

MILLVILLE CITY COUNCIL MEETING
City Hall – 510 East 300 South – Millville, Utah
July 28, 2016

PRESENT: Michael Johnson, Michael Callahan, Cindy Cummings, Mark Williams, Rose Mary Jones, Tara Hobbs, Gary Larsen, Harry Meadows, Chad Kendrick, Paul Inkenbrandt, Roger Roundy, Bob Fotheringham, Cameron Jensen, Francene Jensen, Trevyn Jensen

Call to Order/Roll Call

Mayor Michael Johnson called the City Council Meeting to order for July 28, 2016 at 7:07 p.m. The roll call indicated Mayor Johnson and Councilmembers Michael Callahan, Cindy Cummings, Mark Williams were in attendance with Councilmembers Julianne Duffin and Ryan Zollinger excused. Also Recorder Rose Mary Jones and Treasurer Tara Hobbs were present.

Opening Remarks/Pledge of Allegiance

Councilmember Cindy Cummings welcomed and thanked all for being in attendance at the Council Meeting. She invited all to join with her as she led the pledge of allegiance.

Approval of agenda and time allocations

The agenda for the City Council Meeting of July 28, 2016 was reviewed.

Councilmember Cummings moved to approve the agenda for July 28, 2016.

Councilmember Williams seconded. Councilmembers Callahan, Cummings, and Williams voted yes with Councilmembers Duffin and Zollinger excused. (A copy of the agenda is included as Attachment "A".)

Approval of minutes of the previous meeting

The Council reviewed the minutes of the City Council Meeting for July 14, 2016.

Councilmember Williams moved to approve the minutes for July 14, 2016.

Councilmember Cummings seconded. Councilmembers Callahan, Cummings, and Williams voted yes with Councilmembers Duffin and Zollinger excused. (A copy of the minutes is included as Attachment "B".)

Report on P & Z Meeting held July 21, 2016

Councilmember Callahan had been in attendance at the Planning Commission Meeting held July 21, 2016. He reported the Commission had discussed the process for approving permits and felt it should remain as is, with reviews being made by many eyes to avoid overlooking something. (A copy of the draft minutes for the meeting is included as Attachment "C".)

Consideration of Conditional Use Permit for a Residential Assisted Living Facility located at approximately 305 East 450 North/Set Public Hearing

Roger Roundy reviewed with the Council the proposed placement of a Residential Assisted Living Facility on parcel 02-129-0014 as well as a picture of the projected exterior of the building. (A copy of this information presented is included with the minutes as Attachment "D".) Mr. Roundy indicated the drawings have not been finalized but these pictures would show what is tentatively proposed.

Councilmember Williams moved to set a public hearing for August 25, 2016 at 7:15 p.m. Councilmember Cummings seconded. There was discussion on what information should be sent to those within the 600-foot radius of the parcel. Councilmembers Callahan, Cummings, and Williams voted yes with Councilmembers Duffin and Zollinger excused.

Presentation on the Aquifer Storage and Recovery

Paul Inkenbrandt representing The Utah Geological Survey made a presentation to the Council reporting on the final report for the Aquifer Storage and Recovery project which has been completed. (A copy of this report is included with the minutes as Attachment "E".) He reported the way the report had been drafted would meet the requirements to apply for approval for the development of this storage and recovery system.

Mr. Inkenbrandt reviewed the first phase of the project which had been funded in cooperation with the Utah Geological Survey, Cache County, Division of Drinking Water, and Millville City. The study ensued because of an increased amount of nitrates showing up in the water sampling. The study was to see if storing fresh water in the well could then be drawn back out and if this would decrease the nitrate levels. There was also consideration looking for any other chemical reactions that may occur. There was significant testing on the water showing that a lot of the nitrates were from antibiotics, caffeine, and septic systems. There was also some evidence that all of the nitrates were not just from Millville residences but could be from Providence residences also, where an old cistern or septic system was not being properly maintained. In this testing phase, there had been a small amount of water injected into the Glen Ridge Well which was then pumped out within a couple of months. It was determined the water injected into the ground went down with the slope of the water table. The nitrate level showed some decrease.

In the next testing phase, there was about 125 acre feet of water which had been gravity fed and injected into the well over the winter months. This water was also pumped; however, not nearly as much of the injected water was recovered. The modeling indicated water was flowing to the northwest of the well site. Other wells in the area had also been tested and watched for increased nitrate levels; there was increased nitrates detected in the Alder well.

Mr. Inkenbrandt felt this study showed a lot of positive reinforcements to pursue developing an Aquifer Storage and Recovery System at the Glen Ridge well. He indicated a permit would need to be applied for; however, one of the stipulations would be for Millville City to identify how they are planning to shrink the nitrate levels. It was suggested this may be through public education and better maintenance of the systems within our community. Candace Cady, with the Division of Environmental Quality, would be the individual to work with to pursue the permit process, as well as the Division of Drinking Water and the Utah Division of Water Rights; all three agencies would be involved in the permit process. According to Mr. Inkenbrandt, if the City wants to pursue this, the permit request would need to be submitted by autumn time to Ms. Cady, and she felt there could be approval for this by January.

Superintendent Larsen expressed his appreciation to Mr. Inkenbrandt for the excellent job and all the help he had given to Millville City with these studies. This has been a considerable cost-saving venture to the City in having all of this information prepared at a nominal fee.

Mr. Fotheringham indicated the County was involved to help with securing additional water resources in our area. He felt that a water district may go before the people in the County to vote on this coming fall. The County is also planning to do a similar injection project at the mouth of Green Canyon.

Superintendent Larsen reported this could possibly save the City thousands of dollars in the future by using this system.

Mr. Inkenbrandt was thanked for all of his help with this project and service to our community.

Consideration for Eagle Scout Project Proposal for Emergency Management Pamphlets

Trevyn Jensen proposed an Eagle Scout Project to the City Council to organize and deliver Emergency Management Pamphlets, which had been previously developed and printed, to all Millville residents and those in the south fields. He will organize the routes and recruit scouts and family members to help him with this project. It was suggested that the pamphlets be placed in a plastic bag to prevent weather damage and hung on a door at each residence.

Councilmember Cummings moved to approve Trevyn's proposal for this Eagle Scout Project. Councilmember Callahan seconded. Councilmembers Callahan, Cummings, and Williams voted yes with Councilmembers Duffin and Zollinger excused.

The Council requested that Trevyn report back to the Council after the project is completed.

Bills to be paid

The bills were presented. They are as follows:

Mike Johnson	50.00	Water
Rose Mary Jones	54.23	General
Tara Hobbs	33.85	Water
Questar	17.70	NorthPark/Building
Staples	111.77	Water
ACN Communications	17.03	General
Comcast	75.88	Building
Olson & Hoggan	441.00	Legal
Utah Local Governments Trust	319.87	Insurance
CenturyLink	190.45	General
CNH Capital	14.84	Road
Kilgore	974.70	Road
Cache County Service Area	10,511.65	Sanitation
Cache County Service Area	1,725.00	9-1-1
IPACO	188.79	Road
Turf-It Landscaping	525.00	Park
Don Aslett's Cleaning	92.50	Building
Cache Valley Concrete Cutting	200.00	Road
Peterson Plumbing Supply	25.51	Park
O'Reilly Auto Parts	27.72	Road
LeGrand Johnson Construction	36,597.92	COG Road
LeGrand Johnson Construction	22,671.75	Road
Thomas Petroleum	111.24	Road
Cache County Recorder	81.00	General
DWA Construction	15,282.42	Road
Caselle	2,950.00	
CapFacReplacement/Water		
Meterworks	1,270.60	
CapFacReplacement/Water		
HD Supply Waterworks	42,600.00	
CapFacReplacement/Water		
Justin Murphy	4.26	Water
Richmond Irrigation Company	226.00	Water
Visionary Homes	75.00	Water
Mason Smith	75.00	Water
Thatcher Company	480.95	Water
South Fork Hardware	5.98	Water
Rural Water Association of Utah	100.00	Water
Utah Division of Water Quality	550.00	Stormwater
Watkins Printing	1,068.18	General/Water
Jones Simkins	494.50	General/Water
J-U-B Engineering	22,322.78	General/Water

BILLS (Continued)--

Salary Register

10,459.25

Councilmember Cummings moved to pay the bills for July 28, 2016. Councilmember Callahan seconded. Councilmembers Callahan, Cummings, and Williams voted yes with Councilmembers Duffin and Zollinger excused.

City Reports

Roads/Sidewalks:

Superintendent Larsen reported the road chip and seal project is completed for the year.

The street light which had been purchased by the school district will be installed by TEC Electric at approximately 300 West 500 North.

Superintendent Larsen reported on the change in traffic flow on 100 North and 100 East. Currently there are stop signs for the north/south traffic; however, because of the Mond-Aire Subdivision and the amount of traffic from this area, he suggested the Council consider changing the stop signs and having the east/west traffic stop. The Council requested having this item continued to the next Council Meeting for action.

City Parks:

Superintendent Larsen reported the splash pad is requiring a considerable amount of manpower to maintain the area. Additional restroom maintenance and garbage control is ongoing as well as trying to juggle the watering schedule for the park.

Superintendent Larsen reported that Chad has been looking at a truck he would like to order. It has been budgeted in this year's budget. It is a Chevrolet ¾ ton pickup. There was some discussion about the City truck currently being used and what would be done with it. There was also discussion about the storage of the City's vehicles.

Superintendent Larsen reported there is no more room in the shop for any additional vehicles to be housed.

Culinary Water System:

Superintendent Larsen reported there are 300 ¾-inch meters that have been delivered. They will be installed as time permits. The auto-meter read system had been linked with our computer system and had been tried out today. It seems to work fine and there had been several meters read in a matter of minutes. It was suggested that the system could be set up to have the information sent to the City Office without actually driving around

the City. The system also identifies possible leaks in services or homes (six had been identified during the test run). Superintendent Larsen indicated that Meterworks had been great to work with and felt this had been a good choice for meeting our community's needs.

The well that is to water the fields, etc. at the high school is still not up and running. The City has been able to provide water to the school district to meet their needs. This water is being metered.

There are still several items to be addressed at the high school. The open house is set for August 9.

Councilmember Reports

Councilmember Cummings reported she had been contacted regarding concerns at the City Cemetery where drugs are being distributed, as it is a dark location. The Sheriff's Department have been notified and will patrol the area.

A copy of the Councilmember Reports list is included with the minutes as Attachment "F".)

Other items for Future Agendas

Development Coordinator Harry Meadows reported to the Council that proposed subdivisions are not being required to install the infrastructure for all companies to provide telecommunications. He had checked with the companies and the developer must request to have this installed in their development. He explained that the Mond-Aire Subdivision has provided for Comcast but not for CenturyLink. The Council did not feel it was necessary to provide infrastructure for all companies.

