

Technical Manual to the Upper Peninsula Environmental Health Code of Marquette County



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Technical Manual to the Upper Peninsula Environmental Health Code

Introduction

The Upper Peninsula Environmental Health Code was adopted by Marquette County to promote public health, safety, and welfare of the people of the Upper Peninsula of Michigan. Within the Code are the specifications for construction of sewage and water supply systems, along with other requirements encompassing environmental health. Due to the dynamic and complex nature of on-site sewage and water systems governed by the Code, a technical manual is referred to in several sections and is necessary for detailed technical guidance. This Technical Guidance Manual has been prepared to provide guidelines, specifications, and standard practices under the authority of Section 1-12 of the Upper Peninsula Environmental Health Code. Each topic of this technical manual is provided with a reference to the associated section of the Upper Peninsula Environmental Health Code of Marquette County.

Licensure - Section 3-2

1. Applicant shall complete a written exam proctored by an environmental health representative of the local health department.
2. The exam may be taken at any of the local health department jurisdictions.
3. Upon satisfactory completion of the exam, the results will be reviewed and incorrect answers discussed with the applicant.
4. A passing score is 70%. A retest can be scheduled at contractor's discretion.
5. A separate license will be required for each local health department.
6. The license will be valid for three (3) years, starting with the calendar year in which the license is first issued. The license shall expire on December 31.

100-Year Flood Plain Restrictions - Section 3-14.1.A.6

This section of the code states:

“The site of the proposed system shall not be located in a floodplain of 100 years or less, or in an area subject to seasonal flooding, runoff, or ponding of surface waters. It shall be the property owner’s responsibility to document the 100-year flood plain as recognized by the Michigan Department of the Environment Great Lakes and Energy (EGLE), or appropriate agency, at the request of the department.”

Flood plain delineation is currently the responsibility of the Michigan Department of the Environment Great Lakes and Energy (EGLE), and is subject to change. Flood plain information can be obtained by contacting the appropriate State agency. Requests to EGLE regarding flood plain delineation and boundaries are made through the MiWaters app available at the EGLE MiWaters website.

When an Environmental Health Specialist (EHS) becomes aware of a concern regarding flood plain during a site evaluation, the applicant shall be instructed to coordinate with EGLE through MiWaters to obtain the requested flood plain information. It shall be the applicant’s responsibility to provide the current EGLE flood plain information for the parcel to the department prior to permit issuance.

In some instances, the permit applicant may be unwilling to wait for a response from EGLE through MiWaters due to undesired project delays. In these instances, the permit applicant should be offered the option to contract with a third party engineer to delineate the 100-year flood plain boundary at the expense of the permit applicant. It shall be the permit applicant’s responsibility to provide the engineering data to the department in writing prior to permit issuance.

For the purpose of flood plain enforcement through the Upper Peninsula Environmental Health Code, the flood plain boundary will be defined as follows:

“The first point in the landscape between the proposed septic system or well installation area, where the 100-year flood level, as determined by the appropriate State agency, intersects the land.”

All proposed septic system and well locations must be outside of this boundary as defined. Permit applications for parcels, which cannot meet this requirement, shall be denied in accordance with department policy, and must pursue a variance to move forward.

Systems installed by variance must be installed so that the entire septic system, including the four (4) feet of soil beneath the aggregate and soil interface, are elevated above the 100-year flood level as determined by the appropriate State agency.

Wells, which are installed within the 100-year flood plain by variance or deviation, must have elevated casings, which raise the wellhead and screened vents above the 100-year flood level.

Note: Permits from EGLE, or appropriate State agency, may be required prior to placing fill for the installation of a septic system below or in a 100-year floodplain elevation.

Abandonment of Onsite Sewage Treatment and Disposal System (OSTDS) - Section 3-16

This section of the Upper Peninsula Environmental Health Code states:

“When an OSTDS is abandoned, it shall be rendered to prevent a potential safety hazard. Abandoned septic tanks shall be pumped and the contents disposed of by a licensed septage waste hauler according to law. The septic tank shall then be collapsed and filled with an approved material or shall be removed and transported and disposed of at a Type II landfill in accordance with law.”

Septic Tank

If an abandoned septic tank is left in place after being pumped out in an approved manner, it may be completely filled with clean sand fill or concrete to prevent the safety hazard of a collapse.

If the abandoned septic tank is to be crushed in place after being pumped in an approved method, the tank must be thoroughly crushed and mechanically compacted prior to backfilling. Once crushed and compacted, the tank location shall be backfilled with clean soil and thoroughly mechanically compacted for stability.

Absorption System

When it is practical to do so, the absorption system should be left in place. When the area is needed for other purposes, the absorption system may be removed.

The disposal method to be used shall be one of the following:

1. Remove and haul the contaminated material to a licensed Type II landfill. Containment of the contaminated material must be provided during transport to avoid creation of a nuisance or environmental health hazard.
2. A property owner may choose to bury the abandoned absorption system on his or her own parcel, or the parcel of another with owner's consent. All components of the system shall be buried in a manner that does not create an environmental health hazard.

Aggregate/Stone Material - Section 3-14.3

This section of the Upper Peninsula Environmental Health Code states:

“1. Aggregate shall be washed stone ranging in size from three-eighths (3/8”) to two and one-half inches (2½”) with a total fines content not exceeding five-tenths percent (0.5%) loss by washing. Stone aggregate must rate three or more on Mohs scale of hardness. Sizing and hardness specifications and testing methodology shall be defined in the technical manual.”

Determination of Compliance:

When compliance of drainfield aggregate is in question, the Environmental Health Specialist may require an official sieve analysis to be conducted on the aggregate in question with a report of analysis provided to the department for review and approval.

Stone Size:

One hundred percent (100%) of aggregate must pass a two and one-half inches (2.5”) (63 mm) sieve. When ninety percent (90%) of stone aggregate is retained by a seven-sixteenths inches (7/16”) standard mesh during sieve analysis it is considered to meet the three-eighths-inch (3/8”) minimum sizing requirement.

Classifying Fine Grained Soils:

If soil that will pass through a three inch (3”) sieve is passed through a No. 200 sieve, it will be divided into two portions based on particle size. The particles retained on the No. 200 sieve are sand and gravel size and are called coarse- grained. The particles passing the No. 200 sieve are termed fines. There cannot be more than five-tenths percent (0.5%) fines in the aggregate as indicated on the sieve analysis results.

Sieve Analysis:

The tables below provide a general overview of some of the standard screen sizes used in sieve analysis. The highlighted values are for screens that would be used to determine drainfield aggregate acceptability. The goal is to have ninety percent 90% of the aggregate retained by the seven-sixteenths inches (7/16") (16 mm) standard mesh, one hundred percent (100%) passing the two and one-half inches (2.5") (63 mm) mesh and five-tenths percent (0.5%) or less of the aggregate passing the number 200 mesh.

