

## APPENDIX F

# Community Ground Water Supply Source Water Assessment Worksheet

4-3-01

Data collection to complete the source water assessment worksheet is an extension of the Sanitary Survey conducted as part of the Community Public Water Supply Program. Please complete the following as appropriate.

Name of Supply: \_\_\_\_\_ WSSN: \_\_\_\_\_

Address: \_\_\_\_\_ County: \_\_\_\_\_

Well No.(s): \_\_\_\_\_ Approved Standard Isolation Area: \_\_\_\_\_ Feet

Well Location(s): \_\_\_\_\_ Source Code(s) \_\_\_\_\_

Well Drilling Record Available

Yes  No

Well Drilling Record Entered in WELLOGIC

Yes  No (If No, attach copy)

If Well Drilling Record Entered in WELLOGIC

WELLOGIC # \_\_\_\_\_,

GPS Location Obtained for Well(s)

Yes  No

### Geologic Sensitivity - SWAS<sub>G</sub>

Geologic sensitivity is determined based upon the total thickness of Continuous Confining Material (CCM) or Continuous Partially Confining Material (CPCM). Beginning with a SWAS<sub>G</sub> of 30 points, 3 points are deducted for each 5 feet of CCM or 10 feet of CPCM. The CCM must be reported on the well drilling record as 5 feet of continuous material and the CPCM 10 feet of continuous material to provide for a deduction. The summing of CCM layers thinner than 5 feet or CPCM layers thinner than 10 feet is not allowed. Where the point deduction exceeds 30 points, the SWAS<sub>G</sub> shall be assigned zero (0) points.

#### ***CCM Table: Utilize where well drilling record reports just "clay" or "shale"***

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: Utilize where well drilling record reports mixture of "clay/sand" or "shale/sandstone"***

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 minus the CCM pts. deducted and the CPCM pts. Deducted - **SWAS<sub>G</sub>**

### Well Construction, Maintenance and Use - $SWAS_w$

This portion of the source water assessment score provides an evaluation of the well(s) relative to the grouting, age, casing depth, and pumping rate.

#### 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 after 1994	Constructed 1976 - 1994	Constructed 1967 - 1976	Constructed Pre-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

100 gpm or less	101 - 500 gpm	501 - 1,000 gpm	Greater than 1,000 gpm	Enter Points Below
0 pts.	5 pts.	10 pts.	15 pts.	

Sum of pts. from grouting, age, casing depth, and pumping rate - $SWAS_w$	
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### Water Chemistry and Isotope Data - $SWAS_c$

This portion of the source water assessment score provides an evaluation of the well(s) relative to the presence of nitrates and nitrites, VOC's, SOC's, inorganic chemicals, radionuclides, and tritium.

Regulated Contaminants	Not Detected	Detected to < 1/2 MCL	Detected 1/2 MCL to MCL	Detected Exceeds MCL	Enter Points Below
<i>Note sample date(s)</i>	0 points	10 points	20 points	50 points	
<b>Nitrates and Nitrites</b>					
<b>VOC's</b>					
<b>SOC's and Pesticides</b>					
<b>Inorganics except Fluoride</b>					
<b>Radionuclides</b>					

#### Tritium Results

No Test	Tritium @ < 1 TU	Tritium @ > 10 TU	Enter Points Below
0 pts.	-30 pts.	30 pts.	

Sum of pts. from nitrate/nitrite, VOC's, SOV's, inorganic chemicals, radionuclides, and tritium result (cannot be less than 0) - $SWAS_c$	
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**Isolation from Sources of Contamination - SWAS<sub>s</sub>**

This portion of the source water assessment score provides an evaluation of the CPWS relative to the wells isolation from “major” and “standard” sources of contamination. Sources of contamination are also evaluated dependent upon whether they are “potential” or “known” sources of contamination.

