

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Anthony S. Earl

BOX 450 MADISON, WISCONSIN 53701

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N	REPL	.Υ	REFER	TO:	

STATE OF WISCONSIN)		mace with
DEPARTMENT OF NATURAL RESOURCES)	SS	JAN 3 1 1977 REVISOR OF STATUTES

TO ALL TO WHOM THESE PRESENTS SHALL COME, GREETINGS:

I, Anthony S. Earl, Secretary of the Department of Natural Resources and custodian of the official records of said Department, do hereby certify that the annexed copy of Natural Resources Board Order No. W-89-76 was duly approved and adopted by this Department on September 16, 1976. I further certify that said copy has been compared by me with the original on file in this Department and that the same is a true copy thereof, and of the whole of such original.

> IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the official seal of the Department at Pyare Square Building in the Village of Shorewood Hills, this 215t day of January, 1977.

(SEAL)

STATE OF WISCONSIN NATURAL RESOURCES BOARD

IN THE MATTER of renumbering sections NR 112.03(55) through (73) and NR 112.07(2)(f) through (m); amending sections NR 112.07(2)(a), (b), (d) & (e), NR 112.08(2) .

Table 1, NR 112.17(4)(a)4.d., and Figures 13, 14 & 15; and creating sections NR 112.03(55), NR 112.07(2)(f) & .

(o) of the Wisconsin Administrative Code pertaining to well drilling

ORDER OF THE STATE OF WISCONSIN NATURAL RESOURCES BOARD RENUMBERING, AMENDING AND CREATING RULES

Pursuant to the authority vested in the State of Wisconsin Natural Resources
Board by sections 162.01 and chapter 227, Wisconsin Statutes, the State of Wisconsin
Natural Resources Board hereby renumbers, amends and creates rules as follows:

SECTION 1 - Sections NR 112.03 (55) through (73) are renumbered to be sections NR 112.03 (56) through (74).

- SECTION 2 Section NR 112.03 (55) is created to read:
- (55) "Sanitary building subdrain" means the horizontal portion of a drainage system within a building which cannot flow by gravity to the building drain.
- SECTION 3 Sections NR 112.07 (2) (a), (b), (d) and (e) are amended to read:
- (a) Eight feet between well or reservoir and cast iron or equivalent sanitary or storm building sewer or sanitary or storm building drain or a basement floor drain connected to a cast iron or equivalent sanitary building sewer or sanitary building drain; cast iron or equivalent subdrain; cast iron or equivalent sewage sump; cast iron or equivalent milkhouse floor drain; cast iron or equivalent drain from a conventional silo or glass lined storage facility; cast iron or equivalent sewer conducting manure juices to point of disposal.

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(b) Ten feet between well and independent clear water waste drain, rainwater downspout outlet, cistern, hydrant drain, or similar unit; building
foundation-drain connected to independent clear water waste drain or other subsoil drain; nonconforming existing or unapproved new well pit, pump pit, pressuretank pit, pressure-tank access pit or subsurface pumproom; nonconforming reservoir.

- (d) Twenty-five feet between well or reservoir and watertight grease basin, septic tank, holding tank, subdrain other than cast iron or equivalent pipe; sewage sump other than cast iron or equivalent material; sanitary building or storm building sewer other than cast iron or equivalent material; sanitary building or storm building drain other than cast iron or equivalent material; floor drain connected to sanitary building sewer or drain of other than cast iron or equivalent pipe material; lake or stream shoreline; below-ground swimming pool.
- (e) Twenty-five feet between well or reservoir and wetertight barn gutter; animal barn pen with concrete floor; glass-lined storage facility without pit; conventional silo without pit but with concrete floor and groper drain; water-tight, milkhouse floor drain other than cast iron or equivalent material; watertight, conventional silo drain or glass-lined storage facility drain other than cast iron or equivalent material; watertight sewer other than cast iron or equivalent material conveying manure juices.
- SECTION 4 Sections NR 112.07 (2) (f) through (m) are renumbered to be sections

 NR 112.07 (2) (g) through (n).
- SECTION 5 Sections NR 112.07 (2) (f) and (o) are created to read:
- (f) Twenty-five feet between well or reservoir and a pressurized sewer, other than a street sanitary or storm sewer or similar sanitary or storm sewer piping comprising part of the drainage system on public or private property,

for which the required minimum separating distance between a well or reservoir and such sewers is specified in NR 112.07(2)(h),

(o) For the purpose of paragraphs NR 112.07(2)(a), (d) and (e), the term "equivalent" means, as it pertains to a cast iron sewer, drain or subdrain, approved plastic pipe as listed and limited in Wis. Adm. Code chapter H 62 (State Plumbing Code) for specific uses and as it pertains to a sewage sump, a plastic sump fabricated from a plastic material approved by the division of health, department of health and social services.