Commonly used US Standard commercial sieve and mesh dimensions.			
Source: http://engineeringtoolbox.com			
Sieve size	Opening		Standard Mesh
<i>(mm)</i>	<i>(in)</i>	<i>(10⁻⁶ m)</i>	<i>US</i>
11.2	0.438	11200	7/16"
6.35	0.250	6350	1/4"
5.6	0.223		3.5
4.75	0.187		4
4.0	0.157		5
3.35	0.132		6
2.8	0.110		7
2.36	0.0937		8
2.0	0.0787		10
1.7	0.0661		12
1.4	0.0555		14
1.18	0.0469		16
1.0	0.0394		18
0.841	0.0331	841	20
0.71	0.0278		25
0.595	0.0232	595	30
0.5	0.0197		35
0.400	0.0165	400	40
0.355	0.0139		45
0.30	0.0117		50
0.250	0.0098	250	60
0.210	0.0083	210	70
0.177	0.0070	177	80
0.149	0.0059	149	100
0.125	0.0049	125	120
0.105	0.0041	105	140
0.088	0.0035	88	170
0.074	0.0029	74	200
0.063	0.0024	63	230
0.053	0.0021	53	270
0.044	0.0017	44	325
0.037	0.0015	37	400
0.025	0.0010		500
0.020	0.0008		632

Nominal apertures and permissible variation for selection of US woven wire sieves				
Source: Powder Sampling and Particle Size Determination, Terrance Allen, 2003				
Standard (mm)	Alternative (in)	Tolerance (+ or – mm)	Intermediate (mm)	Maximum (mm)
125.0	5	3.7	130.00	
63.0	2.500	1.9	65.6	66.2
31.5	1.250	1.0	32.9	33.2
16	0.625	0.5	16.7	17.0
8	0.312	0.25	8.41	8.58
4	0.157	0.13	4.23	4.35
2	0.0787	0.070	2.135	2.215
1	0.0394	0.040	1.080	0.135

Terminology Regarding Aggregate:

There is some confusion regarding terminology used to describe aggregate as there are multiple conventions used including ISO, ASTM, and Michigan Department of Transportation standards. The following are examples of sizing terminologies.

Crushed Stone Grades (<http://www.braenstone.com/2013/05/crushed-stone-grades/>)

The following list gives a rundown of crushed stone grades and their best uses. While there may be slight variances in the naming convention of crushed stone the following are the most common names and sizes. The highlighted sizes of crushed rock would be suitable for aggregate use under the condition that fines content is five-tenths percent (0.5%) or less.

- Crushed stone #5 – Sizes from 1" down to fine particles. For road and paver base.
- Crushed stone #67 – Sizes from 3/4" down to fine particles. For fill, road and slab base.
- Crushed stone #1 – Sizes from 2" to 4". The largest of the crushed stone grades. For larger jobs such a culvert ballast.
- Crushed stone #8 – Sizes from 3/8" to 1/2". For concrete and asphalt mix.
- Crushed stone #3 -Sizes from 1/2" to 2". For drainage and railroad projects.
- Crushed stone #10 (also called stone dust) – Screenings or dust. For fabrication of concrete blocks and pavers and for riding arenas.
- Crushed stone #57 – Sizes of about 3/4". For concrete and asphalt mix, driveways, landscaping and French drains.

- Crushed stone #411 – A mixture of stone dust and #57 stone. For driveways, roads and as a base for retaining walls. It can also be used to patch holes in paved areas. The dust mixes with the larger stone and settles well.

Table of Crushed Rock Sizes				
Source: http://www.rbsinc.com/limestone/pageone.htm				
Size Number	Nominal Maximum	Nominal Minimum	Typical Use	Density, PCF (Estimate)
1	3 ½"	1 ½"	Free Draining Heavy Fill Road Base	80-90
2	2 ½"	1 ½"	Road Base, Difficult to Place	100
3	2"	1"		100
4	1 ½"	¾"	Road Base, Easier to Place/Grade	100
57	1"	#4	Free Draining Fill Used under Concrete Slabs	110
67	¾"	#4		110
7	½"	#4		100-110
8	3/8"	#8	Pipe Bedding	100-110
9	#4	#16	Drainage Bed, Snow and Ice	120
Sand (#10 MOD)	#4	#100		130
3" Crusher Run	3"	#100	Driveways, Roads, Compaction Required	130
1½" Crusher Run	1 ½"	#100	Driveways, Roads, Compaction Required	140
¾" Crusher Run	¾"	#100	Driveways, Roads, Compaction Required	140
Rip-Rap	10"	4"		

Field Screening Tool for Fines – Jar Test

A tool known as the ‘jar test’ can be used to evaluate the relative fines content in a load of drainfield rock (or sand fill) delivered to a construction site. This tool has also been used by licensed installers and local inspectors to help evaluate fines in mound sand and single pass sand filters. For drainfield rock, the procedure can be used as a ‘quick check’ on fines in a load of drainfield rock. The jar test is not to be used as a replacement for sieve analysis.

After settling for several hours, if the layer of fines that settle on top of the aggregate is thicker than 1/8 inch (3.2 mm), the aggregate contains too many fines and is not suitable for use in a drainfield. An 8-hour jar test must be conducted for best results.

When in doubt the aggregate supplier should provide an aggregate analysis report to confirm the product meets the sieve specification.

Jar test procedure:

- Place approximately two inches (2") of aggregate in a glass quart jar.
- Fill the jar with water.
- Shake the jar vigorously to mix the aggregate and water.
- Set the jar on a level platform and allow to settle for several hours (4 - 8 hours).
- Upon settling, after several hours (4 - 8 hours), the layer of fines that settle out of the aggregate should not be thicker than 1/8 inch (3.2 mm).

TIPS:*

- Take a sample from the middle of the pile.
- It may be necessary to jar test a composite sample.
- It may be necessary to conduct two jar tests.
- When in doubt, obtain the sieve analysis report from the aggregate supplier or send a sample to the laboratory. Be sure to ask the laboratory to include the No. 200 sieve size.