Development Coordinator Meadows also reviewed the construction deposit required by the City for \$2,000. He reported the Manual of Construction and Design has specific guidelines for cuts that can be made in the curb; this is not being followed or enforced in the development of the current subdivisions. He will work with Superintendent Larsen to identify some type of a checklist that will be given to the homeowners that would indicate what is required in order to have this deposit returned.

Mayor Johnson reviewed with the Council a letter received from the Sheriff's Office regarding the safety of the public during a parade. It was suggested that no candy be

thrown from vehicles. The Council did not see this as a concern at this time and did not wish to pursue it.

Mayor Johnson also discussed with the Council the passing of our City Attorney. He had received a letter from Brent Hoggan of Olson and Hoggan expressing their desire to continue to serve our community. The consensus of the Council was to have their firm remain as our legal counsel. Contacts for legal concerns are to be addressed to Attorneys Miles Jensen and Seth Tate.

Adjournment

Councilmember Cummings moved to adjourn the meeting. Councilmember Williams seconded. Councilmembers Callahan, Cummings, and Williams voted yes with Councilmembers Duffin and Zollinger excused. The meeting adjourned at 8:25 p.m.

ATTACHMENT "A"

NOTICE AND AGENDA

Notice is hereby given that the Millville City Council will hold their regularly scheduled council meeting on Thursday, July 28, 2016, at the Millville City Office, 510 East 300 South in Millville, Utah, which meeting shall begin promptly at 7 p.m. (Please note the time given to each agenda item is an approximate time.)

1. Call to Order / Roll Call – Mayor Michael Johnson.
2. Opening Remarks / Pledge of Allegiance – Councilmember Cindy Cummings.
3. Approval of agenda and time allocation.
4. Approval of minutes of the previous meeting – July 14, 2016.
5. Action Items—
 - A. Report on P & Z Meeting held July 21, 2016 – Councilmember Michael Callahan – 7:03 p.m.
 - B. Consideration of Conditional Use Permit for a Residential Assisted Living Facility located at approximately 305 East 450 North/Set Public Hearing – Roger Roundy – 7:05 p.m.
 - C. Presentation on the Aquifer Storage and Recovery – Paul Inkenbrandt – 7:15 p.m.
 - D. Consideration for Eagle Scout Project Proposal for Emergency Management Pamphlets – Trevyn Jensen – 7:35 p.m.
 - E. Bills to be paid.
6. Discussion Items—
 - A. City Reports.
 1. Roads/Sidewalks – Superintendent Gary Larsen.
 2. City Parks – Superintendent Larsen.
 3. Culinary Water System – Superintendent Larsen.
 - B. Councilmember Reports.
 - C. Other items for Future Agendas.
 - D. Councilmember Reports.
7. Adjournment.

In compliance with the American with Disabilities Act, individuals needing special accommodations (including auxiliary communicative aids and services) during public meetings should notify Rose Mary Jones at (435)752-8943 at least three working days prior to the meeting.

Notice was posted on July 25, 2016, a date not less than 24 hours prior to the date and time of the meeting and remained so posted until after said meeting. A copy of the agenda was sent electronically to the Utah Public Meeting Notices website (<http://www.utah.gov/pmn/index.html>) on July 25, 2016.


Rose Mary A. Jones, Recorder

ATTACHMENT "B"

MILLVILLE CITY COUNCIL MEETING City Hall – 510 East 300 South – Millville, Utah July 14, 2016

PRESENT: Michael Johnson, Michael Callahan, Cindy Cummings, Julianne Duffin, Mark Williams, Ryan Zollinger, Rose Mary Jones, Tara Hobbs, Gary Larsen, Harry Meadows, Seth Duffin, Sarah Duffin, Heidi Carlston

Call to Order/Roll Call

Mayor Michael Johnson called the City Council Meeting to order for July 14, 2016 at 7 p.m. The roll call indicated Mayor Michael Johnson and Councilmembers Julianne Duffin, Mark Williams, and Ryan Zollinger were in attendance with Councilmember Cindy Cummings excused (as she would be late) and Councilmember Michael Callahan absent. Also Recorder Rose Mary Jones and Treasurer Tara Hobbs were present.

Opening Remarks/Pledge of Allegiance

Mayor Johnson invited all present to join with him in saying the pledge of allegiance.

Approval of agenda and time allocations

The agenda for the City Council Meeting of July 14, 2016 was reviewed.

Councilmember Williams moved to approve the agenda for July 14, 2016.

Councilmember Duffin seconded. Councilmembers Duffin, Williams, and Zollinger voted yes with Councilmember Cummings excused and Councilmember Callahan absent. (A copy of the agenda is included as Attachment "A".)

Approval of minutes of the previous meeting

The Council reviewed the minutes of the City Council Meeting for June 23, 2016.

Councilmember Duffin moved to approve the minutes for June 23, 2016.

Councilmember Zollinger seconded. Councilmembers Duffin, Williams, and Zollinger voted yes with Councilmember Cummings excused and Councilmember Callahan absent. (A copy of the minutes is included as Attachment "B".)

Report on P & Z Meetings held July 7, 2016

Development Coordinator Harry Meadows had been in attendance at the Planning Commission Meeting held July 7, 2016. There had been four building permit clearances reviewed and approved. Development Coordinator Meadows reported the addresses on the corner lots in the Mond-Aire Subdivision are incorrect and he is making the corrections as they are being built upon. (A copy of the draft minutes are included as Attachment "C".)

Councilmember Callahan arrived at the meeting at this time.

Development Coordinator Meadows indicated there are four more building clearances scheduled for the next Planning Commission Meeting on July 21, 2016. He indicated there are 64-lots in the Mond-Aire Subdivision; however, the developer is trying to purchase additional property to increase the size of this subdivision.

Consideration of a Request for an Eagle Scout Project Installing a Sign at the corner of 550 North and Highway 165

Seth Duffin reviewed with the Council his Eagle Scout Project to build a sign at the corner of 550 North and Highway 165. It will be approximately 7 feet high and 7 feet wide. The sign will be black with stainless letters. The wheel on the front of the sign is to be blue. The posts used will be cedar and cemented into the ground. It was proposed to have LED strip lights used to light the sign. The sign will be placed facing northwest, so it will not block the vision of traffic. Rocky Mountain Power has been contacted regarding power to the sign; if the lights are to be metered it would be \$5 per month, or if charged by the energy used, it would be \$4 per month. At the base of the sign, it is proposed to have large wood chips.

The cost of the proposed project is about \$3,000 with approximately \$1,600 being donated through labor and materials. Seth proposed to start the project next week and have it completed prior to school starting.

Councilmember Williams moved to approve the Eagle Scout Project proposed by Seth Duffin for the Millville City sign not to exceed \$1,400, to be allocated from the road budget. Councilmember Zollinger seconded. Councilmembers Callahan, Duffin, Williams, and Zollinger voted yes with Councilmember Cummings excused. (A copy of the minutes is included as Attachment "D".)

Report from Cache County Sheriff's Department

Deputy Dave Peatross had scheduled to attend the Council Meeting to make a report from the Cache County Sheriff's Department. He was unable to attend the meeting.

Review of Proposed Sewer Ordinance / Set Public Hearing

Mayor Johnson reviewed with the Council the Sewer Service System ordinance as written. The Council had previously discussed this at a prior meeting, and the changes to the ordinance were reviewed and had been corrected. **Councilmember Callahan moved to set a public hearing on the Sewer Service System Ordinance 2016-3 on August 11 at 7:30 p.m.** Councilmember Williams seconded. Councilmembers Callahan, Duffin,

Williams, and Zollinger voted yes with Councilmember Cummings excused. (A copy of the minutes is included as Attachment “E”.)

Bills to be paid

The bills were presented. They are as follows:

Stephanie Eggleston	3.78	General
Tara Hobbs	101.52	Water
Rose Mary Jones	156.01	Water
Adria Davis	10.48	P&Z
Rocky Mountain Power—		
North Park	65.03	Park
Street lights	1,175.50	Road
Shop	196.33	Building
Crossing Guard	16.94	Crossing Guard
Ball Park	11.13	Park
North Well	347.13	Water
Park Well	2,908.81	Water
Water Treatment	16.65	Water
Highline Reservoir	1,086.81	Water
Public Treasurers Investment Fund	7,667.00	Water
Watkins Printing	174.40	General/City Celebration
AT&T	53.65	General
Caselle	125.00	Water
Maceys	11.94	General
J-U-B Engineer	21,392.11	General/Water
Transportation Repair	80.00	Road
AllTech Resources	32.50	General
Dan Hunsaker	2,000.00	Construction Deposit
Chris Funk	2,000.00	Construction Deposit
Renegade Rentals	7.19	Park
South Fork Hardware	3.38	Park
M & M Asphalt	12,848.57	Road/Park
Riverside Carwash	33.06	Stormwater
Thomson Electric	15.11	Water
Blue Stakes	190.19	Water
Ecosystem Research	25.00	Water
Peterson Plumbing	171.40	Water
RC Welding and Fabrication	90.00	Water
Olson & Hoggan	435.00	Legal
Bear River Health Department	80.00	Water
Maverik	375.51	Water
Meterworks	318.00	Water
Salary Register	15,307.10	

Councilmember Duffin moved to pay the bills for July 14, 2016. Councilmember Williams seconded. Councilmembers Callahan, Duffin, Williams, and Zollinger voted yes with Councilmember Cummings excused.

Ridgeline High School Fun Run

Mayor Johnson requested the Council take a few minutes to hear a proposal from Heidi Carlston, from the Ridgeline PTA. Mrs. Carlston proposed to the Council a Chalk/Color Fun Run as a PTA fundraiser on September 12. They are planning to do a one mile run as well as a 5K run (approximately 3 miles). They are planning to register for the race beginning at 5 p.m. with the race starting at 6 p.m. This will be a race with chalk in the school colors. The proposed routes for the runs were reviewed and discussed. This race will be opened to anyone and families will be encouraged to participate. The cost is \$10 per runner or \$40 per family.

Councilmember Cummings arrived at the meeting at this time.

The Council also discussed safety factors for the races. Mrs. Carlston will contact the Cache County Sheriff's Department Deputies to ask for their assistance with this race. There will be orange cones used to help in directing the way the runners should go as well as volunteers helping. These orange cones will be borrowed from our City; Superintendent Gary Larsen was asked to help with supplying these for the event. (A copy of the information presented showing the routes are included with the minutes as Attachment "F".)

