Ephraim City Well #2

PRELIMINARY EVALUATION REPORT

May 2018

FRANSON
CIVIL ENGINEERS

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Executive Summary

This report has been prepared to show the results of the preliminary evaluation for the new Ephraim City Well #2. This evaluation includes a determination of Drinking Water Source Protection (DWSP) zones, Potential Contamination Sources (PCS) within the zones, and evaluation of the controls for the potential contamination sources for the well.

The Ephraim City waterworks is a public system serving the citizens of Ephraim. It currently consists of five storage tanks, 14 springs, and one existing well. In an effort to increase the resiliency of the system and provide water for future growth, the city is proposing the construction of a new well named Ephraim City Well #2 (Well #2).

Ephraim City is located about 100 miles south of Salt Lake City in the Sanpete Valley, roughly seven miles north of the city of Manti. Well #2 will be situated on the southwest side of town in a protected aquifer fed by the mountains to the east of the city. The well will be located in a valley fill bounded by bedrock, the San Pitch Mountains to the west, and the Wasatch Plateau to the east.

The source protection zones were delineated using the Wellhead Analytic Element Model (WhAEM) produced by the United States Environmental Protection Agency (EPA) using information from previous reports. Ephraim City Well #1 (Well #1) impacts the zones for Well #2 so the flows in Well #1 were increased in anticipation of upgrades on Well #1 in the near future. PCS were determined using previous reports, supplemented by a field survey.

Well #1, Well #2, and the aquifer are currently well managed and protected. Ephraim City maintains land use ordinances and zoning laws to preserve and protect the aquifer.

1 Introduction

1.1 System Information

Ephraim City owns and operates a public water system (PWS) in Sanpete County, Utah. The official name of the PWS is Ephraim City. The water system number assigned by the Utah Division of Drinking Water (UDDW) is 20011. The address for the Ephraim City PWS is:

Ephraim City

5 South Main Street

Ephraim, UT 84627

The existing system consists of 14 springs, one well, five storage tanks, a hydropower plant, and appurtenant piping structures. A new well, named Ephraim City Well #2, will be added to the existing system as documented in this report. This system is a community system currently serving approximately 7,000 residents in the community.

1.2 Source Information

Well #2 will be a new source for the city of Ephraim, and it will be an individual well. It is yet to be constructed, but it will be located roughly southwest of the intersection of 400 West and 400 South on the southwest side of Ephraim City. The plans for Well #2 are being prepared, pending the construction of a test well in the area. Figure 2 shows the approximate location of the Well #2 and Ephraim's other drinking water sources.

1.3 Designated Person - R309-113-5

The name and address of the person currently designated to operate the PWS is:

Chad J. Parry

Public Works Director

Ephraim City

5 South Main Street

Ephraim, UT 84627

Office: (435) 340-1255

Cell: (435) 283-4631

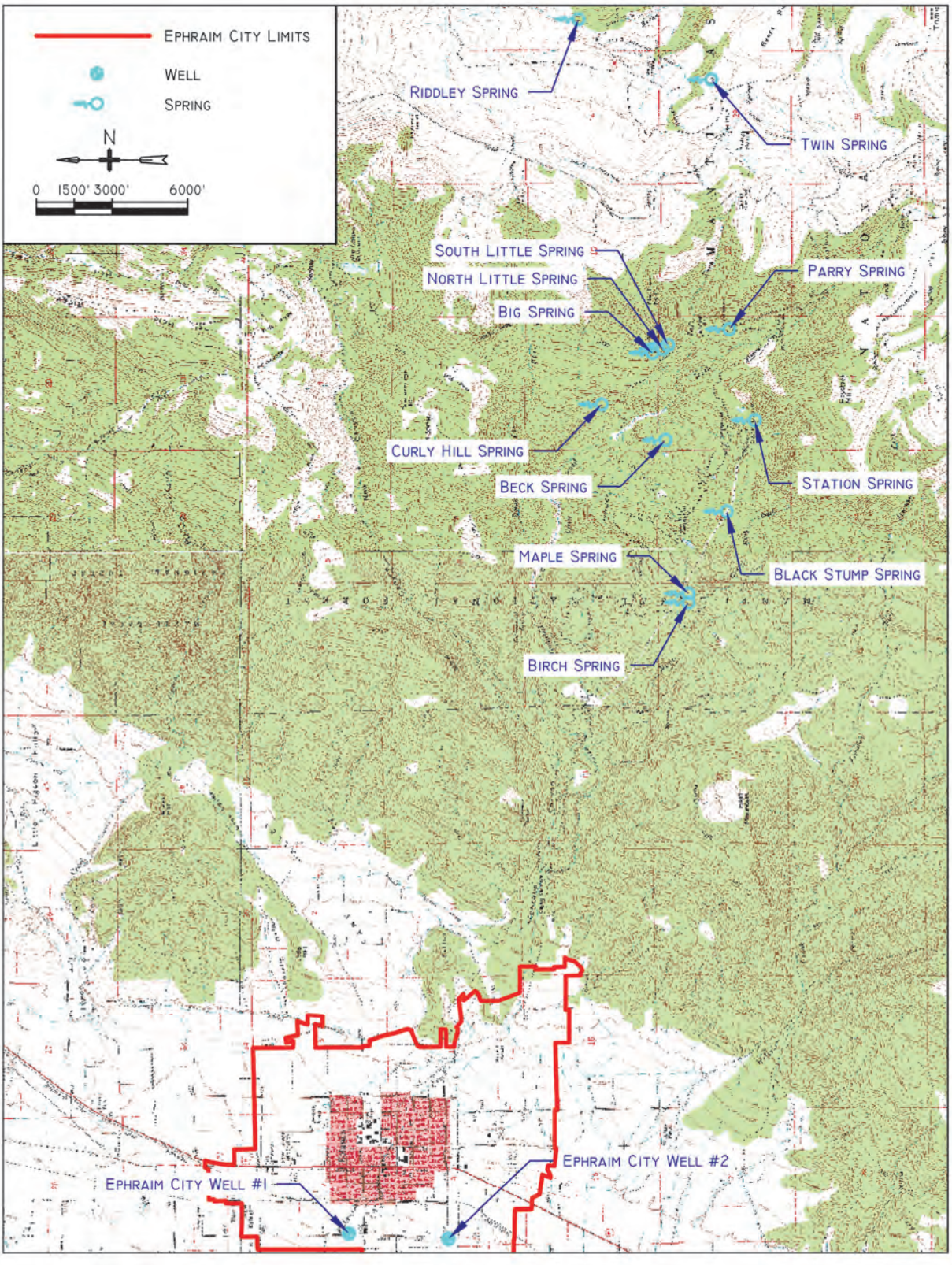

Figure 2: Ephraim City Water Sources

2 Delineation Report - R309-600-9(5)

2.1 Geologic Data - R309-600-9(5)(a)(i)

Ephraim City is located approximately 100 miles south of Salt Lake City in the Sanpete Valley. The city is situated on the east of the valley at the base of the Wasatch Plateau, to the west are wetlands surrounding the San Pitch River. Ephraim Canyon and Ephraim Creek cut through the Wasatch Plateau connecting with the valley bottom just east of the city. The city sits on alluvial deposits with relatively shallow bedrock which dips sharply near the center of the town (Main Street, or Highway 89). A full geologic study has been performed by the Utah Geologic Survey (UGS) and has been attached as Appendix A.

2.1.1 Stratigraphy

The stratigraphy information discussed in this section is taken from information and maps provided by the UGS (Utah Geological Survey 2017).

Alluvium (Holocene)

The valley floor near the river is primarily alluvium. It is unconsolidated material consisting of clay, silt, sand, granules, and sparse cobbles. The layers form broad even surfaces with low relief. Thicknesses range widely with a thickness of 50 feet being most common.

Coalesced Alluvial Fan Deposits (Holocene to Pliocene)

Farther away from the river, deposits of coalesced alluvial fans begin. This layer is similar to the alluvium with larger particle sizes ranging from silt and sand granules to cobbles with sparse boulders. The deposit was formed because of the overlap and interfingering of adjacent alluvial fans. This layer forms a broad, low, sloping apron at the foot of the adjacent hillsides.

Green River Formation (Eocene)

The Green River Formation forms two “islands” in the alluvial valley fill, just west of Ephraim City. The formation consists of limestone underlain by shale with a widely varying thickness of roughly 500 feet to 1,200 feet. The limestone is evenly bedded with thin sandstone and tuff layers. The limestone is dense and often forms resistant ledges and low cliffs. The shale is thin-bedded and friable, commonly forming gentle slopes.

Colton Formation (Eocene)

This layer is located on the east of the valley at the base of the hillslope. It consists of claystone and mudstone with local beds of siltstone, sandstone, and conglomerate. Additionally, there are sparse, interlayered beds of limestone. The layer ranges in thickness from roughly 325 feet to 850 feet.

Landslide Deposits (Holocene and Pliocene)

These deposits are located on the east of the valley on the base of the hillslopes. The deposits are a diverse mixture of fragments and shapes that have slid down slope to form chaotic rubble. The thickness varies widely depending on the size of the deposit with depths up to 150 feet locally.

Flagstaff Limestone (Eocene and Paleocene)

The limestone formation is farther up the mountain side with colors from light gray, to yellow-gray, to brown. Red and pink is present near Jurassic red-beds. The layer is fine-grained and very dense, forming resistant ledges and prominent hogbacks. The layer ranges in thickness from 0 feet in the central portion of the Gunnison plateau to nearly 1,000 feet near Ephraim.

2.1.2 Faults

The UGS keeps a map of known faults in the state of Utah. According to their work, there are no known fractures or faults near the well or within the capture zones. The geological information for the area, including fault data are shown in the report in Appendix A.

2.1.3 Well Location

Well #2 will be located on the southwest of the city in unconsolidated valley fill. The material is uncemented, loosely arranged sediments ranging from clays and silts to coarse gravels. Well #1 is in an area with similar geologic and hydrogeologic features as Well #2. Well logs from Well #1 and other nearby wells nearby are shown in Appendix B and may be considered representative of the new well being drilled.

