

ATTACHMENT C
GROUNDWATER MEASUREMENTS
COLLECTED BY LCCD
IN WRIA 53 STUDY

Field Worksheet for WRIA 53 Well Level Measurement Study

05/26/2011

Date	Well ID	Casing Elev.' (Garmin altimeter, NAVD 88)	Garmin Topo Map Ground Elev.' (NAVD 88)	Casing Height"	Well Depth	Depth to Water When Drilled'	Depth to Water, Etape'	Depth to Water, Sonic Meter'	Ground** water Table Elev.' (NAVD 88) (Etape; if none, then sonic meter)	Notes
1/8/2010	AHJ350	2254	2312	24.50	98	22	20.50		2293.54	
3/8/2010	AHJ350	2293	2312	24.50	98	22		21.4	2292.64	sonic meter - 44 F, 21.4 normal mode; not much room between white PVC liner, pump pipe and power cable, so Etape not used at end of day today.
4/20/2010	AHJ350	2293	2312	24.50	98	22	20.82	21.5	2293.22	sonic meter - 45 F, normal mode. Found and marked with felt pen an OK spot on WSW side of casing to drop Etape down between PVC liner and pipe.
6/4/2010	AHJ350	2293	2312	24.50	98	22	20.94	21.6	2293.10	sonic meter - 48F, normal mode
7/26/2010	AHJ350	2293	2312	24.50	98	22	21.64	22.2	2292.40	sonic meter - 49F, normal mode, variable, ignore top 10.2 ft.
8/18/2010	AHJ350	2293	2312	24.50	98	22	21.54	22.0	2292.50	sonic meter - 48 F, normal mode, variable, ignore top 10.2 and 20.1 ft. Tried normal mode, ignore top 22.1 ft and got 22.2 ft. Also tried ignore top 30.0 and 40.0 ft, and got 43.0 and 43.2 ft. for attempting to measure below the water level.
9/22/2010	AHJ350	2293	2312	24.50	98	22	21.52	22.1	2292.52	sonic meter - 47 F, normal mode, variable, ignore top 15.0 ft.
10/22/2010	AHJ350	2293	2312	24.50	98	22	21.62	22.2	2292.42	sonic meter - 46 F, normal mode, variable, ignore top 15.0 ft. After pump turned on briefly, the water level went down to 22.5 ft, but after the pump shut off, the level went back to 22.2 ft.
11/22/2010	AHJ350	2293	2312	24.50	98	22	21.50	22.1	2292.54	sonic meter - 44 F, normal mode, variable, ignore top 15.0 ft.
1/7/2011	AHJ350	2293	2312	24.50	98	22	21.41	22.0	2292.63	sonic meter - 42 F, normal mode, variable, ignore top 15.2 ft.
2/14/2011	AHJ350	2293	2312	24.50	98	22	20.71	21.4	2293.33	sonic meter - 43 F, normal mode, variable, ignore top 15.0 ft.
3/22/2011	AHJ350	2293	2312	24.50	98	22	19.99	20.6	2294.05	sonic meter - 44 F, normal mode, variable, ignore top 15.0 ft.
4/18/2011	AHJ350	2293	2312	24.50	98	22	20.47	21.2	2293.57	sonic meter - 45 F, normal mode, variable, ignore top 15.0 ft.
12/29/2009	APQ814	1468	1519	24.00	76	35	41.63		1479.37	
2/4/2010	APQ814	1495	1519	24.00	76	35	41.28	41.8	1479.72	sonic meter - 43 F, normal mode
3/8/2010	APQ814	1495	1519	24.00	76	35	40.94	41.6	1480.06	sonic meter - 44 F, normal mode
4/20/2010	APQ814	1495	1519	24.00	76	35	38.78	39.5	1482.22	sonic meter - 45 F, normal mode
6/8/2010	APQ814	1495	1519	24.00	76	35	38.75	39.4	1482.25	sonic meter - 48 F, normal mode
7/26/2010	APQ814	1495	1519	24.00	76	35	39.39	39.8	1481.61	sonic meter - 49 F, normal mode, variable, ignore top 10.2 ft.
8/18/2010	APQ814	1495	1519	24.00	76	35	39.58	40.0	1481.42	sonic meter - 48 F, normal mode, variable, ignore top 30.0 and 40.0 ft. Tried ignore top 40.0 ft, and got 40.2 ft for measuring right at the water level. Also tried normal mode, ignore top 54.6 ft, and got 79.0 ft. Note: this well does NOT have a PVC liner and it does not have any pump, pipe or cables installed in it yet.
9/22/2010	APQ814	1495	1519	24.00	76	35	39.88	40.4	1481.12	sonic meter - 47 F, normal, variable, ignore top 30.0 ft.
10/22/2010	APQ814	1495	1519	24.00	76	35	40.31	40.8	1480.69	sonic meter - 46 F, normal, variable, ignore top 30.0 ft.
1/7/2011	APQ814	1495	1519	24.00	76	35	41.24	41.6	1479.76	sonic meter - 42 F, normal mode, variable, ignore top 30.1 ft.
2/14/2011	APQ814	1495	1519	24.00	76	35	40.91	41.4	1480.09	sonic meter - 43 F, normal mode, variable, ignore top 30.2 ft.
3/22/2011	APQ814	1495	1519	24.00	76	35	38.43	39.0	1482.57	sonic meter - 44 F, normal mode, variable, ignore top 30.0 ft.
4/18/2011	APQ814	1495	1519	24.00	76	35	35.25	35.8	1485.75	sonic meter - 45 F, normal mode, variable, ignore top 25.1 and 30.0 ft.
1/22/2010	APQ811	1686	1692	18.00	300	140	218.35		1475.15	DTW-ATD was 140, so water level has dropped

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2/4/2010	APQ811	1686	1692	19.25	300	140	218.75		1474.85	sonic meter - 43 F, 434.2 deep mode; 5.4 normal mode. Tried several different location from the top of the well casing, but the sonic meter just wouldn't work in this well, perhaps due to 4" PVC liner from 20 to 300 feet. Just use the Etape only on this well
3/8/2010	APQ811	1686	1692	19.25	300	140	218.11		1475.49	sonic meter - 44 F, 5.4 normal mode, 433.6 deep mode. Sonic meter just would not work again. Used flashlight to just barely see that Etape was inside liner at about 20 feet down.
4/20/2010	APQ811	1686	1692	19.25	300	140	217.61		1475.99	sonic meter would not work again in this well
6/8/2010	APQ811	1686	1692	19.25	300	140	218.13		1475.47	sonic meter - no go on this well again
7/26/2010	APQ811	1686	1692	19.25	300	140	217.92	218.0	1475.68	new sonic meter works on this well; 49 F, deep mode, variable, ignore top 140.1 ft.
8/18/2010	APQ811	1686	1692	19.25	300	140	218.02	217.8	1475.58	sonic meter - 48 F, deep mode, variable, ignore top 196.6 and 168.3 ft. Tried normal mode, ignore top 54.6 ft, and got 217.8 ft again. For deep mode, ignore top 225.0 ft., got 235.6 ft., which is different as it is not the typical 2X water depth. Tried deep mode, ignore top 253.6 ft, and got the more expected 2X reading of 434.6 ft for attempting to measure below the water level. With the Etape, got a weak intermittent beep at about 197 to 200 or so feet. It acted like there was moisture on the PVC liner. Turned sensitivity down, got good on/off beep at 218.02 feet. Note: this well does not have a pump in it yet but this may change in the near future.
9/22/2010	APQ811	1686	1692	19.25	300	140	218.06	217.7	1475.54	sonic meter - 47 F, deep mode, variable, ignore top 197.4 ft. Also got 217.7 ft for normal mode, ignore top 54.6 ft.
10/22/2010	APQ811	1686	1692	19.25	300	140	218.17	217.7	1475.43	sonic meter - 46 F, deep mode, variable, ignore top 196.2 ft. Also got 217.7 ft for normal mode, ignore top 54.6 ft.
1/7/2011	APQ811	1686	1692	19.25	300	140		217.4	1476.20	sonic meter - 42 F, deep mode, variable, ignore top 195.5 ft. Also got 217.4 ft for normal mode, ignore top 54.4 ft. This well now has a pump in it, and 4 ft trenches for the water line and power lines next to it. No more use of the Etape is this well, especially with the PVC liner at about 20 ft. Now with the pipe and wires, the PVC liner can't even be seen.
2/14/2011	APQ811	1686	1692	19.25	300	140		216.8	1476.80	sonic meter - 43 F, deep mode, variable, ignore top 195.7 ft. Also got 216.8 ft. for normal mode, ignore top 54.4 ft.
3/22/2011	APQ811	1686	1692	19.25	300	140		216.2	1477.40	sonic meter - 44 F, deep mode, variable, ignore top 195.9 ft. Also got 216.2 ft. for normal mode, ignore top 54.4 ft.
4/18/2011	APQ811	1686	1692	19.25	300	140		214.8	1478.80	sonic meter - 45 F, deep mode, variable, ignore top 196.1 ft. Also got 214.8 ft. for normal mode, ignore top 54.5 ft. Remeasured casing height above ground and got 17.75" on north side. Could hear moving air inside the casing, but could not tell whether air was blowing out or being sucked in. The frost free faucet has never been used yet, so it could not be noise from the pump.
12/29/2009	APQ806	2155	2198	11.25	420	150	232.20		1966.74	
2/4/2010	APQ806	2185	2198	11.25	420	150	234.91	234.0	1964.03	sonic meter - 43 F, 234.0 deep mode; 233.8 normal mode
3/8/2010	APQ806	2185	2198	11.25	420	150	233.71	232.8	1965.23	sonic meter - 44 F, 232.8 deep mode; 5.4 to 232.6 normal mode
4/20/2010	APQ806	2185	2198	11.25	420	150	232.55	231.8	1966.39	sonic meter - 45 F; 231.8 in both deep and normal mode
6/8/2010	APQ806	2185	2198	11.25	420	150	232.71	232.6	1966.23	sonic meter - 48 F; 232.6 ft in both deep mode and normal mode
7/26/2010	APQ806	2185	2198	11.25	420	150	232.73	232.6	1966.21	sonic meter - 49 F, deep mode, variable, ignore top 140.1 ft. Also got 232.6 feet, normal mode, variable, ignore top 54.7 ft.

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8/18/2010	APQ806	2185	2198	11.25	420	150	233.60	233.3	1965.34	sonic meter - 48 F, deep mode, variable, ignore top 196.6 and 225.6 ft. Also got 233.0 ft. for normal mode, ignore top 54.6 ft. Also tried deep mode, ignore top 253.4 and 281.7 ft., and got 460.0 to 459.7 ft. for attempting to measure below the water level. For the Etape, got a weak beep at about 150 ft., like there was moisture on the PVC liner. Turned sensitivity down to get good on/off beep at 233.60 ft. Note: This well has a PVC liner but does NOT yet have a pump installed in it
9/22/2010	APQ806	2185	2198	11.25	420	150	236.67	236.1	1962.27	sonic meter - 47 F, deep mode, variable, ignore top 196.4 and 224.8 ft. Also got 236.1 ft for normal mode, ignore top 54.6 ft.
10/22/2010	APQ806	2185	2198	11.25	420	150	239.79	239.0	1959.15	sonic meter - 46 F, deep mode, variable, ignore the top 196.2 and 224.6 ft. Also got 239.0 ft. for normal mode, ignore top 54.6 ft.
1/7/2011	APQ806	2185	2198	11.25	420	150	242.65	241.1	1956.29	sonic meter - 42 F, deep mode, variable, ignore top 195.5 and 223.7 ft. Had to dig the 1 to 2 ft of snow away from the well casing to get to the cap.
2/14/2011	APQ806	2185	2198	11.25	420	150	233.17	232.0	1965.77	sonic meter - 43 F, deep mode, variable, ignore top 223.9 ft. Also got 231.8 ft. for deep mode, ignore top 195.7 ft.
3/22/2011	APQ806	2185	2198	11.25	420	150	230.42	229.4	1968.52	sonic meter - 44 F, deep mode, variable, ignore top 195.9 and 224.2 ft. Also got 229.4 ft. for normal mode, ignore top 54.4 ft.
4/18/2011	APQ806	2185	2198	11.25	420	150	226.67	255.9	1972.27	sonic meter - 45 F, deep mode, variable, ignore top 196.1 and 224.4 ft.. Also got 225.9 ft. for normal mode, ignore top 54.5 ft. Remeasured casing height on east side, got 11.75".
1/29/2010	BAC950	2214	2211	18.5	642	540				Depth to Water = 540, well depth = 642 feet; lowered the tape down to 475 feet and then quit, expect the water level to be beyond the 500 feet length of the tape; PVC liner extends all of the way to the surface. The well owners, who live year round in the house just above just bought the lot and this well;
2/4/2010	BAC950	2214	2211	18.5	642	540		508.6	1703.94	sonic meter - 43 F; 508.6 deep mode. Do this well with the sonic meter only; If the depth changes, the measured level probably is the water level
3/8/2010	BAC950	2214	2211	18.5	642	540		508.9	1703.64	sonic meter - 44 F, 508.9 deep mode. Got property access form signed by one of the landowners.
4/20/2010	BAC950	2214	2211	18.5	642	540		508.8	1703.74	sonic meter - 45 F, deep mode
6/8/2010	BAC950	2214	2211	18.5	642	540		510.3	1702.24	sonic meter - 48 F, deep mode
7/26/2010	BAC950	2214	2211	18.5	642	540		510.2	1702.34	sonic meter - 49 F, deep mode, variable, ignore top 423.9 ft. Also got 510.0 ft for deep mode, ignore top 140.1 ft.
8/18/2010	BAC950	2214	2211	18.5	642	540		509.4	1703.14	sonic meter - 48 F, deep mode, variable, ignore top 480.2 and 508.6 ft. Also got 509.6 ft for deep mode, ignore top 310.0, 395.6 and 453.6 ft. Also tried deep mode, ignore top 536.9 and 569.2 ft, and the meter would not give a measurement for attempting to measure below the apparent water level.
9/22/2010	BAC950	2214	2211	18.5	642	540		509.4	1703.14	sonic meter - 47 F, deep mode, variable, ignore top 479.8 and 508.0 ft. Also got 60.6 ft for normal mode, ignore top 54.6 ft. Must be a significant bend or some other well feature at about 61 ft.
10/22/2010	BAC950	2214	2211	18.5	642	540		509.1	1703.44	sonic meter - 46 F, deep mode, variable, ignore top 479.2 and 507.6 ft. Also got 509.1 ft. for normal mode, ignore top 54.6 ft.
1/7/2011	BAC950	2214	2211	18.5	642	540		508.1	1704.44	sonic meter - 42 F, deep mode, variable, ignore top 477.2 and 505.6 ft. Had to walk down the hill south of the house, as the access road to the well was not plowed.
2/14/2011	BAC950	2214	2211	18.5	642	540		508.0	1704.54	sonic meter - 43 F, deep mode, variable, ignore top 506.1 ft. Also got 508.2 ft for deep mode, ignore top 477.8 ft.
3/22/2011	BAC950	2214	2211	18.5	642	540		508.8	1703.74	sonic meter - 44 F, deep mode, variable, ignore top 478.4 and 505.6 ft.

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4/18/2011	BAC950	2214	2211	18.5	642	540		508.8	1703.74	sonic meter - 45 F, deep mode, variable, ignore top 478.8 and 507.0 ft. For normal mode, ignore top 54.5 ft., got 60.4 ft. for the well feature. Also tried deep mode, ignore top 535.4 ft., and the meter would not give a reading for attempting to read below the water level.
1/22/2010	APB762	2335	2347	9.50	540	240				tape stopped at 431 feet ?hit bottom?, couldn't reach water; no pump in well; DTW was 240, depth 540 ft.
2/4/2010	APB762	2335	2347	9.50	540	240		408.2	1939.59	sonic meter - 43 F, 408.2 deep mode; when the Etape got to about 250 feet, the tape was not stopped but the drag on the tape felt like it was going down between a liner and the casing. Didn't like the way the tape felt, so quit before getting the tape stuck. Only do this well again with sonic meter; if the level changes by several feet or more after several months, than the depth measured could be the depth to water, especially if the measured level is deeper
3/8/2010	APB762	2335	2347	9.50	540	240		408.8	1938.99	sonic meter - 44 F, 408.8 deep mode. Didn't take time to try Etape again.
4/20/2010	APB762	2335	2347	9.50	540	240		409.2	1938.59	sonic meter - 45 F, deep mode. With new flashlight, was able to see that this well also has a PVC liner at about 10 feet. With more time, should try the Etape once again inside the liner.
6/8/2010	APB762	2335	2347	9.50	540	240		410.6	1937.19	sonic meter - 48 F, deep mode
7/26/2010	APB762	2335	2347	9.50	540	240		410.6	1937.19	sonic meter - 49 F, deep mode, variable, ignore top 393.5 ft. Also got 410.6 ft, ignore top 225.2 ft.
8/18/2010	APB762	2335	2347	9.50	540	240		410.4	1937.39	sonic meter - 49 F, deep mode, variable, ignore top 366.8 and 395.2 ft. Also got 410.4 ft for normal mode, ignore top 54.6 ft. Also tried deep mode, ignore top 423.5 and 451.2 ft, and got 453.4 ft. This is different as it isn't the typical 2X depth reading for attempting to measure below the apparent water level at 410.4 ft. Briefly tried the Etape again, but quit at 50 ft due to the excessive sidewall friction/drag again. This well, which does not have a pump yet but does have a PVC liner, has way more drag inside its PVC liner compared to other wells with PVC liners to 200 to 300 ft to the water level which have been successfully measured with the Etape with no problems. Used flashlight to confirm that Etape was inside PVC liner. Just use sonic meter. May or may not be water at about 410 ft.
9/22/2010	APB762	2335	2347	9.50	540	240		409.7	1938.09	sonic meter - 47 F, deep mode, variable, ignore top 394.8 and 366.4 ft. Also got 409.7 ft for normal mode, ignore top 54.6 ft.
10/22/2010	APB762	2335	2347	9.50	540	240		409.4	1938.39	sonic meter - 46 F, deep mode, variable, ignore top 394.4 ft. Also got 409.5 ft for deep mode, ignore top 366.0 ft and normal mode, ignore top 54.6 ft.
1/7/2011	APB762	2335	2347	9.50	540	240		407.7	1940.09	sonic meter - 42 F, deep mode, variable, ignore top 392.8 ft. Also got 407.7 ft. for normal mode, ignore top 54.4 ft.
2/14/2011	APB762	2335	2347	9.50	540	240		408.3	1939.49	sonic meter - 43 F, deep mode, variable, ignore top 393.2 ft. Also got 71.9 (well feature) to 408.4 ft. for normal mode, ignore top 54.4 ft.
3/22/2011	APB762	2335	2347	9.50	540	240		409.0	1938.79	sonic meter - 44 F, deep mode, variable, ignore top 365.4 and 393.6 ft.
4/18/2011	APB762	2335	2347	9.50	540	240		409.4	1938.39	sonic meter - 45 F, deep mode, variable, ignore top 394.0 ft. Got 409.6 ft. for deep mode, ignore top 365.7 ft. For normal mode, ignore top 54.5 ft., got 409.6 ft along with 54.8 ft. for an apparent well feature.
12/29/2009	APP839	2323	2382	12.00	300	190	169.00		2214.00	
2/4/2010	APP839	2363	2382	12.00	300	190	168.90	168.7	2214.10	sonic meter - 43 F, 168.7, normal; 332.6, deep

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3/8/2010	APP839	2363	2382	12.00	300	190	168.74	168.5	2214.26	sonic meter - 44 F, 168.5 normal; 322.4, deep mode. Had to hold cardboard disk down with fingers to get reading in normal mode. Also used flashlight to confirm Etape was inside PVC liner.
4/20/2010	APP839	2363	2382	12.00	300	190	168.72	168.7	2214.28	sonic meter - 45 F, normal mode. Had to use meter in the WNW part of the casing in order to get to work; marked with felt pen.
6/8/2010	APP839	2363	2382	12.00	300	190	168.87	169.0	2214.13	sonic meter - 48 F, normal mode. Sonic meter worked fine on the north end/power wire input end of the cap.
7/26/2010	APP839	2363	2382	12.00	300	190	168.98	169.2	2214.02	sonic meter - 49 F, normal mode, variable, ignore top 54.7 feet. With the Etape, got a weak quivering beep at about 164 feet due to apparent cascading water, had to turn down sensivity to get good on/off beep at 168.98 ft.
8/18/2010	APP839	2363	2382	12.00	300	190	169.03	169.0	2213.97	sonic meter - 48 F, normal mode, variable, ignore top 54.6 ft. Tried deep mode, ignore top 140.0 and 168.3 ft, and got 169.2 ft. Also tried deep mode, ignore top 196.6 ft, and got 323 ft for attempting to measure below the water level. Note: This well has a PVC liner but does not have a pump installed in it yet.
9/22/2010	APP839	2363	2382	12.00	300	190	169.11	169.2	2213.89	sonic meter - 47 F, normal mode, variable, ignore top 54.5 ft. Also got 169.2 ft for deep mode, ignore top 139.8 ft.
10/22/2010	APP839	2363	2382	12.00	300	190	169.18	169.0	2213.82	sonic meter - 46 F, normal mode, variable, ignore top 54.6 ft. Also got 169.0 ft for deep mode, ignore top 139.8 ft.
1/7/2011	APP839	2363	2382	12.00	300	190	169.05	168.4	2213.95	sonic meter - 42 F, normal mode, variable, ignore top 54.4 ft. Also got 168.1 ft for deep mode, ignore top 139.1 ft.
2/14/2011	APP839	2363	2382	12.00	300	190	168.13	167.6	2214.87	sonic meter - 43 F, normal mode, variable, ignore top 54.4 ft. Also got 167.4 ft for deep mode, ignore top 139.8 ft.
3/22/2011	APP839	2363	2382	12.00	300	190	167.10	166.8	2215.90	sonic meter - 44 F, normal mode, variable, ignore top 54.4 ft. Also got 166.6 ft. for deep mode, ignore top 139.4 ft.
4/18/2011	APP839	2363	2382	12.00	300	190	166.84	166.7	2216.16	sonic meter - 45 F, normal mode, variable, ignore top 54.5 ft. Also got 166.7 ft. for deep mode, ignore top 139.6 ft. Etape got stuck to side to PVC liner due to some apparent moisture, and the meter beeped once and awhile between about 108 and 166 ft. Re-estimated top of casing height from uphill off of well drilling mound, and got about 16" from the ground to the top of the casing.
12/29/2009	ALN861	2054	2087	18.50	640	300	24.70		2063.84	
2/4/2010	ALN861	2066	2087	18.50	640	300	23.80	24.4	2064.74	sonic meter - 43 F, 24.4 normal mode
3/8/2010	ALN861	2066	2087	18.50	640	300	23.66	24.6	2064.88	sonic meter - 44 F, 24.6 normal mode. Could see water in well 25 ft down with flashlight.
4/20/2010	ALN861	2066	2087	18.50	640	300	24.15	25.1	2064.39	sonic meter - 45 F, normal mode
6/8/2010	ALN861	2066	2087	18.50	640	300	23.09	24.1	2065.45	sonic meter - 48 F, normal mode
7/26/2010	ALN861	2066	2087	18.50	640	300	24.71	25.4	2063.83	sonic meter - 49 F, normal mode, variable, ignore top 10.2 ft
8/18/2010	ALN861	2066	2087	18.50	640	300	25.09	25.8	2063.45	sonic meter - 48 F, normal mode, variable, ignore top 10.2 and 20.1 ft. Tried normal mode, ignore top 25.8 ft, and got 26.0 ft for measuring right at the water level. Also tried ignore top 30.1 and 40.0 ft, and got 50.4 to 50.6 ft for attempting to measure below the water level. Note: This well does not have PVC liner and does not have a pump installed in it yet.
9/22/2010	ALN861	2066	2087	18.50	640	300	25.77	26.6	2062.77	sonic meter - 47 F, normal mode, variable, ignore top 15.0 and 20.1 ft.
10/22/2010	ALN861	2066	2087	18.50	640	300	28.07	29.0	2060.47	sonic meter - 46 F, normal mode, variable, ignore top 15.0 and 20.0 ft.

