Development of Statewide Aquifer/Well Test Data Compilation

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Prepared by:

S.S. PAPADOPULOS & ASSOCIATES, INC.
Environmental & Water-Resource Consultants

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1801 Rockville Pike, Suite 220, Rockville, Maryland 20852-1649 • (301) 718-8900

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REPORT

Section 1
Introduction

The statewide aquifer/well test data compilation project is an effort undertaken by the Texas Water Development Board (TWDB) to assemble aquifer property information across the entire state of Texas in an easily accessible digitized format. The currently available aquifer property database is presumed to be a small subset of the overall available information. Additional aquifer and well test data are available as scanned prints and handwritten documents in the form of PDF files. The objective of this project is to extract datasets from the scanned PDF files and compile the digitized information as aquifer property tables.

1.1 Scope of Work

S.S. Papadopulos and Associates, Inc. was retained by the TWDB under contract number 2348302712. The primary scope of work included the compilation of aquifer and pump test data as a digital dataset from scanned documents provided by the TWDB. In addition to the scanned documents provided by the TWDB, alternate publicly available data sources were evaluated and aquifer and pump test data from these sources were compiled as part of the dataset.

S.S. Papadopulos and Associates, Inc. teamed with H2O GeoSolutions, LLC, a certified HUB. Staff at H2O GeoSolutions, LLC provided a complementary skillset and maintained close communication with S.S. Papadopulos and Associates, Inc throughout the project.

Section 2
Data Sources

Information in the Aquifer Properties Table was assembled from documents compiled by the TWDB, downloaded from public data and document depositories, and obtained through outreach efforts. Table 2-1 provides a summary of document sources. A list of documents reviewed for this project is provided in the electronic deliverable (Microsoft Access Database) as described in Sections 4 and 5.

Table 2-1 Summary of sources for documents reviewed

Number of PDFs received from the TWDB	132,490
Number of PDFs downloaded from the TWDB website	4,139
Number of Documents Received from Outreach Efforts	2,414

Not all files received were relevant; the summary count shown refers to file formats with readable/searchable text, such as PDFs, Excel tables, etc.

2.1 The TWDB PDF Delivery

The TWDB provided 132,490 PDF documents representing 254 counties.

2.2 PDFs Downloaded from the TWDB Website

A total of 4,139 documents were downloaded from the TWDB Report Index webpage (https://www.twdb.texas.gov/publications/reports/index.asp) on 7/6/2023 and 12/6/2023. Documents included administrative reports, bulletins, contracted reports, historic groundwater reports, limited printing reports, and numbered reports. These reports were indexed and searched along with files provided by the TWDB as described in Section 3.

2.3 Data Received from Outreach Efforts

A public outreach effort was conducted by the TWDB and S.S. Papadopulos & Associates, Inc. teams. Multiple e-mail communications were sent out to a variety of stakeholders including, but not limited to, groundwater conservation districts (GCDs), local, state, and national agencies, consultants, and other groups who potentially may have useful information with regard to aquifer property data. A list of groups/agencies who responded to the outreach effort are listed in Appendix A. Relevant data was incorporated into the Aquifer Properties Table; however, not all agencies who responded were able to provide relevant data.

2.4 Public Databases and GIS files Downloaded from the TWDB website

While databases and GIS files publicly available from the TWDB's website did not directly provide aquifer properties data, these databases contain other relevant

information, such as well coordinates and construction details, aquifer designations, and notes which reference potential source documents. The following databases and GIS files were downloaded and reviewed:

- The Groundwater Database, downloaded from the TWDB website on 8/2/2023. Download link: https://www.twdb.texas.gov/groundwater/data/GWDBDownloadSQL.zip
- The Groundwater Database well location shapefile, downloaded from the TWDB website on 8/2/2023. Download link: https://www.twdb.texas.gov/mapping/gisdata/doc/well/TWDB_Groundwater.zip
- The Submitted Drillers Report Database, downloaded from the TWDB website on 8/2/2023. Download link: https://www.twdb.texas.gov/groundwater/data/SDRDownload.zip
- The Submitted Drillers Report Database well location shapefile, downloaded from the TWDB website on 8/2/2023. Download link: https://www.twdb.texas.gov/mapping/gisdata/doc/well/SDRDB_well_locations.zip

Section 3
Identification and Extraction of Relevant Information

In total, 139,043 files were evaluated for relevant aquifer properties data, including 132,490 files provided by the TWDB, 4,139 files downloaded from the TWDB website, and 2,414 files obtained through public outreach (Table 2-1).

PDFs were identified for review using two automated methods described below. The automated methods relied on specific search criteria that targeted large documents with datasets. Small reports or short forms with few data were not detected by the automated methods. Documents in formats not amenable to automated searches (such as ESRI shapefiles and Microsoft Access databases) were searched manually. A summary of the document evaluation is provided in Table 3-1.

3.1 Evaluation of PDFs

First, the PDFs were converted to searchable text using optical character recognition technology in the software program Adobe Acrobat Pro. These files were then compiled into an Adobe Catalog object and associated with an index file (.pdx). The index files were searched for keywords, and relevant data were extracted as described in Section 3.1.1, Keyword Searches. Data identified during the keyword searches were extracted into a Microsoft Excel table and reformatted for the Aquifer Properties Table. The format and resolution quality of the data in the original source document dictated if PDF conversion programs (Adobe Acrobat Pro or ABBYY FineReader) or manual data entry was used.

When feasible, data were extracted using automated tools available in the software text recognition and extraction tools for Adobe Acrobat Pro and ABBYY FineReader. Details are provided in the software user guides available at links below.

- Adobe Acrobat Pro: https://helpx.adobe.com/archive/acrobat/X/standard/acrobat_X_standard_help.pdf
- ABBYY FineReader: https://www.abbyy.com/media/14009/guide_english.pdf

Second, the “Comments”, “Other Data Available”, and “Remarks” fields in the Groundwater Database tables were searched for indications that aquifer tests had been performed, and/or that aquifer properties data may be available in the TWDB files. If an aquifer test was indicated, the “Comments” field of the table “DB_WellData” was searched for a reference to a specific document. Data from those documents were extracted and formatted for the Aquifer Properties Table similarly to documents identified through the keyword searches.

3.1.1 Keyword Searches

All PDF documents were converted to searchable text using optical character recognition, and the files were indexed and organized using Adobe Catalog index files (.pdx), as described above. The Adobe Catalog index files were searched for a list of

keywords associated with hydraulic property data. Spelling, grammar, and phrasing vary among documents, and therefore wildcard and proximity searches were employed. Appendix B provides a list of partial words/phrases and combinations of words used for wildcard and proximity searches, along with the exact word or phrase they were intended to identify.

Results of each keyword search, including PDF file name and page number, were saved as a text file. Because multiple keywords were frequently found in a single document, search results were often duplicative. To better track search results and remove duplicate file names, the search result text files were reformatted and compiled into a single table. The initial search identified more than 7,000 documents containing at least one keyword. A preliminary "first-cut" was made based on file size and the number of occurrences of keywords within the document. This first cut included documents with a large file size and/or documents which matched multiple keywords, based on the assumption that these files may contain larger and/or more relevant datasets; for example, summary tables or an appendix composed of multiple aquifer test analyses. After the first cut, 767 individual documents were identified for review. Documents matching multiple keywords and/or larger reports were prioritized for review.

3.1.2 Review of Comments Fields in the Groundwater Database Tables

The "Comments", "Other Data Available", and "Remarks" fields in the Groundwater Database tables were queried for keywords including "aquifer test", "pumping test" (or "pump test"), "transmissivity", "storage" and "aquifer properties". That query returned 5,233 records. Using that query, the "Comments" field was searched again for references to specific Numbered Reports or Bulletins. This search was partially automated using regular expressions (regex) to search for strings in formats similar to the naming conventions of Numbered Reports or Bulletins; for example: "R-" followed by a number, or "TWDB B-" followed by a number (among others). Remaining comments were reviewed manually. During this preliminary search, 88 documents were identified as potential sources of aquifer properties data. Of these 88 documents, 74 documents were linked to those returned from the first cut of the keyword search results table (767 documents).

3.1.3 Documents in Other Formats

In response to outreach efforts, some agencies provided data in formats other than PDF documents, for example electronic GIS files, Microsoft Access files, or Levelogger files. These formats were not amenable to the keyword search method developed for the PDF files, so they were searched manually. A summary is provided in Table 3-1.

3.2 Source Documents for the Aquifer Properties Table

Based on the automated and manual searches described above, 162 documents were identified as data sources for the Aquifer Properties Table. A summary is provided in Table 3-1.

Table 3-1 Summary of document evaluation

	Evaluation Step	Description	Number of Documents
1	Compile and review all documents. See Section 2.	Total number of documents included in this evaluation.	139,043
2	Perform automated keyword searches in the compiled PDFs. Narrow the list for review by performing a first cut based on file size and frequency of keyword occurrence. See Section 3.1.1.	Number documents identified from PDF keyword searches and first cut. (Initial keyword searches yielded 7,050 documents, and first cut narrowed the list to 767 documents)	767
3	Search "Comments", "Other Data Available", and "Remarks" fields in Groundwater Database tables for relevant keywords. See Section 3.1.2.	Number of PDFs identified for further review based on search of relevant fields in the Groundwater Database tables	88
4	Manually review documents that were not amenable to keyword searches, for example files in formats other than PDF (shapefiles, Microsoft Access database files, etc.). See Section 3.1.3.	Number of documents reviewed manually	281
5	Perform additional review of documents identified in steps 2 – 4. If the document contains relevant data, it is included as a source document for the Aquifer Properties Table. See Section 3.2.	Total number of source documents used to compile the Aquifer Properties Table (Appendix C)	162

For this project, documents which included larger data compilations, such as aquifer properties summary tables or appendices comprising multiple pumping test analyses, were prioritized for inclusion into the Aquifer Properties Table. During document evaluation, however, an additional 170 documents were found to contain some potentially relevant data (Appendix D). These documents were usually limited in scope; for example, a single pumping test report for one well. These documents have been noted for further review by the TWDB but have not been incorporated into the Aquifer Properties Table.

Section 4
Electronic Deliverable: The Aquifer Properties Table

The Aquifer Properties Table is provided electronically as a Microsoft Access database (Attachment). Core data in the Aquifer Properties Table comprises well identification, aquifer properties (transmissivity, hydraulic conductivity, storativity), and specific capacity. These data are stored in three linked tables:

- tbl Well ID
- tbl Aquifer Properties
- tbl Specific Capacity

The three core data tables are described in Section 5.1. The Aquifer Properties Table also includes two reference tables and six lookup tables which do not provide direct well or aquifer properties information. They are instead used for data source documentation and quality assurance. The reference tables and lookup tables are described in Sections 5.2 and 5.3.

4.1 Database Structure

A design schematic for the Aquifer Properties Table is presented in Figure 4-1. The schematic illustrates the relationships between the three core data tables and two reference tables. Data tables are linked using the key “kloc”, as described below.

4.2 Keys

The field “kloc” is used in the three core data tables to identify a well. In “tbl Well ID”, the well identifier “kloc” is a primary key. “kloc” cannot be null, and each value of “kloc” must be unique, i.e., any single value of “kloc” must appear exactly once in the table (no duplicates). In “tbl Aquifer Properties” and “tbl Specific Capacity”, the well identifier “kloc” is a foreign key. “kloc” is required for every record, but it need not be unique; i.e., duplicates are allowed. All “kloc” values used in tables “tbl Aquifer Properties” or “tbl Specific Capacity” must be included in “tbl Well ID” (Figure 4-1).

The field “SourceDoc” is a foreign key in the tables “tbl Aquifer Properties”, “tbl Specific Capacity” and “ref Source Docs”. This field may be used to link aquifer properties and specific capacity data with information about the document from which the data was extracted, including file size and location within the County subdirectories used for the TWDB PDF delivery.

