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051104

Report on the Bacteriological  
Water Quality Monitoring of  
Door County Variance and  
Special Casing Approval  
Wells



051104

**REPORT ON THE BACTERIOLOGICAL WATER  
QUALITY MONITORING OF DOOR COUNTY  
VARIANCE AND SPECIAL CASING APPROVAL WELLS**

**July 1992**

**by**

**Keith Hutchison, District Water Supply Specialist**

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## **ACKNOWLEDGEMENTS**

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**Sue Beaumier for her many hours spent collecting the samples and reporting the results to the well owner.**

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**The Bureau of Water Resources Management for providing financial support throughout the Groundwater Fund.**

## **PURPOSE**

Between September 1971 and January 1990, approximately 1,500 variances and approvals, to install less than the required amount of protective well casing, were granted by the Department of Natural Resources for wells constructed in Door County, Wisconsin. This creates some concern about the safety of the wells. How effective are those wells in preventing bacteriological contamination from entering the water supply?

The main purpose of this project was to determine if the granting of variances and approvals resulted in the construction of wells producing bacteriologically unsafe water. This was accomplished by collecting water samples from 192 wells and submitting those samples to the State Laboratory of Hygiene in Madison for bacteriological analysis. In addition, samples were collected for analysis of nitrates, sulfates and iron to help characterize the aesthetic quality of the groundwater. Twelve of the 192 wells were selected for analysis of radium in the water. Radium is a radioactive element suspected of causing bone cancer. Half of the wells in the radium portion of the study obtained water from the deep aquifer (total well depths range from 580 to 735 feet) while the other half obtained water from the shallower aquifer (total well depths range from 90 to 201 feet).

## BACKGROUND

Door County, in northeastern Wisconsin, has long been recognized as an area where the groundwater resource is highly sensitive to events that occur at the ground surface. As a result, special requirements for the construction of drinking water wells have been enacted. These requirements have been in existence since 1958 and dictate that bedrock wells in Door County be constructed with greater than normal amounts of protective well casing. A typical bedrock well in other areas of the state would normally require at least 40 feet of protective well casing. All of Door County is currently zoned to require either 100 or 170 feet of protective well casing. There are some in between or "gray" areas where the well drillers must use 170 feet of casing unless they contact the Department and receive approval to use less casing for that specific well. These special casing areas were established in September of 1971 and also include a one mile extension southward into Kewaunee County.

What is so unusual about Door County to require such a significant increase in the amount of protective well casing needed? Most well water in the county is obtained from the Niagara dolomite aquifer. This is a highly fractured bedrock formation that varies considerably in thickness; anywhere from several feet to several hundred feet. Many parts of Door County have only a thin soil layer overlaying the bedrock. In some areas the bedrock is exposed and sinkholes, fractures and quarries provide easy access routes



for contamination to reach the groundwater. One only has to drive through the county and observe some of the road cuts to visualize how thin the soil layer is and how numerous and large the fractures are which run through the bedrock.

The lack of a significant soil layer over much of the county means that contaminants at or near the surface can reach the groundwater easier than in many other parts of the state. A thick soil layer would normally filter out the contaminants, but in Door County that filter is largely missing, and once the contaminants reach the dolomite formation, they can easily follow the fractures to the groundwater. This may likely create a more contaminated zone in the upper portions of the aquifer. Therefore, the Department requires the extra protective well casing as a means to obtain safe water from below these potentially contaminated zones.

Not all of Door County is equally susceptible to groundwater contamination. That is why we have the 100 foot zones, the 170 foot zones, and the "gray" areas. These zone distinctions are based primarily on the thickness of the surface soil layer. There are areas within Door County where a thick shale layer is close to the surface. This high shale area exists primarily in the western edge of the south half of the county and yields very little water. In that portion of the county, a well constructed according to the special casing requirements would have the casing extend into the shale and completely seal off all the available water in the upper dolomite aquifer.

There are other major disadvantages of extending the casing into the shale. One is that the result is usually a very deep and expensive well. Also, a layer of relatively unfractured dolomite exists below the shale. This layer yields very little water, and wells drilled down to this lower dolomite are often continued into the underlying sandstone aquifer in order to obtain sufficient water. Wells cased into the shale usually extend down to 500 or 600 feet, and sometimes down to almost 800 feet before obtaining water in the sandstone. The aesthetic water quality of those deeper wells is often poor with the water containing elevated levels of sulfates, hardness and sometimes iron. In addition, there is some concern that the deeper wells will produce water with naturally occurring radium.

Therefore, the Department grants variances from the required casing amounts to allow for water to be obtained from above the shale layer, or even from the upper portion of the shale, if that is the only water available. Some of the variances have allowed wells to be constructed with as little as 39 feet of protective well casing.

## METHODS

The selection of wells for sampling was intended to provide coverage over all of Door County. Field contacts were made with those persons who had been granted a variance or approval. Well water samples were collected at the time of the initial field contact. Table 1 in the Appendix gives an overall summary of the wells sampled and is sorted by township.

Some problems did arise in attempting to collect samples by having the initial contact in the field. A number of the wells we had hoped to sample were not available because many of the properties, being recreational, were not occupied during the week. We could not sample on weekends because of lack of mail service, which would cause the bacteria samples to become outdated. The field contacts also revealed that some of those persons that received variances or approvals did not drill a new well. We felt some obligation to offer to sample their existing wells. As a result, there is no construction information available on some of the wells in our data base. Seven persons had new wells drilled, but we could not locate construction logs. Those wells show up in the data tables with a casing amount, but no total depth or formation. Those casing depths are based on the original variance or approval and do not necessarily reflect the actual well construction.

In addition to covering the entire county on a geographical basis, it was intended to collect samples from wells with varying amounts of casing, not just those with relatively little casing. Some wells were purposely chosen that had 170 feet of casing, however, it turned out that more deeper cased wells were sampled than this author would like to have seen. 104 of the wells had 135 feet or more of casing. Out of those 104, there were 32 wells with 170 feet or more of casing. Only 20 wells with less than 100 feet of casing were sampled. Part of the shift to deeper cased wells can be attributed to our lack of access to those wells we desired to sample and which were unavailable because of weekend only use of the property. Also, even though some people had variances or approvals, they still constructed wells with the full required amount of casing. Future studies can be designed to be more selective by obtaining well construction information before a well is sampled, not after.

The actual collection of water samples was done according to standard sampling techniques. All samples were mailed to the State Laboratory of Hygiene (SLOH) in bottles provided by that Laboratory. Water was allowed to discharge from the sampled tap until the well pump ran through at least a full cycle before the sample was collected. A propane torch was used to sterilize each tap before collection of the bacteria sample. All samples were collected by the same Department employee, Sue Beaumier.

## RESULTS

A total of 192 wells were sampled as part of this project. The SLOH reported 26 (13.5%) of these wells to be bacteriologically unsafe based on the initial sample. (See Table 2 in Appendix). On a statewide basis the SLOH reports that 15% of the bacteria samples submitted for private wells are unsafe. On the surface, this compares favorably with the percentage of initial unsafes reported for the Door County project. It appears there are no more bacteriologically unsafe water samples from Door County than the rest of the state. One has to be careful in using the 15% figure from the SLOH because their results include samples from newly constructed wells, which can produce initial unsafe results in 25% of the samples. Also, people experiencing some sort of problem are more likely to use the SLOH. This would tend to increase the overall percentage of bacteriologically unsafe water samples.

The number of initial bacteriologically unsafe water samples is not as critical as the number of confirmed unsafes. Bacteriologically unsafe water samples were confirmed for 10 (5.2)% of the wells. Follow up bacteria samples for 15 of the wells were negative, while arrangements could not be made for a second follow up sample at one well, after the first check sample was received too late at the SLOH.

Why were bacteriologically safe reports received for 15 of the wells that were originally reported unsafe? An unsafe report can result from a number of factors. These are listed below in no order of importance:

1. The sample bottle was not sterile to start.
2. Bacteria were introduced into the bottle by touching the inside or setting the cap down.
3. Laboratory error.
4. The sample tap was not properly sterilized.
5. The well water actually contained bacteria.

One cannot determine from the report what the source of bacteria is.

When a second sample confirms the initial bacteriologically unsafe report, then one can reasonably assume that the bacteria is present in the well water. Our standard recommendation to the well owners with a second bacteriologically unsafe water sample was that they should batch chlorinate the well in an attempt to disinfect it. Sometimes bacteria can enter the well on a one time basis. We have documented cases where insects and small rodents have entered the well under the well cap. Batch chlorination and a vermin proof cap can correct the unsafe condition if the groundwater coming to the well is not contaminated. By having the well owners chlorinate their wells, we were

attempting to determine if the groundwater source was contaminated or if bacteria entered the well through a different route.

Unfortunately, of the 10 wells with confirmed unsafes, 6 of the owners choose not to follow up by chlorinating their wells. We did not collect any additional samples from those wells. One of these 6 wells is of unknown construction, but is believed to be an old, shallow well. This only leaves us with 4 confirmed unsafe wells to work with. Two of those wells were reported bacteriologically safe after one chlorination. The remaining two wells were more troublesome.

One troublesome well, with 42 feet of casing, was bacteriologically unsafe, even after several chlorinations. This is a good indication that the groundwater was contaminated. Two old wells on the property were discovered and properly abandoned. The bacteria counts in the new well went down and eventually several bacteriologically safe samples were obtained. Apparently the old wells were acting as a conduit for contamination to reach the aquifer, and once they were eliminated, the problem corrected itself.

The second troublesome well has 141 feet of casing and finally produced a bacteriologically safe sample after several chlorination attempts. The owners were reluctant to have further sampling done once they obtained the safe results. Perhaps they don't want to know if the well water reverted to an unsafe condition. This is the one

particular well that may have a groundwater contamination problem. Future studies should look at this well again and include nearby wells.

A look at the geographical distribution of the bacteriologically unsafe sample results show them to be widely scattered throughout the county. Unsafe results were reported for wells in 11 of the 13 townships involved in the project. Wells in the townships of Brussels and Sturgeon Bay did not have any reported unsafe results. Only 16 total wells were sampled in those 2 townships.

The closest we get to a bacteria "hotspot" occurs when we look at the confirmed unsafe results. The Township of Gardner accounts for only 13.5% of the total samples, but 40% of the confirmed unsafes. However, within the Township of Gardner these wells are not clustered, but are scattered. Four unsafe wells in a township do not really make that township a problem area, especially since 2 of those wells can be "eliminated". One is of unknown construction, but presumed to be very old and shallow. The other well is the one that tested bacteriologically safe after 2 old wells were properly abandoned. The owners didn't follow up with chlorination of the remaining 2 wells. So in reality, our only "hotspot" disappears.

One also needs to analyze the depth of casing in the wells with confirmed unsafes. Casing depths in the 10 wells range from 41 to 180 feet, with one well of unknown



construction. There does not appear to be any correlation between the depth of casing and confirmed unsafe test results. A quick look at Table 2 will confirm this.

The radium portion of this project involves only 12 wells, but produces significant results. Half of the wells chosen were shallow (90' to 201' total depth), while the other half were deep (580' to 735' total depth). Water samples from these wells were analyzed for radium (226 and 228). Radium is a naturally occurring element known to cause bone cancer. The purpose of the radium sampling is to determine if there is an increased risk of obtaining radium contaminated water by casing off the available water in the upper aquifer above the shale and then having to drill deep. This situation occurs primarily in the southwest part of Door County in the Townships of Gardner, Nasewaupsee and Union. One can then use this information to decide if it may be worth the risk of finding bacterial contamination in a shorter cased well, as opposed to finding radium contamination in a deeper well.

The results of the radium sampling (see Table 3 in Appendix) provide useful information. All the water samples from the 6 deep wells contain radium. Five of those samples contain radium in excess of the drinking water standard of 5 picocuries per liter (pCi/l) for combined radium 226 and 228. The combined radium values for those 5 wells range from 10.8 to 19.8 pCi/l. The sixth well had a combined radium value of 2.9 pCi/l. None of the water samples from the 6 shallow wells exceeded the 5 pCi/l standard. Only

2 of the shallow wells had any detectable levels of radium. The SLOH reported radium 226 at 1.1 and 2.0 pCi/l. Interestingly enough, these wells are the 2 deepest of the shallow wells.

