

Final Report for the FY11 Surface Casing Estimator Site Project

Final Report

by

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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 FY11 for the Surface Casing Estimator Site project involved (1) scanning more than 12,500 geophysical logs of the Q-log library for 12 Texas counties, (2) constructing digital data sets composed of geologic information that relates to estimating surface-casing requirements for a five-county study area in East Texas and a two-county study area in West Texas, and (3) merging/programing 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, base of usable-quality water, base of the underground source of drinking water, top and base of critical water-bearing stratigraphic units, aquifer names, geophysical logs, and well locations. The FY11 work also enables about 1,240 additional geophysical logs to be viewed through the Surface Casing Estimator Site.

INTRODUCTION

The FY11 Surface Casing Estimator Site project continues work on (1) constructing a web-enabled surface-casing estimator site with statewide coverage and (2) scanning geophysical logs of the hardcopy Q-well log-data files that are evaluated to make casing recommendations for wells drilled in Texas. Work for the Surface Casing Estimator Site began in 2004 by developing spatial and tabular data, served over the Internet (Arc IMS) for specific Texas counties, that allows oil and gas operators, Texas Commission of Environmental Quality (TCEQ) and 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 studying Brazos County in 2004, the project has interpreted and prepared estimator-site data sets for 34 counties and has scanned Q-well logs for 44 counties (figures 1 and 2). This project year's work involved three primary phases of work: (1) scanning of geophysical logs for 12 counties and initial preparation of RRC data files for 6 counties to study for their 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 datasets. 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 12,500 log scans were delivered during this project year. Data for the five-county East Texas study area and two-county West Texas study area have been added to the Surface Casing Estimator Site. The site may be viewed at <http://www.beg.utexas.edu/tceq/index.html>.

At the end of FY11, August 2012, the TCEQ Surface Casing Team is scheduled to be transferred to the Railroad Commission of Texas as the RRC Groundwater Advisory Unit. Scanning of the Q-log library is an ongoing task that will continue for additional counties into a new contract year, FY12, with the RRC. Data for six counties are planned to be studied and added to the Surface Casing Estimator Site during the upcoming FY12 work year with the RRC.

GEOPHYSICAL LOG SCANNING

More than 12,500 scans of geophysical Q-logs were made during FY11 for Ward, Winkler, Navarro, Freestone, Ellis, Limestone, Ector, Crane, Midland, Cooke, Bell, and Montague Counties. Falls County Q-logs (Falls Q-folders Q1 to Q81; 109 log scans) had been scheduled to be scanned during this work year, but they had already been scanned during a previous work year as additional scanning work. The scanning of Ward County Q-logs had previously been planned for FY10, but this work was shifted into the current FY11 work year when Reeves County Q-logs were added to the FY10 workload owing to a midyear priority change related to the Texas Water Development Board brackish-water characterization pilot project (BRACS). Scanning, which was done at the Q-log library, typically occurred 3 to 5 days each week. A summary of FY11 scanning follows.

<u>County</u>	<u>Q-Log Folders</u>	<u>Scans of Logs</u>
Ward	Q1 to Q853	2,407
Winkler	Q1 to Q900	1,658
Navarro	Q1 to Q340	590
Freestone	Q1 to Q338	559
Ellis	Q1 to Q71	94
Limestone	Q1 to Q700	810
Ector	Q1 to Q1353	2,714
Crane	Q1 to Q838	1,513
Midland	Q1 to Q575	722
Cooke	Q1 to Q1,029	1,400
Bell	Q1 to Q30	26
Montague	Q1 to Q1,091	1,300 (estimate; ongoing)

In addition to the log-scanning task conducted at the Surface Casing Team's office, three undergraduate research assistants contributed to this year's work. During the fall and summer semesters the research assistants performed tasks related to data preparation, such as GIS work to georeferencing images of geologic/well-location maps, including scanned images of surface-casing linen maps and surface-casing database entry and data verification.