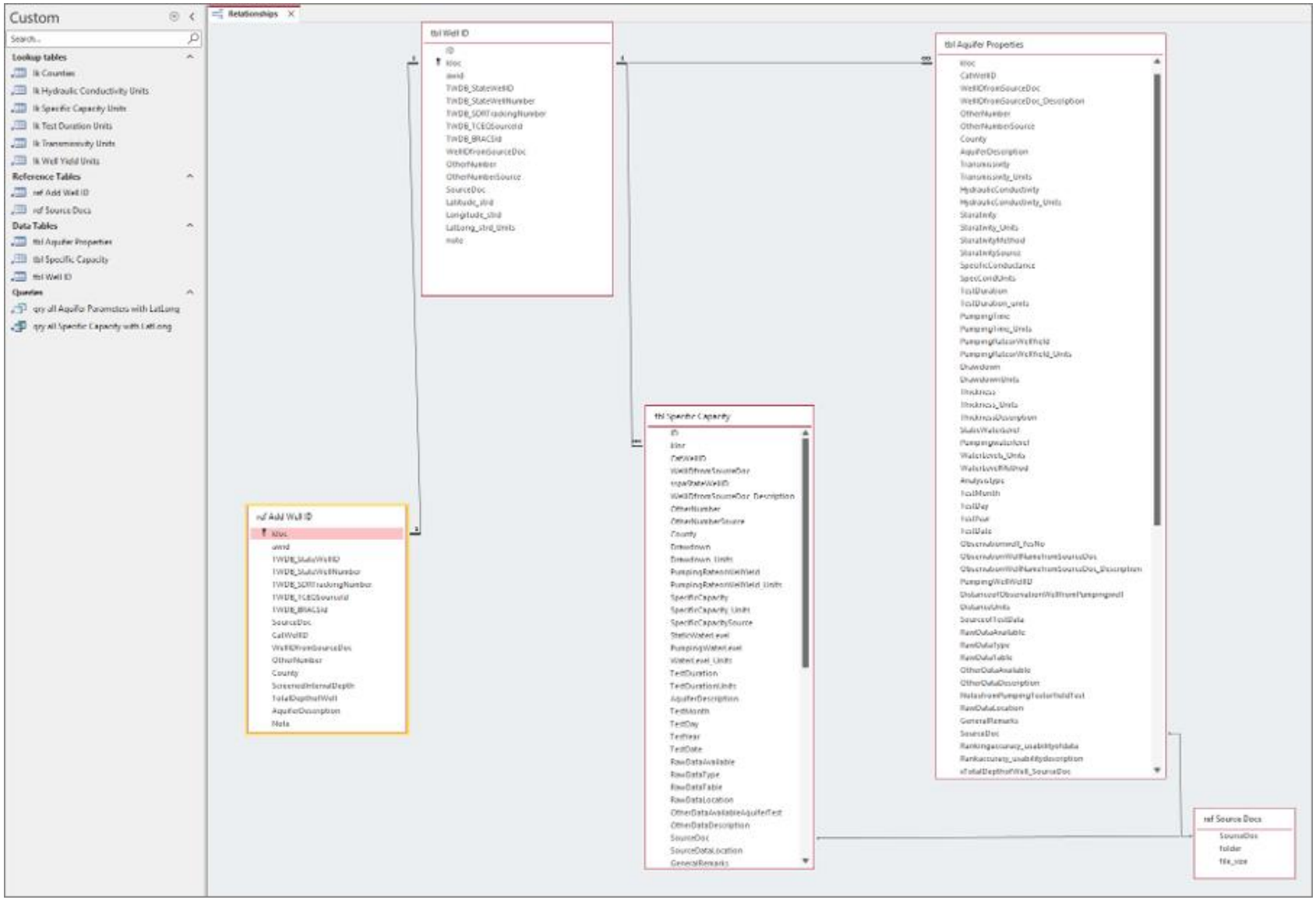


Figure 4-1 Structure of the Aquifer Properties Table

Section 5
Contents of the Aquifer Properties Table

The Aquifer Properties Table contains three core data tables, two reference tables, and six lookup tables. Each table is described below.

5.1 Core Data Tables

Each core data table is described briefly below. Field names, data types, and a description of each field for the three core data tables are provided in Appendix E. This metadata may also be viewed in the Design View for each table within the Microsoft Access database Aquifer Properties Table (Attachment).

5.1.1 tbl Well ID

"tbl Well ID" contains a master list of all well identifiers used in the Aquifer Properties Table. This table may be used to cross-reference between the primary well identifier "kloc" used in the Aquifer Properties Table, and standard well identifiers used by the TWDB, including State Well ID, State Well Number, Submitted Drillers Report Tracking Number, TCEQ Source ID, and BRACS ID. In cases where none of the standard TWDB well identifiers are available, the well identifiers from the original source document are included. These cases are discussed in more detail in the Reference Tables and quality assurance/quality control sections below (Sections 5.2 and Section 6).

"tbl Well ID" also includes latitude/longitude coordinates compiled from source documents. These coordinates represent a master list of coordinates available for each well from any source document; they are not associated with any single source document. Latitude and longitude are reported in decimal degrees. If projections and/or units used in the original source document were something other than decimal degrees, the coordinates were converted before appending to "tbl Well ID".

5.1.2 tbl Aquifer Properties

"tbl Aquifer Properties" includes transmissivity, hydraulic conductivity, and storativity data extracted from the source documents. Additional aquifer test information, for example, aquifer test date, pumping rate, test duration, drawdown, and relevant notes are included when available. Numeric fields have been converted to standardized units when required. Conversion factors between the units used in the original source documents and the standardized units are provided in the lookup tables.

Records in "tbl Aquifer Properties" are keyed to the well identifier "kloc" and may be linked to "tbl Well ID" as described in Section 4.2. All records in "tbl Aquifer Properties" must include a non-null value for "kloc", and all "kloc" values used in "tbl Aquifer Properties" must be included in "tbl Well ID". "kloc" need not be unique in "tbl Aquifer Properties".

In addition to the standardized fields described in Appendix E, the table "tbl Aquifer Properties" contains several fields with the suffix "_SourceDoc". These fields are hidden

in the default Datasheet View of the table in Microsoft Access; they may be viewed by right-clicking on any column header and selecting “Unhide Fields”. These fields include information exactly as formatted in the original source document. For example, “xTransmissivity_SourceDoc” and “xTransmissivityUnits_SourceDoc” provide the transmissivity value and units exactly as reported in the original source document, before values were converted to standard units. These fields are included to assist in data documentation and quality assurance activities in the Aquifer Properties Table and could potentially be removed when the Aquifer Properties Table is finalized. Details are provided in Section 6.

Similarly, because the Aquifer Properties Table does not yet include the State Well Number for all wells, additional information which may help identify the well is also included in this table; for example, XY coordinates from original source document, county, aquifer information, total well depth and screened interval. These fields are also indicated by the suffix “_SourceDoc”.

5.1.3 tbl Specific Capacity

“tbl Specific Capacity” includes specific capacity data extracted from source documents. Additional test information, for example, test date, pumping rate and drawdown are included when available. Numeric fields have been converted to standardized units when required. Conversion factors between the units used in the original source documents and the standardized units are provided in the lookup tables

As with “tbl Aquifer Properties”, additional fields with the suffix “_SourceDoc” have been included at the end of the table. These fields are hidden in the default Datasheet View of the table in Microsoft Access; they may be viewed by right-clicking on any column header and selecting “Unhide Fields”. These fields contain data formatted exactly as they appeared in the source document, before unit conversions and standardization. The purpose of these fields is to facilitate quality assurance activities in the database, as described in Section 6.

5.2 Reference Tables

Two reference tables are included in the Aquifer Properties Table.

- ref Add Well ID
- ref Source Docs

These tables do not contain core well or aquifer properties data; rather, they contain supporting information which may be used for data documentation and quality assurance.

5.2.1 ref Add Well ID

In some cases, none of the standard TWDB well identifiers: State Well ID, State Well Number, Submitted Drillers Report Tracking Number, TCEQ Source ID, or BRACS ID were available directly from aquifer properties source documents. Instead, wells were named according to a system specific to the source document; for example, a well owner’s name, a location description (sometimes shown on a sketch or map), or

latitude/longitude coordinates. These same wells, however, may exist in the TWDB databases under a different name; e.g., one of the standard well identifiers, such as State Well Number.

In these cases, the well is assigned a “kloc” identifier used for the three core data tables within the Aquifer Properties Table. In the table “tbl Well Info”, the “kloc” ID is included as a record, but all the TWDB standard well identifier fields are blank. The table “ref Add Well ID” provides additional information from the source document which may be useful for filling in the blank fields, such as “other number” (a field containing any well alias or description included in the source document), total well depth, screen interval information, county and aquifer description.

In addition, the table “ref Add Well ID” may be joined to the data tables “tbl Aquifer Properties” and “tbl Specific Capacity” via the well identifier “kloc”, thereby allowing “ref Add Well ID” to be associated with the information contained in the data tables, such as test dates and transmissivity value. An example is provided in Figure 5-1.

5.2.2 ref Source Docs

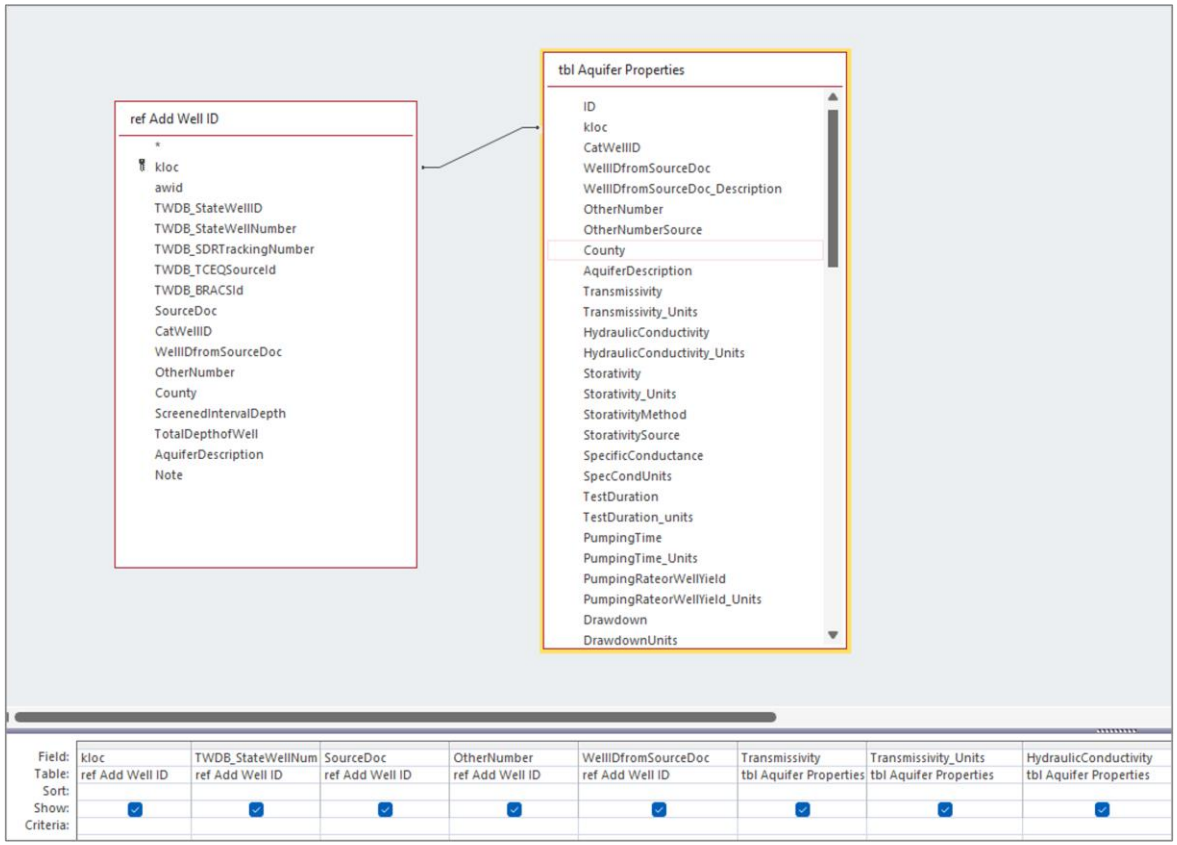
Of the 139,043 documents reviewed, 132,472 were considered to be potential source documents for this project, i.e., they were in formats containing searchable text, such as PDF or .xlsx files. The table “ref Source Docs” lists the potential source documents, along with file size in bytes. For documents included in the delivery from the TWDB (Section 2.1), the subdirectory (county name) is also included. The reference table “ref Source Doc” may be joined to the data tables “tbl Aquifer Properties” and “tbl Specific Capacity” via the “SourceDoc” field (Figure 4-1).

5.3 Lookup Tables

Six lookup tables are included in the Aquifer Properties Table (Figure 4-1).

- lk Counties
- lk Hydraulic Conductivity Units
- lk Specific Capacity Units
- lk Test Duration Units
- lk Transmissivity Units
- lk Well Yield Units

These tables are used to standardize the county name, and to convert units for numeric data when necessary. Each lookup table is named for the parameter it standardizes. Within each table, the first column is named by parameter name with the suffix “_SourceDoc”; for example, “TransmissivityUnits_SourceDoc”. This includes the parameter exactly as it appeared in the original source document. The second field shows the standardized name or unit; for example, “Strd_Transmissivity_Units” shows the standard unit used for transmissivity (gallons per day per foot [gpd/ft]). For lookup tables used to convert numeric data into standard units, an additional column called “Numeric Conversion” is included. This is the factor by which the original value is multiplied to get the standardized value. Examples of database queries which use the lookup tables are provided in Section 6.1.



kloc	TWDB_StateWell Number	SourceDoc	WellID_fromSourceDoc	OtherNumber	Transmissivity	Transmissivity_Units	Hydraulic Conductivity	Hydraulic Conductivity_Units	Screened Interval Depth	Total DepthofWell	County	Aquifer Description	Test Date	General Remarks
klc_1868		R155.pdf	26-602	JY-65-26-602	104000	gpd/ft	54.8088	feet/day		400	Fort Bend	Upper Chicot Aquifer and Lower Chicot Aquifer	7/28/1955	
klc_1877		R155.pdf	812	JY-65-26-812	65700	gpd/ft	46.788	feet/day		1313	Fort Bend	Evangeline Aquifer	8/9/1967	
klc_2710		R1a.pdf	102	PP-80-06-102	124000	gpd/ft	105.6072	feet/day	104-364		Jackson	Gulf Coast aquifer	9/9/1963	Drawdown test.
klc_2715		R1a.pdf	201	PP-66-60-201	81200	gpd/ft	32.48424	feet/day	154-671		Jackson	Gulf Coast aquifer	8/16/1963	Recovery test.

Figure 5-1 Microsoft Access query which connects the reference table “ref Add Well ID” with the core data table “tbl Aquifer Properties”

Section 6
Quality Assurance/Quality Control

An initial quality assurance review was conducted on the Aquifer Properties Table. Records were first spot-checked against their source documents to identify potential transcription errors. Then valid values were determined when possible, and numeric values were converted to standard units. Finally, the database was queried and reviewed for duplicates and internal consistency. This quality assurance process is discussed below.