SECTION 6 - Section NR 112.08 (2), Table 1 is amended to read:

•	DRILLED TYPE WELL REQUIREMENTS												
\$	7			1 2 1				- DICILIE	9	10	11		
4	- 1	-	3	MINIMUM		UPPER DRILLHOLD	PPER DRILLHOLE			MAXIMUM	11.		
	- 1	HATURE OF	•	NOMINAL	HPPER FNLAR	GED DRILLHOLE	REGULAR D	RILLHOLE	LOWER DRILLHOLE	NOMINAL	,		
	Ŀ	ATER BEARING		CASING	5	6	7	8		PROTECTIVE			
			GEOLOGIC FORMATIONS			MINIMUM	MINIMUM	BOTTOM	WELL	LINER			
73	PE'	(AQUIFER)		INCHES	DIAMETER	DEPTH	DIAMETER	ELEVATION	DIAMETER	DIAMETER	CONSTRUCTION CONDITIONS		
			Sand or mixture of	2"	None required	None required	2"	See		 			
			sand and gravel.	[with cable	with cable tool		Construc-			The depth of protective well casing pipe will be governed by	a,	
	- 1	*			tool drilling	drilling. To	l	tion			the pumping level. For pumping levels 20' or less the casing	Pr	
	- }			1	but shall be	depth of casing]	Condi-	Ì	1	shall extend 10' below the pumping level. For pumping levels	p.I	
	- {			\$		setting with	í	tions	1		20' to 25' the casing shall extend to a depth of 30'. For	le	
	- 1			l		rotary drilling.		(Į.		pumping levels greater than 25' the casing shall extend 5'	2"	
	Ų			Į.	one is con		! -		1	1	below the pumping level. When an enlarged upper drillhole is constructed with cable tool equipment, the annular space	th	
	1			1	structed. See		l	ļ	Ī.		shall be filled with clay slurry or coment grout placed in	ce as	
	1			1	construction		ł	Ì	1	j	an approved manner. See Note 2 below. With rotary drilling.	wi	
	į			1	conditions.	·	ļ	1	· ·	į	the upper enlarged drillhole shall be maintained at full	sì	
	1		l	Į	Casing diame- ter plus 2"		l		l	Į,	diameter with drilling mud and the annular space shall be	we	
	i		İ	1	with rotary		!	[}	Į	permanently sealed with drilling mud or cement grout. See	ir	
	1		1	1	drilling.)	1	1	1	Note 1 below. Also see Appendix.	EU	
					4.11.11.6.				ļ			נפ	
1	b. 1	Sand or	Clay or similar	2"	Casing diame-	5' into clay	2"	Sec	i		The protective well casing pipe shall extend 5' below the	*1	
			material to depth	l .	ter plus 4"	below any sand		Construc-	1	1	pumping lovel. With sable tool drilling the upper enlarged	th	
	- 1		of 30' or more,	1	with cable	or gravel above)	tion	}	1	drillhole shall be kept open with temporary well casing and	U	
	1	•	containing layers	1	tool drilling.		}	Condi-	1	1	the upper drillhole shall be kept 1/3 filled with clay	An	
	- 1		of sand or gravel.	1	Casing diame-	with cable tool	į	tions	l .	()	slurry throughout the driving of the permanent well casing.	ъе	
*	į		l .	l .	ter plus 2"	drilling. To		ĺ	1	[The balance of the annular space shall be filled with clay slurry or cement grout. With rotary drilling, the upper	ne	
	1				with rotary	depth of casing	})		} i	enlarged drillhole shall be maintained at full diameter	1r	
	. !		1	}	construction	placement with rotary drilling.	1	1	1	!	with drilling mud and the annular space shall be perma-	t}	
	į		Į.	l	construction conditions.	rotary drilling.		((nently sealed with drilling mud or cement grout. See Note 1	me	
	- !		Į	1 .	conditions.	l		l		i I	below. Also see Appendix.	w	
	i			ļ		1		}	i .	i i	octor rate oct appendix.	ir	
-			<u> </u>	 	 	 		ļ				c	
	e.	Sand or	Clay or similar	2"	Casing diame-	To the bottom of	2"	See	\	,	See (a-11) above for minimum casing depth requirements. With		
		gravel	material from the	\	ter plus 4"	the clay or a		Construc	{		cable tool drilling, the upper drillhole shall be kept 1/3	A) is	
	- !	<u></u>	ground surface to	1	with cable	minimum of 20'		tion	1		filled with clay slurry throughout the driving of the perms-	pa	
	- 1		varying depths.]		whichever is the	ľ	Condi-	1	1	nent well casing. The balance of the annular space shall be	CC ha	
4	1		1	\		lesser with ca-		tions	1	1	filled with clay slurry or cement grout. With rotary	NF	
	- [1 .	ter plus 2"	ble tool drill-		ł	i	[drilling the upper enlarged drillhole shall be maintained at	-11	
	- !			1	with rotary	ing. To the		1	1	1	rull diameter with drilling mud and the annular space shall be permanently sealed with drilling mud or cement grout.		
	i		'	1		depth of casing		1	1	•	See Note 1 below. Also see Appendix.		
	i		}	1		setting with		<u> </u>	1	,	See note I perow. WIRO see whilehory.		
	Ì				conditions.	rotary drilling		L	l	L			

