Kansas Participation in the USGS National Groundwater Monitoring Network

Governor's Conference on the Future of Water in Kansas
November 9, 2017

Brownie Wilson
Geohydrology Section
Kansas Geological Survey
University of Kansas

National Groundwater Monitoring Network (NGWMN)

National effort lead by the USGS to establish a network of selected monitoring wells across the country

- **Data is served dynamically from local, state, and federal sources**
- **Single data portal serving:**
  - **Water levels**
  - **Construction**
  - **Lithology**
  - **Water quality (when available)**
- **https://cida.usgs.gov/ngwmn/**
- **KGS Open-File Reports 2016-28 and 2017-49**

A Little Confession…..

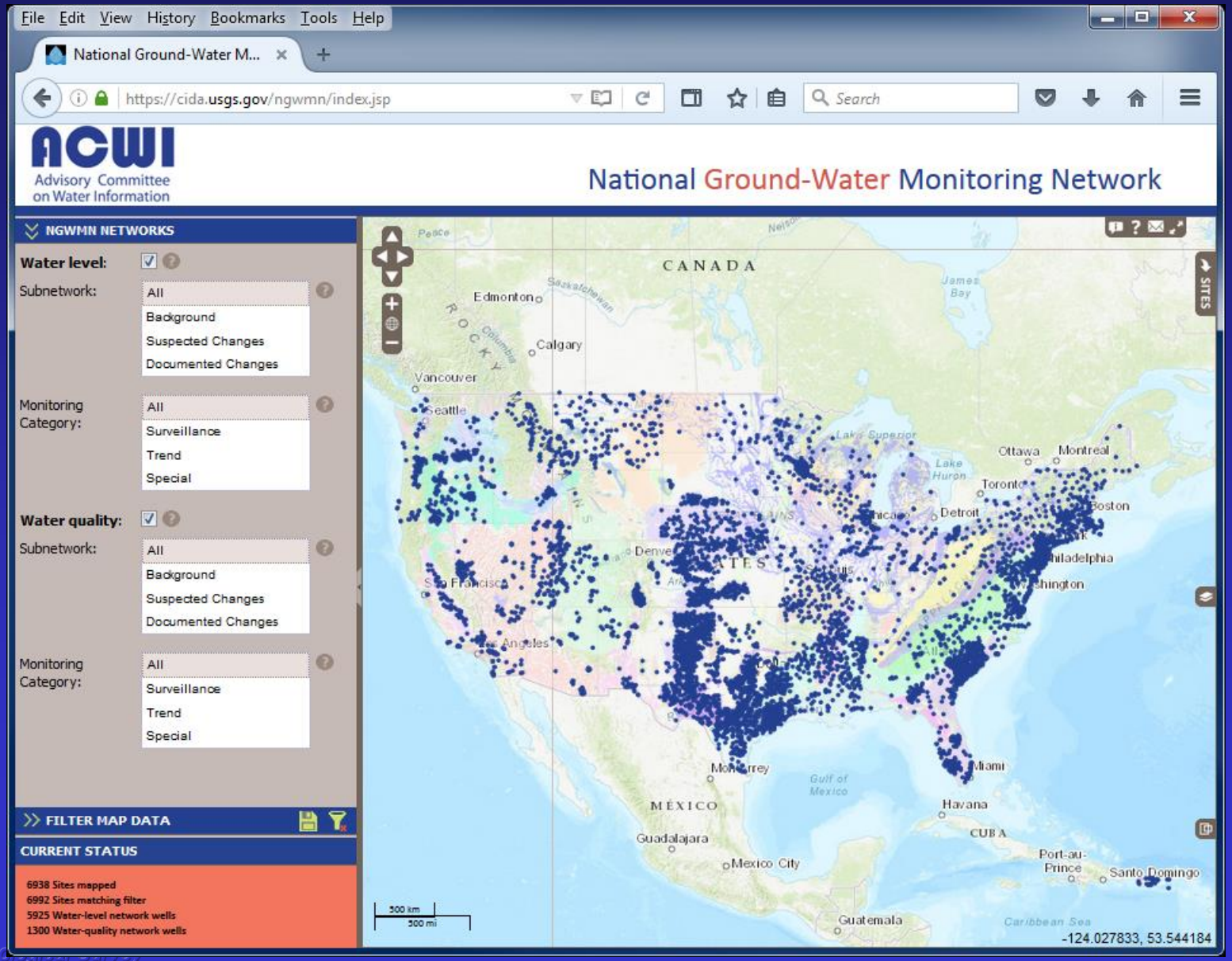
Some apprehension at the start.

- **Project coming from a federal agency**
- **Forms, acronyms, standards, etc….**

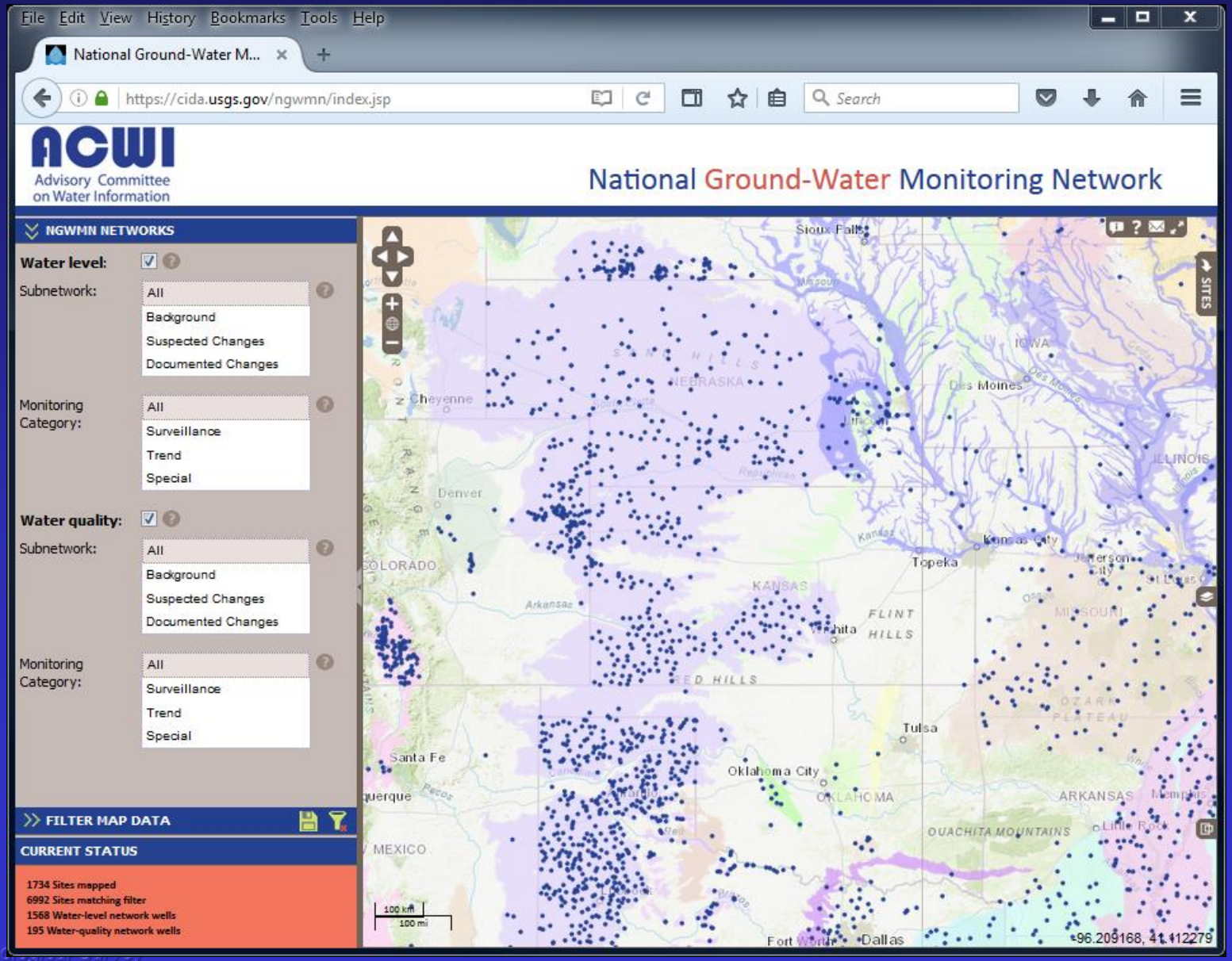
Fears were completely unfounded.

