

Final Report for the FY12 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 FY12 for the Surface Casing Estimator Site project involved (1) scanning more than 11,250 geophysical logs of the Q-log library for 13 Texas counties, (2) constructing digital data sets composed of geologic information that relates to estimating surface-casing requirements for a four-county study area in east-central Texas and a three-county study area in south 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, base of usable-quality water, base of underground source of drinking water, top and base of critical water-bearing stratigraphic units, aquifer names, geophysical logs, and well locations. The FY12 work also has enabled about 880 additional geophysical logs to be viewed through the Surface Casing Estimator Site.

INTRODUCTION

The FY12 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, which began in 2004 with development of spatial and tabular data, has been served 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 41 counties and has scanned Q-well logs for 57 counties (figures 1 and 2). This project year's work involved three primary phases of work: (1) scanning of geophysical logs for 13 counties and initial preparation of RRC data files for 7 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 11,250 log scans were delivered during this project year. Data for the four-county east-central Texas study area and three-county south Texas study area have been added to the Surface Casing Estimator Site at <http://www.beg.utexas.edu/sce/index.html>.

Scanning of the RRC Q-log library is an ongoing task that will continue for 12 additional counties into a new contract year, FY13, with the RRC. Data for eight counties will be studied and added to the Surface Casing Estimator Site during the upcoming FY13 work year with the RRC.

GEOPHYSICAL LOG SCANNING

More than 11,250 scans of geophysical Q-logs were made during FY12 for Montague, Upton, Reagan, Glasscock, Tom Green, Live Oak, McMullen, LaSalle, Dimmit, Webb, Atascosa, Maverick, and Karnes Counties. Scanning for Montague began in late August 2011 during the last days of FY11. Three counties (Sterling, Coke, and Irion), which were originally scheduled for log scanning during this FY12 study year, were removed from the FY12 plan so that Montague, Atascosa, and Karnes Counties could be added. This was done owing to a midyear priority change related to RRC needs and drilling activity associated with south Texas exploration within the Eagle Ford Shale. Scanning, which was done at the RRC Q-log library, typically occurred 5 days a week. A summary of FY12 scanning follows.

<u>County</u>	<u>Q-Log Folders</u>	<u>Scans of Logs</u>
Montague	Q1 to Q1,091	1,408
Upton	Q1 to Q753	987
Reagan	Q1 to Q701	815
Glasscock	Q1 to Q343	384
Tom Green	Q1 to Q528	555
Live Oak	Q1 to Q1,223	1,308
McMullen	Q1 to Q765	780
LaSalle	Q1 to Q483	552
Dimmit	Q1 to Q643	784
Webb	Q1 to Q1,560	2,177
Atascosa	Q1 to Q666	946
Maverick	Q1 to Q233	258
Karnes	Q1 to Q685	957

In addition to the log-scanning task, an undergraduate research assistant contributed to this year's work. During summer semesters, the research assistant performed project-related tasks coordinated by RRC groundwater advisory-unit staff at their office.

SURFACE CASING ESTIMATOR SITE

Data sets for seven counties were added to the Surface Casing Estimator Site this work year. Counties of the four-county east-central Texas study area are Ellis, Navarro, Freestone, and Limestone. The three-county south Texas study area covers Live Oak, McMullen, and LaSalle 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. The site was upgraded with a new application design that replaces the previous map-user interface with a more robust one that integrates Google Maps base layers with the Surface Casing Estimator's business data layers. Other work for the Estimator Site included routine maintenance and updates to the website server.

The four-county east-central Texas study-area data set incorporates information from over 400 wells. Within this east-central 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 360 geophysical Q-logs. The three-county south Texas study-area data set was prepared from data for over 700 wells. The Estimator Site for this area provides elevation and depth estimates for the top of the Carrizo Formation upper isolation zone, base of fresh water, base of usable-quality water, and base of underground source of drinking water, enabling viewing of about 520 geophysical Q-logs. For both the east-central Texas and south Texas study areas, geologists from the RRC groundwater advisory unit provided technical information that helped determine the aquifers and which surface-casing recommendations are needed.

