

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY**

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**INTEROFFICE COMMUNICATION**

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May 4, 2000

**TO:** District and Section Supervisors  
Waste Management Division

**FROM:** Jim Sygo, Chief  
Waste Management Division

**SUBJECT:** Groundwater Not In An Aquifer (GWNIAA) Staff Guidance

A Waste Management Division (WMD) technical committee was put together in October of 1999 with the goal of developing a guidance document that would enable WMD staff to cautiously, thoroughly, and consistently apply a decision process for determining whether groundwater at a site is in an aquifer or not. Attached to this memo is the GWNIAA Staff Guidance developed by that committee.

We have received some requests for GWNIAA determinations in the past and will see more of them in the future. The purpose of this guidance is to consistently apply a review approach throughout the Division. This guidance is a decision-making tool. Please make it available to your geological and other technical staff. The use of this guidance is encouraged, but not demanded. Other approaches of review can be considered on a site-specific basis, but then it is also recommended for technical staff to consult with the WMD, Remedial Action Team.

The Guidance is divided into six sections: Introduction, Definitions, Criteria, Information Requirements, Additional Considerations, and Conclusions. The Criteria section outlines two criteria that need to be met and what can be used to demonstrate compliance with those criteria. The Information Requirements section outlines what information should be included as part of the groundwater study (which is needed as part of the GWNIAA demonstration).

If you or any of your staff should have any questions, comments, or concerns about the GWNIAA Staff Guidance, please contact Ron Stone from WMD's Hazardous Waste Section, at 517-373-7141.

Attachment

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# WMD Staff Guidance for Determining Groundwater Not In An Aquifer

MDEQ-WMD

May 1, 2000

## INTRODUCTION

This document is guidance for the use of the Waste Management Division (WMD) staff, to consistently apply the requirements for a Groundwater Not In An Aquifer (GWNIAA) designation for siting criteria, pathway analysis, monitoring requirements, discharge authorizations, remediations, and other pertinent determinations under the following parts of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA): Part 31, Water Resources Protection; Part 111, Hazardous Waste Management; and Part 115, Solid Waste Management. This guidance describes the criteria that should be considered when evaluating whether groundwater encountered in a formation is or is not in an aquifer as well as information that should be used in applying those criteria.

The WMD reserves the right to utilize site-specific data in review of all cases, in order to decide the most appropriate determination for each site or formation. If it becomes necessary to remediate any media within the groundwater, hazardous waste, or solid waste programs of WMD, Part 201, Environmental Remediation, of the NREPA, is utilized. Part 201 requires all exposure routes and receptors at sites of environmental contamination to be evaluated based upon site conditions and characteristics. At a remediation site where it is determined that groundwater ingestion is not a relevant exposure pathway, it still will be necessary to evaluate all other transport mechanisms and exposure pathways that might result in unacceptable exposure. Monitoring of a saturated zone that is "GWNIAA" may still be necessary in relation to other pathways such as groundwater-surface water interface criteria (GSI) or indoor air inhalation.

This guidance does not apply to an area that has been determined by the Part 31 Groundwater Discharge Permit program to be a monitoring zone.

## DEFINITIONS

- **Aquifer:** A geological formation, group of formations, or part of a formation capable of yielding a significant amount of groundwater to wells or springs.
- **Crock Well:** A well traditionally constructed by excavating or boring a large diameter hole and placing vitrified clay tiles, pre-cast concrete pipe, or stone as casing or side walls to keep the excavation from collapsing.
- **Driven Well (or Stab/Point Well):** Consists of a well point (screen) that is attached to the bottom of the well casing and is pushed into the ground by hand or mechanical methods.
- **Formation:** a unique lithologic unit that can be mapped, but does not include a unit composed of material that has been physically or chemically altered, transformed, or used during a manufacturing process, such that they would impact the potable quality of the groundwater.
- **Groundwater:** Water below the land surface in a zone of saturation.
- **Monitoring Zone:** Area(s) beneath the subsurface where the hydrogeologic environment allows the movement of groundwater and potentially entrained contaminants and is capable of yielding a representative groundwater sample. A monitoring zone may or may not be naturally saturated and may be influenced by regulated surface activities.