- **Fantastic support**
- **Clearly defined objectives**
- **Kansas is data rich**

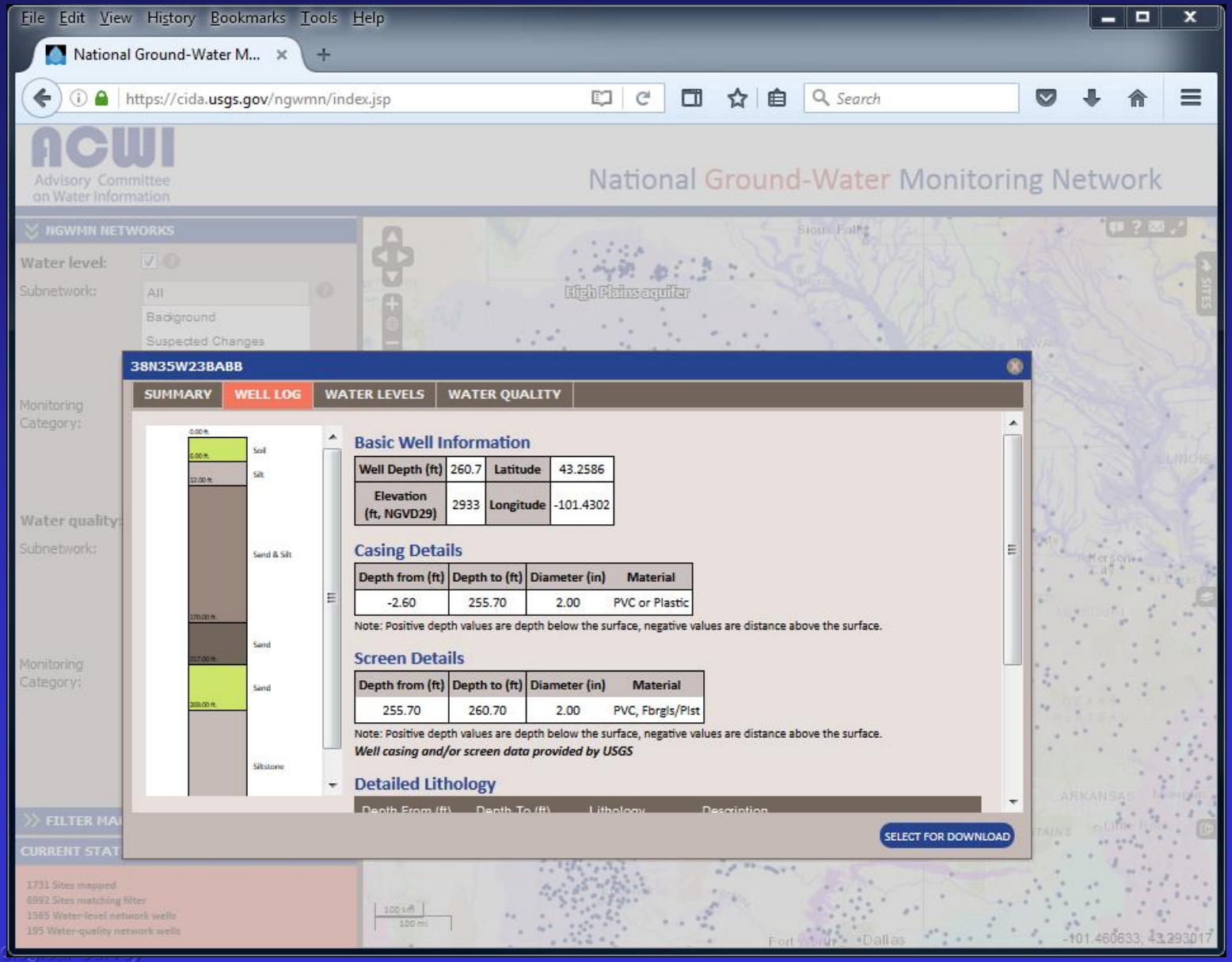
NGWMN Data Portal



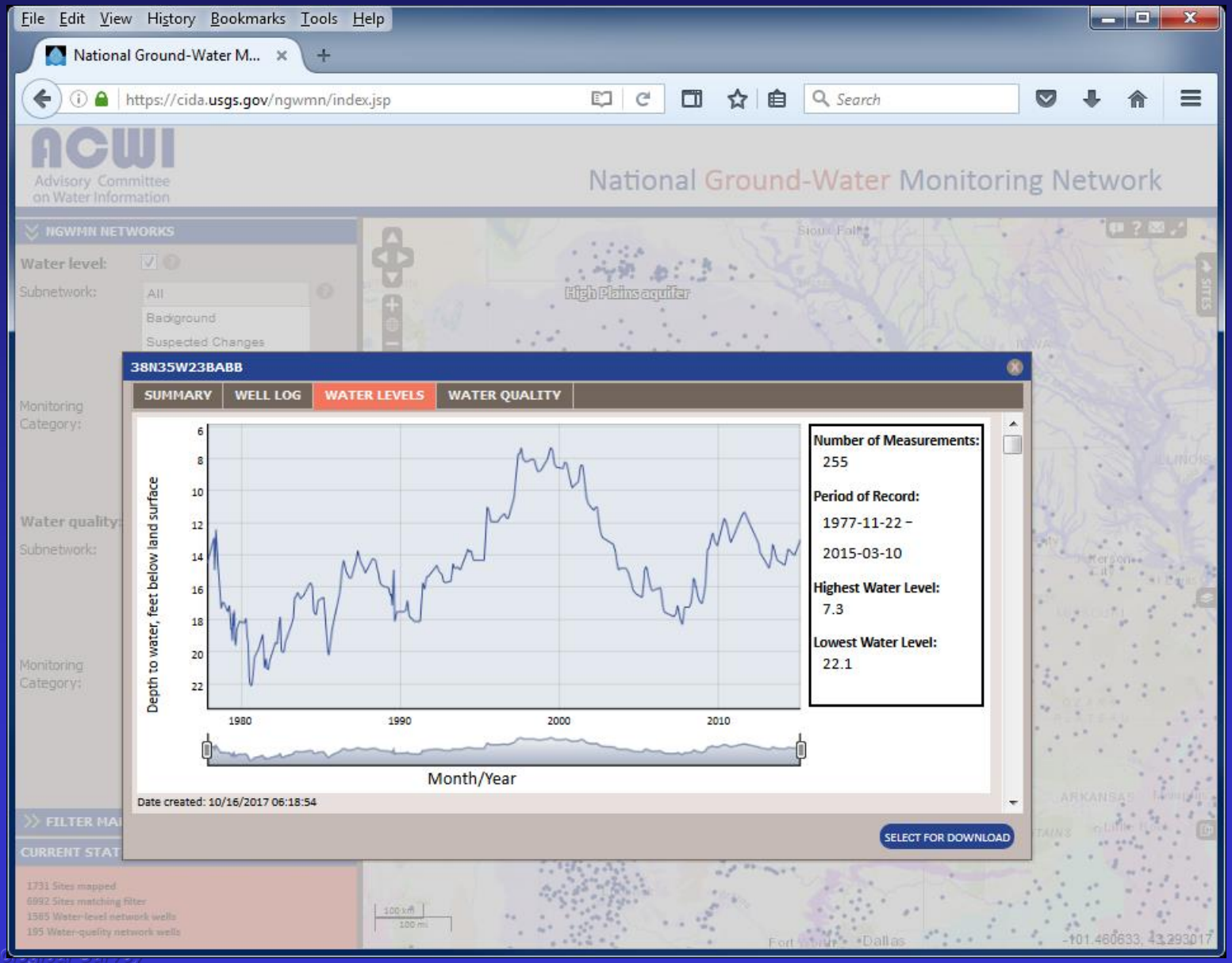
NGWMN Data Portal



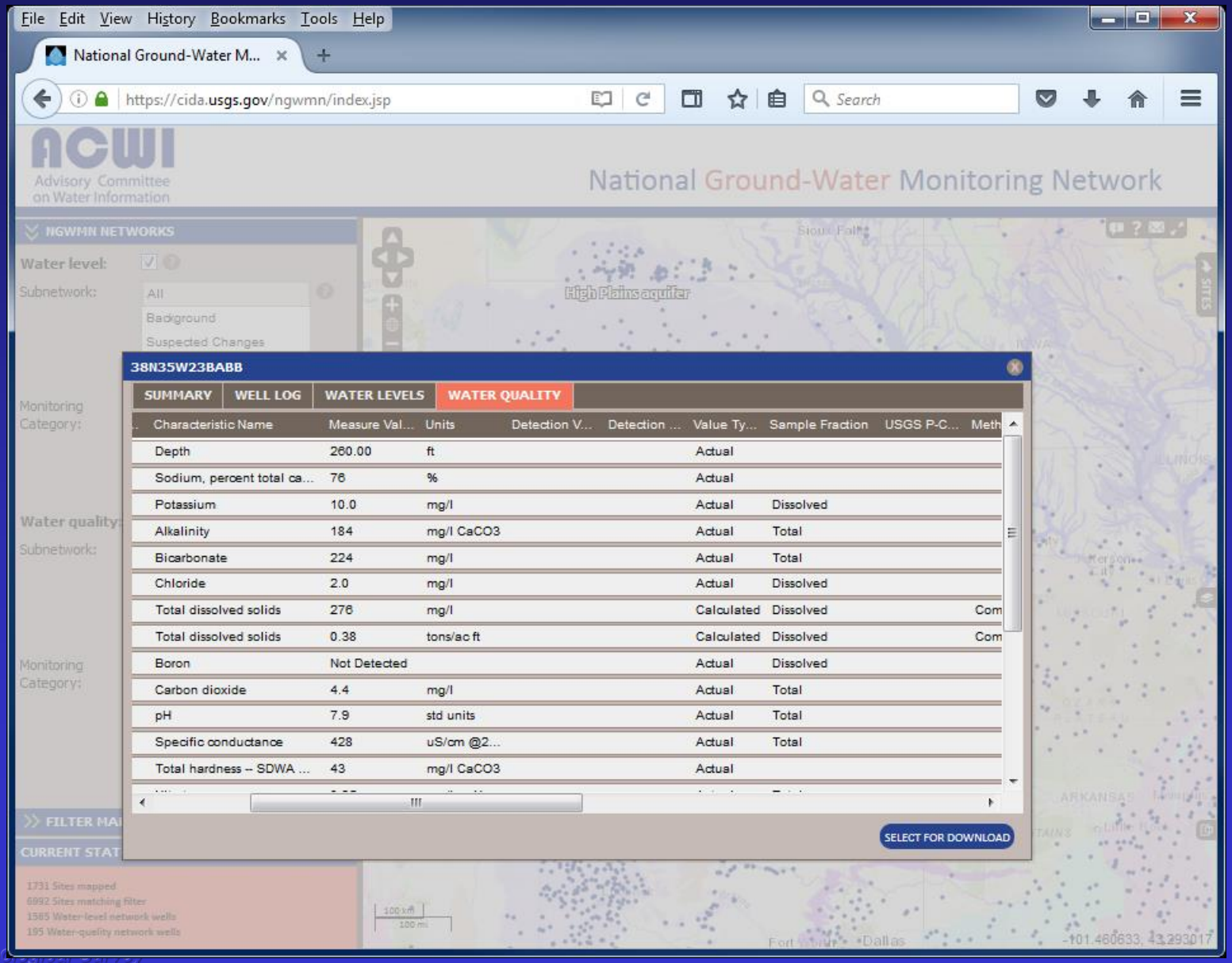
NGWMN Data Portal- Construction



NGWMN Data Portal- Water Levels

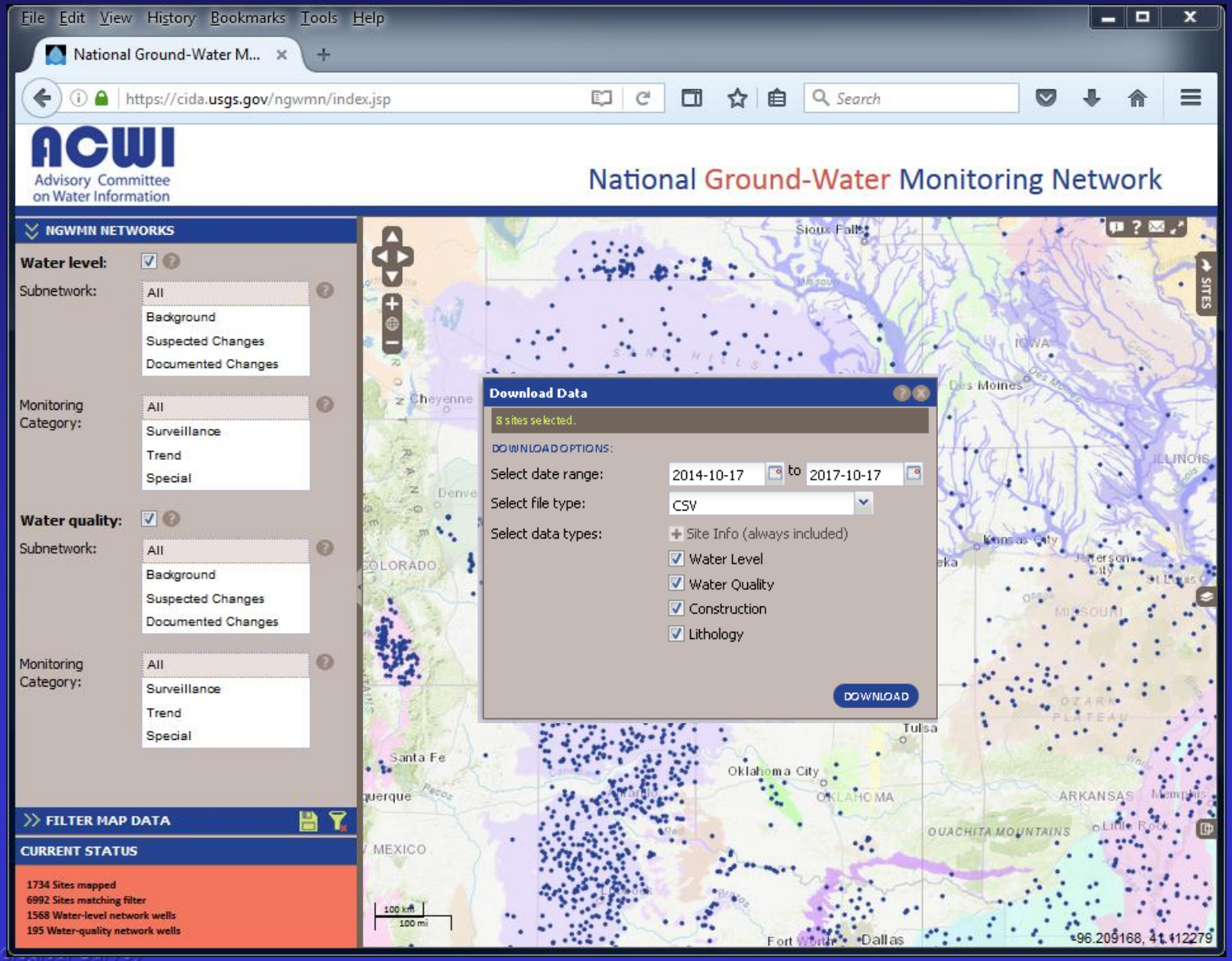


NGWMN Data Portal- Water Quality