2.2 Well Construction Data – R309-600-9(5)(a)(ii) & (iii)

The depth and some of the design parameters will be based on data taken from a test well drilled prior to the construction of Well #2. A preliminary design has been prepared based on drilling logs of similar wells in the area. The preliminary design is summarized below.

Table 1: Preliminary Design Information

Parameter	Estimated Value	Notes
Well Head Elevation	5505 ft	Estimated
Borehole Diameter	24”	
Casing Diameter	18”	Based on desired flow from the well
Total Depth	300 ft	Actual depth will be determined based on results of the test well
Perforated Zone	240 ft to 300 ft	Actual perforated zone will be determined based on test well
Screen	Slotted Perforated Casing and Gravel Pack	
Construction Method	Rotary or Cable Tool	Driller’s preference
Pump	250 hp, 9 Stage, Shaft Driven	Dependent on available flow
Pump Depth	150 ft	
Maximum Flow Rate	1500 gpm	Pending information from test well

Well #2 and its associated test well have yet to be drilled so no driller's logs are available. However, a log of Well #1 has been provided, as well as logs for a well farther north and Larson Well to the south. These logs are expected to be representative of Well #2 (see Appendix B).

2.3 Aquifer Data – R309-600-9(5)(a)(iv)

The information about the aquifer was taken from a Utah Department of Natural Resources Technical Publication (Wilberg and Heilweil 1996) and the existing Ephraim City source protection program (Jones & DeMille Engineering 2010). Well #2 will be drawing from the same aquifer as Well #1 in similar geologic conditions, so the parameters are assumed to be roughly equal.

The Hydraulic Conductivity used to model the aquifer was derived from the aquifer thickness and transmissivity in the source protection plan. The equation used to derive the conductivity is:

$$\frac{T}{b} = K$$

Where T = the transmissivity of the aquifer,

b = the aquifer thickness; and,

K = the Hydraulic Conductivity

The aquifer thickness is largely variable and determined at the time of drilling. The thickness used to determine the transmissivity in Well #2 is estimated and subject to change.

Wilberg and Heilweil designated three levels in the aquifer. The first lies between 0 and 50 feet, the second from 50 to 150 feet, and the final level extends below 150 feet. Well #2 will draw from the third and final level with Well #1.

The data used to describe the aquifer and model the source protection zones is described below.

Table 2: Aquifer Model Information

Interior	Estimated Value	Notes
Hydraulic Conductivity	120 ft/day	Derived from Water Source Protection Plan
Hydraulic Gradient	0.00315 ft/ft	Water Source Protection Plan
Transmissivity	7,200 ft^2/day	Calculated from Hydraulic Conductivity and Estimated Aquifer Thickness
Groundwater Flow Direction	South 85° W	Water Source Protection Plan
Effective Porosity	0.15	Water Source Protection Plan
Aquifer Thickness	60 ft	Estimate for Well #2 Location

2.4 Hydrogeologic Methods and Calculations – R309-600-9(5)(a)(vii)

Drinking water source protection zones were delineated using the WhAEM software provided by the EPA. WhAEM facilitates the creation of models with multiple wells, barriers, and complex aquifer properties for the purpose of delineating protection zones. The model can be created in real world coordinate systems with background images and linework. At its core, WhAEM uses the analytic element method via the GFLOW1 solver. The velocity through the aquifer is based on the equation:

$$v = K \times i \div n$$

Where K = the hydraulic conductivity,

i = the hydraulic gradient, and

n = The effective porosity.

The WhAEM model was produced using the aquifer data shown in the previous section and built to scale using base maps provided by the Utah Automated Geographic Reference Center. The existing well impacts the capture zones significantly and will likely see an increase in flows following renovation this year. The capture zones were modeled using the anticipated flows from the existing well. The capture zones are described in detail below.

Zone 1

Zone 1 is a 100-ft radius around the well, measured from the center of the wellhead.

Zone 2

Zone 2, a 250-day travel time, is semi-circular in shape. The capture zone extends 2,082 feet upgradient from the wellhead, and 1,332 feet down gradient. The direction of flow is east to west at an assumed bearing of South 85° West. The maximum width across the zone is 3,021 feet.

Zone 3

Zone 3, a 3-year travel time, is more elliptical in shape with a straight section from interference with the existing city well. The capture zone extends 5,796 feet upgradient from the wellhead, and 1,921 feet downgradient. The direction of flow is as noted above. The maximum width of the zone is 5,349 feet.

Zone 4

Zone 4, a 15-year travel time, is a “rabbit ear” shape with a straight border from interference with the existing city well. The capture zone extends 20,275 feet upgradient from the wellhead, and 1,942 feet downgradient. The direction of flow is as noted above. The maximum width of the zone is 9,303 feet.

Table 3: Drinking Water Source Protection Zone Information

Parameter	Zone 1	Zone 2	Zone 3	Zone 4
Up Gradient Distance	50 ft	2,082 ft	5,796 ft	20,275 ft
Flow Bearing	S 85° W	S 85° W	S 85° W	S 85° W
Down Gradient Distance	50 ft	1,332 ft	1,921 ft	1,942 ft
Maximum Width	100 ft	3,021 ft	5,349 ft	9,303 ft

The DWSPs were modeled with the existing city well. The interference from the existing well changes the shape of both protection zones dramatically as shown in Figure 3. Both sets of zones are included to show the interaction between them.

2.5 Map of DWSP Zones – R309-600-9(5)(a)(viii)

The map of the DWSP zones was developed by exporting the output from the WhAEM model into AutoCAD and overlaying the linework over a standard USGS Topographic Quadrangle Map. The map (see Figure 3) is shown in the standard 1:24,000 scale (1" = 2,000 ft) with an additional map at 1:60,000 scale (1" = 5,000 ft) as an additional reference due to the large size of the capture zones. The exact output of the WhAEM model are included as Appendix C.

