

OKLAHOMA
CORPORATION COMMISSION

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POLLUTION ABATEMENT/UIC

July 2, 2012

Mr. Derek Smithee
Water Quality Programs Division Chief
Oklahoma Water Resources Board
3800 North Classen Blvd.
Oklahoma City, OK 73118

Re: Appendix H listing for area at N 178th Street & Pennsylvania Ave, Oklahoma City

Dear Mr. Smithee,

The Oklahoma Corporation Commission (Corp Comm) would like to have an area at N 178th Street & Pennsylvania Ave, Oklahoma City, added to your Appendix H listings.

This proposal is dual purpose:

1. to help make sure that any new wells drilled in the area of this known Brownfields historic oilfield pollution area do not encounter the small area of known saline aquifer pollution, and
2. to prevent the additional spread of near surface saline pollution down into the subsurface via traditional gravel-pack water well production.

The pertinent columns for this proposed Appendix H listing are as follows:

Formation Name (Site Name)	Location	Address	Depth Zone (Upper-Lower Limit)	Class *	Agency	Remarks
Garber Wellington aquifer; N 178 th Street & Penn, Oklahoma City, OK	NE/4 31-14N-3W and NW/4 32-14N-3W, Oklahoma County	South of N 178 th Street & Pennsylvania Ave, Oklahoma City, OK	Garber sandstone aquifer is below the Hennessy shale, up to 30' below ground surface. Saline pollution is in the	2	Oklahoma Corp Comm and ACOG	Historic oilfield brine leaked/spilled into the near surface has apparently been piped down into the upper Garber aquifer via gravel-packed water wells. New

			surface shale and (now) the upper Garber.			water wells in area must be pre-approved by OWRB, and cased/ cemented to 50' below ground surface.
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Site History Summary

This area was developed starting ~9 years ago as a subdivision with 1 acre and up lots, with domestic water wells (Garber-Wellington Aquifer) at each home. Not all of the lots have yet been built on. Recently, several neighbors in the development south of N 178th Street & Pennsylvania Ave complained of salty tasting water. Because it was in a historic oilfield area, OWRB referred the site to Commission field staff, who tested the wells in question in 2011. Five of the 6 wells tested exceeded the 250 ppm secondary drinking water standards for chlorides and sodium (one was over 3,000 ppm chlorides), and have a sodium/chloride (Na/Cl) ratio <0.6, indicating an oilfield source¹. Oil wells in this area produced oil and oilfield brine from 1941 until they were plugged years ago; none are currently producing near these homes.

Brownfields staff made GIS maps for the Field Operations staff using our newly acquired old aerial photo coverage. The 1941 photo was particularly useful. It showed several oil drilling derricks still in place, and a number of pits still open containing fluids, or recently dry containing a bright white layer that is usually indicative of white salt crystals. There is also (unfortunately) visual evidence for spills on several old photos, both from pits and of unknown origin (e.g. in the subdivision pool area, behind the initial complainant's property). Later spills while the wells were producing are also possible. Some distinct linear features could be early pipelines going in.

In addition to the 6 homeowner wells in question, we discovered that in the back yards of two of the homeowners, water wells had been initially drilled, apparently by the developer, and had encountered "bad water"; new good wells were then drilled in the front yards of these properties. The initial "bad" wells were not plugged; the only one that could still be accessed also tests as polluted. The front yard wells which were initially OK are now, 8-9 years later, among those saline polluted.

OWRB and Corp Comm persuaded Oklahoma City to run a new water line into the affected portion of the subdivision, so that the homeowners could have clean drinking water. Corp Comm's Brownfields program is having the now-abandoned water wells plugged, with oversight from OWRB's water well drilling program, to prevent further spread of saline pollution down into the aquifer.

¹ The USGS database of Produced Oilfield Brines in Oklahoma had samples from 90 wells in the Edmond, Edmond North, and Edmond West oilfields. These are very saline, with chlorides up to 217,587 ppm. It would not take very large volumes spilled to thoroughly salt-pollute soils and water. Na/Cl ratios in saline producing wells varied from 0.33-0.62, which is typical of Oklahoma produced waters.