Date	Well ID	Casing Elev.' (Garmin altimeter, NAVD 88)	Garmin Topo Map Ground Elev.' (NAVD 88)	Casing Height"	Well Depth	Depth to Water When Drilled'	Depth to Water, Etape'	Depth to Water, Sonic Meter'	Ground** water Table Elev.' (NAVD 88) (Etape; if none, then sonic meter)	Notes
1/7/2011	ALN861	2066	2087	18.50	640	300	23.19	23.7	2065.35	sonic meter - 42 F, normal mode, variable, ignore top 15.2 and 20.0 ft. Note: Apparent bear tracks moving from NE to SW went right past the well casing. The tracks were 2 to 3 times larger than large dog tracks. The local caretaker says a bear is supposedly living somewhere in Dodd Canyon back by the north gate entrance.
2/14/2011	ALN861	2066	2087	18.50	640	300	23.62	24.3	2064.92	sonic meter - 43 F, normal mode, variable, ignore top 15.0 and 20.0 ft.
3/22/2011	ALN861	2066	2087	18.50	640	300	22.88	23.6	2065.66	sonic meter - 44 F, normal mode, variable, ignore top 15.0 and 20.0 ft.
4/18/2011	ALN861	2066	2087	18.50	640	300	23.84	24.7	2064.70	sonic meter - 45 F, normal mode, variable, ignore top 20.0 ft. Also got 24.6 ft. for normal mode, ignore top 15.0 ft. Remeasured casing height on downhill/east side, and got 20.0".
12/29/2009	ALN867	1735	1763	34.00	360	150	272.48		1493.35	
2/4/2010	ALN867	1865	1763	34.00	360	150	270.85	268.8	1494.98	sonic meter - 43 F, 268.8 deep mode; 269.3 normal mode
3/8/2010	ALN867	1865	1763	34.00	360	150	270.03	268.2	1495.80	sonic meter - 44 F, 268.2 deep mode; 268.8 normal mode
4/20/2010	ALN867	1865	1763	34.00	360	150	269.35	267.8	1496.48	sonic meter - 45 F, 267.8 deep mode; 268.2 normal mode
6/8/2010	ALN867	1865	1763	34.00	360	150	269.66	268.6	1496.17	sonic meter - 48 F, deep mode. Also got 269.1 ft., normal mode
7/26/2010	ALN867	1865	1763	34.00	360	150	270.02	269.2	1495.81	sonic meter - 49 F, deep mode, variable, ignore top 225.2 ft. Also got 269.2 ft for ignore top 111.7 ft.
8/18/2010	ALN867	1865	1763	34.00	360	150	270.18	268.8	1495.65	sonic meter - 48 F, deep mode, variable, ignore top 225.0 and 253.4 ft. Also got 269.1 ft. for normal mode, ignore top 54.6 ft. Also tried deep mode, ignore top 281.7 and 310.0 ft., and got 537.7 feet for attempting to measure below the water level. Note: This well does not have a PVC liner and it does not have a pump installed in it yet.
9/22/2010	ALN867	1865	1763	34.00	360	150	270.38	269.0	1495.45	sonic meter - 47 F, deep mode, variable, ignore top 224.8 and 253.1 ft.
10/22/2010	ALN867	1865	1763	34.00	360	150	270.62	269.0	1495.21	sonic meter - 46 F, deep mode, variable, ignore top 252.8 and 224.6 ft. Also got 269.0 ft for normal mode, ignore top 54.6 ft.
1/7/2011	ALN867	1865	1763	34.00	360	150	271.13	268.8	1494.70	sonic meter - 42 F, deep mode, variable, ignore top 251.9 ft. Also got 268.6 ft. for deep mode, ignore top 223.7 ft. The compact snow/slush/ice on the sloping asphalt road made it hard to keep from sliding down hill while walking.
2/14/2011	ALN867	1865	1763	34.00	360	150	269.50	267.6	1496.33	sonic meter - 43 F, deep mode variable, ignore top 252.2 ft. Also got 267.8 ft. for deep mode, ignore top 233.9 ft, and 267.6 ft. for normal mode, ignore top 54.4 ft.
3/22/2011	ALN867	1865	1763	34.00	360	150	266.75	265.3	1499.08	sonic meter - 44 F, deep mode, variable, ignore top 224.2 and 252.4 ft.
4/18/2011	ALN867	1865	1763	34.00	360	150	265.11	263.6	1500.72	sonic meter - 45 F, deep mode, variable, ignore top 224.4 and 252.6 ft. Remeasured casing height on downhill/east side and got 35.0".
1/29/2010	ALN860	1806	1825	24.50	100	30				DTW = 30 feet, depth = 100 feet. Should have been hit water easily in this shallow well, but tape kept hitting obstructions like rocks starting at 30 feet and then stopped/went slack at 33.57 feet. Try sonic meter
2/4/2010	ALN860	1806	1825	24.50	100	30		43.9	1783.14	sonic meter - 43 F; 43.9 normal mode. Etape got stopped again at about 30.4 feet. Don't know if the 4" PVC liner from 20 - 100 feet is somehow catching the Etape. Just measure with the sonic meter from now on.

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3/8/2010	ALN860	1806	1825	24.50	100	30	41.29	42.1	1785.75	sonic meter - 44 F; 42.1 normal mode. This time used the flashlight to see the liner, and also saw water not very far down into the liner. Even with flashlight, it still took several times to get Etape inside liner for once so that the water could be reached. There is granodiorite rock outcrop just uphill.
4/20/2010	ALN860	1806	1825	24.50	100	30	40.65	41.4	1786.39	sonic meter - 45 F, normal mode. Even with the new flashlight, it still took about 5 tries to get the Etape inside the PVC liner at 20 ft down
6/8/2010	ALN860	1806	1825	24.50	100	30	41.57	42.4	1785.47	sonic meter - 48 F, normal mode
7/26/2010	ALN860	1806	1825	24.50	100	30	41.53	42.1	1785.51	sonic meter - 49 F, normal mode, variable, ignore top 10.2 and 26.1 ft.
8/18/2010	ALN860	1806	1825	24.50	100	30	41.94	42.4	1785.10	sonic meter - 48 F, normal mode, variable, ignore top 20.1 and 30.0 ft. Also got 83.9 ft. for normal mode, ignore top 54.6 ft, and 83.8 ft for deep mode, ignore top 83.2 ft, for attempting to measure below the water level. Note: This well does have a PVC liner but does not have a pump installed in it yet.
9/22/2010	ALN860	1806	1825	24.50	100	30	42.58	43.2	1784.46	sonic meter - 47 F, normal mode, variable, ignore top 30.0 ft.
10/22/2010	ALN860	1806	1825	24.50	100	30	43.15	43.8	1783.89	sonic meter - 46 F, normal mode, variable, ignore top 30.0 ft.
1/7/2011	ALN860	1806	1825	24.50	100	30	43.16	43.8	1783.88	sonic meter - 42 F, normal mode, variable, ignore top 30 ft. Had to walk in as the gravel access lane was not plowed, and then had to drive back uphill to get back to the main Ruffed Grouse Lane.
2/14/2011	ALN860	1806	1825	24.50	100	30	39.38	40.0	1787.66	sonic meter - 43 F, normal mode, variable, ignore top 30.2 ft.
3/22/2011	ALN860	1806	1825	24.50	100	30	33.15	33.9	1793.89	sonic meter - 44 F, normal mode, variable, ignore top 25.2 and 30.0 ft.
4/18/2011	ALN860	1806	1825	24.50	100	30	32.47	33.2	1794.57	sonic meter - 45 F, normal mode, variable, ignore top 25.1 and 30.0 ft. Remeasured casing height on the east side away from the depression, and got 25.00 inches.
1/29/2010	ALN853	1610	1603	16.00	680	120	85.25		1519.08	no pump; DTW = 120 ft., well depth = 680 ft.
2/4/2010	ALN853	1610	1603	16.00	680	120	85.03	85.2	1519.30	sonic meter - 43 F, 85.2 normal mode
3/8/2010	ALN853	1610	1603	16.00	680	120	84.27	84.4	1520.06	sonic meter - 44 F, 84.4 normal mode
4/20/2010	ALN853	1610	1603	16.00	680	120	83.18	83.4	1521.15	sonic meter - 45 F, normal mode
6/8/2010	ALN853	1610	1603	16.00	680	120		83.4	1520.93	sonic meter - 48 F, normal mode. A pump with pipe and wires has now been installed in this well, and a back trench has been dug on the south side to allow the pump wiring and frost free faucet to be installed. It looks like the Etape could still be dropped down the east side of the casing, but wanted to wait until well access sheet obtained from new well owner. This is Hawk Creek lot #1.
7/26/2010	ALN853	1610	1603	16.00	680	120		84.8	1519.53	sonic meter - 49 F, normal mode, variable, ignore top 26.5 and 40.1 ft. Obtained phone number of new well owner. Trench next to well casing has now been filled in.
8/18/2010	ALN853	1610	1603	16.00	680	120		83.8	1520.53	sonic meter - 48 F, normal mode, variable, ignore top 54.6 ft. Also got 83.7 ft. for deep mode, ignore top 83.2 ft. Also tried deep mode, ignore top 111.6 and 140.0 ft, and got 166.6 ft for attempting to measure below the water level. Did try Etape again in the most open area on the SE side of casing, but got stopped by something metallic at about 30 ft, and gave up. Just use sonic meter, as it was always close to the Etape reading before the pump was recently installed in this well. Note: This well does not have a PVC liner.
9/22/2010	ALN853	1610	1603	16.00	680	120		84.7	1519.63	sonic meter - 47 F, normal mode, variable, ignore top 54.6 ft.
10/22/2010	ALN853	1610	1603	16.00	680	120		84.6	1519.73	sonic meter - 46 F, normal mode, variable, ignore top 54.6 ft.
1/7/2011	ALN853	1610	1603	16.00	680	120		86.2	1518.13	sonic meter - 42 F, normal mode, variable, ignore top 54.4 ft.

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3/8/2010	LIV1987	1900	1880	11.25	640	300		295.0	1585.94	sonic meter - 44 F, 295.0 deep mode; 5.0 normal mode. Use the blue plastic plug to measure, most open port down the casing. However, other metal plug gave 295.0 measurement also. Only the sonic meter will work here, as the ports are too small for the Etape. Well casing is inside green and white pumphouse that is inside fenced boat storage area and is just north of cell phone tower, just west of Miles-Creston Rd. Need to step over pipes, compressor to get to casing in SW corner of pumphouse. GPS reading taken on concrete pad by SW corner of pump house. Need to contact well owner's son to get access to well.
4/20/2010	LIV1987	1900	1880	11.25	640	300		295.2	1585.74	sonic meter - 45 F, deep mode
6/8/2010	LIV1987	1900	1880	11.25	640	300		296.0	1584.94	sonic meter - 48 F, deep mode
7/26/2010	LIV1987	1900	1880	11.25	640	300		296.2	1584.74	sonic meter - 49 F, deep mode, variable, ignore top 253.6 ft and 225.2 ft.
8/18/2010	LIV1987	1900	1880	11.25	640	300		296.0	1584.94	sonic meter - 48 F, deep mode, variable, ignore top 253.4 and 281.7 ft. Also got 296.0 ft for normal mode, ignore top 54.6 ft. Also tried deep mode, ignore top 310.0 and 338.4 ft, and got 591.0 ft for attempting to measure below the water surface. Note: This well has a pump and small 5/8" port that the sonic meter can barely fit into.
9/22/2010	LIV1987	1900	1880	11.25	640	300		295.5	1585.44	sonic meter - 47 F, deep mode, variable, ignore top 253.1 and 281.4 ft. Also got 295.7 ft for normal mode, ignore top 54.6 ft.
10/22/2010	LIV1987	1900	1880	11.25	640	300		295.6	1585.34	sonic meter - 46 F, deep mode, variable, ignore top 281.2 and 252.8 ft. Also got 295.6 ft. for normal mode, ignore top 54.6 ft.
1/7/2011	LIV1987	1900	1880	11.25	640	300		294.6	1586.34	sonic meter - 42 F, deep mode, variable, ignore top 280.0 ft. Also got 294.3 ft for deep mode, ignore top 251.9 ft, and 294.5 ft for normal mode, ignore top 294.5 ft.
2/14/2011	LIV1987	1900	1880	11.25	640	300		294.6	1586.34	sonic meter - 43 F, deep mode, variable, ignore top 252.2 and 280.4 ft. Also got 294.9 ft. for normal mode, ignore top 54.4 ft.
3/22/2011	LIV1987	1900	1880	11.25	640	300		295.4	1585.54	sonic meter - 44 F, deep mode, variable, ignore top 280.6 ft. Also got 295.4 for normal mode, ignore top 54.4 ft., and 295.2 ft. for deep mode, ignore top 252.4 ft.
4/18/2011	LIV1987	1900	1880	11.25	640	300		295.2	1585.74	sonic meter - 45 F, deep mode, variable, ignore top 280.9 and 252.6 ft. For normal mode, ignore top 54.5 ft., got 295.4 ft. Tried deep mode, ignore top 309.2 ft., and got 589.9 ft. (about 2 X 295 ft.) for attempting to measure below the water level. Remeasured the casing height, and got 11.75' to the top of the port hole, plus 5' for the concrete floor above ground, for a total of 16.75 ft. above ground level on the west side of the pumphouse.
4/28/2010	REI715	2557	2551	21.50	715	NA		580.3	1966.70	sonic meter - 45 F, first 402.4 ft, then 580.3 feet, then 402.4 ft afterwards. Sonic meter just fit through 5/8" port on top of the casing; Etape will not work here. With the 583.6 ft. measurement in June, it looks like the 580.3 measurement is the best measurement to use. No well log could be found, but the well owner says there was about 20 ft of loess over 300-400 ft of basalt over ancient river gravel over granitic bedrock. This well was only drilled after the well in the Atlas missile site a mile to the east was drilled and took most of the water away from the older 300 plus ft well. After the missile base was closed down, the water returned to the older 300+ ft well, and so this newer and deeper 715 feet well has not been used in 5 years due to the low water yield and high carbonates in the water. This well is located in the concrete "well bunker" about 20 yds west of the older 300+ ft. well. The top of the well casing inside the bunker looks to be about 24" below the ground level on the south side of the bunker, and so the depth to water will be the sonic meter reading plus 2 ft. subtracted from the Garmin topo map elevation.
6/8/2010	REI715	2557	2551	21.50	715	NA		583.6	1963.40	sonic meter - 48 F, deep mode. Got 583.6 ft. four different times. Looks like the better April measurement was 580.3 ft.

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7/26/2010	REI715	2557	2551	21.50	715	NA		584.6	1962.40	sonic meter - 49 F, deep mode variable, ignore top 423.9, 480.6 and 565.8 feet. Also got 405.4 ft. with ignore top 225.2 and 338.8 ft. It would appear that there is some feature in the well at about 405 ft. that is reflecting the sonic signal, but the 584.6 ft. reading appears to be the actual water level depth below 405 ft feature. Note: the pump was on when the concrete pumphouse was entered, but the pump then shut off before the measurements were taken. There was a moderate breeze blowing out of the 5/8" port hole.
8/18/2010	REI715	2557	2551	21.50	715	NA		583.4	1963.60	sonic meter - 48 F, deep mode, ignore top 423.5, 480.2 and 565.2 ft. Tried deep mode, ignore top 593.6 and 622.0 ft, and the meter gave no measurement for attempting to read below the water level. Also tried normal mode, ignore top 54.6 ft, and 404.4 ft. There is a persistent well feature at 404 ft above the water level. Also, the pump was not running today and there was only a slight breeze coming out of the port hole.
9/22/2010	REI715	2557	2551	21.50	715	NA		582.6	1964.40	sonic meter - 47 F, deep mode, variable, ignore top 564.7 and 536.4 ft. Also got 404.0 ft for normal mode, ignore top 54.6 ft. - persistent well feature. Pump was not running, and only a slight breeze was coming out of the plug hole.
10/22/2010	REI715	2557	2551	21.50	715	NA		584.2	1962.80	sonic meter - 46 F, deep mode, variable, ignore top 564.2 and 535.8 ft. Also got 405.0 ft for the well feature with normal mode, ignore top 54.6 ft. A slight breeze was coming out of the plug hole and the pump was not running.
1/7/2011	REI715	2557	2551	21.50	715	NA		580.4	1966.60	sonic meter - 42 F, deep mode, variable, ignore top 533.8 and 562.0 ft. Also got 402.6 ft this time for the well feature using normal mode, ignore top 54.4 ft. There was a slight breeze coming out of the port hole.
2/14/2011	REI715	2557	2551	21.50	715	NA		582.4	1964.60	sonic meter - 43 F, deep mode, ignore top 534.3 and 562.5 ft. Also got 403.8 ft (well feature) for normal mode, ignore top 54.4 ft. There was a moderate breeze blowing out of the port hole.
3/22/2011	REI715	2557	2551	21.50	715	NA		579.8	1967.20	sonic meter - 44 F, deep mode, variable, ignore top 563.0 and 534.8 ft. Also got 402.3 ft. for the well feature again using normal mode, ignore top 54.4 ft. Note: There was no air blowing out or being sucked in through the port hole this time.
4/18/2011	REI715	2557	2551	21.50	715	NA		580.2	1966.80	sonic meter - 45 F, deep mode, variable, ignore top 535.4 and 563.6 ft. For normal mode, ignore top 54.5 ft., got 402.4 ft. again for the well feature. Tried deep mode, ignore top 591.9 ft., and the meter would not give a measurement for attempting to measure below the water level. There was only a very slight breeze blowing out of the port hole today. Remeasured the casing height above the concrete floor and got 21.5" again. But, the 1.5 ft diameter, round hole cast in the concrete roof above the casing runs about 84" above the top of the casing. Outside this bunker well, the top of the soil on top of the bunker is about 36" higher than the ground level on the south/uphill side of bunker. So 84" or 7ft. - 36" or 3 ft. = top of casing about 4 ft. below ground level here. For this well, the groundwater elevation is recalculated using the formula: groundwater elevation = column D, Garmin topo map elevation, minus (column I + 4 ft.).
4/28/2010	REI300+	2566	2551	12.00	300+	NA		224.6	2322.90	sonic meter - 45 F, deep mode, consistent measurement made through 5/8" port with blue plug. Etape will not work here. The well casing is below ground level in a concrete well box below the windmill. Top of casing was measured to be about 42 inches below the ground surface, and so the groundwater elevation will be the sonic meter reading plus 3.5 ft, subtracted from the Garmin topo map ground elevation. This well is used to supply house water. This older well regained its water after the Atlas missile base 1 mile to the east was closed down. There is no well log available. The well depth could be 325 ft or could be 425 or 465 ft.