City Reports

Roads/Sidewalks:

Superintendent Larsen reported the chip and seal on the roads will be completed within the next couple of weeks. The map showing those roads being affected has been posted. This is in keeping with the 5-7 year road maintenance program.

Superintendent Larsen reported there is an extra street light that had been purchased by the school. This will become the property of Millville City. The Council discussed whether this light should be stored or whether it should be installed. A bid from TEC Electric had been received in the amount of \$1,495 which would be the cost for the installation. The consensus of the Council was to go ahead and have the light installed near 300 West at 550 North instead of trying to store it. The funding for this would come out of the 'road' budget. (A copy of the information reviewed is included with the minutes as Attachment "G".)

Superintendent Larsen had received a concern on whether there would be 'no parking' signs installed on 200 North at approximately 200 West in the cul-de-sac area. There was a lengthy discussion on the pros and cons of having no parking in the area as well as how to regulate parking on other roads near the new school.

It was determined that Councilmember Zollinger will contact the Cache School District to find out what they are planning for overflow parking, how their property will be fenced, and the paths being installed for foot traffic to and from the facility. This will be discussed again as an action item on August 11.

Superintendent Larsen indicated CenturyLink had started the relocation process of their lines located at 450 North Main. Engineer Murray had written an email outlining the progress of various projects within the City which Mayor Johnson reviewed with the Council. (A copy of this information is included with the minutes as Attachment "H".)

City Parks:

Superintendent Larsen indicated he had no report regarding the city parks.

Culinary Water System:

Superintendent Larsen reported the City's culinary water usage is currently between 1 million and 1.1 million gallons per day. There have been no problems. The Glen Ridge well is currently operating at about 50% capacity.

Paul Inkenbrandt will report on the Aquifer Storage and Recovery Project in the Glen Ridge well at the next Council Meeting.

The Auto Meter Read project is moving forward. There have been 100 meters purchased; several have been installed saving enough for the new homes currently being built. Another 300 meters has been ordered and should be delivered in about two weeks.

The Control Panel to be used on the Garr Spring Project has arrived. The installation on this has been put on hold until sometime in August.

The high school has been using our culinary water, as there well is not up and running yet and they are starting to do some of their landscaping.

There was discussion on whether the roads built by the School District have been inspected and accepted by the City to date. Superintendent Larsen indicated they have not. There is a punch list of items that will need to be addressed before they will be accepted.

Councilmember Duffin reported the TAP sidewalk grant awarded to the City is a federal grant and the match for this is \$13,000, which will be required to be paid upfront. Paul Willardson with J-U-B will be the engineer that will be working with this grant. There are several requirements that must be met or the grant can be pulled and the City would have to pay for the project.

Councilmember Reports

(A copy of the Councilmember Reports list is included with the minutes as Attachment "I".)

Councilmember Cummings reported she had received concerns from neighbors regarding the Stellar Collision Repair business that was approved for Craig Nielson. He was to have just one car at a time at his residence for repair; there have been multi-cars there. Mayor Johnson indicated he would address this with Mr. Nielson.

Councilmember Cummings also indicated she was delayed on Main Street as a semi was parked near the Artistic Rail business to unload materials. She felt this business is too large if it is requiring that type of delivery and should not be in a residential area. Councilmember Zollinger indicated the owner is currently building a new building in Paradise to relocate his business. Councilmember Zollinger did not think he would be asking to renew his business for the next year.

Councilmember Callahan had been approached by the Cemetery Board requesting the City sell the city-owned property located on the cemetery's western boundary. This will continue to be looked into.

Other items for Future Agendas

Treasurer Hobbs asked the Council about the renting of the City Park Pavilion and the accessibility for the restrooms, as they are not ADA Compliant. She questioned if an ADA Ramp could be built for the existing restrooms.

There was discussion about the RAPZ Grant and the restroom facility that will be built near the splash pad. The next step in this process is to have a design drawn of what is to be built. The Council will again address this on August 25.

Treasurer Hobbs acknowledged receiving a thank you note from those chairing the MS race, as they had used our City Park.

Recorder Jones informed the Council of a business name change from 'BAXBO Games' to 'i4 Group LLC'. The Council did not feel this would need to be brought back to them for approval, as it is still in the same location doing the same thing. A new license will be issued with the new name.

Development Coordinator Meadows discussed the distribution of the Emergency Preparedness Pamphlets that has been published. He will make sure this project is completed as an Eagle Scout Project as proposed.

Development Coordinator Meadows had also been in contact with the Utah Local Government Trust (our liability insurance carrier) to question the rental of park facilities with bouncy houses being brought on the property. Our insurance does not cover this for any liability. There are bouncy houses sometimes set up on the public park with no reservation or approval. Development Coordinator Meadows will consult with our insurance carrier to see if insurance could be purchased for this type of use and what liability we would have if there had been no approval for this to be used.

Adjournment

Councilmember Cummings moved to adjourn the meeting. Councilmember Duffin seconded. Councilmembers Callahan, Cummings, Duffin, Williams, and Zollinger voted yes. The meeting adjourned at 8:58 p.m.

ATTACHMENT "C"

MILLVILLE PLANNING COMMISSION MEETING

City Hall - 510 East 300 South - Millville, Utah

July 21, 2016

1. Roll Call:

Chairman Jim Hart, Commissioners Lynette Dickey, Garrett Greenhalgh.

Others Present:

Treasurer Tara Hobbs, Councilmember Michael Callahan, and Eric Kleven. Secretary Adria Davis recorded the minutes.

2. Opening Remarks/Pledge of Allegiance

Chairman Hart opened the meeting at 8:02 p.m. He led those present in the Pledge of Allegiance.

3. Review and Approval of agenda

The agenda for the Planning Commission meeting of July 21, 2016 was reviewed. A motion was made by Commissioner Greenhalgh to approve the agenda as presented. Commissioner Dickey seconded. Commissioners Dickey, Greenhalgh and Hart voted yes.

4. Review and Approval of the Minutes of the Planning Commission Meeting

The minutes for the meeting of July 7, 2016 were reviewed. A motion was made by Commissioner Greenhalgh to approve the minutes as outlined. Commissioner Dickey seconded. Commissioners Dickey, Greenhalgh and Hart voted yes.

Commissioner Farmer arrived at the meeting.

5.A. Consideration of zoning clearance for a building permit by Eric and Rachel Kleven, for a residence to be located at 191 East Center Street in Millville, Ut

Mr. Kleven has provided a new drawing for review. The home was shifted slightly north on the property to allow for the city's setbacks. Commissioner Greenhalgh made a motion to approve the permit. Commissioner Dickey seconded. Commissioners Dickey, Greenhalgh, Farmer and Hart voted yes.

Commissioner Greenhalgh expressed that he had a personal interest in the next two building permits.

5.B. Consideration of zoning clearance for a building permit by Visionary Homes, for a residence to be located at 185 North 430 East, lot #11 Mond-Aire Heights Subdivision in Millville, Ut.

Visionary Homes is building a 2 story spec home (Aberdeen model). It was approved to be built on lot #22 but the builder is moving it to lot #11 to better blend in with neighboring homes. The floor plan has been resubmitted showing its position on lot #11.

Commissioner Farmer made a motion to approve the permit. Commissioner Dickey seconded. Commissioners Hart, Dickey, and Farmer voted yes. Commissioner Greenhalgh abstained from the vote.

5.C. Consideration of zoning clearance for a building permit by Visionary Homes, for a residence to be located at 131 North 480 East, lot #22 Mond-Aire Heights Subdivision in Millville, Ut.

Visionary Homes already had an approval for this lot; however they are now building a different home here and have submitted the new floor plan for review. This home is being built as a spec home. It will be a single story home.

Commissioner Dickey made a motion to approve the permit. Commissioner Farmer seconded. Commissioners Hart, Dickey, and Farmer voted yes. Commissioner Greenhalgh abstained from the vote.

6.A. City Council Reports – review minutes from July 14, 2016 meeting:

Councilman Callahan reviewed the council's discussion regarding the sewer. A public hearing has been set for Aug 11, 2016.

6.B. Agenda Items for Next Meeting

Building permits

6.C. Other

Chairman Hart revisited the idea of having one clerk-issue building permits.

The commission was united in the feeling that this responsibility should remain with the whole commission as there would be more protection for the city if more people were able to review each application. Not much time would be saved by placing the responsibility on one person especially since the commission is willing to hold special meetings as needed.

Chairman Hart presented the Final Platt (Mylar) of the Views at CopperLeaf Subdivision for all the commission to review since he has a personal interest in this item. After all had a chance to view the Mylar drawing he then signed it off as the chairman and the secretary signed as witness.

7. Calendaring of future Planning and Zoning Meeting

The next regularly scheduled meeting will be held Thursday, Aug 8, 2016.

