Office of Drinking Water & Municipal Assistance

Instructions & Worksheet for Completing the Noncommunity Groundwater Supply Source Water Assessments

Background

These instructions will provide guidance for local health department (LHD) staff to perform consistent source water assessments of Nontransient Noncommunity Water Supplies (NTNCWS) that obtain drinking water from groundwater sources. NTNCWS assessments were required by the Michigan Safe Drinking Water Act (SDWA), 1976 PA 399, to identify source areas that supply public tap water, inventory the contaminants and assess the source water susceptibility to contamination, and inform the public of the results. There is a need to continue to update assessments that have been completed, and to perform assessments on newly constructed groundwater wells. The assessments for new wells shall be performed after the well has received approval for use. The updates of the previously completed assessments should be performed on the same schedule as the sanitary survey of the water supply.

Source Water Assessment Score (SWAS)

The vulnerability of NTNCWS wells to contamination will be evaluated by determining a Source Water Assessment Score (SWAS). The SWAS has been created as a numeric system that assigns points for situations that represent a "perceived risk" based upon the evaluation of four criteria. A higher SWAS is equated to a greater perceived risk for the NTNCWS source water. The SWAS is the sum of a geologic sensitivity score ($SWAS_G$); a well construction score ($SWAS_W$); a score for chemistry and isotope data ($SWAS_C$); and isolation and control from sources of contamination score ($SWAS_S$).

Workflow

Tasks and those responsible for completing them are as follows:

- Provide Source Water Assessment (SWA) Worksheet – DEQ staff
- Review the Type II Provisional Delineation Areas on Environmental Mapper or GeoWebFace– LHD Staff
- Complete the SWA Worksheet for each source – LHD staff
- Email (preferred) or fax the SWA Worksheet to the DEQ – LHD Staff
- Determine the susceptibility of the NTNCWS to contaminants – DEQ staff
- Transmit the assessment to the NTNCWS & LHD – DEQ Staff
- File the assessment in the supply file – LHD staff

Office and Field Assessment

Information from well drilling records is critical to the SWAS. As part of SWAS, available well drilling records for NTNCWS wells will be reviewed by the LHD. The lack of information from a well record (or no well record) will increase the SWAS. The SWPA areas locations will need to be reviewed prior to the field assessment. If the LHD cannot locate the SWPA map or notices the water well is not in the correct location, they should not perform the SWA until the location is corrected in Wellogic and a new delineated SWPA is generated. Please contact the Wellogic Help at wellogic@michigan.gov to update the well location.

Source Water Protection Area

The Source Water Protection Area (SWPA) is that area contributing source water to public water supply wells in a 10 year time of travel. The size and shape of a SWPA depends on the characteristics of the aquifer, the well, and/or the watershed. It is within the SWPA that potential releases of contaminant could end up in the public water supply well. In Michigan, we no longer rely simply on isolations distances to determine the susceptibility to contamination. SWPA boundaries are delineated using DEQ's Michigan Groundwater Management Tool. The delineated maps are then used to determine a well's susceptibility to contamination from potential or known sources of contamination.

GEOLOGIC SENSITIVITY - SWASG

The $SWAS_G$ is factored into the SWAS based on the total thickness of Continuous Confining Material (CCM) such as clay or shale or the total thickness of Continuous Partially Confining Material (CPCM) such as a mixture of sand and clay or sandstone and shale found on the well drilling record. Beginning with a $SWAS_G$ of 30 points, (this represents a well lithology with an associated "high geologic sensitivity), 3 points are deducted for each 5 feet of CCM or 10 feet of CPCM. Where the amount of CCM and/or CPCM indicated on the well drilling record results in a deduction of more than 30 points, the $SWAS_G$ shall be assigned a score of zero (0). The total thickness of CCM and CPCM should be determined from the well drilling record for the NTNCWS well. The greater the amount of CCM or CPCM, the greater the geologic protection provided the NTNCWS well, the greater the number of points deducted, and the lower the resulting $SWAS_G$.