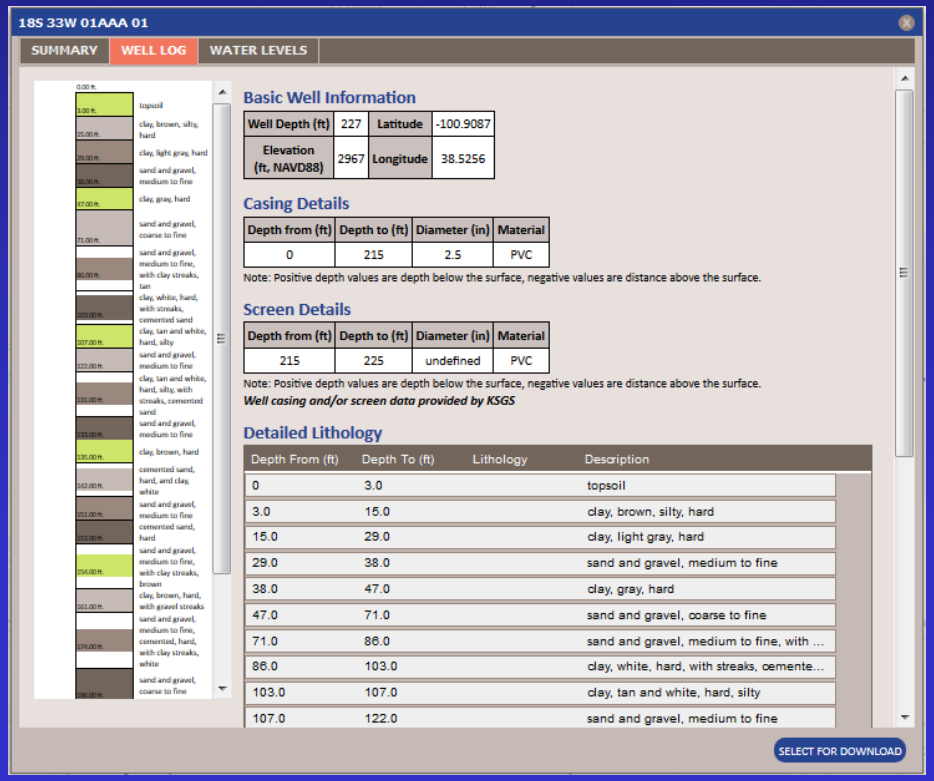
Characteristic Name	Measure Val...	Units	Detection V...	Detection ...	Value Ty...	Sample Fraction	USGS P-C...	Meth
Depth	260.00	ft			Actual			
Sodium, percent total ca...	76	%			Actual			
Potassium	10.0	mg/l			Actual	Dissolved		
Alkalinity	184	mg/l CaCO3			Actual	Total		
Bicarbonate	224	mg/l			Actual	Total		
Chloride	2.0	mg/l			Actual	Dissolved		
Total dissolved solids	276	mg/l			Calculated	Dissolved		Com
Total dissolved solids	0.38	tons/ac ft			Calculated	Dissolved		Com
Boron	Not Detected				Actual	Dissolved		
Carbon dioxide	4.4	mg/l			Actual	Total		
pH	7.9	std units			Actual	Total		
Specific conductance	428	uS/cm @2...			Actual	Total		
Total hardness -- SDWA ...	43	mg/l CaCO3			Actual			