8. Assignment of Representative for City Council Meeting

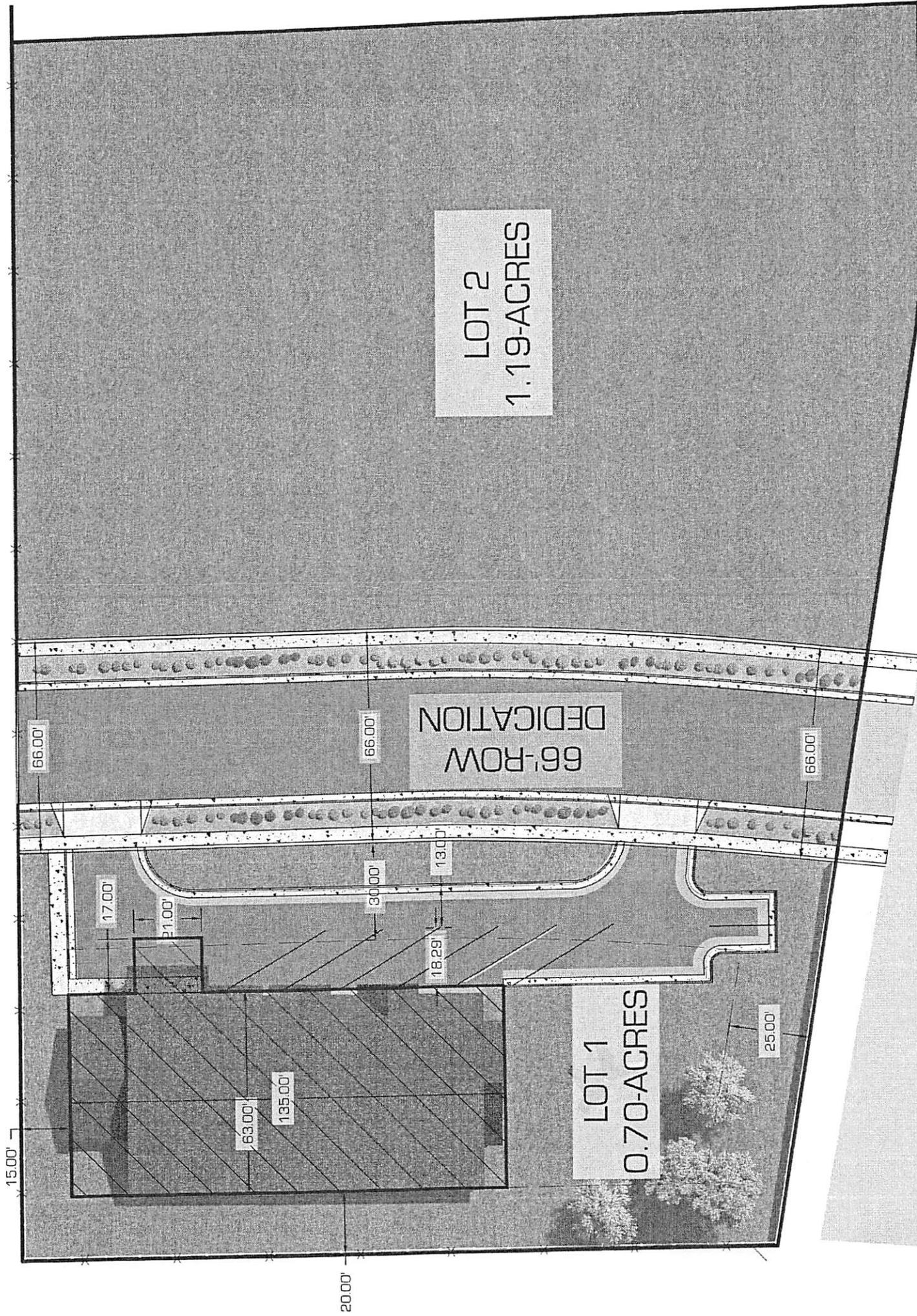
Michael Callahan was appointed to represent the commission at the next council meeting.

9. Adjournment

Chairman Hart moved to adjourn the meeting at 8:37 p.m. Commissioner Farmer seconded.



ATTACHMENT "D"



LOT 2
1.19-ACRES

66'-ROW
DEDICATION

LOT 1
0.70-ACRES

15.00'

20.00'

66.00'

66.00'

66.00'

17.00'

21.00'

30.00'

18.29'

13.00'

63.00'

135.00'

25.00'

AQUIFER STORAGE AND RECOVERY IN MILLVILLE, CACHE COUNTY, UTAH

by Paul Inkenbrandt



REPORT OF INVESTIGATION 275
UTAH GEOLOGICAL SURVEY
a division of
UTAH DEPARTMENT OF NATURAL RESOURCES
2016

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Cover photo: Millville and Providence, Cache County, Utah.



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2016

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AQUIFER STORAGE AND RECOVERY IN MILLVILLE, CACHE COUNTY, UTAH

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ABSTRACT

The Utah Geological Survey in cooperation with Millville City, Utah, investigated the feasibility of an aquifer storage and recovery project using Millville's existing water supply infrastructure. The project involved injecting and pumping with the Glenridge well, a public water supply well with elevated nitrate concentrations of about 8 mg/L, and using Garr spring, a public water supply spring, as the injection source. Millville City conducted two injection and pumping tests. The first test consisted of a week-long injection period immediately followed by a week of pumping, and the second test consisted of five months of injection, two months of storage, and three months of pumping.

I used various modeling techniques and analyses of geochemical samples to investigate the effects of the project. Aquifer test modeling indicates that the aquifer around the Glenridge well has a transmissivity of 135,000 ft²/day (12,500 m²/day). Three-dimensional finite-difference modeling shows the injected spring water flows slowly from the injection well to the northwest at a rate of approximately 1 m per day. Geochemical modeling indicates that the spring water would increase oxidation state of water in the aquifer, potentially causing mobilization of some metals. However, the change due to oxidation is expected to be minute, since geochemical analysis indicates that the major ion chemistry of the spring water is very similar to that of the principal aquifer. Geochemical analysis also indicates that septic systems are contributing significant amounts of nitrate to the water in the principal aquifer.

If this project continues, Millville City should establish a monitoring plan to ensure that metal concentrations do not approach regulatory standards. Also, the city should consider taking steps to remediate identified sources of nitrate, as nitrate contamination unrelated to the aquifer storage and recovery program will continue to increase with population density.

INTRODUCTION

Study Area

The area of study includes and surrounds the city of Millville in southeast Cache Valley, Utah (figure 1). The area of review (AOR) for this study, a two-mile radius around Millville's Glenridge well (figures 1 and 2), is based on state and federal

regulatory requirements of underground injection (U.S. Code of Federal Regulations, 2014; Utah Administrative Code, 2015).

This study was conducted using Millville City's public drinking water system, which supplies water to 572 connections and serves 1900 people (Utah Division of Water Rights, 2015). The Utah Division of Drinking Water (DDW) has assigned system number 03012 to Millville's system. Garr spring and Glenridge well (table 1) are important public water sources in Millville's system.

Goals

Millville City, with assistance from the Utah Geological Survey (UGS), is testing the application of a small-scale aquifer storage and recovery (ASR) program in Cache Valley. Millville proposes to inject water from Garr spring into the Glenridge well from October to March of each year, store the water in Cache Valley's principal basin fill aquifer (figure 1) until late June, and then extract the injected water from June to September when public demand for water is greatest.

The ASR program would (1) provide Millville with a method to store Garr spring water during the winter months, when Millville's water rights for the spring are active and when demand is low, (2) assist in artificially decreasing relatively high measured nitrate concentrations in the Glenridge well, and (3) further utilize existing water rights. Nitrate concentrations at the Glenridge well have increased 4 mg/L over the past 15 years, and positively correlate to Millville's population increase (figure 3). The nitrate concentrations are approaching the federal maximum contaminant level (MCL) of 10 mg/L (nitrate as nitrogen) (U.S. Environmental Protection Agency, 2014).

This study consisted of two phases, a short term injection and pumping cycle conducted during March 2014, and a long term injection, storage, and pumping cycle conducted from October 2014 to October 2015. The goals of this study were to (1) determine how injection of Garr spring water would affect the Cache Valley principal aquifer system, (2) characterize the efficiency and viability of Millville's proposed ASR program, and (3) describe the source, distribution, and possible remediation methods of the nitrate contamination in the aquifer in the Millville area.

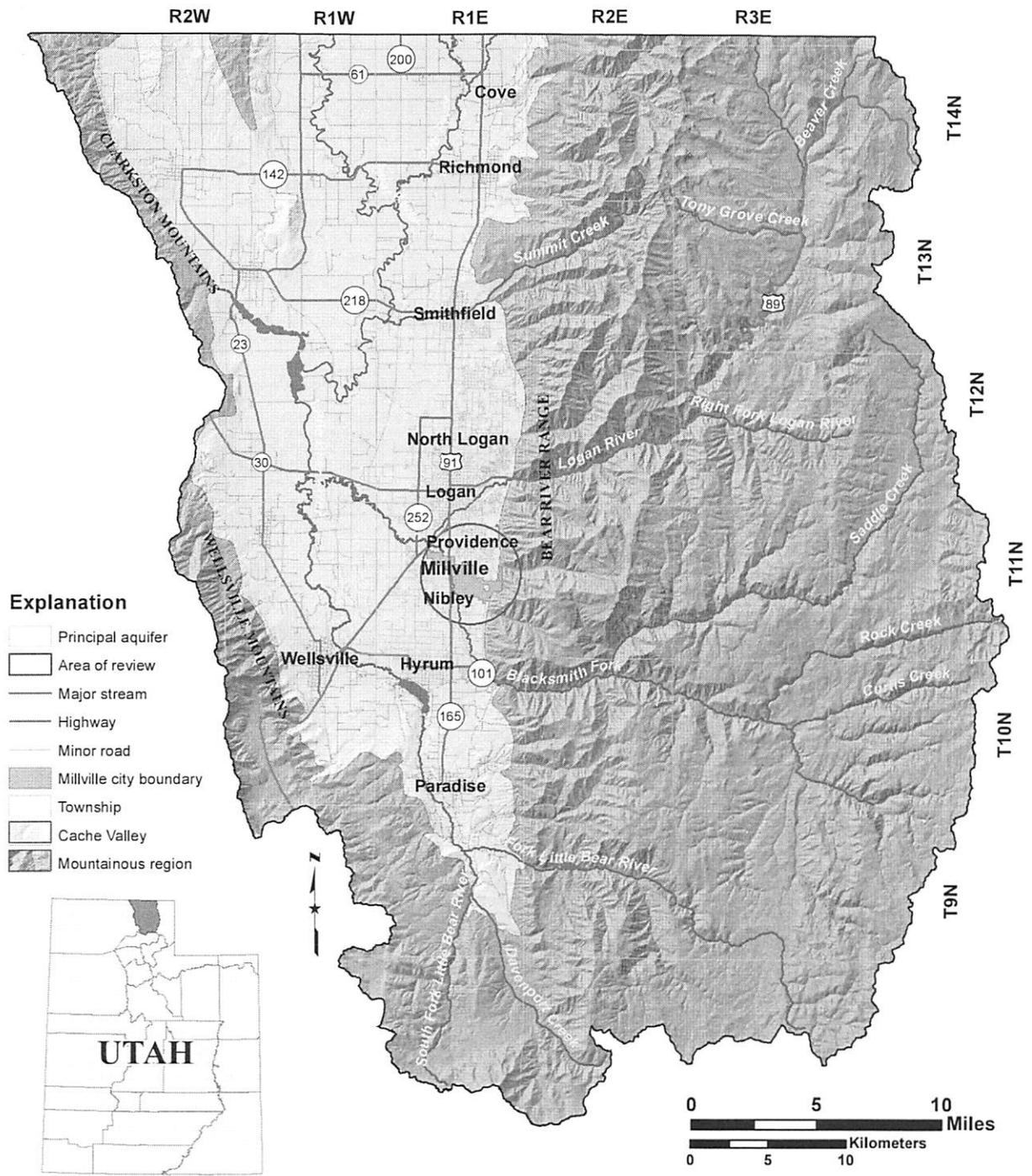


Figure 1. Location of the study area in Cache County, Utah.