a,b,c Protective well casing placed in an upper en-larged drillhole only 2" greater in diameter than the nominal well casing pipe diameter, as is only permissible with rotary-sir drilling, shall be assembled with welded joints and scaled in place with drilling mud or cement grout placed in the ennular share by a suitable pump from the estrom of the casing upward.

An adequate screen shall be provided where necessary. It shall be installed in such manner that removal or replacement can be accomplished without adversely affect-ing the watertight construction of the well.

Approval from the Department is required for a gravelpack well construction in conformance with Section NR 112.04.

NOTE 1. Greater depth of casing is required in areas where well histories show that the vertical zone of contamination extends to a greater depth.
NOTE 2. Some drillers construct an enlarged upper drillhole to a depth of several feet with cable tool equipment by choice under geologic conditions of column 3, line a, to facilitate use of long lengths of pipe.

MAXIMUM

NOMINAL

LINER

PROTECTIVE

DRILLED TYPE

REGULAR DRILLHOLE

BOTTOM

MINIMUM

MINIMIM

NOMINAL

CASING

GEOLOGIC FORMATIONS DIAMETER

NATURE OF

FORMATION

CATER REARING

UPPER DRILLHOLE

MINIMIM

UPPER ENLARGED DRILLHOLE

MINIMIM

LOWER

DRILLHOLE

MINIMIM

WELL

WELL REQUIREMENTS

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NOTE 1. Casing only to rock under conditions of column 3, lines 4 & e and to the depth indicated in action 6, line 1 for condition of column 3, line 1, is only acceptable as a minimum when it is adequate to seal off the vertical zone of contamination. Greater depth of protective casing is required in areas where well histories show that the vertical zone of column 3, line 1, is only acceptable as a minimum when it is adequate to seal off the vertical zone of column 3, line 1, is only acceptable as a minimum when it is adequate to seal off the vertical zone of column 3. Line 1, is only acceptable as a minimum when it is adequate to seal off the vertical zone of column 3. Line 1, is only acceptable as a minimum when it is adequate to seal off the vertical zone of column 3. Line 1, is only acceptable as a minimum when it is adequate to seal off the vertical zone of column 3. Line 1, is only acceptable as a minimum when it is adequate to seal off the vertical zone of column 3. Line 1, is only acceptable as a minimum when it is adequate to seal off the vertical zone of column 3. Line 1, the 1, is only acceptable as a minimum when it is adequate to seal off the vertical zone of column 3. Line 1, the 1, is only acceptable as a minimum when it is adequate to seal off the vertical zone of column 3. Line 1, the 1, is only acceptable as a minimum when it is adequate to seal off the vertical zone of column 3. Line 1, the 2, the 2 line 1, the 2 li

NOTE 3. Although the carbonate rocks in this state are primarily dolomites, the term limestone has been given to them in the well construction specifications because it is the common term given to them by drillers.