WELL CONSTRUCTION - SWASW

The design, physical condition, and operation of a NTNCWS well may allow the entrance of contaminants into the well despite a high level of intrinsic geologic protection. To account for this possibility, the SWAS is assigned points through the $SWAS_W$ based upon four criteria related to the construction and use of the NTNCWS wells. The $SWAS_W$ is assessed points based upon well grouting, the age of the well, the casing depth, and the pumping rate of the well.

Well Grouting - The well grouting criteria provides an evaluation of sealing of the annular space of a water well. Points are added to the $SWAS_W$ in accordance with the following:

0 pts – The well drilling record indicates the casing has been sealed from bottom to top in accordance with R 325.1634a, Construction of wells; **grouting rotary-bored and augered wells**, Rule 134a of Act 368.

5 pts – The well drilling record indicates the casing has been sealed to an unknown depth or to a depth of 25 feet, in accordance with R 325.1635, Construction of wells; grouting **driven casing wells**, Rule 135, of Act 368.

10 pts – The well drilling record indicates the well was grouted, but the date of construction precedes the 1994 revisions to Act 368, and available evidence suggests the well is not in compliance with current grouting requirements.

15 pts – The well drilling record indicates the well was not grouted, no well drilling record is available, or other information suggests the well was ineffectively grouted.

Well Age- The age of a well provides an overall indication of probable conformity to current code requirements for the construction of a well, and an indication of the probable integrity of the well due to deterioration of materials used in the construction of the well. The $SWAS_W$ is assessed a greater number of points as the age of the well increases in accordance with the following criteria:

0 pts – A well drilling record is available that indicates the well was constructed after the 1994 revisions Act 368, or a well drilling record is available that indicates the well was constructed in accordance with the 1994 requirements.

5 pts – A well drilling record is available that indicates the well was constructed prior to 1994 and after 1976, the year the state of Michigan, SDWA was adopted as the standard for the regulation of public water supply systems.

10 pts – A well drilling record is available that indicates the well was constructed prior to 1976 but after 1967, the year Act 368, was originally adopted as the standard for the construction of wells.

15 pts – A well drilling record is not available, the age of the well is unknown, or it is determined that the construction of the well precedes the 1967 inception of Act 368.

Casing Depth- The depth to which a well is cased is a factor in determining the amount of earth material available to provide for natural protection from of potential contaminants. The $SWAS_W$ is assessed a greater number of points as the casing depth is decreased in accordance with the following criteria:

0 pts – The well drilling record, or a physical determination of the casing depth, indicates the well is cased to a depth of 200 feet or greater.

5 pts – The well drilling record, or a physical determination of the casing depth, indicates the well is cased to a depth between 100 and 199 feet.

10 pts – The well drilling record, or a physical determination of the casing depth, indicates the well is cased to a depth between 25 and 99 feet.

15 pts – The well drilling record, or a physical determination of the casing depth, indicates the well is cased less than 25 feet, the casing terminates below grade, or the casing depth is not known.

Pumping Rate - The pumping rate has considerable impact on the "cone of depression" and "area of influence" of a well. The area of influence is greater at higher pumping rates, thereby, increasing the potential for contamination of a NTNCWS well. Accordingly, the $SWAS_W$ is assessed additional points based upon the following criteria for the pumping rate of the permanent pump:

0 pts – The well drilling record, or a physical determination of the pumping rate of the permanent pump, indicates the well is pumped at a rate of 20 gpm or less.

5 pts – The well drilling record, or a physical determination of the pumping rate of the permanent pump, indicates the well is pumped at a rate of 21 to 50 gpm.

10 pts – The well drilling record, or a physical determination of the pumping rate of the permanent pump, indicates the well is pumped at a rate of 51 to 100 gpm.

15 pts – The well drilling record, or a physical determination of the pumping rate of the permanent pump, indicates the well is pumped at a rate greater than 100 gpm.

WATER CHEMISTRY DATA - $SWAS_C$

Water chemistry data provides a refinement to the SWAS through the $SWAS_C$, which may increase or decrease the SWAS. As examples, the presence of nitrates and nitrites, organic chemicals (volatile organic and synthetic organic), and inorganic chemicals (arsenic, cyanide, metals) are indicators of source water vulnerability and increase the SWAS. Review the most recent chemical monitoring records or more if appropriate.

