

Bureau of Environmental Remediation/Remedial Section Guideline

Considerations for Performing Water Well Receptor Surveys near Contaminated Sites

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Section Chief: Bob Jungers Date: 9/10/14
Section Chief: Rendell Faulconer Date: 9/12/14
Section Chief: Cheryl Date: 9/12/14
Bureau Manager: Leo G. Henning Date: 9-16-14

ORIGINATORS

Originator: Chris Carey and Maura O'Halloran

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Introduction

This document serves as guidance for Kansas Department of Health and Environment (KDHE) staff to identify water supply wells located around contaminated sites. The identification of all impacted and potentially impacted water supply wells is an essential part of investigating a contaminated site. In addition, changes in groundwater plume geometry over time may require the re-evaluation of water sources in order to ensure drinking water supplies are protected.

Planning the Water Well Survey

Ideally a water well receptor survey will be conducted early in the Comprehensive Investigation (CI) or Voluntary Cleanup Investigation (VCI) process to determine site receptors and risk at a contaminated site. It is critical to develop a plan which includes the resources utilized to identify wells, planned study area (typically a one-mile radius of the known groundwater contaminant plume), decision framework for well sampling activities, well sampling protocols, and reporting. This plan may be incorporated into another deliverable (e.g., a CI Work Plan or VCI Work Plan) or submitted separately.

Resources Available for Water Well Receptor Surveys

A water well receptor survey should use multiple lines of evidence to conclusively demonstrate whether receptors are exposed to site-related groundwater contamination. KDHE recommends reviewing electronic databases for water supply wells maintained by the Kansas Geological Survey (KGS) and for points of surface and groundwater diversion maintained by the Kansas Department of Agriculture's Division of Water Resources (KDA-DWR) as the initial step for all surveys.

Key resources for identifying private or public water supply wells include:

- **Door-to-Door Reconnaissance:** This is often the most reliable way to locate private water wells and gather information regarding well use and condition, and is required in areas served exclusively by private water wells. KDHE's Water Well Receptor Survey Form (Attachment 1) is provided as an example for documenting information obtained during the reconnaissance. This form may be modified as needed on a case-by-case basis.

- **Mailing Questionnaires:** Questionnaires (Attachment 2) with self-addressed return envelopes are useful for contacting residents who may work during the day or are unavailable during door-to-door reconnaissance.
- **Electronic Databases:** Water well records (forms WWC-5 and WWC-5P) have been required by KDHE's Bureau of Water (BOW) for water wells constructed, reconstructed or plugged in Kansas since 1975. An electronic database for these records is maintained by the KGS. A separate database for all active public water supply (PWS) wells is maintained by KDHE-BOW. The KDA-DWR maintains a water rights database for types of use and points of diversion of surface water and groundwater. Water solely for domestic use, which includes household purposes, watering of livestock, and irrigation of lawns, gardens and orchards not exceeding a total of two acres, is not included in the water rights database.
- **Local municipalities or rural water districts:** Properties served by private wells may be identified by cross-referencing municipal or rural water district connections to known addresses in the study area. Occupied properties not included in water service billings are likely relying on private wells for water. Water district maps available through the Kansas Rural Water Association can help determine if an area is served by a rural water district and can provide helpful contact information.
- **Local Health Departments:** County health departments with Local Environmental Protection Programs can often provide information on private water supplies.
- **Interviews:** Citizens or local government employees can provide information not provided by other sources.

For most KDHE-BER sites, water well receptor surveys focus on the area within one mile of known groundwater contamination, but this may vary based on site hydrogeology (e.g., preferential migration pathways, etc.), contaminants or other site-specific information.

Sampling During a Water Well Receptor Survey

It may be necessary to collect water samples from wells within the survey area to determine if the wells are impacted by site-related contamination. KDHE-BER protocol for private well sampling is provided in Standard Operating Procedure BER-01, *Collection of Groundwater Samples at Known or Suspected Groundwater Contamination Sites*. Depending on available site information, not all wells within the area may need to be sampled as part of the water well survey, but collecting samples from wells located outside the potential area of impact can provide baseline data useful for future actions.