Michigan Department of Transportation (MDOT) Aggregate Terminology and Grades:

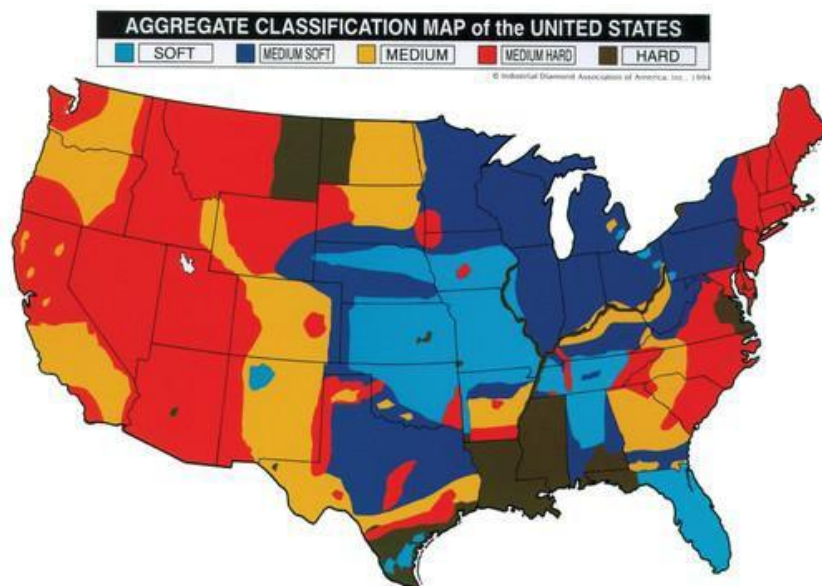
Many contractors and pit operators will use the MDOT terminology when describing and classifying their aggregate. Below is a table describing the characteristics of each MDOT aggregate classification. Per the Marquette County Upper Peninsula Environmental Health Code requirements **ONLY** the 4AA meets the sizing requirements, but **ONLY** under the condition that it is washed to reduce the fines to a max of five-tenths percent (0.5%). The standard 2.0 maximum MDOT allowable fines content is not acceptable for drainfield aggregate.

Michigan Department of Transportation (MDOT) Grading Requirements for Coarse Aggregates, Dense-Grade Aggregates and Open-Graded Aggregates													
Material Type	Class	Item of Work by Section Number (Sequential) (a)	Sieve Analysis (MTM 109) Total Percent Passing										Loss by Washing (MTM 108) % Passing No. 200 (b)
			2.5 in	2 in	1.5 in	1 in	3/4 in	1/2 in	3/8 in	No. 4	No. 8	No. 30	
Coarse Aggregates	4 AA (e)	602	100	90-100	40-60		0-12						2.0 max
	6 AAA (c)	602			100	90-100	60-85	30-60		0-8			1.0 max (d)
	6 AA (c)	601,602 706,708,806			100	95-100		30-60		0-8			1.0 max (d)
	6 A	205, 401,402,601,602,603,706,806			100	95-100		30-60		0-8			1.0 max (d)
	17 A					100	90-100	50-75		0-8			1.0 max (d)
	25 A	508					100	95-100	60-90	5-30	0-12		3.0 max
	26 A	706, 712					100	95-100	60-90	5-30	0-12		3.0 max
	29 A	508						100	90-100	10-30	0-10		3.0 max
Dense-Graded Aggregates	21 AA	302,304,305			100	85-100		50-75			20-45		4-8 (e)(f)
	21 A	302,305											
	22 A	302,305,306,307				100	90-100		65-85		30-50		4-8 (e)(f)(g)
	23 A	306,307				100			60-85		25-60		9-16 (f)
Open-Graded Aggregated	2 G	303(h)			100	85-100		40-70			0-10	0-8	5.0 max
	3 G				100	85-100		40-70			0-30	0-13	5.0 max
	4 G (i)	303			100		60-80	35-65			10-25	5-18	6.0 max
	34 R	404						100	90-100		0-5		3.0 max
	34 G	404						100	90-100		0-5		3.0 max

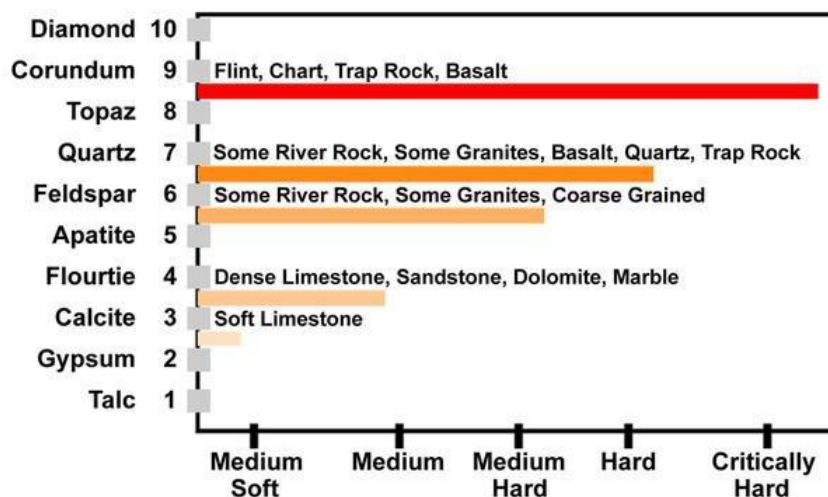
Hardness:

Based upon the graph and the map shown below, all aggregate available in Marquette County should meet the requirement of rating at three or higher on Mohs scale of hardness. Calcite (soft limestone) is considered to be a standard for three on Mohs scale and is technically acceptable under the Upper Peninsula Environmental Health Code of Marquette County.

Source: <http://www.forconstructionpros.com/article/10745911/aggregate-hardness-map-of-the-united-states>



Mohs Hardness Scale 1 through 10



Verifying Hardness During Production:

Limestone and other potentially soft rocks can decay or deteriorate when exposed to sewage and soil causing premature drainfield failure. There are two specified tests to determine sufficient hardness for suitability of use as drainfield aggregate. The standard tests are loss of abrasion and loss of soundness. The purpose of these two tests is to help ensure that limestone and other potentially soft rock does not break down when transported and used in sewage treatment systems.

The limestone aggregate should be tested at the quarry to ensure the material meets the required specifications in the table below.

Limestone testing requirements for ‘hardness’	Method	Results required
Abrasion determines if rock breaks down when moved around	AASHTO Method T 96 (Los Angeles Abrasion Test)	Not more than 40 percent loss
Soundness determines if rock breaks down over time	AASHTO Method T 104 (magnesium sulfate)	Not more than 15 percent loss at end of five cycles

Field Screening Tool for Rock Hardness – Mohs Test:

Another field tool that can be used to help evaluate the suitability of drainfield rock is the Mohs Test (Mohs Hardness, 2008). Drainfield rock would typically have a hardness of three or more on the Mohs Scale of Hardness. Hardness is a measure of a rock’s resistance to abrasion and is measured against a standard scale called the Mohs Scale of Hardness. The scale consists of ten fairly common minerals of known hardness, which are numerically ordered from the softest rock (1) to the hardest rock (10), as follows:

1. Talc (H=1)	2. Gypsum (H=2)	3. Calcite (H=3)	4. Fluorite (H=4)	5. Apatite (H=5)
6. Orthoclase (H=6)	7. Quartz (H=7)	8. Topaz (H=8)	9. Corundum (H=9)	10. Diamond (H=10)

The Mohs Scale of Hardness is based on the fact that a harder material will scratch a softer one. By using a simple scratch test, you can determine the relative hardness of drainfield rock. Please be advised this simple test is not suitable for all rock types. For example, chert and shale, which would ‘pass’ using this field tool would, in fact, break down using the American Associations of State Highway and Transportation Officials (AASHTO) Methods for loss of abrasion and soundness tests because of the structure of the rocks.

