Class I and Class II Wells in Kentucky–A New Map Service of Waste-Disposal, Brine-Injection, and Enhanced-Recovery Wells in Kentucky*

Thomas Sparks1

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1Kentucky Geological Survey, University of Kentucky, Lexington, KY, USA (sparks@uky.edu)

Abstract

A new map service provides information on Kentucky's Class I and Class II injection wells. This catalog was compiled from the U.S. Environmental Protection Agency's well database. These wells are regulated for the safe disposal of industrial wastewater, hazardous chemicals, and brines produced in the petroleum, chemical, and limestone mining industries; and many others are used for injection in enhanced recovery projects.

Class I wells inject hazardous and nonhazardous industrial waste into deep rock formations below the lowest underground sources of drinking water. Eleven Class I disposal wells have been documented in Kentucky; however, no hazardous disposal wells are currently active in the state. Class II wells inject fluids associated with oil and natural gas production. There are two types of Class II wells in Kentucky: 135 saltwater disposal wells, which inject produced brines brought to the surface with oil and gas back into the same or similar underground formation, and 2,937 enhanced-recovery wells, which inject brine, water, and other fluids into oil-bearing formations to recover residual hydrocarbons.

A geodatabase of more than 3,000 injection wells was developed through mapping software and most were linked to the KGS oil-and-gas records database utilizing a buffered search. The wells were symbolized by type (disposal or recovery) and activity (active, inactive, or pending). The geodatabase was uploaded to an online GIS mapping template. The service conveys pertinent information about the injection well (type, status, location, formation, depth), and can display a detailed attribute table of selected wells.
Class I and Class II Wells in Kentucky–
A new map service of waste-disposal, brine-injection, and enhanced-recovery wells in Kentucky

Thomas N. Sparks
Kentucky Geological Survey
University of Kentucky
Lexington, KY 40506-0107

Announcement:

Lexington, Ky. (December 11, 2014) A new online map service has been created by the Kentucky Geological Survey at the University of Kentucky to provide locations and detailed information on Kentucky disposal wells. These wells are used for the safe disposal of industrial wastewater, hazardous chemicals, and brines (salt water) produced in the petroleum, chemical, and limestone mining industries. Others are used for the injection of brines, water, and other fluids for enhanced oil recovery projects. The map service, located at http://goo.gl/xQZ2QD, is an updated and interactive version of a KGS publication released in 2013, “Class I Waste-Disposal Wells and Class II Brine-Injection Wells in Kentucky” (Map and Chart 204, 2013).

Description:

This map service of 3,000 wells was compiled from EPA’s database of Class I and Class II Wells in Kentucky as documented from multiple Freedom of Information Act (FOIA) requests.

There are 11 Class I hazardous and non-hazardous industrial waste disposal wells in Kentucky. Class I wells are regulated to inject industrial and municipal waste into deep rock formations thousands of feet below the lowest underground sources of drinking water (USDW). The two Class I hazardous waste disposal wells in Jefferson County are now plugged and abandoned, and the Latonia Refinery disposal well in Kenton County was abandoned when the refinery was dismantled. The only Class I wells in operation are classified non-hazardous waste disposal for the recycling facility in Butler County and for the disposal of limestone mining wastewater in Mason and Pendleton Counties.

Class II wells inject fluids associated with oil and natural gas production. There are two types of Class II wells in Kentucky: salt water disposal (SWD) wells, and enhanced-recovery injection (ERI) wells. Disposal wells inject brines (salt water) that are brought to the surface with oil and gas back into the same formation from which they were initially produced or into similar porous underground formations. This practice of brine disposal also ensures the protection of USDW. Enhanced recovery wells inject brine, water, steam, polymers, or carbon dioxide into oil-bearing reservoir formations to recover residual oil or natural gas. This process is also known as secondary or tertiary recovery. The produced water is then recycled back into the reservoir to repeat this procedure.

Process:

These data were linked to a Kentucky oil-8-gas well location shapefile by spatial join to EPA-supplied locations using a buffered search method. Over 2000 Class II locations were matched to well locations in the KGS O&G well database. If a successful match were not made by proximity, then the EPA well data information and site location were provided “as is.”

A geodatabase of Class I and Class II wells was created in ArcGIS. The wells were then symbolized by type (disposal or recovery) and activity (active, inactive, or pending). The geodatabase was uploaded to an ArcGIS Online template and additional layers for O&G fields and faults were added. Clicking on a well’s symbol will bring up available information about it, including EPA identification number, KGS record number, well type, status, and injection formation. A full table of attributes can also be displayed (as shown below).

The well database and map service were created by Tom Sparks, Energy and Minerals Section, with technical assistance by Doug Curl, KGS Geoscience Information Section manager.

Map service contents:

- Total of 3,084 Kentucky wells
- 11 Class I industrial waste-disposal wells
- 136 Class II saltwater disposal wells
- 2,937 Class II enhanced recovery injection wells

Detailed, customized legend
- Content tab (select layers on/off, set transparency, open table, metadata description)
- Attribute table of locations, perforation depths, injection zones, perform queries, filter results
- O&G field outlines, Surface faults
- Selectable base maps
- Popups with links to O&G database

Map service available on KGS website:

- Oil and Gas Data page: http://kgs.uky.edu/kgsweb/DataSearching/oilsearch.asp
- News and Announcements: http://www.uky.edu/KGS/announce/map_disposalWells.htm