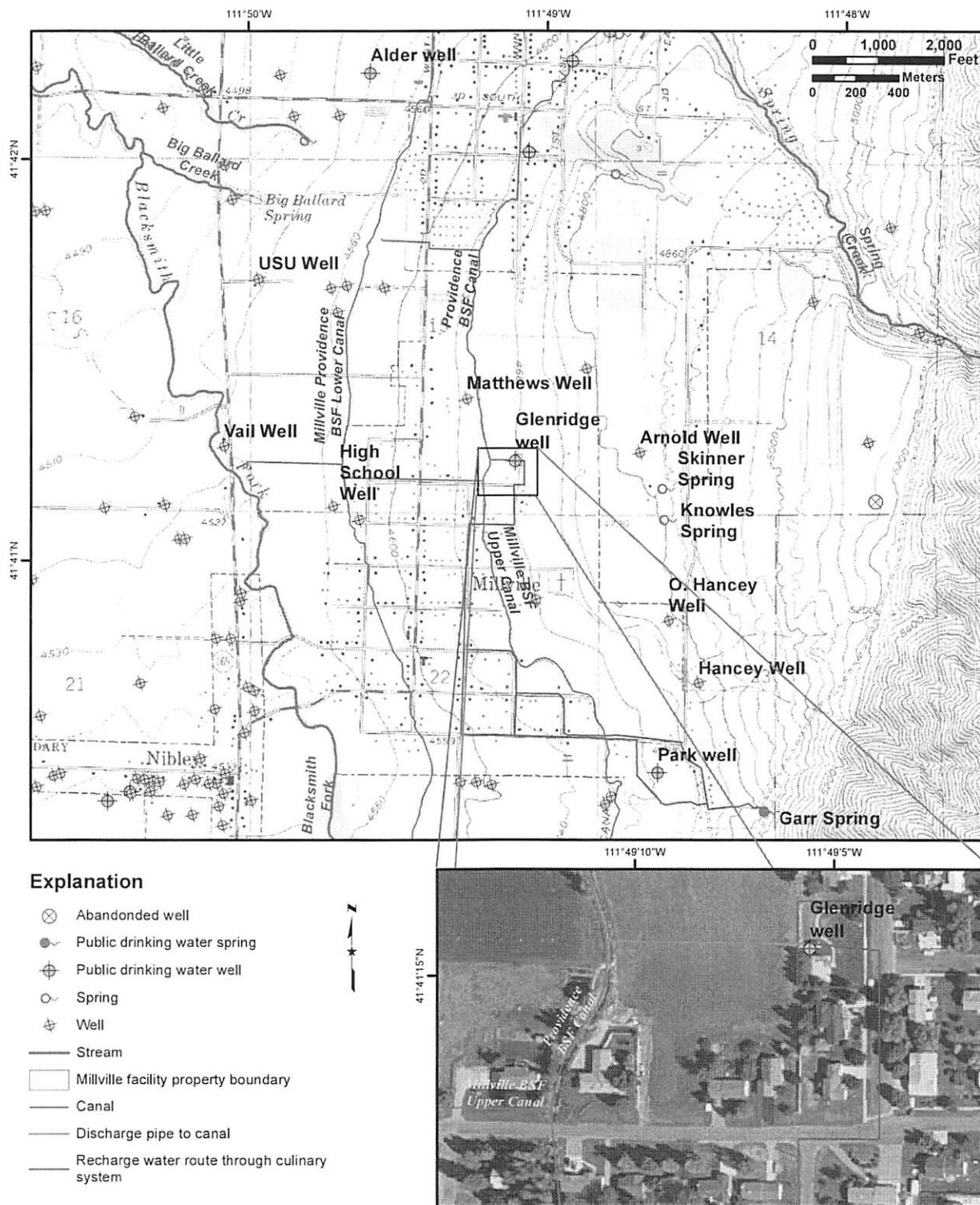


Figure 2. Location of Millville aquifer storage and recovery facility and well.

Table 1. Millville water sources used in the Millville ASR program.

Station Name	Station ID	Elev. (ft)	Lat.*	Long.*	Station Type	WIN	PLSS Location	Source Code	Water Rights
Garr Spring	414024111481101	4848	41.6730	-111.8039	Spring		N 690 ft W 2650 ft SE Cor Sec 23 T11N R1E SLB&M	03012-01	25-3510, 25-3069, 25-5170, 25-8394
Glenridge Well	414115111490301	4682	41.6877	-111.8181	Well	2722	N 790 ft W 1260 ft SE Cor Sec 15 T11N R1E SLB&M	03012-02	25-5171

*North American Datum 1983

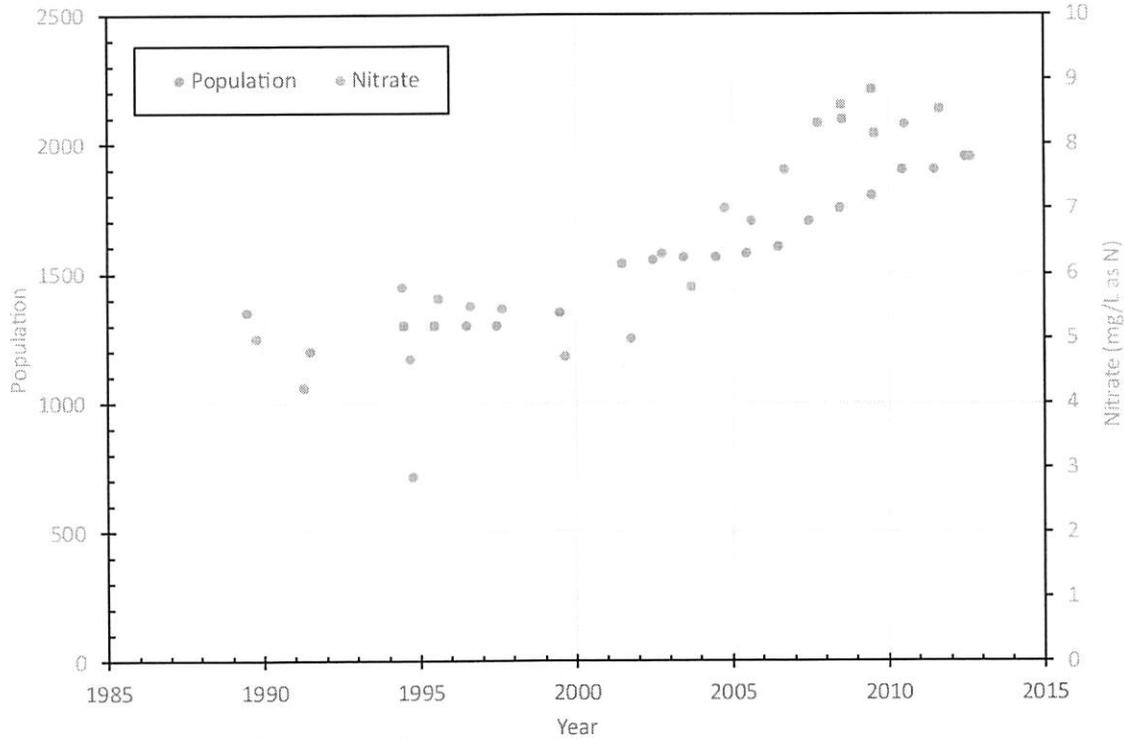


Figure 3. Millville's population and Glenridge well nitrate concentrations both increase over time.

Aquifer Storage and Recovery

Aquifer storage and recovery (ASR) is the method of artificially recharging water into an aquifer, storing the water, and then recovering the water at a later time. In many cases, as is the case for Millville, ASR effectively uses aquifers as subsurface water storage reservoirs. The volumes of water injected and recovered can be managed to balance or change groundwater levels. For this study, the artificially recharged water is referred to as the injectate and the water in the aquifer is the host water.

The recharge aspect of ASR is an attempt to expedite and increase the natural groundwater recharge process through a human intervention process known as managed aquifer recharge, where the water is either injected via well or infiltrated at the ground surface via an infiltration gallery (Pyne, 1995). Thomas and others (2011) and Inkenbrandt and others (2013) investigated the use of surface infiltration to induce groundwater recharge near North Logan in Cache Valley (figure 1). For this study, the applied recharge method is injection into

the Glenridge well, which is also used to extract the water. Injection of water into an aquifer system creates an effective “bubble” of injectate surrounded by the host water of the aquifer (figure 4). Diffusion and groundwater flow slowly disperse

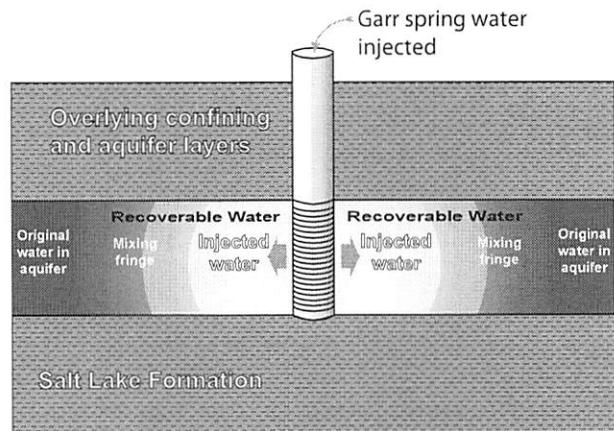


Figure 4. Conceptual diagram of storage of injected water in the Cache Valley principal aquifer (modified from Pyne, 1995).

the bubble, but pumping recovers some quantity of injectate. The ratio of the volume of injectate retrieved to the total volume of injected water is known as recovery efficiency.

During ASR, the injectate and the host water can chemically interact with each other and with minerals in the aquifer. The level of interaction depends on relative differences between the chemistries of the two waters—mainly pH, temperature, oxygen concentrations, and oxidation state. Water near or at the land surface is generally oxygen rich and creates oxidizing (high Eh) conditions in the upper portion of an aquifer system (figure 5a). Low oxygen (low Eh) reducing conditions are

more likely to dominate deeper in an aquifer system, especially if the aquifer is confined (figure 6). Oxygen-rich injectate introduced into an aquifer dominated by low oxygen reducing conditions could change the oxidation state of ions in the host water, resulting in the potential mobilization of ions (Pyne, 1995). For the case of the Glenridge well, a primary concern is mobilizing nitrate via the oxidation of nitrite and ammonium (nitrification) (figure 5b). Oxidation can mobilize metals, including arsenic, uranium, mercury, nickel, chromium, cobalt, lead, and zinc. Microbiota often play an important role in the mobilization and demobilization of these and other ions, especially in the case of nitrate (Canter, 1997).