There are several simple tools that can be used in determining the relative hardness of drainfield rock. For example, your *finger nail* has a hardness of 2.5. If you can scratch the surface of a rock with it, its hardness is less than 2.5; slightly harder than gypsum (H=2) but softer than calcite (H=3). A *penny* has a hardness of 3.0. If you cannot scratch the rock with your finger nail (H=2.5), but can with a penny, the rock is at least as hard as calcite (H=3). The *steel blade* of the average knife commonly has a hardness of about 5.5. If a penny does not scratch your rock but the knife blade does, then it is harder than calcite (H=3) but softer than orthoclase (H=6).

If your drainfield rock	Give it a hardness number
Can be rubbed off on the fingers	1
Can be scratched with a fingernail	2
Can be scratched with a penny	3
Can be scratched easily with a butter knife	4
Can be scratched with a steel nail but not glass	6
Can be used to scratch glass	7
Too hard to be tested in this scale	8 – 10

Proper Transport and Handling of Aggregate:

Some basic handling practices can be used to minimize contamination of drainfield rock with fines, dust, clods of silt and clay, wood, and other undesirable materials. These practices should be used by both equipment operators loading drainfield rock at the pit or quarry and by licensed installers moving rock around the construction site.

Best Handling Practices Pit and Quarry

- Leave a bottom layer of rock (six inches) when loading the truck. Do not scoop up all the rock on the ground because it will mix with the underlying soil and the load will become contaminated with soil and/or fines.
- Do not let the rock get too dusty – it may need to be washed again due to excess fines. For example, if a stock pile sits in the pit for a number of years, it will likely be contaminated with fines because of dusty conditions found at these facilities.

Best Handling Practices Construction Site

- Take rock directly from the truck to the soil treatment system, do not store or stockpile drainfield rock, just place it immediately.
- If rock is stockpiled, use a clean, undisturbed area for temporary storage of drainfield rock. Consider covering stockpiled materials if conditions are excessively dusty.
- If stockpiled, make sure different materials are kept separate (i.e. clean sand, pea rock and drainfield rock).
- Make sure the bucket is clean before scooping up materials.

- Take care not to mix any soil in with drainfield rock when moving it around.
- Carefully place drainfield rock into the excavation; make sure soil is at the proper moisture content. Make sure the bottom and sides of the excavation are not smeared; minimize walking in the excavation. Place drainfield rock into the excavation by minimizing drop distance into the excavation.

Septic Tanks - Section 3-14.5

Section 3-14.5.A:

“Septic tanks shall be watertight and constructed of concrete or other materials approved by the Department.”

1. In order to provide technical guidance to meet this standard, the following specifications have been established:
 - a) Pre-cast concrete tanks shall have a minimum wall, compartment and bottom thickness of two and one-half inches (2 1/2”) and shall be adequately reinforced. The top shall be at least four inches (4”) thick and able to withstand the load for which it was intended.
 - b) Concrete block tanks are not permissible.
 - c) A cast in place concrete tank shall be approved by the Health Officer prior to construction and comply with all specifications listed in part (a).
 - d) The use of polyethylene septic tanks or tanks manufactured with materials other than concrete shall be limited to sites when use of a concrete tank is not feasible. Written approval from the department is required prior to permitting a septic tank constructed of any material other than concrete.
2. The liquid capacity of all prefabricated septic tanks shall be permanently marked on the uppermost tank surface.
3. Manufacturers shall demonstrate, upon request of the department, that the septic tanks, which they manufacturer, are watertight.
4. Multiple compartment tanks shall comply with the following:
 - a) As measured from the invert elevation of the outlet, the first compartment shall have at least two-thirds of the total required liquid capacity.
 - b) Each compartment within a tank shall have an inspection port situated above the outlet baffle.

5. The minimum liquid depth of any compartment shall be thirty-eight inches (38"). Liquid depths greater than seventy-eight inches (78") shall not be considered in determining the working liquid capacity.
6. When a high water table is present, septic tanks shall be weighted to prevent floating or shifting.
7. Access ports shall be provided for maintenance. They shall be a minimum of twelve inches by twelve inches (12"x12"), twelve inches (12") in diameter, or a maximum of twenty inches by twenty inches (20"x20") in diameter. Each access port cover shall be provided with a corrosion resistant strap or handle to facilitate removal.
8. Inspection ports instead of access ports will not be accepted.
9. The access port for cleaning and maintenance purposes shall extend to ground surface by a secure riser. Access port covers shall be adequately secured to prevent unauthorized access. Existing tanks, which will be in continued use for a replacement system, will be required to be retrofitted with an approved riser.
10. A tank shall be located to assure accessibility for inspection and cleaning. No other construction or landscaping shall impede the tank's accessibility.
11. The tank shall be located on the same side of a building that the sewer line exits the foundation wall. The building sewer shall be at least five feet long, but as short as possible, and contain no more than two (2) forty-five degree (45°) degree bends, or one long sweeping ninety degree (90°) bend.
12. The inlet and outlet specifications are as follows:
 - a) Have a minimum diameter of four inches (4").
 - b) Be placed on opposite ends of the tank, unless otherwise specified by the Health Officer.
 - c) The invert elevation of the inlet shall be at least two inches (2") higher than the invert elevation of the outlet.
 - d) The outlet shall be equipped with an effluent filter extending below the tank's liquid level a distance equal to but no less than thirty-five percent (35%) or greater than fifty percent (50%) of the liquid level.
 - e) The tank inlet and outlet shall be installed with a rubber or neoprene gasket to provide watertight connections. The Health Officer may approve in writing other watertight connections.
13. Tank ventilation shall be provided by means of a minimum of eight inches (8") of air space between the underside of the top of the tank and the top of the 'T' fitting.

14. A multiple compartment tank shall have a four-inch (4") minimum diameter 'T' or an effluent filter, placed in the common wall; utilizing the same specifications as established for the effluent filter in section 12.
15. Septic tanks shall be set level side to side and front to back.
16. Tanks shall be installed with the outlet closest to the drainfield as designed by the manufacturer.