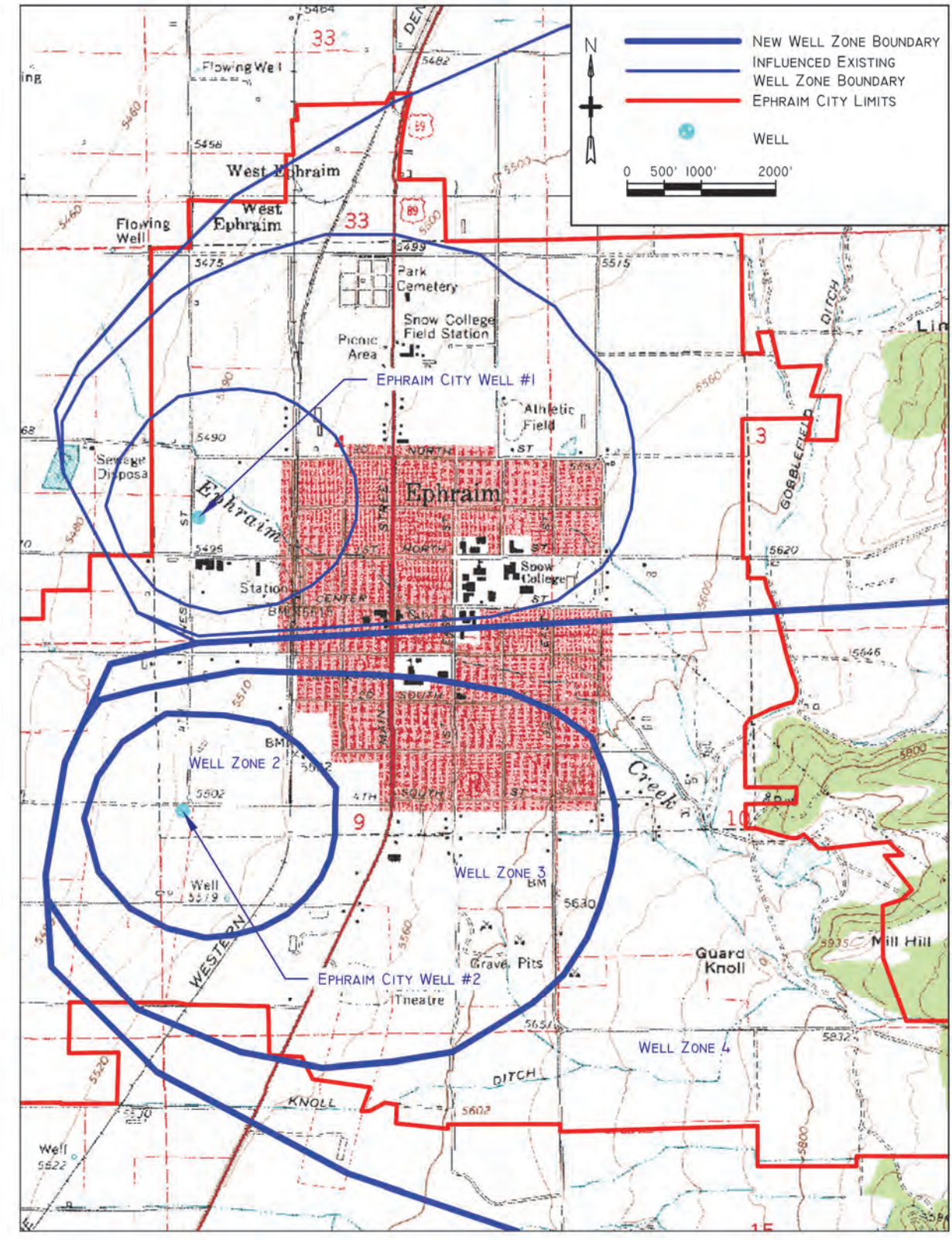

Figure 3: Ephraim Well #2 Drinking Water Source Protection Zones

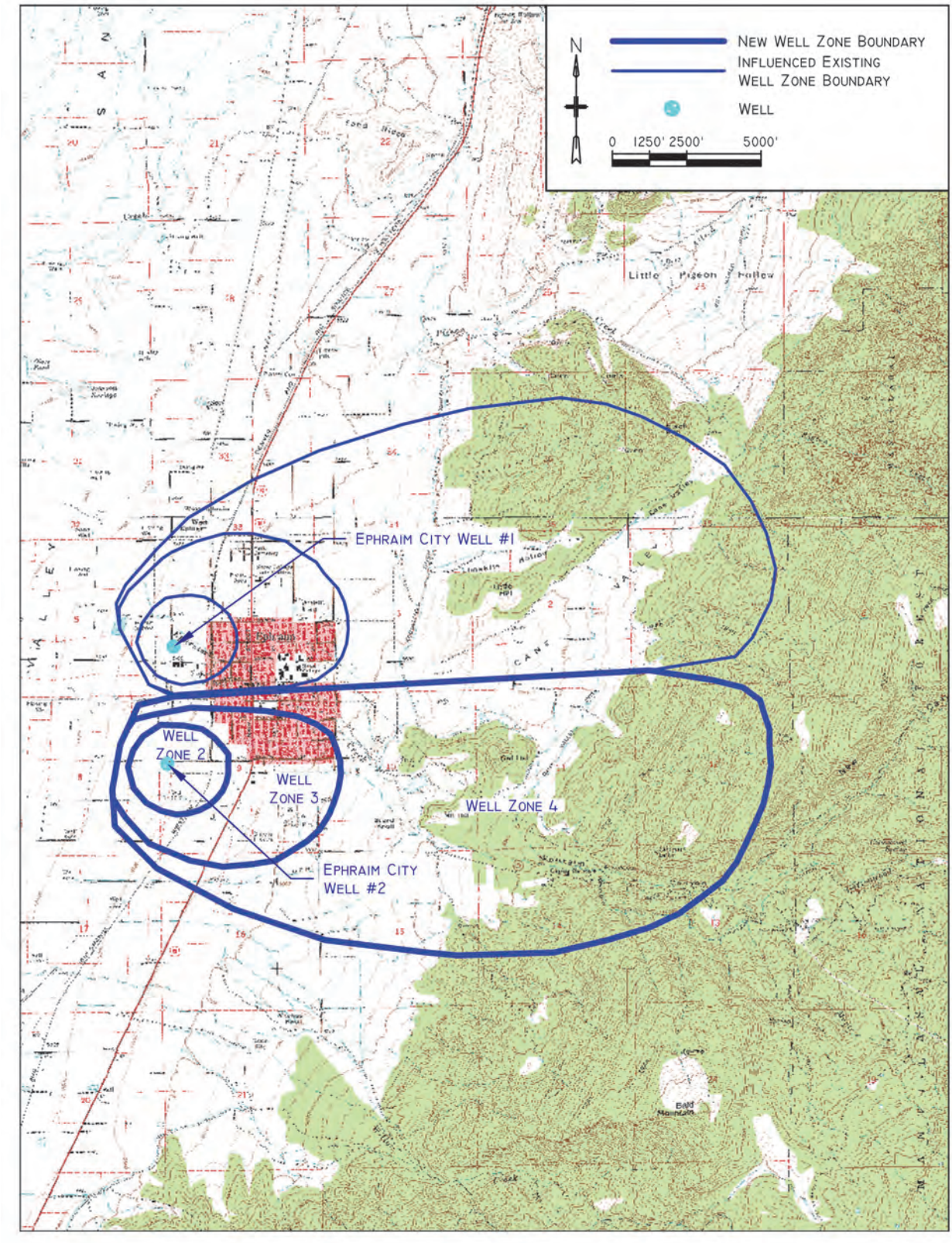

Figure 4: Ephraim Well #2 Full Drinking Water Source Protection Zones

2.6 Protected Aquifer Classification – R309-600-9(3) & (6)

Well #2 will be drilled into the aquifer previously determined to be a protected aquifer in the Water Source Protection plan for the PWS. In order to have a protected status the aquifer must have at least 30 feet of protective clay throughout the first and second capture zones of the well. It must also have a 100-foot grouted surface seal through the protective layer. The driller's log for Existing City Well #1 shows clay from two feet to 28 feet and 70 feet to 99 feet. As indicated in the source protection plan, the well logs in the area appear to indicate that these layers are continuous through much of the valley floor. We agree with the assessment that the conditions are met and conclude that Well #2 will be located in a protected aquifer.

3 Inventory of Potential Contamination Sources – R309-600-10

3.1 List of Potential Contamination Sources – R309-600-10(1)

This section provides a list of PCS located within Ephraim City. The list is drawn from the water source protection program prepared in 2010 (Jones & DeMille Engineering 2010), supplemented by a field survey conducted on March 29, 2018 to verify existing sources and add any new sources.

Table 4: Potential Contamination Sources

Rank	Name	Category	Hazardous Substance	Source Address	Contact Information	Zone
1	Larson Well	Well	Agricultural	360 W* Larson Lane	Ephraim City (435) 283-4631 5 S Main St Ephraim, UT 84627	2
2	House of Suds	Automotive	Oil, Lubricants, Automotive Fluids, Auto Supplies, Fuel	24 E 200 S	Tim Cox (435) 283-3030 24 E 200 S Ephraim, UT 84627	3
3	American Car Care	Automotive	Oil, Lubricants, Automotive Fluids, Auto Supplies, Fuel	450 S 50 E	Ephraim Tire Pros (435) 283-6956 450 S 50 E Ephraim, UT 84627	3
4	Geno's Automotive	Automotive	Oil, Lubricants, Automotive Fluids, Auto Supplies, Fuel	329 W 100 S	329 W 100 S Ephraim, UT 84627	4
5	Hermansen's Equipment	Automotive	Oil, Lubricants, Automotive Fluids, Auto Supplies, Fuel	1409 S Highway 89	Cameron Hermansen (435) 283-6536 1409 S Highway 89 Ephraim, UT 84627	3
6	Original Garage Collision Repair	Automotive	Oil, Lubricants, Automotive Fluids, Auto Supplies, Fuel	327 S Main St	Jason Dotson (435) 283-6200 327 S Main St Ephraim, UT 84627	3
7	Skyline Auto	Automotive	Oil, Lubricants, Automotive Fluids, Auto Supplies, Fuel	385 S Main St	Gary Ray (435) 283-4241 385 S Main St Ephraim, UT 84627	3

Rank	Name	Category	Hazardous Substance	Source Address	Contact Information	Zone
8	RJs Tire and Quicklube	Automotive	Oil, Lubricants, Automotive Fluids, Auto Supplies, Fuel	650 S Main St	Russ Cox (435) 283-8473 650 S Main St Ephraim, UT 84627	3
9	Ephraim City Public Works	Automotive	Oil, Lubricants, Automotive Fluids, Auto Supplies, Fuel	780 S Main St	Ephraim City (435) 283-4631 5 S Main St Ephraim, UT 84627	3
10	IFA	Farm	Fertilizers, Insecticides	460 S Main St	(435) 283-4529 460 S Main St Ephraim, UT 84627	3
11	Turkey Sheds	Farm	Fertilizers, Insecticides, Animal Waste/By-Products	550 S Main St	Deena Anderson 2252 S Whipple Ct St George, UT 84790	3
12	Holman Orthodontics	Medical/ Dental	Medical Waste	35 E 400 S	(801) 405-8128 35 E 400 S Ephraim, UT 84627	3
13	Douglas Dentistry	Medical/ Dental	Medical Waste	41 W 700 S	Colton Douglas (435) 283-3800 41 W 700 S Ephraim, UT 84627	3
14	Ephraim Family Dental	Medical/ Dental	Medical Waste	309 S Main St	Wesley Thompson (435) 283-4081 309 S Main St Ephraim, UT 84627	3
15	Residential Septic System	Septic Tank	Septage	430 S 100 E	Mathew Sorenson 635 S Main St Manti, UT 84642	3
16	Residential Septic System	Septic Tank	Septage	800 S 100 E	Ron Keele 800 S 100 E Ephraim, UT 84627	3
17	Residential Septic System	Septic Tank	Septage	730 S 300 E	James Fullmer 730 S 300 E Ephraim, UT 84627	3
18	Hermansen's Equipment	Septic Tank	Septage	1409 S Highway 89	Cameron Hermansen (435) 283-6536 1409 S Highway 89 Ephraim, UT 84627	3

Rank	Name	Category	Hazardous Substance	Source Address	Contact Information	Zone
19	RJs Tire and Quicklube	Septic Tank	Septage	650 S Main St	Russ Cox (435) 283-8473 650 S Main St Ephraim, UT 84627	3
20	Ephraim City Public Works	Septic Tank	Septage	780 S Main St	Ephraim City (435) 283-4631 5 S Main St Ephraim, UT 84627	3
21	Jorgensen's Chevrolet	Automotive	Oil, Lubricants, Automotive Fluids, Auto Supplies, Fuel	105 S Main St	Scott Miller (435) 283-4033 105 S Main St Ephraim, UT 84627	4
22	Turkey Sheds	Farm	Fertilizers, Insecticides, Animal Waste/By-Products	800 S* Highway 89	Chad Olsen (435) 851-2077 588 S 100 E Ephraim, UT 84627	4
23	King Dairy	Farm	Fertilizers, Insecticides, Animal Waste/By-Products	451 E Mill Road	Art King (435) 283-4304 451 E Mill Road Ephraim, UT 84627	4
24	Residential Septic System	Septic Tank	Septage	1085 S 100 E	Karl Bessey 1085 S 100 E Ephraim, UT 84627	4
25	Residential Septic System	Septic Tank	Septage	1115 S 100 E	William Kappel 1115 S 100 E Ephraim, UT 84627	4
26	Residential Septic System	Septic Tank	Septage	140 E* 1100 S	Darren Pead 77 S 470 E Manti, UT 84642	4
27	Residential Septic System	Septic Tank	Septage	170 E* 1100 S	William Kappel 1115 S 100 E Ephraim, UT 84627	4
28	Residential Septic System	Septic Tank	Septage	175 E 1100 S	Elliot Anderson 175 E 1100 S Ephraim, UT 84627	4
29	Residential Septic System	Septic Tank	Septage	1177 S 1200 E	Mark Wathen 1177 S 1200 E Ephraim, UT 84627	4

