



Protecting, maintaining and improving the health of all Minnesotans

MEMORANDUM

DATE: January 19, 2007

TO: Licensed and Registered Well Contractors
City of Perham
Otter Tail County
Advisory Council on Wells and Borings

FROM: John Linc Stine, Director
Environmental Health Division
P.O. Box 64975
St. Paul, Minnesota 55164-0975

SUBJECT: Notice of Designation of a Special Well Construction Area in the Vicinity of Perham Arsenic Site, East Otter Tail County Fairgrounds in Perham, Otter Tail County, Minnesota

The Minnesota Department of Health (MDH) is designating A SPECIAL WELL CONSTRUCTION AREA (SWCA) that includes a portion of the city of Perham and areas east and southeast of Perham, in Otter Tail County, as shown in the enclosed map (Figure 1). The SWCA designation, which becomes effective on February 15, 2007, applies to the construction, repair, and sealing of all wells and borings and will remain in effect until further notice.

AUTHORITY

Minnesota Statutes, section 103I.101, subdivision 5, item 7 grants the commissioner of health the authority to establish standards for the construction, maintenance, sealing, and water-quality monitoring of wells in areas of known or suspected contamination. Minnesota Rules, part 4725.3650, details the requirements for construction, repair, and sealing of wells within a designated SWCA, including plan review and approval, water-quality monitoring, and other measures to protect public health and prevent degradation of groundwater.

SITE HISTORY

During the 1930's and 1940's, the U.S. Department of Agriculture distributed arsenical pesticides to counties in Minnesota in order to combat grasshopper infestations. Technical grade arsenic was mixed with sawdust and molasses to produce "grasshopper bait," which was then spread in agricultural fields. The East Otter Tail County

fairgrounds was a mixing site for preparing the bait. In 1947, lead arsenate and unused grasshopper bait were buried in a shallow pit (in an area 10 feet by 20 feet, 3 to 6 feet deep) in the southeast corner of the fairgrounds. An estimated 50 pounds of technical-grade arsenic was buried in the pit (MPCA, 1998).

In 1972, Hammer's Construction Company constructed an office/warehouse facility immediately south of the pit and installed a water-supply well that was 31 feet deep. Thirteen employees were exposed to high levels of arsenic in the well water used for drinking. Five employees developed gastrointestinal problems, with three also showing symptoms of neuropathy requiring medical treatment. Five of the remaining eight showed elevated arsenic levels in scalp hair samples. Arsenic levels in the water-supply well reached 11,800 micrograms/liter ($\mu\text{g/l}$) (USDHHS, 1999). For comparison, the Maximum Contaminant Level (MCL) for arsenic in drinking water served by a public water system was 50 $\mu\text{g/l}$ at that time. Effective January 23, 2006, the MCL for arsenic was reduced to 10 $\mu\text{g/l}$. The well was capped and the municipal water system was extended to the building in 1972.

SITE INVESTIGATION AND REMEDIATION

The burial site was initially capped with clay in 1982 (USEPA, 1994). In 1985, after the site was listed on the Minnesota Pollution Control Agency (MPCA) Superfund List, soil exceeding 500 mg/kg (milligrams/kilograms) arsenic was excavated by a MPCA contractor and disposed off site. The excavated area was then filled with clean soil and covered with a clay cap and an impermeable membrane (USEPA, 1994). The former burial site is now paved.

During the 1992-1993 Remedial Investigation and Feasibility Study, the plume was found to be 600 feet long, 400 feet wide, and approximately 85 feet deep, extending eastward and downward from the former pit area (USEPA, 1994). In 1997, the U.S. Environmental Protection Agency (USEPA), with support from the MPCA, installed four remedial wells (Minnesota Unique Well Numbers 603609-603612) along the length of the contaminant plume. Contaminated groundwater has been extracted from the four wells, treated with an activated alumina adsorption system, and discharged to an on-site infiltration gallery. The extraction system remains in operation, managed by the MPCA.

As part of the site remediation, the water-supply well that served the Hammer's Construction Company was permanently sealed in 1993 (Well and Boring Sealing Number H39926). A second well (H39930) at Hammer's Construction and a nearby private well (H42740) were sealed in 1994.