Section 3-14.5.H:

This section states:

"All systems receiving whole house sewage from a pump shall be equipped with a minimum of two 1,000 gallon septic tanks. The first tank shall be installed in series to allow the settling of sewage discharged by the pump and shall be equipped with an outlet baffle. This does not apply to incidental fixtures pumped to a gravity sewer line."

In order to provide technical guidance and clarification regarding the interpretation and intent of this section:

1. The term "whole house sewage" means black water waste, or a blend of black water and gray water waste.
2. The term "incidental fixtures" means an individual laundry machine and/or laundry sink or other small volume plumbing fixture generating gray water waste.

Effluent Filters - Section 3-14.5.D

1. An effluent filter is required in all new and/or replacement septic system installations. This will at times require effluent filters to be retrofitted to existing tanks. The filter shall be installed and used in accordance with the manufacturer's recommendations.
2. An effluent filter shall meet the following specifications:
 - a) Be constructed of durable and corrosion-resistant materials.
 - b) Be designed to prevent the escape of suspended solids during normal operation or malfunction.
 - c) Retain all particles greater than one-eighth inch (1/8") in size.
 - d) Be designed to accommodate the effluent discharge for the system it serves.

3. Effluent lines shall be four-inch (4") diameter schedule 40 PVC, or equivalent, piping with glued joints for the entire length of line between the filter outlet and the drainfield.
4. Effluent lines serving systems that require pumping from the septic tank to the drainfield must be connected to the drainfield header at an angle of forty-five degree (45°) degree or greater. This configuration is to prevent the backflow of effluent from the drainfield to the tank when the pump cycles off.

Absorption System Distribution - Section 3-14.4

Perforated Piping

All perforated piping used within trench or bed infiltration systems shall be four-inch (4") diameter PVC meeting ASTM F810 or ASTM 2729 standards or equivalent. Perforated piping in nonconventional engineered systems such as pressure mounds shall meet the specification indicated within the approved engineered plan.

Trench Designs

The following shall be used to design trench absorption systems.

1. Thirty-six inch (36")-wide trenches shall be spaced seven feet (7') on center, which would leave approximately four feet (4') of undisturbed soil between trenches.
2. Thirty inch (30")-wide trenches shall be spaced at least six feet (6') on center.
3. Twenty-four inch (24")-wide trenches shall be spaced at least five feet (5') on center.
4. Eighteen inch (18")-wide trenches shall be spaced at least four feet (4') on center.
5. A common header shall be installed (footers not required).
6. Rock and pipe trench systems must be constructed of State approved perforated pipe, placed with holes facing downward within the trench, and solid schedule 40 PVC pipe in the header and effluent line.
7. Rock aggregate must be approved aggregate installed at a thickness of six inches (6") below the perforated pipe and extending to two inches (2") above the perforated pipe.
8. Chamber systems may be used for trench installations without gravel Must be installed in accordance with manufacturer's recommendations and will be sized in accordance with current State guidance regarding chamber sizing.

Chamber System Installation

1. Chamber systems can be installed as a bed configuration or a trench configuration.
2. Sizing for chamber systems will be determined by the current State guidance. At the time of this revision, the State has provided a comparison chart in Microsoft XL format.
3. Bed configuration: Number of chambers required is determined by the make and model of the specific chamber used compared to the required number of chambers per 100 ft² of bed without sidewall.
4. Trench configuration: Number of chambers required is determined by the make and model of the specific chamber used compared to the required number of chambers per 100 ft² of bed with sidewall infiltration allowed.
5. Chambers shall be installed in accordance with manufacturer's recommendations on leveled and raked trench bottoms on soil, which has not been compacted or smeared.
6. The effluent line and the header must be constructed of solid schedule 40 PVC piping with glued joints. Headers must be set level. Footers are not required.
7. Observation ports shall be installed in the fittings provided by the manufacturer in the end of each row of chambers.
8. Chambers shall be back filled with clean permeable soil, which is free of rocks, cobbles and boulders, to avoid damage or offset to the chambers.
9. A minimum of twelve inches (12") of soil cover shall be placed over the chambers after final installation.

Mound Site Preparation Procedure

1. Check the moisture content of the soil to a depth of eight inches (8"). Smearing and compacting of wet soil will result in reducing the infiltration capacity of the soil. Proper soil moisture content can be determined by rolling a soil sample between the hands. If it rolls into a one-fourth inch (1/4") wire, the site is too wet to prepare. If it crumbles, site preparation can proceed. If the site is too wet to prepare, do not proceed until it dries.
2. Lay out the fill area on the site so that the distribution cell runs perpendicular to the direction of the slope whenever possible.
3. Standard Mound Installation: Cut trees flush to the ground and leave stumps, remove surface boulders that can be easily removed, remove vegetation over six inches (6") long

by mowing and removing cut vegetation. Prepare the site by breaking up, perpendicular to the slope, the top six inches (6") to eliminate any surface mat that could impede the vertical flow of liquid into the in situ soil. Chisel type plowing is highly recommended especially in fine textured soils. Rototilling or other means that pulverize the soil is not acceptable. The important point is that a rough, un-smeared surface be left. The sand fill will intermingle between the clods of soil, which improves the infiltration rate into the natural soil.

Immediate application of at least six inches (6") of fill material is required after tilling. All vehicular traffic is prohibited on the tilled area. For sites where the effluent may move laterally, vehicle traffic is also prohibited for fifteen feet (15'), down slope and ten feet (10') on both sides of level sites. If it rains after the tilling is completed, wait until the soil dries out before continuing construction.

4. Deep Cut/Cut and Fill Mound Installation: If more permeable soils are available lower in the profile, a deep cut excavation may be made. Deep cut excavations shall not be greater than six feet (6') in depth unless approved by the Health Officer. Deep cut and fill installations will only be permissible where strata that are more permeable are located in the soil profile, which are determined to be of consistent thickness of no less than twenty-four inches (24") and are not affected by water table. The excavation must expose the permeable layer without contamination.
5. Place the fill material, which has been properly selected, around the edge of the tilled or excavated area. Work from the end and upslope sides. This will avoid compacting the soils on the downslope side, which, if compacted, affects lateral movement away from the fill and could cause surface seepage at the toe of the fill on slowly permeable soils. Move the fill material into place using a small track-type tractor with a blade or a large backhoe that has sufficient reach to prevent compaction of the broken up area. Do not use a tractor/backhoe having tires. Always keep a minimum of six inches (6") of fill material beneath tracks to prevent compaction of the in situ soil.
6. Place the fill material to the required depth.

