

Final Report for the FY17 Surface Casing Estimator Site Project

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prepared for

Railroad Commission of Texas

under Contract Number 14-000903

Bureau of Economic Geology

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August 2017

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ABSTRACT

The Surface Casing Estimator Site is a website that provides estimates of possible surface-casing requirements for wells and related information. Work during FY17 for the Surface Casing Estimator Site project involved (1) scanning more than 4,850 geophysical logs of the Q-log library for 14 counties, (2) constructing digital data sets composed of geologic information that relates to estimating surface-casing requirements and groundwater depths for 8 counties in West Texas, and (3) merging/programming the new data with the website's existing data. The Estimator Site provides information on elevations and depths for the top and base of fresh water; the base of usable-quality water; the base of underground sources of drinking water; and the top and base of critical water-bearing stratigraphic units, aquifer names, geophysical logs, and well locations. The FY17 work has enabled about 825 additional geophysical logs in 8 West Texas counties to be viewed through the Surface Casing Estimator Site.

INTRODUCTION

The FY17 Surface Casing Estimator Site project continues work on (1) constructing a web-enabled estimator site with statewide coverage, and (2) scanning geophysical logs of the hard-copy Q-well log data files that are evaluated to make casing recommendations for wells drilled in Texas. Work for the Surface Casing Estimator Site, which began in 2004 with development of spatial and tabular data, has been displayed over the Internet (Arc IMS) for specific Texas counties, allowing oil and gas operators, Railroad Commission of Texas (RRC) staff, and other users to determine probable surface-casing requirements and view selected geophysical logs and other features such as land-survey boundaries, roads, and well locations. Since the initial success of the pilot project, a study of Brazos County in 2004, the project has interpreted and prepared estimator-site data sets for 78 counties and has scanned Q-well logs for 118 counties (figs. 1 and 2).

This project year's work involved three primary phases: (1) scanning of geophysical logs for 14 counties and initial study of RRC data for 8 counties to prepare data sets for addition to the Surface Casing Estimator Site, (2) interpretation of geologic data for estimator-site-study counties, and (3) construction and review of Surface Casing Estimator Site digital data sets for 8 counties. Project deliverables are digital TIFF images of the scanned Q-logs and study-area additions/updates to the web-enabled Surface Casing Estimator Site. More than 4,850 log scans were delivered during this project year. Data for the 8-county West Texas study area have been added to the Surface Casing Estimator Site at <http://www.beg.utexas.edu/research/areas/groundwater-studies/surface-casing-estimator>.

Scanning of the RRC Q-log library is an ongoing task that will continue for 12 additional counties into a new contract year, FY18, with the RRC. Data for 8 counties will be studied and added to the Surface Casing Estimator Site during FY18.

GEOPHYSICAL LOG SCANNING

More than 4,850 scans of geophysical Q-logs were made during FY17. Required scanning for 12 counties—Armstrong, Carson, Culberson, Gray, Hansford, Hutchinson, Lipscomb, Moore, Ochiltree, Potter, Randall, and Roberts—was completed. After scanning was completed for these 12 counties, 2 other counties, Harris and Refugio, were added to the log-scanning task. Selection of these 14 counties for the scanning of geophysical logs conforms to RRC needs and drilling activity. Scanning was conducted at the RRC Q-log library and typically occurred 5 days a week during much of the work year. A summary of FY17 geophysical log scanning is as follows:

<u>County</u>	<u>Q-Log Folders</u>	<u>Scans of Logs</u>
Armstrong	Q1 to Q32	32
Carson	Q1 to Q150	145
Culberson	Q1 to Q243	236
Gray	Q1 to Q246	235
Hansford	Q1 to Q310	300
Hutchinson	Q1 to Q289	281
Lipscomb	Q1 to Q154	150
Moore	Q1 to Q130	123
Ochiltree	Q1 to Q310	303
Potter	Q1 to Q131	131
Randall	Q1 to Q31	30
Roberts	Q1 to Q107	104
Harris	Q1 to Q1,959	1,950
Refugio	Q1 to Q839	831

SURFACE CASING ESTIMATOR SITE

Data sets for the following 8 counties were added to the Surface Casing Estimator Site this work year: Andrews, Crockett, Dawson, Gaines, Glasscock, Howard, Martin, and Yoakum of West Texas. Work to construct the data sets involved (1) collection of available data and digital files for county surveys and abstracts, county boundaries, previous surface-casing recommendations, well-location maps, ground elevations, and subsurface and surface geology; (2) creation of a GIS project using standard ArcMap software; (3) creation of digital-elevation-model grids for ground elevations; (4) review of study-area geology and groundwater units with Surface Casing Team staff, and designation of critical stratigraphic intervals, horizons, and aquifers; (5) study of geologic data, geophysical logs, and location of wells, and construction of digital files for well locations; (6) construction of data spreadsheets and GIS attribute tables for study intervals, horizons, and aquifers; (7) construction of GIS contour grids for study intervals and of horizon and shapefile layers for well locations and aquifer-recommendation areas; and (8) review of data layers through evaluation of layer-overlap techniques and visual study.