NGWMN Data Portal- Downloads

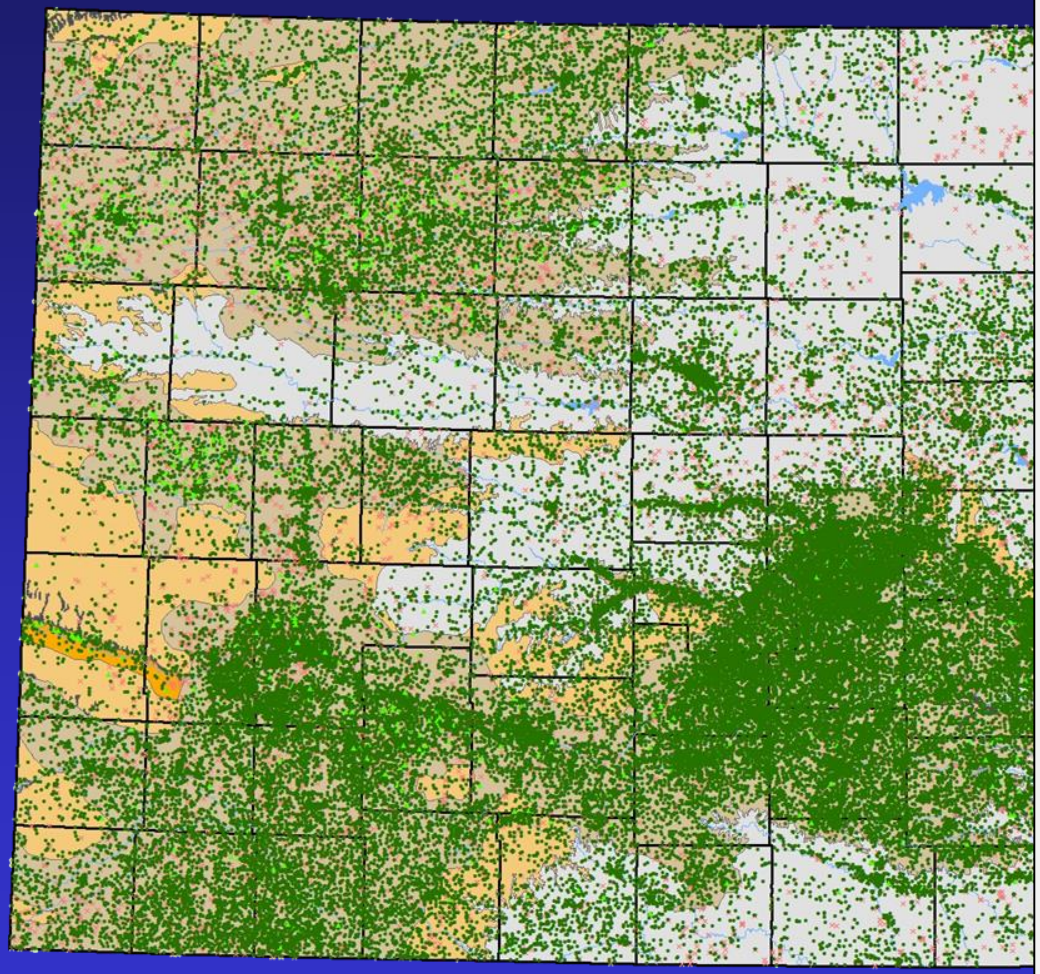


NGWMN Data Standards

- Minimum Data Elements
  - Construction
  - Lithology
  - 5-year measurement history
- Well Classifications
  - Surveillance
  - Trend (daily averages)
- Monitoring Subnetworks
  - Background information
  - Suspected changes
  - Documented changes



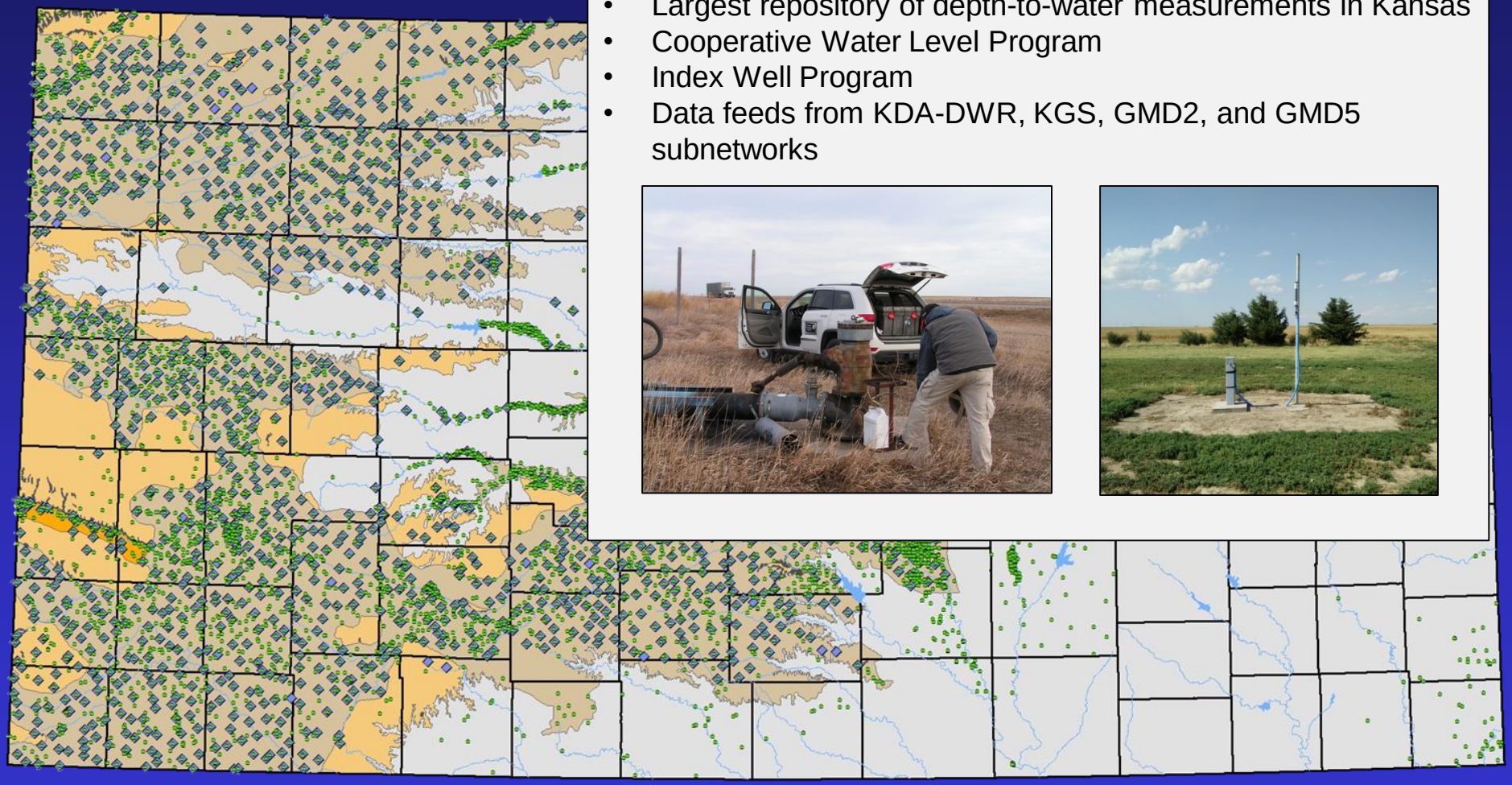
WWC5 Records- Construction and Lithology



Water Well Completion Records (WWC5)

- Required since 1975 by the Kansas Department of Health and Environment
- Submission of driller's logs for constructed, reconstructed or plugged wells