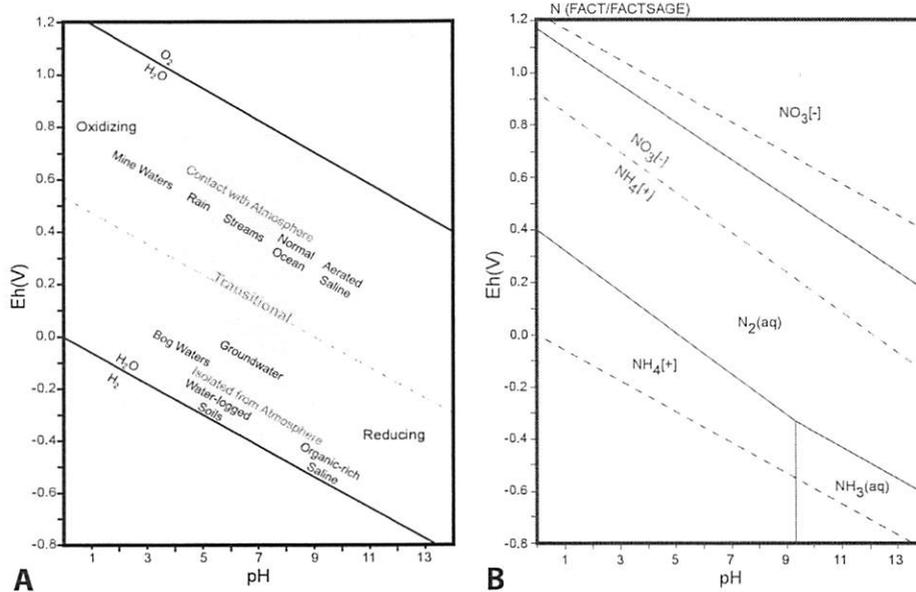


Figure 5. Pourbaix (Eh-pH) diagrams of (A) natural waters (Garrels and Christ, 1965) and (B) nitrogen (Takeno, 2005).

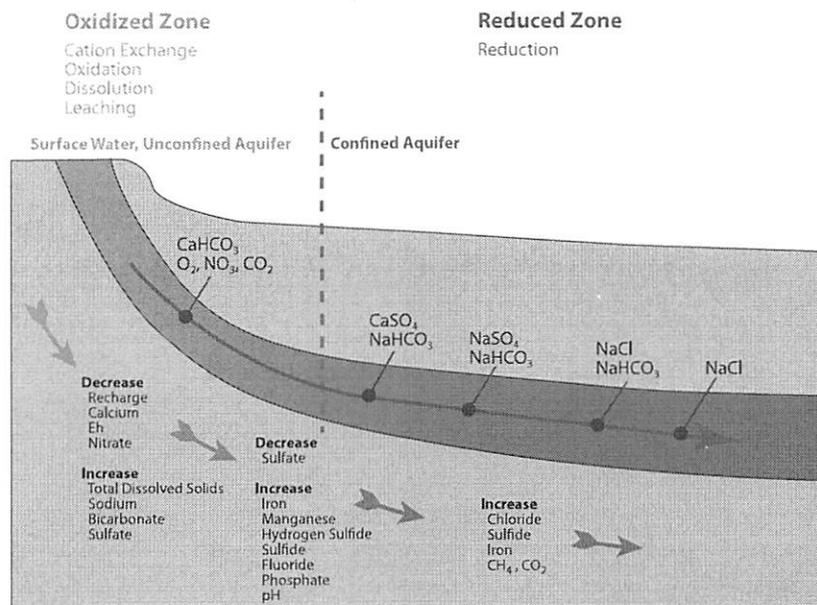


Figure 6. Common geochemical evolution of water as depth, confinement, and residence time increase (Pyne, 1995).

Another concern during ASR injection periods is raising the water table of an unconfined aquifer to the point that nitrate in the previously unsaturated zone is entrained and mobilized, as observed by Nishikawa and others (2003) in a basin-fill aquifer system very similar to that of Cache Valley (figure 4). Raising the groundwater level in an unconfined aquifer that has a nitrate source near the water table would result in higher concentrations of nitrate in the aquifer water.

A similar concern to raising the water table is entraining nitrate in water infiltrating through the ground surface. In an ASR project using a surface-based infiltration gallery, the recharge water travels through the potentially contaminated unsaturated zone before reaching the saturated zone (figure 7), picking up nitrate along its path of travel. If a nitrate source is near or on the ground surface, then the infiltrating water can capture and transport the nitrate as it travels to the saturated zone.

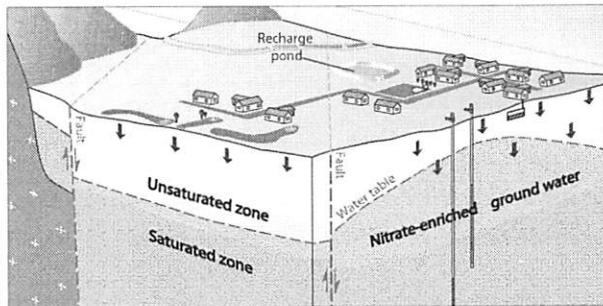


Figure 7. Conceptual model of surface-based infiltration. Water is recharged at the recharge pond, infiltrates through an area with a high density of septic systems, creates a recharge mound, and mobilizes nitrate in the previously unsaturated part of the aquifer (Nishikawa and others, 2003).

Regulation

Injection of water into a drinking water aquifer via Millville's Glenridge well is subject to regulation by the Underground Injection Control (UIC) Program of the Utah Division of Water Quality, the Utah Division of Water Rights, and the Utah Division of Drinking Water (Utah Administrative Code, 2015). The UIC Program classifies all ASR wells as Class 5B4 injection wells, which are wells used to replenish water in an aquifer for subsequent use (Utah Administrative Code, 2015). In order for an entity to inject water into and recover water from a Class 5B4 well, applications must be filed with the UIC Program and the Utah Division of Water Rights (Utah Administrative Code, 2015; Utah Division of Water Rights, 2016a; Utah Division of Water Rights, 2016b). The applications require a hydrogeologic study defining (1) the area of the aquifer potentially impacted by injection (AOR), (2) the implications of injecting foreign water into the groundwater system, (3) the hydrogeology of the area, and (4) the capabilities of the entity injecting water. Regulations require that water sources are regularly sampled for a suite of parameters on a regular basis (table 2).

Hydrogeology

The Cache Valley principal aquifer system (figure 1) is the primary aquifer for drinking-water supplies in Cache County and consists of a complex multiple-aquifer system (figure 8) composed of basin-fill sediment under both unconfined and confined conditions (Bjorklund and McGreevy, 1971; Kariya and others, 1994; Robinson, 1999). The basin-fill sediment consists of multiple layers of silt, sand, and gravel deposited in fluvial, alluvial fan, landslide, and near-shore lacustrine environments, separated by silt and clay layers primarily deposited in offshore lacustrine environments (Bjorklund and McGreevy, 1971; Lowe, 1987). Robinson (1999) defined two predominant and fairly continuous confining layers (B1 and B2) in the Cache Valley principal aquifer, as well as two major water bearing zones (A1 and A2) (figure 8; table 3). The basin fill is more than several hundred feet thick in the valley center (figure 9) and is thickest on the east side of the valley center (Evans and Oaks, 1996; Robinson, 1999).

Most near-surface confinement and recharge areas are dictated by the lacustrine stratigraphy of Pleistocene Lake Bonneville. In the area of Millville, gravel-rich deposits of the Provo and Bonneville shorelines are located near and east of the Glenridge well, respectively (figures 10 and 11) (Evans and others, 1996). Finer lacustrine sediments, some of which have been eroded and reworked by streams and mass movements, are more common west of the well (figures 10 and 11).

Evidence from aquifer tests in the Logan area (figure 1) suggests that the East Cache fault, the basin-bounding normal fault on the east side of the AOR, acts as a barrier to groundwater flow (Inkenbrandt, 2010). The Bear River Range east of the East Cache fault is a broad syncline of Paleozoic carbonates and siliceous meta-sedimentary rocks (figures 10 and 11). The connection between the older strata of the Bear River Range and the valley fill of Cache Valley has yet to be well established, although some have suggested that there is underflow from the range to the valley (Robinson, 1999; Myers, 2003), the focus of which could be coincident with streams entering the valley from the range.

The distribution of confining layers and the vertical hydrologic gradient dictate where groundwater recharges and discharges (Anderson and others, 1994). Groundwater in the principal aquifer is unconfined along the margins of Cache Valley, but is confined in many areas toward the center of the valley where many flowing wells exist (figure 8) (Bjorklund and McGreevy, 1971; Robinson, 1999). Confining conditions in the principal aquifer gradate from confined to leaky to unconfined as one moves from the center of the valley to the margins of the basin, the east side of which is defined by the East Cache fault (Robinson, 1999). Recharge occurs mainly at the margins of Cache Valley, and discharge is predominantly near the center of the valley, with exception of springs flowing from perched zones along the base of deltaic deposits (Anderson and others, 1994; Olsen, 2007) (figures 10 and 11).

Table 2. Constituents analyzed in the injectate and injection well, as mandated by regulatory agencies.