6.1 Valid Values and Standardized Units

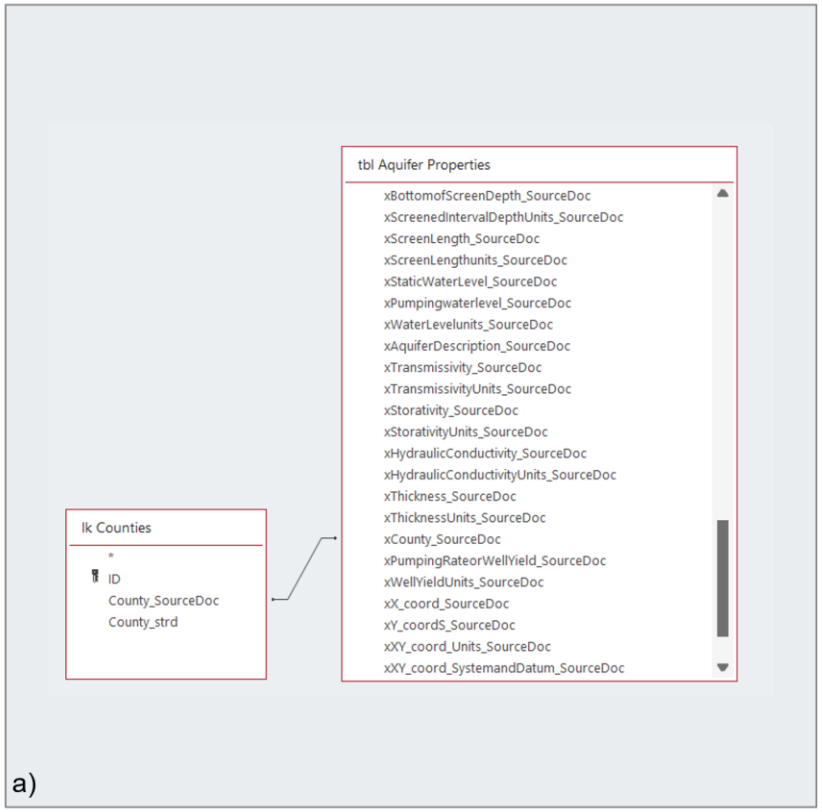
In the core data tables, the field “County” uses a list of valid values; that is, the format of the text string used for county name has been standardized. Likewise, numeric values for aquifer test data have been converted to standard units. The standardization was accomplished using the lookup tables described in Section 5.3. In the core tables, the data as reported in the original source document are preserved in fields with the suffix “_SourceDoc”. These fields were linked to the lookup tables and converted to standard values using the update query function within Microsoft Access. Two examples are provided below.

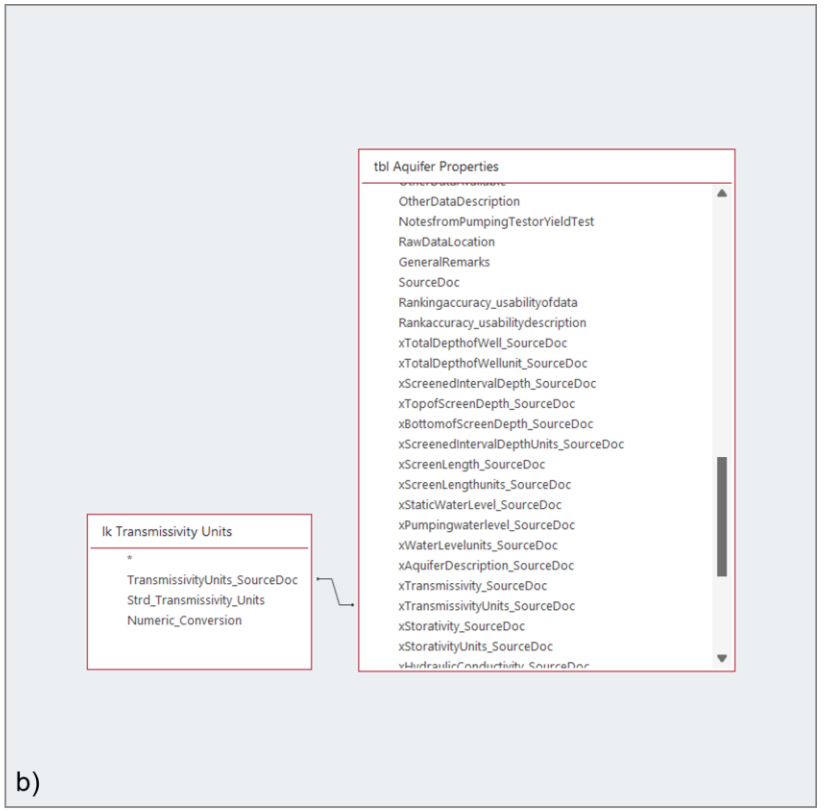
6.1.1 Example 1. Standardized County Names

Counties in Texas comprise a list of valid values; that is, there is a finite number of possible county names. Formats of text strings used for county names, however, vary between source documents; for example, one document used “Bell” and another used “Bell County”. To convert the county names into a standardized format, the lookup table “lk Counties” was used. The field “xCounty_SourceDoc” from “tbl Aquifer Properties” was joined to “County_SourceDoc” in the lookup table “lk Counties”. An update query was then used to fill in the field “County” based on the standardized county name from “lk Counties” (Figure 6-1a).

6.1.2 Example 2. Standardized Transmissivity Units

In the data table “tbl Aquifer Properties”, the field “xTransmissivity_SourceDoc” and “xTransmissivityUnits_SourceDoc” contain the value and units of transmissivity reported in the original source document. The field “xTransmissivityUnits_SourceDoc” from “tbl Aquifer Properties” was linked to “TransmissivityUnits_SourceDoc” from “lk Transmissivity Units”. Then an update query was run. The update query multiplied the value from “xTransmissivity_SourceDoc” by the numeric factor in “Numeric_Conversion,” yielding the standardized value shown in the field “Transmissivity” (Figure 6-1b).





kloc	xCounty_SourceDoc	County_strd
klc_2405	Bell	Bell
klc_0650	Bell County	Bell

kloc	xTransmissivity Units _SourceDoc	Strd _Transmissivity _Units	xTransmissivity _SourceDoc	Numeric _Conversion	Transmissivity
klc_1530	(gal/d)/ft	gpd/ft	3312	1	3312
klc_0024	ft^/day	gpd/ft	1677.1	7.48	12545.58

Figure 6-1 Microsoft Access queries which use lookup tables to a) standardize county name, and b) convert transmissivity values to standard units

6.2 Duplicates within a Source Document

Due to differences in the optical character recognition and data extraction process for different documents, a single record from a source document may appear more than once in the "tbl Aquifer Properties" or "tbl Specific Capacity" tables. Initial quality assurance suggests the cause of this duplication is often that an aquifer test is associated with a single well which has multiple screened intervals. This type of duplication may be identified because most fields – including source document name, well identifier from the source document, and values of aquifer properties – are identical.

Because not all records in the Aquifer Properties Table are yet associated with a TWDB-standard well identifier like State Well Number, and because well construction information like screen intervals may be useful in identifying the well, these duplicate records have been maintained in the dataset. Upon completion of final quality assurance, these duplicate records may be removed.

6.3 Duplicates between Source Documents

In some cases, data from a single aquifer test may be associated with more than one source document. Initial quality assurance suggests that the cause of this duplication is often that one source document summarizes data from another. These duplicates may not be immediately recognizable due to differences in the way data were presented in the two source documents. For example:

- The original report uses a well identifier specific to that report, for example a well owner name or location in a local coordinate system, while the summary document has identified the same well by State Well Number.
- The original report uses different units for an aquifer property value than does the summary document. When the original units are converted to standardized units, the value is slightly different than the value presented in the summary document, due to differences in significant digits (rounding).

In these cases, additional review of both source documents and/or a spatial analysis is recommended to confirm that one record is in fact a duplicate of the other.

6.4 Internal Consistency

Occasionally, one well is associated with multiple values for an aquifer property, such as transmissivity. Initial quality assurance has identified three cases:

1. More than one aquifer test was performed at the same well. These records can usually be identified because the well identifier is the same, but differences exist in test date, test metadata like pumping rate and test duration, and source document name.
2. A source document provided more than one estimate for an aquifer property value based on a single aquifer test. In these cases, usually more than one analytical method has been applied to the same raw data, resulting in a range of value estimates. These records can often be recognized because the source document,

well identifier, and aquifer test metadata like test date and pumping rate are identical, but there is more than one value for an aquifer property like transmissivity.

3. A compilation or summary document reported a single value for a location by aggregating data from other primary sources. For example, the summary document may have reported a “best” or average value from a range of estimates provided in one or more original aquifer test reports. These records can usually be identified because well identifiers in the summary document are the same as those in primary documents, but source document names are different. Aquifer properties values and test metadata may or may not be different, depending on how the value for the summary document was determined.

In these cases, additional review is recommended. If multiple records for the same well have very similar aquifer property values, those values may be considered more reliable. Conversely, if the aquifer property values differ significantly, then these values may be considered less reliable. Data reliability/usability rankings are discussed further in Section 8.1.3.

Section 7
Summary of Aquifer Properties

A brief summary of compiled aquifer property values compiled in the Aquifer Properties Table is provided below.

7.1 Summary Statistics

A statistical summary of data from the Aquifer Properties Table is tabulated in Table 7-1 and presented graphically in Figure 7-1. At least ninety percent of the compiled aquifer property values fall within physically reasonable ranges. Values below the 5th percentile and above the 95th percentile should be reviewed before the Aquifer Properties Table is finalized.

Table 7-1 Statistical summary of aquifer property data in the Aquifer Properties Table

Parameter	Units	Number of Records	Minimum	5th percentile	25th percentile	50th percentile	75th percentile	95th percentile	Maximum
Transmissivity	gpd/ft	4412	3	375	3,959	15,200	43,925	1.34E+05	1.92E+06
Hydraulic Conductivity	feet/day	1880	0.007	0.568	5.61	16.71	38.13	185.01	2.38E+03
Storativity	unitless	1269	5.38E-16	1.29E-05	8.00E-05	2.50E-04	9.50E-04	6.03E-02	6.56E+05
Specific Capacity	gpm/ft	2536	0.002	0.300	1.60	4.90	15.70	47.80	1.32E+03

7.2 Spatial Distribution

Figures 7-2 through 7-5 depict the spatial distribution of transmissivity, hydraulic conductivity, storativity, and specific capacity data compiled in the Aquifer Properties Table. If latitude/longitude coordinates were available, the well is shown as an individual point, panel a) on each figure. In some cases, the source document included the county name, but did not include latitude/longitude coordinates. In panel b) of each figure, the county polygon is shaded if at least one aquifer properties record is associated with that county. In total, 182 counties are represented in the Aquifer Properties Table.

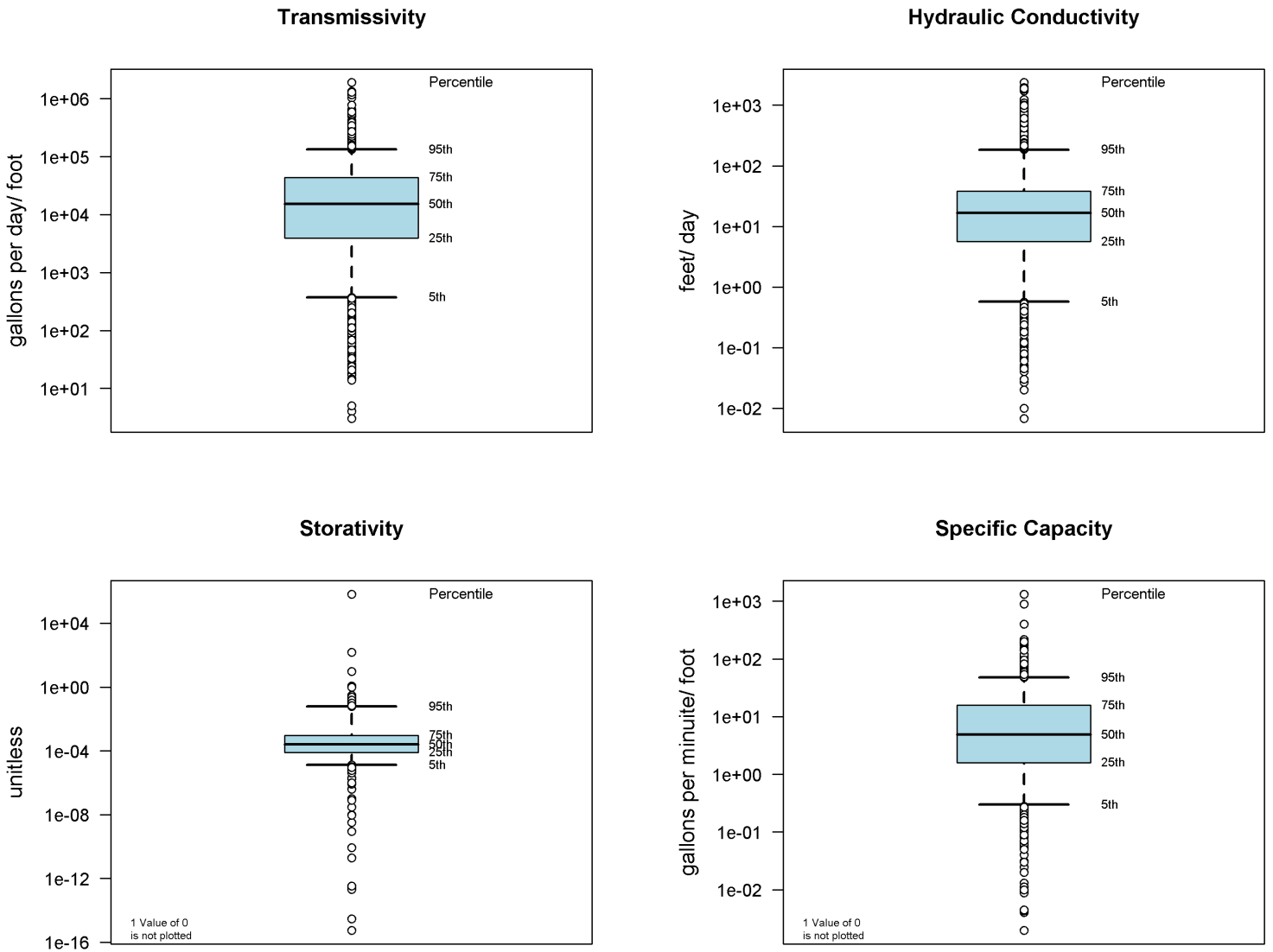


Figure 7-1 Summary statistics for aquifer properties in the Aquifer Properties Table