FUTURE WORK

Future work includes scanning of geophysical Q-logs for 12 counties: Bee, Duval, Karnes, Wilson, Zavala, Frio, Lavaca, Guadalupe, De Witt, Sterling, Coke, and Irion. Planned interpretive work for Surface Casing Estimator Site data sets deals with eight south Texas counties: Dimmit, Maverick, Webb, Atascosa, Bee, Karnes, Wilson, and De Witt. Scheduling for determining which counties to have data interpreted and which to have logs scanned should be kept flexible to meet changes in priorities that may occur during a work year. For example, during FY12, plans for counties' scanning and interpretation required modification during the work year owing to needs related to the Eagle Ford Shale play.

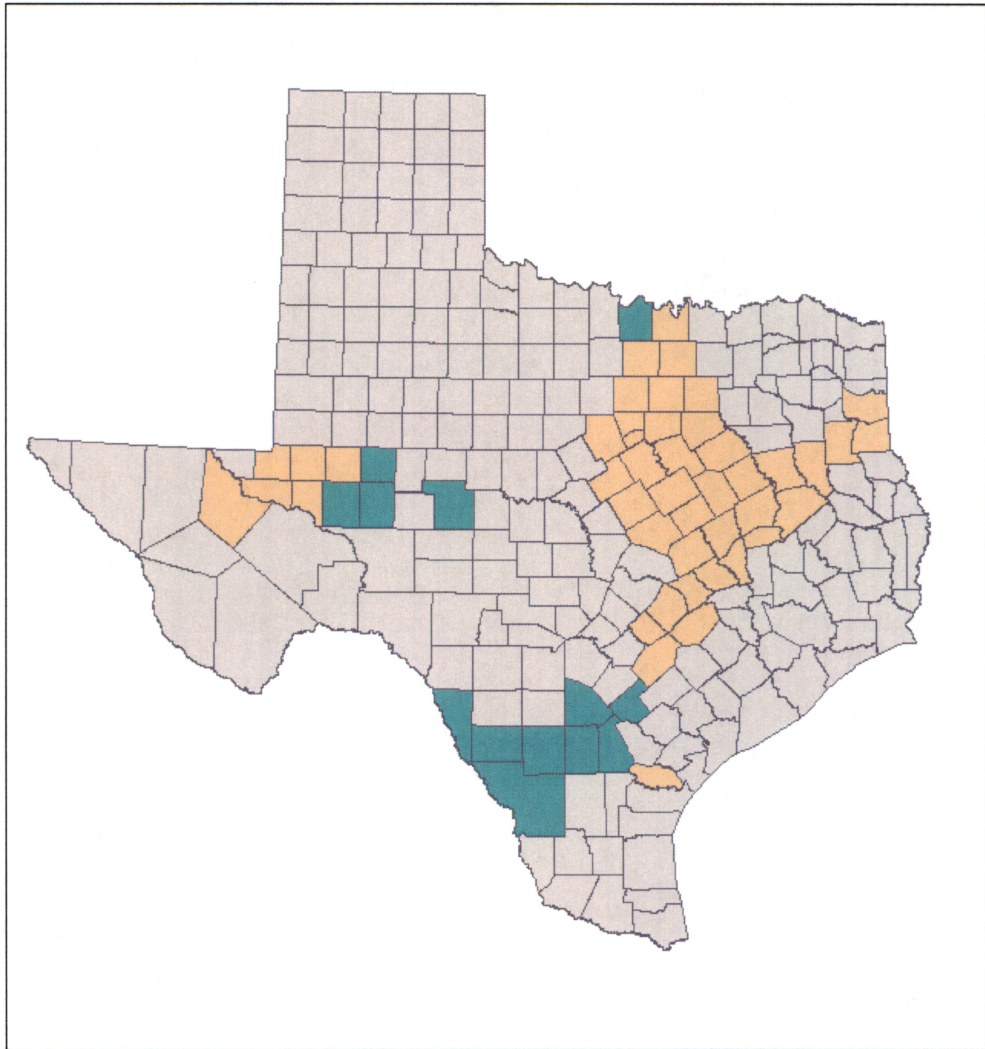


Figure 1. Counties having Q-logs scanned. Counties having Q-logs scanned during FY12 are green. Counties having Q-logs scanned during previous work years are tan.