***“Potential” Major Sources of Contamination from 200 feet to 2000 feet***

Source of Contamination	Number of Sources	Distance From Well (feet)	
Large Scale Waste Disposal			
Land Application of Sanitary Wastewater or Sludge			
Landfill			
Bulk Chemical or Chemical Waste Storage Sites			
Underground Storage Tank Sites			
Other – Describe			Enter Points Below
<b>Number of Major Sources from 200 ft. to 2000 ft.</b>		<b>X 10</b>	

***“Potential” Major Sources of Contamination within 200 feet***

<b>Number of Major Sources within 200 feet</b>		<b>X 20</b>	
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***“Potential” Standard Sources of Contamination within 200 feet***

Source of Contamination	Number of Sources	Distance From Well (feet)	
Storm or Sanitary Sewers			
Pipe Lines			
Septic Tank or Septic Drain Field			
Cesspools, Seepage Pits, or Dry Wells			
Parking Lots/Roads			
Surface Water			
Other			Enter Points Below
<b>Number of Standard Sources within 200 feet</b>		<b>x 10</b>	

***“Known” Sources of Contamination within 2,000 feet***

Source of Contamination	Number Of Sources	Distance From Well (feet)	
Act 201 Sites (formerly 307 sites)			
Superfund Sites			
Leaking Underground Storage Tank Sites			Enter Points Below
<b>Number of Known Sources within 2000 feet</b>		<b>x 25</b>	

***Control of Standard Isolation Area***

Own/Lease Entire Area	Own/Lease >1/2 Area	Own/Lease <1/2 Area	Enter Points Below
0 pts.	10 pts.	20 pts.	

<b>Sum of pts. From control and sources of contamination – SWAS<sub>s</sub></b>	
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**Source Water Assessment Score - SWAS**

Sum of $SWAS_G$ , $SWAS_W$ , $SWAS_C$ and $SWAS_S$ = <b>SWAS</b>	
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**Data Sources**

Comments:

Sketch or Attach Map of Source Water Area(s):

**Water Supply Contact:** \_\_\_\_\_

**Title** \_\_\_\_\_ **Telephone No.** \_\_\_\_\_

**Assessment Completed by** \_\_\_\_\_ **Date** \_\_\_\_\_

**APPENDIX G**

<b>COMMUNITY, PUBLIC WATER SUPPLY SOURCE WATER ASSESSMENT REPORT FOR</b>	
<b>City of Bessemer-Black River Well Field 1</b>	<b>00660</b>

<p><b>What is SWAS?</b> - The Source Water Assessment Score (SWAS) is a process that factors geologic and water well attributes, water chemistry, and potential contaminant sources for each drinking water source into a ranking system to determine the relative potential for contamination. Sources with low scores are considered to be less susceptible to contamination than those with high scores. This assessment is required by the Michigan Source Water Assessment Program under the provisions of the 1996 amendments to the Federal Safe Drinking Water Act.</p>	<p>WSSN: 00660      Well No. 1</p> <p>County: GOGEBIC</p> <p><b>Administrative Contact</b>                  Name: CHATEL, TOM                  Address: 411 South Sophie Street</p> <p>City: BESSEMER      State: MI      Zip: 49911</p>
<p><b>Well Log and Location</b> - A well log is a legal document describing the well location, construction, depth, soil formations penetrated, and capacity. It has been required to be completed by the drilling contractors and copies submitted to the owner, local health department and State since 1967. The lack of information from a well log will increase the SWAS. If no well log was available for this assessment, the SWAS may be higher than if one were available. Wellogic is an electronic database for well logs.</p>	<p>Wellogic ID Number: 270000000344</p>
<p><b>Geologic Sensitivity</b> - This score represents the degree of natural protection afforded by the materials overlying the water-bearing formation. Lower scores indicate more protection. Points are deducted based on the thickness and type of geologic material that overlies the source of water. Surface contaminants migrate downward at varying rates dependent on geologic material and thickness. CCM stands for continuous confining material (eg. clay). CPCPM indicates continuous partially confining material (eg. mixture of sand and clay). More points are deducted for a thick clay layer than a thick sand layer, or a thinner clay layer. Point Range 0-30.</p>	<p><b>Geologic Sensitivity – SWAS (G)</b></p> <p>CCM Pts. Deducted:      0                  CPCPM Pts. Deducted:      30</p> <p>Total SWAS(G) Points:      0</p> <p><b>Geologic Sensitivity Rating – Low</b></p>
<p><b>Well Construction</b> - Points are added when a well lacks features that help protect the water supply from contamination. These include whether the well was grouted (sealing the annulus that is created between the casing and the soil formations during construction); the well age, how deep the casing extends into the ground, and how much water the well pumps since larger volumes can pull contaminants from greater distances. Point Range 0-15 (each category) Lower scores indicate better well construction. Susceptibility increases one level if well construction reflects an adverse condition.</p>	<p><b>Well Construction</b></p> <p>Well Grouting Points:      0                  Well Age Points:      0                  Casing Depth Points      5                  Pumping Rate:      5</p> <p>Total SWAS(W) Points:      10</p>