Rank	Name	Category	Hazardous Substance	Source Address	Contact Information	Zone
30	Residential Septic System	Septic Tank	Septage	113 E 1200 S	Wyatt Anderson 113 E 1200 S Ephraim, UT 84627	4
31	Residential Septic System	Septic Tank	Septage	139 E 1200 S	Spencer Dyches 139 E 1200 S Ephraim, UT 84627	4
32	Residential Septic System	Septic Tank	Septage	1046 S 300 E	Travis Cartright 1046 S 300 E Ephraim, UT 84627	4
33	Residential Septic System	Septic Tank	Septage	1060 S* 300 E	Gary Ray P.O. Box 583 Ephraim, UT 84627	4
34	Residential Septic System	Septic Tank	Septage	1066 S 300 E	Merilyn Hugentolber 1066 S 300 E Ephraim, UT 84627	4
35	Residential Septic System	Septic Tank	Septage	1160 S 300 E	Cless Young 1160 S 300 E Ephraim, UT 84627	4
36	Residential Septic System	Septic Tank	Septage	1239 S 300 E	Wildee Mortensen 1239 S 300 E Ephraim, UT 84627	4
37	Residential Septic System	Septic Tank	Septage	1290 S 300 E	Bennett Black 1290 S 300 E Ephraim, UT 84627	4
38	Residential Septic System	Septic Tank	Septage	409 S 500 E	Jon Larson 409 S 500 E Ephraim, UT 84627	4
39	Residential Septic System	Septic Tank	Septage	1011 S 825 E	Chris Jaussi 1011 S 825 E Ephraim, UT 84627	4
40	Residential Septic System	Septic Tank	Septage	1028 S 920 E	Vickie Butterfield 1028 S 920 E Ephraim, UT 84627	4
41	Residential Septic System	Septic Tank	Septage	1170 S* 920 E	Valear Jackman P.O. Box 557 Ephraim, UT 84627	4
42	Residential Septic System	Septic Tank	Septage	1093 E Canyon Rd	Ben Gordon 1093 E Canyon Rd Ephraim, UT 84627	4

Rank	Name	Category	Hazardous Substance	Source Address	Contact Information	Zone
43	Residential Septic System	Septic Tank	Septage	1151 E Canyon Rd	Darrel Olsen 1151 E Canyon Rd Ephraim, UT 84627	4
44	Residential Septic System	Septic Tank	Septage	560 E* Canyon Rd	Joseph Cozzolino 1248 The Hideout Lake Ariel, PA 18436	4
45	Residential Septic System	Septic Tank	Septage	587 E Canyon Rd	Richard Stevens 587 E Canyon Rd Ephraim, UT 84627	4
46	Residential Septic System	Septic Tank	Septage	521 E Mill Road	Christine Ryhlick 521 E Mill Road Ephraim, UT 84627	4
47	Residential Septic System	Septic Tank	Septage	675 E Mill Road	Sherri Clark 675 E Mill Road Ephraim, UT 84627	4
48	Residential Septic System	Septic Tank	Septage	729 E Mill Road	Brian Thomson 729 E Mill Road Ephraim, UT 84627	4
49	Residential Septic System	Septic Tank	Septage	1003 S Red Knoll Ln	Don Olson 1003 S Red Knoll Ln Ephraim, UT 84627	4
50	Canyon View Park	Park	Fertilizers, Insecticides	650 S 100 E	Ephraim City (435) 283-4631 5 S Main St Ephraim, UT 84627	3
51	Heritage Park	Park	Fertilizers, Insecticides	30 S Main St	Ephraim City (435) 283-4631 5 S Main St Ephraim, UT 84627	4

* No address could be found for these locations. The address given is approximate.

3.2 Prioritized Inventory of PCS – R309-600-10(1)

The potential contamination sources are listed in order of priority in Table 4. This prioritization is not based on any past experience or issue with the sources listed. The rationale for the ranking is based solely on proximity to the well, potential for contaminants to reach the aquifer, and the relative toxicity of the source. A map has also been produced showing the sources in their physical locations (see Figure 5). The numbers on the map correspond to the rank number in Table 4.

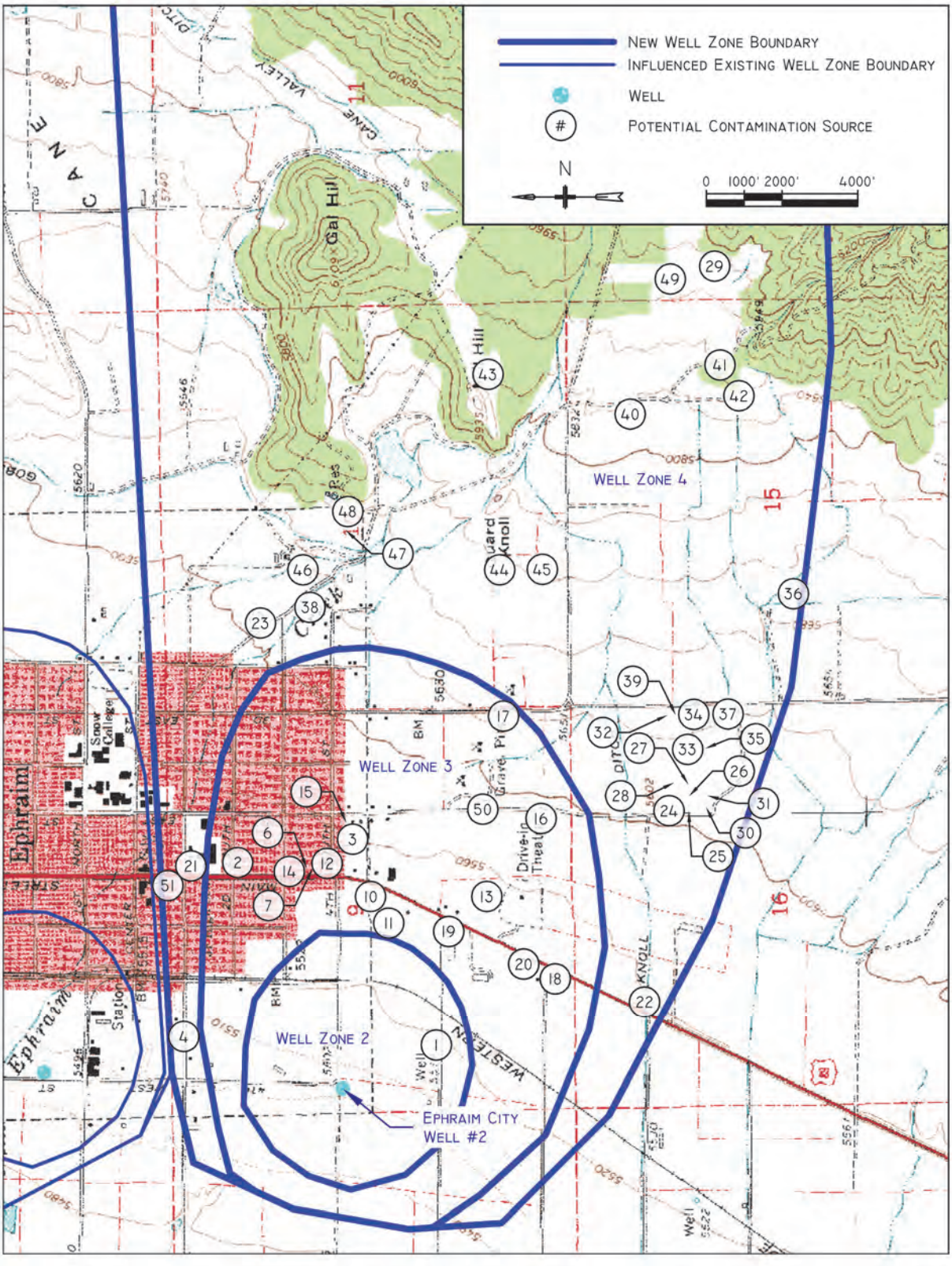

Figure 5: Potential Contamination Source Location Map

4 Identification and Assessment of Current Controls – R309-60-10(2)

The hazards identified in the zones are listed in Table 4.

4.1 Current Control Identification – R309-600-10(2)(a),(b),(c), &(d)

In general, the city currently enforces a Land Use Ordinance and watches future development and land use in the zones of the existing and planned well. The controls identified in this section, in conjunction with the land use ordinance, are considered adequate to ensure protection of the groundwater being used.

4.1.1 Active Wells

The Larson Well was drilled in 1934. The well consists of a steel casing and is used primarily for irrigation. There is no documented surface seal. Ephraim City purchased the well and owns the surrounding property. Third parties still own rights in the well, but Ephraim City can control any new construction in the area. There is very little chance for the wells to convey contaminants into the aquifer.

4.1.2 Septic Tanks and Drain Fields

All septic tanks must be constructed according to the standards set forth by the Utah Department of Environmental Quality (DEQ). There are no current controls regarding operation and maintenance of septic systems by private owners; however, local health departments regulate septic system installations designed for wastewater flows less than 5,000 gallons per day.

4.1.3 City Parks

Ephraim City employees assigned to spread pesticides and fertilizer should have received instruction and certification in their proper use from the Utah Department of Agriculture and Food (UDAF). UDAF also has a field inspector assigned to the area that provides training, instruction, and supervision over local applicators. There are also state and federal laws: namely the State Pesticide Control Act (SPCA) through the state of Utah, and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) through the federal government, both of which provide rules through legislation.

4.1.4 Agriculture

As discussed in section 4.1.3, UDAF provides training in the use of pesticides and fertilizers. There are also laws in place to govern their proper use. In addition to those laws, the Clean Water Act and the Utah Water Quality Act provide additional source controls and permits required for any point or non-point discharge.

4.1.5 Automotive/Roads

The Utah Department of Transportation (UDOT) currently has no controls for potential contaminants from roadways. Automotive businesses are regulated regarding handling and disposal of potential contaminants under the Resource Conservation and Recovery Act (RCRA). Ephraim City ordinances also require that the Fire Chief conduct inspections for potential contaminants annually.