The contaminant plume has been slow to migrate, has largely been contained by the extraction system, and has been diminishing in size and concentration because of the extraction system. Using 2004 data, the current plume is 480 feet long, 150 feet wide, and 60 feet deep. Starting at levels exceeding 1 milligram/liter (mg/l, 1000 µg/l) of arsenic in EW-4 (nearest the source area) and 0.5 mg/l in the treatment system influent in 1998, current levels in the four extraction wells are below 50 µg/l and the effluent of the treatment system to the infiltration gallery is at concentrations of <1 µg/l arsenic. Background levels of arsenic in groundwater in the surficial-sand aquifer appear to be <1 µg/l. Nonetheless, there remain concerns that additional groundwater withdrawals could influence the plume distribution and disrupt the effectiveness of the extraction well system. In addition, the arsenic levels remaining in the plume still exceed the recently revised MCL for arsenic of 10 µg/l.

HYDROGEOLOGY

The geology of the Perham area consists of a surficial deposit of ice contact and outwash sands and gravels, approximately 100 feet in thickness. The material is relatively coarse grained and is highly transmissive (MPCA, 1998). Static water levels are on the order of 21-25 feet below land surface (Johnson, 1998; Scheer, 2006). Underlying the surficial sand and gravel is glacial drift, which, in turn, overlies metasedimentary bedrock. The drift materials appear to contain some sand layers, which may provide sufficient water for water-supply wells.

Groundwater flow in the surficial sand and gravel is from west to east, discharging ultimately into the Otter Tail River, approximately 1.8 miles east of the site. Local lakes and streams may provide some local influence.

PUBLIC HEALTH CONCERNS

The health effects of arsenic depend on its chemical form, the concentration in the water, how much water is consumed, and for how long. Inorganic arsenic poses a more serious health risk than organic arsenic found in plants and animals. A one-time "dose" of 60,000 micrograms of inorganic arsenic can be fatal.

Low concentrations of arsenic may cause adverse health effects when consumed over a long period of time. Arsenic may cause formation of corns (hyperkeratosis) in the palms of hands, the soles of feet, and elsewhere on the body. Arsenic concentrations exceeding 100 µg/l, have been linked to chronic health problems, such as diabetes, and deterioration of the circulatory and nervous systems, skin problems, and cancer of body organs when water is consumed over many decades.

The MCL, the drinking water standard applied to public-water supplies as established by the USEPA, was 50 µg/l for many decades. Effective January 23, 2006, the MCL was reduced to 10 µg/l. The MDH has not finalized a Health Risk Limit (HRL) for arsenic, but references the USEPA standard when assessing impacts on private wells.

BOUNDARIES OF THE SPECIAL WELL CONSTRUCTION AREA

The location of the SWCA is shown in Figure 1. The area includes the south half of Section 14 and that portion of Section 23 north of State Highway 10 of Township 136 North, Range 39 West, Otter Tail County.

REQUIREMENTS IN THE SPECIAL WELL CONSTRUCTION AREA

1. All wells regulated by the MDH are subject to the requirements of this SWCA. Wells include water-supply wells (domestic, public, irrigation, remedial heating/cooling commercial/industrial,), monitoring wells, and dewatering wells. Borings include elevators, environmental bore holes, and vertical heat exchangers. Notifications and plans for water-supply wells and dewatering wells, and permit applications for elevators, monitoring wells, and vertical heat exchangers must be submitted to the MDH, which will then consult with MPCA.
2. Construction of a new well or boring or modification of an existing well or boring (i.e., deepening the well, adding/removing casing below the frost line) may not take place until plans have been submitted to the MDH, in writing, and have been reviewed and approved (in writing) by the MDH. In addition to the information normally required for a notification or permit application, the plan must include the following information: street address; well depth; casing type, diameter, and depth; construction method, including grout materials and grout method, pumping rate; and well use.