Water chemistry data concentrations (including naturally occurring) in the well water shall result in the assignment of points to the $SWAS_C$ in accordance with the following:

0 pts – Not detected in the well water**.**

10 pts – Detected in the well water at a concentration that is less than one-half the MCL.

20 pts – Detected in the well water at a concentration that is less than the drinking water standard, but the concentration is one-half or more than one-half the MCL.

50 pts – Detected in the well water at a concentration that exceeds the MCL.

ISOLATION FROM SOURCES OF CONTAMINATION AND ISOLATION FROM STANDARD AND MAJOR SOURCES - $SWAS_S$

This evaluation occurs onsite. The isolation of a NTNCWS well from sources of contamination is an important criterion in the source water assessment. The maintenance and control of isolation distances can significantly reduce the risk associated with the use of a well. "Standard" sources of contamination include storm and sanitary sewers, septic tanks, drainfields, barnyards, or any surface water. "Major" sources of contamination include large scale waste disposal sites, land application of sanitary wastewater or sludges, sanitary landfills, and chemical or waste chemical storage or disposal facilities.

The $SWAS_S$ is assessed points for failure to have adequate isolation between "potential" sources of contamination and "known" sources of contamination. "Known" sources of contamination include sources where the groundwater has been impacted such as leaking underground storage tank or other sites of environmental contamination. Both Type IIB and IIA are assessed using the same isolation areas. The $SWAS_S$ is assessed points based upon isolation as follows:

10 pts – For each "potential" standard source of contamination within the standard isolation area (75 feet).

10 pts – For each "potential" major source of contamination outside the standard isolation area (75 feet) and within the SWPA.

20 pts – For each "potential" major source of potential contamination within the standard isolation area (75 feet).

25 pts – For each "known" source of contamination located within the SWPA.

A list of resources to view potential sources of contamination is available on the well construction program website at www.michigan.gov/deqwaterwellconstruction.

Completed SWA Worksheets
Completed SWA Worksheets can be emailed to deq-eh@michigan.gov (preferred) or faxed to Wayne Kukuk at 517-241-1328.

Request for Payment
The DEQ will reimburse the LHD for each SWA completed. See the LHD contract regarding number of systems that can be reimbursed each Fiscal Year. LHDs will be reimbursed on a quarterly basis.

Questions
Please contact Wayne Kukuk at kukukw@michigan.gov or 517-284-6517 or Jason Berndt at berndtj1@michigan.gov or 989-705-3420 if you have any questions.

DEQ

Noncommunity Groundwater Supply
Source Water Assessment Worksheet

Data collection to complete the source water assessment worksheet is an extension of the Sanitary Survey conducted as part of the Noncommunity Public Water Supply Program. Please complete the following as appropriate. Email completed SWA Worksheets to deq-eh@michigan.gov (preferred) or fax to Wayne Kukuk at 517-241-1328.

System Name:	**WSSN:**	**Source ID:**
Assessed By:	**Assessment Date:**	

GEOLOGIC SENSITIVITY - $SWAS_G$

CCM Table: Use the attached Geologic Sensitivity Table

CCM (feet)	0 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 45	45 to 49	50 or greater	**CCM Pts. Deducted**
Pts. Deducted	0	3	6	9	12	15	18	21	24	27	30	

CPCM Table: Use the attached Geologic Sensitivity Table

CPCM (feet)	0 to 9	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80 to 89	90 to 99	100 or greater	**CPCM Pts. Deducted**
Pts. Deducted	0	3	6	9	12	15	18	21	24	27	30	

30 Points - CCM points - CPCM points = **$SWAS_G$**	

WELL CONSTRUCTION, MAINTENANCE AND USE - $SWAS_W$

Well Grouting

Casing sealed entire length in accordance w/ 1994 Revisions	**Casing sealed by driven casing method - 1994 Revisions**	**Casing sealed in accordance with 1967 code**	**Casing not sealed or status unknown**	**Enter Points Below**
0 pts.	5 pts.	10 pts.	15 pts.	

