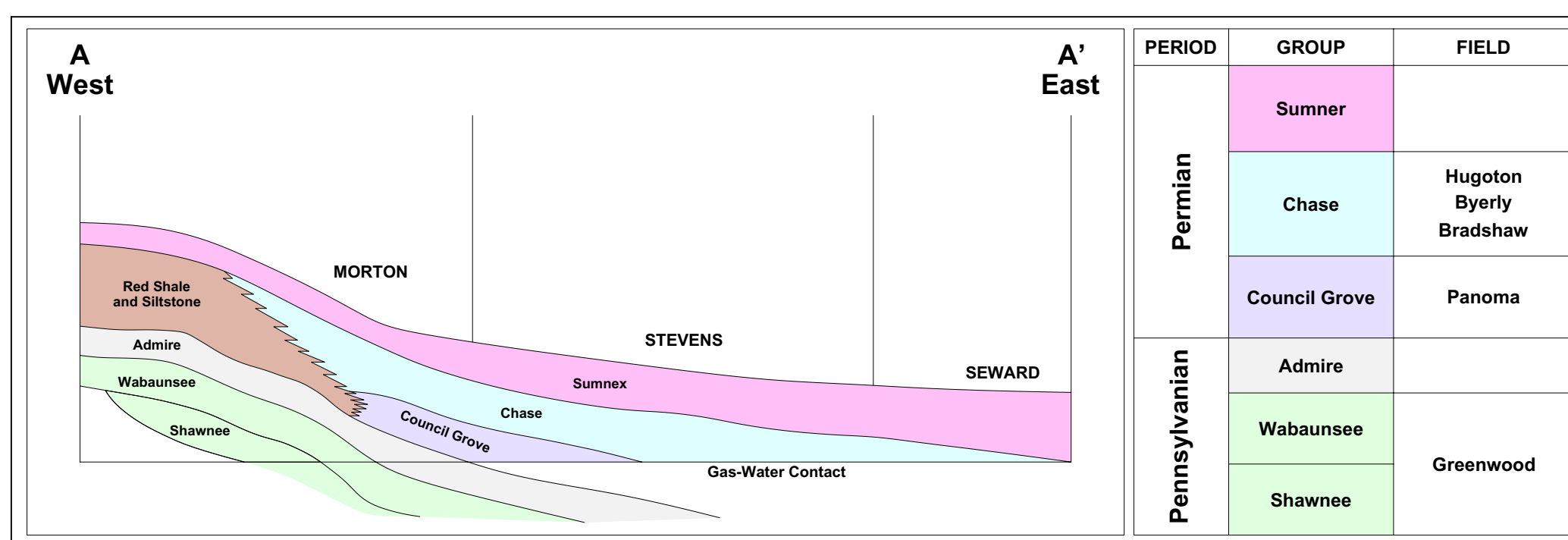


FIGURE 2. GENERALIZED GEOLOGY, HUGOTON GAS AREA, HUGOTON EMBAYMENT

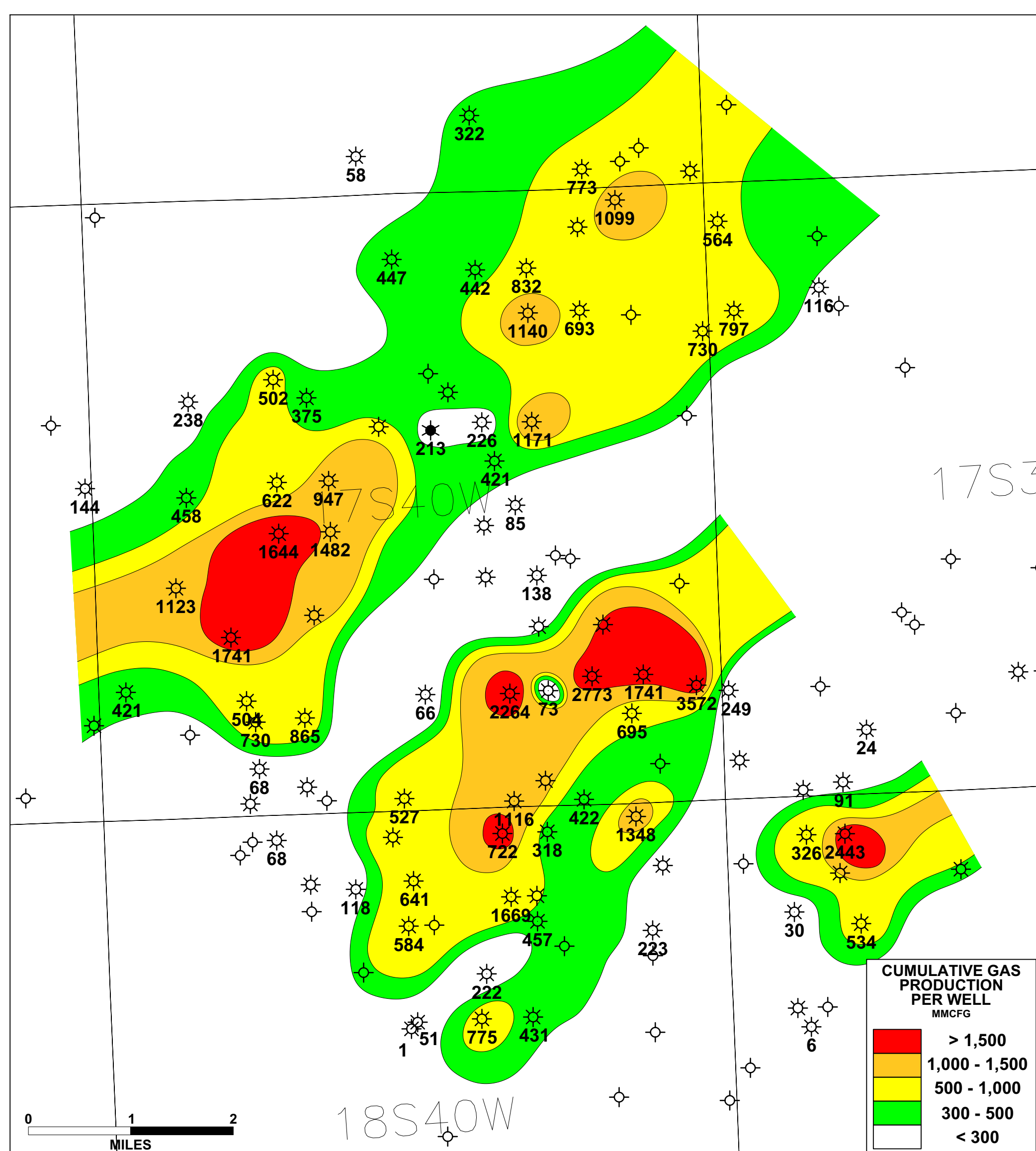