- **Owner/Operator:** The person who owns the facility, or part of the facility, including the titleholder of the land on which the facility is located or the person responsible for the overall operation of the facility.
- **Geologist or qualified groundwater scientist:** A scientist or engineer who has received a baccalaureate or postgraduate degree in the natural sciences or engineering and who has sufficient training and experience in groundwater hydrology and related fields, as demonstrated by state registration, professional certification(s), or completion of accredited university programs, to make sound professional judgments regarding groundwater monitoring, geological conditions, contaminant fate and transport, and corrective action.
- **Staff Geologist:** the WMD geologist assigned to the project in question.
- **Venting:** the discharge of groundwater to surface water or the ground surface.

## CRITERIA

It is the responsibility of the owner/operator of a site to demonstrate that the groundwater beneath the site is GWNIAA and that the groundwater ingestion exposure pathway does not apply. Both of the following criteria must be met to make this demonstration:

1. The formation yields an insignificant amount of water below the site (considering local and regional hydrogeology). This criterion can be met by any one or a combination of the following:
  - a. All site monitoring wells installed in the formation bail or pump dry (at a maximum pumping rate of 0.1 gpm) and do not recharge to within 80 percent of the original well volumes within twenty-four (24) hours. Monitoring wells must be shown to have been installed properly and are presently in good operational condition and the screens must fully penetrate the saturated zone. The staff geologist, on a case-by-case basis, can approve different pumping and recharge rates.
  - b. The *in situ* hydraulic conductivity is to be based on a minimum of five (5) site-specific tests, each of which is less than  $1.0 \times 10^{-6}$  centimeters per second (cm/s). The test results are not to be averaged. Well locations must be approved in advance and cover the formation of concern across the site. The exact number of tests will depend on the size and complexity of the site and will need to be approved by the staff geologist. The staff geologist, on a case-by-case basis, can consider different hydraulic conductivity values for use.
  - c. A site pumping test<sup>1</sup>, designed appropriately to test the formation in question, yields less than 0.1 gallon per minute.
2. The groundwater in question is not in hydraulic communication with groundwater in an aquifer. This criterion can be met through any one or a combination of the following:
  - a. Sufficient knowledge is demonstrated concerning the regional geology supplemented with adequate site-specific information (boring/monitoring well logs, geophysical information, etc.) and is approved by the WMD.
  - b. A site pumping test<sup>1</sup> demonstrates that any water bearing seams of concern are isolated and are not in communication with an aquifer.
  - c. A demonstration that the groundwater is a totally discharging system and is venting to a surface water body (that is not locally recharging an aquifer) can be used to show that the formation in question does not connect to another aquifer laterally. This demonstration must also show that

all GSI criteria are/will be met or that a mixing zone evaluation by the Surface Water Quality Division has been accepted. This demonstration would only eliminate the horizontal concerns with connection to other aquifers. It would still need to be demonstrated that the unit (or the receiving surface water body) in question does not connect to another aquifer vertically. There are many areas along the larger river systems where shallow saturated units with significant quantities of groundwater discharge directly to the river. It would be difficult to comply with both criteria number 1 and number 2 under these conditions, but it may still be possible to eliminate the drinking water pathway.

## INFORMATION REQUIREMENTS

The demonstration that groundwater beneath a site is not in an aquifer, does not need to be monitored and, if applicable, that the groundwater ingestion exposure pathway does not apply, is made in a Groundwater/Hydrogeological Investigation (GI) Report and/or Remedial Action Plan (RAP). In order to make this demonstration the GI or RAP must address all of the applicable components identified below. The GI and/or RAP are subject to review and approval by the staff geologist (or other WMD staff), and additional information may be required to support a finding on the criteria described above.

1. Facility boring and well logs and all private water well logs within a minimum of ½ mile of the facility property boundaries. These should substantiate the continuity of the lower, competent confining layer.
2. At least two (2) scaled cross-sectional drawings, one down the centerline axis of the plume or contaminated area (or parallel to groundwater flow if there is no plume) and one perpendicular to this axis, showing topography, geology, groundwater, and other pertinent features.
3. Scaled isopach maps showing the thickness of the saturated zone and aquiclude/aquitard across the site.
4. A scaled site map showing all buried utility corridors and other subsurface structures, including wells or drainage tiles, that may act as contaminant migration routes or artificially lower the water table due to their depth or proximity to the groundwater. The depths of all such features should be identified and/or included on the cross-sections listed in point 2, above.
5. A summary of the regional geology and topography. Information to support a conclusion that the groundwater ingestion exposure pathway is not relevant should include a well-documented evaluation of site and regional characteristics.
6. A comparison of the formation groundwater elevations with the local aquifer groundwater elevations to sufficiently demonstrate the lack of hydraulic communication. These should also identify the groundwater flow direction at the site and indicate any seasonal variations.
7. Written response from the local health department indicating (1) whether they were contacted to make a determination whether crock wells or driven wells for any private water usage exist in the vicinity of the facility, (2) what that determination was, and (3) any concerns they may have regarding the site and/or the GWNIAA determination.
8. Written response from the Department of Environmental Quality (DEQ), Drinking Water and Radiological Protection Division (DWRPD) indicating whether they were contacted to determine if the facility is located in an approved Local Wellhead Protection Area (LWPA) and what that determination was (see [www.deq.state.mi.us/dwr/](http://www.deq.state.mi.us/dwr/)).