t			DRILLED TYPE WELL REQUIREMENTS								
1	2	3	14					9	10	11	
	! \		MINIMUM		UPPER DRILLHOL			LOWER	MAXIMUM		
	INATURE OF		LAKIMON		GED DRILLHOLE	REGULAR	DRILLHOLE	DRILLHOLE	NOMINAL		
•	MATER BEARDIS		CASING	5	6	7	8		PROTECTIVE	•	
		GEOLOGIC FORMATIONS		MUNIMUM	MINIMUM	MINIMUM	BOTTOM	WELL	LINER		
<u> </u>	(AQUIFER)	OVERLYING AQUIFER	INCHES	DIAMETER	DEPTH		ELEVATION	DIAMETER	DIAMETER	CONSTRUCTION CONDITIONS	
ĕ٠			6"					6"	2" less	The protective well casing pipe shall be firmly seated in	
	(See Note 3)	terials, mainly	į .		with cable tool		struc-		than the	the shale formation. When an upper enlarged drillhole is	
		sand or gravel, to	1	one is con-	drilling. To		tion		lower	constructed with cable tool equipment, the annular space	
	1	depth of at least	ł		shale with	drilling.			drillinole	shall be filled with clay slurry or cement grout placed in	
	1	40' to a radius of	l	cable tool		1	tions.		diameter.	an approved manner. See Note 2 below. With rotary drilling,	
		⅓ mile.		drilling. See		applica-		İ	j	the upper enlarged drillhole shall be maintained at full	
	·		\	construction		ble with	\		1	diameter with drilling mud or temporary well casing and the	
			į	conditions.		rotary			1	annular space shall be permanently sealed with drilling mud	
	ļ		1	Casing diame-		drilling.	1	*	1	or cement grout, except that only cement grout shall be used	
	!			ter plus 2"		ı	-		1	when the upper enlarged drillhole is constructed more than	
		•	1	with rotary		1	!		ł	2' into the shale. The vertical zone of contamination must	
			1	drilling.		I	ĺ		i	be sealed off. See Note 1 below. Also see Appendix.	
			i			1	`		1	• •	
h.	Shale	Clay or similar ma-	6"	Casing diame-	To the bottom	5" with	See con-	6"	2" 1088	The protective well casing pipe shall be firmly seated in	
		terial or such	ľ	ter plus 4"			atrue-		than the	the shale formation. With cable tool drilling, the upoer	
		materials with some		with cable	to the 20' depth		tion		lower	enlarged drillhole shall be kept open with temporary well	
		sand and gravel	1	tool drilling.	whichever is the		condi-		drillhole	casing, when necessary, and shall be kept 1/3 filled with	
		zones to a depth of				Not	tions.		diameter.	clay slurry throughout the driving of the protective casing.	
	1	at least 40 feet to		ter plus 2"		applica-		j j		The balance of the annular space shall be filled with clay	
		a radius of & mile.		with rotary		ble with	i l			slurry or cement grout applied in an approved manner. Con-	
			i			rotary			ł	struction conditions for drilling with rotary equipment are	
		İ		construction		drilling.				the same as above for line g. The vertical zone of contami-	
		i	1	conditions.		1				nation must be sealed off. See Note 1 below. Also see	
		1								Appendix.	
							1				
1.	Shale	Unconsolidated ma-	6"	Casing diame-	40 feet	Not	See con~	6"	2" less	The upper enlarged drillhole through caving formations above	
	(See Note 3)	terials or limeston	ė	ter plus 4"			struc-		than the	the rock shall be kept open by temporary well casing with	
	1	with or without un-	ļ	with cable		ble	tion		lower	cable tool drilling and by such casing or drilling mud with	
		consolidated forma- tions above to a		tool drilling.			condi-			rotary drilling. If the unconsolidated formation over the	
	1	depth of less than		Casing diame-			tions.	ĺ	diameter.	rock is clay or material which will similarly stand open,	
		40' within a radius	}	ter plus 2"	ļ	1]	i 1	i	with rotary drilling the drill cuttings preferably shall be	
	i	of 1/2 mile. No	l .	with rotary			j			removed by mud but use of air will be permitted for such	
	j	record of abandoned		drilling. See						geologic formations. The annular space surrounding the well	
	1	wells or test holes	1	construction	[į į	' [i	casing shall be permanently filled with cement grout. The	
		within the area.)	conditions.			ι Ι	. 1		vertical zone of contamination must be sealed off. See Note 1 below. Also see Appendix.	
		Annual Control of the								1 below. Also see Appendix.	

NOTE 1. Casing only to shale under conditions of column 3, lines g & h and to the depth indicated in column 6, line 1, is condition of column 3, line 1, is only acceptable as a minimum when adequate to seal off the vertical zone of contamination. Greater depth of protective easing is required in areas where will histories show that the vertical zone of contamination extends to a greater depth.