4.1.6 Medical/Dental

The medical and dental facilities are covered by the regulations regarding solid waste. The sources of medical or dental waste are educated regarding proper disposal of waste and fines for violating the regulations.

4.1.7 Commercial/Industrial

Hair salons, retailers, and regular commercial activity are each covered under the RCRA and solid waste disposal regulations.

4.2 Current Control Assessment

4.2.1 Active Wells

The Division of Water Resources regulates wells in Utah through Rule R655-4 of the Utah Administrative Code. These rules regulate construction and prevent contamination through construction standards regarding the casing, surface seals, and well caps. Regulations also control the abandonment of the wells. These standards prevent contaminants from entering the well and traveling into the aquifer. The State of Utah enforces the rule and the hazard is assessed to be adequately controlled. No further land management strategies will be planned and implemented unless conditions change.

4.2.2 Septic Tanks and Drain Fields

Management of septic tanks and drain fields is largely up to the operator. They are typically unmanaged until issues arise with the system. However, the systems are relatively shallow and hydraulically separated from the aquifer being drawn from. The low concentration of septic tanks and the shallow depth means that the potential for contamination is low, but the PCS is not completely controlled and will require a management program. No sewers or septic systems are present or will be allowed in Zone 1.

4.2.3 City Parks

As previously stated, UDAF has a field inspector assigned to the area that provides training, instruction, and supervision over local applicators. This training is regulated by state and federal laws: namely SPCA through the State of Utah, and FIFRA through the federal government, both of which provide rules through legislation. These laws limit and regulate the application and use of pesticides and fertilizers. Ephraim City enforces the rules for its employees. Therefore, the hazard is assessed as adequately controlled. No further land management strategies will be planned and implemented unless conditions change.

4.2.4 Agriculture

Landowners have training and resources for the adequate use of fertilizers, though some may choose not to use them. Some historical livestock operations exist in Zones 2 and 3 of the well. The requirements on these operations have changed substantially in recent years, with larger operations required to develop waste containment management plans and systems. These plans and systems are controlled and monitored by the Utah Division of Water Quality. In addition, Ephraim City enforces the Land Use Ordinances governing densities and quantities of livestock allowed in different zones (see Zoning Ordinance, Pages 92-104, Appendix D). The city will continue to watch development and ensure protection of the groundwater. No activities will be

allowed in Zone 1. These hazards are considered adequately controlled. No further land management strategies will be planned and implemented unless conditions change.

4.2.5 Automotive/Roads

UDOT currently has no controls for potential contaminants from roadways, though it manages salts and deicing fluids. The potential contamination from the roadways in Ephraim stem primarily from runoff bringing trace automotive fluids and materials into the aquifer. The low traffic volume through Ephraim and the low quantity of fluids and materials left on the roads would render the hazard negligible. This hazard is assessed as a negligible quantity and thus adequately controlled. No further land management strategies will be planned and implemented unless conditions change.

Automotive businesses are regulated regarding handling and disposal of potential contaminants under the RCRA. Ephraim City ordinances also require that the Fire Chief conduct inspections for potential contaminants annually. Ephraim City enforces their ordinances. The hazard is assessed as adequately controlled. No further land management strategies will be planned and implemented unless conditions change.

4.2.6 Medical/Dental

Medical and Dental waste is controlled under solid waste regulations (Rule R315, Utah Administrative Code) by the DEQ. Locally, Ephraim City enforces the rule and local businesses are well educated regarding the requirements. This hazard is assessed as adequately controlled. No further land management strategies will be planned and implemented unless conditions change.

4.2.7 Commercial/Industrial

Solid waste is controlled under solid waste regulations (Rule R315, Utah Administrative Code) by the DEQ. Locally, Ephraim City enforces the rule and local businesses are well educated regarding the requirements. This hazard is assessed as adequately controlled. No further land management strategies will be planned and implemented unless conditions change.

5 Land Ownership Map – R309-600-13(2)(c)

The well is located within Ephraim City limits. Ephraim City has enacted land use ordinances to protect the aquifer. The Land Use and Zoning Ordinances are included as Appendix D.

6 Land Use Agreements – R309-600-13(2)(d)

Ephraim City currently owns the entirety of Zone 1 surrounding the well. The city will maintain that buffer and prevent construction of any prohibited item. The city land use and zoning ordinances are attached in Appendix D for reference.

7 References

Jones & DeMille Engineering. 2010. "Ephraim City Source Protection Plan." Report.

Utah Geological Survey. 2017. *Aquifer Storage and Recovery Assessment: Phase 1 for the City of Ephraim, Utah.* Salt Lake City: Utah Geological Survey.

Wilberg, D. E., and V. M. Heilweil. 1996. *Hydrology of Sanpete Valley, Sanpete and Juab Counties, Utah, and Simulation of Groundwater Flow in the Valley Fill aquifer.* Technical Publication No. 113, Salt Lake City: State of Utah, Department of Natural Resources.

Appendix A

Geologic Map of Ephraim (Maps at Half Scale)

GEOLOGIC MAP OF THE EPHRAIM QUADRANGLE, SANPETE COUNTY, UTAH

by Hellmut H. Doelling, Paul A. Kuehne, and Douglas A. Sprinkel

MAP 275DM
UTAH GEOLOGICAL SURVEY
a division of
UTAH DEPARTMENT OF NATURAL RESOURCES
2016

Appendix B: Resources Information

GARY R. HERBERT
Governor
SPENCER J. COX
Lieutenant Governor

State of Utah
DEPARTMENT OF NATURAL RESOURCES
MICHAEL R. STYLER
Executive Director
Utah Geological Survey
RICHARD G. ALLIS
State Geologist/Division Director

November 5, 2018

Monique Robbins
Franson Civil Engineers
1276 South 820 East, Suite 100
American Fork UT 84003

RE: Paleontological file search and recommendations for the Ephraim Well Project, Sanpete County, Utah
U.C.A. 79-3-508 (Paleontological) Compliance; Request for Confirmation of Literature Search according to the UDOT/UGS Memorandum of Understanding.

Dear Monique:

I have conducted a paleontological file search for the Ephraim Well Project in response to your email of November 5, 2018

There are no paleontological localities recorded in our files within this project area. Quaternary, Tertiary and Recent alluvial deposits that are exposed along this project right-of-way have a low potential for yielding significant fossil localities (PFYC 2). Unless fossils are discovered as a result of construction activities, this project should have no impact on paleontological resources.

If you have any questions, please call me at (801) 537-3311.

Sincerely,

Martha Hayden
Paleontological Assistant

GARY R. HERBERT
Governor

SPENCER J. COX
Lieutenant Governor

State of Utah
DEPARTMENT OF NATURAL RESOURCES

MICHAEL R. STYLER
Executive Director

Division of Wildlife Resources

MICHAL D. FOWLKS
Division Director

November 14, 2018

Monique Robbins
Franson Civil Engineers
1276 South 820 East, Suite, 200
American Fork, Utah 84003

Subject: Species of Concern Near the Ephraim Drought Resilience Watersmart Projects

Dear Monique Robbins:

I am writing in response to your email dated November 1, 2018 regarding information on species of special concern proximal to the proposed Ephraim Drought Resilience Watersmart Projects located in Township 16 South, Range 3 East and Township 17 South Range 3 East, SLB&M in Ephraim, Utah.

The Utah Division of Wildlife Resources (UDWR) does not have records of occurrence for any threatened, endangered, or sensitive species within a ½-mile radius of the project area noted above. However, within a two-mile radius there are recent records of occurrence for Bonneville cutthroat trout, a species included on the Utah Sensitive Species List.

The information provided in this letter is based on data existing in the Utah Division of Wildlife Resources' central database at the time of the request. It should not be regarded as a final statement on the occurrence of any species on or near the designated site, nor should it be considered a substitute for on-the-ground biological surveys. Moreover, because the Utah Division of Wildlife Resources' central database is continually updated, and because data requests are evaluated for the specific type of proposed action, any given response is only appropriate for its respective request.

In addition to the information you requested, other significant wildlife values might also be present on the designated site. Please contact UDWR's habitat manager for the central region, Mark Farmer, at (801) 491-5653 if you have any questions.

Please contact our office at (801) 538-4759 if you require further assistance.

Sincerely,

Sarah Lindsey

Sarah Lindsey
Information Manager
Utah Natural Heritage Program

cc: Mark Farmer

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Utah Ecological Services Field Office
2369 West Orton Circle, Suite 50
West Valley City, UT 84119-7603
Phone: (801) 975-3330 Fax: (801) 975-3331
http://www.fws.gov
http://www.fws.gov/utahfieldoffice/

In Reply Refer To:
Consultation Code: 06E23000-2019-SLI-0045
Event Code: 06E23000-2019-E-00127
Project Name: Ephraim City Well

October 31, 2018

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Utah Ecological Services Field Office
2369 West Orton Circle, Suite 50
West Valley City, UT 84119-7603
(801) 975-3330

Project Summary

Consultation Code: 06E23000-2019-SLI-0045

Event Code: 06E23000-2019-E-00127

Project Name: Ephraim City Well

Project Type: WATER SUPPLY / DELIVERY

Project Description: Construct new city well, connection pipelines, and rehabilitate structure to create an emergency bypass.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/39.35596863627558N111.59457206726076W

Counties: Sanpete, UT

Endangered Species Act Species

There is a total of 1 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Flowering Plants

NAME	STATUS
Jones Cycladenia *Cycladenia humilis var. jonesii* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3336	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

WELL DRILLER'S REPORT
State of Utah
Division of Water Rights

For additional space, use "Additional Well Data Form" and attach

Well Identification

Non-Production Well: 1865003M00 WIN: 442153

Owner *Note any changes*

Ephraim City Corporation
5 South Main
Ephraim, UT 84627

Contact Person/Engineer: _____

Well Location *Note any changes*

N 416 E 347 from the W4 corner of section 09, Township 17S, Range 3E, SL B&M

Location Description: (address, proximity to buildings, landmarks, ground elevation,local well #)

Drillers Activity Start Date: 7/23/2018 Completion Date: 8/24/2018

Check all that apply: ☒ New ☐ Repair ☐ Deepen ☐ Clean ☐ Replace ☐ Public Nature of Use: _____

If a replacement well, provide location of new well. _____ feet north/south and _____ feet east/west of the existing well.