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6/8/2010	REI300+	2566	2551	12.00	300+	NA		225.6	2321.90	sonic meter - 48 F, deep mode. Got 225.6 ft. measurement 3 times. With blue plastic plug out of top of well casing, noted a moderate breeze blowing up and out of the well. The well owner noted that this well has blown air before at times.
7/26/2010	REI300+	2566	2551	12.00	300+	NA		203.0	2344.50	sonic meter - 49 F, deep mode, variable, ignore top[168.4 and 196.8 ft. Also got 103 ft using normal mode, ignore top 54.7 ft; and 225.6 ft using deep mode, ignore top 225.2 ft; and about 259 ft using ignore top 256 ft. The apparent rise in water level using the new sonic meter was not expected. This well had a moderately strong breeze blowing out of the 5.8" port hole.
8/18/2010	REI300+	2566	2551	12.00	300+	NA		202.5	2345.00	sonic meter - 48 F, deep mode, ignore top 168.4 and 196.6 ft. Tried normal mode, ignore top 54.6 ft, and got 102.8 ft. There is a persistent well feature above the water level at about 103 ft. Also tried deep mode, ignore top 225.0 ft, and got 225.1 ft., which is what the old sonic meter was measuring with the default ignore top 225.0 setting. With deep mode, ignore top 253.4 ft., got 257.8 ft. Both the ignore top 225.0 and 253.4 ft measurements are different because they aren't the typical 2X depth for attempting to measure below the apparent water level. Also tried ignore top 281.7 ft, and the meter would not give a measurement. After the initial measurements with the pump not running, the pump turned on for about a minute. Took measurements in deep mode, ignore top 168.4 and 196.6 ft right after the pump shut off, and got 202.5 ft again. There was only a slight breeze blowing out of the port hole today. The water level may or may not be at 202.5 ft in this well.
9/22/2010	REI300+	2566	2551	12.00	300+	NA		202.6	2344.90	sonic meter - 47 F, deep mode, variable, ignore top 196.4 and 168.2 ft. Also got 103.0 ft for normal mode, ignore top 54.6 ft - persistent well feature. The pump was not running, and a moderate breeze was blowing out of the plug hole.
10/22/2010	REI300+	2566	2551	12.00	300+	NA		202.4	2345.10	sonic meter - 46 F, deep mode, variable, ignore top 196.2 and 168.0 ft. Also got well feature again at 102.8 ft with normal mode, ignore top 54.6 ft. The pump was not initially running, but did turn on for several minutes after the first measurements were taken. With the pump running, the meter bounced all around in deep mode from 500 ft. to 800 ft. to 1500 ft, and at one time it read 204.6 ft., which might have been the actual water level with the pump running. Tried fixed mode, but this made no difference. After the pump shut off, the water level went back to 202.4 ft.
1/7/2011	REI300+	2566	2551	12.00	300+	NA				Didn't measure this well today. It is questionable if the 202 ft readings are measuring the water level or just a well feature. Wasn't worth shoveling the snow off of the concrete well house cover. Try measuring sometime again in spring with the pump running/not running.
May-05	ACS240	1595	1614	6.00	320	218	235.00		1379.50	In 1984 well depth was 230 ft, with water at 200 ft. Well was deepened to 335 ft. in November 2002 with static water level at 218 ft.. Well owner measured with his own Etape
Sep-05	ACS240	1595	1614	6.00	320	218	277.00		1337.50	well owner measured with own Etape;
Sep-05	ACS240	1595	1614	6.00	320	218	279.00		1335.50	well owner measured with own Etape; after well was pumped hard for 6 hours
3/15/2006	ACS240	1595	1614	6.00	320	218	226.00		1388.50	well owner measured with own Etape
Jul-06	ACS240	1595	1614	6.00	320	218	249.00		1365.50	well owner measured with own Etape
5/19/2007	ACS240	1595	1614	6.00	320	218	235.00		1379.50	well owner measured with own Etape

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Jul-07	ACS240	1595	1614	6.00	320	218	271.00		1343.50	well owner measured with own Etape; with pump running
Jul-07	ACS240	1595	1614	6.00	320	218	264.00		1350.50	well owner measured with own Etape; with pump off
7/13/2008	ACS240	1595	1614	6.00	320	218	274.00		1340.50	well owner measured with own Etape; after pump run all night
1/19/2010	ACS240	1595	1614	6.00	320	218				tape stopped at 68 feet first try, 110 feet second try; couldn't reach water
2/12/2010	ACS240	1595	1614	6.00	320	218		231.5		sonic meter - 43 F (should have been 45 F, but not much difference) 231.50, deep mode, 5.0 normal mode; had to try different areas to get 231.50 multiple times, but sometimes read 1200 - 1600 feet in deep mode. Etape was not used, too much cable in upper well casing. Sonic meter reading was probably bounced off of something in the well ABOVE the water. The sonic meter measurement probably shows that the well water level was not above this depth.
3/9/2010	ACS240	1595	1614	6.00	320	218		232.8		sonic meter - 47 F, deep mode, 5.0 normal. Marvin pulled the top wires out and tried his Etape, but he couldn't get it measure water depth. His tape also got temporarily hung up at 240 and 200 feet on the way out. Sonic meter reading was probably bounced off of something in the well ABOVE the water. The sonic meter measurement probably shows that the well water level was not above this depth.
4/22/2010	ACS240	1595	1614	6.00	320	218	249.20	232.9	1365.30	sonic meter - 49 F, deep mode on SW side of casing. Well owner used his own Etape, which read 249.20 feet to water. This leads to a 16+ difference between Marvin's Etape and the sonic meter. The sonic meter is usually with 1 to 2 feet or less of the District's Etape reading. The well owners Etape should be pretty close to the actual water depth; it got caught up temporarily again at 233 feet. The well owner pulled up his Etape to about 220 feet and is leaving it in the well for easier measuring next time. Sonic meter reading was probably bounced off of something in the well ABOVE the water. The sonic meter measurement probably shows that the well water level was not above this depth.
6/3/2010	ACS240	1595	1614	6.00	320	218	248.20		1366.30	Etape measurement taken with well owners Etape. Got good off and on signal, so measurement is sound. Unable to get sonic meter to read on deep mode at 50 F, just bounced around mostly from 1200 to 1600 feet. Even putting duct tape on the bottom of the cardboard disc did not make any difference. The April Etape measurement with the well owner's Etape should also be good, but the previous sonic meter readings were probably bounced off of something in the well ABOVE the water. These sonic meter measurements probably show that the well water level was not above these depths.
7/27/2010	ACS240	1595	1614	6.00	320	218	253.67		1360.83	The well owner's Etape measured 253 ft. plus 8" = 253.67 ft. Tried the new sonic meter, but it just would not measure the well at its current water level. Closest reading was 232.8 ft using 51 F, deep mode, variable, ignore top 225.6 ft. But most of the time, the same settings would read nonsense depth readings of 1100 to 1600 ft. Tried ignore top 254 ft, also tried fixed mode, but it made no difference. Tried normal mode, variable, ignore top 54.7 feet, and got 213.8 feet. There is some apparent well feature at about 232 feet, but it is not water. The well owner's Etape is the only way to measure this well. Note: There was a good breeze being sucked into the well. The well has been used frequently in the last several weeks since the hot weather began.

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8/17/2010	ACS240	1595	1614	6.00	320	218				The well owner was not present to take measurements with his Etape. The well was not running and there was no breeze being sucked in or blown out of the vent hole in the well today. Sonic meter - 51 F, deep mode, variable, ignore top 225.6 ft - got 232.6 ft. Tried deep mode, ignore top 254.1 ft, and got no reading on the meter, like the ignore depth was below the water depth. Also tried deep mode, ignore top 197.2 ft and got 214.1 ft, and for normal mode, ignore top 54.8 feet, got 214.0 feet. There are persistent well features at about 214 ft and 232 ft that are above the water level. Can't set the meter to ignore the top 240 ft, and so no definitive measurement of the water level can be made today. However, the new sonic meter appears to be indicating that the water in the well is between 232 ft and 254 ft down from the top of the casing.
9/21/2010	ACS240	1595	1614	6.00	320	218	264.25		1350.25	Well owner used his Etape to get the measurement of 264.25 ft. The well was sucking in air some, and it was pumping. The lowest depth that the well owner has seen in the past is about 273 ft, also in September. Sonic meter - For 50 F, deep mode, variable, ignore top 225.4 and 253.8 ft, got measurements bouncing from 500 ft. to 1,600 ft. With the Etape water depth at 264.25 ft., the meter should have been able to measure it with ignore top 253.8 ft, but some feature in this well prevents the sonic meter from working. Also got 213.7 ft. for normal mode, ignore top 54.8 ft, so the feature at 213 to 214 ft. persists.
10/21/2010	ACS240	1595	1614	6.00	320	218		255.8	1358.70	sonic meter - 49 F, deep mode, variable, ignore top 253.6 ft, twice, with sonic meter on SW side of casing closest to driveway, and only about 1/2 of the black cable was pulled out of the casing. The pump was not running. Don't know why the sonic meter appears to be working this time, but seems reasonable with the 264.25 depth last time. Well owner not present to run his Etape. Also got 232.3 ft with deep mode, ignore top 225.2 ft, and also got no reading from the meter for deep mode, ignore top 282.0 ft.
11/19/2010	ACS240	1595	1614	6.00	320	218				Apparent water level is now in between where the meter can measure it without hitting the two well features. Sonic meter - 46 F; for deep mode, variable, ignore top 252.8 ft, meter wouldn't give reading, indicating that it might be trying to read below the water level. For deep, ignore top 224.6 ft, got 232.0 feet for this well feature. For normal mode, variable, ignore top 54.6 feet, got 215.8 ft for the lower well feature.
1/14/2011	ACS240	1595	1614	6.00	320	218		240.2	1374.30	sonic meter - 44 F, deep mode, variable, ignore top 224.2 ft. Didn't take the pump wires out of the casing at all, and had sonic meter tube on the south/ driveway side of the casing to get 239 to 240 ft. most of the time. Have not gotten 240 feet before for the sonic meter, so it appears that this is the water level. For normal mode, ignore top 54.4 ft., got the 213 ft. well feature again.
1/23/2011	ACS240	1595	1614	6.00	320	218	239.00		1375.50	Well owner used his own Etape to get measurement. This 239 ft. measurement indicates that the 240.2 measurement with the sonic meter on 1/14 was also accurate and was measuring the actual water level and not another well feature.
2/10/2011	ACS240	1595	1614	6.00	320	218	236.75		1377.75	Note: A second well log when this well was deepened to 320 ft. in November 2002 was found. The well tag number with this well log is ACS240, and replaces the former well name of 283118_1984. Don't know why sonic meter didn't work this month but worked in January. For the sonic meter - 45 F, deep mode, ignore top 224.4 ft., could only get 232 ft., which is one of the permanent well features in this well. The well owner used his Etape to get 236.75 ft. This Etape was found to have one of the two wires cut near the sensor/brass washer assembly end, and will be taken to BOR to be repaired. The meter on the Etape still showed a definite on and off response with the Etape pulled up and down around the water level, and the 236.75 ft, is close and reasonable compared with the 240.2 and 239.0 measurements from January.

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3/23/2011	ACS240	1595	1614	6.00	320	218	230.92	230.8	1383.58	sonic meter - 47 F, deep mode, variable, ignore top 224.8 ft., multiple times, with all the power cable in the casing and with all of the extra cable out of the casing, on the south side of the casing closest to the driveway. Also got 213.8 ft. for the well feature using normal mode, ignore top 54.6 ft. Used the well owner's BOR style Etape to go down the south side of the well. Tape went slack at 150 ft., but pulled up and tried again, and got tape to go all the way down to water at 230 ft., 11 inches, and then all the way back out. The well owner's Etape showed that the sonic meter was working and right on target with the well water level today.
4/19/2011	ACS240	1595	1614	6.00	320	218	229.50	229.9	1385.00	sonic meter - 49 F, deep mode, fixed gain, ignore top 225.2 ft., with the pump off for several minutes and with all of the excess cable out of the top of the well casing. The well pump was initially running continuously due to a leak inside the adjacent pumphouse. With the pump running, only got one valid measurement of 235.8 ft. with sonic meter using fixed gain, and this 235.8 ft. probably represented the drawdown with the pump running. All the other measurements with the pump running varied from 400 ft. all the way up to 1600+ ft. While trying the well owner's BOR style Etape, the well pump finally shut off and stayed off. The Etape got hung up on something at about 24 ft., and the well owner had to take a second try to get the Etape all the way down to get the 229 ft. 6 in. measurement. The sonic meter got 229.9 ft. numerous times after the well pump had been shut off for several minutes, and was very close to the Etape measurement.
1/19/2010	AHC421	1551	1582	17.50	255	205	233.00		1350.46	
2/12/2010	AHC421	1551	1582	17.50	255	205	230.58	227.6	1352.88	sonic meter - 43 F (should have been 45 F, but not much difference) 227.6 deep mode, 227.9 normal mode. The AHC421 tag is on the well
3/9/2010	AHC421	1551	1582	17.50	255	205	230.43	228.4	1353.03	sonic meter - 47 F, 228.4 deep mode; 228.6 normal mode
4/22/2010	AHC421	1551	1582	17.50	255	205	229.77	228.2	1353.69	sonic meter - 49 F; 228.2 deep mode, 228.6 normal mode
6/3/2010	AHC421	1551	1582	17.50	255	205	229.24	228.4	1354.22	sonic meter - 228.4 ft, 50F, deep mode. Also got 228.0 feet, normal mode
7/27/2010	AHC421	1551	1582	17.50	255	205	229.02	227.6	1354.44	sonic meter - 51 F, deep mode, variable, ignore top 197.2 and 225.6 ft. Also got 227.7 ft. using normal mode, variable, ignore top 54.8 ft.
8/17/2010	AHC421	1551	1582	17.50	255	205	229.10	227.6	1354.36	sonic meter - 51 F, deep mode, variable, ignore top 197.2 and 225.6 ft. Also tried deep mode, ignore top 254.6 ft, and got 454.6 ft. for attempting to measure below the water depth. Also got 227.6 ft for normal mode, ignore top 54.8 ft. It should be noted that this well hasn't been used in years, has no pump, pipe or wires in it, and that the landowner will most likely be decommissioning this well and drilling a new well farther up hill in the near future.
9/21/2010	AHC421	1551	1582	17.50	255	205	229.39	227.6	1354.07	sonic meter - 50 F, deep mode, variable, ignore top 197.6 ft. Also got 227.8 ft. for normal mode, ignore top 54.8 ft.
10/21/2010	AHC421	1551	1582	17.50	255	205	229.51	227.9	1353.95	sonic meter - 49 F, deep mode, variable, ignore top 196.8 ft. For deep mode, ignore top 225.2 ft, got 228.2 ft. Also got 227.9 ft. for normal mode, ignore top 54.7 ft.
11/19/2010	AHC421	1551	1582	17.50	255	205	229.47	227.1	1353.99	sonic meter - 46 F, deep mode, variable, ignore top 224.6 and 196.2 ft. Also got 227.4 for normal, variable, ignore top 54.6 ft.
1/14/2011	AHC421	1551	1582	17.50	255	205	229.18	226.6	1354.28	sonic meter - 44 F, deep mode, variable, ignore top 195.9 and 224.2 ft. Also got 226.6 ft. for normal mode, ignore top 54.4 ft.
2/10/2011	AHC421	1551	1582	17.50	255	205	228.56	226.2	1354.90	sonic meter - 45 F, deep mode, variable, ignore top 196.1 and 224.4 ft. Also got 226.4 for normal mode, ignore top 54.5 ft.

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3/23/2011	AHC421	1551	1582	17.50	255	205	226.84	225.0	1356.62	sonic meter - 47 F, deep mode, variable, ignore top 196.4 and 224.8 ft. Also got 225.2 ft. for normal mode, ignore top 54.6 ft. Note: Lake Roosevelt is so low now that the 2 docks just downhill to the west in Eden Harbor are high and dry on the mud.
4/19/2011	AHC421	1551	1582	17.50	255	205	226.06	224.6	1357.40	sonic meter - 49 F, deep mode, variable, ignore top 168.4 and 196.8 ft. Also got 224.9 ft for normal mode, ignore top 54.7 ft. Lake Roosevelt is down so far now that there is not much water left in Eden Harbor.
1/19/2010	AHC420	1516	1554	32.50	300	130	187.00		1369.71	
2/12/2010	AHC420	1516	1554	32.50	300	130	183.75	182.5	1372.96	sonic meter - reset to 45 F for region 7, Grand Coulee dam area; 182.5 normal. Initially tried at 43 F - 181.2 normal, 363.3 deep
3/9/2010	AHC420	1516	1554	32.50	300	130	181.21	180.4	1375.50	sonic meter - 47 F, 180.4 normal mode; 360.0 deep mode
4/22/2010	AHC420	1516	1554	32.50	300	130	177.46	176.8	1379.25	sonic meter - 49 F, normal mode
6/3/2010	AHC420	1516	1554	32.50	300	130	186.30	186.0	1370.41	sonic meter - 50 F, normal mode
7/27/2010	AHC420	1516	1554	32.50	300	130	188.42	187.9	1368.29	sonic meter - 51 F, normal mode, variable, ignore top 54.7 ft.
8/17/2010	AHC420	1516	1554	32.50	300	130	182.66	182.2	1374.05	sonic meter - 51 F, normal mode, variable, ignore top 54.8 ft. Note: this pump was not run for about 24 hours before measuring today.
9/21/2010	AHC420	1516	1554	32.50	300	130	185.47	185.0	1371.24	sonic meter - 50 F, normal mode, variable, ignore top 54.8 ft. Also got 184.8 ft for deep mode, ignore top 168 ft.
10/21/2010	AHC420	1516	1554	32.50	300	130	186.57	185.8	1370.14	sonic meter - 49 F, normal mode, variable, ignore top 54.7 ft. Also got 185.6 ft for deep mode, ignore top 168.4 ft. This well hasn't been pumped for awhile, perhaps several days or more since the irrigation season is winding down.
11/19/2010	AHC420	1516	1554	32.50	300	130	184.00	182.9	1372.71	sonic meter - 46 F, normal mode, variable, ignore top 54.6 ft.
1/14/2011	AHC420	1516	1554	32.50	300	130	173.89	172.7	1382.82	sonic meter - 44 F, normal mode, variable, ignore top 54.4 ft. Well has come back up about 10 ft.
2/10/2011	AHC420	1516	1554	32.50	300	130	174.52	173.6	1382.19	sonic meter - 45 F, normal mode, variable, ignore top 54.5 ft.
3/23/2011	AHC420	1516	1554	32.50	300	130	172.95	172.2	1383.76	sonic meter - 47 F, normal mode, variable, ignore top 54.6 ft. There are now fairly large sandy/gravelly beaches exposed on the south side of the reservoir to the east.
4/19/2011	AHC420	1516	1554	32.50	300	130	168.37	168.2	1388.34	sonic meter - 49 F, normal mode, variable, ignore top 54.7 ft. Also got 168.0 ft. for deep mode, ignore top 140.1 ft. Remeasured height of casing above average ground height to get 30.25". This pump has not been run much lately because APC865 is able to provide the needed water.
1/19/2010	APC865	1525	1542	34.00	404	244	272.30		1272.53	
2/12/2010	APC865	1525	1542	34.00	404	244	260.00	258.4	1284.83	sonic meter - 45 F; 258.40 deep mode. The well owner marked the top of casing/collar with red pencil, only run the Etape down here at the red pencil to avoid getting hung up on the poor job of taping the pump wires to the pump pipe
3/9/2010	APC865	1525	1542	34.00	404	244	244.22	243.2	1300.61	sonic meter - 47 F, 243.2 deep mode; 5.5 normal mode
4/22/2010	APC865	1525	1542	34.00	404	244		259.2	1285.63	sonic meter - 49 F, deep mode. The Etape got stopped twice at about 180 feet on the NE side of the casing where the tape had dropped down OK the previous 3 times. Unable to reach water with the Etape, try again in May. The sonic meter reading should be within 1 - 2 feet of what the Etape would have measured.
6/3/2010	APC865	1525	1542	34.00	404	244		299.2	1245.63	sonic meter - 50 F, deep mode. Well owner did not want to try the Etape in this well. Well owner also noted that the reservoir level was at its lowest about 10 days ago, and now it is slowly filling back up again.

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7/27/2010	APC865	1525	1542	34.00	404	244		317.6	1227.23	sonic meter - 51 F, deep mode, variable, ignore top 225.6 and 282.6 ft. Well owner says the last time this well was run was at midnight. He now only runs the pump in this well for 8 minutes at a time, 4 times a day, or else he risks the pump sucking the well dry. He used to be able to run the pump for 15 minutes at a time. This well has dropped quite a bit, and is not hydrologically connected to Lake Roosevelt which has now risen back up to full pool level.
8/17/2010	APC865	1525	1542	34.00	404	244		290.4	1254.43	sonic meter - 51 F, deep mode, variable, ignore top 225.2 and 282.2 ft. Also tried deep mode, ignore top 311.4 ft, and got no reading from the meter for attempting to read below the water level. This pump has also not been run for 24 hours, and has come up about 17 ft compared to the last measurement on July 27th. Also noticed/saw for the first time the white PVC liner along the NW side of the casing below the red chalk mark. With the PVC liner running from about 15 feet down to 404 ft, it is best not to chance measuring this well anymore with the Etape.
9/21/2010	APC865	1525	1542	34.00	404	244		304.7	1240.13	sonic meter - 50 F, deep mode, variable, ignore top 283.2 ft. Also got 304.8 ft for deep mode, ignore top 253.4 ft.
10/21/2010	APC865	1525	1542	34.00	404	244		304.6	1240.23	sonic meter - 49 F, deep mode, variable, ignore top 253.6 and 282.0 ft. Also got 304.5 ft for normal mode, ignore top 54.7 ft. This well had not been pumped yet this morning, but is still being pumped 4 times a day for 8 minutes or less at 9 AM, noon, 3 PM and 9 PM.
11/19/2010	APC865	1525	1542	34.00	404	244		284.2	1260.63	sonic meter - 46 F, deep mode, ignore top 281.2 and 252.8 ft. Also got 284.2 ft. for normal mode, variable, ignore top 54.6 ft.
1/14/2011	APC865	1525	1542	34.00	404	244		260.2	1284.63	sonic meter - 44 F, deep mode, variable, ignore top 251.9 ft. Also got 260.2 ft. for normal mode, ignore top 54.4 ft.
2/10/2011	APC865	1525	1542	34.00	404	244		263.4	1281.43	sonic meter - 45 F, deep mode, variable, ignore top 224.4 and 252.2 ft. Also got 263.4 ft. for normal mode, ignore top 54.5 ft.
3/23/2011	APC865	1525	1542	34.00	404	244		283.4	1261.43	sonic meter - 47 F, deep mode, variable, ignore top 253.1 and 281.4 ft., for pump not running at about 9 AM. Also got 283.4 ft. for normal mode, ignore top 54.6 ft., and 283.6 ft for deep mode, ignore top 224.8 ft. Came back to well at 10:30 AM when well owner returned. Initially got 305.8 for deep mode, ignore top 281.4 ft., but by about 5 minutes later, the well had slowly risen back to 303.3 ft. Discovered that the well had turned on at 10 AM after the first sampling had been taken at 9 AM, and was slowly recovering towards the 283 ft. static level. The well owner doesn't know why this well would be down 20 ft. this month at this time of year, but still believes that the well water level is NOT tied to the level of Lake Roosevelt, which is probably down about 30 ft.
4/19/2011	APC865	1525	1542	34.00	404	244		254.6	1290.23	sonic meter - 49 F, deep mode, variable, ignore top 225.2 and 253.6 ft. Also got 254.6 ft. for normal mode, ignore top 54.7 ft. The well owner shut the pump switch to be sure that the pump would not turn on at 9 AM, and so the well had not been pumped since last night. The well owner noted that Lake Roosevelt had not been lowered as much as it is now for the last 5 - 10 years. With the reservoir 20 ft. or more down this time, but with the well level about 30 ft. higher than last month, this shows that this well is not connected to Lake Roosevelt and that pumping must have lead to the unexpected well level drop last month.
2/12/2010	ROY1991	1304	1357	34.25	198	105	59.41	59.4	1300.44	need to drive to neighbors house all the way at the end of the lane, walk about 80 yds due west through lawn and trees to flagged bitterbrush with sagebrush all around. No pump; iron top now held down with large cobble.
3/9/2010	ROY1991	1304	1357	34.25	198	105	64.80	64.9	1295.05	sonic meter - 47 F, 64.9 normal mode. This well has dropped 5.39 feet since February, which corresponds to the sandy beaches exposed now along the south side of the river.