ANALYTE	CAS #	UNITS	MCL	Secondary Regulations	Once per 5 Year Permit Cycle for Established Injectate Source	Annually for Each New Injection Source (1)	Baseline Groundwater	Recovered Groundwater
Inorganics:								
Aluminum	7429-90-6	mg/L		0.05 to 0.2	X	X	X	
Antimony	7440-36-0	mg/L	0.006		X	X	X	
Arsenic	7440-38-2	mg/L	0.01		X	X	X	
Barium	7440-39-3	mg/L	2		X	X	X	
Beryllium	7440-41-7	mg/L	0.004		X	X	X	
Cadmium	7440-43-9	mg/L	0.005		X	X	X	
Chloride	7647-14-5	mg/L		250	X	X	X	
Chromium (Total)	7440-47-3	mg/L	0.1		X	X	X	
Copper	7440-50-8	mg/L		1	X	X	X	
Cyanide (as free Cyanide)	143-33-9	mg/L	0.2		X	X	X	
Fluoride	7681-49-4	mg/L	4	2	X	X	X	
Iron	7439-88-6	mg/L		0.3	X	X	X	
Manganese	7439-86-5	mg/L		0.05	X	X	X	
Mercury (inorganic)	7487-94-7	mg/L	0.002		X	X	X	
Nickel	7440-02-0	mg/L			X	X	X	
Selenium	7782-49-2	mg/L	0.05		X	X	X	
Silver	7440-22-4	mg/L		0.1	X	X	X	
Sodium						X	X	
Sulfate (2)	7757-82-6	mg/L	1,000	250	X	X	X	
Thallium	7440-28-0	mg/L	0.002		X	X	X	
Total Dissolved Solids (3)		mg/L	2000	500	X	X	X	
Zinc	7440-66-6	mg/L		5	X	X	X	
Nitrate/Nitrite:								
Nitrate (as Nitrogen)	14797-55-8	mg/L	10		X	X	X	
Nitrite (as Nitrogen)	14797-65-0	mg/L	1		X	X	X	
Total Nitrate and Nitrite (as N)		mg/L	10		X	X	X	
Asbestos:								
Asbestos (4)	1332-21-4	million fibers/longer than 10 microns	7		X	X	X	
Volatile Organic Contaminants (VOC):								
Benzene	71-43-2	mg/L	0.005		X	X	X	
Carbon tetrachloride	56-23-5	mg/L	0.005		X	X	X	
Dichlorobenzene o-	95-50-1	mg/L	0.6		X	X	X	
Dichlorobenzene p-	106-46-7	mg/L	0.075		X	X	X	
Dichloroethane (1,2-)	107-06-2	mg/L	0.005		X	X	X	
Dichloroethylene (1,1-)	75-35-4	mg/L	0.007		X	X	X	
Dichloroethylene (cis-1,2-)	156-59-2	mg/L	0.07		X	X	X	
Dichloroethylene (trans-1,2-)	156-60-5	mg/L	0.1		X	X	X	
Dichloromethane	75-09-2	mg/L	0.005		X	X	X	
Dichloropropane (1,2-)	78-87-5	mg/L	0.005		X	X	X	
Ethylbenzene	100-41-4	mg/L	0.7		X	X	X	
Monochlorobenzene	108-90-7	mg/L	0.1		X	X	X	
Styrene	100-42-5	mg/L	0.1		X	X	X	
Tetrachloroethylene	127-18-4	mg/L	0.005		X	X	X	
Toluene	108-88-3	mg/L	1		X	X	X	
Trichlorobenzene (1,2,4-)	120-82-1	mg/L	0.07		X	X	X	
Trichloroethane (1,1,1-)	71-55-6	mg/L	0.2		X	X	X	
Trichloroethane (1,1,2-)	79-00-5	mg/L	0.005		X	X	X	
Trichloroethylene	79-01-6	mg/L	0.005		X	X	X	
Vinyl chloride	75-01-4	mg/L	0.002		X	X	X	
Xylenes	1330-20-7	mg/L	10		X	X	X	

Table 2. Continued.

ANALYTE	CAS #	UNITS	MCL	Secondary Regulations	Once per 5 Year Permit Cycle for Established Injectate Source	Annually for Each New Injection Source (1)	Baseline Groundwater	Recovered Groundwater
Pesticides:								
2,4 - D (2,4 - dichlorophenoxyacetic acid)	94-75-7	mg/L	0.07		X	X	X	
2,4,5-TP (Silvex)	93-72-1	mg/L	0.05		X	X	X	
Alachlor	15972-60-8	mg/L	0.002		X	X	X	
Aldicarb	116-06-3	mg/L	0.003		X	X	X	
Aldicarb sulfone	1646-88-4	mg/L	0.003		X	X	X	
Aldicarb sulfoxide	1646-87-3	mg/L	0.004		X	X	X	
Atrazine	1912-24-9	mg/L	0.003		X	X	X	
Benzo(a)pyrene (PAH)	50-32-8	mg/L	0.0002		X	X	X	
Carbofuran	1563-66-2	mg/L	0.04		X	X	X	
Chlordane	57-74-9	mg/L	0.002		X	X	X	
Dalapon (sodium salt)	75-99-0	mg/L	0.2		X	X	X	
Di(2-ethylhexyl) adipate	103-23-1	mg/L	0.4		X	X	X	
Di(2-ethylhexyl) phthalate	117-81-7	mg/L	0.006		X	X	X	
Dinoseb	88-85-7	mg/L	0.007		X	X	X	
Endrin	72-20-8	mg/L	0.002		X	X	X	
Heptachlor	76-44-8	mg/L	0.0004		X	X	X	
Heptachlor epoxide	1024-57-3	mg/L	0.0002		X	X	X	
Hexachlorobenzene	118-74-1	mg/L	0.001		X	X	X	
Hexachlorocyclopentadiene	77-47-4	mg/L	0.05		X	X	X	
Lindane	58-89-9	mg/L	0.0002		X	X	X	
Methoxychlor	72-43-5	mg/L	0.04		X	X	X	
Oxamyl (Vydate)	23135-22-0	mg/L	0.2		X	X	X	
Pentachlorophenol	87-86-5	mg/L	0.001		X	X	X	
Pidoram	1918-2-1	mg/L	0.5		X	X	X	
Polychlorinated biphenyls (PCBs)	1336-36-3	mg/L	0.0005		X	X	X	
Simazine	122-34-9	mg/L	0.004		X	X	X	
Toxaphene	8001-35-2	mg/L	0.003		X	X	X	
Radionuclides:								
Gross alpha particle activity (Radium 226; excludes Radon & Uranium)		pCi/l	15		X	X	X	
Radium-226 (only required if gross alpha is >= 5pCi/L)	7440-14-4	pCi/l	5					
Radium-228	7440-14-4	pCi/l	5					
Uranium (only if gross alpha MCL is exceeded)	7440-61-1	mg/L	0.03		X	X	X	
Gross beta particle and photon emitters (5)		mrem/yr	4		X	X	X	
Tritium (only if gross beta exceeds 50 pCi/L)		pCi/L	20,000		X	X	X	
Strontium-90 (only if gross beta exceeds 50 pCi/L)		pCi/l	8		X	X	X	
Radon	10043-92-2	pCi/l			X	X	X	
Total Trihalomethanes (TTHMs): (8) (if Chlorine used as disinfectant)								
Chloroform	67-66-3	mg/L	0.08		X	X	X	
Bromodichloromethane	75-27-4	mg/L			X	X	X	
Dibromochloromethane	124-48-1	mg/L			X	X	X	
Bromoform	75-25-2	mg/L			X	X	X	
Haloacetic acids (HAA5): (7) (if Chlorine used as disinfectant)								
Trihaloacetic acids (THAAs)								
Trichloroacetic acid (TCAA)	76-03-9	mg/L			X	X	X	X
Dihaloacetic acids (DHAAs)								
Dichloroacetic acid (DCAA)	76-43-6	mg/L			X	X	X	X
Dibromoacetic acid (DBAA)	631-64-1	mg/L			X	X	X	X
Monohaloacetic acids (MHAAs)								
Monochloroacetic acid (MCAA)	79-11-8	mg/L			X	X	X	X
Monobromoacetic acid (MBAA)	79-08-3	mg/L			X	X	X	X

Table 2. Continued.

ANALYTE	CAS #	UNITS	MCL	Secondary Regulations	Once per 5 Year Permit Cycle for Injectate Source	Annually for Each New Injection Source (1)	Baseline Groundwater	Recovered Groundwater
Disinfectants and Their By-Products: (8)								
Chloramine (if used as a disinfectant)	10599-90-3	mg/L	4		X	X	X	X
Chlorine	7782-50-5	mg/L	4		X	X	X	X
Chlorine Dioxide (if used as a disinfectant)	10049-04-4	mg/L	0.8		X	X	X	X
Chlorite (if Chlorine Dioxide is used as a disinfectant)	7758-19-2	mg/L	1		X	X	X	X
Bromide / Bromate (if Ozone is used as a disinfectant) (9)	24859-67-9	mg/L			X	X	X	X
Turbidity:		NTU	(10)		X	X	X	
Total Coliform:			(11)		X	X	X	
Additional Parameters:								
Color		Color Units	15			X	X	
Corrosivity			Non-Corr.			X	X	
Foaming Agents		mg/L	0.5			X	X	
Odor		Threshold	3			X	X	
pH		pH units	6.5 – 8.5			X	X	
Ammonia, as N		mg/L				X	X	
Boron		mg/L				X	X	
Calcium		mg/L				X	X	
Lead		mg/L				X	X	
Magnesium		mg/L				X	X	
Potassium		mg/L				X	X	
Specific Conductivity at 25° C		µmhos/cm				X	X	
Bicarbonate		mg/L				X	X	
Carbon Dioxide		mg/L				X	X	
Carbonate		mg/L				X	X	
Hydroxide		mg/L				X	X	
Phosphorous, Ortho as P		mg/L				X	X	
Silica, dissolved as SiO ₂		mg/L				X	X	
Surfactant as MBAS		mg/L				X	X	
Total Hardness as CaCO ₃		mg/L				X	X	
Alkalinity as CaCO ₃		mg/L				X	X	
Total Organic Carbon (TOC) (12)		mg/L				X	X	

- (1) Permittee shall analyze any new injection source annually for the permit cycle. This is to comply with the Division of Drinking Water's requirement for new source monitoring.
- (2) According to Utah DDW, if Sulfate is greater than 500 mg/L the water management must demonstrate that no better water is available.
- (3) DDW has TDS limits of 2,000 mg/L but because of the Ground Water/UIC Rules, injection of water with TDS concentrations greater than the TDS limit of the Ground Water Class of the receiving aquifer is not permitted.
- (4) Asbestos monitoring is not required unless the new source is located in area of natural deposits of asbestos or the distribution system contains any asbestos cement piping.
- (5) See R309-200-5(4) (d) for actual MCL of 4 millirem/year. Use 50 pCi/L as a screening level for further analysis.
- (6) According to Utah DDW, the maximum contaminant level for community water systems serving a population of 10,000 or more and utilizing chlorine as a disinfectant is 80 µg/l as a location based running annual average.
- (7) HAA5 includes MCAA, DCAA, TCAA, MBAA, and DBAA
- (8) The permit limits for disinfectants are maximum residual disinfectant levels (MRDLs) and not MCLs
- (9) DWQ has added bromide to the analytical parameter list with an analytical method reporting limit not to exceed 0.02 mg/L. If the bromide concentration exceeds 0.04 mg/L, permittee will be required to analyze for bromate concentrations.
- (10) The turbidity limit for surface water sources or ground water sources under the direct influence of surface water is 0.3 NTU in at least 95% of the samples per month. The turbidity limit for slow sand filtration and diatomaceous earth filtration is 1.0 NTU in at least 95% of the samples per month. The turbidity level for ground water sources not under the direct influence of surface water is 5.0 NTU.
- (11) For a system which collects less than 40 samples per month, no more than one sample per month may be total coliform-positive. For a system which collects 40 or more samples per month, no more than 5.0 % of the samples collected during a month may be total coliform-positive. Any fecal coliform-positive or Escherichia coliform (E. coli)-positive repeat sample or any total coliform-positive repeat sample following a fecal coliform-positive or E.coli-positive routine sample constitutes an acute MCL violation for total coliforms. This applies to samples taken throughout the distribution system. For the injection wells, no more than 5% of the monthly samples collected of the plant effluent may be total coliform-positive.
- (12) If surface water is the source of the injectate, total organic carbon (TOC) shall be included for analysis.