NOTE 2. Some drillers construct an enlarged upper drillhole with cable tool drilling equipment by civice under geologic conditions of column 3, line g, to facilitate use of longer lengths of pipe.

NOTE 3. Wells normally shall not be developed into a shale formation. Such constructions are limited primarily to "Maquoketa" shale where the limestone is missing or very thin but only when the shale is known to be firm enough so that the drillhole will remain open and the water therefrom is not turbid. These wells may occur along the western edge of the Niagara dolomite extending from Door County to the Illinois border, at Blue Mound, at the Platteville Mound and in the Sinsinawa area in Grant County. Shale wells under similar geologic conditions in other areas of the state where overlying rock is missing or thin will also be acceptable.

g,h
Protective well casing pipe
placed in an upper enlarged
drillhole only 2" greater
in diameter than the nominal
well casing pipe diameter,
as is only permissible with
rotary-air drilling, shall
be assembled with welded
joints and sealed in place
with drilling mud or cement
grout placed in the annular
space by a suitable pump
from the bottom of the
casing upward.

g,h,i Protective liner pipe shall be assembled with welded joints, placed concentrically within the drillhole and scaled in place with cement grout placed by a suitable pump or other approved method from the bottom of the liner pipe upward.

The upper enlarged drillhole dismeter need be only 2" greater than the nominal well casing pire dismeter when the well casing pire dismeter when the well casing pipe is assembled with welded jointo and in the cement grout is placed in the campular srace by a suitable pump or other approved pressure method from the bottom of the casing upward.

TABLE I DRILLED TYPE WELL REQUIREMENTS

ř.						DUTTIE	SD TIFE	MELL VEC		3													
- :	2	3	MINIMUM		MANAGEMENT STATE			LOWER	MAXIMUM	11													
	HATTRE OF		NOMINAL	UPPER ENLARGE	D DRILLHOLE	REGULAR I	RILLHOLE	DRILLHOLE	NOMINAL														
	WATER BEARING		CASING	5	6	7	8		PROTECTIVE														
	FIRMATIN	GEOLOGIC FORMATIONS	DIAMETER	MINIMUM	MINIMUM	MINIMUM	BOTTOM	WELL	LINER														
73		OVERLYING AQUIFER	INCHES	DIAMETER	DEPTH		ELEVATION	DIAMETER	DIAMETER	CONSTRUCTION CONDITIONS													
	Frantite or quartiite See Note 1)		6"	one is con-	with cable tool. To rock with rotary drilling.	cable		6"	2" less than the lower drillhole diameter.	The protective well casing pipe shall be firmly seated in the rock formation. When an enlarged upper drillhole is constructed with cable tool equipment, the annular space shall be filled with clay slurry or cement grout placed in an approved manner. See Note 2 below. With rotary drilling equipment, the upper enlarged drillhole shall be maintained at full diameter with drilling mud or temporary well casing and the annular space shall be permanently sealed with drilling mud or cement grout, except that only cement grout shall be used when the upper enlarged drillhole is constructed more than 2' into the granite. The vertical zone of contamination must be sealed off. See Note 3 below. Also see Appendix.	j,k Protective well c placed in an uppe drillhole only 2" in diameter than well cesing pipe as is only permis rotary-air drilli be assembled with joints and sealed with drilling mud grout placed in t space by a suitab												
1	. Granite or Justizite (See Note 1)	Clay or similar material or such meterials with some sand and gravel zones to a depth of at least 40 to a radius of ½ mile.	İ		lesser with cable tool drilling. To	6" with cable tool drilling Not applicable with rotary drilling		6"	2" less than the lower drillhole diameter.	The protective well easing pipe shall be firmly seated into the rock formation. With cable tool drilling the upper enlarged drillhole shall be kept open with temporary well casing, when necessary, and shall be kept 1/3 filled with clay slurry throughout the driving of the protective casing. The balance of the annular space shall be filled with clay slurry or cement grout applied in an approved manner. Construction conditions for drilling with rotary equipment are the same as above for line j. The vertical zone of contamination must be sealed off. See Note 3 below. Also see Appendix.	from the bettern of casing upward. j,k,l Protective liner be assembled with joints, placed co cally within the and seeled in placement grout place suitable pump or approved method foottom of the lin upward.												
	. Tranite or quartitie (See Note 1)	Unconsolidated materials for depth less than 40' within a radius of	6"	Casing diameter plus h" with cable tool drilling. Casing diameter plus 2" with rotary drilling. Sec construction conditions.		Not applica- ble.		6"	2" less than the lower drillhole diameter.	Normally 40° of pipe is required to seal off the vertical zone of contamination. An attempt shall be made to obtain water below 40° and at least to a depth of 75° even though water in quantity may be encountered during drilling at a depth above 40°. Should an adequate vater producing zone not be encountered below 40° and down to a depth of 75° or lower, consideration may be given by the Department to permit production of the vater above 40°. Department approval is required for such well. Other construction conditions are the same as for line f. The vertical zone of contamination must be sealed off. See Note 3 below. Also see Appendix.	The upper enlarge dismeter need be greater than the casing pipe diame well casing ripe with velded Joint cement grout is p annular space by pump or other arrangement of the casing upper of the casing upper proper		NOTE L. Crysta	lline rocks are classe	d as grani	te because they	are commonly refer	red to as	oranite by	drillers rec	rdless of t	heir true rock type. This includes trap rock.	