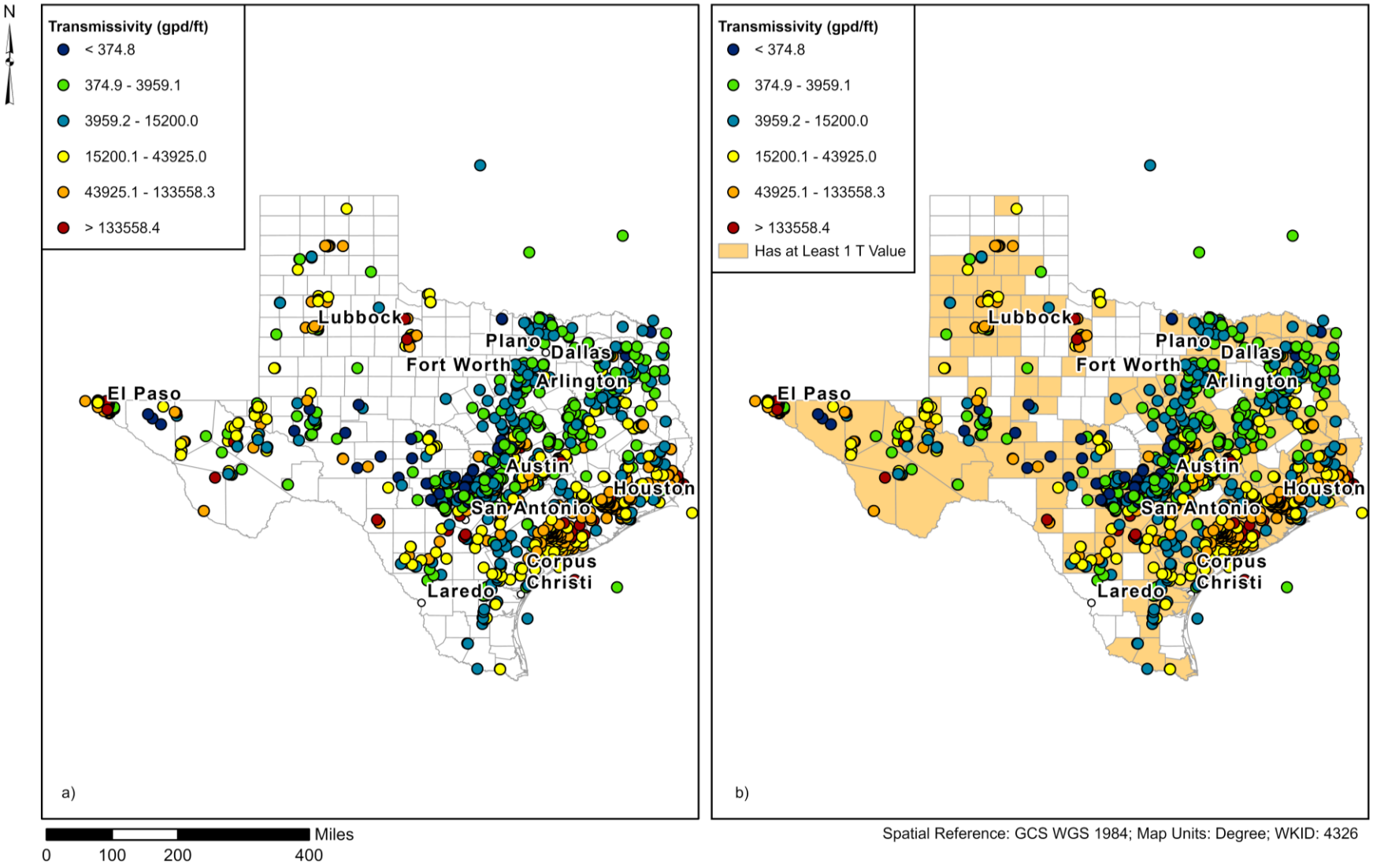


Figure 7-2 Spatial distribution of transmissivity data by a) well and b) county. 182 counties are represented.

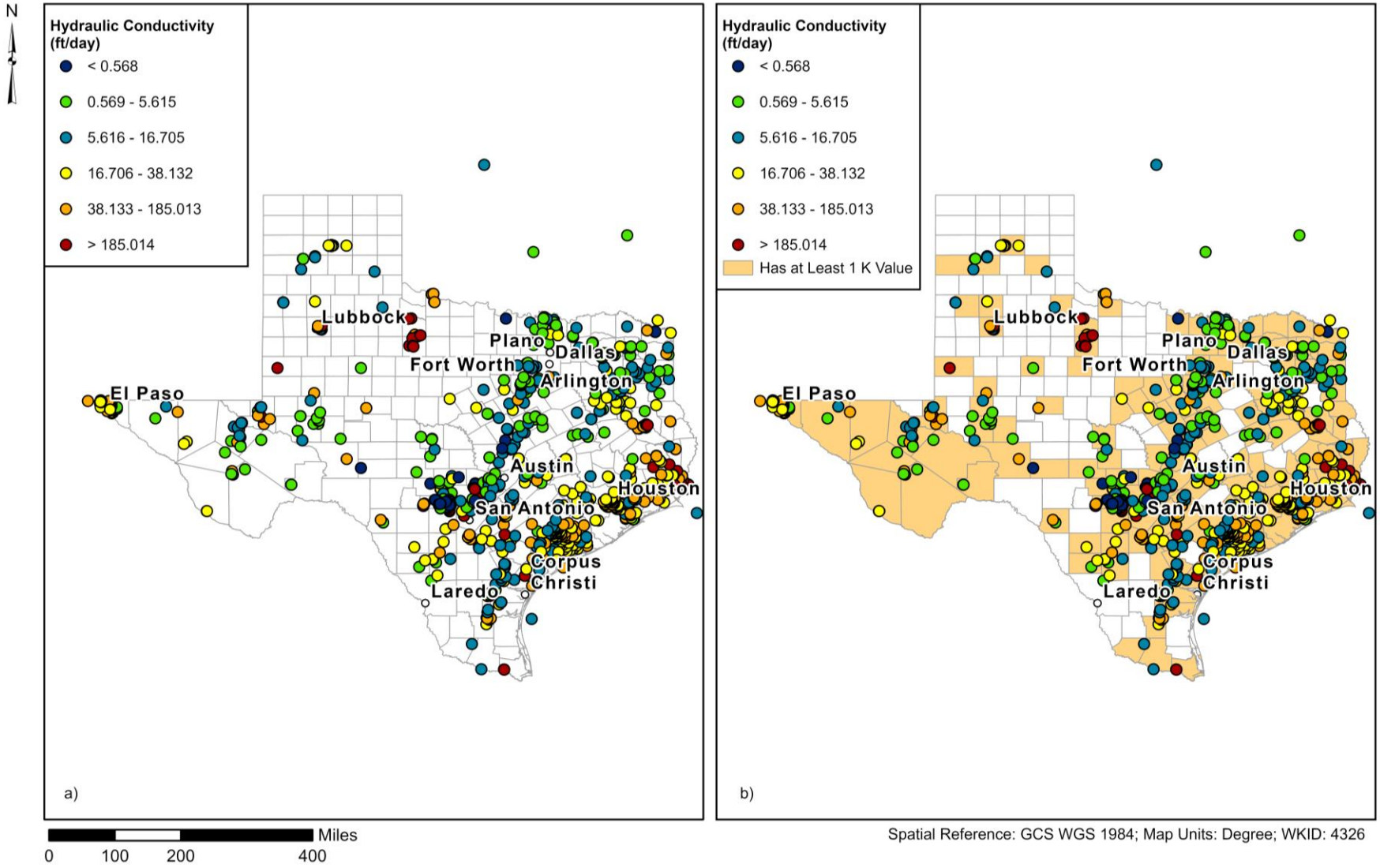


Figure 7-3 Spatial distribution of hydraulic conductivity data by a) well and b) county. 152 counties are represented.

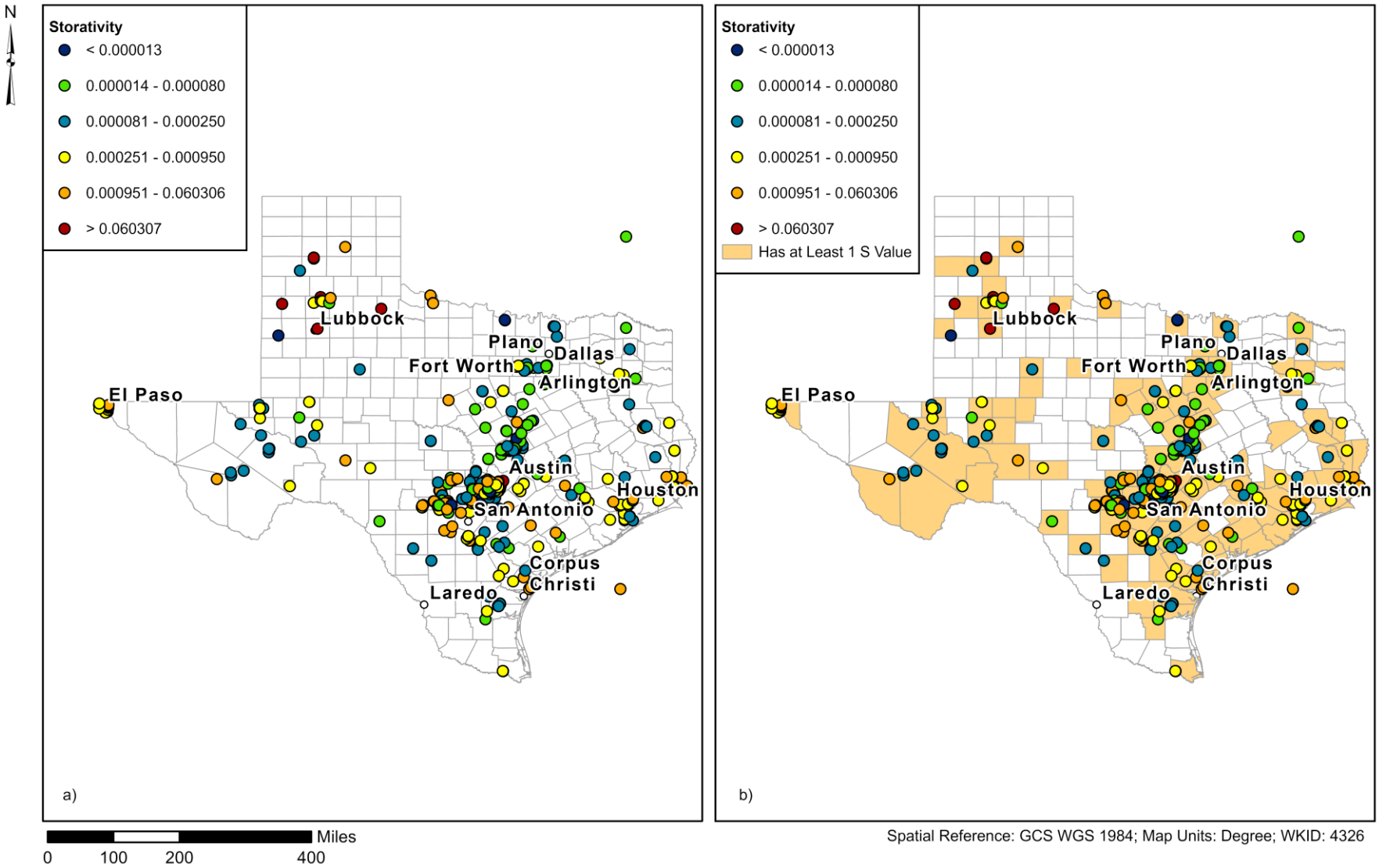


Figure 7-4 Spatial distribution of storativity data by a) well and b) county. 116 counties are represented.