DEPTH (feet) FROM	TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0	330	12 1/4"	mud rotary	Bentonite

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABLE High	PERMEABLE Low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTION AND REMARKS (e.g., relative %, grain size, sorting, angularity, bedding, grain composition density, plasticity, shape, cementation, consistancy, water bearing, odor, fracturing, minerology, texture,degree of weathering, hardness, water quality, etc.)
0	15				X									
15	20							X						medium
20	35				X	X	X							
35	40							X						fine
40	60				X	X	X							
60	75							X						medium
75	80				X									
80	90						X	X						
90	100							X						
100	110						X	X						medium

Static Water Level

Date 8/21/2018 Water Level 49.8 feet Flowing? ☐ Yes ☒ No

Method of Water Level Measurement Sounder If Flowing, Capped Pressure _____ PSI

Point to Which Water Level Measurement was Referenced ground Elevation _____

Height of Water Level reference point above ground surface 1.5 feet Temperature _____ degrees ☐ C ☐ F

Well Log

Construction Information

DEPTH (feet) FROM	TO	CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)
0	100	Steel	.250	8
110	120	Steel	.250	8
150	175	Steel	.250	8
185	200	Steel	.250	8
230	290	Steel	.250	8

DEPTH (feet) FROM	TO	☐SCREEN ☒PERFORATIONS ☐OPEN BOTTOM SCREEN SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
100	110	.125	2.5	8/row
120	150	.125	2.5	8/row
175	185	.125	2.5	8/row
200	230	.125	2.5	8/row
290	320	.125	2.5	8/row

Well Head Configuration: capped — Access Port Provided? ☐Yes ☒No

Casing Joint Type: Welded — Perforator Used: factory perforated

Was a Surface Seal Installed? ☒Yes ☐No — Depth of Surface Seal: 30 feet — Drive Shoe? ☐Yes ☒No

Surface Seal Material Placement Method: Tremie pipe

Was a temporary surface casing used? ☐Yes ☒No If yes, depth of casing: _____ feet diameter: _____ inches

DEPTH (feet) FROM	TO	SURFACE SEAL / INTERVAL SEAL / FILTER PACK / PACKER INFORMATION: SEAL MATERIAL, FILTER PACK and PACKER TYPE and DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal., # bag mix, gal./sack etc.)
0	30	3/4 hole plug bentonite	18 sacks	
30	95	1/4 minus gravel	10 cu ft	
95	100	3/4 hole plug bentonite	5 sacks	
100	320	1/4 minus gravel	50 cu ft	

Well Development and Well Yield Test Information

DATE	METHOD	YIELD	Units Check One GPM	Units Check One CFS	DRAWDOWN (ft)	TIME PUMPED (hrs & min)
8/3/2018	air lift	560	X		100	~~18~~ hrs
8/20/2018	jetting	800	X		220	9 hrs

Pump (Permanent)

Pump Description: _____ Horsepower: _____ Pump Intake Depth: _____ feet

Approximate Maximum Pumping Rate: _____ Well Disinfected upon Completion? ☐Yes ☐No

Comments

Description of construction activity, additional materials used, problems encountered, extraordinary Circumstances, abandonment procedures. *Use additional well data form for more space.*

Well Driller Statement

This well was drilled and constructed under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name ALL WELLS DRILLING, LLC (Person, Firm, or Corporation - Print or Type) License No. 398

Signature _____ (Licensed Well Driller) Date 8/31/2018

WELL DRILLER'S REPORT ADDTIONAL DATA FORM
State of Utah
Division of Water Rights

Well Identification

Non-Production Well: 1865003M00

Owner *Note any changes*

Ephraim City Corporation
5 South Main
Ephraim, UT 84627

Contact Person/Engineer: _____

Well Location *Note any changes*

N 416 E 347 from the W4 corner of section 09, Township 17S, Range 3E, SL B&M

Location Description: (address, proximity to buildings, landmarks, ground elevation,local well #)

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABLE High	PERMEABLE Low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTION AND REMARKS (e.g., relative %, grain size, sorting, angularity, bedding, grain composition density, plasticity, shape, cementation, consistancy, water bearing, odor, fracturing, minerology, texture,degree of weathering, hardness, water quality, etc.)
110	115					X	X	X						
115	135							X						course
135	155							X						medium
155	180						X	X						small
180	210						X	X						
210	235				X		X						gray	
235	290										X	shale	red	
290	320										X	sandstone	Tan & Red	
320	330										X	shale	Red & grey	

Construction Information (con't)

DEPTH (feet) FROM	DEPTH (feet) TO	CASING: CASING TYPE AND MATERIAL/GRADE	CASING: WALL THICK (in)	CASING: NOMINAL DIAM. (in)	DEPTH (feet) FROM	DEPTH (feet) TO	☐SCREEN ☐PERFORATIONS ☐OPEN BOTTOM: SCREEN SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
320	330	steel	.250	8"					

DEPTH (feet) FROM	DEPTH (feet) TO	SURFACE SEAL / INTERVAL SEAL / FILTER PACK / PACKER INFORMATION: SEAL MATERIAL, FILTER PACK and PACKER TYPE and DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal., # bag mix, gal./sack etc.)

Comments (con't)

Well Driller Statement

This well was drilled and constructed under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name ALL WELLS DRILLING, LLC (Person, Firm, or Corporation - Print or Type) License No. 398

Signature [signature] (Licensed Well Driller) Date 8/31/2018

CHEMTECH-FORD
LABORATORIES

9/27/2018

Work Order: 18H1378
Project: Hanksville New Source

All Wells Drilling
Attn: Lisa Wells
P.O. Box 159
Hanksville, UT 84734

Client Service Contact: 801.262.7299

The analyses presented on this report were performed in accordance with the National Environmental Laboratory Accreditation Program (NELAP) unless noted in the comments, flags, or case narrative. If the report is to be used for regulatory compliance, it should be presented in its entirety, and not be altered.

NELAP ACCREDITED TNI LABORATORY

Approved By:

DRAFT REPORT, DATA SUBJECT TO CHANGE

CHEMTECH-FORD LABORATORIES

Certificate of Analysis

Lab Sample No.: 18H1378-01

Name:	**All Wells Drilling**	***Sample Date:***	8/21/2018 2:00 PM
Sample Site:	Ephraim Test Well	***Receipt Date:***	8/22/2018 9:20 AM
Comments:		***Sampler:***	Kenny Walker
Sample Matrix:	Water	***Project:***	Hanksville New Source
PO Number:		***System No.:***	
Source Code:	***Sample Point:***	***Report to State:***	

Parameter	Sample Result	EPA Max Contaminant Level (MCL)	Minimum Reporting Limit	Units	Analytical Method	Preparation Date/Time	Analysis Date/Time	Flag
Calculations								
Langelier Index @ 22 Deg. C	-0.03			None	Calculation	09/05/2018	09/05/2018	
Hardness, Total as CaCO3	326		1.32	mg/L	SM 2340 B	08/23/2018	08/27/2018	
Inorganic								
Alkalinity - Bicarbonate (as CaCO3)	295		1.0	mg/L	SM 2320 B	08/29/2018	08/29/2018	
Alkalinity - Carbonate (as CaCO3)	ND		1.0	mg/L	SM 2320 B	08/29/2018	08/29/2018	
Alkalinity - Hydroxide (as CaCO3)	ND		1.0	mg/L	SM 2320 B	08/29/2018	08/29/2018	
Alkalinity - Total (as CaCO3)	295		1.0	mg/L	SM 2320 B	08/29/2018	08/29/2018	
Ammonia as N	ND		0.2	mg/L	SM 4500 NH3 H	08/23/2018	08/23/2018	
Chloride	13	250	1	mg/L	EPA 300.0	08/22/2018	08/22/2018	
Color	5	15	0	Color Units	SM 2120 B	08/22/2018 13:00	08/22/2018 13:00	
Conductivity	656		1	umho/cm	EPA 120.1	08/30/2018	08/30/2018	
Cyanide, Free	ND	0.2	0.016	mg/L	SM 4500 CN-E	08/28/2018	08/28/2018	
Fluoride	0.2	4	0.1	mg/L	EPA 300.0	08/22/2018	08/22/2018	
MBAS Surfactants	ND	0.5	0.08	mg/L	SM 5540 C	08/23/2018 10:30	08/23/2018 10:30	
Nitrate as N	2.1	10	0.1	mg/L	EPA 300.0	08/22/2018 12:00	08/22/2018 20:40	
Nitrite as N	ND	1	0.1	mg/L	EPA 300.0	08/22/2018 12:00	08/22/2018 20:40	
Odor	ND	3	0	0 - 5 Scale	SM 2150 B	08/22/2018 13:00	08/22/2018 13:00	
pH	7.4		0.1	pH Units	SM 4500 H-B	08/22/2018 16:00	08/22/2018 16:00	SPH
Phosphate, ortho as P	0.03		0.01	mg/L	SM 4500 P-E	08/23/2018 13:00	08/23/2018 13:00	
Sulfate	34	250	1	mg/L	EPA 300.0	08/22/2018	08/22/2018	
Total Dissolved Solids (TDS)	340	1000	20	mg/L	SM 2540 C	08/22/2018	08/22/2018	
Turbidity	11	5	0.02	NTU	EPA 180.1	08/22/2018 16:30	08/22/2018 16:30	
Metals								
Aluminum, Total	**0.2**	0.2	0.05	mg/L	EPA 200.7	08/23/2018	08/27/2018	
Antimony, Total	ND	0.006	0.0005	mg/L	EPA 200.8	08/23/2018	08/28/2018	
Arsenic, Total	0.0006	0.01	0.0005	mg/L	EPA 200.8	08/23/2018	08/28/2018	
Barium, Total	0.095	2	0.005	mg/L	EPA 200.7	08/23/2018	08/27/2018	
Beryllium, Total	ND	0.004	0.001	mg/L	EPA 200.7	08/23/2018	08/27/2018	
Boron, Total	ND		0.05	mg/L	EPA 200.7	08/23/2018	08/27/2018	
Cadmium, Total	ND	0.005	0.0002	mg/L	EPA 200.8	08/23/2018	08/28/2018	
Calcium, Total	58.2		0.2	mg/L	EPA 200.7	08/23/2018	08/27/2018	
Chromium, Total	ND	0.1	0.005	mg/L	EPA 200.7	08/23/2018	08/27/2018	
Copper, Total	0.0019	1.3	0.0010	mg/L	EPA 200.8	08/23/2018	08/28/2018	
Iron, Total	0.19	0.3	0.02	mg/L	EPA 200.7	08/23/2018	08/27/2018	
Lead, Total	ND	0.015	0.0005	mg/L	EPA 200.8	08/23/2018	08/28/2018	
Magnesium, Total	43.9		0.2	mg/L	EPA 200.7	08/23/2018	08/27/2018	
Manganese, Total	0.006	0.05	0.005	mg/L	EPA 200.7	08/23/2018	08/27/2018	