casing ripe oper enlarged 2" greater an the nominal e diameter, issible with lling, shall ith welded led in place ud or cement the annular able pump of the

er pipe shall th welded concentrie drillhole lace with aced by a or other from the liner ripe

rged drillhole be only 2" he nominal well ameter when the pe is assembled ints and the s placed in the y a suitable approved pres-om the bottom upward.

NOTE 1. Crystalline rocks are classed as grante because they are commonly referred to as grante by drillers regardless of their true rock type. This includes trap rock.

NOTE 2. Some drillers construct an enlarged upper drillhole with cable tool equipment by choice under geologic conditions of column 3, line j, to facilitate use of longer lengths of pipe.

NOTE 3. Casing only to rock under conditions of column 3, lines j & hand to the depth indicated in column 6, line l, for condition of column 3, line l, is only acceptable as a minimum when it is adequate to seal off the vertical zone of contamination. Greater depth of protective casing is required in areas where well histories show that the vertical zone of contamination extends to a greater depth.

-							DRILLE		WELL REQU	JIREMENT)	·
=	YFE	(AQUIFER) Sandstone	GEOLOGIC FORMATIONS OVERLYING AQUIFER Unconsolidated materials mainly sand and gravel to a depth of 25' or more.	MIRIMUM NOMINAL CASING CASING DIAMETER INCHES	one is con- structed with	6 MINIMUM DEPTH None required with cable tool. Into firm sand— stone with rotary drilling.	REQULAR 7 MINIMUM DIAMETER 6" with	DRILLHOLE 8 BOTTOM ELEVATION See con- struction condi- tions.	9 LOWER DRILLHOLE MINIMUM WELL DIAMETER	10 MAXIMUM NOMINAL PROTECTIVI LINER DIAMETER 2" less than the lower	CONSTRUCTION CONDITIONS The protective well casing pipe shall be firmly seated in the rock formation. When an upper enlarged drillhole is constructed with cable tool equipment, the annular space shall be filled with clay slurry or cement grout placed in an approved manner. See Note 2 below. With rotary drilling, the upper enlarged drillhole shall be maintained at full diameter with drilling mud or with temporary well casing and the annular space shall be permanently sealed with drilling mud or cement grout, except that only cement grout shall be used when the upper enlarged drillhole is constructed more than 2' into the sandstone. The vertical zone of contamination must be sealed off. See Note 1 below. Also see Appendix.	m,n Protective well casing gipe placed in an upper enlarged drillhole only 2" greater in dismeter than the norinal well casing pipe diameter, as is only permissible with rotary-air drilling, shall be assembled with welded joints and sealed in place with drilling mud or cement grout placed in the ennular space by a suitable pump from the bottom of the
	n-	Sandstone	Clay or similar ma- terial or such ma- terial with some sand and gravel zones to depth of 25' or more.	6"	ter plus 4" with cable tool drilling. Casing diame- ter plus 2" with rotary drilling. See	To the bottom of the clay or to the 20' depth whichever is the lesser, with cable tool drill- ing. Into firm sandstone with rotary drilling.	tool drilling Not ap-		611	2" less than the lower drillhole diameter.	The protective well casing pipe shall be firmly seated in the rock formation. With cable tool drilling, the upper enlarged drillhole shall be kept open by temporary well casing, when necessary and shall be kept 1/3 filled with clay slurry throughout the driving of the protective casing. The balance of the annular space shall be filled with clay slurry or cement grout applied in an approved manner. Construction conditions for drilling with rotary equipment are the same as above for line m. The vertical zone of contamination must be sealed off. See Note 1 below. Also see Appendix.	caning upward. m,n,o Frotective liner pipe shall be assembled with welded joints, placed concentri- cally within the drillhole and sealed in place with cement grout placed by a suitable pump or other approved method from the bottom of the liner pipe upward.
			Any material except limestone to a depth of less than 25'.		ter plus 4" with cable tool drilling. Casing diame- ter plus 2" with rotary drilling. See construction conditions.		Not applicable		6"	diameter.	The upper enlarged drillhole through caving formations above the rock shall be kept open by temporary well casing with cable tool drilling and by such casing or drilling mud with rotary drilling. If the formation over the rock is clay or material which will similarly stand open, with rotary drilling the drill cuttings preferably shall be removed by mud but use of air will be permitted for such secloric formations. The annular space surrounding the protective well casing shall be permanently filled with cement grout. The vertical zone of contamination must be sealed off. See Note 1 below. Almo see Appendix.	o The upper enlarged drillhole diameter need be only 2" greater than the naminal well casing pipe diameter when well casing pipe is uncentral with welded joints and the cement grout is placed in the annular space by a suitable pump or other approved years are method from the bottom of the casing upward.