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4/22/2010	ROY1991	1304	1357	34.25	198	105	71.07	71.1	1288.78	sonic meter - 49 F, normal mode. Note: On the nearby bedrock shoreline, the current water level is about 15 to 20 feet down from the high water mark.
6/3/2010	ROY1991	1304	1357	34.25	198	105	77.42	77.5	1282.43	sonic meter - 50 F, normal mode
7/27/2010	ROY1991	1304	1357	34.25	198	105	56.56	56.6	1303.29	sonic meter - 51 F, normal mode, variable, ignore top 30.0 and 10.0 ft. Lake Roosevelt just to the north is at full pool, and no sandy beaches or chalk lines on the bedrock are now exposed.
8/17/2010	ROY1991	1304	1357	34.25	198	105	60.08	60.0	1299.77	sonic meter - 51 F, normal mode, variable, ignore top 30.0, 40.0 and 54.8 ft. Also tried deep mode, ignore top 83.5 ft, and got 119.0 ft for attempting to measure below the water level. The shoreline around Lake Roosevelt shows that the water has dropped about 4 to 5 ft since the end of July.
9/21/2010	ROY1991	1304	1357	34.25	198	105	64.21	64.2	1295.64	sonic meter - 50 F, normal mode, variable, ignore top 50.1 and 54.8 ft.
10/21/2010	ROY1991	1304	1357	34.25	198	105	56.99	57.2	1302.86	sonic meter - 49 F, normal mode, variable, ignore top 50.0 and 54.7 ft. The well owner of APC865 said that the current Lake Roosevelt elevation was 1288 ft., close to the full pool elevation of 1290 ft, and the water does look about as high as it gets.
11/19/2010	ROY1991	1304	1357	34.25	198	105	58.17	58.2	1301.68	sonic meter - 46 F, normal mode, variable, ignore top 54.6 ft.
1/14/2011	ROY1991	1304	1357	34.25	198	105	62.21	62.3	1297.64	sonic meter - 44 F, normal mode, variable, ignore top 50.0 and 54.4 ft.
2/10/2011	ROY1991	1304	1357	34.25	198	105	63.68	63.8	1296.17	sonic meter - 45 F, normal mode, variable, ignore top 54.5 ft. Note: The water level in Lake Roosevelt may be down 15 to 20 ft.
3/23/2011	ROY1991	1304	1357	34.25	198	105	87.34	87.2	1272.51	sonic meter - 47 F, normal mode, variable, ignore top 54.6 ft. About 20 to 30+ feet of cliff wall exposed along then north shore of the reservoir.
4/19/2011	ROY1991	1304	1357	34.25	198	105	103.89	103.8	1255.96	sonic meter - 49 F, normal mode, variable, ignore top 54.7 ft. Lake Roosevelt may be down 50 or so ft. The casing height is measured from within the the depression around the casing. The estimated height of the casing from the undisturbed uphill/south side of the ground around the casing is 20'.
1/19/2010	BBH538	1357	1368	25.75	165	91	77.73		1292.42	
2/12/2010	BBH538	1357	1368	25.75	165	91	81.80	80.9	1288.35	sonic meter - 45 F, 80.90, normal mode; a pump, pipe and wires are now installed; only put the Etape down the casing side next to wire input from outside to avoid any cables.
3/9/2010	BBH538	1357	1368	25.75	165	91	86.85	86.6	1283.30	sonic meter - 47 F, 86.6 normal mode. This well has dropped 5.05 feet since February, appears to be related to the drop in river level with more sandy beaches exposed on the south side.
4/22/2010	BBH538	1357	1368	25.75	165	91	94.79	94.5	1275.36	sonic meter - 49 F, normal mode. This well's water levels seem to be pretty closely tied to the level of Lake Roosevelt
6/3/2010	BBH538	1357	1368	25.75	165	91	93.31	93.2	1276.84	sonic meter - 50 F, normal mode. Well owner to east closer to dam noted that the reservoir water level was at its lowest about 10 days ago, and now the reservoir is slowly filling up again.
7/27/2010	BBH538	1357	1368	25.75	165	91	77.14	77.0	1293.01	sonic meter - 51 F, normal mode, variable, ignore top 10.0 and 54.8 ft.
8/17/2010	BBH538	1357	1368	25.75	165	91	81.91	81.6	1288.24	sonic meter - 51 F, normal mode, variable, ignore top 40.0 and 54.8 ft. Also tried deep mode, ignore top 83.5 and 111.7 ft, and got 162.2 ft for attempting to measure below the water level. The water level on the north side of the reservoir looks like it is down 4 to 5 ft.
9/21/2010	BBH538	1357	1368	25.75	165	91	82.30	82.0	1287.85	sonic meter - 50 F, normal mode, variable, ignore top 54.8 ft.
10/21/2010	BBH538	1357	1368	25.75	165	91	76.94	76.8	1293.21	sonic meter - 49 F, normal mode, variable, ignore top 54.7 ft.

Date	Well ID	Casing Elev.' (Garmin altimeter, NAVD 88)	Garmin Topo Map Ground Elev.' (NAVD 88)	Casing Height"	Well Depth	Depth to Water When Drilled'	Depth to Water, Etape'	Depth to Water, Sonic Meter'	Ground** water Table Elev.' (NAVD 88) (Etape; if none, then sonic meter)	Notes
11/19/2010	BBH538	1357	1368	25.75	165	91	80.18	79.8	1289.97	sonic meter - 46 F, normal mode, variable, ignore top 54.6 ft. Lake Roosevelt doesn't look to be down very much on the bedrock across the river, but the well is down several feet.
1/14/2011	BBH538	1357	1368	25.75	165	91	84.17	83.7	1285.98	sonic meter - 44 F, normal mode, variable, ignore top 54.4 ft. The water level appeared to be down about 10 on the cliff wall on the north side of the reservoir
2/10/2011	BBH538	1357	1368	25.75	165	91	87.65	87.3	1282.50	sonic meter - 45 F, normal mode, variable, ignore top 54.5 ft.
3/23/2011	BBH538	1357	1368	25.75	165	91	111.68	109.2	1258.47	sonic meter - 47 F, normal mode, variable, ignore top 54.6 ft.
4/19/2011	BBH538	1357	1368	25.75	165	91	135.87	109.6	1234.28	sonic meter - 49F, normal mode, variable, ignore top 54.7 ft. The 109.6 ft. measurement appeared to questionable right away, as all the other wells that are connected to Lake Roosevelt have dropped another 20 or so ft. for April. The Etape was make it OK all the way down to 135 ft. along the south side of the casing to hit water, showing that the 109.6 ft today and the 109.2 ft. measurement from last month from the sonic meter are the same apparent well feature, The sonic meter will not give accurate readings in this well when the water level is deeper than about 109 ft. Also got 109.6 ft. for deep mode, ignore top 83.3 ft., but for deep mode, ignore top 111.7, 140.1 and 168.4 (greater than the well depth) ft., got 217.9 to 217.7 ft. instead of the expected 2X measurement of 270 or so feet for attempting to measure below the water level. Remeasured the casing height on the south side to get 28.75 "
1/19/2010	BAC955	1817	1846	22.00	228	170	149.70		1698.13	
2/12/2010	BAC955	1817	1846	22.00	228	170	150.22	149.8	1697.61	sonic meter - 45 F, 149.8 normal mode
3/9/2010	BAC955	1817	1846	22.00	228	170	150.30	150.2	1697.53	sonic meter - 47 F, 150.2 normal mode; 299.2 deep mode
4/22/2010	BAC955	1817	1846	22.00	228	170	150.15	150.3	1697.68	sonic meter - 49 F, normal mode
6/3/2010	BAC955	1817	1846	22.00	228	170	150.21	150.4	1697.62	sonic meter - 50 F, normal mode
7/27/2010	BAC955	1817	1846	22.00	228	170	150.23	150.2	1697.60	sonic meter - 51 F, normal mode, variable, ignore top 54.8 ft.
8/17/2010	BAC955	1817	1846	22.00	228	170	150.29	150.2	1697.54	sonic meter - 51 F, normal mode, variable, ignore top 40.0 and 54.8 ft. Also tried deep mode, ignore top 168.6 ft. and got 299.3 ft for attempting to measure below the water level.
9/21/2010	BAC955	1817	1846	22.00	228	170	150.27	150.1	1697.56	sonic meter - 50 F, normal mode, variable, ignore top 54.8 ft. Also got 149.6 ft for deep mode, ignore top 140.2 ft.
10/21/2010	BAC955	1817	1846	22.00	228	170	150.29	150.0	1697.54	sonic meter - 49 F, normal mode, variable, ignore top 54.7 ft. Also got 149.6 ft for deep mode, ignore top 140.1 ft.
11/19/2010	BAC955	1817	1846	22.00	228	170	150.25	149.8	1697.58	sonic meter - 46 F, normal mode, variable, ignore top 54.6 ft.
1/14/2011	BAC955	1817	1846	22.00	228	170	150.38	149.8	1697.45	sonic meter - 44 F, normal mode, variable, ignore top 54.4 ft. Also got 149.6 ft. for deep mode, ignore top 139.4 ft.
2/10/2011	BAC955	1817	1846	22.00	228	170	150.55	150.2	1697.28	sonic meter - 45 F, normal mode, variable, ignore top 54.5 ft. Also got 149.9 ft. for deep mode, ignore top 139.6 ft.
3/23/2011	BAC955	1817	1846	22.00	228	170	150.43	150.2	1697.40	sonic meter - 47 F, normal mode, ignore top 54.6 ft. The well owner said this well was rated at 5 gpm.
4/19/2011	BAC955	1817	1846	22.00	228	170	150.47	150.5	1697.36	sonic meter - 49 F, normal mode, variable, ignore top 54.7 ft. Also got 150.2 ft. for deep mode, ignore top 140.1 ft. Remeasured the casing height on the east side where Etaped to get 25.50 "
1/19/2010	APF669	1831	1849	22.50	200	160	150.70		1700.18	
2/12/2010	APF669	1831	1849	22.50	200	160	150.40	149.7	1700.48	sonic meter - 45 F, 149.7 normal mode
3/9/2010	APF669	1831	1849	22.50	200	160	150.45	150.0	1700.43	sonic meter - 47 F, 150.0 normal mode
4/22/2010	APF669	1831	1849	22.50	200	160	150.38	150.2	1700.50	sonic meter - 49 F, normal mode
6/3/2010	APF669	1831	1849	22.50	200	160	150.40	150.2	1700.48	sonic meter - 50 F, normal mode

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7/27/2010	APF669	1831	1849	22.50	200	160	150.47	150.2	1700.41	sonic meter - 51 F, normal mode, variable, ignore top 54.8 ft.
8/17/2010	APF669	1831	1849	22.50	200	160	150.49	150.2	1700.39	sonic meter - 51 F, normal mode, variable, ignore top 40.0 and 54.8 ft. Also tried deep mode, ignore top 168.6 ft, and got 299.3 ft for attempting to measure below the water level. Wells APF669 and BAC955 are only about 25 ft apart, have almost the same water level, and have very static water levels that basically don't vary at all over the year. Both of these wells still have empty casings with no pump, pipe or wires in them.
9/21/2010	APF669	1831	1849	22.50	200	160	150.47	150.1	1700.41	sonic meter - 50 F, normal mode, variable, ignore top 54.8 ft. Also got 150.0 ft for deep mode, ignore top 140.2 ft.
10/21/2010	APF669	1831	1849	22.50	200	160	150.51	150.0	1700.37	sonic meter - 49 F, normal mode, variable, ignore top 54.7 ft. Also got 150.0 ft for deep mode, ignore top 140.1 ft.
11/19/2010	APF669	1831	1849	22.50	200	160	150.46	149.6	1700.42	sonic meter - 46 F, normal mode, variable, ignore top 54.6 ft.
1/14/2011	APF669	1831	1849	22.50	200	160	150.59	149.8	1700.29	sonic meter - 44 F, normal mode, variable, ignore top 54.4 ft. Also got 149.6 ft for deep mode, ignore top 139.4 ft.
2/10/2011	APF669	1831	1849	22.50	200	160	150.70	150.0	1700.18	sonic meter - 45 F, normal mode, variable, ignore top 54.5 ft. Also got 149.6 ft for deep mode, ignore top 139.6 ft.
3/23/2011	APF669	1831	1849	22.50	200	160	150.55	150.0	1700.33	sonic meter - 47 F, normal mode, variable, ignore top 54.6 ft. The well owner noted that this well would be deepened in the near future to increase the yield from current 3 gpm.
4/19/2011	APF669	1831	1849	22.50	200	160	150.65	150.4	1700.23	sonic meter - 49 F, normal mode, variable, ignore top 54.7 ft. Also got 150.0 ft for deep mode, ignore top 140.1 ft. Remeasured casing height on the west side where Etaped to get 24.50"
1/22/2010	ABQ390	1521	1529	14.50	410	275				well tag on casing, couldn't find it on Ecology website; tape stopped for awhile at 40, 65, and finally 102.5 ft, sounded like metal; couldn't reach water; stuck temporarily on way out; try sonic meter next time
2/12/2010	ABQ390	1521	1529	14.50	410	275		243.2	1287.01	sonic meter - 43 F, 243.2 deep mode, 5.4 normal. 243.2 appears to be reasonable for water level, try sonic meter again to see if measurement changes.
3/9/2010	ABQ390	1521	1529	14.50	410	275		248.8	1281.41	sonic meter - 44 F, 248.8 deep mode; also tried at 47 F, 249.4 deep mode. Keller Ferry is close to the region 9 / region 7 line on the sonic meter map for temperature adjustment. This well has dropped about 5.6 feet, which corresponds to the stony bars now exposed on the north side of the river.
4/22/2010	ABQ390	1521	1529	14.50	410	275		256.5	1273.71	sonic meter - 256.5 ft, 49 F, deep mode. Since it has been warm here recently, the 49 F temp setting for Zone 7 is probably more accurate. In comparison, 45 F and deep mode for Zone 9 (cooler zone to east) read 255.5 ft, which is only 1 foot difference for 4 degrees difference in temp setting on the sonic meter. A well user reports that the reservoir level several days ago was down 17 feet from its high point this season, and so this well is falling with the river also.
6/3/2010	ABQ390	1521	1529	14.50	410	275		259.6	1270.61	sonic meter - 259.6, 50 F, deep mode. Also got 259.0, 48 F, deep mode. Saw what appears to be 4" diameter white PVC liner down 15 to 20 feet. No wonder the Etape never made it water; it would be hard to get the Etape in the only small open space on the north side.
7/27/2010	ABQ390	1521	1529	14.50	410	275		240.6	1289.61	sonic meter - 51 F, deep mode, variable, ignore top 225.6 ft. Also got 240.2 ft for 49 F, deep mode variable, ignore top 225.6 ft., for a small difference of 0.4 ft. Also got 240.8 ft for 51 F, normal mode, variable, ignore top 54.8 ft.

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8/17/2010	ABQ390	1521	1529	14.50	410	275		244.6	1285.61	sonic meter - 51 F, deep mode, variable, ignore top 225.6 and 197.5 ft. Also got 243.6 ft for 48 F, deep mode, ignore top 225.6 ft., for a small difference of 1 ft. over 244 ft. Also tried deep mode, 51 F, ignore top 254.1 and 282.2 ft, and the meter would not give a reading for attempting to measure below the water level. Note: The 4 to 5 ft drop in water level in the reservoir has reexposed a lot of the stony and bouldery bar along the inside bend on the north side of the river.
9/21/2010	ABQ390	1521	1529	14.50	410	275		246.8	1283.41	sonic meter - 50 F, deep mode, ignore top 225.4 ft. Also got 245.2 ft. for 47 F, deep mode, ignore top 225.4 ft.
10/21/2010	ABQ390	1521	1529	14.50	410	275		240.8	1289.41	sonic meter - 49 F, deep mode, ignore top 225.4 ft. For 49 F, normal mode, ignore top 54.7 ft, also got 240.8 ft. For 46 F, deep mode, ignore top 225.4 ft, got 242.2 ft.
11/19/2010	ABQ390	1521	1529	14.50	410	275		244.4	1285.81	sonic meter - 46 F, deep mode, variable, ignore top 224.6 ft. Also got 244.4 for normal mode, ignore top 54.6 ft. Tried 44 F, deep mode, variable, ignore top 224.6 ft, and got 244.0 ft., for a difference of .4 ft for the recommended Grand Coulee area temp (Zone 7) versus the rest of Lincoln County area temp (Zone 9). The well has dropped 3.6 ft, and about 1/4 to 1/3 of the stone/boulder bar across the river has been reexposed again.
1/14/2011	ABQ390	1521	1529	14.50	410	275		246.6	1283.61	sonic meter - 44 F, deep mode, variable, ignore top 224.2 ft. Also got 246.6 ft. for normal mode, ignore top 54.4 ft. A lot of the stone/boulder bar was now visible now above the reservoir level. One might think that the well level might have been down more than about 2 ft.
2/10/2011	ABQ390	1521	1529	14.50	410	275		248.8	1281.41	sonic meter - 45 F, deep mode, variable, ignore top 224.4 ft. Also got 248.4 ft. for normal mode, ignore top 54.5 ft. A well user noted that the original pump in this well quit working, and that when the pipe was pulled up and out, the pump remained in the bottom of the well. The pump installer installed a screen on top of the old pump with seals and then installed 4" PVC liner all the way down to the pump. Above the screened area, some collars were installed to keep sand from falling down any more on the pump and screen. The boulder bar across the river shows that the reservoir may be down several feet from January.
3/23/2011	ABQ390	1521	1529	14.50	410	275		273.6	1256.61	sonic meter - 47 F, deep mode, variable, ignore top 224.8 and 253.1 ft. The stony/bouldery bar on the north side of the reservoir has about doubled in size, as this well has dropped 24.8 ft. since February.
4/19/2011	ABQ390	1521	1529	14.50	410	275		292.8	1237.41	sonic meter - 49 F, deep mode, variable, ignore top 253.6 and 282.0 ft. Lake Roosevelt is down so far now that the stony/bouldery bar on the north side of the reservoir now extends about 400 to 500 ft out from the north shore.
1/19/2010	DID1982	2643	2658	17.00	353	200				Etape stopped at 240 ft, then stuck at 140 ft; never reached water
2/12/2010	DID1982	2643	2658	17.00	353	200		231.2	2428.22	sonic meter 43 F, 231.2 deep mode; 5.4 normal mode. Etape not used due to other Etape still stuck in well. Ask the well owner if 231.2 ft. seems believable for water level. If so, try sonic meter again, see if measurement changes. But Etape got to 240 feet last time without reaching water.
3/9/2010	DID1982	2643	2658	17.00	353	200		231.6	2427.82	sonic meter - 44 F, 231.6 deep mode. It seems unlikely that the measurement is reflecting off of the water surface but is instead reflecting off of something else in the well at about 231 feet.
4/22/2010	DID1982	2643	2658	17.00	353	200		231.8	2427.62	sonic meter - 45 F, deep mode. Keep on measuring this well? Sonic meter may not be reflecting the water level, which should be significantly deeper.

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7/27/2010	DID1982	2643	2658	17.00	353	200		256.2	2403.22	sonic meter - 49 F, deep mode, both variable and fixed gain, ignore top 253.6 ft. Also got 233.2 ft using 49 F, deep mode, variable, ignore top 225.6 ft. There seems to be some type of persistent well feature at about 232 ft. Tried deep mode and ignore top 196.8 and 168.4 ft, and got 233.2 ft. again. But when ignore top 282.0 and 310.4 ft used, the meter would not read any depth. Best guess at this time is that the actual water level is at 256.2 feet since the Etape made it down to 240 ft. without beeping/reaching water before it got stuck back up at 140 feet back in January. Also, the lack of readings for ignore depths > 256 ft. might happen if these ignore depths were below water level.
8/17/2010	DID1982	2643	2658	17.00	353	200		256.4	2403.02	sonic meter - 48 F, deep mode, variable, ignore top 253.6 ft. Also tried deep mode, ignore top 282.0, 310.4 and 338.8 ft, and the meter would not give a measurement in this well for attempting to measure below the apparent water level. Also tried deep mode, ignore top 225.2 ft, and normal mode, ignore top 54.8 ft, and got 233.2 ft. both times. There is a persistent well feature at 232 to 233 ft above the apparent water level.
9/21/2010	DID1982	2643	2658	17.00	353	200		256.6	2402.82	sonic meter - 47 F, deep mode, variable, ignore top 253.1 ft, and before pump turned on. Also got 233.1 ft for normal mode, ignore top 54.8 ft. and deep mode, ignore top 224.8 ft, with the pump still off - persistent well feature. Used the frost free faucet and hose to run water for several minutes to get the well pump to turn on. After several minutes, turned the faucet off, and got 264.2 ft for deep mode, ignore top 253.1 ft. The well pump ran for a few more minutes, and just after it shut off, the meter read 267.7 ft. About 4-5 minutes later, the meter read 256.3 ft. So, the July, August and September sonic meter measurements are of the actual water level at 254 to 256 ft., and not another well feature. Should be able to measure water levels in this well as long as the water level doesn't rise to above 233 ft. in the well.
10/21/2010	DID1982	2643	2658	17.00	353	200		256.4	2403.02	sonic meter - 46 F, deep mode, variable, ignore top 252.8 ft, well pump off. Turned on frost free faucet, let water run for several minutes, pump turned on and run for several minutes, with water depth reading at 267.0 ft just after the pump shut off. About 3 minutes after the pump shut off, the water level had come back up to 257.6 ft.
11/19/2010	DID1982	2643	2658	17.00	353	200		255.8	2403.62	sonic meter - 44 F, deep mode, variable, ignore top 252.4 ft. Also got 232.5 ft for the well feature using deep, ignore top 224.2 ft.
1/14/2011	DID1982	2643	2658	17.00	353	200		256.2	2403.22	sonic meter - 42 F, deep mode, variable, ignore top 251.9 ft. Also got 233.0 ft for the well feature with normal mode, ignore top 54.4 ft., and deep mode, ignore top 223.7 ft. And for deep mode, ignore top 280.0 ft., the meter would not give a measurement. The actual water level should be at 256.2 ft.
2/10/2011	DID1982	2643	2658	17.00	353	200		256.6	2402.82	sonic meter - 43 F, deep mode, variable, ignore top 252.2 ft. Also got 233.3 ft for normal mode, ignore top 54.4 ft, for the well feature.
3/23/2011	DID1982	2643	2658	17.00	353	200		257.0	2402.42	sonic meter - 44 F, deep mode, variable, ignore top 252.4 ft, on the second try, with the pump not running. The first try with deep mode, ignore top 252.4 ft., would not give any measurements, and the initial assumption that the well water level had risen above 252.4 ft. was soon proven wrong. Used the short hose and frost free faucet to get the well pump to turn on, with the lowest level of 267.8 ft. measured just after the pump shut off. About 4 minutes after the pump shut off, the well level was 257.6 ft. on its way to returning to the SWL of 257.0 ft., proving that the sonic meter was reading the water level. Also got 233.6 ft. for the well feature using normal mode, ignore top 54.4 ft, and deep mode, ignore top 224.2 ft.