CHEMTECH-FORD LABORATORIES

Certificate of Analysis

Lab Sample No.: 18H1378-01

Name:	**All Wells Drilling**	***Sample Date:***	8/21/2018 2:00 PM
Sample Site:	Ephraim Test Well	***Receipt Date:***	8/22/2018 9:20 AM
Comments:		***Sampler:***	Kenny Walker
Sample Matrix:	Water	***Project:***	Hanksville New Source
PO Number:		***System No.:***	
Source Code:		***Sample Point:***	***Report to State:***

Parameter	Sample Result	EPA Max Contaminant Level (MCL)	Minimum Reporting Limit	Units	Analytical Method	Preparation Date/Time	Analysis Date/Time	Flag
Metals (cont.)								
Mercury, Total	ND	0.002	0.00020	mg/L	EPA 245.1	08/24/2018	08/24/2018	
Nickel, Total	ND	0.1	0.005	mg/L	EPA 200.7	08/23/2018	08/27/2018	
Potassium, Total	1.5		0.5	mg/L	EPA 200.7	08/23/2018	08/27/2018	
Selenium, Total	0.0012	0.05	0.0005	mg/L	EPA 200.8	08/23/2018	08/28/2018	
Silica, (as SiO2) Total	13.3		0.1	mg/L	EPA 200.7	08/23/2018	08/27/2018	
Silver, Total	ND	0.1	0.0005	mg/L	EPA 200.8	08/23/2018	08/28/2018	
Sodium, Total	18.2		0.5	mg/L	EPA 200.7	08/23/2018	08/27/2018	
Thallium, Total	ND	0.002	0.0002	mg/L	EPA 200.8	08/23/2018	08/28/2018	
Zinc, Total	ND	5	0.01	mg/L	EPA 200.7	08/23/2018	08/27/2018	
Carbamates								
3-Hydroxycarbofuran	ND		1	ug/L	EPA 531.1	08/23/2018	08/23/2018	
Aldicarb	ND		1	ug/L	EPA 531.1	08/23/2018	08/23/2018	
Aldicarb sulfone	ND		1	ug/L	EPA 531.1	08/23/2018	08/23/2018	
Aldicarb sulfoxide	ND		1	ug/L	EPA 531.1	08/23/2018	08/23/2018	
Carbaryl	ND		1	ug/L	EPA 531.1	08/23/2018	08/23/2018	
Carbofuran	ND	40	1	ug/L	EPA 531.1	08/23/2018	08/23/2018	
Methomyl	ND		1	ug/L	EPA 531.1	08/23/2018	08/23/2018	
Oxamyl	ND	200	1	ug/L	EPA 531.1	08/23/2018	08/23/2018	
Herbicides								
2,4,5-TP (Silvex)	ND	50	0.440	ug/L	EPA 515.3	08/27/2018	08/27/2018	
2,4-D	ND	70	0.220	ug/L	EPA 515.3	08/27/2018	08/27/2018	
Dalapon	ND	200	2.20	ug/L	EPA 515.3	08/27/2018	08/27/2018	
Dicamba	ND		1.00	ug/L	EPA 515.3	08/27/2018	08/27/2018	
Dinoseb	ND	7	0.440	ug/L	EPA 515.3	08/27/2018	08/27/2018	
Pentachlorophenol	ND	1	0.088	ug/L	EPA 515.3	08/27/2018	08/27/2018	
Picloram	ND	500	0.220	ug/L	EPA 515.3	08/27/2018	08/27/2018	
Pesticides								
Endrin	ND	2	0.022	ug/L	EPA 508.1	08/27/2018	08/29/2018	
Heptachlor	ND	0.4	0.088	ug/L	EPA 508.1	08/27/2018	08/29/2018	
Heptachlor epoxide	ND	0.2	0.044	ug/L	EPA 508.1	08/27/2018	08/29/2018	
Lindane	ND	0.2	0.044	ug/L	EPA 508.1	08/27/2018	08/29/2018	
Methoxychlor	ND	40	0.22	ug/L	EPA 508.1	08/27/2018	08/29/2018	
PCB-1016	ND	0.2	0.20	ug/L	EPA 508.1	08/27/2018	08/29/2018	
PCB-1221	ND	0.5	0.20	ug/L	EPA 508.1	08/27/2018	08/29/2018	
PCB-1232	ND	0.5	0.20	ug/L	EPA 508.1	08/27/2018	08/29/2018	
PCB-1242	ND	0.5	0.50	ug/L	EPA 508.1	08/27/2018	08/29/2018	
PCB-1248	ND	0.5	0.50	ug/L	EPA 508.1	08/27/2018	08/29/2018	

CHEMTECH-FORD LABORATORIES

Certificate of Analysis

Lab Sample No.: 18H1378-01

Name:	**All Wells Drilling**	***Sample Date:***	8/21/2018 2:00 PM
Sample Site:	Ephraim Test Well	***Receipt Date:***	8/22/2018 9:20 AM
Comments:		***Sampler:***	Kenny Walker
Sample Matrix:	Water	***Project:***	Hanksville New Source
PO Number:		***System No.:***	
Source Code:	***Sample Point:***	***Report to State:***	

Parameter	Sample Result	EPA Max Contaminant Level (MCL)	Minimum Reporting Limit	Units	Analytical Method	Preparation Date/Time	Analysis Date/Time	Flag
Pesticides (cont.)								
PCB-1254	ND	0.5	0.50	ug/L	EPA 508.1	08/27/2018	08/29/2018	
PCB-1260	ND	0.5	0.50	ug/L	EPA 508.1	08/27/2018	08/29/2018	
PCB - Total	ND	0.5	0.50	ug/L	EPA 508.1	08/27/2018	08/29/2018	
Toxaphene	ND	3	2.2	ug/L	EPA 508.1	08/27/2018	08/29/2018	
Semi-Volatile Compounds								
Alachlor	ND	2	0.44	ug/L	EPA 525.2	08/27/2018	08/29/2018	
Aldrin	ND		2.00	ug/L	EPA 525.2	08/27/2018	08/29/2018	
Atrazine	ND	3	0.22	ug/L	EPA 525.2	08/27/2018	08/29/2018	
Benzo (a) pyrene	ND	0.2	0.04	ug/L	EPA 525.2	08/27/2018	08/29/2018	
Bis (2-ethylhexyl) Adipate	ND	400	1.30	ug/L	EPA 525.2	08/27/2018	08/29/2018	
Bis (2-ethylhexyl) Phthalate	ND	6	1.30	ug/L	EPA 525.2	08/27/2018	08/29/2018	
Butachlor	ND		0.50	ug/L	EPA 525.2	08/27/2018	08/29/2018	
alpha-Chlordane	ND	2	0.44	ug/L	EPA 525.2	08/27/2018	08/29/2018	
gamma-Chlordane	ND	2	0.44	ug/L	EPA 525.2	08/27/2018	08/29/2018	
Chlordane - Total	ND	2	0.44	ug/L	EPA 525.2	08/27/2018	08/29/2018	
Dieldrin	ND		1.00	ug/L	EPA 525.2	08/27/2018	08/29/2018	
Hexachlorobenzene	ND	1	0.22	ug/L	EPA 525.2	08/27/2018	08/29/2018	
Hexachlorocyclopentadiene	ND	50	0.22	ug/L	EPA 525.2	08/27/2018	08/29/2018	
Metolachlor	ND		0.50	ug/L	EPA 525.2	08/27/2018	08/29/2018	
Metribuzin	ND		0.50	ug/L	EPA 525.2	08/27/2018	08/29/2018	
Propachlor	ND		0.50	ug/L	EPA 525.2	08/27/2018	08/29/2018	
Simazine	ND	4	0.15	ug/L	EPA 525.2	08/27/2018	08/29/2018	
Volatile Organic Compounds								
1,1,1,2-Tetrachloroethane	ND		1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
1,1,1-Trichloroethane	ND	200	0.5	ug/L	EPA 524.2	08/23/2018	08/23/2018	
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
1,1,2-Trichloroethane	ND	5	0.5	ug/L	EPA 524.2	08/23/2018	08/23/2018	
1,1,2-Trichlorotrifluoroethane	ND		1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
1,1-Dichloroethane	ND		1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
1,1-Dichloroethene	ND	7	0.5	ug/L	EPA 524.2	08/23/2018	08/23/2018	
1,1-Dichloropropene	ND		0.5	ug/L	EPA 524.2	08/23/2018	08/23/2018	
1,2,3-Trichlorobenzene	ND		1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
1,2,3-Trichloropropane	ND		1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
1,2,4-Trichlorobenzene	ND	70	0.5	ug/L	EPA 524.2	08/23/2018	08/23/2018	
1,2,4-Trimethylbenzene	ND	70	1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
1,2-Dichlorobenzene	ND	600	0.5	ug/L	EPA 524.2	08/23/2018	08/23/2018	
1,2-Dichloroethane	ND	5	0.5	ug/L	EPA 524.2	08/23/2018	08/23/2018	