NOTE 1. Casing only to the depth indicated in column 6, lines m, n & o, for conditions of column 3, lines m, n & o, is only acceptable as a minimum when it is adequate to seal off the vertical zone of contamination extends to a greater depth.

NOTE 2. Some drillers construct

enlarged upper drillholes to a depth of several feet with cable tool equipment by choice under geologic conditions of column 3, line m, to facilitate use of longer lengths of pipe.

*						DRILLE	D TYPE I	VELL REQU	JIREMENTS	3	
1	2	3	4					9	10	11	
	1)	MINIMUM		UPPER DRILLHOLE			LOWER	MAXIMUM		
	NATURE OF		HOMENAL	UPPER ENLAR	GED DRILLHOLE	REGULAR I	DRILLHOLE	DRILLHOLE	NOMINAL		
	WATER BEARING		CASING	5	6	7	8	MUMINIM	PROTECTIVI	· .	•
	FORMADION	GEOLOGIC FORMATIONS			MINIMUM	MINIMUM	BOTTOM	WELL	LINER		•
<u> </u>		OVERLYING AQUIFER	INCHES	DIAMETER	DEPTH		ELEVATION	DIAMETER			
. 2.		Limestone to depth	6"		15' into firm	Not	1	6	2" less	The upper enlarged drillhole through caving formations above	PQ
		of 40' or less with	I		sandstone.	applica-		}	than the	the rock shall be kept open by temporary well casing with	Protective well casing pipe
	ĺ	pr without unconsol-		with cable		ble.			Lover	leable tool drilling and by such essing or drilling mud with!	placed in an upper enlarge;
		idated overburden	Į.	tool drilling.				į	drillhole	rotary drilling. If the formation over the rock is clay or	drillhole only 2" greater
		over the limestone.	1	Casing diame-	1	j	1	i	diameter	material which will similarly stand open, with rotary	in diameter than the numinal
	1	}	1	ter plus 2"		1	\ .	1	1	drilling the drill cuttings preferably shall be removed by	well casing pipe diameter,
	}	l .		with rotary	i	1	j	!	ł	mud but use of air will be permitted for such geologic	shall be assembled with
	1	ļ	ł	drilling. See	1	I	1	i	į.	formation. The annular space surrounding the protective	welded joints and sealed in
	!	i	1	construction		1	1	į.	ł	well casing shall be permanently filled with cement grout.	place with cement grout
	}	ł	1 .	conditions.	1	ł		1	ı	The vertical zone of contamination must be sealed off. See	placed in the annular
	}		\		ì	1	}	1	1	Note 2 below. Also see Appendix.	space by a suitable pump
_	1	ł	1			1	İ		l		from the bottom of the
-	l		1	i	1	1	ŀ	i	i		caning upward.
	1	1	ł	1	1	1		l	[
	1		1	1	1				1 +		Protective liner pite
		\	1	\$	l'	ł	} .		}	1	shall be assembled with
		t	ì		Į.	1	ļ	i	1	. 1	welded joints, placed
		1		1	1	1	1	i		, ,	concentrically within the
	}	1	1	}	1	ì	ì	1	1	1	drillhole and sealed in
	 	 	 		 	 			 	· .	place with cement grout
g.	Sandstone	limestone extending	6"	Casing diame-	40' or 10' into	Not	Į	6"	2" less	The upper enlarged drillhole diameter need be only 2"	placed by a suitable rump
	1	to a depth greater	1	ter plus 4"	uncreviced rock	applica-	.[i	than the	greater than the nominal well casing pipe diameter when	or other approved method
	1	than 40' with or	l.	with cable	below 30'.	ble.	1	1	lower	the well casing pipe is assembled with welded joints and	from the bottom of the
	1	without unconsoli-	ì	tool drilling.	}	1	١	}	drillhole	the cement grout is placed in the annular space by a	liner pipe upward.
		dated overburden	1	Casing diame-		i	1 .	1	diameter.	suitable pump or other approved pressure method from	
	ł .	over the limestone.	.i	ter plus 2"		l	l		l	the bottom of the casing upward.	
	1	1		with rotary	1	1]	i	f		
	1	1	1	drilling. See	ŀ	ļ	1		ĺ	i	
	1		1	construction		}	١.	1	}	.\	
	1	j		conditions.	ļ		1	1		1	