**APPENDIX G**

**SOURCE WATER ASSESSMENT REPORT for WSSN 00660 (Continued)**

<p><b>Water Chemistry and Isotope Data</b> – Points are added if water sample results indicate detectable levels of nitrates or nitrites, volatile organic chemicals (solvents, fuel components), synthetic organic chemicals (pesticides or herbicides), inorganics (metals) or radionuclides. Tritium monitoring is included as a voluntary means of age dating the water. Generally, the older the water the more protected the source. Point Range 0-50 (each category). <b>Susceptibility is very high if contaminants exceeds the Maximum Contaminant Level (MCL).</b> The MCL used for arsenic and radionuclide scores were those in effect prior to May 2003.</p>	<p><b>Water Chemistry and Isotope Data – SWAS(C)</b></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Nitrate and Nitrites</td> <td style="width: 10%; text-align: right;">0</td> <td style="width: 30%;">Socs:</td> <td style="width: 10%; text-align: right;">0</td> </tr> <tr> <td>VOCs:</td> <td style="text-align: right;">0</td> <td>Inorganics:</td> <td style="text-align: right;">10</td> </tr> <tr> <td>Tritium Results:</td> <td style="text-align: right;">0</td> <td>Radionuclides:</td> <td style="text-align: right;">0</td> </tr> <tr> <td colspan="2"><b>Total SWAS(C) Points:</b></td> <td colspan="2" style="text-align: right;"><b>10</b></td> </tr> </table>	Nitrate and Nitrites	0	Socs:	0	VOCs:	0	Inorganics:	10	Tritium Results:	0	Radionuclides:	0	<b>Total SWAS(C) Points:</b>		<b>10</b>													
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VOCs:	0	Inorganics:	10																										
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<b>Total SWAS(C) Points:</b>		<b>10</b>																											
<p><b>Isolation From Sources of Contamination</b> – Points are added based on the number and type of potential contaminant sources within the isolation distance (200 feet from standard or 2000 feet from major contaminant sources). For delineated wells, the delineated area is substituted for the 2000 foot radius. Examples of the 200 foot distance are septic tanks, sewer lines, storm sewers, etc. The 2000 foot distance is for chemical waste or storage such as fuel tanks, landfills, lagoons, or known plumes of groundwater contamination. Point Range – indefinite. <b>Susceptibility increases an additional level if there is a major source within 200' or a known source within 2000'.</b> Points are also added if the water supplier does not own or control the approved standard isolation area.</p>	<p><b>Isolation from Contamination – SWAS (S)</b></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">Major sources from 200 to 2000 feet:</td> <td style="width: 10%; text-align: right;">1</td> <td style="width: 10%; text-align: right;">x 10 =</td> <td style="width: 20%; text-align: right;">10</td> </tr> <tr> <td>Major sources within 200 feet:</td> <td style="text-align: right;">0</td> <td style="text-align: right;">x 20 =</td> <td style="text-align: right;">0</td> </tr> <tr> <td>Standard sources within 200 feet:</td> <td style="text-align: right;">0</td> <td style="text-align: right;">x 10 =</td> <td style="text-align: right;">0</td> </tr> <tr> <td>Known sources within 2000 feet:</td> <td style="text-align: right;">0</td> <td style="text-align: right;">x 25 =</td> <td style="text-align: right;">0</td> </tr> <tr> <td>Control of Isolation</td> <td style="text-align: right;">0</td> <td colspan="2"></td> </tr> <tr> <td>Delineated Area</td> <td style="text-align: right;">Y</td> <td colspan="2"></td> </tr> <tr> <td colspan="2"><b>Sum of points from sources of contamination:</b></td> <td colspan="2" style="text-align: right;"><b>10</b></td> </tr> </table>	Major sources from 200 to 2000 feet:	1	x 10 =	10	Major sources within 200 feet:	0	x 20 =	0	Standard sources within 200 feet:	0	x 10 =	0	Known sources within 2000 feet:	0	x 25 =	0	Control of Isolation	0			Delineated Area	Y			<b>Sum of points from sources of contamination:</b>		<b>10</b>	
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<b>Sum of points from sources of contamination:</b>		<b>10</b>																											
<p><b>Source Water Assessment Score</b> – The total SWAS factored with the Geologic Sensitivity are used to determine the overall Susceptibility.</p>	<p><b>Source Water Assessment Score – SWAS</b></p> <p><b>SWAS(G)+SWAS(W)+SWAS(C)+ SWAS(S)=SWAS</b></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%; text-align: right;">0</td> <td style="width: 20%; text-align: right;">10</td> <td style="width: 20%; text-align: right;">10</td> <td style="width: 20%; text-align: right;">10</td> <td style="width: 20%; text-align: right;">30</td> </tr> </table>	0	10	10	10	30																							
0	10	10	10	30																									
<p><b>Susceptibility Determination</b> –Susceptibility is a means to identify the relative potential of contamination for public water supply sources.</p> <p>The Michigan SWAP evaluated 2442 community groundwater sources and determined susceptibility to be <b>Very Low</b> for 1.6%, <b>Low</b> for 16.2%, <b>Moderately Low</b> for 34.5%, <b>Moderate</b> for 26.9%, <b>Moderately High</b> for 15.3%, <b>High</b> for 4.8%, and <b>Very High</b> for .7%.</p>	<p><b>Susceptibility Determination</b></p> <p>Based on the above compilation of source geology, well construction, water chemistry and potential contaminant sources for this public source of drinking water, this assessment determines its:</p> <p><b>Susceptibility is <u>Low</u></b></p>																												