Pollution Sources

What Corp Comm and ACOG believe has happened is that historic brine spills and pipeline leaks in this part of the old Edmond oil field created several saline pockets or areas (a.k.a. plumes) in the Hennessy shale, which extends from the surface to approximately 30 feet deep in this area, overlying the Garber sandstone aquifer. Using geophysical instruments, ACOG has been able to map several of these plumes, two of which are closely associated with old oilfield gathering pipelines. These saline spills appear for the most part to have been encapsulated within the shale, extending down to around 20 feet deep.

However, the two abandoned backyard wells are within part of the largest, most concentrated of these plumes; another of the water wells in question is not far from a second smaller plume. Typical water well construction in this area involves a short section of surface casing, with a gravel pack from below the casing down into the aquifer. Unfortunately, this construction technique can act as a conduit, allowing for denser saline water encountered in shallow zones to flow down through the gravel pack into the underlying aquifer. All significant soil and the most concentrated of the ground water saline impacts appear (based on the geophysics) to be currently above 50' deep.

Appendix H Justification

This is a historically polluted Brownfields site. It is rarely technically feasible to remediate saline groundwater pollution. In addition, the oilfield activities causing the initial pollution happened long ago, and there is no currently-in-business responsible party to undertake remediation. The aquifer pollution is therefore in effect an irreversible man-induced impact, at least in our lifetimes.

Mr. Tim Baker, Corp Comm's Pollution Abatement Manager, has spoken and written to the OWRB's well permitting group requesting that they NOT permit similar water wells to be drilled in the Edmond oilfield area. However, there is no real mechanism in OWRB's rules that can allow them to prevent this. By enacting the proposed Appendix H listing, Corp Comm hopes to put in place such a mechanism for this known saline impacted area. By requiring that new water wells in this area be pre-approved by OWRB, we can keep them out of aquifer zones known to be polluted; requiring that wells be cased to 50' below ground surface will help ensure that no more shallow pollution is piped down to the aquifer.

A justification document for this Appendix H listing, following OWRB's 2012 guidance, is attached.

Sincerely,


Patricia Billingsley
Brownfields Manager

Justification for Appendix H Listing, area south of N 178th Street & Pennsylvania Ave

A. Pertinent technical details of location and beneficial use designations to be listed in Appendix H

Formation Name (Site Name)	Location	Address	Depth Zone (Upper-Lower Limit)	Class *	Agency	Remarks
Garber Wellington aquifer Oklahoma City, OK	NE/4 31-14N-3W and NW/4 32-14N-3W, Oklahoma County	N 178 th Street & Pennsylvania Ave	Garber sandstone aquifer is below the Hennessy shale, up to 30' below ground surface. Saline pollution is in the surface shale and upper Garber.	2	Oklahoma Corp Comm and ACOG	Historic oilfield brine leaked/spilled into the near surface has apparently been piped down into the upper Garber aquifer via gravel packed water wells. New water wells in this area must be pre-approved by OWRB, and cased/cemented to 50' below ground surface.

B. The proposing agency should provide a justification document discussing the reasons for the proposed entry. Justification should establish the following:

785:45-7-3 (b)(2)(E) A beneficial use designation for groundwater may be amended or removed only after a demonstration to the satisfaction of the Board that meets one of the following tests:

- (i) The designated use does not exist due to a condition that was not caused by humans, and treatment using Best Available Technology will not achieve the designated use, or*
- (ii) The designated use does not exist due to a condition that is attributable to irreversible impacts caused by humans, and the remedy would cause substantial*

:

1. The brine leaks and spills that later resulted in salinity-impairment of the shallow Garber Wellington aquifer in this area occurred while the West Edmond oil field was operating

in the twentieth century, starting in 1941. This area has had no oil and gas production for more than 10 years.

2. This is a state Brownfields site; there is no responsible party (oil and gas company) from that era still in operation to task with the remediation.
3. Corp Comm and OWRB (Kent Wilkins) arranged for Oklahoma City to run a water line into this portion of the subdivision so that homeowners can have clean drinking and household water.
4. Corp Comm and ACOG undertook assessment activities to outline the area of polluted groundwater.
5. Corp Comm is funding, and OWRB overseeing, the plugging of homeowner wells no longer being used and older abandoned water wells, to help prevent further spread of shallow saline pollutants down into the Garber-Wellington Aquifer
6. This is a historically polluted Brownfields site. It is rarely technically feasible to remediate saline groundwater pollution. In addition, the oilfield activities causing the initial pollution happened long ago, and there is no currently-in-business responsible party to undertake remediation. The pollution is therefore in effect an irreversible man-induced impact, at least in our lifetimes.
7. The saline groundwater should not be used for drinking water or other household purposes, which is why the Appendix H listing to prevent new water wells in the area.