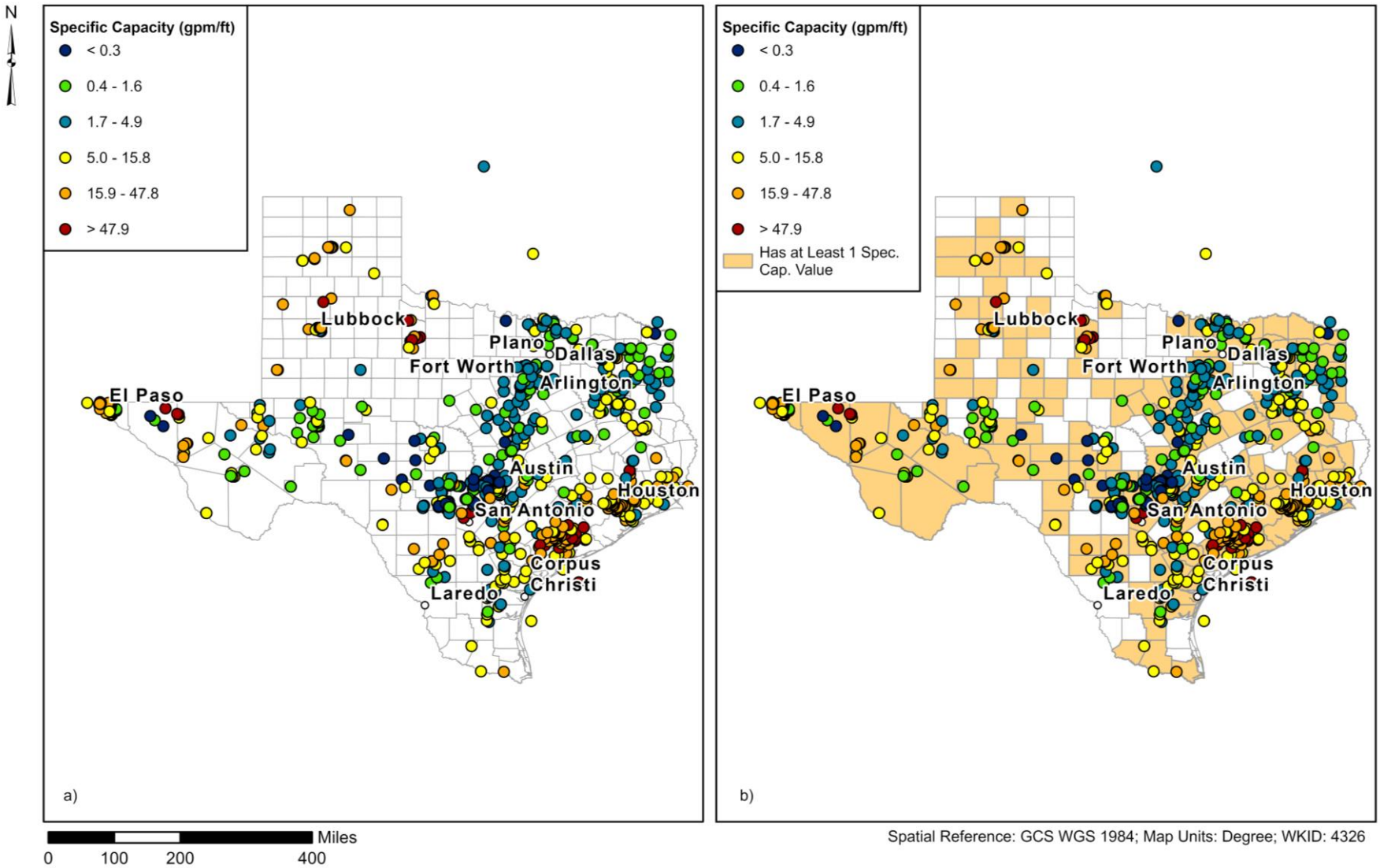


Figure 7-5 Spatial distribution of specific capacity data by a) well and b) county. 171 counties are represented.

Section 8
Conclusions and Recommendations

All key documents containing aquifer and pump test data were digitized and the extracted data were added to the database. Documents containing large datasets were prioritized. Specific capacity was not the primary objective, however, if any specific capacity data was found during PDF searches, that data was added to the database. Documents that contain less and/or scattered information were given lower priority. Low priority documents were identified and are anticipated to be included in the database in the future. The PDF name and the relevant page numbers have been provided as detailed below. The intent of this database is to be a living document that will be updated regularly as existing data is digitized or as new data becomes available.

Limited quality assurance was performed as outlined in Section 6. Aquifer test analyses were outside of the scope of this project, however original source document name was tracked along with the compiled data so that sources and the underlying analyses may be reviewed if required.

8.1 Further Work

Next steps include: incorporating any source documents that have not yet been included in the Aquifer Properties Table; assigning the TWDB-standard well identifiers such as State Well Number to all records; and assigning a rank for data reliability/usability to aquifer property values.

8.1.1 Additional Source Documents

As discussed in Section 3.2, source documents with large data compilations were prioritized for inclusion into the Aquifer Properties Table. During the data identification and extraction process, however, 170 additional documents were found to contain some potentially relevant data. These documents were usually limited in scope; for example, a single pumping test report for one well. These documents, the relevant page numbers, the type of data, and the scan quality of the document have been noted for further review by the TWDB (Appendix D).

8.1.2 Wells Not Yet Assigned a State Well Number

During the initial phase of data compilation, the TWDB reviewed location and construction information for wells compiled in the Aquifer Properties Table. The TWDB was able to associate about half the compiled locations with a TWDB-standard well identifier such as State Well Number, Submitted Drillers Report Tracking Number, or TCEQ Source ID. Further review is required to associate the remaining wells with the standard well identifiers.

As described in Section 5.2.1, the reference table “ref Add Well ID” was compiled for this purpose. This table contains information which may be useful in identification of the well, such as “other number” (a field containing any well alias or description included in the source document), total well depth, screen interval information, county and aquifer

description. It also contains the well identifier key field “kloc”, so it may be linked to the core data tables “tbl Aquifer Properties” and “tbl Specific Capacity”, as described in Section 5.2.1 and shown on Figure 5-1.

8.1.3 Data Reliability/Usability Rankings

Additional analysis is recommended to determine the reliability/usability rankings for aquifer properties data. This includes review/evaluation of source documents, and checks within the database for internal consistency, statistical outliers, and spatial outliers. Examples are provided below.

8.1.3.1 Internal Consistency

Check for consistency in the aquifer parameters for a single well or aquifer test. One example, for an individual well, is described in Section 6.4: if more than one aquifer test was performed at the same well, compare resulting values for aquifer properties. Similar values would suggest higher reliability, while disparate values would suggest lower reliability. Any values which vary significantly from the mean and/or seem physically unreasonable should be flagged for further review.

8.1.3.2 Statistical Outliers

Calculate summary statistics and plot aquifer properties data on an aggregate chart such as the box plots presented in Figure 7-1. Any aquifer properties values which fall outside ranges considered physically reasonable for those properties, and/or which differ significantly from average values, should be considered less reliable and flagged for further review. This type of outlier analysis could be performed for different subsets of data: for example, by individual well, county, or aquifer.

8.1.3.3 Spatial Outliers

Plot the aquifer properties data on maps using a color-coded scale, such as those presented in Figures 7-2 through 7-5. Any records which deviate significantly from surrounding locations may be considered less reliable and flagged for further review. This type of analysis could be performed on subsets of data for spatial or physical groupings: for example, by county or an aquifer.

APPENDICES

Appendix A

Groups/Agencies that Responded to Stakeholder Outreach Process

Table A-1

Groups/agencies that responded to stakeholder outreach process[1]

Group or agency[2]	Contact person/e-mail
Texas Association of Groundwater Districts (TAGD) and its members	Julia <julia@texasgroundwater.org>
Water Well Team at Texas Department of Licensing and Regulations (TDLR)	water.well@tdlr.texas.gov Adam Foster <Adam.Foster@tdlr.texas.gov>
Plum Creek Conservation District	daniel.meyer@pccd.org
Kingland Water	Tammy King <tammy@kinglandwater.com>
Bureau of Economic Geology	Hunt, Brian <brian.hunt@beg.utexas.edu>
Barton Springs/Edwards Aquifer Conservation District	Jeff Watson <jwatson@bseacd.org>
Trinity Glen Rose Groundwater Conservation District	Amanda Maloukis <a.maloukis@trinityglenrose.com>; Trinity Glen Rose GCD <tgr@trinityglenrose.com> (Emily Green)
City of Weatherford	Rick Shaffer <rshaffer@weatherfordtx.gov>
Texas Water Trade	Sharlene Leurig <leurig@texaswatertrade.org>
Permian Basin Underground Water Conservation District	PBUWCD Office <permianbasin@pbuwcd.com>
Hornsby Bend	Moede, Ian <Ian.Moede@austintexas.gov>
Austin Water CER	Dr. Anderson
Panhandle Groundwater Conservation District	
Rolling Plains Groundwater Conservation District	
South Texas Water Authority	
Texas Commission on Environmental Quality (TCEQ)	Kathy Mccormack <kathy.mccormack@tceq.texas.gov> Sean Ables <sean.ables@tceq.texas.gov>
TGPC Groundwater Issues Subcommittee	Kathy Mccormack <kathy.mccormack@tceq.texas.gov>
Prairielands Groundwater Conservation District	Kathy Turner Jones <kjones@prairielandsgcd.org>
Medina County Groundwater Conservation District	gmmcgcd@att.net
Clearwater Underground Water Conservation District	Mike Keester <mike.keester@rwharden.com> daaron@cuwcd.org
Edwards Aquifer Authority	Carol Patterson <carolpatterson202@gmail.com> mhamilton@edwardsaquifer.org rruiz@edwardsaquifer.org pbertetti@edwardsaquifer.org
Bandera County River Authority and Groundwater District	Luke Whitmire <lwhitmire@bcragd.org>
Texas Ground Water Association	Bobby Bazan <bbazan@tgwa.org>
Fayette County Groundwater Conservation District	David Van Dresar <david@fayettecountygroundwater.com>
Nueces River Authority	tpruski <tpruski@nueces-ra.org>
Region C Regional Water Planning Group	Abigail Gardner <Abigail.Gardner@freese.com>
San Antonio River Authority	Cayethania Castillo <ccastillo@sariverauthority.org>
S.S. Water Supply Corporation	Carlos Febus <cfebus@sswater.net>
City of Lubbock Water Utilities	Aubrey A. Spear <ASpear@mylubbock.us>
City of Austin	Eatman, Sara <Sara.Eatman@austintexas.gov> David Van Dresar <david@fayettecountygroundwater.com>
Gillespie County Underground Water and Conservation District	kay wischkaemper <kwischkawork@gmail.com>
Headwaters Groundwater Conservation District	Gene Williams <gene@hgcd.org>
South Texas Water Authority	
Mid-East Texas Groundwater Conservation District	
San Antonio Water System	
San Jacinto River Authority	Briana Gallagher <bgallagher@sjra.net>
Guadalupe County Groundwater Conservation District	Kelley Cochran <kelley@gcgcd.org>
Southeast Texas Groundwater Conservation District	John Martin <jmartin@setgcd.org>

[1] A large number of stakeholders were contacted. This table lists only those who responded.

[2] Several agencies shared the announcement with their members via e-mail, newsletter, website, and other means.

Appendix B

Keywords Used to Search PDFs for Aquifer Properties Data

Table B-1

Keywords used to search PDFs for aquifer properties data

Words and phrases used to find approximate keyword matches*	Target keyword(s)	Number of PDFs which matched keyword(s)
analyt+solut	analytical solution	104
aqtesolv	Aqtesolv	34
aquif+coeff	aquifer coefficients	71
aquif+test	aquifer test	585
aquif+test+data	aquifer test data	174
barker+1988	Barker 1988	0
birso+summ	Birsoy-Summers	0
bouw+rice	Bouwer-Rice	3
butler+1988	Butler 1988	0
butler+1990	Butler 1990	0
butler+1997	Butler 1997	0
butler+1998	Butler 1998	1
cm2+day	cm2/day	2
coeff+permeab	coefficient of permeability	87
coeff+transmiss	coefficient of transmissivity	435
consta+hea+test	constant head test	2
consta+rate	constant rate	199
cooley+case	Cooley-Case	0
coop+brede+papadop	Cooper-Bredehoeft-Papadopulos	0
coop+jaco	Cooper-Jacob	279
dagan+1978	Dagan 1978	0
daviau	Daviau	0
dista+drawdo	distance + drawdown	63
dougherty+babu	Dougherty-Babu	0
drawdo	drawdown	1000+
drawdo+data	drawdown data	395
drawdo+gpm	drawdown gpm	1000+
drawdo+pump	drawdown pumping	1000+
driscoll+1986	Driscoll 1986	20
ft2+day	ft2/day	73
ft3+day+ft	ft3/day/ft	9
gpd+ft	gpd/ft	1000+
gpm+ft	gpm/ft	1000+
gringar+with	Gringarten -Witherspoon	0
hantush	Hantush	19
hantush+jacob	Hantush-Jacob	6
hvorsl	Hvorslev	1
hydraul+coeff	hydraulic coefficients	33
hydraul+condu	Hydraulic Conductivity	543
hydraul+propert	hydraulic properties	169
hydrosolve	Hydrosolve	6
kruse+ridder	Kruseman and DeRidder	1
m2+day	m2/day	19
m3+day+m	m3/day/m	19
moen+prick	Moench-Prickett	0

Table B-1

Keywords used to search PDFs for aquifer properties data

Words and phrases used to find approximate keyword matches*	Target keyword(s)	Number of PDFs which matched keyword(s)
moench	Moench	10
murdoch+1994	Murdoch 1994	0
neum+wither	Neuman-Witherspoon	0
neuman	Neuman	70
papadop+coop	Papadopulos-Cooper	4
pump+test	pumping test	1000+
recove+data	recovery data	112
recove+pha	recovery phase	51
residu+drawdo	residual drawdown	88
satur+thic	saturated thickness	254
slug+test	slug test	11
speci+stora	specific storage	94
speci+yiel	specific yield	419
specif+capac	specific capacity	1000+
stora+coeff	storage coefficient	1000+
storativity	storativity	152
streltso	Streltsova	0
tartakov+neum	Tartakovsky -Neuman	0
theis	Theis	556
thiem	Thiem	24
time+drawdo	time + drawdown	266
time+recove	time-recovery	243
transmissibility	transmissibility	440
transmissivity	transmissivity	677
well+yield	well yield	1000+

* Spelling, grammar, and phrasing varied by document, so wildcard and proximity searches were used to identify partial keyword matches. "Target" keyword is the exact word or phrase the search was intended to match.
In a wildcard search, a keyword is matched if all the letters appear together; for example searching "drawdo" returns matches for "drawdown".
In a proximity search, the keywords must occur within a set number of words (usually 2 to 5); for example searching for "stora+coeff" returns matches for "storage coefficient" and "coefficient of storage".