Fill Material

1. Clean medium sand with little or no fines is to be used to form a sand base to the elevation that is required on the permit and/or site evaluation. Sand fill shall be added from the upslope side or ends to reduce site disturbance whenever possible.
2. When constructing a mound system, a five-foot (5') sand extension around the bed is required. This sand extension prevents effluent from leaching out of the toe of slope.
3. In addition to the five foot (5') sand extension, a minimum 3:1 slope to natural grade is recommended. Steeper slopes can be approved by the Health Officer on a site-specific basis. It is recommended that a sand-based soil be used for this slope. The edge of the aggregate bed must be placed a minimum of ten feet (10') from property lines. In no case

shall slope fill cross property lines without direct consent of the owner of the impacted parcel.

Observation Ports

1. Observation ports shall extend to the ground surface and remain visible after installation.
2. The inspection port shall be constructed of non-perforated PVC, which is four inches (4") in diameter, and be equipped with a removable cap.
3. Inspection ports shall be installed one foot (1') from the corner of the footer, on each outside lateral of the system using a ninety degree (90°) 'T' fitting oriented upward vertically. The inspection port shall be glued into the 'T' fitting for permanent installation.

Aggregate Cover

1. Straw/Hay is an approved material for covering the aggregate. This straw/hay must be of sufficient thickness that fines cannot filter through and clog the drainfield (enough so that no aggregate can be seen when covered).
2. Soils used to cover the drainfield should not be clay-based soils in order to maximize evapo-transpiration. A minimum of twelve inches (12") and a maximum of thirty inches (30") of soil cover are required.
3. The field area shall be seeded and mulched to provide grass growth and prevent erosion of the field. The area around the field shall be landscaped to drain surface runoff away from the field area. Trees should not be grown on or near the field area as the roots will eventually plug the laterals. Grass is the best cover for your drainfield.
4. To avoid compaction and breakage of drainfield materials, the drainfield should not have structures built upon it and vehicle traffic should not be allowed.

Privies/Outhouses - Section 3-15

Privies/Outhouses can only be permitted to be installed on parcels, which meet the Michigan Department of Consumer and Industry Services' 2006 Technical Bulletin, *"Requirements for Plumbing Fixtures in Remote Cabins"*

Privy permits will not be issued for properties having available power, or for properties where there is intent to install available power.

Available power or intent to install available power is defined to include solar power, portable or permanently installed power generators, available power along the road frontage of the property, or the installation of wiring within a structure on the property.

Prior to being granted a privy permit, the applicant must provide written proof of a plumbing permit exemption from the Marquette County Construction Code Authority.

Privy permits will not be issued in areas where the practice is prohibited by local zoning or where other statutes and/or ordinances prohibits without prior approval from the associates authority.

Issuance of a privy permit will also require application for and issuance of a grey water permit if a structure with a sink or primitive bathing facility will be constructed.

Privy Construction requirements are governed by Act 273 PA 1939 and the rules promulgated there under titled “Department of Environmental Quality, Division of Water and Radiological Protection, Outhouses” including Rule 325.421 through Rule 325.426.

Privy Construction Requirements:

1. A soil test hole must be evaluated for the primary privy location and a reserve replacement area.
2. Soil conditions must be known, and must meet suitability requirements for a minimum vertical distance of four feet (4') below the intended bottom of the pit (for an earth pit privy). This will require a test hole of minimum eight and one-half feet (8.5') depth.
3. The constructed earth pit shall have a depth minimum of four and one-half feet (4.5') and a depth maximum of six feet (6'). These depth requirements may require mounding if water table or bedrock is encountered. The minimum volume of the pit shall be fifty cubic feet (50 ft³) per seat.
4. Sills shall be provided to support the outhouse structure.
5. Pit curbing shall be installed to support the excavation from collapse and shall extend the depth of the pit. Pit curbing shall not be used to support the outhouse structure or sills.
6. Pit mounds shall be of well tamped earth installed in thin layers and shall extend outward on the level a minimum of eighteen inches (18") beyond the edge of the sills. Slopes on mound edges shall not be steeper than 3:1, and shall be seeded or covered with sod to prevent erosion.
7. The floor and seat riser shall be constructed of impervious material or tongue and groove lumber, and in a manner to exclude insects. The seat riser shall be bonded to the floor to prevent seepage, and shall be provided with a seat with a hinge lid.

8. The pit shall be ventilated from the riser to a point outside of the structure by a flue or vent having a cross-sectional area of a minimum twelve square inches (12 in²). The joints of the vent shall be tight and the opening screened with sixteen (16) mesh screening.
9. The privy structure shall be fully enclosed and fly tight.

Vaulted privies can be constructed by using an approved septic tank, or concrete privy vault, in substitution of a pit and meeting all criteria stated above. Vaulted privies shall be placed where they are accessible to a septic pumping truck.

Grey Water Systems - Section 3-14.1.B and Section 3-14.2.F

Grey water only systems are considered an alternative on-site wastewater treatment technology under the Upper Peninsula Environmental Health Code of Marquette County.

Grey water only systems can only be permitted to be installed on parcels, which meet the Michigan Department of Consumer and Industry Services' 2006 Technical Bulletin *"Requirements for Plumbing Fixtures in Remote Cabins"*

Grey water system permits will not be issued for properties having available power, or for properties where there is intent to install available power.

Available power or intent to install available power is defined to include solar power, portable or permanently installed power generators, available power along the road frontage of the property, or the installation of wiring within a structure on the property.

Grey water systems can only be installed for structures, which do not have pressurized plumbing, and rely on carried water only. For the purposes of this technical manual, pressurized plumbing includes plumbing under gravity pressure from a storage tank, or plumbing, which relies on temporary connections to surface water or storage tank pumps.

Prior to being granted a grey water system permit, the applicant must provide written proof of a plumbing permit exemption from the Marquette County Construction Code Authority.

Frequently, grey water installations are requested for sauna installations. If power is available per MDCIS Remote Cabin definition, all sauna drains must be sumped and pumped to a septic tank connected to an absorption system located on the parcel.

Issuance of a grey water system permit will also require issuance of a privy permit to serve the remote structure.

It is important to note that grey water has been scientifically shown to convey pathogens and contain significant nutrients. As such, grey water is a potential threat to ground and surface water resources.

Grey Water Systems Permitting and Construction Requirements:

1. A test hole must be provided in the intended location of the grey water drain, and in a suitable replacement area, to determine soil suitability.
2. Grey water installations shall meet all isolation distance requirements specified for drainfield absorption beds in the Marquette County Upper Peninsula Environmental Health Code.
3. The grey water infiltration system shall be installed to allow thirty-six inches (36") of suitable soil beneath the drain system/soil interface and any evidence of water table or bedrock.
4. The sewer line connecting the source to the grey water drain shall be a Schedule 40 PVC sewer line with glued joints.
5. The infiltration system shall be constructed in accordance with the requirements for construction of absorption fields specified by current code, and shall be of adequate size to handle the projected flow rate of the source. Alternatively, a drywell can be constructed as an infiltration system using approved aggregate and cribbing which allows for the transfer of wastewater to the soil interface. Drums, which have been used to contain toxic materials such as petroleum products, shall not be modified for use as dry well cribs due to potential groundwater and soil contamination issues. Minimum drywell sizing shall be twenty-four inches (24") in diameter by twenty-four inches (24") in depth. Vertical isolation from the bottom of the drywell to water table, bedrock or other soil restrictions shall be maintained at thirty-six inches (36").