C. Revisions to Appendix H are governed by the Oklahoma **Administrative Procedures Act O.S. 75 Section 303**. The proposing agency should provide information to answer for each following questions required by the APA for the Notice of Rulemaking Intent (NORI).

1. *In simple language, a brief summary of the rule;*

In this area, all new water wells must be pre-approved by OWRW, cased and cemented from the ground surface down to fifty (50) feet deep.

2. *The circumstances which created the need for the rule;*

Historic brine spills and pipeline leaks in this part of the old Edmond oil field created several saline pockets or areas (a.k.a. plumes) in the Hennessy shale, which extends from the surface to approximately 30 feet deep in this area, overlying the Garber sandstone aquifer. Typical water well construction in this area involves a short section of surface casing, with a gravel pack from below the casing down into the aquifer. Unfortunately, this construction technique can act as a conduit, allowing for denser saline water encountered in shallow zones to flow down through the gravel pack into the underlying aquifer. The two abandoned backyard wells are adjacent to the largest, most concentrated of these plumes; another of the water wells in question is not far from a second smaller plume. This rule will help prevent that from occurring again, as well as help prevent new water well owners from pulling saline water into their own wells.

5. *The intended effect of the rule;*

To prevent people from being exposed to potentially polluted groundwater, and preventing the spread of old saline oilfield pollution into more of the Garber aquifer.

D. The proposing agency should provide information to answer for each following questions required by the APA Rule Impact statement (RIS)

1. *a brief description of the purpose of the proposed rule:*

See above

2. *. a description of the classes of persons who most likely will be affected by the proposed rule, including classes that will bear the costs of the proposed rule, and any information on cost impacts received by the agency from any private or public entities,*

People who would otherwise use well water will be protected. Water well drillers will have to alter their standard practices in this area, at minimal extra cost.

3. *a description of the classes of persons who will benefit from the proposed rule,*

All persons that might otherwise be exposed to polluted aquifer water

4. *a description of the probable economic impact of the proposed rule upon affected classes of persons or political subdivisions, including a listing of all fee changes and, whenever possible, a separate justification for each fee change,*

No fee change is proposed. Water well drillers will have to alter their standard practices in this area, at a minimal extra cost which home or business owners would pay. Alternatively, homeowners and businesses can hook up to city water lines, at usual costs, which have now been brought into the area.

5. *the probable costs and benefits to the agency and to any other agency of the implementation and enforcement of the proposed rule, the source of revenue to be used for implementation and enforcement of the proposed rule, and any anticipated effect on state revenues, including a projected net loss or gain in such revenues if it can be projected by the agency,*

No costs. The Benefits are in protecting the water resources of the state, and protecting citizens in the area from pollution.

6. *a determination of whether implementation of the proposed rule will have an economic impact on any political subdivisions or require their cooperation in implementing or enforcing the rule,*

None

7. *a determination of whether implementation of the proposed rule may have an adverse economic effect on small business as provided by the Oklahoma Small Business Regulatory Flexibility Act,*

None

8. *an explanation of the measures the agency has taken to minimize compliance costs and a determination of whether there are less costly or nonregulatory methods or less intrusive methods for achieving the purpose of the proposed rule,*

N/A

9. *a determination of the effect of the proposed rule on the public health, safety and environment and, if the proposed rule is designed to reduce significant risks to the public health, safety and environment, an explanation of the nature of the risk and to what extent the proposed rule will reduce the risk,*

This aquifer supplies at least 40% of the water used in the Oklahoma City Metropolitan area, and needs to be protected. The proposed Appendix H listing will put in place two protective mechanisms for this known saline impacted area:

- a) . By requiring that new water wells in this half section area be pre-approved by OWRB, water wells can be kept out of aquifer zone(s) known to be polluted;
- b) Requiring that wells be cased to 50' below ground surface will help ensure that no more shallow pollution is piped down to the aquifer.

10. *a determination of any detrimental effect on the public health, safety and environment if the proposed rule is not implemented,*

The aquifer could become more polluted, and citizens could be exposed to the pollution.

- E. A representative from the proposing agency should make a brief presentation explaining the listing at one of our public meetings and be prepared to respond to questions and comments from the public.