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3/11/2010	DAVEN#1	2430	2421	7.25	?	?	134.95		2286.65	WP-052 Garmin, averaging. This well is not currently being used and has no pump in it. It is located inside the brick pumphouse at 11th and Washington. The GPS measurement was taken on the NE corner of the concrete border around the casing. The city foreman saw water cascading down the casing. There was a false Etape light and beep that started flickering/wavering at about 86 feet, Turned down sensitivity to get beep on and off at 134.95 feet. Sonic meter could not be used because a 2.5 foot diameter cardboard was needed to cover the top of the casing. The city foreman noted that this well had been previously measured for many years by Ecology.
4/27/2010	DAVEN#1	2430	2421	7.25	?	?	135.60		2286.00	sonic meter would not work on this big and empty 15" casing well either, even with large piece of cardboard on top; meter read 5.4 ft. normal mode, 271 ft. deep mode, which are both incorrect readings. Etape had weak, wavering beep with cascading water from 73 ft down to 135 ft, had to turn down sensitivity quite a bit to get beep off and on at 135.60 ft. With new flashlight, could see stream of water coming in from the SE side of the casing at about 73 feet. Ran the Etape down the opposite NW side, but cascading water still affected the tape.
6/4/2010	DAVEN#1	2430	2421	7.25	?	?	135.62		2285.98	Cascading water by about 78 feet. Water coming in from SE side was reduced quite a bit, hard to see. Had to turn sensitivity way down to get on and off beep with tape up and down at 135.62 ft.
7/29/2010	DAVEN#1	2430	2421	7.25	?	?	138.15		2283.45	Water cascading by about 100 ft, turned down sensitivity to get OK beep up and down at 138.15 ft
8/23/2010	DAVEN#1	2430	2421	7.25	?	?	139.98	141.2	2281.62	Experimenting with the new sonic meter showed that this well could be measured using fixed gain mode. For 48 F, normal mode, fixed, ignore top 54.6 ft, the meter bounced between 141.2 ft and 57 to 59 feet. For deep mode, fixed ignore top 111.6 to 140.0 ft, got 141.2 ft. Next time, use deep mode, fixed, ignore top 111.6 ft for best results. The weak, quivering beep from cascading water did not start till about 100 ft. Turned down the sensitivity to get an OK on/off beep at 139.98 ft. Couldn't see cascading water in the well shaft but could hear it.
9/28/2010	DAVEN#1	2430	2421	7.25	?	?	140.35	141.4	2281.25	sonic meter - 47 F, deep mode, fixed gain, ignore top 111.5 ft. Also got 59.0 ft for normal mode, fixed, ignore top 54.6 ft - persistent well feature. Cascading water, quivering Etape beep started at about 100 ft.
10/26/2010	DAVEN#1	2430	2421	7.25	?	?	140.16	141.1	2281.44	sonic meter - 46 F, deep mode, fixed gain, ignore top 111.4 ft. Cascading water, quivering Etape beep started at about 95 ft. this time.
11/22/2010	DAVEN#1	2430	2421	7.25	?	?	139.51	140.2	2282.09	sonic meter - 44 F, deep mode, fixed gain, ignore top 111.2 ft. Cascading water, quivering beep started at about 90 ft. Could hear some cascading water but could not see it with the flashlight.
1/20/2011	DAVEN#1	2430	2421	7.25	?	?	137.07	137.9	2284.53	sonic meter - 42 F, deep mode, fixed gain, ignore top 111.0 ft. Could hear the water cascading in the well but could not see it with the flashlight. The cascading water/quivering beep started at about 77 ft. and got quite a bit of the Etape wet.
2/18/2011	DAVEN#1	2430	2421	7.25	?	?	129.97	131.6	2291.63	sonic meter - 43 F, deep mode, FIXED gain, ignore top 111.0 ft. Note: Could easily hear the cascading water and see it with the flashing light flowing in from the SE side of the casing. This time, started off by running Etape down the SE side of casing to record first cascading water beeps at about 51.7 feet. Then moved Etape to NW side of casing to try to avoid cascading water. It was a little tricky, but with adjusting the sensitivity down but not down too far, got OK on/off beep at about 129.97 feet. Note: The maximum well casing diameter measured at the top is 14", and NOT 15" or 16".

Date	Well ID	Casing Elev.' (Garmin altimeter, NAVD 88)	Garmin Topo Map Ground Elev.' (NAVD 88)	Casing Height"	Well Depth	Depth to Water When Drilled'	Depth to Water, Etape'	Depth to Water, Sonic Meter'	Ground** water Table Elev.' (NAVD 88) (Etape; if none, then sonic meter)	Notes
3/24/2011	DAVEN#1	2430	2421	7.25	?	?	128.45	129.4	2293.15	sonic meter - 44 F, deep mode, fixed gain, ignore top 111.2 ft, second try. Initially got 136.3 for deep mode and normal mode, ignore top 54.4 ft. But this didn't make sense that the water in Well #1 would go down 5 ft. when Well #2 came up about 2 ft. On the second try, the sonic meter oscillated between 135.6 and 129.4 for deep mode, and between 59.0 (well feature) and 135.6 for normal mode. Don't know why the sonic meter didn't read 129.4 ft. the first time. Could see and hear the cascading water coming in from the SE part of the well at about 50 feet. The quivering beep/cascading water started at about 60 ft. on the NW side of the well. Turned sensitivity down to get OK on/off beep at about 128.45 ft.
4/21/2011	DAVEN#1	2430	2421	7.25	?	?	127.26	128.2	2294.34	sonic meter - 45 F, deep mode, fixed gain, ignore top 111.2 ft. Also got 128.2 ft. for normal mode, ignore top 54.5 ft. Could see and hear a substantial stream of water cascading in from the SE side of the well. The quivering beep/cascading water didn't start until about 73 ft. on the opposite/NW side of the well. Turned down the sensitivity on the Etape to get OK on/off beep at 127.26 ft.
1/22/2010	BBH041	1577	1601	27.75	92	54	55.20		1548.11	well tag on casing, couldn't find it on Ecology website; no pump in well, not being used for now
2/19/2010	BBH041	1577	1601	27.75	92	54	55.13	55.2	1548.18	sonic meter - 43 F, 55.2 normal mode, 225.2 deep mode
3/16/2010	BBH041	1577	1601	27.75	92	54	55.05	55.4	1548.26	sonic meter - 55.4 normal mode, 44 F. Was able to get hard copy of well log.
4/27/2010	BBH041	1577	1601	27.75	92	54	54.98	55.2	1548.33	sonic meter - 45 F, normal mode
6/4/2010	BBH041	1577	1601	27.75	92	54	55.05	55.4	1548.26	sonic meter - 48F, normal mode
7/29/2010	BBH041	1577	1601	27.75	92	54	55.13	55.2	1548.18	sonic meter - 49 F, normal mode, variable, ignore top 25.0 ft.
8/23/2010	BBH041	1577	1601	27.75	92	54	55.27	55.4	1548.04	sonic meter - 48 F, normal mode, variable, ignore top 40.0, 50.0 and 54.6 ft. Also tried deep mode, variable, ignore top 83.6 and 111.6 ft, and got 112.8 ft. This well has a PVC liner but does not yet have a pump.
9/28/2010	BBH041	1577	1601	27.75	92	54	55.37	55.4	1547.94	sonic meter - 47 F, normal mode, variable, ignore top 40.0 ft.
10/26/2010	BBH041	1577	1601	27.75	92	54	55.39	55.6	1547.92	sonic meter - 46 F, normal mode, variable, ignore top 45.0 ft.
11/22/2010	BBH041	1577	1601	27.75	92	54	55.38	55.6	1547.93	sonic meter - 44 F, normal mode, variable, ignore top 45.0 ft.
1/20/2011	BBH041	1577	1601	27.75	92	54	55.29	55.6	1548.02	sonic meter - 42 F, normal mode, variable, ignore top 45.1 ft.
2/18/2011	BBH041	1577	1601	27.75	92	54	55.16	55.4	1548.15	sonic meter - 43 F, normal mode, variable, ignore top 45.2 ft.
3/24/2011	BBH041	1577	1601	27.75	92	54	54.97	55.4	1548.34	sonic meter - 44 F, normal mode, variable, ignore top 45.0 ft.
4/21/2011	BBH041	1577	1601	27.75	92	54	54.70	55.0		sonic meter - 45 F, normal mode, variable, ignore top 45.0 ft. Remasured casing height at Etape mark to get 27.25", but the estimated height above the undisturbed ground on the uphill/west side of the casing is about 21".
2/19/2010	NEL1968	1588	1640	9.00	240	145	131.27		1509.48	sonic meter - 43 F, 262.0 deep mode. Sonic meter just didn't work on this well through the 1" threaded port, just use Etape
3/16/2010	NEL1968	1588	1640	9.00	240	145	130.92		1509.83	sonic meter - 5.2 normal mode, 44 F. Sonic meter just won't in this well.
4/27/2010	NEL1968	1588	1640	9.00	240	145	129.88		1510.87	sonic meter would not work, 5.9 ft normal mode, 268 ft deep mode. This irrigation well was not running. The pump looks to be a submersible pump and not driven by a shaft, so it may possible to use Etape with it running in May & June.

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6/4/2010	NEL1968	1588	1640	9.00	240	145	130.66		1510.09	Well owner said the pump had been used for irrigating but had been shut off for a week now.
7/29/2010	NEL1968	1588	1640	9.00	240	145	130.39	131.0	1510.36	sonic meter - 49 F, normal mode, FIXED gain, ignore top 40.1 and 54.7 ft. Pump was not running and hasn't been running in awhile. Normal mode using variable gain with ignore top 25, 40.1 and 57.7 ft read 260.8 ft, which is deeper than the well. Variable gain did not work in this well, but perhaps fixed gain works in most bigger diameter wells like this 14" diameter well.
8/23/2010	NEL1968	1588	1640	9.00	240	145	130.57	131.2	1510.18	sonic meter - 48 F, normal mode, fixed, ignore top 40.0 and 54.6 ft. Tried deep mode, fixed, ignore top 111.6 ft, and to 131.2 ft. again. Tried deep mode, fixed, ignore top 140 and 168.3 ft, and got 261.1 ft for attempting to measure below the water level. Note: This irrigation pump was not running, and looks like it has not been run in awhile.
9/28/2010	NEL1968	1588	1640	9.00	240	145	130.81	131.2	1509.94	sonic meter - 47 F, normal mode, fixed gain, ignore top 54.6 ft. The pump was not running.
10/26/2010	NEL1968	1588	1640	9.00	240	145	131.22	131.5	1509.53	sonic meter - 46 F, normal mode, fixed gain, ignore top 54.6 ft. Pump was not running and the irrigation season is done for the year.
11/22/2010	NEL1968	1588	1640	9.00	240	145	131.44	131.6	1509.31	sonic meter - 44 F, normal mode, fixed gain, ignore top 54.4 ft
1/20/2011	NEL1968	1588	1640	9.00	240	145	131.86	131.8	1508.89	sonic meter - 42 F, normal mode, fixed gain, ignore top 54.4 ft. Also got 131.8 ft. for deep mode, ignore top 111.0 ft.
2/18/2011	NEL1968	1588	1640	9.00	240	145	130.86	131.0	1509.89	sonic meter - 43 F, normal mode, FIXED gain, ignore top 54.4 ft. Also got 130.9 ft. for deep mode, FIXED gain, ignore top 111.0 ft. Note: measured top of casing diameter, and got 14", which is what the well log says. Because this well diameter is only 14", perhaps this is why the sonic meter in FIXED mode can work in this well and Davenport well #1, but won't work in the larger 16" diameter Davenport well #2.
3/24/2011	NEL1968	1588	1640	9.00	240	145	129.59	129.9	1511.16	sonic meter - 44 F, deep mode, fixed gain, ignore top 111.2 ft. Also got 129.8 ft. for normal mode, fixed gain, ignore top 54.4 ft. Note: the nearby canarygrass wetland along Welch Creek just to the south has up to 1 ft. ponded water away from the creek. Also, this irrigation well has an air line and might be a good well to check air line measurements versus the Etape and sonic meter.
4/21/2011	NEL1968	1588	1640	9.00	240	145	127.11	127.7	1513.64	sonic meter - 45 F, deep mode, fixed gain, ignore top 111.2 ft. Also got 127.7 ft. for normal mode, ignore top 54.5 ft. Remeasured port pipe height to get 9.25" above the concrete pad, which is 2" above ground level.
1/22/2101	AKT389	1830	1810	17.75	180	135				Dropped well; pressure tank, wires, and pipe in casing, way too much stuff in casing to use Etape and probably sonic meter also.
2/19/2010	AKT389	1830	1810	17.75	180	135				Dropped well; sonic meter - 43 F, 254.9 deep mode, 6.0 normal mode. Sonic meter would also not work in this well either. Drop well for good, unless meter can be adjusted to ignore upper depths.
7/29/2010	AKT389	1830	1810	17.75	180	135		61.2	1750.28	New sonic meter able to measure well! 49F, normal mode, variable, ignore top 25.0, 30.1, 40.1 and 54.7 ft. Tried ignore top 20.2 ft, and got 21.2 ft. Well features at about 21 ft interfere with the sonic meter. Also tried deep mode, ignore top 83.6 ft, and got 136.3 ft. for attempting to read below the water level.
8/23/2010	AKT389	1830	1810	17.75	180	135		61.1	1750.38	sonic meter - 48 F, normal mode, variable, ignore top 40 and 54.6 ft. Also tried deep mode, variable, ignore top 83.2 and 111.6 ft, and got 136.6 ft for attempting to measure below the water level.
9/28/2010	AKT389	1830	1810	17.75	180	135		61.2	1750.28	sonic meter - 47F, normal mode, variable, ignore top 45.1 ft. If possible, should try to make arrangements with well owner to measure when he is there so that the pump can be turned to verify that he water level drops some.
10/26/2010	AKT389	1830	1810	17.75	180	135		61.0	1750.48	sonic meter - 46 F, normal mode, variable, ignore top 45.0 and 54.6 ft.

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11/22/2010	AKT389	1830	1810	17.75	180	135		61.0	1750.48	sonic meter - 44 F, normal mode, variable, ignore top 45.0 and 50.0 ft.
1/20/2011	AKT389	1830	1810	17.75	180	135		61.0	1750.48	sonic meter - 42 F, normal mode, variable, ignore top 50.0 ft.
2/18/2011	AKT389	1830	1810	17.75	180	135		61.0	1750.48	sonic meter - 43 F, normal mode, variable gain, ignore top 50.0 ft.
3/24/2011	AKT389	1830	1810	17.75	180	135		61.2	1750.28	sonic meter - 44 F, normal mode, variable, ignore top 50.0 ft. Note: For the first time, could hear a slight trickle of water cascading in the well, and there was also a 1 ft. wide stream running in the bottom of McDowell Canyon about 80 ft. away and 30 ft. below the level of the well.
4/21/2011	AKT389	1830	1810	17.75	180	135		61.1	1750.38	sonic meter - 45 F, normal mode, variable, ignore top 50.1 ft. Could still hear a tiny trickle of water cascading in the well. There is still a tiny stream flowing down the bottom of McDowell Canyon about 35 ft below the well.
4/27/2010	HOP1991	1734	1754	11.00	125	30		32.2	1722.72	sonic meter - 45 F, normal mode. Upper 5 to 10 feet of casing is full of wires, pipe and yellow air hose, can't even see the new pressure tank in the casing below. Way too much stuff in the casing to use the Etape, but the sonic meter measurement appears to be reasonable. The well casing is south of the house in the horse pasture next to the water troughs. If nobody is home and the horses are in the pasture, walk out to the well to measure. Just use the sonic meter only.
6/4/2010	HOP1991	1734	1754	11.00	125	30		33.8	1721.12	sonic meter - 48 F, normal mode
7/29/2010	HOP1991	1734	1754	11.00	125	30		35.6	1719.32	sonic meter - 49 F, normal mode, variable, ignore 10.0, 20.2 and 30.1 ft. Tried ignore top 40.1 ft, and got 57.0 ft for attempting to measure below the water level.
8/23/2010	HOP1991	1734	1754	11.00	125	30		36.8	1718.12	sonic meter - 48 F, normal mode, variable, ignore top 25.0 and 30.0 ft. Tried normal mode, ignore top 40.0 ft, and got 42.2 to 50.6 ft. Also tried normal mode, ignore top 54.6 ft, and got 60.1 ft for attempting to measure below the water level. Note: the pump was running and lawn sprinkler was going.
9/28/2010	HOP1991	1734	1754	11.00	125	30		38.6	1716.32	sonic meter - 47 F, normal mode, variable, ignore top 25.0 ft. The pump was running.
10/26/2010	HOP1991	1734	1754	11.00	125	30		39.2	1715.72	sonic meter - 46 F, normal mode, variable, ignore top 25.0 ft. Pump was not running.
11/22/2010	HOP1991	1734	1754	11.00	125	30		39.9	1715.02	sonic meter - 44 F, normal mode, variable, ignore top 25.1 ft.
1/20/2011	HOP1991	1734	1754	11.00	125	30		36.0	1718.92	sonic meter - 42 F, normal mode, variable, ignore top 25.0 and 30.1 ft. This well has come back up about 4 ft. since November, but Welch Creek has not come up much at all yet this year.
2/18/2011	HOP1991	1734	1754	11.00	125	30		31.8	1723.12	sonic meter - 43 F, normal mode, variable, ignore top 25.0 and 30.2 ft. This well has come back up 8.1 ft since its lowest level back in November.
3/24/2011	HOP1991	1734	1754	11.00	125	30		24.8	1730.12	sonic meter - 44F, normal mode, variable, ignore top 15.0 and 20.0 ft. Initially tried ignore top 25.1 ft., and got 25.2 ft. for attempting to measure below the well level, which has come up another 7 ft.
4/21/2011	HOP1991	1734	1754	11.00	125	30		20.7	1734.22	sonic meter - 45 F, normal mode, variable, ignore top 15.0 and 20.0 ft.
1/8/2010	APC864	2382	2441	26.00	178	101				tape stopped at 97 ft due to wires, couldn't reach water
2/19/2010	APC864	2463	2441	26.00	178	101				sonic meter - 43 F, 6.1 normal mode, 238.7 deep mode. Sonic meter just won't work in this well either. Drop this well, unless sonic meter can ever be adjusted to ignore the upper depths.