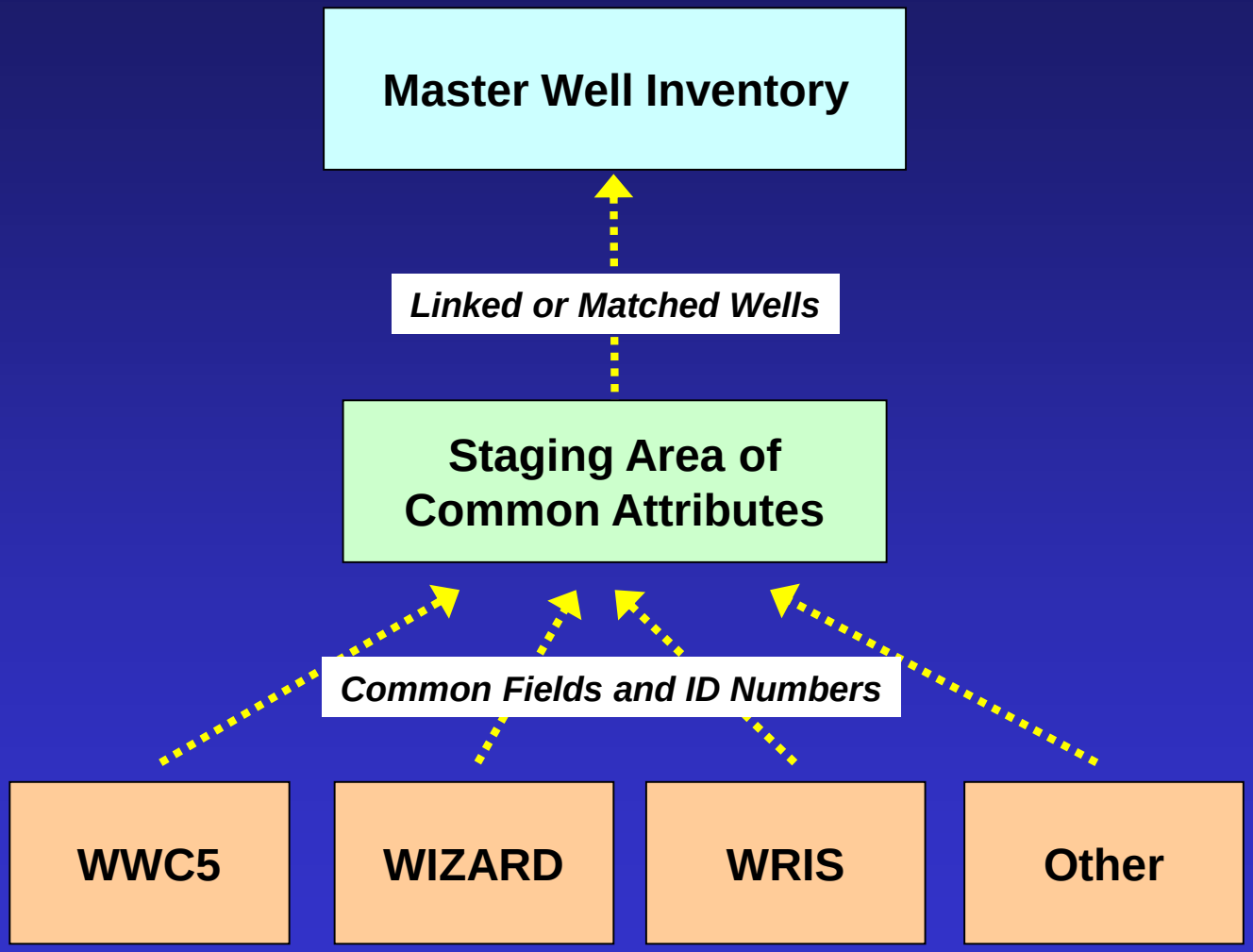
WIZARD- Water Levels



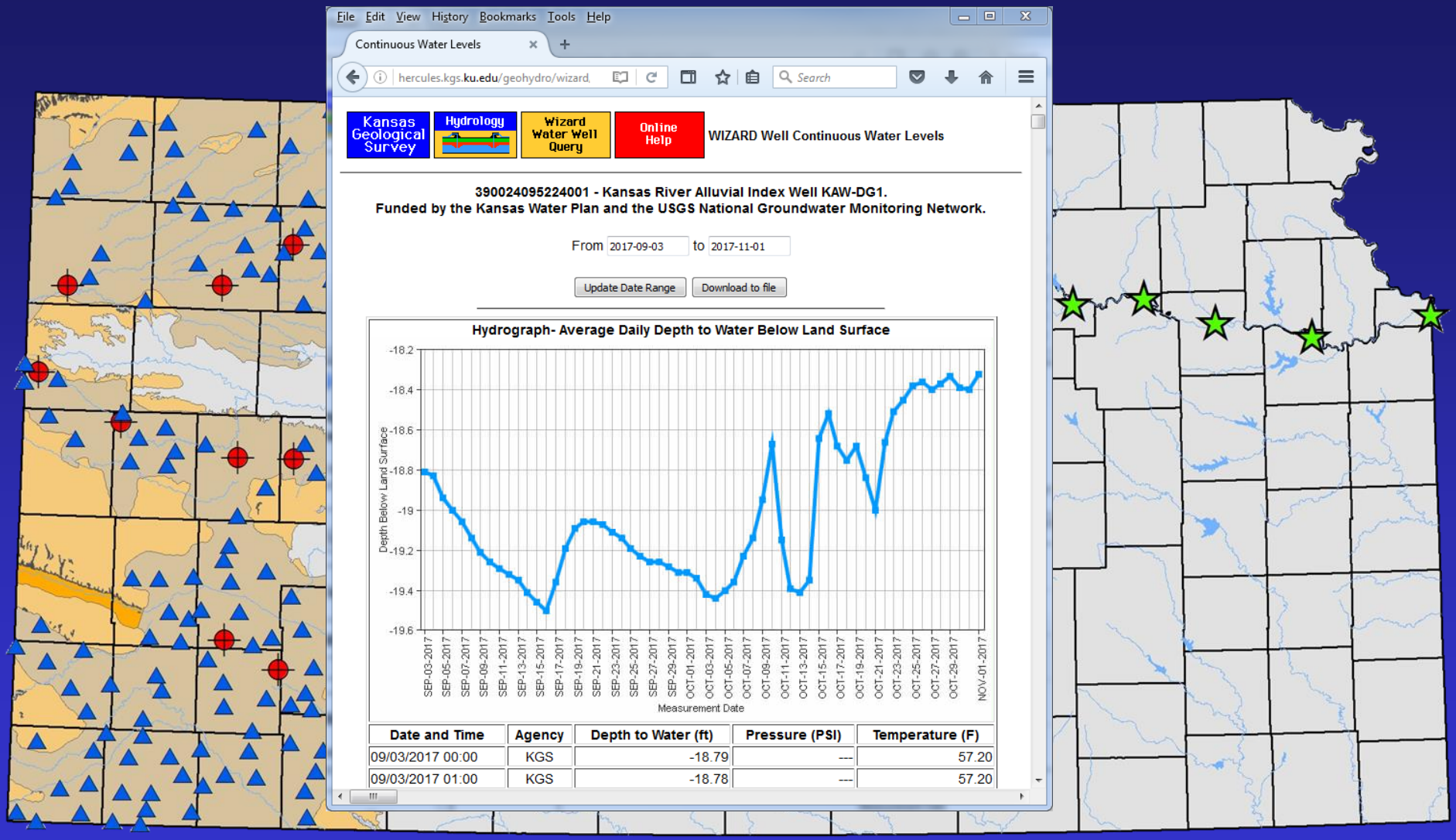
Water Information Storage and Retrieval Database (WIZARD)

- Largest repository of depth-to-water measurements in Kansas
- Cooperative Water Level Program
- Index Well Program
- Data feeds from KDA-DWR, KGS, GMD2, and GMD5 subnetworks

Kansas Master Well Inventory



NGWMN Selected Sites



Serving Data via REST-Based Web Services

Web Service Request

SQL Queries via
Master Well Inventory

NGWMN Registry
Or
Your Computer

Replicated KGS ColdFusion
Servers

KGS Oracle Server

XML Document

ColdFusion Record Sets

WIZARD Web Services

KGS Open-file Report 2016-28

Water Levels Method

http://maps.kgs.ku.edu/geohydro/wizard/services/data.cfc?**method=WaterLevels**&sites=375439098413701

Lithology Method

http://maps.kgs.ku.edu/geohydro/wizard/services/data.cfc?**method=Lithology**&sites=375439098413701

Casing Method

http://maps.kgs.ku.edu/geohydro/wizard/services/data.cfc?**method=Casing**&sites=375439098413701

Screens Method

http://maps.kgs.ku.edu/geohydro/wizard/services/data.cfc?**method=Screens**&sites=375439098413701