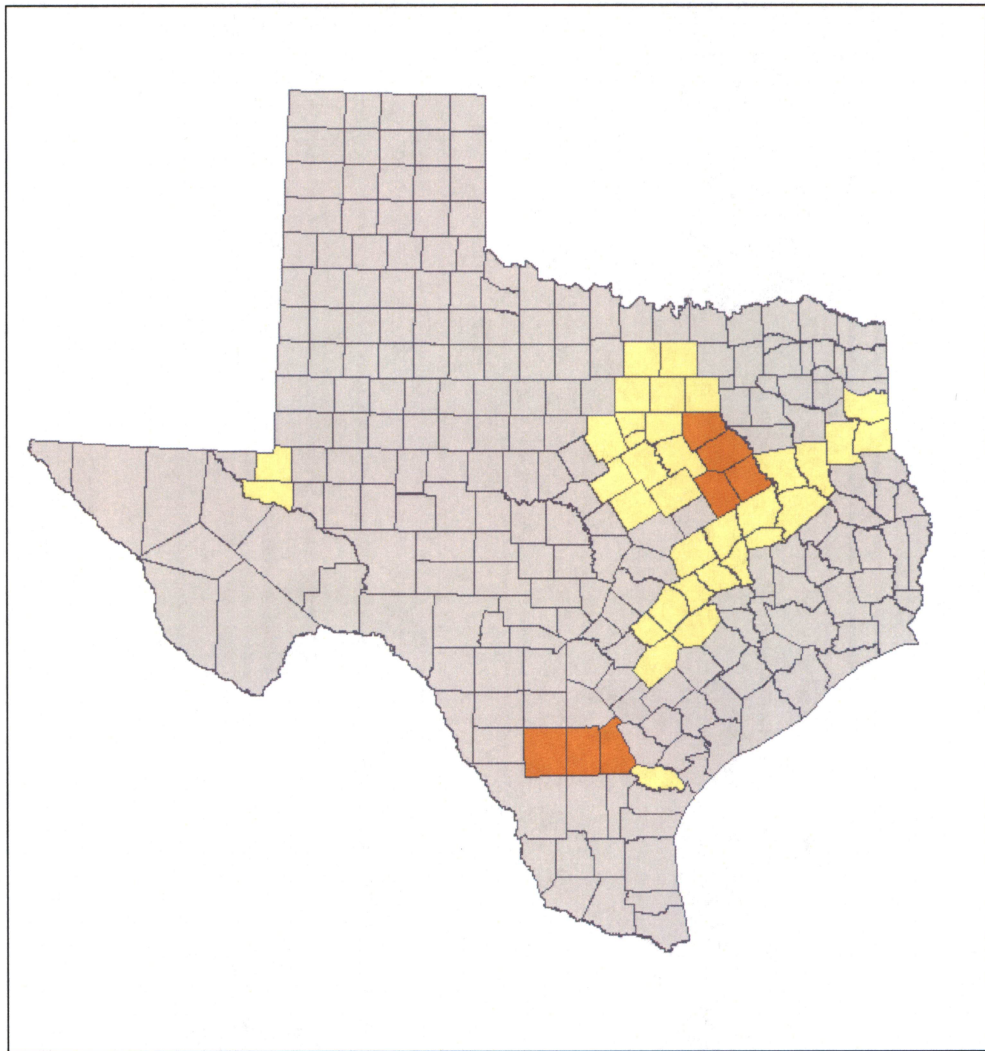


Figure 2. Counties completed for Surface Casing Estimator Site. FY12 study counties are orange. Counties completed for the site during previous work years are yellow.