JENNIFER M. GRANHOLM  
GOVERNOR

STATE OF MICHIGAN  
DEPARTMENT OF ENVIRONMENTAL QUALITY  
UPPER PENINSULA DISTRICT OFFICE



STEVEN E. CHESTER  
DIRECTOR

March 22, 2004

Mayor and Council  
411 South Sophie Street  
Bessemer, MI 49911

ATTN: Mr. Tom Chatel  
Acting City Manager

Dear Mr. Chatel:

Subject: Source Water Assessment

Enclosed are source water assessment reports completed by the Department of Environmental Quality (DEQ) for each active well providing source water to your community water supply.

The 1996 amendments to the federal Safe Drinking Water Act (SDWA) require each state to develop and implement a source water assessment program (SWAP) to assess the susceptibility of all public water supply sources to contamination. The Michigan SWAP was developed through an advisory committee, approved by the U. S. Environmental Protection Agency in October 1999 and is currently being implemented. This program requires the DEQ to analyze source sensitivity (natural protection available), delineate source water areas, inventory contaminant sources, determine susceptibility, and assure the public is notified of this determination. Enclosed for your reference is a brochure which further explains the Michigan SWAP.

Community ground water supplies which do not have an approved Wellhead Protection Program (WHPP) were assessed using a numerical scoring procedure which provided a Source Water Assessment Score (SWAS) for each well. The SWAS is composed of four parts; geology or SWAS(G), well construction or SWAS(W), chemistry or SWAS(C), and source isolation or SWAS(S) for each public water supply well. DEQ staff completed worksheets with data obtained from the DEQ files and on-site observations which scored these 4 categories and respective subcategories. The basis for scoring each category is noted in the left column of the report with the respective scores for each category or sub-category in the right column.

Your water supply's susceptibility determination noted in the lower right corner on the second page of the report is based primarily on geologic sensitivity, water chemistry, and contaminant sources. If a well record was not available, the source was considered highly sensitive due to the lack of geologic information. Failure of source water to meet chemical Maximum Contaminant Levels (MCL) caused an increase of susceptibility as did the location of a potential major contaminant source with 200 feet of a well or known

contamination source within 2000 feet of the well. Please note the contaminant specific MCL used for this assessment were those in effect prior to May 2003. This assessment did not utilize the future arsenic and radionuclide drinking water standards.

The public notification provisions of the SDWA require communities to inform the public of the state's susceptibility determination and announce the availability in its next Consumer Confidence Report (CCR). You may utilize language which includes the susceptibility determination and where this assessment letter and report is available to satisfy the CCR requirement. We also suggest you use this opportunity to inform your customers of wellhead protection activities if your community is pursuing approval of a wellhead protection program (WHPP).

We encourage all community water supplies to pursue wellhead protection to safeguard this valuable drinking water resource. Please contact Chuck Thomas, Ground Water Engineer, Water Division, DEQ Upper Peninsula District Office at 906-346-8534, Scott Ross, Wellhead Protection Unit Chief, Water Division, DEQ Lansing at 517-335-3385, or Kelly Hon, Michigan Rural Water Association at 989-539-4111, if assistance is desired in implementing your wellhead protection program.