Contour-grid image files and point and polygon shapefiles have been added and programmed into the Surface Casing Estimator Site using the ArcGIS Server so that this year's data could be merged with the site's existing data. This year's work for the estimator site also included upgrades related to the programming of data sets, routine maintenance, and updates to the website server.

The data set for the 8 West Texas counties incorporates information from 827 geophysical logs and 1,124 RRC well records for surface casing recommendations/protection depths (SCRIP files) and salt water disposal (SWD files). Some of these counties, which span different parts of West Texas, required study of different horizons, including the following: the bases of West Texas shallow aquifers, Cretaceous strata, the Santa Rosa Formation, and underground sources of drinking water, as well as the top of the Santa Rosa interval. The top and bottom of the San Andres interval were also studied for a local area. Geologists from the RRC Groundwater Advisory Unit provided technical information that helped determine the aquifers and which surface-casing recommendations were needed. The 8-county data set also enables viewing of 827 additional geophysical logs on the Surface Casing Estimator Site.

FUTURE WORK

Future work includes scanning of geophysical Q-logs for 12 counties: Archer, Brazoria, Crosby, Hidalgo, Jefferson, Montgomery, Nolan, Scurry, Stephens, Waller, Wichita, and Young. Planned interpretive work for Surface Casing Estimator Site data sets involves 8 counties within different parts of the state: Cochran, Culberson, Hockley, Irion, Loving, Pecos, Reeves, and Refugio. Scheduling to determine which counties will have data interpreted and which will have logs scanned should be kept flexible to meet changes in priorities that may occur during a work year. Upgrades to the website and server are also periodic tasks.