Appendix C

Documents Used to Compile Core Data Tables

Table C-1

Documents used to compile core data tables

Document name	Contains aquifer properties data	Contains specific capacity data
0604830587_WTBOL_GAM.pdf	X	X
0639708.pdf	X	
0639712.pdf	X	X
0904831000_Rustler.pdf	X	X
1248301294_HPAS.pdf	X	
1348321576_Victoria Area ASR.pdf	X	
1548301856Updated_Vol2CWQCSP_GAM_all.pdf	X	
1548321870.pdf	X	X
1600011951_Blossom.pdf	X	X
1600011952_Nacatoch.pdf	X	X
18443Hwy46Bulverde_2023.pdf	X	X
2936708.pdf	X	X
4543404.pdf	X	
5741403.pdf	X	X
5742721.pdf	X	
5748701.pdf	X	
5748702.pdf	X	
5748704.pdf	X	
5749504.pdf	X	X
5750901.pdf	X	X
5751704.pdf	X	X
5755604.pdf	X	
5755606.pdf	X	X
5755705.pdf	X	X
5763204.pdf	X	X
5764101.pdf	X	
5764106.pdf	X	X
5764301.pdf	X	X
5764705.pdf	X	
5764707.pdf	X	
5764902.pdf	X	X
5827805.pdf	X	
5850120.pdf	X	
5850234.pdf	X	X
5850731.pdf	X	
5857308.pdf	X	X
5857406.pdf	X	X
5857512.pdf	X	X
5857515.pdf	X	X
5861908.pdf	X	X
5862707.pdf	X	

Table C-1

Documents used to compile core data tables

Document name	Contains aquifer properties data	Contains specific capacity data
6060603.pdf	X	
6513624.pdf	X	X
6513944.pdf	X	
6514101.pdf	X	X
6522130.pdf	X	
6742303.pdf	X	X
6813513.pdf	X	X
6817112.pdf	X	
6820806.pdf	X	X
6820814.pdf	X	X
6825528.pdf	X	
6852803.pdf	X	X
6860601.pdf	X	
6860603.pdf	X	X
6915502.pdf	X	X
6916805.pdf	X	
72_pp1-78.pdf	X	X
8483515.pdf	X	X
92483314.pdf		X
AGS_Final_CowCreekGCD_GW-Availability_2022.pdf	X	
B5001.pdf	X	
B5301.pdf	X	
B5502.pdf	X	X
B5601.pdf	X	
B5615.pdf	X	
B5701.pdf	X	
B5710.pdf	X	
B5711.pdf	X	X
B5712.pdf	X	
B5802.pdf		X
B5916.pdf	X	
B6003.pdf	X	
B6010.pdf	X	
B6013.pdf	X	X
B6017.pdf	X	
B6105.pdf	X	
B6202.pdf	X	
B6214V1.pdf	X	X
B6301.pdf	X	X
B6302.pdf	X	
B6406.pdf	X	

Table C-1

Documents used to compile core data tables

Document name	Contains aquifer properties data	Contains specific capacity data
B6517.pdf	X	X
B6518.pdf	X	X
B6520.pdf	X	X
BCRAGD records	X	X
BSEACD_DS_2010-0701.pdf	X	X
Bulletin5709_A.pdf	X	X
FINAL Horseshoe Ridge Report.pdf	X	X
Final_Lower-Trinity-Availability-BSEACD-Technical-Memo_20200630-BAS-7-28.pdf	X	X
GeohydrologicReportCentexMaterials_1993.pdf	X	
Headwaters17_Report_Final.pdf	X	X
M025.pdf	X	X
M138.pdf	X	X
M249.pdf	X	
M292.pdf	X	
PumpTestSantaRosaWells_WellmanOilField_1985.pdf	X	X
R04.pdf	X	
R109.pdf	X	X
R110.pdf	X	X
R12.pdf	X	X
R125_a.pdf	X	X
R133.pdf	X	X
r135.pdf	X	X
R150.pdf	X	X
R155.pdf	X	X
R162.pdf	X	X
R163.pdf	X	X
R169.pdf	X	X
R17.pdf	X	X
R173.pdf	X	X
R181.pdf	X	X
R185.pdf	X	X
R186.pdf	X	X
R195v1_1st_part.pdf	X	X
R1a.pdf	X	X
r215a.pdf	X	X
R218.pdf	X	
R224.pdf		X
r226_SeymourAquifer_Vol1.pdf	X	X
R235.pdf	X	X
R240.pdf	X	X

Table C-1

Documents used to compile core data tables

Document name	Contains aquifer properties data	Contains specific capacity data
R269v1.pdf	X	X
r27.pdf	X	X
R270.pdf	X	X
R276.pdf	X	X
R297.pdf	X	X
R298_A.pdf	X	X
R299.pdf	X	X
R305.pdf	X	X
r307.pdf	X	X
R32.pdf	X	X
R374_AquifersofUpperCoastalPlains.pdf	X	X
R381_AquiferTests.pdf	X	X
R389-TWDB-ASR-report-Longevity-Assessment-for-Bandera-Water-Wells.pdf	X	
R50.pdf	X	X
R56.pdf	X	
R61.pdf	X	X
R68.pdf	X	X
R73.pdf	X	X
R79.pdf	X	
R91.pdf	X	X
R98.pdf	X	X
R98-b.pdf	X	X
RanchesOfBuenavista_Burleson_2008.pdf	X	X
Report 359 Dockum Final.pdf	X	X
Report of Findings - Aquifer Test Results of the HGCD Well No. 19 (9-9-2020).pdf	X	X
Rpt273.pdf	X	
RW Harden & Associates email attachment: Baylor Report	X	
RW Harden & Associates email attachment: Collier Report	X	
RW Harden & Associates email attachment: GAM Rpt App D	X	
RW Harden & Associates email attachment: ntgam	X	
RW Harden & Associates email attachment: NTWGAM geodatabase	X	
RW Harden & Associates email attachment: Permit Application Review	X	
RW Harden & Associates email attachment: tceq	X	
RW Harden & Associates email attachment: TGI Report	X	
RW Harden & Associates email attachment: TWDB R-195	X	
RW Harden & Associates email attachment: TWDB R-98	X	
RW Harden & Associates email attachment: TWDB R-98; R195	X	
RW Harden & Associates email attachment: TWDB R-98; R-195	X	

Table C-1

Documents used to compile core data tables

Document name	Contains aquifer properties data	Contains specific capacity data
RW Harden & Associates email attachment: WRGS Report	X	
SwRI_All_Aquifer_Test_Data_Points.shp	X	X

Appendix D

Potential Source Documents Containing Data that Have Not Been Extracted and Incorporated into the Aquifer Properties Table

Table D-1

Potential source documents containing data that have not been extracted and incorporated into the Aquifer Properties Table

File Name	Document Title	Location of Data in Document	PDF Page(s) of Data	Type of Data[1]	Scan Quality[2]	Note(s)
1600011948_DBS_Blaine.pdf	-	Appendix A	82-83	T,K,SC	excellent	Summary table of aquifer coefficients
Aqua Texas Inc Copper Hills Well No. 5 - Application for Production Permit (6-24-21).pdf	Copper Hills Water System Well No. 5: Production Permit Application	Table 4	66	T,S,SC	excellent	
Woodcreek Test Wells - Aquifer Test Report (10-18-22).pdf	RE: Woodcreek Test Well No. 1 & 2 Project – Aquifer Tests (September 29 & October 3, 2022)	Table 2	10	T,S,SC	excellent	
Rutherford Springs Phase II GAC_04.27.23.pdf	GROUNDWATER AVAILABILITY STUDY RUTHERFORD SPRINGS PHASE II	Table 3	26	T,S,SC	excellent	
Trinity Acres_GAC_08.31.22.pdf	GROUNDWATER AVAILABILITY STUDY TRINITY ACRES 13110 CR 102	Table 3	27	T,S,SC	excellent	
SAWS Brackish GW Desal Feasability Assess_102908.pdf	Brackish Groundwater Desalination Feasibility Assessment Report	Table 2-4	29	T,S,SC	excellent	
Headwaters15_Report.pdf	Pumping Test and Sampling of Headwaters Groundwater Conservation District Monitor Well 15 Kerr County, Texas	Table	5	T,SC	excellent	
Headwaters_MW16_Report_Final.pdf	PUMPING TEST AND SAMPLING OF HEADWATERS GROUNDWATER CONSERVATION DISTRICT MONITORWELL 16	Table	5	T,SC	excellent	
HGCD MW No. 12 Report.pdf	Results of Aquifer Test Analysis for the Headwaters GCD Monitoring Well No. 12	Tables 2, 3	15	T,SC	excellent	
HGCD MW No. 13 Report.pdf	Results of Aquifer Test Analysis for the Headwaters GCD Monitoring Well No. 13	Tables 2, 3	14	T,SC	excellent	
HGCD MW No. 4 Report.pdf	Results of Aquifer Test Analysis for the Headwaters GCD Monitoring Well No. 4	Tables 2, 3	15	T,SC	excellent	
Japonica HOA Well No 2 - Pump Test.pdf	Results of Aquifer Test Analysis for the Japonica HOA Well No. 2 (HGCD Well No. 1522)	Tables 2, 3	14	T,SC	excellent	
Lagro_Report.pdf	Pumping Test Report for the Lagro Well (# 1973) Kerr County, Texas	Table	6	T,SC	excellent	
LBG-GA_MW14_Report.pdf	Report on Construction and Testing of Headwaters Monitor Well 14 Kerr County, Texas	Table	7	T,SC	excellent	
Lions Camp Report 11-1-12.pdf	Results of Aquifer Test Analysis for the Texas Lions Camp Well (HGCD Well No. 2102)	Tables 2, 3	15	T,SC	excellent	
Nickerson Farms No. 2 Report.pdf	Results of Aquifer Test Analysis for the Nickerson Farms Well No. 2 Lower Trinity Aquifer	Tables 2, 3	16	T,SC	excellent	
Old River Rd RV Resort Well No. 1 - Aquifer Testing Report.pdf	Aquifer Testing of the Old River Road RV Resort Well No. 1 (HGCD Well No. 2475)	Tables 2, 3	16	T,SC	excellent	
Report of Findings WRGS 21-006 Camp Verde Subdivision Kerr County.pdf	Camp Verde Groundwater Availability Certification for Platting: Kerr County, Texas	Table 3	27	T,S,SC	excellent	
Southern Hills No 4 Report - Submittal.pdf	Results of Aquifer Test Analysis for the Southern Hills Well No. 4	Tables 2, 3	14	T,S,SC	excellent	
Triple T Report.pdf	Results of Aquifer Test Analysis for the Triple T RV Resort Well (HGCD Well No. 2120)	Tables 2, 3	14	T,SC	excellent	
Woods WSC Well 1A - Aquifer Test Results - June 2014.pdf	Results of Aquifer Test Analysis and Stratigraphic Log for the Woods Water Supply Corporation Well 1A	Tables 2, 3	15	T,SC	excellent	

Table D-1

Potential source documents containing data that have not been extracted and incorporated into the Aquifer Properties Table