3. Special well construction and/or monitoring requirements may be imposed on well or boring completion, location, and use in order to protect public health and groundwater quality and prevent further migration of contaminated groundwater. These requirements will be based on available knowledge of groundwater contamination and movement near the well site and the proposed use and pumping rate of the well.
4. Water-supply wells will not be approved in the surficial-outwash sand/gravel aquifer (approximately upper 100 feet) in the south half of Section 14 and that portion of Section 23 north of State Highway 10 for any potable uses. For purposes of the SWCA, potable uses include consumptive uses or other uses involving human contact, including drinking, cooking, bathing, manufacturing or processing food, drink, or pharmaceuticals, or to supply water to plumbing fixtures accessible to humans or animals.
5. Only wells cased and grouted into an aquifer below or within the drift underlying the surficial sand/gravel aquifer may be considered for potable uses within the SWCA. The well must be grouted from within 10 feet of the bottom of the casing to the surface to prevent any introduction/migration of contaminated groundwater from the surficial aquifer. The casing and annular grout seal must fully penetrate a confining layer, as defined in Minnesota Rules, part 4725.0100, subpart 24a.
6. MDH may consider allowing a well completed within the surficial sand/gravel aquifer for portable uses within Section 23 of the SWCA under the following conditions:
 - The community public water supply is not currently available to the site.
 - The well use is to be only for domestic purposes.
 - The well owner agrees, in writing, to a schedule for arsenic testing of the well. Testing must be performed by a laboratory certified by the MDH to perform arsenic testing. Testing results must be reported to the MDH.
 - The well owner agrees, in writing, to connect to the community public water supply once it becomes available to the site.
 - The well owner agrees, in writing, to seal the well once the property is connected to the community public water supply.

7. For all other water-supply wells (including irrigation wells and remedial wells dewatering wells, monitoring wells, and borings, the MDH will consider approval of construction or reconstruction of a well completed in the surficial sand/gravel aquifer only if the water use and discharge do not pose a threat to public health or the environment, and if it is demonstrated that the well use will not alter the extent and distribution of the contaminant plume or the performance of the remediation system.
8. For all wells completed within the SWCA, the owner must agree to pay the MDH for an arsenic analysis of a water sample collected from the well. The well contractor, monitoring well contractor, or limited well/boring contractor must contact the MDH Fergus Falls district office staff to arrange sample collection and sample analysis by the MDH laboratory. MDH will report the analytical results to the well owner and the MPCA.
9. The well owner must allow the MDH to resample the well for arsenic analysis approximately one year following the previous original analysis. MDH will report the analytical results to the well owner and the MPCA.
10. No well or boring may be permanently sealed until the MDH has received, reviewed, and approved (in writing) the plans for the proposed sealing. In addition to the required notification, the plan must include the following information: street address; original well/boring depth; current well/boring depth (if different); casing type(s), diameter(s), depth(s); methods of identifying and sealing any open annular space(s); methods of identifying and removing any obstructions; grout materials; and sealing methods.
11. Contractors must contact the MDH Fergus Falls district office by phone at least 24 hours prior to start of drilling a new well or boring, modification of an existing well or boring, or sealing of a well or boring. The verbal notification must be made during normal business hours (Monday through Friday, 8 a.m. to 4:30 p.m.) and must specify the date work is to begin.
12. All provisions of Minnesota Rules, Chapter 4725, are in effect.

Licensed and Registered Well Contractors
City of Perham
Otter Tail County
Advisory Council on Wells and Borings
Page 7
January 19, 2007

PERSONS TO CONTACT

For additional information regarding this SWCA, please contact:

Mr. Michael Convery
Minnesota Department of Health
Well Management Section
P.O. Box 64975
St. Paul, Minnesota 55164-0975
651/201-4586
michael.convery@state.mn.us

Plans for construction, repair, and sealing of wells (water-supply wells, monitoring wells, and dewatering wells) within the SWCA must be submitted to:

Mr. Jeff Grugel
Minnesota Department of Health
Fergus Falls District Office
1505 Pebble Lake Road, Suite 300
Fergus Falls, Minnesota 56537-3858
218/332-5148
jeff.grugel@state.mn.us

Notifications for construction or sealing of wells and permits for construction of monitoring wells must be mailed or faxed to:

Minnesota Department of Health
Well Management Section
P.O. Box 64975
St. Paul, Minnesota 55164-0975
651/201-4600
Fax: 651/201-4599

Licensed and Registered Well Contractors
City of Perham
Otter Tail County
Advisory Council on Wells and Borings
Page 8
January 19, 2007

For information regarding health effects, please contact:

Mr. Carl Herbrandson
Minnesota Department of Health
Site Assessment & Consultation Unit
P.O. Box 64975
St. Paul, Minnesota 55164-0975
651/201-4906
carl.herbrandson@state.mn.us

For information regarding the investigation, monitoring, and remediation of the Perham Arsenic Site, please contact:

Ms. Susan Johnson/Ms. Barbara Gnabasik
Minnesota Pollution Control Agency
Remediation Division
525 Lake Avenue South, Suite 400
Duluth, Minnesota 55802
218/725-7762 / 216/592-6266
Susan.Johnson@pca.state.mn.us / Barb.Gnabasik@pca.state.mn.us

REFERENCES

Johnson, M., 1998, Request for Special Well Construction Area - Perham Arsenic Site, 13 pages.