CHEMTECH-FORD LABORATORIES

Certificate of Analysis

Lab Sample No.: 18H1378-01

Name:	**All Wells Drilling**	***Sample Date:***	8/21/2018 2:00 PM
Sample Site:	Ephraim Test Well	***Receipt Date:***	8/22/2018 9:20 AM
Comments:		***Sampler:***	Kenny Walker
Sample Matrix:	Water	***Project:***	Hanksville New Source
PO Number:		***System No.:***	
Source Code:		***Sample Point:***	***Report to State:***

Parameter	Sample Result	EPA Max Contaminant Level (MCL)	Minimum Reporting Limit	Units	Analytical Method	Preparation Date/Time	Analysis Date/Time	Flag
Volatile Organic Compounds (cont.)								
1,2-Dichloropropane	ND	5	0.5	ug/L	EPA 524.2	08/23/2018	08/23/2018	
1,3,5-Trimethylbenzene	ND		1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
1,3-Dichlorobenzene	ND		1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
1,3-Dichloropropane	ND		0.5	ug/L	EPA 524.2	08/23/2018	08/23/2018	
1,4-Dichlorobenzene	ND	75	0.5	ug/L	EPA 524.2	08/23/2018	08/23/2018	
2,2-Dichloropropane	ND		0.5	ug/L	EPA 524.2	08/23/2018	08/23/2018	
2-Chlorotoluene	ND		1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
4-Chlorotoluene	ND		1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
Benzene	ND	5	0.5	ug/L	EPA 524.2	08/23/2018	08/23/2018	
Bromobenzene	ND		1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
Bromochloromethane	ND		1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
Bromodichloromethane	ND		0.5	ug/L	EPA 524.2	08/23/2018	08/23/2018	
Bromoform	ND		0.5	ug/L	EPA 524.2	08/23/2018	08/23/2018	
Bromomethane	ND		1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
Carbon Tetrachloride	ND	5	1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
Chlorobenzene	ND	100	0.5	ug/L	EPA 524.2	08/23/2018	08/23/2018	
Chloroethane	ND		1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
Chloroform	ND		0.5	ug/L	EPA 524.2	08/23/2018	08/23/2018	
Chloromethane	ND		1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
cis-1,2-Dichloroethene	ND	70	1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
cis-1,3-Dichloropropene	ND		1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
Dibromochloromethane	ND		0.5	ug/L	EPA 524.2	08/23/2018	08/23/2018	
Dibromomethane	ND	5	1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
Dichlorodifluoromethane	ND		1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
Ethyl Benzene	ND	700	0.5	ug/L	EPA 524.2	08/23/2018	08/23/2018	
Hexachlorobutadiene	ND		1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
Isopropylbenzene	ND		1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
Methyl tert-Butyl Ether (MTBE)	ND		1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
Methylene Chloride	ND	5	1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
Naphthalene	ND		1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
n-Butyl Benzene	ND		1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
n-Propyl Benzene	ND		1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
p-Isopropyltoluene	ND		1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
sec-Butyl Benzene	ND		1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
Styrene	ND	100	0.5	ug/L	EPA 524.2	08/23/2018	08/23/2018	
tert-Butylbenzene	ND		1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
Tetrachloroethene	ND	5	0.5	ug/L	EPA 524.2	08/23/2018	08/23/2018	
Toluene	ND	1000	0.5	ug/L	EPA 524.2	08/23/2018	08/23/2018	
trans-1,2-Dichloroethene	ND	100	0.5	ug/L	EPA 524.2	08/23/2018	08/23/2018	

CHEMTECH-FORD LABORATORIES

Certificate of Analysis

Lab Sample No.: 18H1378-01

Name:	**All Wells Drilling**	***Sample Date:***	8/21/2018 2:00 PM
Sample Site:	Ephraim Test Well	***Receipt Date:***	8/22/2018 9:20 AM
Comments:		***Sampler:***	Kenny Walker
Sample Matrix:	Water	***Project:***	Hanksville New Source
PO Number:		***System No.:***	
Source Code:	***Sample Point:***	***Report to State:***	

Parameter	Sample Result	EPA Max Contaminant Level (MCL)	Minimum Reporting Limit	Units	Analytical Method	Preparation Date/Time	Analysis Date/Time	Flag
Volatile Organic Compounds (cont.)								
trans-1,3-Dichloropropene	ND		1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
Trichloroethene	ND	5	0.5	ug/L	EPA 524.2	08/23/2018	08/23/2018	
Trichlorofluoromethane	ND		1.0	ug/L	EPA 524.2	08/23/2018	08/23/2018	
Vinyl Chloride	ND	2	0.5	ug/L	EPA 524.2	08/23/2018	08/23/2018	
Xylenes, total	ND	10000	0.5	ug/L	EPA 524.2	08/23/2018	08/23/2018	

Report Footnotes

Abbreviations

ND = Not detected at the corresponding Minimum Reporting Limit.
1 mg/L = one milligram per liter or 1 mg/Kg = one milligram per kilogram = 1 part per million.
1 ug/L = one microgram per liter or 1 ug/Kg = one microgram per kilogram = 1 part per billion.
1 ng/L = one nanogram per liter or 1 ng/Kg = one nanogram per kilogram = 1 part per trillion.

Flag Descriptions

SPH = Sample submitted past method specified holding time.

Data Comparisons

Values reported in **RED** exceed Primary Drinking Water standards.
Values reported in **BLUE** exceed Secondary Drinking Water standards.
BLANK values in the MCL column indicate no standard.

DRINKING WATER SAMPLES ONLY

CHEMTECH - FORD ANALYTICAL LABORATORY

CHAIN OF CUSTODY

COMPANY: All Wells Drilling
ADDRESS: P.O. Box 159
CITY/STATE/ZIP: Hanksville, UT 84734
PHONE #: 435-542-3451 FAX:
CONTACT: Lisa Wells PROJECT: Hanksville New Source
EMAIL: hanksvilleclerk@gmail.com

BILLING ADDRESS:
BILLING CITY/STATE/ZIP:
PURCHASE ORDER:

CHEMTECH-FORD LABORATORIES

TURNAROUND TIME REQUIRED*:
* Expedited turnaround subject to additional charge

State System Number	Send to State
—	Yes No

Please fill in all blue highlighted areas. Thank you!

Lab Use Only	CLIENT SAMPLE INFORMATION						TESTS REQUESTED	Bacteria			LAB FAIL Ref #
	LOCATION	DATE	TIME	FACILITY ID (source code)	POINT CODE (DBP)	Field: Residual Chlorine	Public New Source	Total Coliform + E. coli (Present/Absent)	Total Coliform + E. coli (Enumerated)	HPC (Plate Count)	
H1378											
-01	1. Ephraim Test well	8/21/18	2 PM				X				
	2.										
	3.										
	4.										
	5.										
	6.										
	7.										
	8.										
	9.										
	10.										

R = Routine
I = Investigative
TR = Trigger Source
RP = Repeat

REPEAT
OR = Original Location
UP = Upstream
DN = Downstream

Sampled by: [print] Kenny Allwellsdrilling Sampled by: [signature]

ON ICE NOT ON ICE Temp (C°): 4.3

Special Instructions:

Samples received outside the EPA recommended temperature range of 0-6 C° may be rejected.

Relinquished by: [signature] Kenny Allwellsdrilling	Date/Time 8/22 9 AM	Received by: [signature]	Date/Time 8-22-18 9:20
Relinquished by: [signature]	Date/Time	Received by: [signature]	Date/Time
Relinquished by: [signature]	Date/Time	Received by: [signature]	Date/Time

CHEMTECH-FORD
9632 South 500 West
Sandy, UT 84070

801.262.7299 PHONE
866.792.0093 FAX
www.ChemtechFord.com

Payment Terms are net 30 days OAC. 1.5% interest charge per month (18% per annum).
Client agrees to pay collection costs and attorney's fees.

Check Date: 9-26-18
Cash Amount 1,915.00
VISA/MC Initials: HNY

Work Order # H1378

CHEMTECH FORD LABORATORIES

Sample Receipt

CHEMTECH-FORD LABORATORIES

Delivery Method:

☐ UPS ☐ USPS
☐ FedEx ☐ Chemtech Courier
☒ Walk-in ☐ Customer Courier

Receiving Temperature 4.3 °C

Sample #	Container	Chemtech Lot # or Preservative	Number of Subsamples	Preserved by Client/Third Party	Preserved in Receiving Laboratory	Filtered in Field by Client	Misc Volume (oz/mL)	Comments
-01	R(1-2)				X			
	AQ(1-2)							
	C	852						
	AP							
	M	867						
	N	868						
	J(1-3)	786						
	K(1-3)	768						
	U(1-2)	787						
	V(1)							1 vial broken & other with headspace. Client wants to run.
	G						250mL	Amber

Sample Condition (check if yes)

- ☐ Custody Seals
- ☑ Containers Intact
- ☑ COC/Labels Agree
- ☑ Preservation Confirmed
- ☑ Received on Ice
- ☑ Correct Containers(s)
- ☑ Sufficent Sample Volume
- ☑ Headspace Present (VOC)
- ☐ Temperature Blank
- ☑ Received within Holding Time

Plastic Containers

A- Plastic Unpreserved
B- Miscellaneous Plastic
C- Cyanide Qt (NaOH)
E- Coliform/Ecoli/HPC
F- Sulfide Qt (Zn Acetate)
L- Mercury 1631
M- Metals Pint (HNO3)
N- Nutrient Pint (H2SO4)
R- Radiological (HNO3)
S- Sludge Cups/Tubs
Q- Plastic Bag

Glass Containers

D- 625 (Na2S2O3)
G- Glass Unpreserved
H- HAAs (NH4Cl)
J- 508/515/525 (Na2SO3)
K- 515.3 Herbicides
O- Oil & Grease (HCl)
P- Phenols (H2SO4)
T- TOC/TOX (H3PO4)
U- 531 (MCAA, Na2S2O3)
V- 524/THMs (Ascorbic Acid)
W- 8260 VOC (1:1 HCl)
X- Vial Unpreserved
Y- 624/504 (Na2S2O3)
Z- Miscellaneous Glass