File Name	Document Title	Location of Data in Document	PDF Page(s) of Data	Type of Data[1]	Scan Quality[2]	Note(s)
Crown Pine Timber (pump test data).pdf	Crown Pine Timber (pump test data)	Aqt Plots	10-13	T,S	great	
ETEC - Bio Mass Facility (pump test data).pdf	ETEC - Bio Mass Facility (pump test data)	Plots, text	4-7	T,SC	great	
6861508.pdf	-	Table 9-1	6	T,S,SC	poor	
2126CR154Austin_2022.pdf	GROUNDWATER AVAILABILITY STUDY OVERLOOK AT WEIR 2126 CR 154	Table 3	21	T,S,SC	great	Contains aquifer coefficients from one pumping test
FloCommunityWSC_WellReport.pdf	re: State of Texas Well Report; Flo Community WSC Deep Well at Weedon Plant	Table 1	19	SC	great	Contains aquifer coefficients from one pumping test; table from TWDB report 332
Data Collection and Analysis Report.pdf	Data Collection and Analysis of Aquifers in Southern Gonzales County, Texas	Table 5-8, 5-10, 5-12	60, 66, 69	T	excellent	
South Bexar Co Aquifer Storage & Recovery Ph II Well Const Feb 2006.pdf	South Bexar County Aquifer Storage and Recovery Well Construction and Testing	Table 3.3	33	T,S,SC	excellent	
South Bexar County Aquifer Storage & Recovery Well Const & Testing.pdf	South Bexar County Aquifer Storage and Recovery Phase II Well Construction and Testing	Table 3.5	47	T,S,SC	excellent	
Report of Findings WRGS 21-019 The Hideout Ranch Subdivision.pdf	The Hideout Ranch Subdivision Groundwater Availability Certification for Platting: Kerr and Gillespie Counties, Texas	Table 3	47	T,S,SC	excellent	
94483049a.pdf	-	Text	15, 16, 52-55	T,SC	poor	Coefficients of T and S reported in paragraphs 1 and 2 on PDF page 15. Coefficient of T reported in paragraph 3 on PDF page 16.
6827108.pdf	-	Table 4	5	T,S,K	great	One test
0639708.pdf	-	Plots	15-16	T,K	poor	One test
0639712.pdf	-	Plots	17-18	T,S	great	
5755402.pdf	-	Table 1	17	T,S	poor	One test
5850129.pdf	-	Fig C-4 to C-6 fig D-1 to D-3	18-20, 23-25	T,S	poor	
2004483525_USCA_COSA.pdf	-	Text	72, 74-75	T,S,SC	excellent	
6825528.pdf	-	CHART	14-16	T,S	excellent	
5861908.pdf	-	Plots	9-11	T	great	
6813513.pdf	-	Figure 3	5, 7	T	excellent	
6742303.pdf	-	Plots	7-10	T,S	great	
5748701.pdf	-	Chart, Table	8, 9, 10	T,S	poor	
5858425.pdf	-	Plots	11-15, 32-33	T,S	great	
6908306.pdf	-	Fig 4	23-25, 27-28	T,S	poor	
5850130.pdf	-	Plots	11-13, 16-18, 19	T,S	great	PDF page 19 contains summary table
5850731.pdf	-	Charts	21-24, 28-36	T,K,S	excellent	
M079.pdf	-	Table 4	19	T,S	poor	
6817112.pdf	-	Charts, table 3	14-16, 19	T,S	poor	PDF page 19 contains summary table
5861207.pdf	-	Table 1	8	T,S	poor	
4035801.pdf	-	Table 2	9, 11-12	T	poor	
5748702.pdf	-	Table 1	14	T,S	great	
5748704.pdf	-	Charts	8	T,S	poor	
5755604.pdf	-	Table 1	15	T,S	great	
5756480.pdf	-	Charts	31-32	T,S	poor	
5756605.pdf	-	Table 2	19	T,S	great	
5764203.pdf	-	Charts and table 2	15	T,S	poor	
5764403.pdf	-	Text	19, 21	T	great	
5857611.pdf	-	Charts	17-19	T,S	poor	
5858106.pdf	-	Table 1	17	T,S	poor	
7037803.pdf	-	Charts	6-11	T,S	poor	Aqtesolv plots

Table D-1

Potential source documents containing data that have not been extracted and incorporated into the Aquifer Properties Table

File Name	Document Title	Location of Data in Document	PDF Page(s) of Data	Type of Data[1]	Scan Quality[2]	Note(s)
7037804.pdf	-	Plots	6-11	T,S	poor	Aqtesolv plots
5850215.pdf	-	Plots	21-27	T,S	poor	Aqtesolv plots
5850860.pdf	-	Charts	9-28	T,S	poor	Aqtesolv plots
B5206.pdf	-	Table 1	8	T,S	great	Plots + text; pumping test info. provided in text
4758603.pdf	-	Plots	134, 138, 141	T	poor	Handwritten plots
5747903.pdf	-	Table 1	16	T,S	poor	Aqtesolv plots; pumping test/well info. provided in text
5748912.pdf	-	Table 2	17	T,S	great	Aqtesolv plots; pumping test/well info. provided in text
5755608.pdf	-	Plots	14-15	T,S	great	Aqtesolv plots; pumping test/well info. provided in text
5755801.pdf	-	Table 1	10	T,S	poor	Aqtesolv plots; pumping test/well info. provided in text
5756308.pdf	-	Table 3	9	T,S	great	Aqtesolv plots; pumping test/well info. provided in text
5764204.pdf	-	Table 2	14	T,S	poor	Aqtesolv plots; pumping test/well info. provided in doc
5764906.pdf	-	Figures 2-3	11-12	T	poor	pumping test/well info. provided in text
5849714.pdf	-	Table 1	12	T,S	poor	Aqtesolv plots; pumping test/well info. provided in text
5857106.pdf	-	Table 4	16	T,S	great	Aqtesolv plots; pumping test/well info. provided in text
5857314.pdf	-	Figure C-4 and C-5, Table	20-23, 28	T,S	poor	Aqtesolv plots; pumping test/well info. provided in text
5858127.pdf	-	Aqtesolv Chart	9-20	T,S	poor	Aqtesolv plots; pumping test/well info. provided in doc
5858220.pdf	-	Text	31-33	T,SC	great	Aqtesolv plots; pumping test/well info. provided in text
5858430.pdf	-	Table and Charts	16-18	T,S	poor	summary tables/plots; additional info. provided in text
5858506.pdf	-	Plots	9-15	T	great	Aqtesolv plots; pumping test/well info. provided in text
5235104.pdf	-	Figure B.4	18	T,S	great	Plots + text; pumping test info. provided in text
5652704.pdf	-	Table 3	19	T,K	excellent	
5654106.pdf	-	Table 3	15	T,K	excellent	
5654405.pdf	-	Table 3	28	T,K	excellent	
5662412.pdf	-	Charts	23	T	poor	Plots; pumping test info. provided in text
5663105.pdf	-	Table 3	15	T,K	excellent	
5663620.pdf	-	Table 3	17	T,K	excellent	
5757703.pdf	-	Charts	39	T	poor	Plots; well construction info. provided in text
6801409.pdf	-	Table 3	18	T,K	excellent	
6907207.pdf	-	Table 3	15	T,K	excellent	
6907208.pdf	-	Table 3	18	T,K	excellent	
R165.pdf	-	Text	14	T,SC	great	Data from two tests presented in body of text.
B6014VI.pdf	-	Text	32	T,SC	great	Data from two tests presented in body of text.
R164.pdf	-	Text	14	T	great	Data from two tests presented in body of text.
B5003.pdf	-	Text	15, 19, 22	T,S,SC	great	Data from one test presented in body of text on PDF page 22. SC data presented in text on PDF pages 15 and 19.
6908513.pdf	-	Table 3	15	T,K	excellent	
6908514.pdf	-	Table 3	15	T,K	excellent	
7037703.pdf	-	Plots	6-7	T,S	great	Aqtesolv plots; pumping test/well info. provided in text
3727201.pdf	-	Tables	19	T,S,SC	great	Table; well construction info. provided in text
4543404.pdf	-	Charts	18-19	T	poor	
5850120.pdf	-	Fig C-7, C-8	14-16	T	poor	
5850234.pdf	-	Fig 7	8-10	T	poor	
5827805.pdf	-	chart	7-12	T,SC	poor	
6852803.pdf	-	Chart	14	T	Poor	
6860601.pdf	-	Chart	3	T,S	poor	
6860603.pdf	-	Chart	6-7	T	poor	
6915502.pdf	-	Charts	12	T	excellent	
6916805.pdf	-	Charts	8	T	excellent	
5862707.pdf	-	Charts	7-9	T,S	poor	
6829107.pdf	-	Text	6, 11	T,S	poor	

Table D-1

Potential source documents containing data that have not been extracted and incorporated into the Aquifer Properties Table

File Name	Document Title	Location of Data in Document	PDF Page(s) of Data	Type of Data[1]	Scan Quality[2]	Note(s)
5741403.pdf	-	Charts	19	T	poor	
5742721.pdf	-	Charts	10	T	poor	
5749504.pdf	-	Charts	11	T	poor	
5750901.pdf	-	Charts	11	T	poor	
5751704.pdf	-	Charts	14	T	poor	
6513624.pdf	-	Charts	7	T	poor	
6513944.pdf	-	Charts	15	T	poor	
6514101.pdf	-	Charts	10	T	poor	
6522130.pdf	-	Charts	15	T	poor	
5747901.pdf	-	in text, plots	11, 16	T,S	excellent	
5755705.pdf	-	chart	7-9	T	excellent	
5756606.pdf	-	chart	14-15	T,S	excellent	
5756710.pdf	-	in text, Charts	12, 18	T,S	excellent	
5763204.pdf	-	Charts, table 7	7-8	T,S	excellent	
5763702.pdf	-	in text, Charts	9, 14	T,S	excellent	
5764101.pdf	-	chart	9	T	excellent	
5764106.pdf	-	Table 7	14-15	T,SC	excellent	
5764301.pdf	-	chart, Table 4	11-13	T,S	excellent	
5764404.pdf	-	in text	12, 14	T,S	excellent	
5764705.pdf	-	chart	10	T	excellent	
5764707.pdf	-	chart	12	T	excellent	
5764902.pdf	-	Figure 4, 5	10-11	T	excellent	
5857308.pdf	-	Figure 4, 5	5, 6	T,S	excellent	
5857406.pdf	-	Table 2	9	T,S	excellent	
5857407.pdf	-	figure 6-11, text	5-10, 13	T,S	excellent	PDF page 13 contains summary table
5857512.pdf	-	figure 4,7,8	9-11	T,S	poor	
5857515.pdf	-	Figure, 4, 7, 8, 9, 15	14-18	T,S,SC	poor	
5857916.pdf	-	Charts	16-18, 28-31	T	poor	Two different tests in the same well
5858102.pdf	-	Charts, text	5-8, 12	T,S	poor	Aqtesolv plots; pumping test/well info. provided in text
5858108.pdf	-	Text, Charts	10-15	T,S	excellent	Table; well construction info. provided in text
5858412.pdf	-	Text, Charts	20, 21	T,S	excellent	Plots; pumping test info. provided in text
5858419.pdf	-	Charts	9, 10, 11, 12	T,S	excellent	Plots; well construction info. provided in text
5858709.pdf	-	Charts	8, 9, 10	T,S	excellent	Plots; well construction info. provided in text
6808401.pdf	-	Text	21, 23, 25, 27	T,S	excellent	Plots; well construction info. provided in text
6802911.pdf	-	Charts	14	T	poor	Plots; pumping test/well info. provided in text
6805804.pdf	-	Charts	16	T	poor	Plots; pumping test/well info. provided in text
6810624.pdf	-	Charts	15	T	poor	Plots; well construction info. provided in text
5654404.pdf	-	Charts	5-7, 67-69	T	excellent	Two different tests in the same well
5662417.pdf	-	Table 3, Charts	14, 18	T,K	excellent	
5664303.pdf	-	Text, Table 2, chart	10, 37	T,K	excellent	
6908116.pdf	-	Table 3, Charts	17, 21	T,K	excellent	
6908515.pdf	-	Table 3, Charts	16, 20	T,K	excellent	
3713407.pdf	-	Charts	20	T,SC	poor	Plot
3727304.pdf	-	text	13	T,S,SC	poor	
5835619.pdf	-	SEVERAL Charts	5-11	T	poor	
5843702.pdf	-	Charts	32-35	T,S,SC	poor	
5850126.pdf	-	Charts	8-10, 13-17	T,S	poor	
5850131.pdf	-	Charts	19-20	T	poor	
5827801.pdf	-	Charts	12-15	T	poor	

Table D-1

Potential source documents containing data that have not been extracted and incorporated into the Aquifer Properties Table

File Name	Document Title	Location of Data in Document	PDF Page(s) of Data	Type of Data[1]	Scan Quality[2]	Note(s)
LP-196.pdf	Ground-Water Conditions in the Triassic Aquifer in Deaf Smith and Swisher Counties	Text	25	T,S	great	Data only provided for one location
Water Well 14.pdf	-	Form	14-15	SC	poor	Data only provided for one location
Water Well 20.pdf	-	Form	15	SC	poor	Data only provided for one location
Water Well 25.pdf	-	Form		SC	poor	Data only provided for one location
Water Well 26.pdf	-	Form		SC	poor	Data only provided for one location
Water Well 8.pdf	-	Form		SC	poor	Data only provided for one location
Water Well 13.pdf	-	Form	16-17	SC	poor	Data only provided for one location
Water Well 17.pdf	-	Form	16-17	SC	poor	Data only provided for one location
Water Well 28.pdf	-	Table	4	T	poor	Data only provided for one location
Water Well 13 (2).pdf	-	Form	16-17	SC	poor	Data only provided for one location
Report-of-Findings-Aquifer-Test-Results-of-the-HGCD-Well-No.-20-11-16-22.pdf	Aquifer Test Results of the Headwaters GCD Monitoring Well No. 20: Kerr County, Texas	Table 2	10	T,SC	excellent	
5664712.pdf	-	Table 2	12	T,K,S	excellent	

[1] T = Transmissivity; S = Storativity; K = Hydraulic Conductivity; SC = Specific Capacity

[2] Each category pertains to the display of the relevant data in digital form and the ease at which it can be converted/extracted to text (useable) form.
"Excellent" = PDF document is rendered or computer-generated.
"Great" = PDF contains structured table with clear column and row structure resulting in a majority of the PDF text accurately converted to electronic (.txt) format.
"Poor" = PDF contains crooked/slanted tables with pixelated character resolution, resulting in a minority of the PDF text accurately converted to electronic (.txt) format. PDF contains artifacts such as stray lines, markings (like paper hole punches), etc.