Well Age

Constructed 1994 or after	**Constructed 1976 - 1993**	**Constructed 1967 – 1975**	**Constructed Before 1967**	**Enter Points Below**
0 pts.	5 pts.	10 pts.	15 pts.	

Casing Depth

Well cased 200 feet or greater	**Well cased from 100 - 199 feet**	**Well cased from 25 - 99 feet**	**Well cased <25 feet or not known**	**Enter Points Below**
0 pts.	5 pts.	10 pts.	15 pts.	

Pumping Rate

20 gpm or less	21 - 50 gpm	51 - 100 gpm	Greater than 100 gpm	Enter Points Below
0 pts.	5 pts.	10 pts.	15 pts.	

Sum of pts. from well construction, maintenance, and use - **$SWAS_W$**	

WATER CHEMISTRY AND ISOTOPE DATA - $SWAS_C$

Regulated Contaminants	Not Detected	Detected to < ½ MCL	Detected ½ MCL to MCL	Detected Exceeds MCL	Enter Points Below
	0 points	10 points	20 points	50 points	
Nitrates and Nitrites					
VOC's					
SOC's and Pesticides					
Inorganics (arsenic, cyanide, metals)					

Sum of pts. from parameters - **$SWAS_C$**	

ISOLATION FROM SOURCES OF CONTAMINATION - $SWAS_S$

"Potential" Major Sources of Contamination within the SWPA

Source of Contamination	Number of Sources	Distance From Well (feet)	
Large Scale Waste Disposal			
Land Application of Sanitary Wastewater or Sludge			
Animal Waste Lagoon or Manure Storage			
Landfill			
Bulk Chemical or Chemical Waste Storage			
Fuel Storage Tank			
Other			Enter Points Below
Number of Major Sources >=75 feet and within the SWPA		**X 10**	

"Potential" Major Sources of Contamination within 75 feet

Number of Major Sources within 75 feet		**X 20**	

"Potential" Standard Sources of Contamination within 75 feet

Source of Contamination	**Number of Sources**	**Distance From Well (feet)**	
Septic Tank or Drainfield or Dry Well			
Sewage Pump Chamber			
Storm or Sanitary Sewer			
Pipeline			
Animal Yard			
Surface Water			
Other			**Enter Points Below**
Number of Standard Sources within 75 feet		**x 10**	

"Known" Sources of Contamination within the SWPA

Source of Contamination	**Number Of Sources**	**Distance From Well (feet)**	
Part 201 Sites of Environmental Contamination			
Part 213 Leaking Underground Storage Tanks			**Enter Points Below**
Number of Known Sources within the SWPA		**x 25**	

Sum of pts. from sources of contamination – **$SWAS_S$**	
$SWAS_G + SWAS_W + SWAS_C + SWAS_S =$	

Comments:

GEOLOGIC SENSITIVITY ($SWAS_G$) TABLE

DESCRIPTION (PRIMARY MATERIAL)	ASSESSMENT CLASS
CLAY	CM
CLAY & BOULDERS	CM
CLAY & COBBLES	CM
CLAY & GRAVEL	PCM
CLAY & SAND	PCM
CLAY & SILT	PCM
CLAY & STONES	PCM
CLAY GRAVEL SAND	PCM
CLAY GRAVEL SILT	PCM
CLAY GRAVEL STONES	PCM
CLAY SAND GRAVEL	PCM
CLAY SAND SILT	PCM
CLAY SILT GRAVEL	PCM
CLAY SILT SAND	PCM
COAL	PCM
DOLOMITE & SHALE	PCM
GRAVEL & CLAY	PCM
GYPSUM	PCM
HARDPAN	CM
LIMESTONE & SHALE	PCM
SAND & CLAY	PCM
SHALE	CM
SHALE & COAL	PCM
SHALE & LIMESTONE	PCM
SILT & CLAY	PCM
SLATE	CM
SOAPSTONE (TALC)	PCM

Confining Material = CM
3 points deducted for each 5 feet

Partially Confining Material = PCM
3 points deducted for each 10 feet

Note: Greater than 30 points deduction results in a $SWAS_G$ score of 0.