Constructing a well with less casing in an attempt to obtain water above the shale may increase the potential for bacterial contamination. However, providing extra casing to protect against bacterial contamination, will result in a deep well and a high probability of radium contamination.

Another reason for wanting to avoid a well open to the shale formation is the likelihood of obtaining water high in sulfates. A total of 22 wells have water reported to exceed 200 parts per million (ppm) of sulfates. Nineteen of those wells are open to the shale formation, and another of unknown construction, had the highest sulfate concentration of 2100 ppm. (See Table 4 in Appendix)

Iron is a common problem in Door County with 111 (57.8%) of the water samples reported to exceed the aesthetic standard of 0.3 ppm. Six (3.1%) of the water samples exceeded an iron concentration of 5.0 ppm. There does not appear to be any correlation between iron concentrations and well depth. (See Table 5 in Appendix)

Surprisingly enough, there does not appear to be a nitrate problem in the ground water in Door County. One might expect that if bacteria have relatively easy access to the upper aquifer, then nitrates would too. However, 125 (65.1%) of the water samples were reported to contain no detectable levels of nitrate. Another 56 (29.2%) were reported to contain nitrate at a level of 5.0 ppm or less. Eight (4.2%) samples were reported between 5 and 10 ppm and only 3 (1.5%) exceeded the 10 ppm drinking water standard. The 3 wells with the high levels of nitrate are cased relatively deep. They were reported to contain nitrates at levels of 21.8, 15.9 and 11.0 ppm, and constructed with 180, 171, and 145 feet of casing, respectively (See Table 6 in Appendix). All 3 of these wells were reported to be bacteriologically unsafe after the initial sample and the well with 180 feet of casing was confirmed unsafe. This indicates that there may be a problem with the integrity of well construction or there may be a significant contamination source nearby.

## CONCLUSIONS

The granting of casing variances and special approvals does not appear to be resulting in a verifiable increase in the construction of wells that are contaminated with bacteria because of the installation of lesser amounts of protective well casing. Of the 192 wells sampled, only 10 were reported to be confirmed bacteriologically unsafe. The owners of 6 of those wells did not follow up with the Department recommendation of chlorination and no further samples were collected. Perhaps if we had better cooperation from those well owners we could provide a more definitive conclusion. The remaining 4 wells did yield a bacteriologically safe water sample after 1 or more chlorinations.

The sample results definitely indicate that deep wells in the southwestern part of the county will most likely produce water contaminated with naturally occurring radium. In that area it may be prudent to attempt obtaining water above the shale. Why go deep at first, when a deep well is much more expensive and likely to contain radium? A deep well can always be drilled to replace a shallow one contaminated with bacteria. Because reducing the amount of casing can increase the risk of bacteriological contamination, one must still be cautious and not allow just any amount of casing in an attempt to obtain water above the shale.

## **RECOMMENDATIONS**

The Department should continue to grant casing variances and special approvals until future studies indicate otherwise. Currently there is not sufficient evidence to support any change.

Future studies will need to:

1. Establish a sampling history for wells with an initial bacteriologically unsafe sample. Quarterly sampling for at least one year is needed.
2. Sample wells in the vicinity of any well with a confirmed bacteriologically unsafe test result.
3. Determine construction of wells prior to sampling.
4. Concentrate more on wells with less than 100 feet of casing.
5. Expand the radium portion of this project by attempting to find and sample for radium, deep wells in other than the southwestern part of Door County.

**APPENDIX**

## Tables 1 through 6

Note: All laboratory results for inorganic parameters are reported in milligrams per liter, or parts per million.

Laboratory results for radium 226 and 228 are reported in picocuries per liter.

Casing amounts and total depth are reported in feet.

"Formation" column indicates what geologic formations the well is open to. The order of listing, for those wells open to more than one formation, is not of any significance.

LS = Limestone (Dolomite)

SH = Shale

SS = Sandstone

Copies of the laboratory results and well construction logs are available in the Water Supply office of the Departments' Lake Michigan District Headquarters.

Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
DM011	BECKER	BAILEYS HARBOR	147	241	LS	1.2	ND	6.0			
EF822	DUEMKE	BAILEYS HARBOR	153	201	LS	.05	.3	18.0			
AO658	HENNING	BAILEYS HARBOR	151	227	LS	.36	ND	10.6			
AP058	JUSTINEN	BAILEYS HARBOR				4.0	ND	5.6			
AO500	KROWAS	BAILEYS HARBOR	174	301	LS	ND	.5	13.4			
AO660	LURIE	BAILEYS HARBOR	146	282	LS	3.0	ND	15.6		YES	YES
AJ840	MIDDLETON	BAILEYS HARBOR	142	242	LS	6.3	ND	ND			
AO652	PARENT	BAILEYS HARBOR	163	342	LS	1.5	ND	10.8			
AJ845	REX	BAILEYS HARBOR	146	227	LS	.6	ND	ND			
AP057	SCHEPELZ	BAILEYS HARBOR	158	301	LS	.48	.2	11.1			
EF819	STARNES	BAILEYS HARBOR	145	242	LS	2.7	ND	ND			
DK866	TROLLER	BAILEYS HARBOR	146	261	LS	.08	ND	20.0		YES	NO
DM015	VANABLE	BAILEYS HARBOR	153	202	LS	.39	ND	12.0			
DK868	JADIN	BRUSSELS	170	280	LS	.29	ND	23.0			
AP170	LACROSSE	BRUSSELS	170			ND	5.7	20.9			
AO591	MACCOUX	BRUSSELS	140			ND	ND	57.0			
CE037	MASSART	BRUSSELS	63	155	LS	.28	8.8	45.0			
AP166	RASS	BRUSSELS	170	380	LS	1.2	ND	25.2			
AP169	THASE	BRUSSELS	130	164	LS	1.0	0.2	41.0			
AP163	VANDERTIE	BRUSSELS	160	226	LS	.92	ND	16.0			
DK870	VANDERTIE	BRUSSELS	170	235	LS/SHALE	.43	ND	8.0			
AP060	BOLAND	EGG HARBOR	157	262	LS	.25	ND	1400.0			
AP055	DESOTELLE	EGG HARBOR	142	300	LS	1.8	ND	100.0			
EF824	GROH	EGG HARBOR	141	197	LS	.29	1.6	41.0		YES	NO
DM020	ROZA	EGG HARBOR	141	227	LS	2.2	ND	31.0			
AO513	SKOOG	EGG HARBOR	135	190	LS	.29	3.4	16.1			
AO520	SOUKUP	EGG HARBOR	153	183	LS	.06	1.9	14.0			
AP054	SPUDE	EGG HARBOR	147	197	LS	.38	1.4	19.7			
EF823	STOWELL	EGG HARBOR	137	300	LS	.26	ND	780.0			
AO519	THOMAS	EGG HARBOR	135	174	LS	ND	2.8	20.4			

Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
DK863	WHITE	EGG HARBOR	138	280	LS/SHALE	ND	ND	880.0			
AO612	CHRISTENSON	FORESTVILLE	162	242	LS	.47	ND	2.9			
DJ754	KRUEGER	FORESTVILLE	150	205	LS	1.7	ND	11.0			
DK862	KRUEGER	FORESTVILLE	170			2.0	ND	11.0			
AP161	LECLOUX	FORESTVILLE	120	164	LS	1.3	ND	18.2			
AO614	MALVITZ	FORESTVILLE	170	305	LS	5.0	ND	40.0			
AP164	MRAZ	FORESTVILLE	110			2.2	ND	22.2			
AP168	NAZE	FORESTVILLE	125	279	LS	ND	ND	12.9			
EF828	PEDERSON	FORESTVILLE	100	235	LS	1.4	ND	15.0			
AP167	SCHIESSER	FORESTVILLE	140	224	LS	.59	ND	13.3		YES	YES
DM231	SCHUBERT	FORESTVILLE	170	235	LS	.14	2.8	21.0			
AP165	UECKER	FORESTVILLE	150	249	LS	.33	ND	8.2			
AO604	BISSEN	GARDNER	125	747	LS/SHALE	.37	ND	550.0			
CE043	BUG FIRESTATION	GARDNER	50	110	LS	3.7	ND	21.0			
AP162	COLUMB	GARDNER	80	690	LS/SHALE	.28	ND	64.0			
CE048	COUNARD	GARDNER	140	184	LS/SHALE	2.6	ND	7.0	2.0/<1.1	YES	NO
AO597	DAOUST	GARDNER	41	92	LS/SHALE	.06	2.1	46.0		YES	YES
AO599	DEBAUCHE	GARDNER				.10	ND	3.4			
AO613	EVENSON	GARDNER	50	101	LS/SHALE	.74	ND	74.0			
CA850	GEISE	GARDNER	91	125	LS	.18	6.8	13.7		YES	NO
DM012	GRAF	GARDNER	100	145	LS	.74	ND	10.0			
AO720	KROLL	GARDNER	180	695	LS/SS	ND	21.8	52.0		YES	YES
AW327	KUTIL	GARDNER	42	105	LS/SHALE	.80	.6	40.0			
AO598	LALUZERN	GARDNER				16.0	ND	15.4			
AO514	LAROCHE	GARDNER	101	677	LS/SHALE	1.6	ND	470.0			
CA849	MALVITZ	GARDNER	42	105	LS/SHALE	ND	8.0	19.6	<1.0 / <1.4	YES	YES
DJ751	MATHY	GARDNER	170	680	LS/SS/SH	7.2	ND	500.0	7.7 / 5.8		
DJ752	MATHY	GARDNER	170	680	LS/SS/SH	.68	ND	490.0			
DJ753	MATHY	GARDNER		40	LS	2.3	ND	69.0			
AO622	MOTQUIN	GARDNER				.42	ND	2100.0			
AO619	NUEVILLE	GARDNER	130	190	LS	ND	ND	4.5			



Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
A0600	SMITH	GARDNER	100	152	LS	.08	ND	24.0			
A0611	SYKES	GARDNER				.25	ND	510.0			
DK867	VANDERMAUSE	GARDNER				1.8	ND	15.0		YES	YES
A0716	WATTON	GARDNER	50	100	LS/SHALE	2.4	ND	88.0			
A0719	WELCH	GARDNER	170	640	LS/SS	2.4	ND	510.0			
AJ862	YEDICA	GARDNER	39	140	LS/SHALE	2.0	ND	140.0			
AW356	ZELLNER	GARDNER	195	650	LS/SHALE	.75	ND	520.0	8.3 / 5.5		
DM029	BUNTA	GIBRALTOR	141	227	LS	3.2	ND	120.0		YES	YES
A0656	DEBBINK	GIBRALTOR				ND	.2	20.8			
A0659	HAGGERTY	GIBRALTOR	154	180	LS	.06	.2	25.6			
CE502	JARMAN	GIBRALTOR	123	222	LS	.05	2.4	21.0			
A0657	LAUTER	GIBRALTOR	139	180	LS	.43	ND	17.9			
AX080	LOGERQUIST	GIBRALTOR	170	220	LS	.8	.3	16.0			
A0626	BAGNALL	JACKSONPORT	118	332	LS	.23	ND	10.0			
CW325	BERKNAHN	JACKSONPORT	120	220	LS	.07	ND	14.0			
A0711	CARMODY	JACKSONPORT	133	241	LS	1.3	ND	ND			
AH608	CUMMINGS	JACKSONPORT	175	257	LS	.24	ND	19.0			
A0629	DONOVAN	JACKSONPORT	133	242	LS	.32	ND	6.3		YES	YES
A0655	KIEHNAU	JACKSONPORT	135	157	LS	.15	.7	16.9			
A0628	KNOWLES	JACKSONPORT	155	212	LS	.33	ND	7.6			
A0651	LAMBIOTTE	JACKSONPORT	129	276	LS	ND	ND	7.4			
AF861	LAUTENBACK	JACKSONPORT	171	227	LS	.83	ND	10.0			
A0713	OLSON	JACKSONPORT	116	181	LS	1.6	ND	7.4			
A0712	SCHARRIG	JACKSONPORT	130	167	LS	.25	.2	17.9			
A0630	SCHNEIDER	JACKSONPORT	144	301	LS	1.0	ND	8.2		YES	NO
A0627	SKOBOW	JACKSONPORT	150	277	LS	.20	ND	6.6			
A0502	ABEGG	LIBERTY GROVE	142	221	LS	1.9	.2	8.8			
DM032	ALMAN	LIBERTY GROVE	152	203	LS	.19	ND	19.0			
DM018	ANDERSON	LIBERTY GROVE	170			.29	ND	26.0			
DM019	ANDERSON	LIBERTY GROVE	140	174	LS	.77	ND	18.0			
A0515	BECKSTROM	LIBERTY GROVE	147	197	LS	1.8	ND	21.8			

Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
EF827	BORT	LIBERTY GROVE	150	221	LS	ND	.4	100.0			
DM040	CANNON	LIBERTY GROVE	141	171	LS	3.3	ND	11.0			
DM021	CARLSON	LIBERTY GROVE	130			.33	.2	20.0			
A0509	COLLEY	LIBERTY GROVE	115	178	LS	3.5	ND	4.4		YES	YES
BJ460	COOPER	LIBERTY GROVE	154	181	LS	2.0	ND	28.0			
A0501	DETMER	LIBERTY GROVE	150	221	LS	ND	.2	10.4			
DM039	ERICKSON	LIBERTY GROVE	138	184	LS	.14	.5	16.0		YES	YES
A0503	EVENSON	LIBERTY GROVE	145	212	LS	1.1	.5	11.4			
DM028	GORDON	LIBERTY GROVE	147	203	LS/SHALE	ND	.6	77.0			
BJ226	HEIZER	LIBERTY GROVE	137	202	LS	2.3	1.9	11.0			
A0512	HOLMES	LIBERTY GROVE	100	150	LS	ND	.5	14.6			
A0510	KOPRIWA	LIBERTY GROVE	115	180	LS	4.3	ND	1.4			
A0507	LIECHTY	LIBERTY GROVE	134	237	LS	ND	.2	8.7			
DM016	MILLER	LIBERTY GROVE	155	182	LS	ND	ND	ND			
DM033	MOSS	LIBERTY GROVE				.96	.3	11.0			
EF826	NYE	LIBERTY GROVE				.26	ND	24.0			
DM013	PETERSON	LIBERTY GROVE	145			.14	11.0	16.0		YES	NO
DM037	RAYMOND	LIBERTY GROVE	137	201	LS	ND	ND	19.0			
DM036	ROGERS	LIBERTY GROVE	151	212	LS	1.2	ND	31.0		YES	NO
A0505	ROSENQUIST	LIBERTY GROVE	163	201	LS	.91	ND	20.2			
DM017	RUSY	LIBERTY GROVE	138	201	LS	ND	ND	20.0			
A0506	SIMPSON	LIBERTY GROVE				ND	1.3	12.2			
DM034	STENZEL	LIBERTY GROVE	165	183	LS	.07	1.1	14.0			
A0504	SZWEDA	LIBERTY GROVE	118	227	LS	1.8	.1	11.7			
DM030	TEETAERT	LIBERTY GROVE	135	197	LS	.67	ND	8.0		YES	NO
DM022	TELFER	LIBERTY GROVE	157	221	LS	2.8	ND	26.0			
EF825	TENBROEK	LIBERTY GROVE	148	227	LS	ND	ND	ND			
DM031	WEBORG	LIBERTY GROVE				.58	.3	16.0			
DM035	WICKMAN	LIBERTY GROVE	173	201	LS	ND	1.5	17.0			
AA960	BECKER	NASEWAUPEE	43	100	LS	2.2	ND	11.1			
A0609	BREMER	NASEWAUPEE	131	212	LS	6.3	ND	3.8			

Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
AA967	BRETL	NASEWAUPEE	171	224	LS	.1	15.9	46.0		YES	NO
AO606	BRICKNER	NASEWAUPEE				3.1	ND	15.0			
AO608	COISMAN	NASEWAUPEE	170	735	LS/SS/SH	3.8	ND	420.0	8.9 / 10.9		
DF896	DRYSDALE	NASEWAUPEE	102	201	LS/SHALE	.81	ND	10.1	1.1 / <1.1		
AO653	GUILLETTE	NASEWAUPEE				.49	ND	4.6			
AO610	KUZMA	NASEWAUPEE	151	174	LS	2.4	ND	12.8			
CA865	LENIUS	NASEWAUPEE	60	155	LS	.74	ND	13.2	<1.0 / <1.2		
AX060	MACCOUX	NASEWAUPEE	170	280	LS	.06	.2	13.0			
EF821	NELLIS	NASEWAUPEE	110	124	LS	4.2	ND	ND			
AO618	O'CONNOR	NASEWAUPEE	133	244	LS/SHALE	.76	ND	16.2			
AO516	SCHUMACHER	NASEWAUPEE	155	219	LS	.71	ND	10.9			
AO607	SHANK	NASEWAUPEE	61	122	LS	.69	ND	10.6			
DK865	VILLERS	NASEWAUPEE	171	244	LS	.2	1.3	24.0			
AO623	WAGNER	NASEWAUPEE	125	190	LS	2.3	ND	9.4			
AA952	WALRAVEN	NASEWAUPEE	185	708	LS/SHALE	5.9	ND	570.0	1.4 / 1.5		
AO605	WECKLER	NASEWAUPEE	140	190	LS	3.3	ND	2.6			
AO654	WITCZAK	NASEWAUPEE	175	730	LS/SHALE	2.0	ND	440.0			
DK864	WORLEY	NASEWAUPEE	170	220	LS	8.0	ND	11.0			
AW355	ALVIN	SEVASTOPOL	130	218	LS	.08	6.2	18.0			
AO620	BELLIN	SEVASTOPOL	130	207	LS	.25	ND	7.5			
AO518	BORKOVETZ	SEVASTOPOL	130	159	LS	ND	5.5	17.7			
AO621	BUERGERMEISTER	SEVASTOPOL	130	190	LS	.05	1.2	18.2		YES	?
DJ757	DHINE	SEVASTOPOL				1.3	1.3	13.0			
DM027	HANSEN	SEVASTOPOL	133	212	LS	1.7	ND	18.0			
BJ122	HISLOP	SEVASTOPOL	150	187	LS	.15	4.4	19.0			
DK869	IVERSON	SEVASTOPOL	147	212	LS	ND	.9	10.0			
AP056	JONES	SEVASTOPOL	135	204	LS	.29	.3	17.4			
AO624	JUNION	SEVASTOPOL	140	205	LS	.32	.5	11.4			
CK119	NEMETH	SEVASTOPOL	142	220	LS	.09	4.9	19.0		YES	NO
DJ760	REIMER	SEVASTOPOL	130	157	LS	.14	1.1	17.0			
DJ759	SCHACHT	SEVASTOPOL	135	197	LS	.06	2.1	20.0			

Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
DJ758	SHEETS	SEVASTOPOL	152	185	LS	ND	5.4	20.0			
DB620	THALER	SEVASTOPOL	172	221	LS	.44	2.2	16.0			
A0625	VADNAIS	SEVASTOPOL	150	234	LS	.11	1.1	11.5			
A0616	BURLO	STURGEON BAY	110	187	LS	.57	ND	5.1			
DM024	GROENFELDT	STURGEON BAY	170	324	LS	ND	1.2	17.0			
DM025	JORGENSEN	STURGEON BAY	100	245	LS	.08	3.5	20.0			
CJ126	LAMER	STURGEON BAY	174	221	LS	.81	1.1	15.0			
A0615	LIEBERG	STURGEON BAY	135	189	LS	.12	ND	7.7			
DM026	NUEBAUER	STURGEON BAY	100	205	LS	.05	1.0	12.0			
A0617	PEDERSON	STURGEON BAY				2.7	ND	4.3			
DJ756	ROBERTSON	STURGEON BAY	110	230	LS	.51	.2	7.0			
A0593	BAUDHUIN	UNION	120	790	LS/SHALE	.12	ND	70.0			
A0715	BUYENS	UNION	71	90	SHALE	1.2	ND	380.0	<1.0 / <1.0		
AW351	DEGRAVE	UNION	105	144	LS	.09	3.3	16.2	<1.0 / <1.0		
A0595	DESTREE	UNION	170	579	LS/SS/SH	.93	ND	890.0			
A0592	DRAIZE	UNION	100	175	LS	4.3	ND	88.0			
A0602	GRATHEN	UNION	70	104	LS/SHALE	3.7	ND	210.0			
A0717	HEINTZKILL	UNION	160	625	LS/SS/SH	1.3	ND	280.0	4.5 / 6.3		
A0596	LAZERNE	UNION	170			ND	7.0	23.4			
A0603	NANION	UNION	72	104	SHALE	.65	ND	100.0		YES	NO
A0601	PURNELL	UNION	80	568	LS/SS/SH	.28	ND	320.0			
A0517	RASS	UNION	100	624	LS/SHALE	.30	ND	330.0			
A0718	RENARD	UNION	150	580	LS/SHALE	2.4	ND	300.0	9.1 / 7.1		
AG236	SEROOGY	UNION	101	183	LS/SS	4.4	ND	3.5			
DM038	STOER	UNION		52		.45	ND	110.0			
A0594	VANDEVEN	UNION	80	724	LS/SHALE	.33	ND	390.0		YES	NO
A0494	ARENDS	WASHINGTON ISLAND	126	202	LS	.9	ND	8.9			
AH628	BERQUIST	WASHINGTON ISLAND	136	242	LS	1.5	ND	14.2			
A0491	CONKLYN	WASHINGTON ISLAND	146	200	LS	.07	ND	7.7			
A0492	DAVIES	WASHINGTON ISLAND	113	161	LS	.05	.4	12.4		YES	NO
A0496	GREENFELDT	WASHINGTON ISLAND				.39	ND	7.7			

Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
AO497	JOHNSON	WASHINGTON ISLAND	170	217	LS	ND	.4	15.9		YES	NO
AO493	MAIKEN	WASHINGTON ISLAND	130	204	LS	.17	.7	14.3		YES	NO
AO495	OVERLY	WASHINGTON ISLAND	125	189	LS	1.6	ND	4.4			
DM014	SIKES	WASHINGTON ISLAND	132	222	LS	.07	ND	6.0			
AO498	STERMER	WASHINGTON ISLAND	146	301	LS	2.0	ND	10.2			
DB630	TEICH	WASHINGTON ISLAND	105	241	LS	.62	ND	9.0			
AO499	WORTHINGTON	WASHINGTON ISLAND	112	201	LS	1.2	ND	9.4			