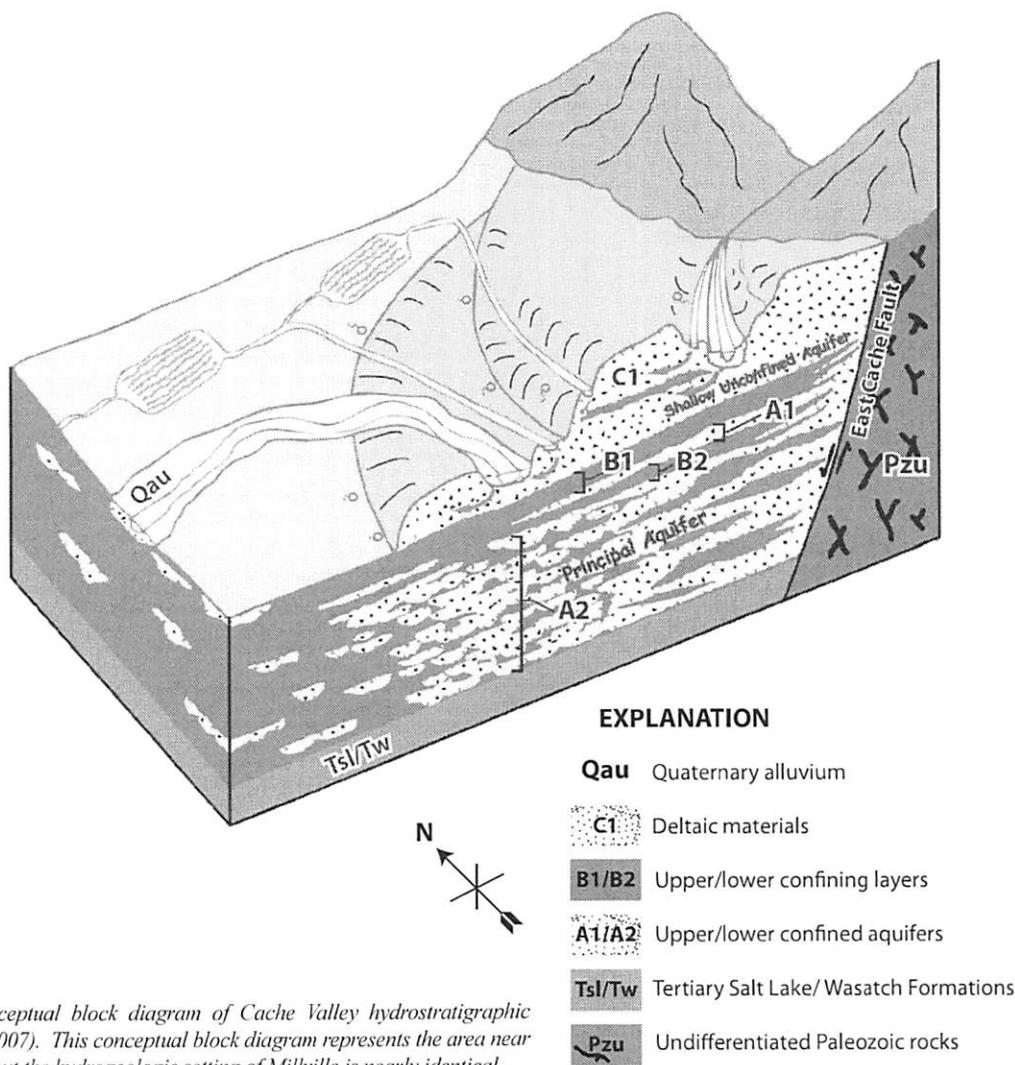


Figure 8. Conceptual block diagram of Cache Valley hydrostratigraphic units (Olsen, 2007). This conceptual block diagram represents the area near Logan, Utah, but the hydrogeologic setting of Millville is nearly identical.

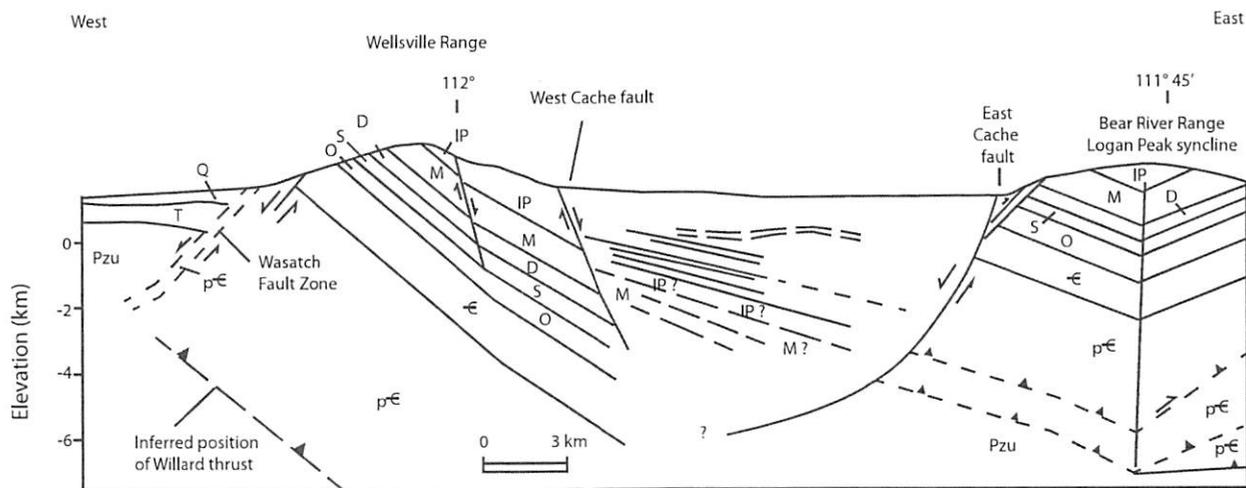


Figure 9. West-east cross section through Cache Valley at Millville's latitude (Evans and Oaks, 1996). Abbreviations: Pzu—undifferentiated, Paleozoic, pC—Proterozoic, C—Cambrian, O—Ordovician, S—Silurian, D—Devonian, M—Mississippian, IP—Pennsylvanian, T—Tertiary, Q—Quaternary.

Table 3. Hydrostratigraphic units in Cache Valley as defined by Robinson (1999).

Unit (Avg. thickness, ft)	Description	Water-Bearing Properties
Qau (50)	<u>Quaternary alluvium undifferentiated</u> Cobbles, gravel, sand, and silt; well to poorly sorted; unconsolidated; eolian sand and spring tufa	Generally highly to moderately conductive; unconfined; transmissivities generally adequate for stock wells
B1 (60)	<u>Upper confining layer</u> Clay grading to silt, sand, and gravel near the valley margins	Considered to be a highly impermeable aquitard; vertical gradients as great as 0.5
C1 (>200)	<u>Deltaic deposits</u> Cobbles, gravel, sand, and silt; well to poorly sorted; unconsolidated	Transmissivities are generally the highest in the valley; unconfined to confined; high water quality
A1 (30)	<u>Upper confined aquifer</u> Gravels to cobbles interbedded with sand and silt; clay beds present in discontinuous lenses	Moderately conductive but relatively low thickness gives low transmissivities; water generally contains much iron; well confined
B2 (30)	<u>Lower confining layer</u> Thickly bedded clay containing thin gravel lenses near the valley margins	Considered to be a highly impermeable aquitard; vertical gradients as great as 0.5
A2 (1340)	<u>Lower confined aquifer</u> Unconsolidated to semiconsolidated, thickly bedded gravels and sands; discontinuous lenses of silt, clay and marl; woody debris, peat, and shells sometimes present	Conductivities very low to very high; these sediments compose the major aquifer of the valley
Tsl (9000)	<u>Tertiary Salt Lake Fm. undifferentiated</u> Tuff, and mostly tuffaceous and calcareous siltstone, sandstone, and conglomerate, limestone and marl	Conductivities generally low, but may be high locally in solution cavities or fanglomerate facies; water quality is highly variable
Tw (150)	<u>Tertiary Wasatch Fm. undifferentiated</u> Poorly consolidated red-colored cobble- to boulder-bearing conglomerate	Conductivities generally low to moderate; low well discharges possible; source of some springs
Pz (>>10,000)	<u>Paleozoic, undifferentiated</u> Well consolidated to slightly metamorphosed sandstone, shale, dolomite, and limestone; possibly containing solution cavities	Permeability is predominately due to fractures and solution cavities, ranging from very low to locally quite high

Recharge and discharge zones for Utah basin-fill aquifers are organized into three categories: (1) primary recharge – less than 20 feet (ft) (<6 m) of clay and a downward hydraulic gradient, (2) secondary recharge – confining layers (greater than 20 ft [6 m] and a downward hydraulic gradient, and (3) discharge areas – upward hydraulic gradient (Anderson and others, 1994).

Transmissivity for the principal aquifer is high relative to many aquifers, having values as high as 135,000 feet squared per day (ft²/day) (12,500 m²/day) (Inkenbrandt, 2010; Inkenbrandt, 2012; Inkenbrandt, 2014). Some of the highest transmissivity values are near the Millville area (Inkenbrandt, 2010). Distribution of transmissivity in the principal aquifer follows a pattern similar to the confining zones. Transmissivity decreases to the west, as valley fill material becomes finer. Vertically, the lower water bearing stratum of the principal aquifer (A2) has relatively higher transmissivity (Inkenbrandt, 2012). High transmissivities increase the rate of travel for contaminants. In aquifers with high transmissivities, cones of

depression as well as their inverse, artificial recharge mounds, show much smaller changes in head, but over a much larger area than in aquifers with smaller transmissivities (Kruseman and Ridder, 1990).

Horizontal hydraulic gradient in the principal aquifer in the area of the Glenridge well is 0.002 from generally east to west (Inkenbrandt, 2014). This value agrees with ranges reported for the principal aquifer of 0.0004 to 0.004 (Bjorklund and McGreevy, 1971). The gradient generally follows the land surface, starting out steep near the mountains and becoming more gentle towards the center of the valley. Based on a gradient of 0.002, a transmissivity of 135,000 ft²/day (12,500 m²/day), and an aquifer thickness of 100 ft (30.5 m) (Inkenbrandt, 2014), the estimated Darcy velocity (Fetter, 2000) for the principal aquifer in the area of the Glenridge well is 2.7 ft/day (0.8 m/day). However, this value will likely decrease towards the center of the valley and transmissivity and hydraulic gradient decrease.