NOTE 1. Although the carbonate rocks in this state are primarily dolomites, the term limestone has been given to them in the well construction specifications because it is the common term given to them by the driffiers.

NOTE 2. Casing only to the depth indicated in column 8, lines p & q, is only acceptable as a minimum when it is adequate to seal off the vertical zone of contamination, Greater depth of protective casing is required in areas where well historica show that the vertical zone of contamination extends to a greater depth.

SECTION 7 - Section NR 112.17 (4) (a) 4. d. is amended to read:

d. Unless an approved-type above-ground discharge unit is installed as illustrated in figures 14 and 15, or the discharge pipe is installed above grade and drains back above grade into the well between pumping cycles, the pump discharge line and accessory equipment installed above grade shall be protected against freezing by insulation of structure and piping and installation of dependable heating facilities, preferably a thermostatically controlled type.

SECTION 8 - Figures 13, 14 and 15 are amended to read:

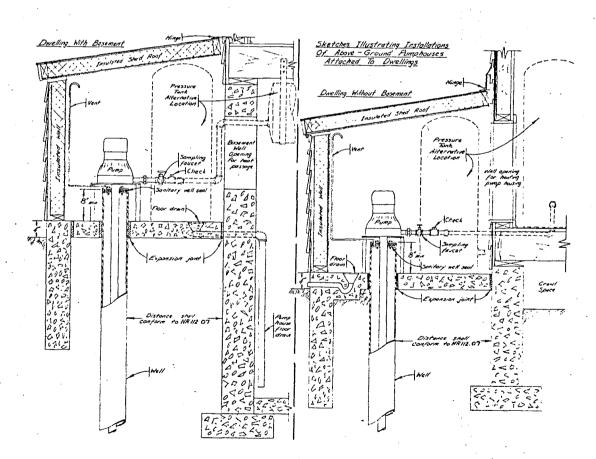


Figure 13. Insulated Pumphouse Adjoining a Dwelling.

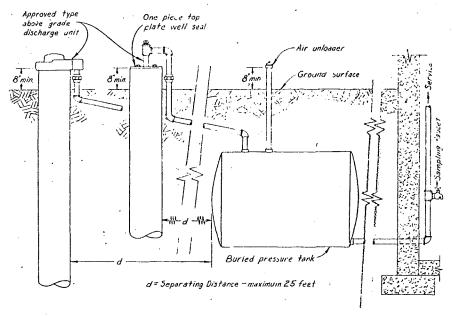


Figure 14. Pump Installations using Submersible Pumps and Approved Above-Ground Discharge Unit.

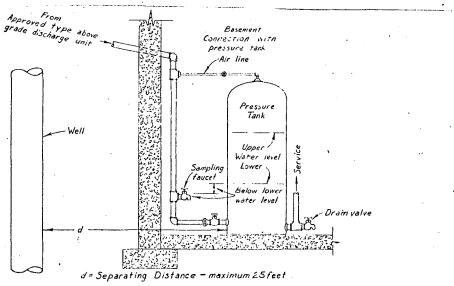


Figure 15. Alternative Pressure Tank Location with Submersible Pump Installation and Ypproved Above-Ground Discharge Unit.

The foregoing rules were approved and adopted by the State of Wisconsin Natural Resources Board on September 16, 1976.

The rules contained herein shall take effect upon publication.

21 January 1577

STATE OF WISCONSIN DEPARTMENT OF NATURAL RESOURCES

By Lulhon

thony S. Earl, Secretary

(SEAL)