Appendix E

Field Descriptions for Core Data Tables

Table E-1

Field descriptions for tbl Well ID

Key	Field name	Type	Field size	Notes
	ID	Long Integer	4	
primary	kloc	Text	255	well identifier (primary key)
foreign	awid	Long Integer	4	id number from table ref Add Well ID (foreign key)
none	TWDB_StateWellID	Text	255	State Well ID
none	TWDB_StateWellNumber	Text	255	State Well Number
none	TWDB_SDRTrackingNumber	Text	255	SDR Tracking Number
none	TWDB_TCEQSourceId	Text	255	TCEQ Source ID
none	TWDB_BRACSId	Text	255	BRACS ID
none	WellIDfromSourceDoc	Text	255	well identifier used in the original source document (for wells with no State Well Number)
none	OtherNumber	Text	255	other number/alias used in the original source document (for wells with no State Well Number)
none	OtherNumberSource	Text	255	source ofother number/alias (for wells with no State Well Number)
none	SourceDoc	Text	255	source document (for wells with no State Well Number)
none	Latitude_strd	Text	255	latitude from source document, in decimal dgrees (units from source document were converted to decimal degrees when necessary)
none	Longitude_strd	Text	255	logitude from source doc, in decimal dgrees (units from source document were converted to decimal degrees when necessary)
none	LatLong_strd_Units	Text	255	standard units used for lat/long: decimat degrees
none	note	Text	255	notes related to the well identified in kloc

Table E-2

Field descriptions for tbl Aquifer Properties

Key	Field name	Type	Field size	Notes
	ID	Long Integer	4	
foreign	kloc	Text	255	well identifier (foreign key)
none	CatWellID	Text	255	concatenation of the source document pdf name and well id from original source document
none	WellIDfromSourceDoc	Text	255	well id as used in source document
none	WellIDfromSourceDoc_Description	Text	255	description of source document well id
none	OtherNumber	Text	255	any other number/alias used for the well in source document
none	OtherNumberSource	Text	255	source of "other number"
none	County	Text	255	county name in standardized format
none	AquiferDescription	Text	255	aquifer description from source document. If original source document had "do", then aquifer description is taken from the record above. aquifer description names have not been standardized.
none	Transmissivity	Double	8	transmissivity, in gallons per day per foot (gpd/ft)
none	Transmissivity_Units	Text	255	gallons per day per foot (gpd/ft), the standard units for transmissivity
none	HydraulicConductivity	Double	8	hydraulic conductivity, in feet/day
none	HydraulicConductivity_Units	Text	255	feet/day, the standardized unit for hydraulic conductivity
none	Storativity	Double	8	storativity (unitless)
none	Storativity_Units	Text	255	n/a
none	StorativityMethod	Text	255	method used to determine storativity
none	StorativitySource	Text	255	source of storativity
none	SpecificConductance	Double	8	specific conductance in micromhos per centimeter (umhos/cm)
none	SpecCondUnits	Text	255	micromhos per centimeter (umhos/cm), the standard units for specific conductance
none	TestDuration	Double	8	duration of test, in hours
none	TestDuration_units	Text	255	hours, the standardized unit for time duration
none	PumpingTime	Double	8	duration of pumping during aquifer test
none	PumpingTime_Units	Text	255	hours, the standardized unit for time duration
none	PumpingRateorWellYield	Long Integer	4	pumping rate in gallons per minute (gpm)
none	PumpingRateorWellYield_Units	Text	255	gallons per minute (gpm), the standardized unit for pumping rates and well yields
none	Drawdown	Double	8	drawdown in feet
none	DrawdownUnits	Text	255	feet, the standardized units for length and depth measurements
none	Thickness	Double	8	aquifer thickness in feet, unless otherwise noted in thickness description
none	Thickness_Units	Text	255	feet, the standardized units for length and depth measurements
none	ThicknessDescription	Text	255	thickness definition (ex. screen length, geologic layer thickness, etc.)
none	StaticWaterLevel	Double	8	static water level, in feet from reference point listed in water level units (ex. feet below ground surface, feet below top of casing)

Table E-2

Field descriptions for tbl Aquifer Properties

Key	Field name	Type	Field size	Notes
none	Pumpingwaterlevel	Double	8	pumping water level, in feet from reference point listed in water level units (ex. feet below ground surface, feet below top of casing)
none	WaterLevels_Units	Text	255	water level units (ex. feet below ground surface, feet below top of casing)
none	WaterLevelMethod	Text	255	method used to measure water level
none	Analysistype	Text	255	method used to calculate aquifer properties (ex. Cooper-Jacob, Theis)
none	TestMonth	Double	8	month of aquifer test
none	TestDay	Double	8	day of aquifer test
none	TestYear	Double	8	year of aquifer test
none	TestDate	Date/Time	8	date of aquifer test (date as reported in source document; for tests lasting multiple days, this may reflect first or last day of test)
none	Observationwell_YesNo	Text	255	yes if well identified by kloc is observation well. blank does not necessarily indicate a pumping well; it may be that well type is unspecified.
none	ObservationWellNamefromSourceDoc	Text	255	name of observation well as used in the source document
none	ObservationWellNamefromSourceDoc_Description	Text	255	description of observation well as used in the source document
none	PumpingWellWellID	Text	255	name of pumping well as used in the source document
none	DistanceofObservationWellfromPumpingwell	Double	8	distance from pumping to observation well, in feet
none	DistanceUnits	Text	255	feet, the standardized units for length and depth measurements
none	SourceofTestData	Text	255	source of test data
none	RawDataAvailable	Text	255	yes if raw data is available in source document. blank does not necessarily indicate there is no raw data available; it may be in other parts of source document not compiled for this database
none	RawDataType	Text	255	type of raw data available
none	RawDataTable	Text	255	yes if raw data is tabulated in source document.
none	OtherDataAvailable	Text	255	yes if other types of data are available in the source document. blank does not necessarily indicate there is no raw data available; it may be in other parts of source document not compiled for this database
none	OtherDataDescription	Text	255	description of other data available in the source document
none	NotesfromPumpingTestorYieldTest	Text	255	notes from pumping test
none	RawDataLocation	Text	255	location of raw data
none	GeneralRemarks	Text	255	general notes and remarks from source document
foreign	SourceDoc	Text	255	original source document name (foreign key)
none	Rankingaccuracy_usabilityofdata	Integer	2	usability ranking (not yet determined)
none	Rankaccuracy_usabilitydescription	Text	255	description of usability ranking
none	xTotalDepthofWell_SourceDoc	Double	8	total depth of well from source document
none	xTotalDepthofWellunit_SourceDoc	Text	255	units of total depth from source document
none	xScreenedIntervalDepth_SourceDoc	Text	255	screened interval from source document

Table E-2

Field descriptions for tbl Aquifer Properties

Key	Field name	Type	Field size	Notes
none	xTopofScreenDepth_SourceDoc	Double	8	top of screen depth from source document
none	xBottomofScreenDepth_SourceDoc	Double	8	bottom of screen depth from source document
none	xScreenedIntervalDepthUnits_SourceDoc	Text	255	units of screened interval from source document
none	xScreenLength_SourceDoc	Double	8	screen length from source document
none	xScreenLengthunits_SourceDoc	Text	255	units of screen length from source document
none	xStaticWaterLevel_SourceDoc	Double	8	static water level from source document
none	xPumpingwaterlevel_SourceDoc	Double	8	pumping water level from source document
none	xWaterLevelunits_SourceDoc	Text	255	water level units from source document
none	xAquiferDescription_SourceDoc	Text	255	aquifer description from source document
none	xTransmissivity_SourceDoc	Double	8	transmissivity from source document
none	xTransmissivityUnits_SourceDoc	Text	255	transmissivity units from source document
none	xStorativity_SourceDoc	Double	8	storativity from source document
none	xStorativityUnits_SourceDoc	Text	255	storativity units from source document
none	xHydraulicConductivity_SourceDoc	Double	8	hydraulic conductivity from source document
none	xHydraulicConductivityUnits_SourceDoc	Text	255	hydraulic conductivity units from source document
none	xThickness_SourceDoc	Double	8	thickness from source document
none	xThicknessUnits_SourceDoc	Text	255	thickness units from source document
none	xCounty_SourceDoc	Text	255	county from source document
none	xPumpingRateorWellYield_SourceDoc	Double	8	pumping rate or well yield from source document
none	xWellYieldUnits_SourceDoc	Text	255	pumping rate or well yield units from source document
none	xX_coord_SourceDoc	Text	255	X coordinate from source document
none	xY_coordS_SourceDoc	Text	255	Y coordinate from source document
none	xXY_coord_Units_SourceDoc	Text	255	XY coordinate units from source document
none	xXY_coord_SystemandDatum_SourceDoc	Text	255	XY coordinate system and datum from source document
none	xTestDuration_SourceDoc	Double	8	test duration from source document
none	xTestDurationUnits_SourceDoc	Text	255	test duration units from source document
none	xPumpingTime_SourceDoc	Double	8	pumping time from source document
none	xPumpingTime_Units_SourceDoc	Text	255	pumping time units from source document

Table E-3

Field descriptions for tbl Specific Capacity

Key	Field name	Type	Field size	Notes
	ID	Long Integer	4	
foreign	kloc	Text	255	well identifier (foreign key)
none	CatWellID	Text	255	concatenation of the source document pdf name and well id from original source document
none	WellIDfromSourceDoc	Text	255	well id as used in source document
none	WellIDfromSourceDoc_Description	Text	255	description of source document well ID
none	OtherNumber	Text	255	any other number/alias used for the well in source document
none	OtherNumberSource	Text	255	source of "other number"
none	County	Text	255	county name in standardized format
none	Drawdown	Double	8	drawdown in feet
none	Drawdown_Units	Text	255	feet, the standardized units for length and depth measurements
none	PumpingRateorWellYield	Double	8	pumping rate in gallons per minute
none	PumpingRateorWellYield_Units	Text	255	gallons per minute, the standardized unit for pumping rates and well yields
none	SpecificCapacity	Double	8	specific capacity in gallons per minute/feet
none	SpecificCapacity_Units	Text	255	gallons per minute, the standardized unit for pumping rates and well yields
none	SpecificCapacitySource	Text	255	source of specific capacity data
none	StaticWaterLevel	Double	8	static water level, in feet from reference point listed in water level units (ex. feet below ground surface, feet below top of casing)
none	PumpingWaterLevel	Double	8	pumping water level, in feet from reference point listed in water level units (ex. feet below ground surface, feet below top of casing)
none	WaterLevel_Units	Text	255	water level units (ex. feet below ground surface, feet below top of casing)
none	TestDuration	Double	8	duration of test, in hours
none	TestDurationUnits	Text	255	hours, the standardized unit for time duration
none	AquiferDescription	Text	255	aquifer description from source document. If original source document had "do", then aquifer description is taken from the record above. aquifer description names have not been standardized.
none	TestMonth	Double	8	month of test
none	TestDay	Double	8	day of test
none	TestYear	Double	8	year of test
none	TestDate	Date/Time	8	date of test
none	RawDataAvailable	Text	5	yes if raw data is available in source document. blank does not necessarily indicate there is no raw data available; it may be in other parts of source document not compiled for this database
none	RawDataType	Text	255	type of raw data available
none	RawDataTable	Text	5	yes if raw data is tabulated in source document.
none	RawDataLocation	Text	255	location of raw data

Table E-3

Field descriptions for tbl Specific Capacity

Key	Field name	Type	Field size	Notes
none	OtherDataAvailable	Text	5	yes if other types of data are available in the source document. blank does not necessarily indicate there is no raw data available; it may be in other parts of source document not compiled for this database
none	OtherDataDescription	Text	255	description of other data available in the source document
foreign	SourceDoc	Text	255	original source document name (foreign key)
none	SourceDataLocation	Text	255	location of the source data
none	GeneralRemarks	Text	255	general notes and remarks from source document
none	Rankingaccuracy_usabilityofdata	Long Integer	4	usability ranking (not yet determined)
none	Rankaccuracy_usabilitydescription	Text	255	description of usability ranking
none	xX_coord_txt_SourceDoc	Text	255	X coordinate from source document
none	xY_coord_txt_SourceDoc	Text	50	Y coordinate from source document
none	xXY_coord_Units__SourceDoc	Text	255	XY coordinate units from source document
none	xXY_coord_SystemandDatum__SourceDoc	Text	255	XY coordinate system and datum from source document
none	xDrawdown_SourceDoc	Double	8	drawdown from source document
none	xDrawdownUnits_SourceDoc	Text	255	units of drawdown from source document
none	xPumpingRateorWellYield_SourceDoc	Double	8	pumping rate or well yield from source document
none	xWellYieldUnits_SourceDoc	Text	255	pumping rate or well yield units from source document
none	xSpecificCapacity_SourceDoc	Double	8	specific capacity from source document
none	xSpecificCapacityUnits_SourceDoc	Text	255	specific capacity units from source document
none	xTotalDepthofWell_SourceDoc	Double	8	total depth of well from source document
none	xTotalDepthofWellunit_SourceDoc	Text	255	units of total depth from source document
none	xScreenedIntervalDepth_SourceDoc	Text	255	units of screened interval from source document
none	xTopofScreenDepth_SourceDoc	Double	8	top of screen depth from source document
none	xBottomofScreenDepth_SourceDoc	Double	8	bottom of screen depth from source document
none	xScreenedIntervalDepthUnits_SourceDoc	Text	255	units of screened interval from source document
none	xScreenLength_SourceDoc	Double	8	screen length from source document
none	xScreenLengthunits_SourceDoc	Text	255	units of screen length from source document
none	xStaticWaterLevel_SourceDoc	Double	8	static water level from source document
none	xPumpingwaterlevel_SourceDoc	Double	8	pumping water level from source document
none	xWaterLevelunits_SourceDoc	Text	255	method used to measure water level source document
none	xWaterLevelMethod_SourceDoc	Text	255	water level units from source document
none	xAquiferDescription_SourceDoc	Text	255	aquifer description from source document
none	xCounty_SourceDoc	Text	255	county from source document
none	xTestDuration_SourceDoc	Double	8	test duration from source document
none	xTestDurationUnits_SourceDoc	Text	255	test duration units from source document