

Project: 3

Title: El Reno Wellfield Resistivity Survey

Agency: Association of Central Oklahoma Governments (ACOG)

Project Description:

The municipal water well field for the city of El Reno is located in the alluvium next to the North Canadian River. Highway 81 bisects the field, which is composed of nearly two dozen shallow wells. The rapidly developing area surrounding the well field is multizonal with agricultural, industrial, and single-unit housing. Previous numerical modeling of the well field defining the wellhead protection zones suggested that water quality in the well field may be affected from various sources, including effluent from septic fields north of the field and nitrates from agricultural activities. However, the model assumed a homogeneous sand unit for the alluvium, due to the lack of geologic information. As with most well fields in the North Canadian alluvium, geophysical logs and even driller information is lacking. There is a widespread assumption is that the sands are homogeneous - even when well yields show a wide variation. Most wells are just drilled to bedrock and cased.

Recent geophysical surveys in the alluvium several miles to the east have shown that the geology of the alluvium is quite heterogeneous. Geophysical data from a grid of lines would vastly improve the accuracy of the numerical model. In addition, efficiency of well placement would be increased, due to the ability to accurately pinpoint water sands.

Methodology:

Using the ACOG SuperSting, a series of approximately eleven 3D lines in a grid (see map) would be acquired using an appropriate array configuration such as a mixed dipole-gradient array. This information would be incorporated into a revised MODFLOW model to assess the impact of the septic fields to the north of the river.

Timeline

October 2007-June 2008

Proposed Budget:

\$25,000

Tasks

- Progress Reports
- QAPP
- Field work Report
- Revised MODFLOW model

Deliverables

- Field work assessment report – June 2008
- MODFLOW model – June 2008

Correlation to PAMs

This workplan will achieve Environmental Results under EPA Order 5700.7 and meet EPA's Strategic Plan for Oklahoma Goal 2: Clean And Safe Water Objective 2.1: Protect Human Health Sub-objective 2.1.1: Water Safe To Drink.

Budget

El Reno Wellfield Resistivity Survey FY 2007 604(b)a						
Description	Due Date	Staff	Time			
1 QAPP	Oct-07	Supervisor	0.004 Man-Years			\$264
2 Field Work	Dec-07	Supervisor	0.064 Man-Years			\$4,217
3 Numerical Modeling	Feb-07	Supervisor	0.040 Man-Years			\$2,635
4 Draft Report	Mar-07	Supervisor	0.020 Man-Years			\$1,294
5 Final Report	Jun-08	Supervisor	0.006 Man-Years			\$395
Total ACOG Salaries			0.133 Man-Years			\$8,805
6 Passive electrical resistivity imaging cable	Oct-07					\$4,000
7 Cable Reels	Oct-07					\$1,000
8 Water Level Meter	Oct-07					\$900
9 MODFLOW 2000 Software	Oct-07					\$1,259
10 Fringe				37.73%		\$3,322
11 Indirect Costs				47.12%		\$5,714
12 Fringe and Indirect Costs						\$16,195
Total Project Expenses						\$25,000

Budget Explanation

1 QAPP	Quality Assurance Project Plan; EPA requirement for federally funded environmental studies
2 Field Work	Eleven geophysical lines and processing
3 Numerical Modeling	Update groundwater model using MODFLOW 2000.
4 Draft Report	Report output from project
5 Final Report	Report output from project
6 Cable Reels	Necessary equipment to store cables with.
7 Passive electrical resistivity imaging cable	Necessary equipment for 3D resistivity acquisition
8 Water Level Meter	Necessary equipment to evaluate transmissivity of aquifer.
9 MODFLOW 2000 Software	Necessary software for modeling contaminant flow

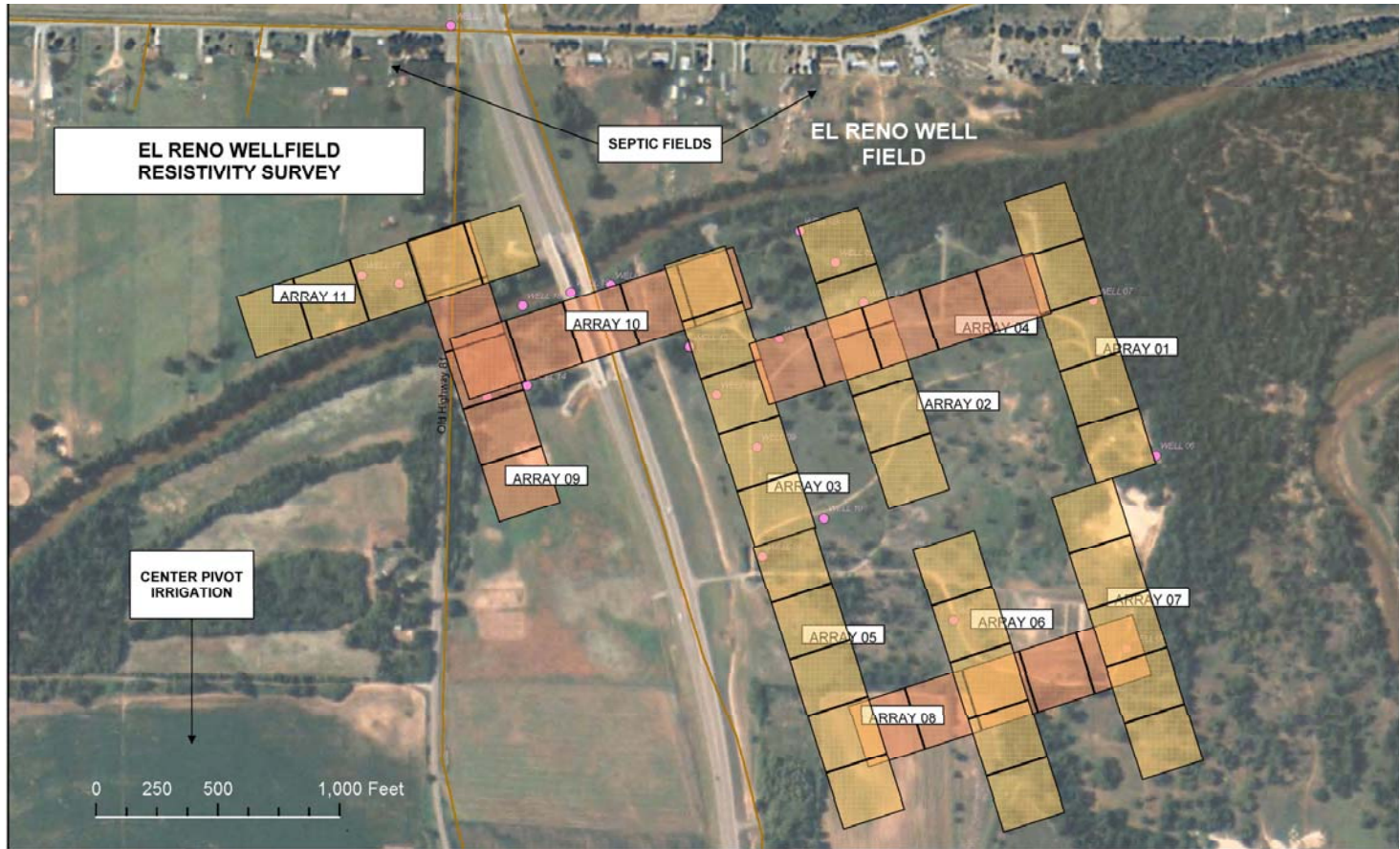


FIGURE 1 Project Location Map – El Reno Municipal Well Field – Suggested Resistivity Array Orientation