Understanding Well Construction

Knowledge of well construction is necessary for the proper collection and interpretation of well water data.

- **Type** – Wells can be dug (typically by hand), bored (excavated by hand or power auger), drilled (excavated by percussion or rotary drills) or driven (e.g. sand point).
- **Depth** – Depth generally coincides with the bottom of the well screen. In some cases wells will be drilled deeper than the targeted aquifer to create a reservoir in low-yielding

formations. These wells may be unscreened, and the borehole diameter should be used for purge volume calculations.

- **Screened interval** – Slotted, wire-wrapped or perforated well screen allows groundwater to move freely from the aquifer into the well while stabilizing the aquifer material. The screened interval is placed to intercept the targeted aquifer. Some water supply wells are constructed with screens intercepting several water-bearing zones, which introduces the possibility of cross-contamination between zones.
- **Casing** – Durable watertight casing provides protection against contamination from overlying zones. Approved casing materials may consist of steel, wrought iron, or thermal plastic. Polyvinyl chloride (PVC) casing is commonly used in private water supply and monitoring wells. Casing commonly used in older wells has included galvanized steel, oil-field iron, cement, clay tile, and transite (asbestos cement).
- **Gravel pack** – Gravel pack is washed sand positioned between the screen and borehole, which prevents clogging of the well screen and presents a larger area to intercept the aquifer. Gravel pack depth will extend across and typically 1-2 feet above the well screen in monitoring wells. In water supply wells, the gravel pack interval may extend some distance above the screen. In these cases, water from shallower zones may infiltrate the well and produce a water sample that does not necessarily represent the quality of water in the screened zone.
- **Grout** – Cement and/or bentonite clay is used to seal the annular space and protect the aquifer from shallow and surface contamination. Since May 1987, the minimum interval for sealing the top of the well's annular space with grout is 20 feet or to a minimum of five feet into the first clay or shale layer, if present, whichever is greater. In the case of groundwater depth less than the minimum grouting requirement, the grouting requirement may be modified if approved by BOW. Prior to May 1987, the minimum grout interval was 10 feet.
- **Condition** - Wells in poor condition can produce water that is non-representative of the aquifer. Damaged grout, cracked casing or unsealed well caps can result in surface water or contaminated shallow water entering the well.
- **Pumps** – Commonly used pumps in water supply wells include submersible (pump and motor below the water table) and jet (jet attached to pump above the water table or located at bottom of well). Piston pumps are used in windmills and are the mechanisms used with hand pumps.
- **Holding or pressure tanks** – The size of the holding or pressure tank used in a private water system will affect the length of time needed to purge the system of stagnant water prior to sampling.
- **Filters** – Filtration or other types of treatment systems to improve water quality are commonly used with water supply wells. It should be determined where the system is connected to the water supply in order to collect an untreated sample.

Community Involvement

Private well sampling events provide an opportunity for owners and residents to ask questions about site activities and to express their concerns. It is critical to develop a community involvement strategy that fosters trust between all stakeholders. Field personnel should be prepared to answer basic site and sampling questions (when will results be available, what

happens next?). These initial efforts will prove beneficial if site-related contamination impacts water wells in the area.

When private wells are sampled, KDHE-BER will provide the findings and appropriate recommendations to well owners/residents. If wells are impacted by site-related contamination, KDHE will work with responsible parties or voluntary parties to ensure access to a safe and reliable permanent water source.

If water wells are impacted, a community involvement strategy will be formulated. This can include one-on-one meetings with the affected property owners and residents, community meetings, fact sheets, and press releases. Community involvement efforts must be coordinated with KDHE management.

Documentation

Water well receptor surveys are typically combined with other site activities and presented in initial site deliverables such as the CI Report or VCI Report, or as a separate Water Well Receptor Survey Report. The report should include:

- Completed water well questionnaire for each well in the study area and WWC-5 form where available
- Interview notes/records
- Field notes
- Well construction details, if available
- Well sampling information
- Laboratory reports
- Maps showing the site location, contaminant plume, groundwater flow direction, well locations, and study area boundary
- Known or suspected sources of pollution in the site vicinity

Future Actions

KDHE may require periodic water well surveys to identify new wells or reactivated wells in the site vicinity that may be threatened by groundwater contamination, depending on site-specific circumstances such as current or potential groundwater use, extent and magnitude of groundwater contamination, remedy selected and the number of potential receptors. Existing water well receptor surveys should be reviewed and updated as appropriate to ensure conditions remain protective of human health and the environment. These subsequent surveys can be less detailed than the initial water well survey. Periodic water well receptor surveys and water well sampling events must be coordinated with KDHE-BER.



