

**Michigan Department of Environmental Quality
Office of Drinking Water and Municipal Assistance
Wellhead Protection Program**

**Guidance for Developing a Wellhead Protection Program
in Low Tritium Communities**

INTRODUCTION

Tritium concentrations in groundwater provide a useful method for determining the degree of confinement of an aquifer and is identified by the U.S. EPA as an acceptable means of assessing the vulnerability of aquifers. Tritium levels at or below one tritium unit (TU) are obtained from water supply wells that are highly confined or “not vulnerable.”

Although tritium levels may indicate an aquifer is “not vulnerable,” it is important to realize that the potential for contamination still exists. Activities that compromise the integrity of the confining unit, or activities in the area of groundwater recharge, could impact the well(s) in the future.

Where tritium levels of one TU or less are obtained and confirmed, the guidelines for wellhead protection are outlined in the subsequent discussion.

ROLES AND RESPONSIBILITIES

To ensure long term success of a local wellhead protection program, it is necessary to identify individuals who will help develop and implement the program. This is generally accomplished by creating a local team and establishing the appropriate roles and responsibilities for each team member. A local wellhead protection team would ideally include a representative from each of the following:

- the water utility
- municipality
- local planning or zoning agency
- county or district health department
- neighboring municipality
- local fire department
- education
- business and industry
- agriculture
- environmental group
- general public

WELLHEAD PROTECTION AREA DELINEATION

A wellhead protection area delineation is not required for public water supply wells that have been shown to be "not vulnerable" through the sampling and analysis for tritium. In lieu of completing a wellhead protection area delineation, the local wellhead protection program may be implemented with the elements of the program applied to the area defined by a one-mile radius around a public water supply well or well field. In many instances the managed area may be reduced by completing a wellhead protection area delineation. Where a wellhead protection area delineation is completed, the delineation effort must comply with the wellhead protection area delineation guidelines established in the State of Michigan, Wellhead Protection Program to obtain approval. With approval of the wellhead protection area, the remaining activities discussed in subsequent sections are completed for the approved wellhead protection area.

CONTAMINANT SOURCE INVENTORY

A local wellhead protection program plan should include a detailed map and verified list of known existing sites and known potential sources of contamination. The program plan should identify a process for maintaining and updating this list on a regular basis. Information should be provided on the following:

- Part 201 of Act 451, Sites of Environmental Contamination (307 sites)
- Underground Storage Tanks (Part 213 of Act 451)
- Leaking Underground Storage Tanks (Part 211 of Act 451)
- Oil & Gas Contamination Sites (Act 61)
- Hazardous Waste Generators (Part 111 of Act 451)
- Groundwater Discharge Permits (Part 31 of Act 451)
- Landfills (Part 115 of Act 451)
- Federal National Priority List (Superfund)
- Oil and Gas Permit Locations

MANAGEMENT

Management of a local wellhead protection program in a low tritium community requires that an abandoned well program be implemented. The program should include a search for unplugged abandoned wells within a one-mile radius of the well field. The search should focus directly on known existing and known potential sites of environmental contamination as identified in the contaminant source inventory. Where such wells are identified, they should be properly sealed in accordance with the Groundwater Quality Control Act, Part 127 of Act 368, PA 1978, as amended and rules.

Records Search

Any search for abandoned wells should begin with a search of all available records. Information regarding location, completion, plugging, and abandonment of a well may be available through a number of sources:

Public Water Utility records - new connections information

Local Health Departments - well logs
Geological Survey Division - well logs
County tax records - addresses
Leasing agreements - land use information
Oil company records - maps, well logs
Well driller records - addresses, well logs, field notes

Assume wherever a building existed, a well existed.
Evaluate areas that have been annexed into the city or village.
Evaluate areas into which the public water supply has been extended.

Interviews with Local Residents

Conversations with local residents concerning past drilling activities may be coupled with other search methods to assist in locating abandoned wells. Property owners, "old timers," former oil field workers or well drillers may be able to provide information that is not available from any other source.

When conducting a survey of local residents, careful explanation of the reason for the search, as well as an indication of the importance of the information, is imperative. Without this knowledge and understanding, a local resident may not wish to divulge the information.

Surveys may be conducted by mail, telephone, or in person. Contacts with residents are often more productive if a person familiar with the general area conducts the interview. Several communities have had a good response with volunteers surveying their own neighborhoods.