SURFACE CASING ESTIMATOR SITE

Data sets for seven counties were added to the Surface Casing Estimator Site this work year. Counties of the five-county East Texas study area are Anderson, Cherokee, Rusk, Harrison, and Panola. The two-county West Texas study area covers Ward and Winkler Counties. 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 and geophysical logs, location of wells, and construction of digital files for well locations; (6) construction of data spreadsheets and GIS attribute tables for study intervals and horizons, including stratigraphic units, top and base of fresh water (1,000 TDS), base of usable-quality water (3,000 TDS), base of underground source of drinking water (10,000 TDS), and aquifers; (7) construction of GIS contour grids for study intervals and horizons and shape-file 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-shape files 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. Other work for the Estimator Site included routine maintenance and updates to the website server.

The five-county East Texas study-area data set incorporates information from over 740 wells. Within this East Texas area, the Estimator Site presents elevation and depth estimates for the top and base of fresh water, base of usable-quality water, and base of underground source of drinking water, enabling viewing of about 720 geophysical Q-logs. The two-county West Texas study-area data set was prepared from data for over 1,000 wells. The Estimator Site for this area provides elevation and depth estimates for the top of the upper isolation zone (ground elevation), base of the Santa Rosa Formation (base of usable-quality water), top and bottom of the Rustler Formation, and top and bottom of the Capitan Formation, and enabling viewing of about 520 geophysical Q-logs. Rustler and Capitan information is displayed only for geographic parts of this study area in which surface-casing recommendations for these units may be needed. These areas were determined by Surface Casing Team staff.

FUTURE WORK

Future work includes scanning of geophysical Q-logs for 13 counties: Upton, Glasscock, Reagan, Sterling, Irion, Coke, Tom Green, Maverick, Dimmit, La Salle, McMullen, Live Oak, and Webb. Scheduling for determining which counties to have logs scanned should be kept flexible to meet changes in priorities that may occur during a work year. For example, during FY10, scanning for Reeves County became a priority addition to the scanning project, resulting in the need to move scanning for Ward County to FY11 work. The addition of Ward log scanning resulted in the need to shift Upton County scanning into FY12 work.

Planned work for Surface Casing Estimator Site data sets deals with two study areas. A two-county, West Texas study area covers Ector and Crane Counties. Another four-county study area in East-Central Texas deals with Freestone, Limestone, Navarro, and Ellis Counties.