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7/29/2010	APC864	2463	2441	26.00	178	101		120.4	2322.77	New sonic meter works in this well! 49 F, normal, variable, ignore top 54.7 ft, just as well pump turned on. Just after pump turned off about 5 minutes later, meter read 138.6, for a drawdown of 18.2 ft. In 2 minutes, just after pump turned on again, water level had recovered to 120.4 ft. again. Also tried deep mode, ignore top 83.3 ft. with pump running, and got 138.8 ft.
8/23/2010	APC864	2463	2441	26.00	178	101		110.0	2333.17	sonic meter - 48 F, normal mode, variable, ignore top 54.6 ft. Tried deep mode, variable, ignore top 83.2 ft, and got 110.0 ft. Tried deep mode, variable, ignore top 140 ft, and got 146.0 ft. Then tried deep, ignore top 168.3 ft, and got no measurement from the meter. Note: The pump was not running and the sprinklers were not going on the lawn.
9/28/2010	APC864	2463	2441	26.00	178	101		108.4	2334.77	sonic meter - 47 F, normal mode, variable, ignore top 54.6 ft. The pump was not running.
10/26/2010	APC864	2463	2441	26.00	178	101		108.0	2335.17	sonic meter - 46 F, normal mode, variable, ignore top 54.6 ft.
11/22/2010	APC864	2463	2441	26.00	178	101		107.3	2335.87	sonic meter - 44 F, normal mode, variable, ignore top 54.4 ft.
1/20/2011	APC864	2463	2441	26.00	178	101		106.8	2336.37	sonic meter - 42 F, normal mode, variable, ignore top 54.4 ft.
2/18/2011	APC864	2463	2441	26.00	178	101		106.0	2337.17	sonic meter - 43 F, normal mode, variable, ignore top 54.4 ft.
3/24/2011	APC864	2463	2441	26.00	178	101		104.6	2338.57	sonic meter - 44 F, normal mode, variable, ignore top 54.4 ft. Also got 104.6 ft. for deep mode, ignore top 82.9 ft.
4/21/2011	APC864	2463	2441	26.00	178	101		102.8	2340.37	sonic meter - 45 F, normal mode, variable, ignore top 54.5 ft. Also got 102.8 ft. for deep mode, ignore top 83.0 ft. Remeasured casing height on north side to get 27.25."
1/8/2010	BAC976	2360	2421	11.00	502	290				The Etape went slack at 300 ft, couldn't reach water. The Etape may or may not have been inside the PVC liner
2/19/2010	BAC976	2442	2421	11.00	502	290	292.15	290.6	2129.77	sonic meter - 43 F, 290.6 deep mode, 5.4 normal mode. Used flashlight to confirm that Etape was inside liner
3/16/2010	BAC976	2442	2421	11.00	502	290	292.17	291.2	2129.75	sonic meter - 291.2 deep mode, 44 F
4/27/2010	BAC976	2442	2421	11.00	502	290	292.36	291.5	2129.56	sonic meter - 45 F, deep mode
6/4/2010	BAC976	2442	2421	11.00	502	290	292.56	292.4	2129.36	sonic meter - 48 F, deep mode
7/29/2010	BAC976	2442	2421	11.00	502	290	292.56	292.4	2129.36	sonic meter - 49 F, deep mode, variable, ignore top 225.6 and 253.6 ft. Also tried deep mode, ignore top 310.4 ft, and got 338.8 ft for attempting to measure below water level.
8/23/2010	BAC976	2442	2421	11.00	502	290	292.68	292.2	2129.24	sonic meter - 48 F, deep mode, variable, ignore top 253.4 and 281.7 ft. Also tried deep mode, ignore top 310.0 and 338.4 ft, and the meter would not give a measurement. This well has a PVC liner but does not have a pump in it yet.
9/28/2010	BAC976	2442	2421	11.00	502	290	292.55	292.0	2129.37	sonic meter - 47 F, deep mode, variable, ignore top 281.4 ft. Also got 59.5 ft for normal mode, ignore top 54.6 ft - some type of well feature.
10/26/2010	BAC976	2442	2421	11.00	502	290	292.69	291.8	2129.23	sonic meter - 46 F, deep mode, variable, ignore top 281.2 ft.
11/22/2010	BAC976	2442	2421	11.00	502	290	292.72	291.2	2129.20	sonic meter - 44 F, deep mode, variable, ignore top 280.6 ft. The aluminum well cap had some ice from melted snow that had to be chipped away to get at the cap bolts. Warmer air from the well must have melted the snow.
1/20/2011	BAC976	2442	2421	11.00	502	290				Didn't measure, as Bachelor Prairie Rd was not plowed, and an ATV or snowmobile was needed in order to run on top of the hard, crusty snow to get Arm View Lane and the well.

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2/18/2011	BAC976	2442	2421	11.00	502	290	293.44	291.8	2128.48	sonic meter - 43 F, deep mode, variable, ignore top 280.4 ft. The Etape started a quivering beep at about 112 ft. Had to turn sensitivity down some. The apparent moisture on the side of the PVC liner apparently got the Etape to partially stick to the side of the liner and increased the drag on the Etape. Don't suspect any cascading water inside the PVC liner; confirmed Etape inside liner with flashlight. Road in from the west was OK, with only scattered snow patches left.
3/24/2011	BAC976	2442	2421	11.00	502	290	294.25	292.8	2127.67	sonic meter - 44 F, deep mode, variable, ignore top 280.6 ft. Note: Due to apparent moisture on the inside of the PVC liner, the Etape stuck to the side of the liner, resulting in quite a bit of friction going down and coming back up from 294 ft. to 200 ft. Quivering beep, more water on inside of liner? at about 278 ft., had to turn sensitivity down a little bit to get good on/off beep at 294.25. ft.8
4/21/2011	BAC976	2442	2421	11.00	502	290	294.37	293.2	2127.55	sonic meter - 45 F, deep mode, variable, ignore top 252.6 and 280.9 ft. Also got 59.4 ft. for normal mode, ignore top 54.5 ft., for the well feature/bend in liner/casing. The Etape stuck to the PVC liner again due to some apparent water on the liner, causing significant friction from 200 to 294 ft. A quivering beep started at about 291 ft., but turned down the sensitivity to get good off/on beep at 294.37 ft. Remeasured the casing on the Etape mark north side of the casing to get 12.0", but the estimated height of the casing above undisturbed ground just to the west is 18.5".
1/8/2010	BAS262	2404	2444	15.50	362	304	247.00		2198.29	There are valid concerns that the 247.00 measurement on this date is NOT accurate, after having initial continuous tape beep again at 244 ft, with final OK measurement at 284.60 feet (Etape beeped on and off, as expected) and correlation with sonic meter at 283.1 ft. on 02/19/2010. Also, the amount of rust on Etape on 01/08/2010 may indicate that tape was between the liner and the casing and not inside the liner.
2/19/2010	BAS262	2433	2444	15.50	362	304	284.60	283.1	2160.69	sonic meter - 43 F, 283.1 deep, south side; 5.2 normal. This well is tricky to measure with Etape. Used flashlight to confirm tape inside 4" PVC liner. Etape started continuous beep at about 244 feet, but turned sensitivity down, got Etape to beep off and on as expected, at 284.60 feet, so measurement seems valid. Note - much of the Etape got wet from this well.
3/16/2010	BAS262	2433	2444	15.50	362	304	284.29	283.2	2161.00	sonic meter - 283.2 deep mode, 44 F. Could here a trickle of water cascading down well again, but was able to have the sensitivity on the Etape turned up all the way down.
4/27/2010	BAS262	2433	2444	15.50	362	304		283.3	2161.99	sonic meter - 45 F, deep mode. Note: A pump, piping and wiring have now been installed in this well along with pressure tank. There is only about a 1" gap on the south side of the PVC liner. Not worth trying to get the Etape down almost 300 feet when the sonic meter readings on the south side of the casing still appear to be very close to what the Etape would read.
6/4/2010	BAS262	2433	2444	15.50	362	304		284.2	2161.09	sonic meter - 48 F, deep mode
7/29/2010	BAS262	2433	2444	15.50	362	304		284.2	2161.09	sonic meter - 49 F, deep mode, variable, ignore top 225.6 and 253.6 ft. For deep mode, ignore top 282.0 ft, got 284.3 ft. Also tried ignore top 310.4 and 338.3 and got no measurement on meter for attempting to measure below the water level.

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8/23/2010	BAS262	2433	2444	15.50	362	304		284.7	2160.59	For some unknown reason, the initial attempts with the new sonic meter using deep mode, variable, ignore the top 196.6, 225.0, 253.4 and 281.7 ft. would not yield any measurements. Got 152.9 ft for normal mode, ignore top 54.6 ft, and for deep mode, ignore top 140.0 ft. But a rise in the water level of 132 ft. did not seem plausible. Tried a third time using deep mode, variable, ignore tip 253.4 ft, and got the meter to bounce between 284.7 ft and no measurement. 287.4 ft seems to be much more plausible than 152.9 feet, given the previous measurements with the sonic meters and the Etape. This well has a PVC liner and pump, but is not being used yet. There is some type of apparent well feature at 152.9 ft that is above the water level.
9/28/2010	BAS262	2433	2444	15.50	362	304				Could not get sonic meter to read the expected water depth of about 284 feet down the casing. Tried 47 F, deep mode, variable and fixed gain, and ignore top 253.1, 224.8, and 281.4 ft. but could only get no meter readings, measurements from about 400 ft to 800+ ft, and at times 253.6 ft. Also got 152.8 ft. for normal mode, ignore top 54.6 ft. There are apparent well features at 152.8 and 253.6 ft. No power to the pump yet. May not be able to measure this well anymore. Look into possibility of measuring BAS 263, which is just 20 ft uphill.
10/26/2010	BAS262	2433	2444	15.50	362	304				Couldn't get sonic meter to read this well again. Tried deep mode, variable and fixed gain, and ignore top 252.8 and 281.2 ft in several different locations around the top of the casing, but the meter would not give any reading. Did get the persistent well feature again at 152.7 ft for normal mode, ignore top 54.6 ft., and deep mode, ignore top 139.6 ft. There is no point in attempting to measure this well any more. The earlier Etape and sonic meter data is still usable, except for the January 8th measurement.
1/8/2010	BAC970	2422	2469	12.00	242	138	100.00		2370.00	about 100 ft to water; tape wouldn't stop beeping due to sediment in probe sensor. There are valid concerns that the 100.00 measurement on this date is NOT accurate, due to OK measurement of 142.01 ft on 02/19 and initial static water level of 138 feet when the well was drilled.
2/19/2010	BAC970	2487	2469	12.00	242	138	142.01		2327.99	sonic meter - 43 F, 271.6 deep mode, 5.2 normal mode. The sonic meter just wouldn't work in this well. This well is tricky to measure with Etape. Used flashlight to confirm tape inside 4" PVC liner. Etape went past 150 feet without beeping with sensitivity on just enough to beep with button. Turned sensitivity up, reeled back up to 140 feet until tape stopped beeping, then got tape to beep off and on as expected at 142.01 feet. Measurement seems valid with initial water level at 138 feet.
3/16/2010	BAC970	2487	2469	12.00	242	138	141.90		2328.10	sonic meter - 5.2 normal mode, 271.9 deep mode. Sonic meter just won't work on this well. Was able to leave Etape sensitivity up all the way down this time.
4/27/2010	BAC970	2487	2469	12.00	242	138	141.85		2328.15	sonic meter would not work again
6/4/2010	BAC970	2487	2469	12.00	242	138	142.19		2327.81	
7/29/2010	BAC970	2487	2469	12.00	242	138	143.08	143.1	2326.92	new sonic meter works in this well. 49 F, normal mode, variable, ignore top 57.7 ft. For deep mode, variable, ignore top 111.7 and 140.1 ft, got 143.1 and 143.2 ft. Also tried deep mode, ignore top 168.4 and 196.8 ft., and got 275.4 ft. for attempting to measure below the water level.
8/23/2010	BAC970	2487	2469	12.00	242	138	143.40	143.2	2326.60	sonic meter - 48 F, normal mode, variable, ignore top 54.6 ft. Also tried deep mode, variable, ignore top 111.6 and 140.0 ft, and got 143.2 ft. again. This well has a PVC liner but does not have a pump in it yet.
9/28/2010	BAC970	2487	2469	12.00	242	138	143.67	143.4	2326.33	sonic meter - 47 F, normal mode, variable, ignore top 54.6 ft.
10/26/2010	BAC970	2487	2469	12.00	242	138	144.00	143.8	2326.00	sonic meter - 46 F, normal mode, variable, ignore top 54.6 ft.
11/22/2010	BAC970	2487	2469	12.00	242	138	144.16	143.7	2325.84	sonic meter - 44 F, normal mode, variable, ignore top 54.5 ft.

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1/20/2011	BAC970	2487	2469	12.00	242	138				Didn't measure, as Bachelor Prairie Rd was not plowed, and an ATV or snowmobile was needed in order to run on top of the hard, crusty snow to get Arm View Lane and the well.
2/18/2011	BAC970	2487	2469	12.00	242	138	144.55	144.1	2325.45	sonic meter - 43 F, normal mode, variable, ignore top 54.4 ft. Also got 144.1 ft. for deep mode, ignore top 139.2 ft.
3/24/2011	BAC970	2487	2469	12.00	242	138	144.28	143.9	2325.72	sonic meter - 44 F, normal mode, variable, ignore top 54.5 ft. Also got 143.9 ft. for deep mode, ignore top 139.4 ft.
4/21/2011	BAC970	2487	2469	12.00	242	138	143.93	143.6	2326.07	sonic meter - 45 F, normal mode, variable, ignore top 54.5 ft. Also got 143.6 ft. for deep mode, ignore top 139.6 ft. Remeasured casing height at Etape mark/north side to get 13.0", but the estimated height of the casing above the undisturbed ground uphill is 18.0". Note: there are no quartzitic glacial erratic cobbles on the surface at the slightly higher well, but there are quite a few erratics on the surface next to the gravel lane at about 2455 ft. elevation.
1/8/2010	BAC969	2411	2458	17.25	360	182	176.50		2282.94	
2/19/2010	BAC969	2490	2458	17.25	360	182	176.54	175.6	2282.90	sonic meter - 43 F, 175.6 for normal mode, 352.8 ft for deep mode. The liner almost to top of well is iron, not PVC.
3/16/2010	BAC969	2490	2458	17.25	360	182	176.73	176.0	2282.71	sonic meter - 176.0 normal mode, 44 F
4/27/2010	BAC969	2490	2458	17.25	360	182	176.41	176.0	2283.03	sonic meter - 45 F, normal mode
6/4/2010	BAC969	2490	2458	17.25	360	182	177.02	176.8	2282.42	sonic meter - 48 F, normal mode
7/29/2010	BAC969	2490	2458	17.25	360	182	177.44	177.0	2282.00	sonic meter - 49 F, normal mode, variable, ignore top 54.7 ft. For deep mode, ignore top 168.4 ft, got 176.8 ft.
8/23/2010	BAC969	2490	2458	17.25	360	182	177.72	177.0	2281.72	sonic meter - 48 F, normal mode, variable, ignore top 54.6 ft. Tried deep mode, variable, ignore top 168.3 ft, and got 176.8 ft. Also tried deep mode, ignore top 196.6 and 225.0 ft, and got 356.7 ft for attempting to measure below the water level. This well has an IRON liner but does not have a pump in it yet.
9/28/2010	BAC969	2490	2458	17.25	360	182	177.36	176.8	2282.08	sonic meter - 47 F, ignore top 54.6 ft. Also got 176.6 ft for deep mode, ignore top 168.2 ft.
10/26/2010	BAC969	2490	2458	17.25	360	182	177.30	176.6	2282.14	sonic meter - 46 F, normal mode, ignore top 54.6 ft. Also got 176.4 ft for deep mode, ignore top 168.0 ft.
11/22/2010	BAC969	2490	2458	17.25	360	182	177.00	176.2	2282.44	sonic meter - 44 F, normal mode, variable, ignore top 54.4 ft. Also got 176.0 for deep mode, variable, ignore top 167.6 ft. Some ice from melted snow was on the well cap and had to be chipped away to get at the bolts.
1/20/2011	BAC969	2490	2458	17.25	360	182				Didn't measure, as Bachelor Prairie Rd was not plowed, and an ATV or snowmobile was needed in order to run on top of the hard, crusty snow to get Arm View Lane and the well.
2/18/2011	BAC969	2490	2458	17.25	360	182	176.90	176.0	2282.54	sonic meter - 43 F, normal mode, variable, ignore top 54.4 ft. Also got 176.4 ft for deep mode, ignore top 167.5 ft. Note: Turned around here on road and headed back west to avoid deep snowdrifts and muddy conditions to the east.
3/24/2011	BAC969	2490	2458	17.25	360	182	176.26	175.5	2283.18	sonic meter - 44 F, normal mode, variable, ignore top 54.4 ft. Also got 175.2 ft for deep mode, ignore top 167.6 ft.
4/21/2011	BAC969	2490	2458	17.25	360	182	175.39	174.8	2284.05	sonic meter - 45 F, normal mode, variable, ignore top 54.5 ft. Also got 174.6 and 175.2 ft. for deep mode, ignore top 167.8 ft.
1/8/2010	AHC407	1630	1702	35.00	160	120	72.70		1632.22	
2/19/2010	AHC407	1690	1702	35.00	160	120		66.5	1638.42	sonic meter - 43 F, 66.5 normal mode, 225.9 deep mode; tried twice with Etape, couldn't get tape into liner, and not much room inside liner with pipe and wires. Both times at opposite sides of well, stopped at about 40 feet between liner and casing. Ask where the first Etape measurement was done.

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3/16/2010	AHC407	1690	1702	35.00	160	120	64.61	65.2	1640.31	sonic meter - 65.2 normal mode, 44 F. Found good spot on N/NE side of casing to drop Etape down with no obstructions. Only drop the Etape down where marked.
4/27/2010	AHC407	1690	1702	35.00	160	120	67.65	68.2	1637.27	sonic meter - 45 F, normal mode
6/4/2010	AHC407	1690	1702	35.00	160	120	>77.30			Etape felt like it was hitting the power cable next to the pipe inside the 4" PVC liner at 77.30 feet and could get stuck if it went any lower. Etape checked several times, but would not beep by 77.30 feet. Sonic meter first said 71.4 feet, but then said 80.8 feet with the Etape in the well, and then said 77.6, 76.6 and 75.4 feet with the Etape removed. The sonic meter must have bouncing off of the power cord and/or pipe. All that can be said is that the water level was below 77.30 feet. May not be able to measure levels in well with Etape. Maybe the new sonic meter might work better when it arrives.
6/17/2010	AHC407	1690	1702	35.00	160	120				Used new WL650/200U sonic meter. Tried various different options, but either got about 70 ft in normal mode or 139 feet in deep mode. Suspect water is at about 80 feet, but not able to set meter to ignore the top 78 feet or so in normal mode because the maximum ignore is 54.6 feet in normal mode. 48 F, normal, variable, ignore top 30 or top 50 ft, got 70.2 feet, then got 70.0 feet in fixed mode. In deep mode, variable, ignore top 54.9 ft and then top 83.2 ft, got 70.0 feet and then 139.2 ft. The big jump in measurement may indicate that the water level is between 54.9 and 83.2 ft, such as 80 feet. Try with Etape again to confirm that water isn't at 70.2 feet.
7/29/2010	AHC407	1690	1702	35.00	160	120		94.0	1610.92	New sonic meter worked good in the well this time. Well owner just turned on 2 garden sprinklers before sampling. 49 F, normal mode, variable, ignore top 54.7 ft. Got 94.0 ft the first time with the pump off. After the pump turned on and just shut off, got 103.4 ft. For the second cycle, got 100.4 ft. just after pump started, and got 108.0 ft just after pump shut off. For third cycle, meter read 104.4 ft. just after the pump turned back on. Also tried deep mode, variable, ignore top 11.7 ft, and got 199.0 ft for attempting to measure below water level. Well owner believes that well will return to 94.0 ft. by tomorrow after the sprinklers have been shut off all night.
8/23/2010	AHC407	1690	1702	35.00	160	120		114.8	1590.12	The well owner started the sprinklers in the garden about 15 minutes before the first measurements were taken. Sonic meter - 48 F, normal mode, variable, ignore top 54.6 ft. The pump turned on before any measurements could be taken. Just after the pump shut off for the first time, got 118.4 ft. using normal mode, ignore top 54.6 ft. Just after the pump turned on for the second time several minutes later, got 114.8 ft. Several minutes later, after the pump shut off for a second time, got 121.4 ft. Just after the pump turned back on for a second time, got 117.6 ft. So this well, when running for a while, has the water level about 3 ft lower each time it starts up. Got nearly identical results using deep mode, variable, ignore top 83.2 ft. This well has a PVC liner, and the bottom of the pump is at about 150 ft. according to the well owner.
9/28/2010	AHC407	1690	1702	35.00	160	120		80.2	1624.72	sonic meter - 47 F, normal mode, variable, ignore top 54.6 ft. The pump was not running.
10/26/2010	AHC407	1690	1702	35.00	160	120	72.90	73.4	1632.02	sonic meter - 46 F, normal mode, variable, ignore top 54.6 ft. The pump was not running. Now that the water level is back up above 77 ft., the Etape can safely be used again on the NE side of the casing where marked.
11/22/2010	AHC407	1690	1702	35.00	160	120	72.71	73.1	1632.21	sonic meter - 44 F, normal mode, variable, ignore top 54.4 ft.
1/20/2011	AHC407	1690	1702	35.00	160	120	64.86	65.2	1640.06	sonic meter - 42 F, normal mode, variable, ignore top 54.4 ft. Note: This well has now returned back to the 65 ft level that it was back in March 2010, and so the well level varied 50 ft. but returned back to its winter starting point. Nearby Hawk Creek has not come up much at yet this winter.
2/18/2011	AHC407	1690	1702	35.00	160	120	63.10	63.6	1641.82	sonic meter - 43 F, normal mode, variable, ignore top 54.4 ft.