Aerial Photograph Interpretation

Historical to present-day aerial photographs are available from many federal, state, and local agencies as well as from private companies.

Examination of aerial photographs taken over time or at selected time intervals may provide information on when water lines were extended into a neighborhood that previously had been served by on-site individual wells. These photographs can be used to supplement data obtained from a record search.

To assist in locating aerial photographs, the USGS National Cartographic Information Center (NCIC), 507 National Center, Reston, Virginia 22092, maintains a computerized listing of available aerial coverage for the entire United States. The NCIC can provide a listing of all the aerial photographs available for the geographic area contained within a USGS 7½ minute quadrangle map. They can be contacted at 703-860-6045.

Visual/Logical

Field location of abandoned wells can be accomplished by visually identifying the well or by identifying clues and equipment associated with well drilling activities. Some abandoned wells can be easily located, particularly if the casing still extends above the ground surface or if equipment associated with well drilling is still visible at the site.

However, if the casing has been cut off below ground, removed, or is located within the building structure, locating the well is much more difficult.

One feature common to all wells is the disturbance of the ground surface. Other evidence of abandoned wells includes old roads, pits, vegetation changes, or vegetation associated with former homesteads, windmills, and areas where roads have been widened or where demolition has occurred.

Metal Detectors

Metal detectors are a tool that can be used in intensive field searches to locate abandoned wells. Metal detectors detect shallow buried metallic objects and can be used to identify the actual location of metal casings or other metal objects associated with drilling and/or previous well construction activities.

A search with a metal detector is conducted by walking over the desired area and operating the equipment in a sweeping motion. The response of the metal detector will depend on the size, shape, orientation, composition and distance of the object. Metallic objects buried within 5 feet of the ground surface can usually be detected. The most effective way to conduct a search is to establish a grid pattern of the area. This provides a systematic approach to evaluating the area and helps to insure that no objects are overlooked. If an object is detected, it should be marked immediately with a nonmetal marker. This provides visualization of the distribution of metal objects in an area without interfering with the operation of the equipment.

Excavation

Excavation is the process of digging up or uncovering well casings or objects associated with well drilling activities. Excavation is usually the last step in locating an abandoned well that is not visible from the surface, and is used to verify findings by other search methods. Widespread excavation may be used where other search methods have proven unsuccessful.

CONTINGENCY PLAN

It is important that an effective contingency plan for water supply emergencies be in place. The wellhead protection program plan should identify personnel, testing equipment, procedures, and materials necessary for the fast and effective mitigation of an emergency that could impact the public water supply system. A contingency plan should also include response protocol and notification procedures.

NEW WELLS

Where water supply expansion, increases in water use, or susceptibility of existing wells (that have been determined to be vulnerable) to contamination may necessitate the future development of new production facilities, a mechanism for incorporating new wells into the local wellhead protection program should be provided.

Knowledge of the demands on the public water supply system, current capacity, and the community's projected growth are essential in determining the need for a new well(s).

Things to consider when making a decision with regard to planning for new wells includes:

- The location and capacity of all public water supply wells.
- How does current capacity compare to current use?
- Is community development and expansion expected?
- Do commercial or industrial facilities located in the community require more water?
- Can enhancement of the water supply system attract new business and industry to the community?
- Will the system have to be expanded to meet future demands?
- What contamination sources have been identified in the protected area?

If the need for further groundwater resource development and the construction of new wells is anticipated, a description of how the new wells will be incorporated into the local wellhead protection program should be provided.

PUBLIC EDUCATION AND PARTICIPATION

In order for a wellhead protection program to be effective, it is important to generate interest and initiate community support. Following are suggestions on ways to promote the local wellhead protection program in your community:

- Village/city/township meetings
- Planning board or commission meetings
- Newsletters
- Newspaper articles
- Presentation at schools or local organizations meetings focusing on the hazards of abandoned wells and the importance of properly sealing them
- Waste reduction strategies and frequent household hazardous waste collection days for residents of the community
- Wellhead protection ordinances or policies
- Wellhead protection information distributed in the monthly water bill
- Produce video tapes showing well abandonment/plugging procedure

The involvement of the public, both in development and implementation of a wellhead protection program, will improve the quality of the program and help ensure its success.