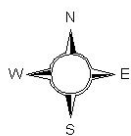
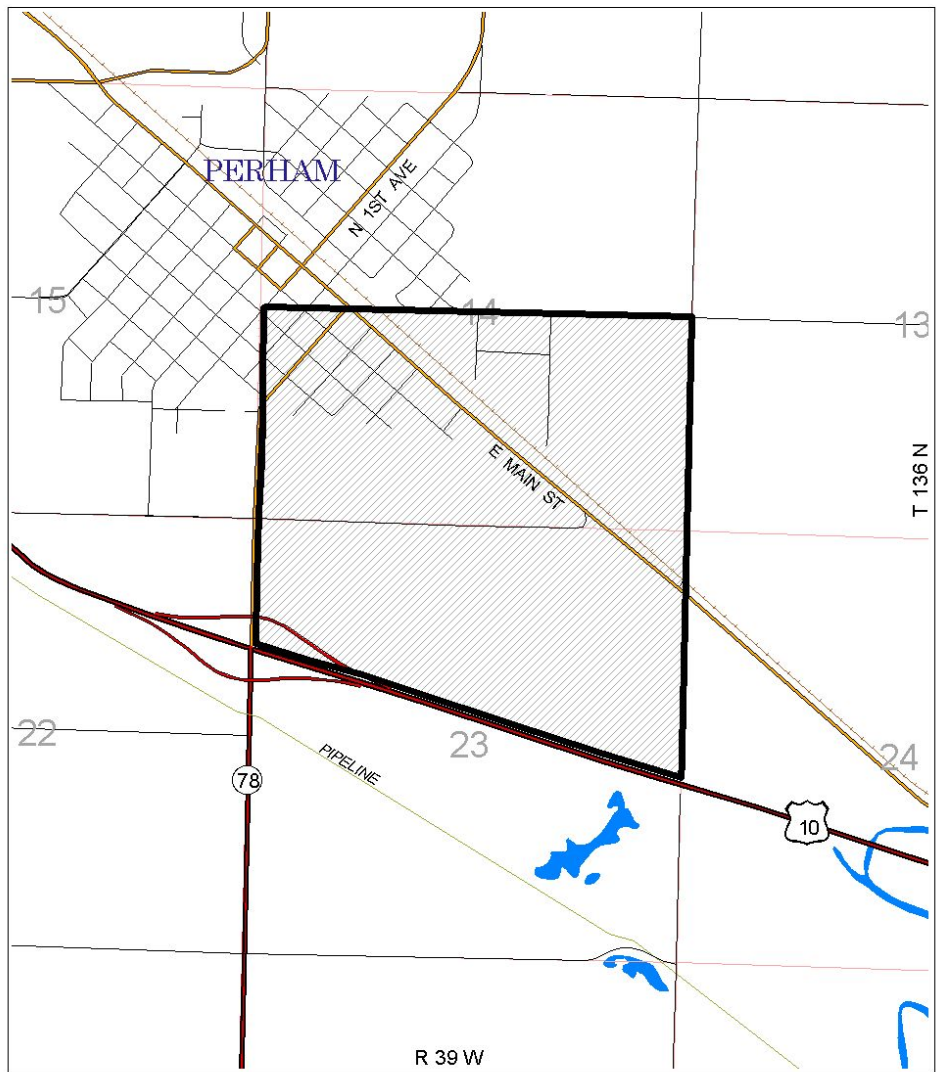
Scheer, D. 2006, Summary Spreadsheets of Environmental Data – Perham Arsenic Site, 57 pages.

United States Department of Health and Human Services, 1999, Health Consultation – Perham Arsenic Site, 10 pages.

United States Environmental Protection Agency, 1994, Record of Decision – Perham Arsenic Burial Site, 41 pages.

JLS:MPC:jmw:fal

Figure 1. Special Well Construction Area
Perham Arsenic Site, Otter Tail County



0.5 0 0.5 Miles