9. Any available groundwater quality analyses, including conditions upgradient, downgradient, and outside any area of on-site contamination.
10. Documentation of any other characteristics of the site that would assist in making this determination.

### **ADDITIONAL CONSIDERATIONS**

1. When conducting this review as part of a site remediation, some programs may use an evaluation of the relative risk with respect to toxicity, concentration, volume, mass, or quantity of the hazardous substance in determining whether the groundwater poses a threat to the environment or the public health and safety. The staff geologist may request this information as part of the review for a GWNIAA determination.
2. With Michigan's highly variable geology, this decision-making process is often a localized consideration. There are some formations around the state in which groundwater availability is limited, but which may still be used as a water source by the use of crock wells or driven wells. Some of these formations may be used as a drinking water source, while others may be used for other purposes (sprinklers, cooling, swimming pools, etc.). If the site is in an area served by crock wells or driven wells or if the area groundwater is used for drinking water or other purposes, the owner/operator must assess whether the water source(s) may be impacted by site activity and whether sampling such water supplies is warranted. The documentation required to support a determination that the groundwater is not in an aquifer at this type of site would also be more extensive. The assigned staff geologist may require additional information to help in the decision making process for areas of the state where crock or driven wells are used.
3. If the groundwater beneath a site is determined to be not in an aquifer, it may be necessary to place a deed notification or restriction on the property to allow the higher degree of contamination (if existing) to remain. The deed notification or restriction should alert any existing or future owner of the condition of the groundwater, that it has been determined to be unusable, and that it will not impact neighboring properties. The staff geologist and/or the WMD must approve the wording of any deed notification or restriction before it is filed. Proof of filing must be supplied to the WMD. On-site soils that are remediated to levels that do not consider the groundwater pathway must not be removed to a different site where groundwater may be vulnerable.
4. The Owner/Operator must contact the DEQ, DWRPD to determine if the site is located in an approved LWPA (see [www.deq.state.mi.us/dwr/](http://www.deq.state.mi.us/dwr/)). If the site is located in such an area, the need for adequate documentation, data collection and assessment is greatly increased, and comments will be required from the DWRPD before a final decision can be made.
5. Monitoring wells used in this evaluation must be properly constructed, developed, and maintained in accordance with WMD approved methods and approved for use by the staff geologist.
6. Site characteristics vary. Therefore, depending on the characteristics of the specific site, additional information could be submitted to, or requested by, the WMD or the staff geologist. The owner/operator should contact the staff geologist concerning site-specific issues.
7. The formation may be naturally saturated, seasonally saturated, or only saturated due to a regulated discharge. These possibilities should be considered by the owner/operator during their evaluation. The staff geologist must determine whether the formation is a monitoring zone before concluding their evaluation.

## CONCLUSIONS

This document is intended to assist the WMD staff to foster consistent application of the NREPA, Parts 31, 111, and 115, regarding designations of GWNIAA. This document is not intended to convey any rights to any parties, nor create any duties or responsibilities under law. This document and matters addressed herein are subject to revision.

Responsibility for periodic review and revisions to this document lies with the WMD, Hazardous Waste Program Section, Technical Support Unit.

<sup>1</sup> Pumping tests must be run by an individual qualified to conduct such tests. These tests must be run for sufficient time to determine if boundary conditions (e.g., impermeable boundaries, recharge from leaky confining layers) are encountered. Plotting the drawdown versus time graphs in the field during the pumping test is recommended as a means of determining when the pumping test can be terminated. Wells to be used (or plans for proposed wells) must be approved by the staff geologist, before the test is performed.