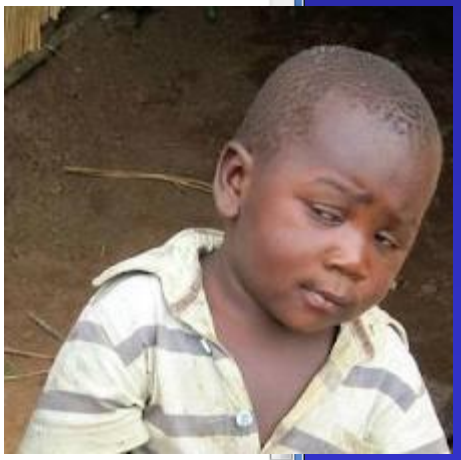
Returns an XML Document

File Edit View History Bookmarks Tools Help

http://maps.kg...75439098413701

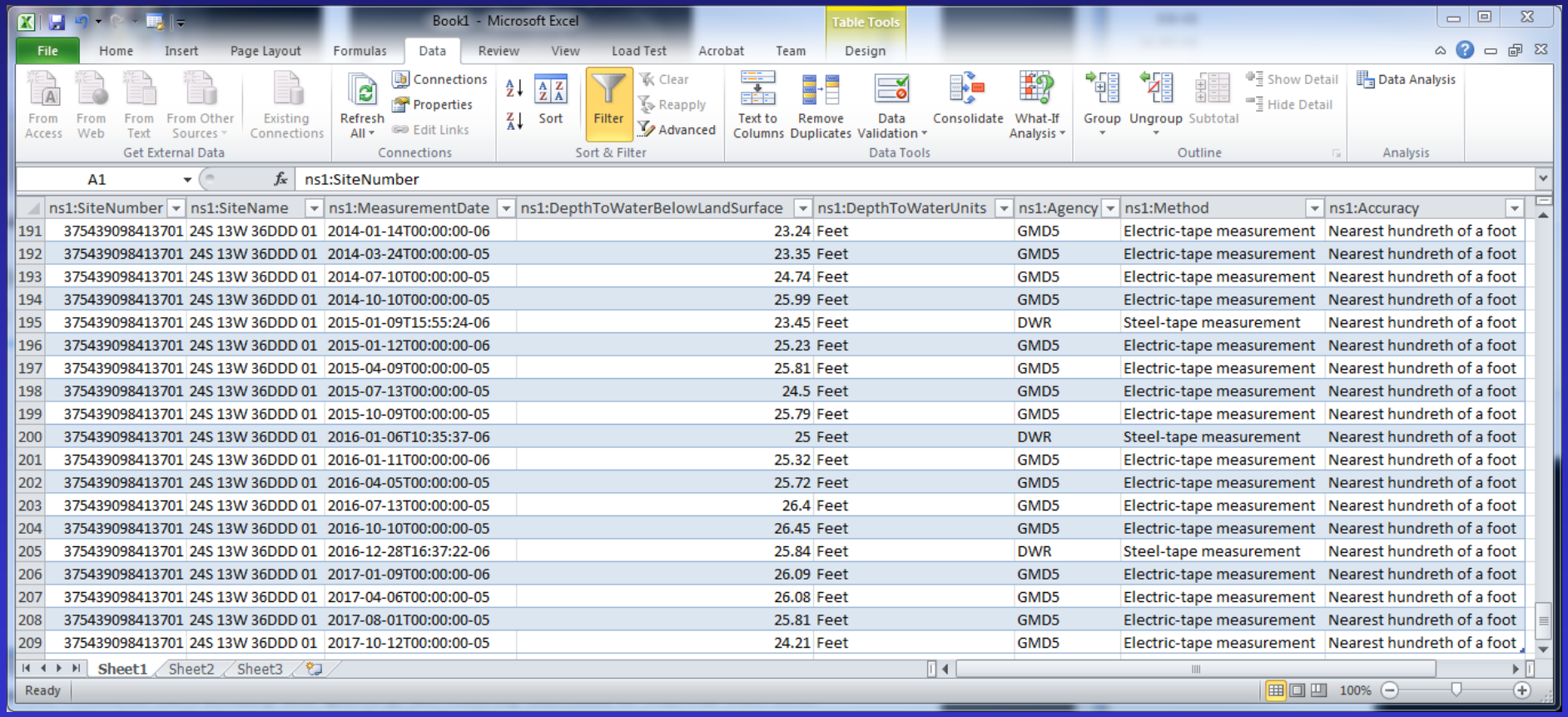
maps.kgs.ku.edu/geohydro/wizard/services/data.cfc?r


```
– <WaterLevelMeasurement>
    <SiteNumber>375439098413701</SiteNumber>
    <SiteName>24S 13W 36DDD 01</SiteName>
    <MeasurementDate>2013-10-08T00:00:00-05</MeasurementDate>
    <DepthToWaterBelowLandSurface>22.87</DepthToWaterBelowLandSurface>
    <DepthToWaterUnits>Feet</DepthToWaterUnits>
    <Agency>GMD5</Agency>
    <Method>Electric-tape measurement</Method>
    <Accuracy>Nearest hundreth of a foot</Accuracy>
  </WaterLevelMeasurement>
– <WaterLevelMeasurement>
    <SiteNumber>375439098413701</SiteNumber>
    <SiteName>24S 13W 36DDD 01</SiteName>
    <MeasurementDate>2014-01-08T14:33:37-06</MeasurementDate>
    <DepthToWaterBelowLandSurface>22.55</DepthToWaterBelowLandSurface>
    <DepthToWaterUnits>Feet</DepthToWaterUnits>
    <Agency>DWR</Agency>
    <Method>Steel-tape measurement</Method>
    <Accuracy>Nearest hundreth of a foot</Accuracy>
  </WaterLevelMeasurement>
– <WaterLevelMeasurement>
    <SiteNumber>375439098413701</SiteNumber>
    <SiteName>24S 13W 36DDD 01</SiteName>
    <MeasurementDate>2014-01-14T00:00:00-06</MeasurementDate>
    <DepthToWaterBelowLandSurface>23.24</DepthToWaterBelowLandSurface>
    <DepthToWaterUnits>Feet</DepthToWaterUnits>
    <Agency>GMD5</Agency>
    <Method>Electric-tape measurement</Method>
    <Accuracy>Nearest hundreth of a foot</Accuracy>
  </WaterLevelMeasurement>
– <WaterLevelMeasurement>
    <SiteNumber>375439098413701</SiteNumber>
    <SiteName>24S 13W 36DDD 01</SiteName>
    <MeasurementDate>2014-03-24T00:00:00-05</MeasurementDate>
    <DepthToWaterBelowLandSurface>23.35</DepthToWaterBelowLandSurface>
    <DepthToWaterUnits>Feet</DepthToWaterUnits>
    <Agency>GMD5</Agency>
    <Method>Electric-tape measurement</Method>
    <Accuracy>Nearest hundreth of a foot</Accuracy>
```



Returned XML Document in Excel

http://maps.kgs.ku.edu/geohydro/wizard/services/data.cfc?method=WaterLevels&sites=375439098413701