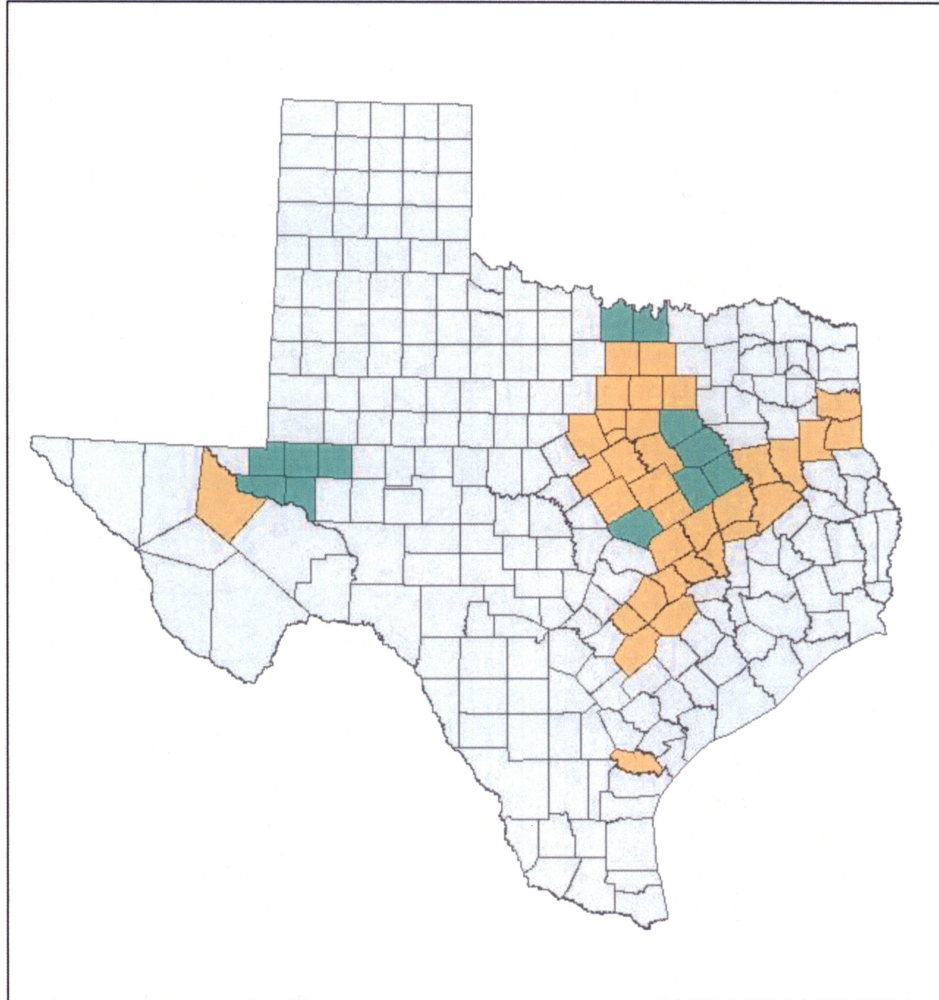


Figure 1. Counties with Q-logs scanned. Counties having Q-logs scanned during FY11 are green. Counties having Q-logs scanned during previous work years are tan.

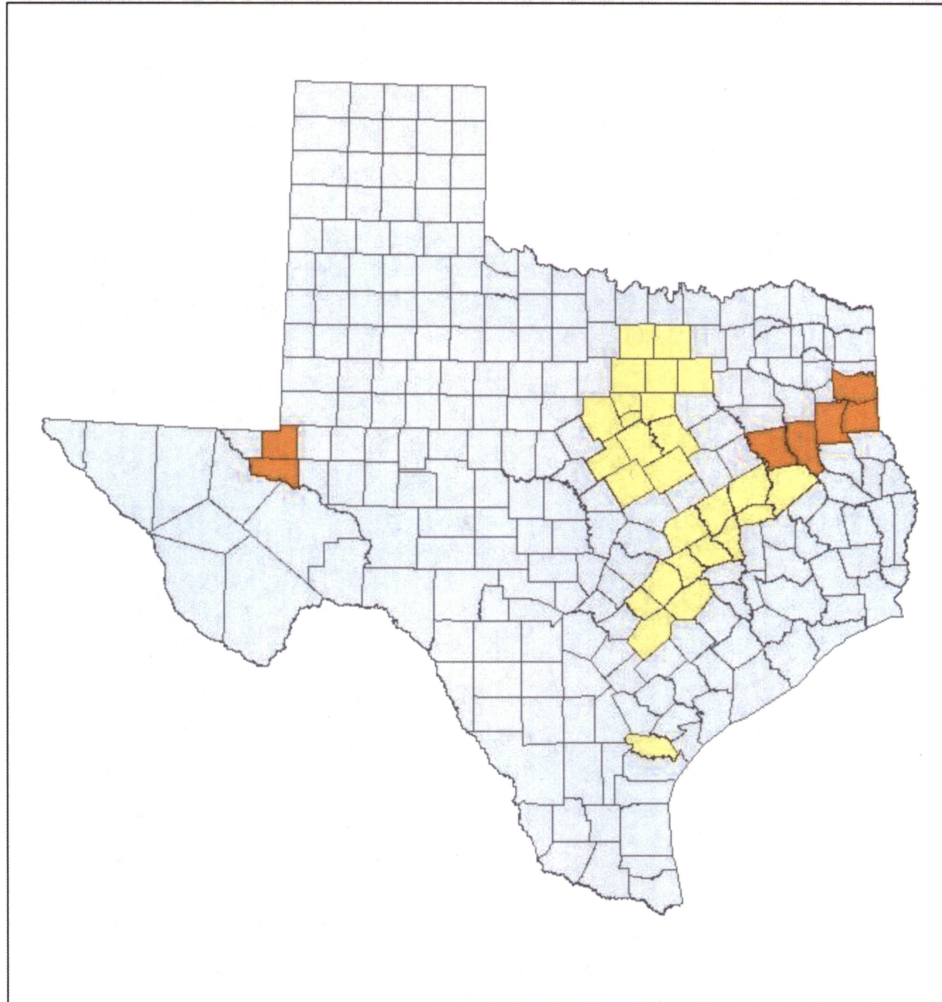


Figure 2. Surface Casing Estimator Site counties. FY11 study counties are orange. Counties completed for the site during previous work years are yellow.