## UNSAFE SAMPLED WELLS

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Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed	Comments
AO621	BUERGERMEISTER	SEVASTOPOL	130	190	LS	.05	1.2	18.2		YES	?	CK SAM OLD-OWNER DIDNOT RESCHEDULE
AO603	NANION	UNION	72	104	SHALE	.65	ND	100.0		YES	NO	
AO594	VANDEVEN	UNION	80	724	LS/SHALE	.33	ND	390.0		YES	NO	
CA850	GEISE	GARDNER	91	125	LS	.18	6.8	13.7		YES	NO	
AO492	DAVIES	WASHINGTON ISLAND	113	161	LS	.05	.4	12.4		YES	NO	
AO493	MAIKEN	WASHINGTON ISLAND	130	204	LS	.17	.7	14.3		YES	NO	
DM030	TEETAERT	LIBERTY GROVE	135	197	LS	.67	ND	8.0		YES	NO	
CE048	COUNARD	GARDNER	140	184	LS/SHALE	2.6	ND	7.0	2.0/<1.1	YES	NO	
EF824	GROH	EGG HARBOR	141	197	LS	.29	1.6	41.0		YES	NO	
CK119	NEMETH	SEVASTOPOL	142	220	LS	.09	4.9	19.0		YES	NO	
AO630	SCHNEIDER	JACKSONPORT	144	301	LS	1.0	ND	8.2		YES	NO	
DM013	PETERSON	LIBERTY GROVE	145			.14	11.0	16.0		YES	NO	
DK866	TROLLER	BAILEYS HARBOR	146	261	LS	.08	ND	20.0		YES	NO	
DM036	ROGERS	LIBERTY GROVE	151	212	LS	1.2	ND	31.0		YES	NO	
AO497	JOHNSON	WASHINGTON ISLAND	170	217	LS	ND	.4	15.9		YES	NO	
AA967	BRETL	NASEWAUPEE	171	224	LS	.1	15.9	46.0		YES	NO	
DK867	VANDERMAUSE	GARDNER				1.8	ND	15.0		YES	YES	NO FOLLOWUP BY OWNER-UNKNOWN CONST
AO597	DAOUST	GARDNER	41	92	LS/SHALE	.06	2.1	46.0		YES	YES	NO FOLLOWUP BY OWNER
CA849	MALVITZ	GARDNER	42	105	LS/SHALE	ND	8.0	19.6	<1.0 / <1.4	YES	YES	SAFE AFTER ABANDONING UNUSED WELLS
AO509	COLLEY	LIBERTY GROVE	115	178	LS	3.5	ND	4.4		YES	YES	SAFE AFTER 1 CHLORINATION
AO629	DONOVAN	JACKSONPORT	133	242	LS	.32	ND	6.3		YES	YES	SAFE AFTER 1 CHLORINATION
DM039	ERICKSON	LIBERTY GROVE	138	184	LS	.14	.5	16.0		YES	YES	NO FOLLOWUP BY OWNER
AP167	SCHIESSER	FORESTVILLE	140	224	LS	.59	ND	13.3		YES	YES	NO FOLLOWUP BY OWNER
DM029	BUNTA	GIBRALTOR	141	227	LS	3.2	ND	120.0		YES	YES	SAFE AFTER SEVERAL CHLORINATIONS
AO660	LURIE	BAILEYS HARBOR	146	282	LS	3.0	ND	15.6		YES	YES	NO FOLLOWUP BY OWNER
AO720	KROLL	GARDNER	180	695	LS/SS	ND	21.8	52.0		YES	YES	NO FOLLOWUP BY OWNER

## RADIUM SAMPLING RESULTS

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Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
CA849	MALVITZ	GARDNER	42	105	LS/SHALE	ND	8.0	19.6	<1.0 / <1.4	YES	YES
CA865	LENIUS	NASEWAUPEE	60	155	LS	.74	ND	13.2	<1.0 / <1.2		
AO715	BUYENS	UNION	71	90	SHALE	1.2	ND	380.0	<1.0 / <1.0		
DF896	DRYSDALE	NASEWAUPEE	102	201	LS/SHALE	.81	ND	10.1	1.1 / <1.1		
AW351	DEGRAVE	UNION	105	144	LS	.09	3.3	16.2	<1.0 / <1.0		
CE048	COUNARD	GARDNER	140	184	LS/SHALE	2.6	ND	7.0	2.0/<1.1	YES	NO
AO718	RENARD	UNION	150	580	LS/SHALE	2.4	ND	300.0	9.1 / 7.1		
AO717	HEINTZKILL	UNION	160	625	LS/SS/SH	1.3	ND	280.0	4.5 / 6.3		
DJ751	MATHY	GARDNER	170	680	LS/SS/SH	7.2	ND	500.0	7.7 / 5.8		
AO608	COISMAN	NASEWAUPEE	170	735	LS/SS/SH	3.8	ND	420.0	8.9 / 10.9		
AA952	WALRAVEN	NASEWAUPEE	185	708	LS/SHALE	5.9	ND	570.0	1.4 / 1.5		
AW356	ZELLNER	GARDNER	195	650	LS/SHALE	.75	ND	520.0	8.3 / 5.5		

Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
A0622	MOTQUIN	GARDNER				.42	ND	2100.0			
AP060	BOLAND	EGG HARBOR	157	262	LS	.25	ND	1400.0			
A0595	DESTREE	UNION	170	579	LS/SS/SH	.93	ND	890.0			
DK863	WHITE	EGG HARBOR	138	280	LS/SHALE	ND	ND	880.0			
EF823	STOWELL	EGG HARBOR	137	300	LS	.26	ND	780.0			
AA952	WALRAVEN	NASEWAUPEE	185	708	LS/SHALE	5.9	ND	570.0	1.4 / 1.5		
A0604	BISSEN	GARDNER	125	747	LS/SHALE	.37	ND	550.0			
AW356	ZELLNER	GARDNER	195	650	LS/SHALE	.75	ND	520.0	8.3 / 5.5		
A0611	SYKES	GARDNER				.25	ND	510.0			
A0719	WELCH	GARDNER	170	640	LS/SS	2.4	ND	510.0			
DJ751	MATHY	GARDNER	170	680	LS/SS/SH	7.2	ND	500.0	7.7 / 5.8		
DJ752	MATHY	GARDNER	170	680	LS/SS/SH	.68	ND	490.0			
A0514	LAROCHE	GARDNER	101	677	LS/SHALE	1.6	ND	470.0			
A0654	WITCZAK	NASEWAUPEE	175	730	LS/SHALE	2.0	ND	440.0			
A0608	COISMAN	NASEWAUPEE	170	735	LS/SS/SH	3.8	ND	420.0	8.9 / 10.9		
A0594	VANDEVEN	UNION	80	724	LS/SHALE	.33	ND	390.0		YES	NO
A0715	BUYENS	UNION	71	90	SHALE	1.2	ND	380.0	<1.0 / <1.0		
A0517	RASS	UNION	100	624	LS/SHALE	.30	ND	330.0			
A0601	PURNELL	UNION	80	568	LS/SS/SH	.28	ND	320.0			
A0718	RENARD	UNION	150	580	LS/SHALE	2.4	ND	300.0	9.1 / 7.1		
A0717	HEINTZKILL	UNION	160	625	LS/SS/SH	1.3	ND	280.0	4.5 / 6.3		
A0602	GRATHEN	UNION	70	104	LS/SHALE	3.7	ND	210.0			
AJ862	YEDICA	GARDNER	39	140	LS/SHALE	2.0	ND	140.0			
DM029	BUNTA	GIBRALTOR	141	227	LS	3.2	ND	120.0		YES	YES
DM038	STOER	UNION		52		.45	ND	110.0			
A0603	NANION	UNION	72	104	SHALE	.65	ND	100.0		YES	NO
AP055	DESOTELLE	EGG HARBOR	142	300	LS	1.8	ND	100.0			
EF827	BORT	LIBERTY GROVE	150	221	LS	ND	.4	100.0			
A0592	DRAIZE	UNION	100	175	LS	4.3	ND	88.0			
A0716	WATTON	GARDNER	50	100	LS/SHALE	2.4	ND	88.0			



Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
DM028	GORDON	LIBERTY GROVE	147	203	LS/SHALE	ND	.6	77.0			
AO613	EVENSON	GARDNER	50	101	LS/SHALE	.74	ND	74.0			
AO593	BAUDHUIN	UNION	120	790	LS/SHALE	.12	ND	70.0			
DJ753	MATHY	GARDNER		40	LS	2.3	ND	69.0			
AP162	COLUMB	GARDNER	80	690	LS/SHALE	.28	ND	64.0			
AO591	MACCOUX	BRUSSELS	140			ND	ND	57.0			
AO720	KROLL	GARDNER	180	695	LS/SS	ND	21.8	52.0		YES	YES
AA967	BRETL	NASEWAUPEE	171	224	LS	.1	15.9	46.0		YES	NO
AO597	DAOUST	GARDNER	41	92	LS/SHALE	.06	2.1	46.0		YES	YES
CE037	MASSART	BRUSSELS	63	155	LS	.28	8.8	45.0			
AP169	THASE	BRUSSELS	130	164	LS	1.0	0.2	41.0			
EF824	GROH	EGG HARBOR	141	197	LS	.29	1.6	41.0		YES	NO
AO614	MALVITZ	FORESTVILLE	170	305	LS	5.0	ND	40.0			
AW327	KUTIL	GARDNER	42	105	LS/SHALE	.80	.6	40.0			
DM020	ROZA	EGG HARBOR	141	227	LS	2.2	ND	31.0			
DM036	ROGERS	LIBERTY GROVE	151	212	LS	1.2	ND	31.0		YES	NO
BJ460	COOPER	LIBERTY GROVE	154	181	LS	2.0	ND	28.0			
DM018	ANDERSON	LIBERTY GROVE	170			.29	ND	26.0			
DM022	TELFER	LIBERTY GROVE	157	221	LS	2.8	ND	26.0			
AO659	HAGGERTY	GIBRALTOR	154	180	LS	.06	.2	25.6			
AP166	RASS	BRUSSELS	170	380	LS	1.2	ND	25.2			
AO600	SMITH	GARDNER	100	152	LS	.08	ND	24.0			
DK865	VILLERS	NASEWAUPEE	171	244	LS	.2	1.3	24.0			
EF826	NYE	LIBERTY GROVE				.26	ND	24.0			
AO596	LAZERNE	UNION	170			ND	7.0	23.4			
DK868	JADIN	BRUSSELS	170	280	LS	.29	ND	23.0			
AP164	MRAZ	FORESTVILLE	110			2.2	ND	22.2			
AO515	BECKSTROM	LIBERTY GROVE	147	197	LS	1.8	ND	21.8			
CE043	BUG FIRESTATION	GARDNER	50	110	LS	3.7	ND	21.0			
CE502	JARMAN	GIBRALTOR	123	222	LS	.05	2.4	21.0			
DM231	SCHUBERT	FORESTVILLE	170	235	LS	.14	2.8	21.0			

Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
AP170	LACROSSE	BRUSSELS	170			ND	5.7	20.9			
AO656	DEBBINK	GIBRALTOR				ND	.2	20.8			
AO519	THOMAS	EGG HARBOR	135	174	LS	ND	2.8	20.4			
AO505	ROSENQUIST	LIBERTY GROVE	163	201	LS	.91	ND	20.2			
DJ758	SHEETS	SEVASTOPOL	152	185	LS	ND	5.4	20.0			
DJ759	SCHACHT	SEVASTOPOL	135	197	LS	.06	2.1	20.0			
DK866	TROLLER	BAILEYS HARBOR	146	261	LS	.08	ND	20.0		YES	NO
DM017	RUSY	LIBERTY GROVE	138	201	LS	ND	ND	20.0			
DM021	CARLSON	LIBERTY GROVE	130			.33	.2	20.0			
DM025	JORGENSON	STURGEON BAY	100	245	LS	.08	3.5	20.0			
AP054	SPUDE	EGG HARBOR	147	197	LS	.38	1.4	19.7			
CA849	MALVITZ	GARDNER	42	105	LS/SHALE	ND	8.0	19.6	<1.0 / <1.4	YES	YES
AH608	CUMMINGS	JACKSONPORT	175	257	LS	.24	ND	19.0			
BJ122	HISLOP	SEVASTOPOL	150	187	LS	.15	4.4	19.0			
CK119	NEMETH	SEVASTOPOL	142	220	LS	.09	4.9	19.0		YES	NO
DM032	ALMAN	LIBERTY GROVE	152	203	LS	.19	ND	19.0			
DM037	RAYMOND	LIBERTY GROVE	137	201	LS	ND	ND	19.0			
AO621	BUERGERMEISTER	SEVASTOPOL	130	190	LS	.05	1.2	18.2		YES	?
AP161	LECLOUX	FORESTVILLE	120	164	LS	1.3	ND	18.2			
AW355	ALVIN	SEVASTOPOL	130	218	LS	.08	6.2	18.0			
DM019	ANDERSON	LIBERTY GROVE	140	174	LS	.77	ND	18.0			
DM027	HANSEN	SEVASTOPOL	133	212	LS	1.7	ND	18.0			
EF822	DUEMKE	BAILEYS HARBOR	153	201	LS	.05	.3	18.0			
AO657	LAUTER	GIBRALTOR	139	180	LS	.43	ND	17.9			
AO712	SCHARRIG	JACKSONPORT	130	167	LS	.25	.2	17.9			
AO518	BORKOVETZ	SEVASTOPOL	130	159	LS	ND	5.5	17.7			
AP056	JONES	SEVASTOPOL	135	204	LS	.29	.3	17.4			
DJ760	REIMER	SEVASTOPOL	130	157	LS	.14	1.1	17.0			
DM024	GROENFELDT	STURGEON BAY	170	324	LS	ND	1.2	17.0			
DM035	WICKMAN	LIBERTY GROVE	173	201	LS	ND	1.5	17.0			
AO655	KIEHNAU	JACKSONPORT	135	157	LS	.15	.7	16.9			

Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
A0618	O'CONNOR	NASEWAUPEE	133	244	LS/SHALE	.76	ND	16.2			
AW351	DEGRAVE	UNION	105	144	LS	.09	3.3	16.2	<1.0 / <1.0		
A0513	SKOOG	EGG HARBOR	135	190	LS	.29	3.4	16.1			
AP163	VANDERTIE	BRUSSELS	160	226	LS	.92	ND	16.0			
AX080	LOGERQUIST	GIBRALTOR	170	220	LS	.8	.3	16.0			
DB620	THALER	SEVASTOPOL	172	221	LS	.44	2.2	16.0			
DM013	PETERSON	LIBERTY GROVE	145			.14	11.0	16.0		YES	NO
DM031	WEBORG	LIBERTY GROVE				.58	.3	16.0			
DM039	ERICKSON	LIBERTY GROVE	138	184	LS	.14	.5	16.0		YES	YES
A0497	JOHNSON	WASHINGTON ISLAND	170	217	LS	ND	.4	15.9		YES	NO
A0660	LURIE	BAILEYS HARBOR	146	282	LS	3.0	ND	15.6		YES	YES
A0598	LALUZERN	GARDNER				16.0	ND	15.4			
A0606	BRICKNER	NASEWAUPEE				3.1	ND	15.0			
CJ126	LAMER	STURGEON BAY	174	221	LS	.81	1.1	15.0			
DK867	VANDERMAUSE	GARDNER				1.8	ND	15.0		YES	YES
EF828	PEDERSON	FORESTVILLE	100	235	LS	1.4	ND	15.0			
A0512	HOLMES	LIBERTY GROVE	100	150	LS	ND	.5	14.6			
A0493	MAIKEN	WASHINGTON ISLAND	130	204	LS	.17	.7	14.3		YES	NO
AH628	BERQUIST	WASHINGTON ISLAND	136	242	LS	1.5	ND	14.2			
A0520	SOUKUP	EGG HARBOR	153	183	LS	.06	1.9	14.0			
CW325	BERKNAHN	JACKSONPORT	120	220	LS	.07	ND	14.0			
DM034	STENZEL	LIBERTY GROVE	165	183	LS	.07	1.1	14.0			
CA850	GEISE	GARDNER	91	125	LS	.18	6.8	13.7		YES	NO
A0500	KROWAS	BAILEYS HARBOR	174	301	LS	ND	.5	13.4			
AP167	SCHIESSER	FORESTVILLE	140	224	LS	.59	ND	13.3		YES	YES
CA865	LENIUS	NASEWAUPEE	60	155	LS	.74	ND	13.2	<1.0 / <1.2		
AX060	MACCOUX	NASEWAUPEE	170	280	LS	.06	.2	13.0			
DJ757	DHINE	SEVASTOPOL				1.3	1.3	13.0			
AP168	NAZE	FORESTVILLE	125	279	LS	ND	ND	12.9			
A0610	KUZMA	NASEWAUPEE	151	174	LS	2.4	ND	12.8			
A0492	DAVIES	WASHINGTON ISLAND	113	161	LS	.05	.4	12.4		YES	NO

Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
AO506	SIMPSON	LIBERTY GROVE				ND	1.3	12.2			
DM015	VANABLE	BAILEYS HARBOR	153	202	LS	.39	ND	12.0			
DM026	NUEBAUER	STURGEON BAY	100	205	LS	.05	1.0	12.0			
AO504	SZWEDA	LIBERTY GROVE	118	227	LS	1.8	.1	11.7			
AO625	VADNAIS	SEVASTOPOL	150	234	LS	.11	1.1	11.5			
AO503	EVENSON	LIBERTY GROVE	145	212	LS	1.1	.5	11.4			
AO624	JUNION	SEVASTOPOL	140	205	LS	.32	.5	11.4			
AA960	BECKER	NASEWAUPEE	43	100	LS	2.2	ND	11.1			
AP057	SCHEPELZ	BAILEYS HARBOR	158	301	LS	.48	.2	11.1			
BJ226	HEIZER	LIBERTY GROVE	137	202	LS	2.3	1.9	11.0			
DJ754	KRUEGER	FORESTVILLE	150	205	LS	1.7	ND	11.0			
DK862	KRUEGER	FORESTVILLE	170			2.0	ND	11.0			
DK864	WORLEY	NASEWAUPEE	170	220	LS	8.0	ND	11.0			
DM033	MOSS	LIBERTY GROVE				.96	.3	11.0			
DM040	CANNON	LIBERTY GROVE	141	171	LS	3.3	ND	11.0			
AO516	SCHUMACHER	NASEWAUPEE	155	219	LS	.71	ND	10.9			
AO652	PARENT	BAILEYS HARBOR	163	342	LS	1.5	ND	10.8			
AO607	SHANK	NASEWAUPEE	61	122	LS	.69	ND	10.6			
AO658	HENNING	BAILEYS HARBOR	151	227	LS	.36	ND	10.6			
AO501	DETMER	LIBERTY GROVE	150	221	LS	ND	.2	10.4			
AO498	STERMER	WASHINGTON ISLAND	146	301	LS	2.0	ND	10.2			
DF896	DRYSDALE	NASEWAUPEE	102	201	LS/SHALE	.81	ND	10.1	1.1 / <1.1		
AF861	LAUTENBACK	JACKSONPORT	171	227	LS	.83	ND	10.0			
AO626	BAGNALL	JACKSONPORT	118	332	LS	.23	ND	10.0			
DK869	IVERSON	SEVASTOPOL	147	212	LS	ND	.9	10.0			
DM012	GRAF	GARDNER	100	145	LS	.74	ND	10.0			
AO499	WORTHINGTON	WASHINGTON ISLAND	112	201	LS	1.2	ND	9.4			
AO623	WAGNER	NASEWAUPEE	125	190	LS	2.3	ND	9.4			
DB630	TEICH	WASHINGTON ISLAND	105	241	LS	.62	ND	9.0			
AO494	ARENDS	WASHINGTON ISLAND	126	202	LS	.9	ND	8.9			
AO502	ABEGG	LIBERTY GROVE	142	221	LS	1.9	.2	8.8			

Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
AO507	LIECHTY	LIBERTY GROVE	134	237	LS	ND	.2	8.7			
AO630	SCHNEIDER	JACKSONPORT	144	301	LS	1.0	ND	8.2		YES	NO
AP165	UECKER	FORESTVILLE	150	249	LS	.33	ND	8.2			
DK870	VANDERTIE	BRUSSELS	170	235	LS/SHALE	.43	ND	8.0			
DM030	TEETAERT	LIBERTY GROVE	135	197	LS	.67	ND	8.0		YES	NO
AO491	CONKLYN	WASHINGTON ISLAND	146	200	LS	.07	ND	7.7			
AO496	GREENFELDT	WASHINGTON ISLAND				.39	ND	7.7			
AO615	LIEBERG	STURGEON BAY	135	189	LS	.12	ND	7.7			
AO628	KNOWLES	JACKSONPORT	155	212	LS	.33	ND	7.6			
AO620	BELLIN	SEVASTOPOL	130	207	LS	.25	ND	7.5			
AO651	LAMBIOTTE	JACKSONPORT	129	276	LS	ND	ND	7.4			
AO713	OLSON	JACKSONPORT	116	181	LS	1.6	ND	7.4			
CE048	COUNARD	GARDNER	140	184	LS/SHALE	2.6	ND	7.0	2.0/<1.1	YES	NO
DJ756	ROBERTSON	STURGEON BAY	110	230	LS	.51	.2	7.0			
AO627	SKOBOW	JACKSONPORT	150	277	LS	.20	ND	6.6			
AO629	DONOVAN	JACKSONPORT	133	242	LS	.32	ND	6.3		YES	YES
DM011	BECKER	BAILEYS HARBOR	147	241	LS	1.2	ND	6.0			
DM014	SIKES	WASHINGTON ISLAND	132	222	LS	.07	ND	6.0			
AP058	JUSTINEN	BAILEYS HARBOR				4.0	ND	5.6			
AO616	BURLO	STURGEON BAY	110	187	LS	.57	ND	5.1			
AO653	GUILLETTE	NASEWAUPEE				.49	ND	4.6			
AO619	NUEVILLE	GARDNER	130	190	LS	ND	ND	4.5			
AO495	OVERLY	WASHINGTON ISLAND	125	189	LS	1.6	ND	4.4			
AO509	COLLEY	LIBERTY GROVE	115	178	LS	3.5	ND	4.4		YES	YES
AO617	PEDERSON	STURGEON BAY				2.7	ND	4.3			
AO609	BREMER	NASEWAUPEE	131	212	LS	6.3	ND	3.8			
AG236	SEROOGY	UNION	101	183	LS/SS	4.4	ND	3.5			
AO599	DEBAUCHE	GARDNER				.10	ND	3.4			
AO612	CHRISTENSON	FORESTVILLE	162	242	LS	.47	ND	2.9			
AO605	WECKLER	NASEWAUPEE	140	190	LS	3.3	ND	2.6			
AO510	KOPRIWA	LIBERTY GROVE	115	180	LS	4.3	ND	1.4			

Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
AJ840	MIDDLETON	BAILEYS HARBOR	142	242	LS	6.3	ND	ND			
AJ845	REX	BAILEYS HARBOR	146	227	LS	.6	ND	ND			
A0711	CARMODY	JACKSONPORT	133	241	LS	1.3	ND	ND			
DM016	MILLER	LIBERTY GROVE	155	182	LS	ND	ND	ND			
EF819	STARNES	BAILEYS HARBOR	145	242	LS	2.7	ND	ND			
EF821	NELLIS	NASEWAUPEE	110	124	LS	4.2	ND	ND			
EF825	TENBROEK	LIBERTY GROVE	148	227	LS	ND	ND	ND			

Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
A0598	LALUZERN	GARDNER				16.0	ND	15.4			
DK864	WORLEY	NASEWAUPEE	170	220	LS	8.0	ND	11.0			
DJ751	MATHY	GARDNER	170	680	LS/SS/SH	7.2	ND	500.0	7.7 / 5.8		
AJ840	MIDDLETON	BAILEYS HARBOR	142	242	LS	6.3	ND	ND			
A0609	BREMER	NASEWAUPEE	131	212	LS	6.3	ND	3.8			
AA952	WALRAVEN	NASEWAUPEE	185	708	LS/SHALE	5.9	ND	570.0	1.4 / 1.5		
A0614	MALVITZ	FORESTVILLE	170	305	LS	5.0	ND	40.0			
AG236	SEROOGY	UNION	101	183	LS/SS	4.4	ND	3.5			
A0510	KOPRIWA	LIBERTY GROVE	115	180	LS	4.3	ND	1.4			
A0592	DRAIZE	UNION	100	175	LS	4.3	ND	88.0			
EF821	NELLIS	NASEWAUPEE	110	124	LS	4.2	ND	ND			
AP058	JUSTINEN	BAILEYS HARBOR				4.0	ND	5.6			
A0608	COISMAN	NASEWAUPEE	170	735	LS/SS/SH	3.8	ND	420.0	8.9 / 10.9		
A0602	GRATHEN	UNION	70	104	LS/SHALE	3.7	ND	210.0			
CE043	BUG FIRESTATION	GARDNER	50	110	LS	3.7	ND	21.0			
A0509	COLLEY	LIBERTY GROVE	115	178	LS	3.5	ND	4.4		YES	YES
A0605	WECKLER	NASEWAUPEE	140	190	LS	3.3	ND	2.6			
DM040	CANNON	LIBERTY GROVE	141	171	LS	3.3	ND	11.0			
DM029	BUNTA	GIBRALTOR	141	227	LS	3.2	ND	120.0		YES	YES
A0606	BRICKNER	NASEWAUPEE				3.1	ND	15.0			
A0660	LURIE	BAILEYS HARBOR	146	282	LS	3.0	ND	15.6		YES	YES
DM022	TELFER	LIBERTY GROVE	157	221	LS	2.8	ND	26.0			
A0617	PEDERSON	STURGEON BAY				2.7	ND	4.3			
EF819	STARNES	BAILEYS HARBOR	145	242	LS	2.7	ND	ND			
CE048	COUNARD	GARDNER	140	184	LS/SHALE	2.6	ND	7.0	2.0/<1.1	YES	NO
A0610	KUZMA	NASEWAUPEE	151	174	LS	2.4	ND	12.8			
A0716	WATTON	GARDNER	50	100	LS/SHALE	2.4	ND	88.0			
A0718	RENARD	UNION	150	580	LS/SHALE	2.4	ND	300.0	9.1 / 7.1		
A0719	WELCH	GARDNER	170	640	LS/SS	2.4	ND	510.0			
A0623	WAGNER	NASEWAUPEE	125	190	LS	2.3	ND	9.4			

Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
BJ226	HEIZER	LIBERTY GROVE	137	202	LS	2.3	1.9	11.0			
DJ753	MATHY	GARDNER		40	LS	2.3	ND	69.0			
AA960	BECKER	NASEWAUPEE	43	100	LS	2.2	ND	11.1			
AP164	MRAZ	FORESTVILLE	110			2.2	ND	22.2			
DM020	ROZA	EGG HARBOR	141	227	LS	2.2	ND	31.0			
AJ862	YEDICA	GARDNER	39	140	LS/SHALE	2.0	ND	140.0			
AO498	STERMER	WASHINGTON ISLAND	146	301	LS	2.0	ND	10.2			
AO654	WITCZAK	NASEWAUPEE	175	730	LS/SHALE	2.0	ND	440.0			
BJ460	COOPER	LIBERTY GROVE	154	181	LS	2.0	ND	28.0			
DK862	KRUEGER	FORESTVILLE	170			2.0	ND	11.0			
AO502	ABEGG	LIBERTY GROVE	142	221	LS	1.9	.2	8.8			
AO504	SZWEDA	LIBERTY GROVE	118	227	LS	1.8	.1	11.7			
AO515	BECKSTROM	LIBERTY GROVE	147	197	LS	1.8	ND	21.8			
AP055	DESOTELLE	EGG HARBOR	142	300	LS	1.8	ND	100.0			
DK867	VANDERMAUSE	GARDNER				1.8	ND	15.0		YES	YES
DJ754	KRUEGER	FORESTVILLE	150	205	LS	1.7	ND	11.0			
DM027	HANSEN	SEVASTOPOL	133	212	LS	1.7	ND	18.0			
AO495	OVERLY	WASHINGTON ISLAND	125	189	LS	1.6	ND	4.4			
AO514	LAROCHE	GARDNER	101	677	LS/SHALE	1.6	ND	470.0			
AO713	OLSON	JACKSONPORT	116	181	LS	1.6	ND	7.4			
AH628	BERQUIST	WASHINGTON ISLAND	136	242	LS	1.5	ND	14.2			
AO652	PARENT	BAILEYS HARBOR	163	342	LS	1.5	ND	10.8			
EF828	PEDERSON	FORESTVILLE	100	235	LS	1.4	ND	15.0			
AO711	CARMODY	JACKSONPORT	133	241	LS	1.3	ND	ND			
AO717	HEINTZKILL	UNION	160	625	LS/SS/SH	1.3	ND	280.0	4.5 / 6.3		
AP161	LECLOUX	FORESTVILLE	120	164	LS	1.3	ND	18.2			
DJ757	DHINE	SEVASTOPOL				1.3	1.3	13.0			
AO499	WORTHINGTON	WASHINGTON ISLAND	112	201	LS	1.2	ND	9.4			
AO715	BUYENS	UNION	71	90	SHALE	1.2	ND	380.0	<1.0 / <1.0		
AP166	RASS	BRUSSELS	170	380	LS	1.2	ND	25.2			
DM011	BECKER	BAILEYS HARBOR	147	241	LS	1.2	ND	6.0			



Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
DM036	ROGERS	LIBERTY GROVE	151	212	LS	1.2	ND	31.0		YES	NO
A0503	EVENSON	LIBERTY GROVE	145	212	LS	1.1	.5	11.4			
A0630	SCHNEIDER	JACKSONPORT	144	301	LS	1.0	ND	8.2		YES	NO
AP169	THASE	BRUSSELS	130	164	LS	1.0	0.2	41.0			
DM033	MOSS	LIBERTY GROVE				.96	.3	11.0			
A0595	DESTREE	UNION	170	579	LS/SS/SH	.93	ND	890.0			
AP163	VANDERTIE	BRUSSELS	160	226	LS	.92	ND	16.0			
A0505	ROSENQUIST	LIBERTY GROVE	163	201	LS	.91	ND	20.2			
A0494	ARENDS	WASHINGTON ISLAND	126	202	LS	.9	ND	8.9			
AF861	LAUTENBACK	JACKSONPORT	171	227	LS	.83	ND	10.0			
CJ126	LAMER	STURGEON BAY	174	221	LS	.81	1.1	15.0			
DF896	DRYSDALE	NASEWAUPEE	102	201	LS/SHALE	.81	ND	10.1	1.1 / <1.1		
AW327	KUTIL	GARDNER	42	105	LS/SHALE	.80	.6	40.0			
AX080	LOGGERQUIST	GIBRALTOR	170	220	LS	.8	.3	16.0			
DM019	ANDERSON	LIBERTY GROVE	140	174	LS	.77	ND	18.0			
A0618	O'CONNOR	NASEWAUPEE	133	244	LS/SHALE	.76	ND	16.2			
AW356	ZELLNER	GARDNER	195	650	LS/SHALE	.75	ND	520.0	8.3 / 5.5		
A0613	EVENSON	GARDNER	50	101	LS/SHALE	.74	ND	74.0			
CA865	LENIUS	NASEWAUPEE	60	155	LS	.74	ND	13.2	<1.0 / <1.2		
DM012	GRAF	GARDNER	100	145	LS	.74	ND	10.0			
A0516	SCHUMACHER	NASEWAUPEE	155	219	LS	.71	ND	10.9			
A0607	SHANK	NASEWAUPEE	61	122	LS	.69	ND	10.6			
DJ752	MATHY	GARDNER	170	680	LS/SS/SH	.68	ND	490.0			
DM030	TEETAERT	LIBERTY GROVE	135	197	LS	.67	ND	8.0		YES	NO
A0603	NANION	UNION	72	104	SHALE	.65	ND	100.0		YES	NO
DB630	TEICH	WASHINGTON ISLAND	105	241	LS	.62	ND	9.0			
AJ845	REX	BAILEYS HARBOR	146	227	LS	.6	ND	ND			
AP167	SCHIESSER	FORESTVILLE	140	224	LS	.59	ND	13.3		YES	YES
DM031	WEBORG	LIBERTY GROVE				.58	.3	16.0			
A0616	BURLO	STURGEON BAY	110	187	LS	.57	ND	5.1			
DJ756	ROBERTSON	STURGEON BAY	110	230	LS	.51	.2	7.0			

Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
AO653	GUILLETTE	NASEWAUPEE				.49	ND	4.6			
AP057	SCHEPELZ	BAILEYS HARBOR	158	301	LS	.48	.2	11.1			
AO612	CHRISTENSON	FORESTVILLE	162	242	LS	.47	ND	2.9			
DM038	STOER	UNION		52		.45	ND	110.0			
DB620	THALER	SEVASTOPOL	172	221	LS	.44	2.2	16.0			
AO657	LAUTER	GIBRALTOR	139	180	LS	.43	ND	17.9			
DK870	VANDERTIE	BRUSSELS	170	235	LS/SHALE	.43	ND	8.0			
AO622	MOTQUIN	GARDNER				.42	ND	2100.0			
AO496	GREENFELDT	WASHINGTON ISLAND				.39	ND	7.7			
DM015	VANABLE	BAILEYS HARBOR	153	202	LS	.39	ND	12.0			
AP054	SPUDE	EGG HARBOR	147	197	LS	.38	1.4	19.7			
AO604	BISSEN	GARDNER	125	747	LS/SHALE	.37	ND	550.0			
AO658	HENNING	BAILEYS HARBOR	151	227	LS	.36	ND	10.6			
AO594	VANDEVEN	UNION	80	724	LS/SHALE	.33	ND	390.0		YES	NO
AO628	KNOWLES	JACKSONPORT	155	212	LS	.33	ND	7.6			
AP165	UECKER	FORESTVILLE	150	249	LS	.33	ND	8.2			
DM021	CARLSON	LIBERTY GROVE	130			.33	.2	20.0			
AO624	JUNION	SEVASTOPOL	140	205	LS	.32	.5	11.4			
AO629	DONOVAN	JACKSONPORT	133	242	LS	.32	ND	6.3		YES	YES
AO517	RASS	UNION	100	624	LS/SHALE	.30	ND	330.0			
AO513	SKOOG	EGG HARBOR	135	190	LS	.29	3.4	16.1			
AP056	JONES	SEVASTOPOL	135	204	LS	.29	.3	17.4			
DK868	JADIN	BRUSSELS	170	280	LS	.29	ND	23.0			
DM018	ANDERSON	LIBERTY GROVE	170			.29	ND	26.0			
EF824	GROH	EGG HARBOR	141	197	LS	.29	1.6	41.0		YES	NO
AO601	PURNELL	UNION	80	568	LS/SS/SH	.28	ND	320.0			
AP162	COLUMB	GARDNER	80	690	LS/SHALE	.28	ND	64.0			
CE037	MASSART	BRUSSELS	63	155	LS	.28	8.8	45.0			
EF823	STOWELL	EGG HARBOR	137	300	LS	.26	ND	780.0			
EF826	NYE	LIBERTY GROVE				.26	ND	24.0			
AO611	SYKES	GARDNER				.25	ND	510.0			

Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
A0620	BELLIN	SEVASTOPOL	130	207	LS	.25	ND	7.5			
A0712	SCHARRIG	JACKSONPORT	130	167	LS	.25	.2	17.9			
AP060	BOLAND	EGG HARBOR	157	262	LS	.25	ND	1400.0			
AH608	CUMMINGS	JACKSONPORT	175	257	LS	.24	ND	19.0			
A0626	BAGNALL	JACKSONPORT	118	332	LS	.23	ND	10.0			
A0627	SKOBOW	JACKSONPORT	150	277	LS	.20	ND	6.6			
DK865	VILLERS	NASEWAUPEE	171	244	LS	.2	1.3	24.0			
DM032	ALMAN	LIBERTY GROVE	152	203	LS	.19	ND	19.0			
CAB50	GEISE	GARDNER	91	125	LS	.18	6.8	13.7		YES	NO
A0493	MAIKEN	WASHINGTON ISLAND	130	204	LS	.17	.7	14.3		YES	NO
A0655	KIEHNAU	JACKSONPORT	135	157	LS	.15	.7	16.9			
BJ122	HISLOP	SEVASTOPOL	150	187	LS	.15	4.4	19.0			
DJ760	REIMER	SEVASTOPOL	130	157	LS	.14	1.1	17.0			
DM013	PETERSON	LIBERTY GROVE	145			.14	11.0	16.0		YES	NO
DM039	ERICKSON	LIBERTY GROVE	138	184	LS	.14	.5	16.0		YES	YES
DM231	SCHUBERT	FORESTVILLE	170	235	LS	.14	2.8	21.0			
A0593	BAUDHUIJN	UNION	120	790	LS/SHALE	.12	ND	70.0			
A0615	LIEBERG	STURGEON BAY	135	189	LS	.12	ND	7.7			
A0625	VADNAIS	SEVASTOPOL	150	234	LS	.11	1.1	11.5			
A0599	DEBAUCHE	GARDNER				.10	ND	3.4			
AA967	BRETL	NASEWAUPEE	171	224	LS	.1	15.9	46.0		YES	NO
AW351	DEGRAVE	UNION	105	144	LS	.09	3.3	16.2	<1.0 / <1.0		
CK119	NEMETH	SEVASTOPOL	142	220	LS	.09	4.9	19.0		YES	NO
A0600	SMITH	GARDNER	100	152	LS	.08	ND	24.0			
AW355	ALVIN	SEVASTOPOL	130	218	LS	.08	6.2	18.0			
DK866	TROLLER	BAILEYS HARBOR	146	261	LS	.08	ND	20.0		YES	NO
DM025	JORGENSON	STURGEON BAY	100	245	LS	.08	3.5	20.0			
A0491	CONKLYN	WASHINGTON ISLAND	146	200	LS	.07	ND	7.7			
CW325	BERKNAHN	JACKSONPORT	120	220	LS	.07	ND	14.0			
DM014	SIKES	WASHINGTON ISLAND	132	222	LS	.07	ND	6.0			
DM034	STENZEL	LIBERTY GROVE	165	183	LS	.07	1.1	14.0			

Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
A0520	SOUKUP	EGG HARBOR	153	183	LS	.06	1.9	14.0			
A0597	DAJUST	GARDNER	41	92	LS/SHALE	.06	2.1	46.0		YES	YES
A0659	HAGGERTY	GIBRALTOR	154	180	LS	.06	.2	25.6			
AX060	MACCOUX	NASEWAUPEE	170	280	LS	.06	.2	13.0			
DJ759	SCHACHT	SEVASTOPOL	135	197	LS	.06	2.1	20.0			
A0492	DAVIES	WASHINGTON ISLAND	113	161	LS	.05	.4	12.4		YES	NO
A0621	BUERGERMEISTER	SEVASTOPOL	130	190	LS	.05	1.2	18.2		YES	?
CE502	JARMAN	GIBRALTOR	123	222	LS	.05	2.4	21.0			
DM026	NUEBAUER	STURGEON BAY	100	205	LS	.05	1.0	12.0			
EF822	DUEMKE	BAILEYS HARBOR	153	201	LS	.05	.3	18.0			
A0512	HOLMES	LIBERTY GROVE	100	150	LS	ND	.5	14.6			
A0497	JOHNSON	WASHINGTON ISLAND	170	217	LS	ND	.4	15.9		YES	NO
A0500	KROWAS	BAILEYS HARBOR	174	301	LS	ND	.5	13.4			
A0501	DETMER	LIBERTY GROVE	150	221	LS	ND	.2	10.4			
A0506	SIMPSON	LIBERTY GROVE				ND	1.3	12.2			
A0507	LIECHTY	LIBERTY GROVE	134	237	LS	ND	.2	8.7			
A0518	BORKOVETZ	SEVASTOPOL	130	159	LS	ND	5.5	17.7			
A0519	THOMAS	EGG HARBOR	135	174	LS	ND	2.8	20.4			
A0591	MACCOUX	BRUSSELS	140			ND	ND	57.0			
A0596	LAZERNE	UNION	170			ND	7.0	23.4			
A0619	NUEVILLE	GARDNER	130	190	LS	ND	ND	4.5			
A0651	LAMBIOTTE	JACKSONPORT	129	276	LS	ND	ND	7.4			
A0656	DEBBINK	GIBRALTOR				ND	.2	20.8			
A0720	KROLL	GARDNER	180	695	LS/SS	ND	21.8	52.0		YES	YES
AP168	NAZE	FORESTVILLE	125	279	LS	ND	ND	12.9			
AP170	LACROSSE	BRUSSELS	170			ND	5.7	20.9			
CA849	MALVITZ	GARDNER	42	105	LS/SHALE	ND	8.0	19.6	<1.0 / <1.4	YES	YES
DJ758	SHEETS	SEVASTOPOL	152	185	LS	ND	5.4	20.0			
DK863	WHITE	EGG HARBOR	138	280	LS/SHALE	ND	ND	880.0			
DK869	IVERSON	SEVASTOPOL	147	212	LS	ND	.9	10.0			
DM016	MILLER	LIBERTY GROVE	155	182	LS	ND	ND	ND			

Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
DM017	RUSY	LIBERTY GROVE	138	201	LS	ND	ND	20.0			
DM024	GROENFELDT	STURGEON BAY	170	324	LS	ND	1.2	17.0			
DM028	GORDON	LIBERTY GROVE	147	203	LS/SHALE	ND	.6	77.0			
DM035	WICKMAN	LIBERTY GROVE	173	201	LS	ND	1.5	17.0			
DM037	RAYMOND	LIBERTY GROVE	137	201	LS	ND	ND	19.0			
EF825	TENBROEK	LIBERTY GROVE	148	227	LS	ND	ND	ND			
EF827	BORT	LIBERTY GROVE	150	221	LS	ND	.4	100.0			

Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
A0720	KROLL	GARDNER	180	695	LS/SS	ND	21.8	52.0		YES	YES
AA967	BRETL	NASEWAUPEE	171	224	LS	.1	15.9	46.0		YES	NO
DM013	PETERSON	LIBERTY GROVE	145			.14	11.0	16.0		YES	NO
CE037	MASSART	BRUSSELS	63	155	LS	.28	8.8	45.0			
CA849	MALVITZ	GARDNER	42	105	LS/SHALE	ND	8.0	19.6	<1.0 / <1.4	YES	YES
A0596	LAZERNE	UNION	170			ND	7.0	23.4			
CA850	GEISE	GARDNER	91	125	LS	.18	6.8	13.7		YES	NO
AW355	ALVIN	SEVASTOPOL	130	218	LS	.08	6.2	18.0			
AP170	LACROSSE	BRUSSELS	170			ND	5.7	20.9			
A0518	BORKOVETZ	SEVASTOPOL	130	159	LS	ND	5.5	17.7			
DJ758	SHEETS	SEVASTOPOL	152	185	LS	ND	5.4	20.0			
CK119	NEMETH	SEVASTOPOL	142	220	LS	.09	4.9	19.0		YES	NO
BJ122	HISLOP	SEVASTOPOL	150	187	LS	.15	4.4	19.0			
DM025	JORGENSEN	STURGEON BAY	100	245	LS	.08	3.5	20.0			
A0513	SKOOG	EGG HARBOR	135	190	LS	.29	3.4	16.1			
AW351	DEGRAVE	UNION	105	144	LS	.09	3.3	16.2	<1.0 / <1.0		
A0519	THOMAS	EGG HARBOR	135	174	LS	ND	2.8	20.4			
DM231	SCHUBERT	FORESTVILLE	170	235	LS	.14	2.8	21.0			
CE502	JARMAN	GIBRALTOR	123	222	LS	.05	2.4	21.0			
DB620	THALER	SEVASTOPOL	172	221	LS	.44	2.2	16.0			
A0597	DAOUST	GARDNER	41	92	LS/SHALE	.06	2.1	46.0		YES	YES
DJ759	SCHACHT	SEVASTOPOL	135	197	LS	.06	2.1	20.0			
A0520	SOUKUP	EGG HARBOR	153	183	LS	.06	1.9	14.0			
BJ226	HEIZER	LIBERTY GROVE	137	202	LS	2.3	1.9	11.0			
EF824	GROH	EGG HARBOR	141	197	LS	.29	1.6	41.0		YES	NO
DM035	WICKMAN	LIBERTY GROVE	173	201	LS	ND	1.5	17.0			
AP054	SPUDE	EGG HARBOR	147	197	LS	.38	1.4	19.7			
A0506	SIMPSON	LIBERTY GROVE				ND	1.3	12.2			
DJ757	DHINE	SEVASTOPOL				1.3	1.3	13.0			
DK865	VILLERS	NASEWAUPEE	171	244	LS	.2	1.3	24.0			

Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
AO621	BUERGERMEISTER	SEVASTOPOL	130	190	LS	.05	1.2	18.2		YES	?
DM024	GROENFELDT	STURGEON BAY	170	324	LS	ND	1.2	17.0			
AO625	VADNAIS	SEVASTOPOL	150	234	LS	.11	1.1	11.5			
CJ126	LAMER	STURGEON BAY	174	221	LS	.81	1.1	15.0			
DJ760	REIMER	SEVASTOPOL	130	157	LS	.14	1.1	17.0			
DM034	STENZEL	LIBERTY GROVE	165	183	LS	.07	1.1	14.0			
DM026	NUEBAUER	STURGEON BAY	100	205	LS	.05	1.0	12.0			
DK869	IVERSON	SEVASTOPOL	147	212	LS	ND	.9	10.0			
AO493	MAIKEN	WASHINGTON ISLAND	130	204	LS	.17	.7	14.3		YES	NO
AO655	KIEHNAU	JACKSONPORT	135	157	LS	.15	.7	16.9			
AW327	KUTIL	GARDNER	42	105	LS/SHALE	.80	.6	40.0			
DM028	GORDON	LIBERTY GROVE	147	203	LS/SHALE	ND	.6	77.0			
AO512	HOLMES	LIBERTY GROVE	100	150	LS	ND	.5	14.6			
AO500	KROWAS	BAILEYS HARBOR	174	301	LS	ND	.5	13.4			
AO503	EVENSON	LIBERTY GROVE	145	212	LS	1.1	.5	11.4			
AO624	JUNION	SEVASTOPOL	140	205	LS	.32	.5	11.4			
DM039	ERICKSON	LIBERTY GROVE	138	184	LS	.14	.5	16.0		YES	YES
AO492	DAVIES	WASHINGTON ISLAND	113	161	LS	.05	.4	12.4		YES	NO
AO497	JOHNSON	WASHINGTON ISLAND	170	217	LS	ND	.4	15.9		YES	NO
EF827	BORT	LIBERTY GROVE	150	221	LS	ND	.4	100.0			
AP056	JONES	SEVASTOPOL	135	204	LS	.29	.3	17.4			
AX080	LOGERQUIST	GIBRALTOR	170	220	LS	.8	.3	16.0			
DM031	WEBORG	LIBERTY GROVE				.58	.3	16.0			
DM033	MOSS	LIBERTY GROVE				.96	.3	11.0			
EF822	DUEMKE	BAILEYS HARBOR	153	201	LS	.05	.3	18.0			
AO501	DETMER	LIBERTY GROVE	150	221	LS	ND	.2	10.4			
AO502	ABEGG	LIBERTY GROVE	142	221	LS	1.9	.2	8.8			
AO507	LIECHTY	LIBERTY GROVE	134	237	LS	ND	.2	8.7			
AO656	DEBBINK	GIBRALTOR				ND	.2	20.8			
AO659	HAGGERTY	GIBRALTOR	154	180	LS	.06	.2	25.6			
AO712	SCHARRIG	JACKSONPORT	130	167	LS	.25	.2	17.9			

Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
AP057	SCHEPELZ	BAILEYS HARBOR	158	301	LS	.48	.2	11.1			
AP169	THASE	BRUSSELS	130	164	LS	1.0	.2	41.0			
AX060	MACCOUX	NASEWAUPEE	170	280	LS	.06	.2	13.0			
DJ756	ROBERTSON	STURGEON BAY	110	230	LS	.51	.2	7.0			
DM021	CARLSON	LIBERTY GROVE	130			.33	.2	20.0			
A0504	SZWEDA	LIBERTY GROVE	118	227	LS	1.8	.1	11.7			
AA952	WALRAVEN	NASEWAUPEE	185	708	LS/SHALE	5.9	ND	570.0	1.4 / 1.5		
AA960	BECKER	NASEWAUPEE	43	100	LS	2.2	ND	11.1			
AF861	LAUTENBACK	JACKSONPORT	171	227	LS	.83	ND	10.0			
AG236	SEROOGY	UNION	101	183	LS/SS	4.4	ND	3.5			
AH608	CUMMINGS	JACKSONPORT	175	257	LS	.24	ND	19.0			
AH628	BERQUIST	WASHINGTON ISLAND	136	242	LS	1.5	ND	14.2			
AJ840	MIDDLETON	BAILEYS HARBOR	142	242	LS	6.3	ND	ND			
AJ845	REX	BAILEYS HARBOR	146	227	LS	.6	ND	ND			
AJ862	YEDICA	GARDNER	39	140	LS/SHALE	2.0	ND	140.0			
A0491	CONKLYN	WASHINGTON ISLAND	146	200	LS	.07	ND	7.7			
A0494	ARENDS	WASHINGTON ISLAND	126	202	LS	.9	ND	8.9			
A0495	OVERLY	WASHINGTON ISLAND	125	189	LS	1.6	ND	4.4			
A0496	GREENFELDT	WASHINGTON ISLAND				.39	ND	7.7			
A0498	STERMER	WASHINGTON ISLAND	146	301	LS	2.0	ND	10.2			
A0499	WORTHINGTON	WASHINGTON ISLAND	112	201	LS	1.2	ND	9.4			
A0505	ROSENQUIST	LIBERTY GROVE	163	201	LS	.91	ND	20.2			
A0509	COLLEY	LIBERTY GROVE	115	178	LS	3.5	ND	4.4		YES	YES
A0510	KOPRIWA	LIBERTY GROVE	115	180	LS	4.3	ND	1.4			
A0514	LAROCHE	GARDNER	101	677	LS/SHALE	1.6	ND	470.0			
A0515	BECKSTROM	LIBERTY GROVE	147	197	LS	1.8	ND	21.8			
A0516	SCHUMACHER	NASEWAUPEE	155	219	LS	.71	ND	10.9			
A0517	RASS	UNION	100	624	LS/SHALE	.30	ND	330.0			
A0591	MACCOUX	BRUSSELS	140			ND	ND	57.0			
A0592	DRAIZE	UNION	100	175	LS	4.3	ND	88.0			
A0593	BAUDHUIN	UNION	120	790	LS/SHALE	.12	ND	70.0			



Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
AO594	VANDEVEN	UNION	80	724	LS/SHALE	.33	ND	390.0		YES	NO
AO595	DESTREE	UNION	170	579	LS/SS/SH	.93	ND	890.0			
AO598	LALUZERN	GARDNER				16.0	ND	15.4			
AO599	DEBAUCHE	GARDNER				.10	ND	3.4			
AO600	SMITH	GARDNER	100	152	LS	.08	ND	24.0			
AO601	PURNELL	UNION	80	568	LS/SS/SH	.28	ND	320.0			
AO602	GRATHEN	UNION	70	104	LS/SHALE	3.7	ND	210.0			
AO603	NANION	UNION	72	104	SHALE	.65	ND	100.0		YES	NO
AO604	BISSEN	GARDNER	125	747	LS/SHALE	.37	ND	550.0			
AO605	WECKLER	NASEWAUPEE	140	190	LS	3.3	ND	2.6			
AO606	BRICKNER	NASEWAUPEE				3.1	ND	15.0			
AO607	SHANK	NASEWAUPEE	61	122	LS	.69	ND	10.6			
AO608	COISMAN	NASEWAUPEE	170	735	LS/SS/SH	3.8	ND	420.0	8.9 / 10.9		
AO609	BREMER	NASEWAUPEE	131	212	LS	6.3	ND	3.8			
AO610	KUZMA	NASEWAUPEE	151	174	LS	2.4	ND	12.8			
AO611	SYKES	GARDNER				.25	ND	510.0			
AO612	CHRISTENSON	FORESTVILLE	162	242	LS	.47	ND	2.9			
AO613	EVENSON	GARDNER	50	101	LS/SHALE	.74	ND	74.0			
AO614	MALVITZ	FORESTVILLE	170	305	LS	5.0	ND	40.0			
AO615	LIEBERG	STURGEON BAY	135	189	LS	.12	ND	7.7			
AO616	BURLO	STURGEON BAY	110	187	LS	.57	ND	5.1			
AO617	PEDERSON	STURGEON BAY				2.7	ND	4.3			
AO618	O'CONNOR	NASEWAUPEE	133	244	LS/SHALE	.76	ND	16.2			
AO619	NUEVILLE	GARDNER	130	190	LS	ND	ND	4.5			
AO620	BELLIN	SEVASTOPOL	130	207	LS	.25	ND	7.5			
AO622	MOTQUIN	GARDNER				.42	ND	2100.0			
AO623	WAGNER	NASEWAUPEE	125	190	LS	2.3	ND	9.4			
AO626	BAGNALL	JACKSONPORT	118	332	LS	.23	ND	10.0			
AO627	SKOBOW	JACKSONPORT	150	277	LS	.20	ND	6.6			
AO628	KNOWLES	JACKSONPORT	155	212	LS	.33	ND	7.6			
AO629	DONOVAN	JACKSONPORT	133	242	LS	.32	ND	6.3		YES	YES

Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
AO630	SCHNEIDER	JACKSONPORT	144	301	LS	1.0	ND	8.2		YES	NO
AO651	LAMBIOTTE	JACKSONPORT	129	276	LS	ND	ND	7.4			
AO652	PARENT	BAILEYS HARBOR	163	342	LS	1.5	ND	10.8			
AO653	GUILLETTE	NASEWAUPEE				.49	ND	4.6			
AO654	WITCZAK	NASEWAUPEE	175	730	LS/SHALE	2.0	ND	440.0			
AO657	LAUTER	GIBRALTOR	139	180	LS	.43	ND	17.9			
AO658	HENNING	BAILEYS HARBOR	151	227	LS	.36	ND	10.6			
AO660	LURIE	BAILEYS HARBOR	146	282	LS	3.0	ND	15.6		YES	YES
AO711	CARMODY	JACKSONPORT	133	241	LS	1.3	ND	ND			
AO713	OLSON	JACKSONPORT	116	181	LS	1.6	ND	7.4			
AO715	BUYENS	UNION	71	90	SHALE	1.2	ND	380.0	<1.0 / <1.0		
AO716	WATTON	GARDNER	50	100	LS/SHALE	2.4	ND	88.0			
AO717	HEINTZKILL	UNION	160	625	LS/SS/SH	1.3	ND	280.0	4.5 / 6.3		
AO718	RENARD	UNION	150	580	LS/SHALE	2.4	ND	300.0	9.1 / 7.1		
AO719	WELCH	GARDNER	170	640	LS/SS	2.4	ND	510.0			
AP055	DESOTELLE	EGG HARBOR	142	300	LS	1.8	ND	100.0			
AP058	JUSTINEN	BAILEYS HARBOR				4.0	ND	5.6			
AP060	BOLAND	EGG HARBOR	157	262	LS	.25	ND	1400.0			
AP161	LECLOUX	FORESTVILLE	120	164	LS	1.3	ND	18.2			
AP162	COLUMB	GARDNER	80	690	LS/SHALE	.28	ND	64.0			
AP163	VANDERTIE	BRUSSELS	160	226	LS	.92	ND	16.0			
AP164	MRAZ	FORESTVILLE	110			2.2	ND	22.2			
AP165	UECKER	FORESTVILLE	150	249	LS	.33	ND	8.2			
AP166	RASS	BRUSSELS	170	380	LS	1.2	ND	25.2			
AP167	SCHIESSER	FORESTVILLE	140	224	LS	.59	ND	13.3		YES	YES
AP168	NAZE	FORESTVILLE	125	279	LS	ND	ND	12.9			
AW356	ZELLNER	GARDNER	195	650	LS/SHALE	.75	ND	520.0	8.3 / 5.5		
BJ460	COOPER	LIBERTY GROVE	154	181	LS	2.0	ND	28.0			
CA865	LENIUS	NASEWAUPEE	60	155	LS	.74	ND	13.2	<1.0 / <1.2		
CE043	BUG FIRESTATION	GARDNER	50	110	LS	3.7	ND	21.0			
CE048	COUNARD	GARDNER	140	184	LS/SHALE	2.6	ND	7.0	2.0/<1.1	YES	NO

Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
CW325	BERKNAHN	JACKSONPORT	120	220	LS	.07	ND	14.0			
DB630	TEICH	WASHINGTON ISLAND	105	241	LS	.62	ND	9.0			
DF896	DRYSDALE	NASEWAUPEE	102	201	LS/SHALE	.81	ND	10.1	1.1 / <1.1		
DJ751	MATHY	GARDNER	170	680	LS/SS/SH	7.2	ND	500.0	7.7 / 5.8		
DJ752	MATHY	GARDNER	170	680	LS/SS/SH	.68	ND	490.0			
DJ753	MATHY	GARDNER		40	LS	2.3	ND	69.0			
DJ754	KRUEGER	FORESTVILLE	150	205	LS	1.7	ND	11.0			
DK862	KRUEGER	FORESTVILLE	170			2.0	ND	11.0			
DK863	WHITE	EGG HARBOR	138	280	LS/SHALE	ND	ND	880.0			
DK864	WORLEY	NASEWAUPEE	170	220	LS	8.0	ND	11.0			
DK866	TROLLER	BAILEYS HARBOR	146	261	LS	.08	ND	20.0		YES	NO
DK867	VANDERMAUSE	GARDNER				1.8	ND	15.0		YES	YES
DK868	JADIN	BRUSSELS	170	280	LS	.29	ND	23.0			
DK870	VANDERTIE	BRUSSELS	170	235	LS/SHALE	.43	ND	8.0			
DM011	BECKER	BAILEYS HARBOR	147	241	LS	1.2	ND	6.0			
DM012	GRAF	GARDNER	100	145	LS	.74	ND	10.0			
DM014	SIKES	WASHINGTON ISLAND	132	222	LS	.07	ND	6.0			
DM015	VANABLE	BAILEYS HARBOR	153	202	LS	.39	ND	12.0			
DM016	MILLER	LIBERTY GROVE	155	182	LS	ND	ND	ND			
DM017	RUSY	LIBERTY GROVE	138	201	LS	ND	ND	20.0			
DM018	ANDERSON	LIBERTY GROVE	170			.29	ND	26.0			
DM019	ANDERSON	LIBERTY GROVE	140	174	LS	.77	ND	18.0			
DM020	ROZA	EGG HARBOR	141	227	LS	2.2	ND	31.0			
DM022	TELFER	LIBERTY GROVE	157	221	LS	2.8	ND	26.0			
DM027	HANSEN	SEVASTOPOL	133	212	LS	1.7	ND	18.0			
DM029	BUNTA	GIBRALTOR	141	227	LS	3.2	ND	120.0		YES	YES
DM030	TEETAERT	LIBERTY GROVE	135	197	LS	.67	ND	8.0		YES	NO
DM032	ALMAN	LIBERTY GROVE	152	203	LS	.19	ND	19.0			
DM036	ROGERS	LIBERTY GROVE	151	212	LS	1.2	ND	31.0		YES	NO
DM037	RAYMOND	LIBERTY GROVE	137	201	LS	ND	ND	19.0			
DM038	STOER	UNION		52		.45	ND	110.0			

Unique ID	Lname	Township	Casing	Total	Formation	Iron	Nitrates	Sulfates	Radium 226/228	Unsafe	Confirmed
DM040	CANNON	LIBERTY GROVE	141	171	LS	3.3	ND	11.0			
EF819	STARNES	BAILEYS HARBOR	145	242	LS	2.7	ND	ND			
EF821	NELLIS	NASEWAUPEE	110	124	LS	4.2	ND	ND			
EF823	STOWELL	EGG HARBOR	137	300	LS	.26	ND	780.0			
EF825	TENBROEK	LIBERTY GROVE	148	227	LS	ND	ND	ND			
EF826	NYE	LIBERTY GROVE				.26	ND	24.0			
EF828	PEDERSON	FORESTVILLE	100	235	LS	1.4	ND	15.0			

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051104 Report on the Bacteriological  
Water Quality Monitoring of  
Door County Variance and  
Special Casing Approval Wells

DATE

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