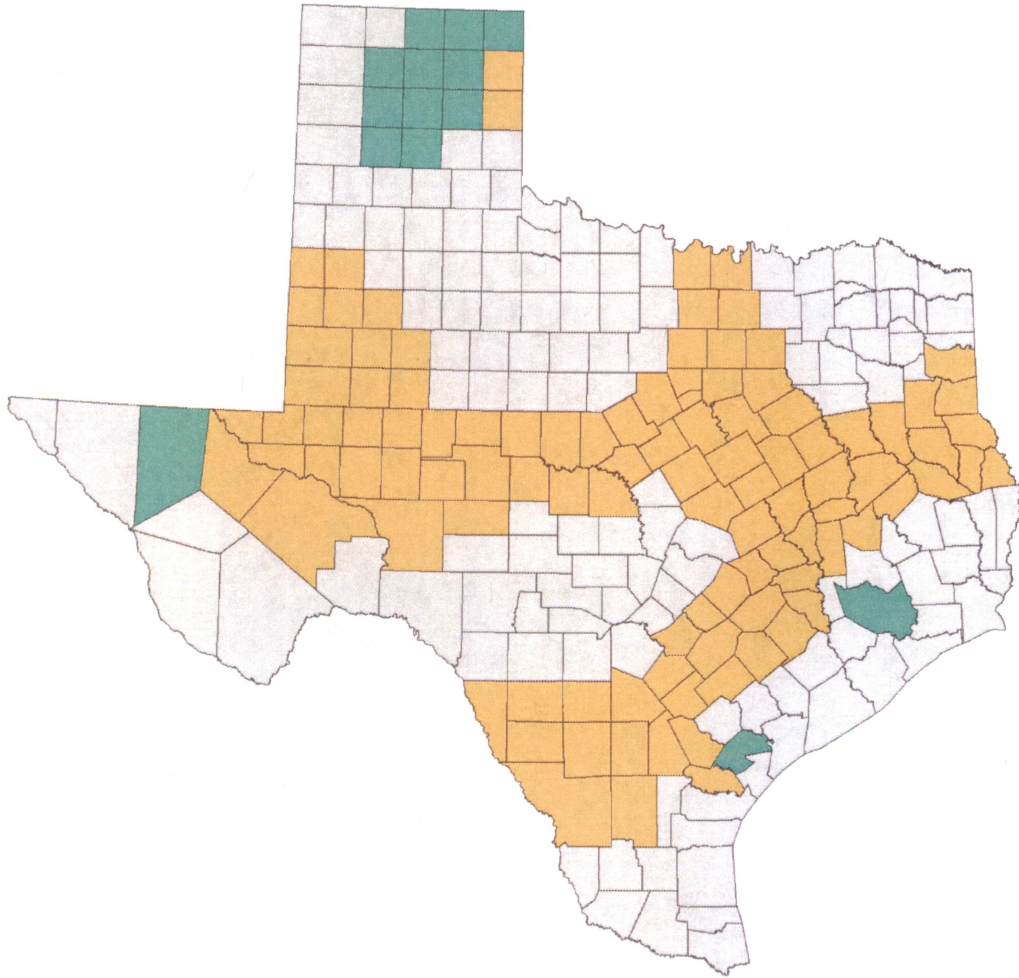


Figure 1. Counties with Q-logs scanned during FY17 (green) and during previous work years (orange).

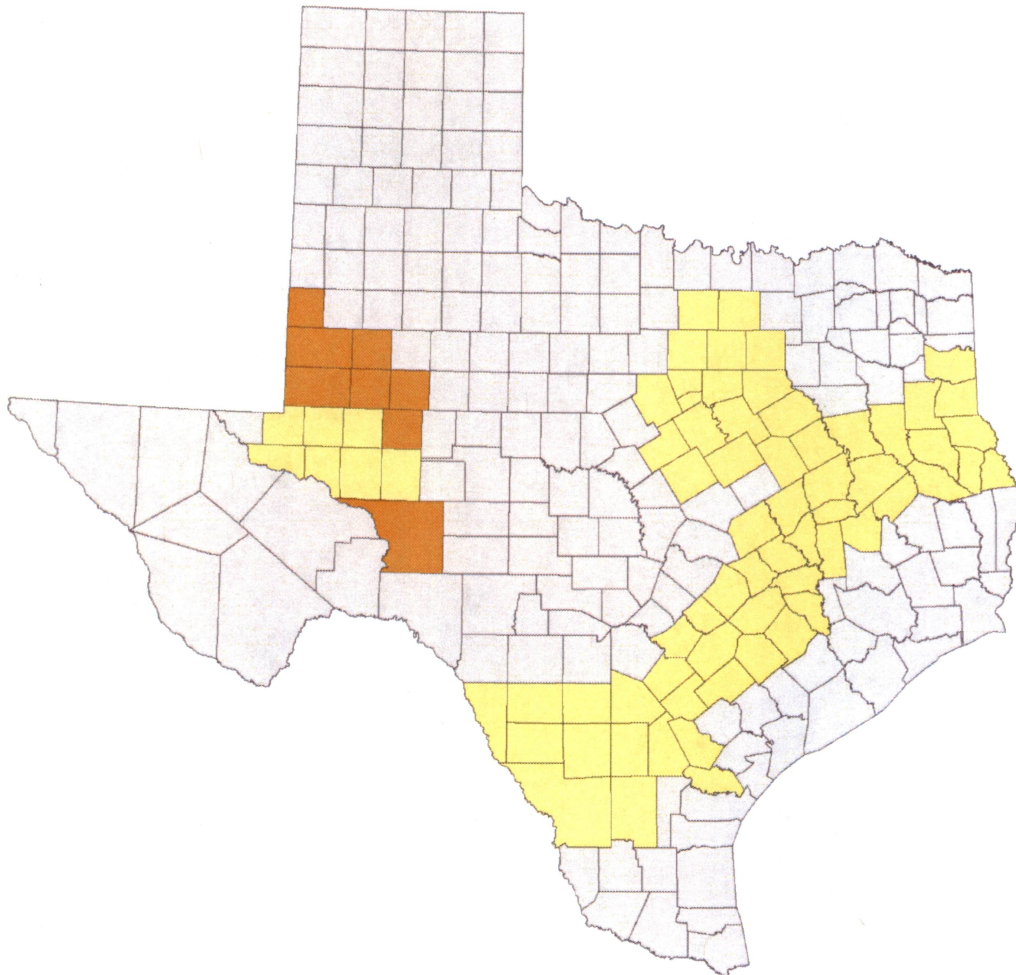


Figure 2. Counties completed for Surface Casing Estimator Site during FY17 study (orange) and during previous work years (yellow).