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3/24/2011	AHC407	1690	1702	35.00	160	120	53.54	54.6	1651.38	sonic meter - 44 F, normal mode, variable, ignore top 54.4 ft. This well has come up over 10 ft. compared to February, and is higher than it ever was in 2010.
4/21/2011	AHC407	1690	1702	35.00	160	120	60.81	61.4	1644.11	sonic meter - 45 F, normal mode, variable, ignore top 45.0 and 54.5 ft.
1/8/2010	ELL1977	1692	1730	13.00	7	2	4.70		1726.38	
2/19/2010	ELL1977	1748	1730	13.00	7	2	4.15		1726.93	sonic meter - 43 F, 5.0 to 5.4 ft. normal mode; couldn't really cover the small irregular opening, so meter really didn't work so well
3/16/2010	ELL1977	1748	1730	13.00	7	2	4.16		1726.92	sonic meter - 5.4 normal mode, 44 F. Sonic meter just isn't going to work.
4/27/2010	ELL1977	1748	1730	13.00	7	2	4.27		1726.81	didn't try sonic meter, as it doesn't work in this shallow well
6/4/2010	ELL1977	1748	1730	13.00	7	2	4.67		1726.41	
7/29/2010	ELL1977	1748	1730	13.00	7	2	5.69		1725.39	Pump was not running.
8/23/2010	ELL1977	1748	1730	13.00	7	2	6.07		1725.01	The pump was not running.
9/28/2010	ELL1977	1748	1730	13.00	7	2	6.13		1724.95	The pump was not running.
10/26/2010	ELL1977	1748	1730	13.00	7	2	6.09		1724.99	The pump was not running and has been shut off for winter.
11/22/2010	ELL1977	1748	1730	13.00	7	2	5.95		1725.13	The heater started up just before the door to the pump house was opened up. The block was put back in front of the door.
1/20/2011	ELL1977	1748	1730	13.00	7	2	4.73		1726.35	Had to walk 1/2 mile in on top of the hard, crusty snow to get to the well house. The snow along Hawk Creek here is right down to the water level, and so the creek did not come up at all during the recent thaw and rains. There is no evidence of any runoff from here all the way down to Miles-Creston Rd. The heater came on when the door was opened, and turned off when the door was closed and door block replaced.
2/18/2011	ELL1977	1748	1730	13.00	7	2	3.86		1727.22	Water is up inside culvert, but hard water ring on suction line shows that the highest water was about 6" higher than it is now. The heater turned on when pump house door was opened, and kept on running after the door was closed and cement block placed back against door. Note: Was able to drive in to the project area along creek channel in 4WD, but got stuck several times in the melting crusty snow turning round, and walked the rest of way to the well.
3/24/2011	ELL1977	1748	1730	13.00	7	2	3.47		1727.61	The water inside the culvert is now only about 2" below the high mark of hard water deposits on the intake pipe. The spring seep that comes out of the base of the basalt bluff back close the the start of the 1/2 mile driveway and Hawk Creek Ranch Road is running again and crossing the driveway into Hawk Creek. Estimated flow from this spring seep where it crosses the driveway is .2 to .3 CFS. This spring seep only runs in years of higher precip over winter.
4/21/2011	ELL1977	1748	1730	13.00	7	2	3.62		1727.46	The water is now down about 3" from the top of the hard water deposits. The spring seep is still crossing the driveway but is only about 1/2 to 1/3 of the volume that it was last month.
1/22/2010	PLA1992	2530	2520	9.00	180	145	141.35		2379.40	take cap off, pull wires out of way, put tape down west side of well, sounded like water cascading down well

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3/16/2010	PLA1992	2530	2520	9.00	180	145				sonic meter - 6.1 normal, 279.1 deep. Sonic meter would just not work on this well. Could here a substantial stream of water cascading down the well, starting about 27-28 feet on the Etape. Tried two times to get Etape down W side of well, but was stopped by basalt at 36-38 feet. Same result on the south side of well. Tried the north side of well, felt drag at 73, 80 and 93 feet before giving up, got temporarily hung up at 25 feet on the way out.
4/27/2010	PLA1992	2530	2520	9.00	180	145				sonic meter would not work again, 6.2 ft normal mode, 279.0 ft deep mode. Used new flashlight, but could not see any good open area to drop Etape down. Tried once again on West side of casing, but stopped again at 37 feet. Cascading water caused wavering beep from about 27-28 feet down to 37 feet. Could hear the cascading water, but couldn't see it, and could also not see the liner that is supposed to be in the well. Need new sonic meter to ignore the top 50 to 100 feet of the well.
7/28/2010	PLA1992	2530	2520	9.00	180	145		143.6	2377.15	new sonic meter worked! 49 F, normal mode, variable, ignore top 29.9 and 54.7 ft. Also tried ignore top 10.0 and 20.0 ft, and got 22.9 ft. There must be some feature such as the PVC liner at 22.9 ft that is reflecting the sonic pulse. Can still hear some water cascading in the well, but not as much as in the spring. Can also just barely see the PVC liner, but can't see it good enough to try to direct the Etape to it.
8/25/2010	PLA1992	2530	2520	9.00	180	145		143.4	2377.35	Well owner recently pulled the old pump, which quit working, and replaced it with a new pump. There was a small leak at the pitman joint about 10 ft down that could be seen with the flashlight and also heard. Could not hear any cascading water this time with the leak. Initial measurements with the sonic meter gave a false high reading of 149.0 ft. But when the pump turned on the first time the meter read 143.5 ft. The water level should not go up 5.5 ft., even with the small leak with the pump running. After several more on/off cycles of the pump, the water level at its highest was 143.4 ft, and with the pump running, the lowest level was 144.0 ft. The meter still would bounce between 143.4 and 149.8 ft. at times. Don't know why. Sonic meter - 48 F, normal, mode, variable, ignore top 54.6 ft. Also got 143.4 ft. with deep mode, variable, ignore top 140 ft. Tried deep mode, ignore top 168.3 ft and got 170.6 ft. Also tried deep mode, ignore top 196.6 ft, and the meter would not give a measurement. With new pump in well, still could not see the PVC liner to try the Etape again.
9/22/2010	PLA1992	2530	2520	9.00	180	145		143.4	2377.35	sonic meter - 47 F, normal mode, variable, ignore top 54.6 ft. Also got 143.4 ft for deep mode, ignore top 139.8 ft. Note: the well pump was not running then, and meter would oscillate back and forth between 143.4 and 149.0. With flashlight, could see that there was no more leak spraying out, and there was only a drip left. It was quiet enough again that the cascading water could be heard again. Well was turned on with frost free faucet close to well, and got 144.0 ft maximum depth with the pump running, and <u>no 149.0 measurements</u> . With pump shut off again, got 143.4 and 149.0 ft again. Can't explain why the meter would read a greater depth with the pump off, and only a shallower depth to water with the pump on, but it must be some type of artifact. If there is any question on water depth, the pump running shows that the lower number is the actual water depth with the pump running or not.
10/22/2010	PLA1992	2530	2520	9.00	180	145		143.4	2377.35	sonic meter - 46 F, normal mode, variable, ignore top 54.6 ft, pump not running. Also got 143.4 ft. for deep mode, ignore top 139.6 ft. Turned on the frost free faucet so that the pump ran for several minutes. The lowest the water level would go for normal and deep mode was 143.8 ft. with the pump running. Soon after the pump shut off, the water level came back up to 143.3 ft. Note: the pitman junction was oozing water and dripping much more than last month, so much so that the cascading water could not be heard.

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1/13/2011	PLA1992	2530	2520	9.00	180	145		142.8	2377.95	sonic meter - 42 F, normal mode, variable, ignore top 54.4 ft. Also got 142.8 ft. for deep mode, ignore top 139.1 ft. Could hear a slight trickle of cascading water, but could not hear any water leaking from the pitman junction. The pump was not running, and the frost free faucet was not used.
2/14/2011	PLA1992	2530	2520	9.00	180	145		143.1	2377.65	sonic meter - 43 F, normal mode, variable, ignore top 54.4 ft. Also got 143.1 ft. for deep mode, ignore top 139.2 ft. Could hear a moderate trickle of cascading water, but no leaks at all.
3/22/2011	PLA1992	2530	2520	9.00	180	145		143.0	2377.75	sonic meter - 44 F, normal mode, variable, ignore top 54.4 ft, and deep mode, ignore top 139.4 ft., with the pump not running. There was only a relatively small trickle of water that could be heard this time cascading in the well. Used the small hose and turned on the frost free faucet to get the well pump to turn on. While the pump was running, the measured depth went down very slightly to 143.4 ft. for both normal and deep mode, and after the pump shut off again, the level quickly went back to 143.0 ft.
4/18/2011	PLA1992	2530	2520	9.00	180	145		143.5	2377.25	sonic meter - 45 F, normal mode, ignore top 54.5 ft. Only got 143.5 ft. once, and this was after the pump shut off, and the other measurements were 149.0 ft. For some reason, this well at times measures deeper with the sonic meter when it is not running than when it is running. The initial measurements with the pump NOT running were 149.0 ft. for both normal mode, variable, ignore top 54.5 ft., and deep mode, ignore top 139.6 ft. Used the short hose and turned on the frost free faucet to get well pump to turn on. With the well pump running, got 144.0 ft. for both normal mode, ignore top 54.5 ft, and deep mode, ignore top 139.6 ft. After the pump shut off, except for the one 143.5 ft. measurement, all of the readings went back to 149.0 ft for both normal and deep modes. Could only hear a moderate flow of water cascading down the well this time, and there were few or no leaks on the Pitman junction. Remeasured the casing height on the NW side, and got 11.50".
6/10/2010	SCH1992	2532	2538	21.00	125	50		41.0	2498.75	Used the new WL650/200U sonic meter. Tried 48 F, normal, variable, and the default ignore the top 10 ft of the well, and got 41.0 feet. Tried the old 200 sonic meter, 48 F, normal mode, and also got 41.0 ft. The east side of the PVC liner, the only side that is open, also has the power cable coiled around it. Decided not to risk getting the Etape caught up on the power cable, and the well owner concurred. Just use the new sonic meter in this well.
7/28/2010	SCH1992	2532	2538	21.00	125	50		42.8	2496.95	sonic meter - 49 F, normal mode, variable, ignore top 25 ft.
8/25/2010	SCH1992	2532	2538	21.00	125	50		43.2	2496.55	sonic meter - 48 F, normal mode, variable, ignore top 20.2, 30.0 and 40.0 ft. Also got 87.6 ft for normal, ignore top 54.6 ft and deep mode, ignore top 83.8 ft., for attempting to read below the water level.
9/23/2010	SCH1992	2532	2538	21.00	125	50		43.2	2496.55	sonic meter - 47 F, normal mode, variable, ignore top 30.0 ft. This time the water could be seen shimmering inside the PVC liner.
10/27/2010	SCH1992	2532	2538	21.00	125	50		43.8	2495.95	sonic meter - 46 F, normal mode, variable, ignore top 30.0 ft.
1/13/2011	SCH1992	2532	2538	21.00	125	50		44.0	2495.75	sonic meter - 42 F, normal mode, variable, ignore top 30.1 ft.

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2/22/2011	SCH1992	2532	2538	21.00	125	50		43.8	2495.95	sonic meter - 43 F, normal mode, variable, ignore top 30.2 ft.
3/25/2011	SCH1992	2532	2538	21.00	125	50		43.5	2496.25	sonic meter - 44 F, normal mode, variable, ignore top 30.0 ft.
4/22/2011	SCH1992	2532	2538	21.00	125	50		43.4	2496.35	sonic meter - 45 F, normal mode, variable, ignore top 30.0 and 40.2 ft. Remeasured casing height on uphill side to get 22.25".
4/29/2010	ABI086	2542	2539	22.50	245	70	64.69		2476.19	sonic meter - 45 F, 5.4 normal, 235.5 deep. Sonic meter just would not work in this well with the PVC liner. PVC liner at 17 feet looked full with the pipe and wire, but was able to get Etape down in the NW side of liner the first time. Went down slow, felt no obstructions down to the water, but was hung up for a very little bit at about 23 feet. coming back up. Need to go slow down and back up this well. Old style iron well cap has 9/16 nuts. Well is east of house and just west of electric fence.
6/10/2010	ABI086	2542	2539	22.50	245	70		65.8	2475.08	Used the new WL650/200U sonic meter. Used 48 F, normal, variable, default ignore top 10 ft. of well, and got 65.8 ft with the pump off on the north side of well.. When the pump turned on for several minutes, the meter read 12.9 ft. After the pump shut off, the meter read 66.0 ft, and then stabilized at 65.8 ft. again. Tried the old 200 sonic meter, and got an unusable measurement of 5.7 ft. Because the Etape got temporarily stopped at about 23 ft in April, this is most likely the power cable. With the new sonic meter reading very close to the Etape reading last month, just use the sonic meter.
7/28/2010	ABI086	2542	2539	22.50	245	70		66.2	2474.68	sonic meter - 49 F, normal mode, variable, ignore top 25.0 and 40.1 ft. The pump did not turn on this time while sampling the well.
8/25/2010	ABI086	2542	2539	22.50	245	70		66.7	2474.18	sonic meter - 48 F, normal mode, variable, ignore top 40.0 and 54.6 ft. With several cycles of the pump turning off and on, the highest level was 66.7 ft. before the pump turned on, and lowest level was 70.4 ft. just after the pump shut off. Also tried deep mode, ignore top 83.3 and 111.6 ft, and got 121.7 to 121.4 ft for attempting to measure below the water level.
9/23/2010	ABI086	2542	2539	22.50	245	70		66.7	2474.18	sonic meter - 47 F, normal, variable, ignore top 40.0 and 54.6 ft. The pump was not running.
10/27/2010	ABI086	2542	2539	22.50	245	70		67.4	2473.48	sonic meter - 46 F, normal, variable, ignore top 40.0 ft. The pump was not running.
1/13/2011	ABI086	2542	2539	22.50	245	70		67.6	2473.28	sonic meter - 42 F, normal mode, variable, ignore top 40.0 ft. The pump was not running.
2/22/2011	ABI086	2542	2539	22.50	245	70		66.6	2474.28	sonic meter - 43 F, normal mode, variable, ignore top 40.0 ft.
3/25/2011	ABI086	2542	2539	22.50	245	70		66.0	2474.88	sonic meter - 44 F, normal mode, variable, ignore top 40.1 ft.
4/22/2011	ABI086	2542	2539	22.50	245	70		65.6	2475.28	sonic meter - 45 F, normal mode, variable, ignore top 40.2 and 54.5 ft.
4/28/2010	STI1987	2441	2437	7.00	79	NA				This short, older style well cap and casing is located at SE corner of property of first house along Cline Rd, about even with the windbreak. Four of the cap bolts had nuts siezed on them that WD-40 could not loosen right away.

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4/29/2010	STI1987	2441	2437	7.00	79	NA	25.85	26.4	2411.73	sonic meter - 45 F, normal mode. Open spot, can see water at bottom of casing next to south side of casing. No PVC liner, so sonic meter actually worked. Replaced 4 of the bolts on the cap with hard or siezed nuts. PVC pipe with power cord in it was full of water, notified well owner.
6/10/2010	STI1987	2441	2437	7.00	79	NA	25.74	26.3	2411.84	Used new WL650/200U sonic meter. 48 F, normal, variable, ignore top 10 ft got 26.3 feet. PVC pipe with power cord in it still filled up with water to the top.
7/28/2010	STI1987	2441	2437	7.00	79	NA	27.51	28.1	2410.07	sonic meter - 49 F, normal mode, variable, ignore top 10.0 ft. Tried using ignore top 30.0 and 54.7 ft, and got 55.2 ft for meter attempting to measure below the top of the water. PVC pipe with power cord in it still filled up with water to the top.
8/25/2010	STI1987	2441	2437	7.00	79	NA	28.11	28.5	2409.47	sonic meter - 48 F, normal mode, variable, ignore top 10.2 and 20.1 ft. Also tried normal mode, ignore top 40.0 and 54.6 ft., and got 56.0 ft for attempting to measure below the water level. PVC pipe with power cord in it still filled up with water to the top.
9/23/2010	STI1987	2441	2437	7.00	79	NA	28.37	28.8	2409.21	sonic meter - 47 F, normal mode, variable, ignore top 20.1 ft.
10/27/2010	STI1987	2441	2437	7.00	79	NA	28.73	29.2	2408.85	sonic meter - 46 F, normal mode, variable, ignore top 20.0 ft. The well pump started just before the first sonic meter measurements could be taken. Just after the pump shut off after running for several minutes, the meter read 29.4 ft. After the pump shut off for 3 to 4 minutes, the water level stabilized at 29.2 ft.
1/13/2011	STI1987	2441	2437	7.00	79	NA	27.12	27.4	2410.46	sonic meter - 42 F, normal mode, variable, ignore top 20.0 ft.
2/22/2011	STI1987	2441	2437	7.00	79	NA	23.94	24.4	2413.64	sonic meter - 43 F, normal mode, variable, ignore top 20.0 ft, and the pump not running. The well pump did turn on for several minutes, and the depth on the sonic meter dropped slightly to 25.0 ft. while the pump was running. Note: The well owner noted that the spring like seep just to the south of the gravel lane was actually the output of a geothermal heating system that extracts heat from well water to help heat the house.
3/25/2011	STI1987	2441	2437	7.00	79	NA	23.26	23.6	2414.32	sonic meter - 44 F, normal mode, variable, ignore top 15.0 and 20.0 ft., about 5 minutes after the well pump shut off. When the pump was running the maximum water depth seen with the sonic meter was 24.4 ft.
4/22/2011	STI1987	2441	2437	7.00	79	NA	24.29	24.8	2413.29	sonic meter - 45 F, normal mode, variable, ignore top 15.0 and 20.0 ft., with the pump off. The well pump turned on after the Etape measurement. The maximum depth with the well pump running was 25.6 ft. with the sonic meter. Remeasured top of casing inside well collar to get 6.5' off of the ground.
10/27/2010	ACW391	2441	2436	21.00	80	24		29.6	2408.15	sonic meter - 46 F, normal, variable, ignore top 20.0 ft. There are a bunch of power wires in the upper casing that would have to be moved in order to try to get the Etape into the more open east side of the casing. Wait until well owner is present to try doing this at least once. This well is about 30 ft east of well 253710_1987.
1/13/2011	ACW391	2441	2436	21.00	80	24		27.9	2409.85	sonic meter - 42 F, normal mode, variable, ignore top 20.0 ft. Note: What was thought to be tiny spring seep emanating from under the south side of the road here between ACW391 and the Stiles 1987 well turned out to be the small outflow from a geothermal system using the heat from well water to help heat the neighbor's house.
2/22/2011	ACW391	2441	2436	21.00	80	24		24.8	2412.95	sonic meter - 43 F, normal mode, variable, ignore top 20.0 ft, and the pump not running. Note: The well pump did turn on after the original measurement, and the water level went down slightly to 25.6 ft with the pump running.

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4/28/2010	STU1979	2415	2369	13.00	185	60				sonic meter would not work through the 1" port pipe; 45 F, 6.0 ft normal mode, 287.1 deep. Port not big enough to use Etape in 6" casing. Casing itself is located at the bottom of a round concrete well box between the house and the shop. The top of the port pipe is about 36" below ground level here, so the groundwater elevation would be the new sonic meter reading plus 3 feet, subtracted from the Garmin topo map ground elevation. The GPS measurement was taken at ground level next to the concrete ring. Have to remove wooden lid and step on blue pressure tank to get to bottom of well box. Don't step on plastic pipe fittings.
6/10/2010	STU1979	2415	2369	13.00	185			18.0	2348.00	Used new WL650/200U sonic meter. First tried 48 F, normal, variable, ignore top 40 ft, and got 143.2 ft. Same result for setting to ignore top 54.6 ft max in normal mode. In deep mode, ignore top 54.9 ft, got 142.8 ft. But these figures were suspect, since DTW-ATD was only 60 ft. Tried again in 48 F, normal, variable, with meter set to ignore the top 10 ft, 7 ft, and 15 ft, and got a final measurement of 18.0 ft each time. When meter set to ignore top 20.1 ft, meter read 20.2. Looks like actual depth to water is 18.0 ft. Well owner showed shallow hand dug well just 50 ft away and 2 ft higher than grass here at first well, and measured 7.87 ft down to the 2 to 3 ft deep water below the wooden board platform below the windmill. The water level here also indicates that the water level of 18.0 ft below the top of the well casing is the correct water level in the measured well inside the round concrete well box.
7/28/2010	STU1979	2415	2369	13.00	185	60		17.9	2348.10	sonic meter - 49 F, normal mode, variable and fixed gain, ignore top 10.0 ft. The pump was running continuously to pump water to the lawn sprinklers. Also tried ignore top 20.2 ft, and got 20.7 ft. Then tried ignore top 40.1 and 54.7 ft, and got 144.8 ft. for the meter attempting to measure below the water level. Checked the shallow hand dug well below the windmill about 40 yards WNW of the main well, and measured 9.41 ft. to water below the top of the green cover boards. This hand dug well has dropped 1.54 ft since June 10th. The main well level at 17.9 ft. below the top of the well casing seems to be about the same height of the water in the spring fed pond a little farther to the northwest.
8/25/2010	STU1979	2415	2369	13.00	185	60		18.0	2348.00	sonic meter - 48 F, normal mode, variable, ignore top 10.2 and 15.0 ft. Tried normal mode, ignore top 18.1 ft, and got 18.6 ft for attempting to measure just below the water level. Also tried normal mode, ignore top 20.1 and 40.0 ft., and got 145.5 ft. for attempting to measure below the water level. Note: the pump was not running and the sprinklers were not going today. At the old hand dug well, the Etape measured 10.26 ft to the water, which was harder to see this time. The level of the water in the small pond just to the NW seems to be about 10 ft lower than the level of the water in the hand dug well.
9/23/2010	STU1979	2415	2369	13.00	185	60		18.0	2348.00	sonic meter - 47 F, normal mode, variable, ignore top 10.2 ft. Had problems measuring the well this time for some unknown reason. The meter initially only read 145.6 ft, and was acting like it was trying to measure below the water level. Tried fixed mode, and ignore top 8.2 and 5.2 ft., and got 8.2 and 5.2 ft. respectively. Then the pump turned on, turned back to variable mode and ignore top 10.2 ft, and meter read 18.0 ft before going back to 145.6 ft. After pump shut off, meter stayed at 145.6 ft. again. Next time, try taking a short hose and turning the nearby frost free faucet to keep the well running. The nearby hand dug well measured 10.79 ft to water with the Etape. The well owner said the nearby pond is as low as it has been in quite some time, and it may be 2 ft. down from the typical high water mark.

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10/27/2010	STU1979	2415	2369	13.00	185	60				The sonic meter just would not measure the water level today. Tried normal, variable, ignore top 8.0, 10.0, 20.0, and 30.0 ft, and got 145.8 ft. Tried ignore top 7.0 and 6.0 ft, and got 7.2 and 6.2 ft, respectively. Don't believe the low or nonsense high depth readings. Turned on the frost free faucet to keep the pump running continuously, and even tried fixed mode, but still got 145.8 ft. for ignore top 10.0 ft. After today, the validity of the previous 18 ft. measurements may be in question. Measured the hand dug well under the old windmill with the Etape to get 10.97 ft. The well owner noted that his nearby pond is as low as he has seen it in a long time.
1/13/2011	STU1979	2415	2369	13.00	185	60				The wooden lid of the concrete well box was covered insulation, and so no attempt will be made to try any further sonic meter measurements until spring when the insulation can be removed. The well owner's crowbar was needed to pry up the boards covering the well underneath the windmill. The depth of water in this shallow, hand dug, 13 ft deep well today was 9.00 ft. with the Etape, and so the water level in the well has come up about 2 ft since late October. The well owner estimated that the nearby pond had also risen about 1 ft. The pond and this hand dug well should be hydrologically connected. The well owner noted that when this pond was dug and last cleaned out, a spring filled the pond from the bottom.
2/22/2011	STU1979	2415	2369	13.00	185	60				Did not attempt to measure, as the wood lid was still covered with insulating leaves, which will be needed toward the end of the week with projected 0 degree low temperatures.
3/25/2011	STU1979	2415	2369	13.00	185	60				Was going to use borrowed BOR Etape to try measuring well depth, but groundwater had seeped into the bottom of the round concrete well box to a depth of several inches. The well owner is using a sump pump to pump this water out.
4/15/2011	STU1979	2415	2369	13.00	185	60	71.67		2294.00	Used a borrowed BOR style Etape with flexible washed weights on the end to go down the short port pipe. The measurement point was the top of the casing, which is 13" above the dirt floor but is also 40" or 3.33 ft. below the lawn surface. So, 71.67 plus 3.33 ft. below the ground level = SWL of 75 ft. below ground level here. Water level elevation = 2369 - 75 = 2,294 ft. This well is on a separate, lower aquifer that is separate from the shallow aquifer in the adjacent windmill well and pond. There is still 2 to 3" of water in the bottom of the concrete well box that is being pumped out with a sump pump. The 71.67 ft. measurement below the top of the casing shows that all of the previous attempted measurements by the sonic meter of 18 ft. to 145 ft. from June through September 2010 were inaccurate and were well features or measurement artifacts.
6/10/2010	STUWIN	2363	2369	6.25	13 ?		7.87		2361.65	Well owner showed shallow hand dug well just 50 ft away and 2 ft higher than grass here at first well, and measured 7.87 ft down to the 2 to 3 ft deep water below the wooden board platform below the windmill. The sonic meter won't work in this 6 ft diameter, rock lined, hand dug well.
7/28/2010	STUWIN	2363	2369	6.25	13 ?		9.41		2360.11	Checked the shallow hand dug well below the windmill about 40 yards WNW of the main well, and measured 9.41 ft. to water below the top of the green cover boards. This hand dug well has dropped 1.54 ft since June 10th.
8/25/2010	STUWIN	2363	2369	6.25	13 ?		10.26		2359.26	At the old hand dug well, the Etape measured 10.26 ft to the water, which was harder to see this time. The level of the water in the small pond just to the NW seems to be about 10 ft lower than the level of the water in the hand dug well.
9/23/2010	STUWIN	2363	2369	6.25	13 ?		10.79		2358.73	The nearby hand dug well measured 10.79 ft to water with the Etape. The well owner said the nearby pond is as low as it has been in quite some time, and it may be 2 ft. down from the typical high water mark.