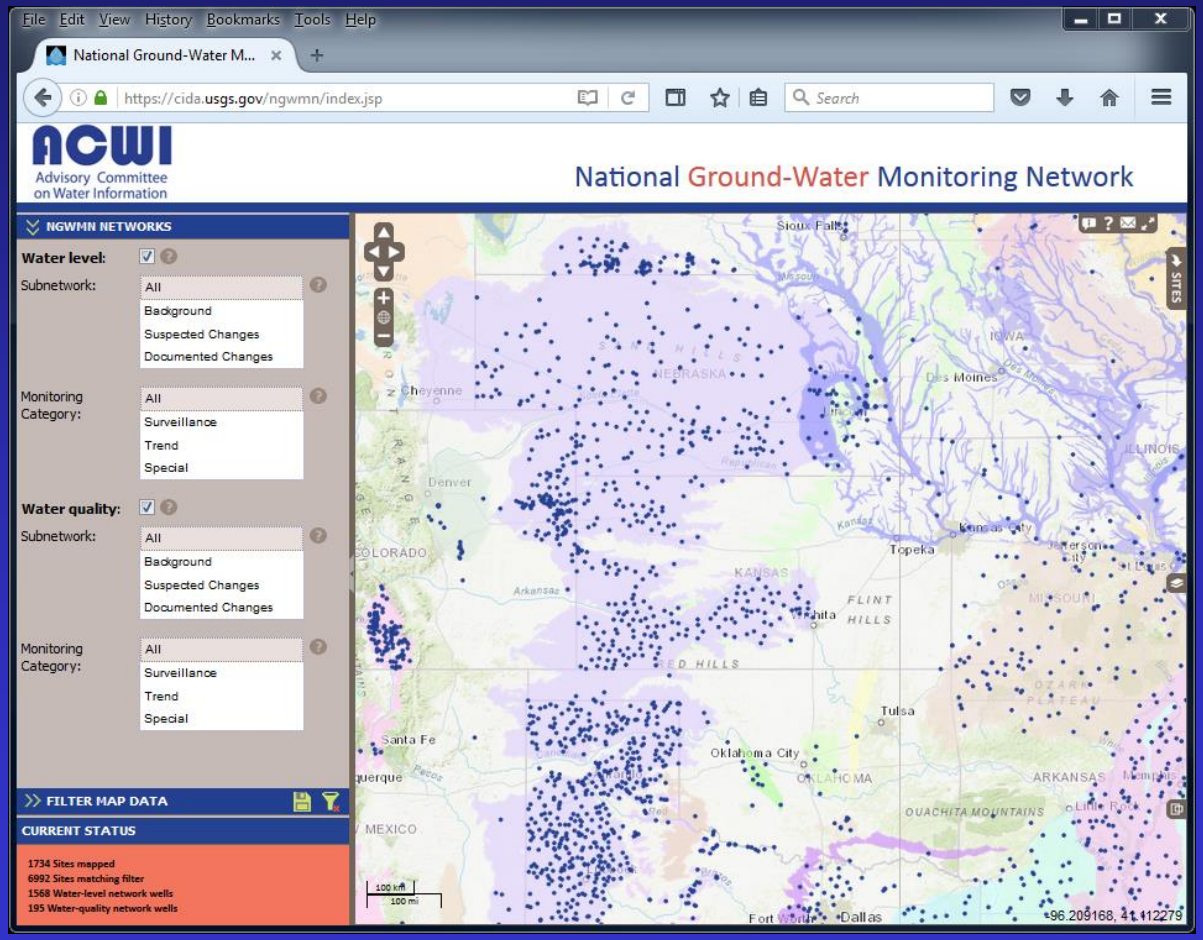
	ns1:SiteNumber	ns1:SiteName	ns1:MeasurementDate	ns1:DepthToWaterBelowLandSurface	ns1:DepthToWaterUnits	ns1:Agency	ns1:Method	ns1:Accuracy
191	375439098413701	24S 13W 36DDD 01	2014-01-14T00:00:00-06	23.24	Feet	GMD5	Electric-tape measurement	Nearest hundreth of a foot
192	375439098413701	24S 13W 36DDD 01	2014-03-24T00:00:00-05	23.35	Feet	GMD5	Electric-tape measurement	Nearest hundreth of a foot
193	375439098413701	24S 13W 36DDD 01	2014-07-10T00:00:00-05	24.74	Feet	GMD5	Electric-tape measurement	Nearest hundreth of a foot
194	375439098413701	24S 13W 36DDD 01	2014-10-10T00:00:00-05	25.99	Feet	GMD5	Electric-tape measurement	Nearest hundreth of a foot
195	375439098413701	24S 13W 36DDD 01	2015-01-09T15:55:24-06	23.45	Feet	DWR	Steel-tape measurement	Nearest hundreth of a foot
196	375439098413701	24S 13W 36DDD 01	2015-01-12T00:00:00-06	25.23	Feet	GMD5	Electric-tape measurement	Nearest hundreth of a foot
197	375439098413701	24S 13W 36DDD 01	2015-04-09T00:00:00-05	25.81	Feet	GMD5	Electric-tape measurement	Nearest hundreth of a foot
198	375439098413701	24S 13W 36DDD 01	2015-07-13T00:00:00-05	24.5	Feet	GMD5	Electric-tape measurement	Nearest hundreth of a foot
199	375439098413701	24S 13W 36DDD 01	2015-10-09T00:00:00-05	25.79	Feet	GMD5	Electric-tape measurement	Nearest hundreth of a foot
200	375439098413701	24S 13W 36DDD 01	2016-01-06T10:35:37-06	25	Feet	DWR	Steel-tape measurement	Nearest hundreth of a foot
201	375439098413701	24S 13W 36DDD 01	2016-01-11T00:00:00-06	25.32	Feet	GMD5	Electric-tape measurement	Nearest hundreth of a foot
202	375439098413701	24S 13W 36DDD 01	2016-04-05T00:00:00-05	25.72	Feet	GMD5	Electric-tape measurement	Nearest hundreth of a foot
203	375439098413701	24S 13W 36DDD 01	2016-07-13T00:00:00-05	26.4	Feet	GMD5	Electric-tape measurement	Nearest hundreth of a foot
204	375439098413701	24S 13W 36DDD 01	2016-10-10T00:00:00-05	26.45	Feet	GMD5	Electric-tape measurement	Nearest hundreth of a foot
205	375439098413701	24S 13W 36DDD 01	2016-12-28T16:37:22-06	25.84	Feet	DWR	Steel-tape measurement	Nearest hundreth of a foot
206	375439098413701	24S 13W 36DDD 01	2017-01-09T00:00:00-06	26.09	Feet	GMD5	Electric-tape measurement	Nearest hundreth of a foot
207	375439098413701	24S 13W 36DDD 01	2017-04-06T00:00:00-05	26.08	Feet	GMD5	Electric-tape measurement	Nearest hundreth of a foot
208	375439098413701	24S 13W 36DDD 01	2017-08-01T00:00:00-05	25.81	Feet	GMD5	Electric-tape measurement	Nearest hundreth of a foot
209	375439098413701	24S 13W 36DDD 01	2017-10-12T00:00:00-05	24.21	Feet	GMD5	Electric-tape measurement	Nearest hundreth of a foot

Future Plans

- https://cida.usgs.gov/ngwmn/

- Update the NGWMN well registry with changes from the 2018 Cooperative Water Level run

- Populate NGWMN well registry with new Index/Trend wells



Questions????

Kansas Geological Survey
1930 Constant Ave
Lawrence, KS 66047
785-864-2118

KU KANSAS GEOLOGICAL SURVEY
The University of Kansas

Visit our site at
http://www.kgs.ku.edu