On-site Storage and Hauling of Sewage (Pump and Haul) - Section 3-10.D

On-site storage and hauling of sewage, or the use of a pump and haul method, in lieu of the handling of sewage through an approved on-site sewage treatment and disposal system (OSTDS) or a municipal sewer connection, for sewage originating from structures other than privies shall be in accordance with the Upper Peninsula Environmental Health Code of Marquette County.

The on-site storage and hauling of sewage originating from structures other than privies may be approved by the Marquette County Health Department (MCHD), Director of Environmental Health under strictly short-term temporary emergency conditions for the purpose of the protection of public health and the environment until such time that conditions permit the installation of an approved OSTDS or municipal sewer connection.

On-site storage and hauling of sewage, or the use of a pump and haul method, in lieu of the handling of sewage through an approved on-site sewage treatment and disposal system (OSTDS) or a municipal sewer connection, shall not be approved for convenience purposes, financial purposes, or to circumvent environmental limitations that would preclude the installation of an approved OSTDS.

On-site storage and hauling of sewage, or the use of a pump and haul method, will not be approved in areas where the practice is prohibited by local zoning or where other statutes and/or ordinances prohibits without prior approval from the associates authority.

On-site storage and hauling of sewage, or the use of a pump and haul method, shall be reviewed and approved in writing by the Director of Environmental Health and must meet the following conditions for short-term temporary use:

1. Tanks used for the storage of sewage shall be watertight and designed in accordance with the Upper Peninsula Environmental Health Code of Marquette County including statutes and guidelines referred to by reference and the associated Technical Guidance Manual.
2. Tanks used for the storage of sewage shall be sized with a capacity capable of meeting the flow demands of the structure to which they are connected with a capacity sufficient to meet the scheduling frequency of the licensed septage pumper and hauler with a designed safety margin of a minimum thirty-three percent (30%) additional capacity.
3. Under no circumstances shall a tank system used for the storage of sewage be of a capacity that is less than seventy-two (72) hours of retention of sewage flow from the structure with a forty-eight (48) hour pump and haul frequency.
4. An ongoing contract for the pumping and hauling of sewage by a licensed septage hauler shall be obtained by the property owner at the property owner's expense. A copy of the current pump and haul contract shall be provided to MCHD and shall be congruent with the volume retention time of the sewage storage tank.
5. At no time shall sewage discharge from the sewage storage tank to the environment.
6. Any discharge from the sewage storage tank to the environment, or any deviation from the approved on-site storage and hauling of sewage, or deviation from the approved pump and haul process shall be grounds for the immediate condemnation of the structure from which sewage is generated.

Alternative or Non-Conventional On-site Sewage Treatment and Disposal Systems - Section 3-14.2.F

Alternative or Non-Conventional On-site Sewage Treatment and Disposal Systems (OSTDS) may be approved on a case by case bases by the MCHD, Director of Environmental Health.

To be considered for approval for the installation and use of an alternative or non-conventional OSTDS, the following must be provided to the department by the permit applicant for review and consideration:

1. A stamped engineered plan produced by a Professional Engineer including the following information:
 - a. A scale site plan in two foot (2') contour intervals indicating locations of all existing and proposed structures, all property boundaries, all wells within the parcel and on neighboring parcels, the proposed location of all components of the OSTDS, the proposed replacements area for all components of the OSTDS, surface water boundaries including areas of seasonal ponding and ephemeral streams, and the 100-year floodplain boundary for any floodplain encroaching upon the parcel.
 - b. A scaled cross-sectional drawing indicating the vertical orientation of all components of the OSTDS as placed including piping, pumps, aggregate, and fill soil, cover materials and cover fill.
 - c. Detailed native soil information in the area of the proposed and replacement OSTDS including soil profile using the USDA soil classification system, depth to seasonal high water table, redoximorphic features and depth to and location of limiting layers including bedrock, or soils which would impeded filtration.
 - d. A detailed description of all fill soil and aggregate planned for installation.
 - e. Detailed engineering and materials description and manufacturer's specifications of all OSTDS components planned for installation.
2. Supporting data and documentation of the performance of the proposed alternative or non-conventional OSTDS technology originating from a non-manufacturer associated third party such as a regulatory authority or a standards authority such as The American Society for Testing and Materials (ASTM) or the National Sanitation Foundation (NSF). Performance data must be based upon "real world" application of the technology in a similar environment with similar native soil and hydrogeological conditions under similar hydraulic and nutrient loading rates.
3. The Department (MCHD) may require ongoing maintenance and performance monitoring of any approved alternative or non-conventional OSTDS at the owner's expense. A detailed description of the OSTDS technology, ongoing maintenance requirements, and ongoing performance monitoring may be recorded on the parcel deed.

Non-Conventional or Alternative Infiltration System Aggregates - Section 3-14.4.C

Alternative or Non-Conventional infiltration systems and aggregates may be approved on a case by case bases by the Marquette County Health Department (MCHD), Director of Environmental Health.

To be considered for approval for the installation and use of an alternative or non-conventional infiltration systems and aggregates, the following must be provided to the department by the permit applicant for review and consideration:

1. Supporting data and documentation of the performance of the proposed alternative or non-conventional infiltration systems and/or aggregates technology originating from a non-manufacturer associated third party such as a regulatory authority or a standards authority such as The American Society for Testing and Materials (ASTM) or the National Sanitation Foundation (NSF). Performance data must be based upon “real world” application of the technology in a similar environment with similar native soil and hydrogeological conditions under similar hydraulic and nutrient loading rates.
2. Detailed manufacturer’s materials and design specifications including installation and operational guidance for the proposed alternative or non-conventional infiltration system and/or aggregate technology.
3. MCHD may require supporting opinions and/or approval from the Michigan Department of the Environment Great Lakes and Energy (EGLE), or the current State agency having oversight, regarding permitting, design and performance concerns associated with any proposed alternative or non-conventional infiltration system and/or aggregate technology.
4. Permitting, design, installation, and sizing requirements for an OSTDS using an alternative or non-conventional infiltration system and/or aggregate technology will be in accordance with the recommendations and guidance of EGLE, or the current State agency having oversight, supporting third party performance data and documentation and in consideration of the manufacturer’s specifications and installation recommendations.
5. The Department (MCHD) may require ongoing maintenance and performance monitoring of any approved alternative or non-conventional infiltration systems and aggregates at the owner’s expense. A detailed description of the OSTDS technology, ongoing maintenance requirements and ongoing performance monitoring may be recorded on the parcel deed.