FIGURE 3. CUMULATIVE GAS PRODUCTION, BYERLY FIELD

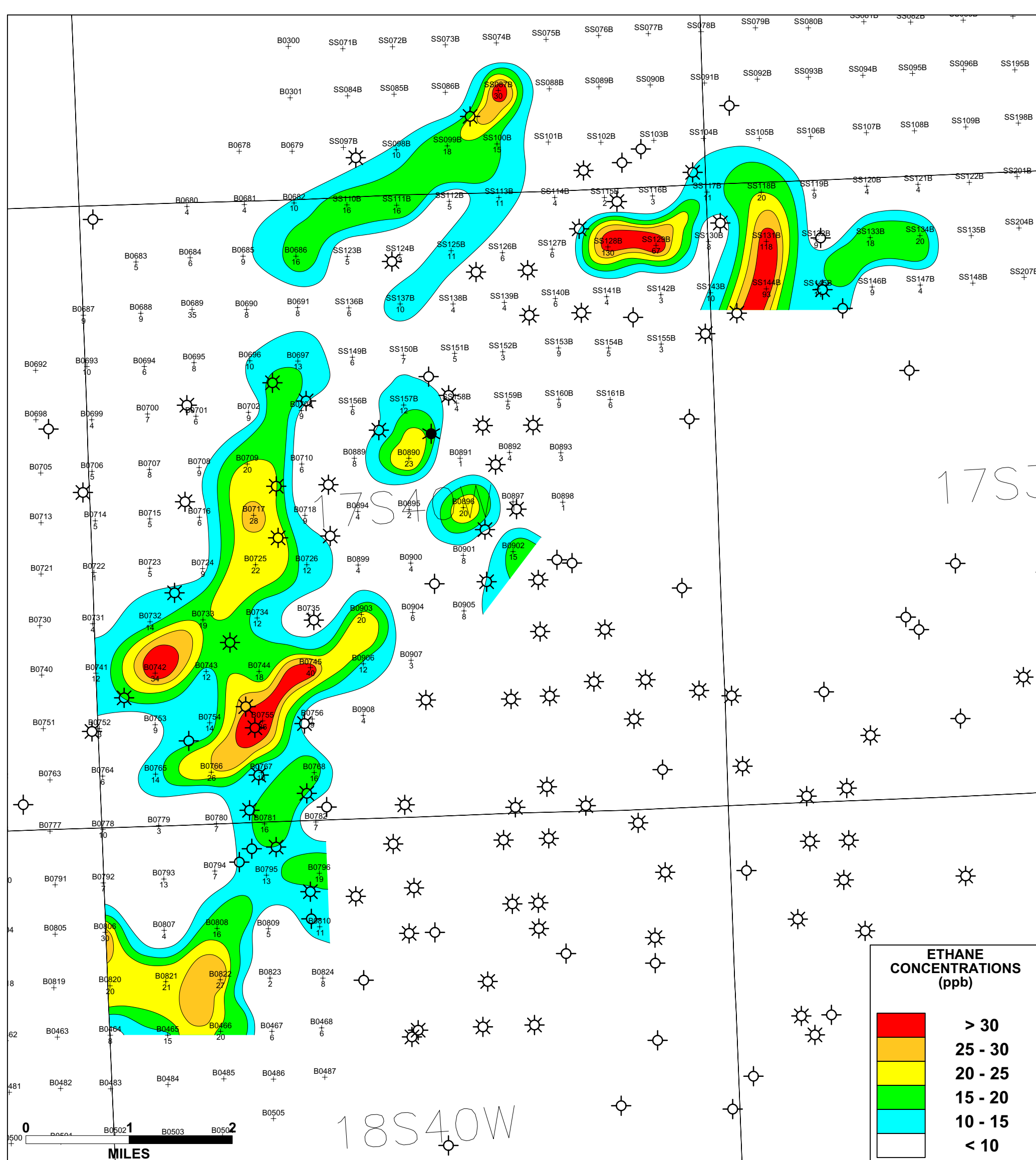


FIGURE 4. ETHANE MAGNITUDE CONTOUR MAP (ppb)