Attachment 1

Water Well Receptor Survey Form

Form completed by: _____ Date: _____

Site name/project code: _____

Property address: _____

Individual surveyed - name: _____

Owner ___ Renter ___ Other (explain) _____

Contact Info: Mailing address: _____

Telephone: _____ E-mail: _____

Is the residence connected to a public water supply? no ___ yes ___ Name of PWS: _____

Are there any water wells on the property? ___ How many? ___ (complete a separate survey for each well identified)

What is the well used for?

- ___ Drinking ___ Kitchen Use ___ Bath/Shower
___ Watering lawn ___ Watering garden produce ___ Irrigating crops
___ Watering livestock/pets
___ Other (describe) _____

If used for drinking water, number of people drinking the water and their ages: _____

Is a treatment system in use? no ___ yes ___ If yes, where is it connected: _____

What type? R/O ___ Water Softener ___ Filter (describe): _____

Does household use bottled water for drinking? no ___ yes ___

GPS coordinates of well: Latitude: _____ Longitude: _____ Datum: _____

Date constructed: _____ Driller: _____ Well type: drilled/hand dug/sand point/other: _____

Well Pump Used? ___ Working? ___ Pump Type/Condition/Details: _____

Casing material: _____ Casing diameter: _____ Screen interval: _____

Total depth: _____ Static water level: _____ Date SWL measured: _____

Measuring point: TOC, land surface, or other: _____

Distance of measuring point above/below land surface: _____

Source(s) of well construction information/measurements: _____

Water sample(s) collected from well? no ___ yes ___

Sample collection point(s): _____

Volume/time purged _____ Analyses: _____

Description of well location and condition:

Sketches:

Show measuring point and/or TOC (plan and side views); location of well(s) in relation to buildings or other physical features; potential pollution sources; surface water drainage or areas of ponding. Provide approximate measurements and distances.



Attachment 2

Residential Well Use Questionnaire

This questionnaire is designed to help the Kansas Department of Health and Environment (KDHE) understand current groundwater use in your area. Information from this questionnaire will be used to implement appropriate management practices during ongoing groundwater investigations or cleanup efforts. Please complete this questionnaire and return it to KDHE using the enclosed stamped envelope. Your information is essential to help KDHE make the correct decisions for the cleanup of groundwater contamination.

Your name: _____ Date: _____

Address: _____

Telephone: _____ E-mail: _____

Are you the: Owner ___ Renter ___ Other ___ at _____ (questionnaire address) _____

Is the residence connected to a public water supply? no ___ yes ___ name of PWS: _____

Are there any water wells on the property? no ___ yes ___ If yes, how many? _____

If known, how deep is/are your well(s)? _____ What is/are the screened interval(s)? _____

If you use a water well on your property, do you use it for

___ Normal residential use ___ Normal non-residential use ___ Watering lawn

___ Watering garden produce ___ Livestock/pets

___ Other describe) _____

If used for drinking water, number of people drinking the water and their ages: _____

Is a treatment system connected to the well? no ___ yes ___ If yes, what kind:

Filter ___ Water softener ___ Reverse osmosis (RO) ___ Other (describe) _____

Why do you use the treatment system? _____

If you are connected to a PWS but also have a well:

What is your primary source of drinking water?

Public water supply ___ Water well ___ Bottled or other source ___

If you have a garden, what is your primary source of water for irrigation of produce?

Public water supply ___ Water well ___ Other ___

Do you anticipate changing the source of your water supply in the near future? no ___ yes ___

May we contact you by telephone if we need additional information about your water well? no ___ yes ___

If yes, what time of day would be best to reach you?

Completed by (please print) _____ Date _____

Thanks for your time completing this survey!