Geothermal Wells - Section 5-14

The Upper Peninsula Environmental Health Code's definition of a "well" includes the following:

"A heat exchange well used for the purpose of utilizing the geothermal properties of the earth formations for heating or air conditioning. This includes both supply and return wells and vertical bore holes for closed loop systems."

Vertical Closed Loop Systems

Vertical closed loop systems shall be constructed in accordance with current EGLE guidance/best practices. Vertical Closed Loop Systems are any installations vertical or horizontally directionally bored which are at a depth of fifteen feet (15') or greater. Vertical closed loop systems require a permit from the local health department. One permit is required for single and two family residential sites or systems. One permit is required per twenty-five (25) boreholes on a commercial site or system. Permit application shall include a site diagram, the number of proposed boreholes, and proposed heat transfer fluids to be used. A permit application must be submitted to the local health department fourteen (14) days prior to installation.

Construction Permit Requirements:

1. Geothermal boreholes must be constructed (drilled and grouted) by a Michigan licensed water well driller or individuals authorized under the Administrative Rules, as amended, of the Michigan Public Health Code, 1978 PA 368, Part 127.
2. All hydronic piping installation must abide by the rules set forth in the 2006 International Mechanical Code.
3. A preliminary site evaluation shall be conducted by the health department and a construction permit issued prior to any drilling or installation.
4. Geothermal boreholes must be constructed and grouted in accordance with Part 127.
5. Grouting of boreholes shall be completed within twenty-four (24) hours of borehole completion.
6. One record representing the formation must be submitted for each geothermal permit. The formation information, as-built drawing, and all other requested information must be recorded on the DEQ Geothermal Closed –Loop Construction Notice and submitted to the health department within sixty (60) days of completion of the boreholes.
7. Vertical loops shall be isolated in accordance with the following isolation distances:

Household drinking water well - fifty feet (50') Type IIb or Type III public water well - seventy-five feet (75') Type I or IIa public water well - two-hundred feet (200')
Residential on-site sewage system - twenty-five feet (25') Buried water service line or sewer line - ten feet (10') Property line - ten feet (10')

Note: Marquette County Health Department shall have the authority to grant variances to or increase the isolation distance listed above.

Heat transfer fluids shall be food-grade propylene glycol, methanol, or ethanol (20 %) or other nontoxic compounds that meet IGSHPA Closed Loop/Geothermal Heat Pump Systems, Design and Installation Standards, 2007 Edition, Section 3B and 3C, and are compatible with manufactures' specifications. Flammable liquids shall not be used.

9. All underground piping must be a minimum of 160-psi pressure rated high- density polyethylene.
10. All joints in piping must be heat fused by butt, socket, sidewall, or electro fusion in accordance with the pipe manufacture's procedures and in compliance with the 2006 International Mechanical Code.
11. Pressure testing must be conducted prior to transfer fluids being installed. Pressure testing must be at 100 psi for thirty (30) minutes in compliance with the International Mechanical Code.
12. A leakage detected shall be immediately excavated and repaired or the loop shall be permanently abandoned in accordance with Part 127.
13. A tag listing contractor's name, chemicals used for heat transfer fluids, and chemical concentrations must be installed on the heat exchanger unit.
14. All buried geothermal piping must have continuous locator tape attached.
15. All vertical boreholes that are to be abandoned must be abandoned in accordance with Part 127. If the loop cannot be removed, the loop shall be permanently sealed by pumping high solids bentonite grout into the loop and completely filling the loop with grout.

Vertical Open Loop Systems

Vertical Open Loops Systems utilize a water well to supply ground water to a heat pump. All open loop wells are regulated under Part 127, require a water well permit from the local health department, and shall be constructed by a Michigan licensed well driller. Wells that are part of a groundwater thermal exchange system may not serve another function, except water may be supplied to the domestic water system if the domestic water system is protected by an air gap or backflow prevention device in accordance with Michigan's Plumbing Code.

Horizontal Closed Loop Systems

Horizontal closed loop systems are regulated by Mechanical Code Authorities.

Well Permit and Construction Restrictions - – Sections 5-3.2.D, 5-3.2.F, and 5-3.2.H

The Upper Peninsula Environmental Health Code of Marquette County gives MCHD authority to restrict the permitting of a proposed well as follows:

1. When it is determined that the requirements of the Upper Peninsula Environmental Health Code of Marquette County have not or cannot be met.
2. When the issuance of a well permit or the construction of a well permit thereunder may create a condition that constitutes a nuisance, or a threat to the public health or the environment.
3. The permit may impose limitations or special construction practices which the Department deems necessary to protect public health or ground water quality.

The installation of a water supply connection to any structure will create a condition under which water carried sewage is or could be generated. Water carried sewage that is not handled by an approved OSTDS creates a nuisance and a threat to public health and the environment. The following restrictions to well permitting and construction are intended to preclude the creation of a threat to public health and the environment.

Verification of an Approved OSTDS Prior to Well Permitting

To avoid illicit sewage discharge which could create a public health threat or a threat to groundwater surface water or the environment, the availability of an OSTDS serving the structure and suitable to handle water carried must be verified prior to the issuance of a well permit.

Prior to the issuance of a well permit, the availability of a suitable OSTDS serving the structure must be verified by one of the following methods:

1. The parcel must have an OSTDS permit with an approved final inspection on file with MCHD, or
2. Parcels lacking an OSTDS permit with an approved final inspection on file must successfully perform an existing system evaluation in accordance with Section 3-7.3 of the Upper Peninsula Environmental Health Code of Marquette County, or
3. The permit applicant must simultaneously apply for an OSTDS permit.
4. If the well is proposed to be an industrial, irrigation, test well, or other well proposed not to be connected to a structure, a site evaluation must be conducted by MCHD to verify that no structure exists on the parcel which could potentially be connected to the proposed water supply well. If a structure, which could potentially be connected to the proposed water supply well is found to exist on the parcel, one of the conditions in sections 1-3 above must be satisfied prior to issuance of the well permit.

Hand Pump Wells

Hand pump well permits will only be granted for parcels, which meet the requirements of the Michigan Department of Consumer and Industry Services' 2003 Technical Bulletin *"Requirements for Plumbing Fixtures in Remote Cabins"*, or for parcels already served by an OSTDS designed to handle water carried sewage.

Prior to being granted a hand pump well permit, the applicant must provide written proof of a plumbing permit exemption from the Marquette County Construction Code Authority.

For remote structures, a privy permit and potentially a grey water permit must also accompany a hand pump well permit.