Thank you for your commitment to protect your water supply's source water. We hope this assessment serves as a tool to safeguard this valuable drinking water resource.

Sincerely,

Douglas B. Pascoe, P.E.  
District Engineer  
Water Division  
906-346-8531

CT:DP:DN

Enclosure

cc/encl: Mr. Dennis Gustafson, Superintendent of Water  
Mr. John Cox, Western U.P. District Health Dept., Bessemer

## Appendix H

### Letter to Wellhead Protection Communities

Dear Mr. Letter:

SUBJECT: Source Water Assessment

Thank you for all of your efforts in working with the Department of Environmental Quality (DEQ) for the city of Example's Wellhead Protection Program (WHPP). Your voluntary commitment to protect the source water for the city of Example water supply by an approved WHPP is very encouraging.

The 1996 amendments to the federal Safe Drinking Water Act (SDWA) require each state to develop and implement a Source Water Assessment Program (SWAP) to assess the susceptibility of all public water supply sources to contamination. The Michigan SWAP was developed through an advisory committee, approved by the U. S. Environmental Protection Agency in October 1999, and is currently being implemented. This program requires the DEQ to analyze source sensitivity (natural protection available), delineate source water areas, inventory contaminant sources, determine susceptibility, and assure the public is notified of this determination. The assessments consist of a "geologic sensitivity" analysis and an overall source water "susceptibility" determination. The geologic sensitivity is inherent to the aquifer from which the production wells obtain groundwater. Susceptibility is determined in large part by the number and type of contamination sources within the wellhead protection area (WHPA), with additional consideration to aspects of well construction and the chemical monitoring history of individual production wells. Enclosed for your reference is a brochure that further explains the Michigan SWAP.

Since the city of Example has already addressed many of the SWAP requirements, the DEQ utilized this information to complete a source water assessment of your water supply. The following paragraphs summarize information from your WHPP for the geologic sensitivity of your wells and contaminant source inventory within the delineated source water areas.

#### Sensitivity

*Individual supply's Sensitivity is shown here.*

#### Contaminant Source Inventory

*Individual supply's Contaminant Source Inventory is shown here.*

Wells PW-1, PW-3, and PW-5 have "high" susceptibility based on the above mentioned geologic sensitivity analysis, listed potential contaminant sources within the WHPA, and on the following:

- No Maximum Contaminate Level (MCL) violations have occurred.
- The well construction meets standards.
- There are no potential contamination sources within the standard isolation area.
- Your community has an active WHPP that supports management of existing or potential sources of contamination in the WHPA.
- Known sources of contamination within the WHPA are being remediated to prevent movement of contamination to the municipal wells.

We are asking the city of Example, the DEQ's Field Operation Section staff, and the Local Health Department to consider these issues and respond within 30 days if there are concerns that may change the susceptibility determination and affect the ability of the city of Example's production wells to meet existing drinking water standards now or in the future. You may respond to me at the telephone number below or e-mail [brogrenb@michigan.gov](mailto:brogrenb@michigan.gov).

Mr. Example Letter

Page 2

Date

If there are no responses after 30 days, the source water assessment for the city of Example will be considered complete.

Public notification provisions of the SDWA require communities to inform the public of the state's susceptibility determination and announce the availability of the source water assessment in its next Consumer Confidence Report (CCR). We suggest that the city of Example also use this opportunity to inform the public of your efforts in your local WHPP.

We encourage the city of Example to continue WHPP activities to safeguard this valuable drinking water resource. DEQ staff or the Wellhead Protection Specialist for Michigan Rural Water Association may aid in support implementation of your WHPP. Please contact Mr. Scott Ross, Chief, Wellhead Protection Unit, Groundwater Section, Water Division, DEQ, at 517-335-3385 or Ms. Kelly Hon of the Michigan Rural Water Association at 989-539-4111, if you want assistance to support your program.

Thank you for your commitment to protect the city of Example's source water.

Sincerely,

Bradley B. Brogren, P.E.  
Program Manager  
MDEQ Affiliate Center  
Michigan Public Health Institute  
517-241-1361

BBB:ckp

Enclosure

cc: Mr. Example Letter, Water Superintendent, City of Example  
Ms. Kelly Hon, Michigan Rural Water Association  
Local Health Department, Example County  
Mr. Scott Ross, DEQ  
Example District Office, DEQ