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10/27/2010	STUWIN	2363	2369	6.25	13	?	10.97		2358.55	Measured the hand dug well under the old windmill with the Etape to get 10.97 ft. The well owner noted that his nearby pond is as low as he has seen it in a long time.
1/13/2011	STUWIN	2363	2369	6.25	13	?	9.00		2360.52	The well owner's crowbar was needed to pry up the boards covering the well underneath the windmill. The depth of water in this shallow, hand dug, 13 ft deep well today was 9.00 ft. with the Etape, and so the water level in the well has come up about 2 ft since late October. The well owner estimated that the nearby pond had also risen about 1 ft. The pond and this hand dug well should be hydrologically connected. The well owner noted that when this pond was dug and last cleaned out, a spring filled the pond from the bottom. Need to take GPS and platform height measurements next time in field.
2/22/2011	STUWIN	2363	2369	6.25	13	?	5.06		2364.46	The nearby pond is way up and covered with ice. The ice extends beyohd the granite boulder and to the edge of the trees along the east side of the pond. Like the pond, the hand dug, basalt rock lined well under the windmill is also up quite a ways. The approximate inside diameter of this hand well is 50", or about 4 ft.
3/25/2011	STUWIN	2363	2369	6.25	13	?	3.51		2366.01	The nearby pond just downhill is up several more feet and has now extended about 20 ft. east of the trees. The well owner says that groundwater seeping into the pond is raising the pond level every day now, but the pond has been several feet higher than it is now.
4/15/2011	STUWIN	2363	2369	6.25	13	?	3.57		2365.95	The adjacent pond down below the windmill well appears to be down several inches, and the edge of the water has retreated about a foot back from the edge of trash at the high water mark.
4/28/2010	AFA197	2399	2388	37.25	180	150				sonic meter would not work; 45 F, 5.4 ft normal, 1200-1600 deep mode. Difficult to try to get Etape inside liner on south side 17 ft down. Couldn't tell for sure if Etape inside liner, but got stopped and hung up a little bit at 41 feet. Need new sonic meter to disregard top 50 or so feet of well.
6/10/2010	AFA197	2399	2388	37.25	180	150		70.0	2321.10	Used the new WL650/200U sonic meter. Tried 48 F, normal, variable, ignore top 30 ft, then ignore top 50 feet, and got same measurement of 70.0 ft. Tried the old 200 sonic meter, and got the unusable measurement of 5.4 ft. The PVC liner is just down too far to get the Etape in, even if the power cable did not stop it before 70 ft.
7/28/2010	AFA197	2399	2388	37.25	180	150		79.1	2312.00	sonic meter - 49 F, normal mode, variable, ignore top 40.1 ft., with the pump off. When the pump turned on for several minutes, used ignore top 54.6 ft to get reading of 86.0 feet just before the pump shut off, for a drawdown of 6.9 ft. After the pump shut off for a minute, the well level returned to 79.1 ft.
8/25/2010	AFA197	2399	2388	37.25	180	150		83.4	2307.70	sonic meter - 48 F, normal mode, variable, ignore top 40.0 and 54.6 ft. Tried deep mode, ignore top 83.2 ft., and got 83.4 ft. Also tried deep mode, ignore top 111.6 ft, and got 122.6 ft. Also tried deep mode, ignore top 140.0 ft, and got 188.8 ft. Note: The pump was not running and the sprinklers were not going today when measuring.
9/23/2010	AFA197	2399	2388	37.25	180	150		83.6	2307.50	sonic meter - 47 F, normal mode, variable, ignore top 54.6 ft. Not sure if the pump was running or not. There were some water flow/gurgling noises coming from the well.
10/27/2010	AFA197	2399	2388	37.25	180	150		80.1	2311.00	sonic meter - 46 F, normal mode, variable, ignore top 54.6 ft., with the pump not running. The pump turned on later for about a minute, and the water level measured 86.0 ft. right after the pump shut off. Can hear some cascading water and gurgling sounds along with some kind of whirring sound which can only be heard when the pump isn't running.
1/13/2011	AFA197	2399	2388	37.25	180	150		73.5	2317.60	sonic meter - 42 F, normal mode, variable, ignore top 54.4 ft. Also got 73.4 ft for deep mode, ignore top 54.6 ft. The pump was not running, and this time now cascading or gurgling sounds could be heard.

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2/22/2011	AFA197	2399	2388	37.25	180	150		67.3	2323.80	sonic meter - 43 F, normal mode, variable, ignore top 54.4 feet. Also got 67.4 ft for deep mode, ignore top 54.6 ft. The pump was not running, and could not hear any cascading water or gurgling sounds
3/25/2011	AFA197	2399	2388	37.25	180	150		62.5	2328.60	sonic meter - 44 F, normal mode, variable, ignore top 54.4 ft.
4/12/2011	AFA197	2399	2388	37.25	180	150		59.2	2331.90	sonic meter - 45 F, normal mode, variable, ignore top 54.5 ft. Could hear a very slight trickle of water cascading in the well.
4/28/2010	ENS1965	2378	2369	3.00	324	37				a large vertical irrigation pump with drive shaft sits on top of casing. An 2" port at a 45 degree angle gives access to the casing below the pump. Sonic meter would not work in port; 45 F, 5.4 ft normal, 1200 ft deep mode. Etape only made it 3 feet down port pipe until the long metal sensor could not make the corner to go down the casing. WSU did measure this well through the port in the past with a different type of Etape, but stopped taking measurements because the water level never changed much. Currently, it sounds like the irrigation wells north of Hwy 2 have declining water levels. Ensors would really like to measure this well with a new sonic meter before and after irrigation season. Pump is in metal pumphouse next to power pole at end of winding driveway past red barn and yellow shop.
6/10/2010	ENS1965	2378	2369	3.00	324	37		39.6	2329.65	Used the new WL650/200U sonic meter. Tried 48 F, normal, variable and fixed, and ignore top 30 ft and then top 35 ft of the well, and ended up getting a pretty consistent measurement of 39.6 feet. Next time, use normal, variable and ignore top 30 feet. Well owner said that this large irrigation well had been pumping for the last 15 or so days, and was just shut off at 9 PM last night. Pump was shut off while measuring, and should be shut off for the next several weeks for haying. If the pump is running, this may interfere with the new sonic meter measurement.
7/9/2010	ENS1965	2378	2369	3.00	324	37		39.6	2329.65	sonic meter - 49F; 39.6 ft using normal, variable, ignore top 30.1 and ignore top 25 ft. Also got 39.8 ft using ignore top 35 ft. Pump was not running and hasn't been running since June 9th due to rain and hay still on the ground. Need to measure level again when pump is running in a week or so to see if the measured level drops, indicating that this is the water level and not some feature in the well casing.
7/28/2010	ENS1965	2378	2369	3.00	324	37		39.3	2329.95	sonic meter - 49 F, normal, variable, ignore top 25.0, 30.1 and 35.0 ft, with the pump running. Tried fixed gain for ignore top 25.0 and 35.0 ft., and got 39.4 ft, so fixed gain did not make that much difference with the pump running. 39.3 ft was obtained for the most depths, and appears to be the water depth, which was not drawn down very much for this large irrigation pump running. Tried ignore top 10.0 feet, and got 10.8 ft. Tried ignore top 20.2 ft, and got 20.2 ft. Features in the well at less than 25.0 feet apparently interfere with the sonic meter measurement. Tried ignore top 40.1 ft, and the meter bounced around from 41.8 to 55.6 ft. Tried ignore top 54.7 ft. max, and got 56.0 ft. for attempting to read below the apparent water level.

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8/25/2010	ENS1965	2378	2369	3.00	324	37		39.2	2330.05	sonic meter - 48 F, normal mode, variable, ignore top 25.0 and 35.0 ft. Tried normal mode, fixed gain, ignore top 35.0 ft, and got 39.4 ft. Fixed mode doesn't seem to make much difference in this irrigation well. Tried normal mode, variable, ignore top 39.2 ft, and got 39.8 ft. for attempting measure right at the water level. Tried normal mode, variable, ignore top 45.2 ft., and got 49.2 ft. Tried normal mode, ignore top 54.6 ft., and got 55.8 ft. Also tried deep mode, variable, ignore top 83.2 ft., and got 85.4 ft. Note: The pump was running and has been running for the past week. The water level, as can be measured with the sonic meter, just doesn't change that much with the pump running or not running. Well owner noted again that WSU used to measure this well with a more flexible Etape, but gave up years ago because the well level never changed much at all.
9/23/2010	ENS1965	2378	2369	3.00	324	37		39.4	2329.85	sonic meter - 47 F, normal mode, variable, ignore top 25.0 and 35.0 ft. Also tried ignore top 40.0 ft, and got 44.3 ft. The pump was not running and is now turned off for the year.
10/27/2010	ENS1965	2378	2369	3.00	324	37		32.4	2336.85	The sonic meter had a difficult time trying to consistently measure water level depth above the water level but below 20 ft. The pump has been shut off for the season. Used normal mode, variable gain to get the following results. For ignore top 40.0 ft, got consistent 46.7 ft. For ignore top 35 ft., got consistent 44.5 ft. For ignore top 33 ft., got 39.3 ft at first, then 34.4 ft. For ignore top 32.4 ft., the best inferred water level today, got 34.6 ft. mostly. For ignore top 32.0 ft, got consistent 32.4 ft. For ignore top 31.0 ft., got mostly 32.4 ft, with some 39.3 ft readings. For ignore top 30.0 ft, got mostly 32.4 ft, with some initial measurements of 39.4 and 39.5 ft. For ignore top 25.0 ft., the measurements bounced around from 25.0 to 26.6 to 39.3 ft. For ignore top 20.0 ft., got a fairly consistent 20.5 ft. After today, don't know if the earlier 39.X ft, measurements are good measurements or are artifacts. It would be helpful to have a flexible sensor end Etape to an Etape measurement going down the port pipe and going down the casing.
1/13/2011	ENS1965	2378	2369	3.00	324	37		39.4?		Tried 14 different combinations of ignore top depths and switching between variable and fixed gain, but could not get 2 good measurements that were the same with the sonic meter, 42 F and normal mode. In summary, the sonic meter just read about 2 to 6 ft. deeper than what the ignore depth was set, and switching to fixed mode didn't make any significant difference. There is probably no reason to attempt to measure this well again until an Etape with a flexible end can be obtained to drop down the angled 2" side port pipe. The readings obtained are as follows: For normal mode, variable gain: For ignore top 15.2 ft., got 15.4 ft; for ignore top 20.0 ft., got 20.8 ft; for ignore top 25.0 ft., got 25.2 ft.; for ignore top 30.1 ft, got 39.4 ft.; for ignore top 40 ft., got 42.6 ft; for ignore top 45.0 ft., got 49.6 ft; for ignore top 50 ft., got 56.4 ft; for ignore top 54.4 ft, got 56.4 ft. For normal mode, fixed gain: For ignore top 30.1 ft., got 39.6 ft.; for ignore top 40.0 ft., got 46.8 ft.; for ignore top 45.0 ft., got 47.0 ft.; for ignore top 50.0 ft., got 51.2 ft.; for ignore top 54.4 ft., got 56.3 ft. For deep mode, fixed gain, ignore top 82.8 ft., got 86.2 ft.
2/22/2011	ENS1965	2378	2369	3.00	324	37				Note: Did not measure this time, but will attempt to measure in March using flexible end/brass washer end Etape.

Date	Well ID	Casing Elev.' (Garmin altimeter, NAVD 88)	Garmin Topo Map Ground Elev.' (NAVD 88)	Casing Height"	Well Depth	Depth to Water When Drilled'	Depth to Water, Etape'	Depth to Water, Sonic Meter'	Ground** water Table Elev.' (NAVD 88) (Etape; if none, then sonic meter)	Notes
3/25/2011	ENS1965	2378	2369	3.00	324	37	43.33		2325.92	Used borrowed BOR style Etape with flexible brass washers on the end to go down the angled 2" port pipe. The meter started quivering halfway at about 37 ft., indicating the depth of the cascading water that could be heard in the well. The meter was first pegged all the way over at 43 ft., 4 inches, indicating the top of the static water level. Tried the sonic meter again down the port pipe, but could not get any consistent values even close to Etape reading. For normal mode, fixed gain, ignore top 40.1 ft., got 47.0 ft. For ignore top 35.0 ft., the meter oscillated between 39.9 and 36.4, which may have something to do with the cascading water at 37 ft. For ignore top 30.0 ft., got 34.7 ft. The well log notes that the well is cased down to 37 ft., and it appears that water somewhat higher above may be running down the casing and entering the borehole in the basalt at about 37 ft.
4/15/2011	ENS1965 (253627_1965)	2378	2369	3.00	324	37	40.88		2328.37	Used borrowed BOR style Etape again to measure water at 40 ft., 10.5 inches. Couldn't hear the cascading water near as much this time, and the meter did not flicker from 37 to 43 ft. like it did last month. Tried the sonic meter once again down the 2" port pipe, but it did not work, giving measurements from 36.4 ft. to 46.9 ft. that were 1 to 6 ft greater than the ignore depths of 35 ft. and 40.2 ft. All of the previous attempts to measure the depth to water in this well from June 2010 through January 2001 using the sonic meter were inaccurate measurements and should be disregarded. Only the March and April 2011 measurements with the BOR style Etape are valid measurements.
Dropped Wells Visited in Field										
12/29/2009	APQ818	1900			680	120				Dropped well; tape stopped by plugged well at 50.5 ft, couldn't reach water
1/29/2010	ALN857	1648	1645	18.50	220	40				Dropped well; Etape sensor kept hitting something at 69.3 feet, weight lost/tape started going slack; no pump in well. Try sonic meter
2/4/2010	ALN857	1648	1645	18.50	220	40				Dropped well; sonic meter - 43 F, 5.4 normal mode; 244.4 deep mode. The sonic meter just wouldn't work in this well, perhaps due to 4" PVC liner from 40 to 220 feet. The well is only 220 feet deep, and DTW-ATD was 40 feet. The Etape got stopped again at 70.4 feet without reaching water. Something is wrong with this well, drop it.
1/29/2010	APC480									Dropped Well; Could not find this well along Partridge Lane; found APP850 and APB748 just uphill from the lane, but these wells were not selected for measurement.
1/29/2010	APB747									Dropped Well; Found the well drilling mound above Partridge Lane, which is extensive, but there was no well casing to be found.
4/28/2010	FIN1_16in 506ft (243602_16in 506ft)	2356	2379		506	NA				a large vertical irrigation pump with drive shaft sits on top of casing. There is no port to access the casing below the well. This pump hasn't been run in 10 to 20 years and will probably never again. This well is inside a metal A frame pump house at the end of dirt lane that runs north and then east from Old Kuchs Rd. Drop this well.
4/28/2010	FIN2_6in_165ft_s hallow (243602_6in_165 ft_shallow)	2337	2379	34.75	165	50				the sonic meter could not fit down into the 1/2" port and did not work; 45 F, 5.4 ft normal, 272 feet deep. The Etape would not fit through port, not useable here. Tried to take off south half of metal cover plate but 1 bolt was froze up. This well is located only about 25 yards west of the large irrigation well. No complete fences to keep cows in, doesn't look like well has been used for awhile. Drop this well.

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1/29/2010	JOH1978 (273606_1978)	1844	1809	3.00	420					well is off to NW of older blue and white farmhouse just across barbwire fence; turnoff just south of Deer Meadows Rd and go uphill to the farmhouse. An iron plate is welded on top of the well. Since remaining casing is so low to the ground, it would need to be extended upward by several feet or perhaps a sealed port could be cut into the cap to try Etape/sonic meter
4/28/2010	SCHIRR (253628_1969)	2353	2389		400	66				a large vertical irrigation pump with drive shaft sits on top of casing. There is no port to access the inner casing. There is an air pressure line that might be able to be used when the pump is running later in the season. The well is inside a tin roof well house at the west edge of grass/alfalfa field about 300 ft south of Hwy 2
1/8/2010	ACW361	2270		24.00	590	453				Etape stopped at 408 ft, couldn't reach water; long, potentially treacherous route to get to the well using the back way in with snow/slick roads
3/16/2010	ACW361	2239	2312	25.00	590	453	480.8	1833.28		WP-054 Garmin, averaging. Drove in the back way from Ellis's, drove out the front way, OK. Sonic meter - 480.8 deep, 44 F. Because the well is 590 feet deep, the sonic meter reading is plausible. Measure with sonic meter next month. Because a 4" PVC liner runs from 10 to 590 feet along with the well pipe and cable, it was not worth taking the risk dropping almost all of the 500 ft Etape down the liner to confirm the sonic meter.
4/27/2010	ACW361	2239	2312	25.00	590	453	479.7	1834.38		sonic meter - 45 F, deep mode. Note: There was a significant breeze blowing out of the well casing all of the time while at the well today. The breeze coming up out of the well casing and coming out of the vent holes on the underside of the well cap was enough to blow the grass at the base of the casing. The breeze interfered with sonic meter reading, but after trial and error, folding up a small part of the cardboard along the edge would let enough breeze out of the casing to get readings of 479.7 and 479.6 five to six different times, and so this may be the water level. However, the sonic meter would also bounce around up to 1200 and 1600 plus ft. and also go as low as 200 and 500 plus ft. Not worth dropping the Etape down an estimated 480 ft within the small gap between the PVC liner and the pipe. The breeze from the well might be generated by an underground cave in the basalt which is being refilled with water and is pushing a substantial amount of air out of the well.
6/4/2010	ACW361	2239	2312	25.00	590	453	482.3	1831.78		sonic meter - 48 F, deep mode. A very slight breeze was blowing out of the well.
7/29/2010	ACW361	2239	2312	25.00	590	453				For some reason, new sonic meter was not able to get a reliable depth measurement. Only a little air was blowing out of the well, so this should not have interfered with the sonic pulse. The only repeatable depth measurement on the meter was 125.6 ft for 49 F, deep mode, variable, ignore top 83.3 and 111.7 ft. But for deep mode, ignore top 55.0 ft, got 55.5 ft, and for normal mode ignore top 54.7 ft, got 55.4 ft. Must be some well feature at about 55 ft. For all deep mode measurements, ignore 168.4 ft all the way up to 565 ft, the meter would not give any measurement. The well sort of acts today like the water level is 125.6 ft, but previous old sonic meter measurements were around 480 ft, and the DTW-ATD was 453 ft, and so the 126.5 ft reading is probably just an off the wall innacurate measurement or another well feature. Try this well again next month.

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8/23/2010	ACW361	2239	2312	25.00	590	453				Just could not get new sonic meter to work on this well. With typical top depths to ignore ranging from 225 ft to 453 ft, and variable or fixed mode, just could not get any consistent measurements in the 450 to 500 ft range. The meter would bounce between a 400 ft. range measurement to 1200 ft to 1600 ft and back to 700 or so ft, and at other times read no measurement at all. Kept getting 55.4 ft for normal mode, variable, ignore top 54.6 ft., and kept getting 125.6 ft for deep mode, variable or fixed gain, ignore top 11.6 ft. The well owner turned the sprinkler system on, but this made no difference in the 55.4 ft and 125.6 ft measurements (i.e. the depth to water did not increase), and it also made no difference with ignore top 225 to 453 ft measurements. There appears to be permanent well features that the sonic wave is bouncing off of well above the water level at 55 and 125 ft. With the new sonic meter not able to work in this well, and the PVC liner and estimated depth of 450+ feet to reach water with the Etape, there is no reason at this time to try measuring this well again. Drop this well. The earlier measurements with the old sonic meter of around 480 ft. may or may not have been valid measurements. A moderate breeze was blowing out of the well today.

Note - the ground water table elevation is calculated from the following formula: Ground water table elevation = Garmin topo map ground elevation - (Etape measured distance [or sonic meter measured distance if there is no Etape measured distance] minus the casing height converted to feet). For example, for the first measurement in row 3, ground water table elevation = D3 - [H3 - (E3/12.00)]. The Garmin topo map ground elevation that is recorded for each well casing waypoint is used because it is much more reliable and accurate than the elevation reading from the Garmin eTrex Vista HCx GPS unit placed on top of the well casing, and because the Garmin topo map elevations are already reported in the NAVD 88 vertical datum. For several wells with the top of well casing/measuring point below the ground surface, the groundwater elevation is calculated by taking the Garmin topo map elevation (D) and subtracting from it the [water depth from the top of the casing (H or I) plus the depth of the top of the casing below the ground surface (in feet)]. Those measurements in pink shaded cells and crossed out are no longer considered to be valid or accurate measurements and should not be used.